REER

PHOTOELECTRIC SAFETY BARRIERS

ARGOLUX
AS SERIES

INSTALLATION AND MAINTENANCE MANUAL

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GENERAL OBSERVATIONS

The ARGOLUX AS curtain is a multibeam optoelectronic protective device designed to secure operators working on dangerous machines in an industrial environment.

The ARGOLUX AS system is made up of an emitter, a receiver and a separate control unit. The 3 units are combined to provide a type 2 fail-safe system as defined by the EN 61496-1 and prEN 61496-2 («Safety of machinery - Electro-sensitive protective system»).

When an opaque object (such as the operator's hand or arm) enters the dangerous areas and therefore goes through the detection field between the emitter and the receiver, the control unit de-energizes its output relays.

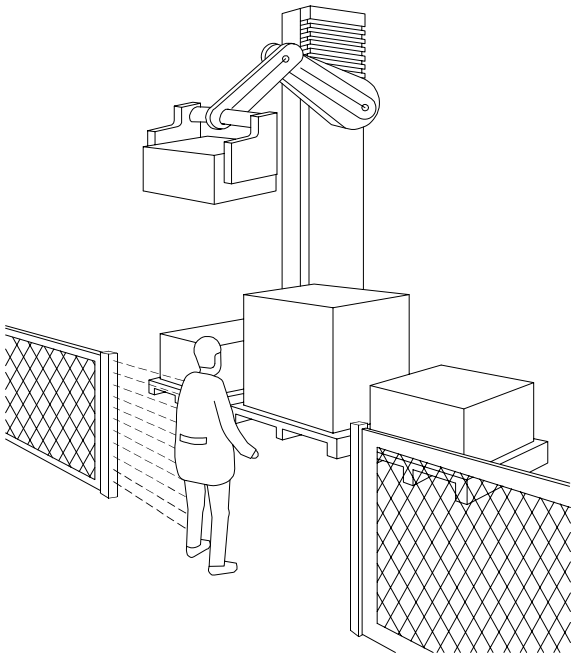
The result is the immediate stoppage of the dangerous movement if the control unit is correctly connected to the machine control circuitry.

To fulfil correctly its safety function, the safety system must be correctly interfaced to the machine circuitry and correctly positioned regarding the danger zone to reduce or cancel risk.

APPLICATIONS

The ARGOLUX AS curtain may be used on industrial machines for which the risk assessment allows the use of a type 2 electrosensitive protective system.

The detection of an object obscuring any beam in the curtain de-energizes the output circuit of the curtain and the moving body of the machine comes to rest.



The following are examples of machines where the ARGOLUX AS may be used:

- Machinery for product handling such as conveyors, palletizing, collating machines;
- Packaging and wrapping devices;
- Automated assembly lines;
- Automated warehousing.

To control access all around a machine, the ARGOLUX AS curtain can be used with deflection mirrors to build a perimetric protection surrounding the dangerous area.

For applications in the food and beverage industry consult the factory to check the compliance with the materials and chemical agents involved.

The safeguarding function of optoelectronic protective devices is not efficient if:

The moving body of the machine cannot be electrically controlled and if its movement cannot be stopped at any time during the machine cycle.

Danger is related to falling objects or object ejection.

If necessary, in the case of technical safety questions, consult the safety authorities of your country or the competent industry association.

DESIGN AND OPERATION

Sensing function.

The emitter is made up of a row of infrared light emitting diodes and lenses. Each diode successively emits an infrared beam with a scanning frequency of about 15kHz.
The receiver sensors catch the beams and an invisible protection field is created between the emitter and the receiver units.

The synchronisation between the emitting diodes and the receiver sensors is provided by an extra beam emitted by the receiver unit towards the emitter unit. This synchronisation beam delimits one side of the detection zone (see figure 1).

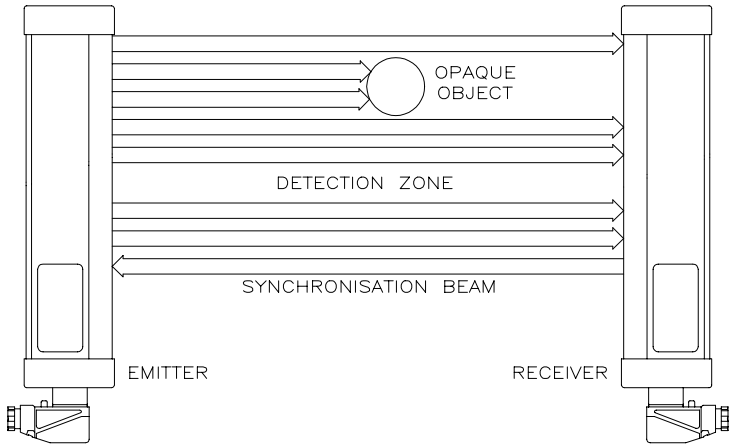


Fig. 1

The synchronisation beam is part of the detection zone.

When an opaque object with a diameter greater or equal to the resolution of the system interrupts one or several beams (figure 2), the receiver output provides an alarm signal to command the control unit to de-energize the output relays.

The resolution corresponds to the size of the smallest object that can be detected within the protection zone, obscuring at least one beam (figure 2).

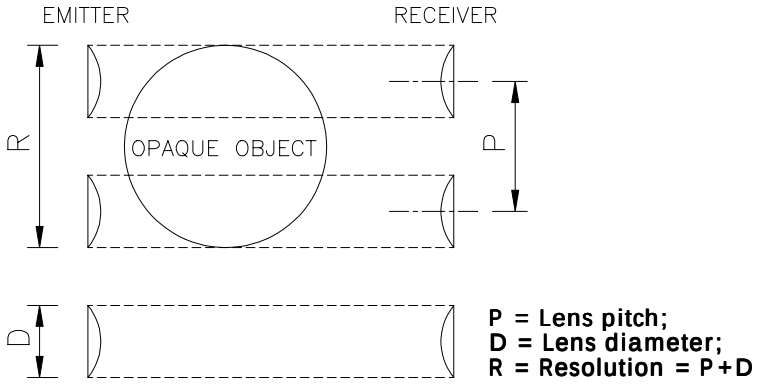


Fig. 2

An object with a diameter equal or greater than the resolution R interrupts at least one beam.

The resolution is always the same in the protection zone, whatever the scanning range may be since it only depends on the lens diameter and the lens pitch.

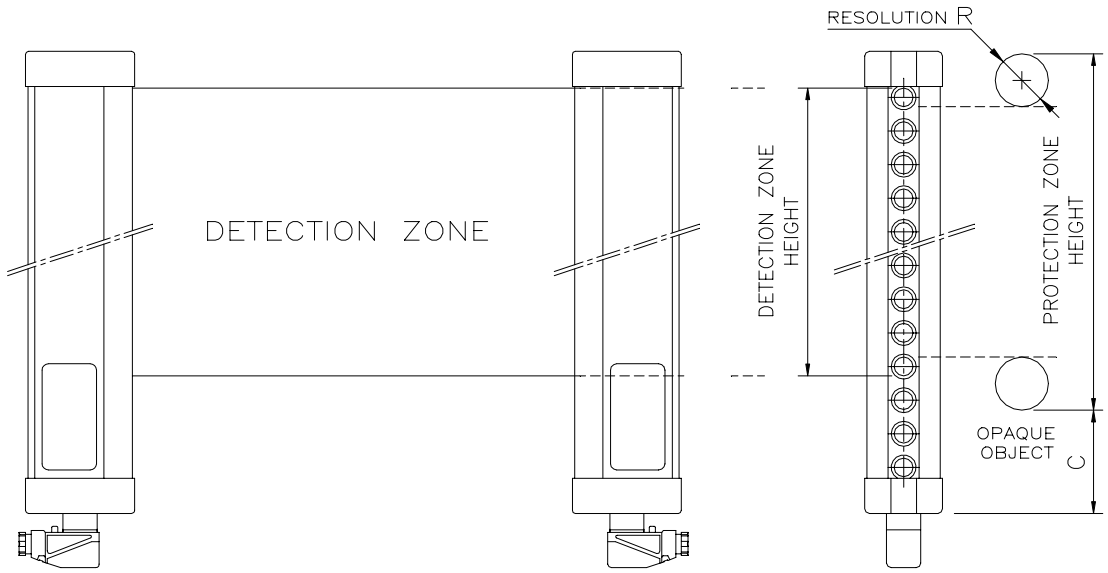


Fig. 3

Position and dimensions of the detection zone and the protection zone.

The presence in the protection zone (figure 3) of an object greater or equal to the resolution of the curtain de-energizes the output relays.

Two different resolutions are available (ø35mm or ø55mm) and the following table shows the values of the detection and protection heights.

MODELS	DETECTION ZONE HEIGHT	PROTECTION ZONE HEIGHT	C	R
AS 203	185	230	65	35
AS 405	355	440	45	55
AS 403		400	65	35
AS 605	525	610	45	55
AS 603		570	65	35
AS 705	700	785	45	55
AS 703		745	65	35
AS 905	870	955	45	55
AS 903		915	65	35
AS 1105	1045	1130	45	55
AS 1103		1090	65	35
AS 1205	1215	1300	45	55
AS 1203		1260	65	35
AS 1405	1390	1475	45	55
AS 1403		1435	65	35
AS 1605	1560	1645	45	55
AS 1603		1605	65	35

Dimensions in mm

Argolux AS light curtain is available also in the MULTIBEAM configuration. From the optical point of view, a beam's pitch of 172mm is the characteristic of these seven models.

Due to the particular configuration of the beams (figure 4) the Argolux AS MULTIBEAM models shall be used only to detect intrusion of the whole body of a person and not parts of the body (hands, legs, ...).

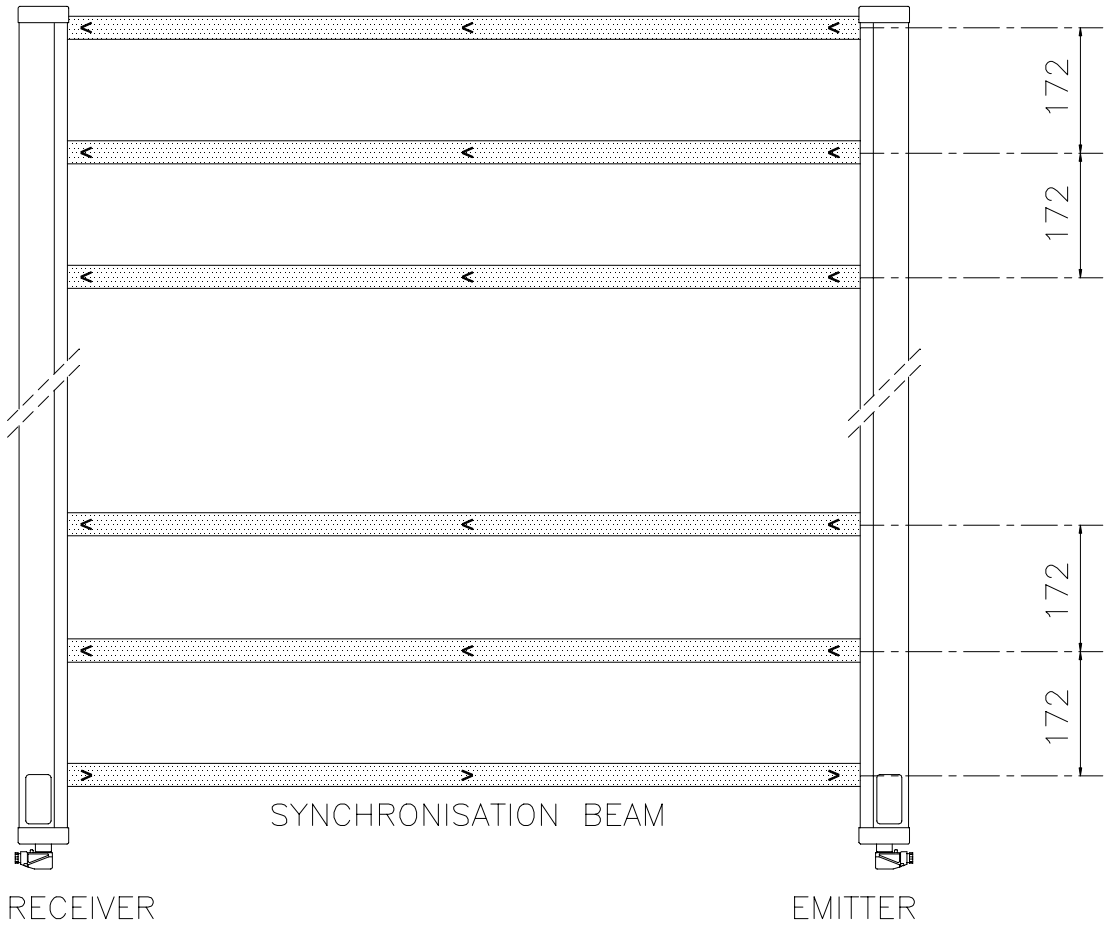


Fig. 4
MULTIBEAM Models: beams configuration.

See the following table for the MULTIBEAM optic characteristics.

Model **AS**	**418**	**618**	**718**	**918**	**1118**	**1218**	**1418**	**1618**
Number of beams	3	4	5	6	7	8	9	10
Lens pitch mm	172							

TEST SEQUENCE AND CONTROLS

Optical scanning circuitry.

The scanning circuitry of ARGOLUX AS safety barrier is based upon a self-checking principle which permanently controls its correct operation. Particularly, the system controls the multiplex signal on the emitter side, and measures the IR light pulse period emitted for each beam of the curtain.

The reversed operations are carried out on the receiver side where the system controls the demultiplex signals and recognize the infrared light pulse thanks to the measurement of the caught light period.

An accurate synchronisation enables this identification and avoids taking into account possible infrared disturbances.

If an unwanted condition occurs during the IR light beam transmission (an object is in the detection field or a failure appears), the receiver sends a command signal to the control unit which de-energizes its relays and remains in the alarm condition until the fault condition is removed.

Output circuitry.

The control unit AU S3 controls the correct operation of the both emitter and the receiver units thanks to its electrical connection with the receiver ASR. The receiver provides the control unit with a signal through its unique relay output. As mentioned in the EN 61496-1 norm, the test facility provided with type 2 optoelectronic protective devices is partly designed to check the correct operation of this relay output.

Other operations are checked during the test to ensure the integrity of the system:

- The correct interlinking of the test sequence and the effective reset of the system (test command);
- The reaction time of the two inner relays A and B (safety relays with guided contacts) and the reaction time of the two external relays K1 and K2, if auxiliary contacts of K1 and K2 are connected to terminals 5 and 6 (use only safety relays with guided contacts);
- The inner command of A and B relays. A possible failure of one component of the output circuitry can only be detected during the test phase, and therefore the control unit de-energizes its relays only when the next test is applied. This is also true for external relays K1 and K2 by means of the feedback control (see below).

Test input.

The ARGOLUX AS curtain is a type 2 opto-electronic protective device designed according to the EN 61496-1 and prEN 61496-2 European Norm. Its safeguarding function is based upon a periodic performance test initiated by the machine.

The control unit displays a test input which must be used to generate a test sequence before each reset of the safety system or before a machine cycle if necessary.

European regulations enforce the test performance before the effective reset of the system, at power up and after any intrusion into the detection field.

The test command is activated by closing a contact between terminals 15 and 16 during 10ms at least. The test is then performed during 100ms.

If a failure is detected, the reset of the system is impossible and no machine cycle can be initiated. If no a failure is detected, the control unit energizes its relays A and B, which is the condition to initiate a new machine cycle.

It is possible to generate a test sequence at any moment by closing a contact between terminals 15 and 16.

The first step consists in controlling the correct operation of the scanning circuitry.

The system checks that the ASR receiver output relay goes to the OFF state when the detection field is broken. This detection is electronically simulated.

Then, the next step consists in controlling the AU S3 output relay . The ON and OFF reaction times of both relays are measured and compared.

During the 100 ms test period, the outputs remain open (contacts between terminals 8-13 and 9-12 remain open).

The test sequence can be generated at power up, after any intrusion into the detection field and at any other moment if the detection field is clear.

The test is only allowed when the detection field is clear.

CONTACTS STATUS *(Ref.: connection diagram page 27)*

		Control unit status						
		GUARD	CLEAR	BREAK	FAIL		FAIL (FAIL K1-K2)	
Output of the the receiver ASR					Sensing field not interrupted	Sensing field interrupted	Sensing field not interrupted	Sensing field interrupted
Output of the control unit AU S3	8-13							
	9-12							
	10-11							
Relay K1	K1-1							
	K1-2							
Relay K2	K2-1							
	K2-2							

LED STATUS INDICATORS

UNIT	LED N°	COLOUR	STATE	INDICATIONS	AU S3 STATUS
EMITTER ASE	1	Green	On	Reception of the synchronisation beam	GUARD - CLEAR - BREAK (*)
	2	Yellow	On	Misalignment of the synchronisation beam	BREAK (*)
	2	Yellow	Alternately flickering	Failure on the emitter unit	BREAK (*)
	3	Red			
RECEIVER ASR	4	Green	On	Protection field is clear, output relay of AU S3 are energized	GUARD (*)
	5	Yellow	On	Protection field is clear, output relay of AU S3 are de-energized	CLEAR (*)
	6	Red	On	Protection field is entered, output relay of AU S3 are de-energized	BREAK (*)
	5	Yellow	Alternately flickering	Failure on the receiver unit	BREAK (*)
	6	Red			
CONTROL UNIT AU S3	7	Green	On	Protection field is clear, output relay of AU S3 are energized	GUARD
	8	Yellow	On	Protection field is clear, output relay of AU S3 are de-energized	CLEAR
	9	Red	On	Protection field is entered, output relay of AU S3 are de-energized	BREAK
	9	Red	Flickering	Failure on the control unit output relay of AU S3 are de-energized	FAIL
	9	Red	Flickering	Failure on the external relays K1 and K2 output relay of AU S3 are de-energized	FAIL (FAIL K1-K2)
	10	Red			

(*) With control unit AU S3 correctly operating.

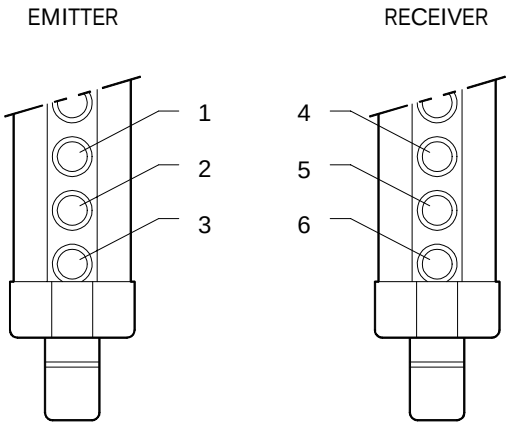


Fig. 5

Led status indicators on emitter and receiver.

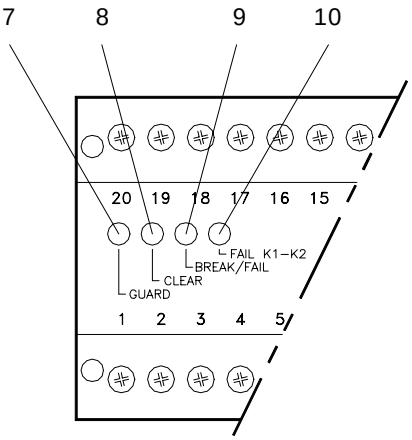


Fig. 6

Led status indicators on control unit.

TECHNICAL FEATURES

Emitter and receiver with a ø35mm resolution.

Model		AS	203	403	603	703	903	1103	1203	1403	1603
Protection heights		mm	230	400	570	745	915	1090	1260	1435	1605
Number of beams			9	17	25	33	41	49	57	65	73
Resolution		mm	35								
Lens pitch		mm	21,5								
Lens diameter		mm	12								
Scanning range		m	0 ÷ 12								
Ambient light immunity		lx	> 50.000								
Response time		ms	13	14		15		16		17	
Power supply		V_{dc}	24 ± 20%								
Power consumption at 24V_{dc}	Emitter	W	4,2								
	Receiver		3,3	4,6	6	7,4	8,8	10,1	11,5	12,9	14,3
Operating temperature		°C	0 ÷ 55 (without condensation and ice)								
Sealing			IP 65								
Dimensions	Width	mm	50								
	Depth		70								
	Height		360	530	705	875	1050	1220	1395	1565	1735

Emitter and receiver with a ø55mm resolution.

Model		AS	405	605	705	905	1105	1205	1405	1605
Protection heights		mm	440	610	785	955	1130	1300	1475	1645
Number of beams			9	13	17	21	25	29	33	37
Resolution		mm	55							
Lens pitch		mm	43							
Lens diameter		mm	12							
Scanning range		m	0 ÷ 12							
Ambient light immunity		lx	> 50.000							
Response time		ms	13		14			15		
Power supply		V_{dc}	24 ± 20%							
Power consumption at 24V_{dc}	Emitter	W	4,2							
	Receiver		3,3	4	4,6	5,3	6	6,7	7,4	8,3
Operating temperature		°C	0 ÷ 55 (without condensation and ice)							
Sealing			IP 65							
Dimensions	Width	mm	50							
	Depth		70							
	Height		530	705	875	1050	1220	1395	1565	1735

Emitter and receiver: MULTIBEAM models.

Model		AS	418	618	718	918	1118	1218	1418	1618
Number of beams			3	4	5	6	7	8	9	10
Lens pitch		mm	172							
Lens diameter		mm	12							
Scanning range		m	0 ÷ 12							
Ambient light immunity		lx	> 50.000							
Response time		ms	13		14			15		
Power supply		V_{dc}	24 ± 20%							
Power consumption at $24V_{dc}$	Emitter	W	4,2							
	Receiver		3 max.							
Operating temperature		°C	0 ÷ 55 (without condensation and ice)							
Sealing			IP 65							
Dimensions	Width	mm	50							
	Depth		70							
	Height		530	705	875	1050	1220	1395	1565	1735

Control unit AU S3.

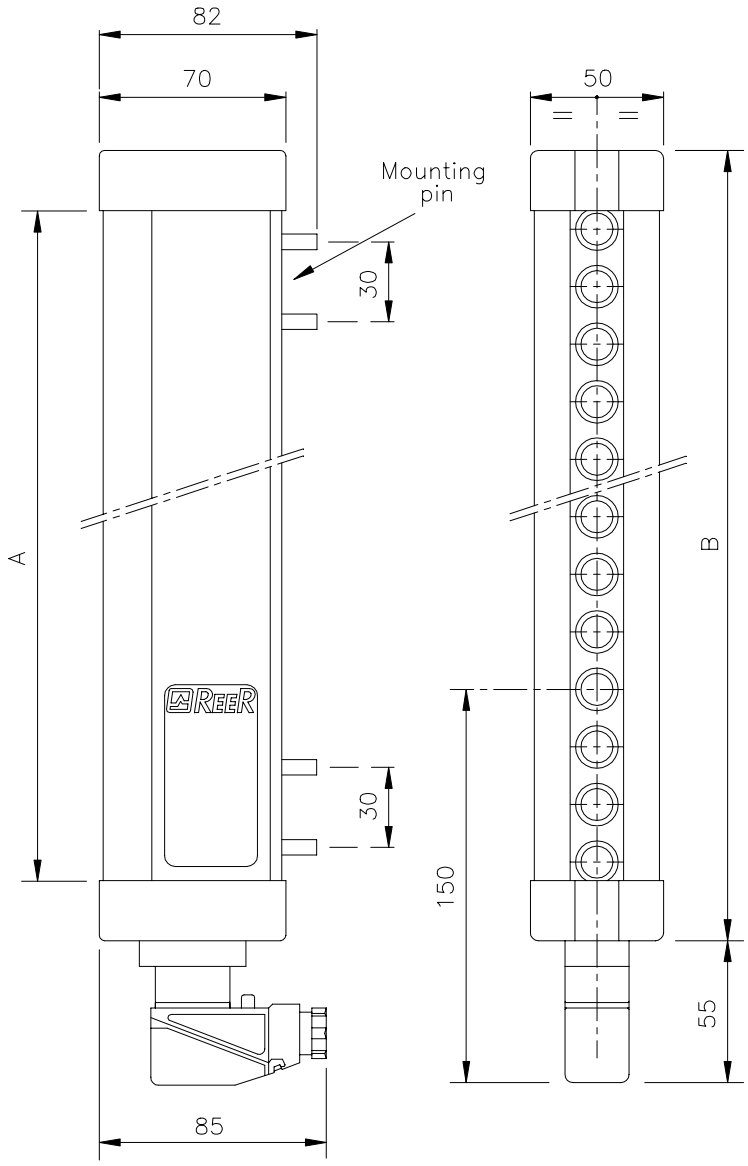
Power supply	V_{dc}	24 ± 20%
Power consumption	W	5,5
Output relays (*)		2 N.O. contacts 2A $125V_{ac}$ 1 N.C. contact 2A $125V_{ac}$
Response time	ms	≤ 15
Min. closing time of the test contact	ms	10
Test duration	ms	100
Electrical connections		Terminal blocks
Cable lenght (**)	m	100 max
Operating temperature	°C	0 ÷ 55
Sealing (housing)		IP 40
Sealing (terminal blocks)		IP 2X
Mechanical mounting		Quick mounting on Omega rail according to EN 50022-35
Dimensions	mm	100 x 73 x 120
Weight	g	500

(*) Refer to “Load features” in the Electrical connection chapter (page 26).

(**) We recommend shielded cable where the level of electrical disturbances is higher than the specified IEC 801-4/level IV.

DIMENSIONS *(in mm)*

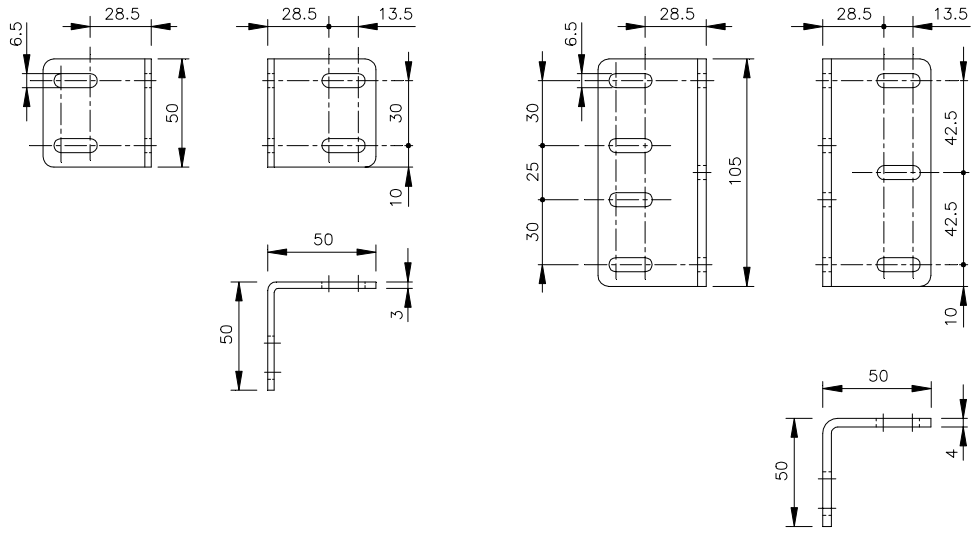
Emitters ASE and receivers ASR.



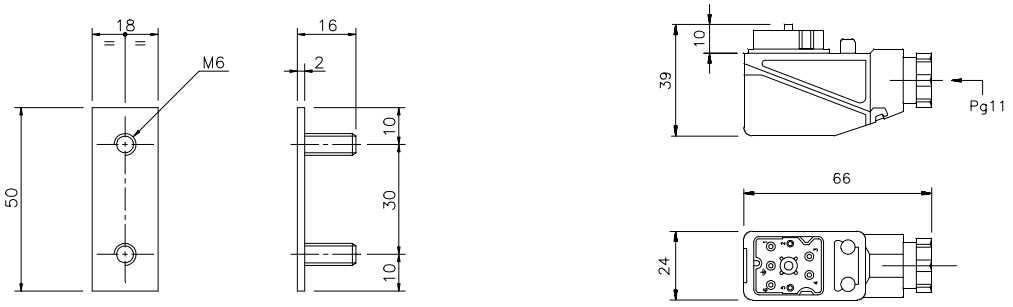
Model AS	203	403 405 418	603 605 618	703 705 718	903 905 918	1103* 1105* 1118*	1203* 1205* 1218*	1403* 1405* 1418*	1603* 1605* 1618*
A	250	425	595	770	940	1115	1285	1455	1630
B	305	475	650	820	995	1165	1340	1510	1680
Mounting	2 LL brackets with 2 mounting pins					2 LH brackets with 4 mounting pins			

(*) When the emitter and the receiver are exposed to hight vibrations, it is recommended to use the antivibration dampers (see page 29).

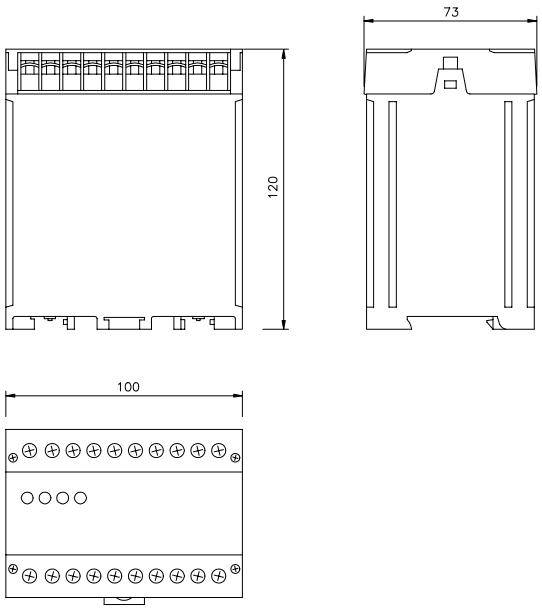
LL and LH brackets.



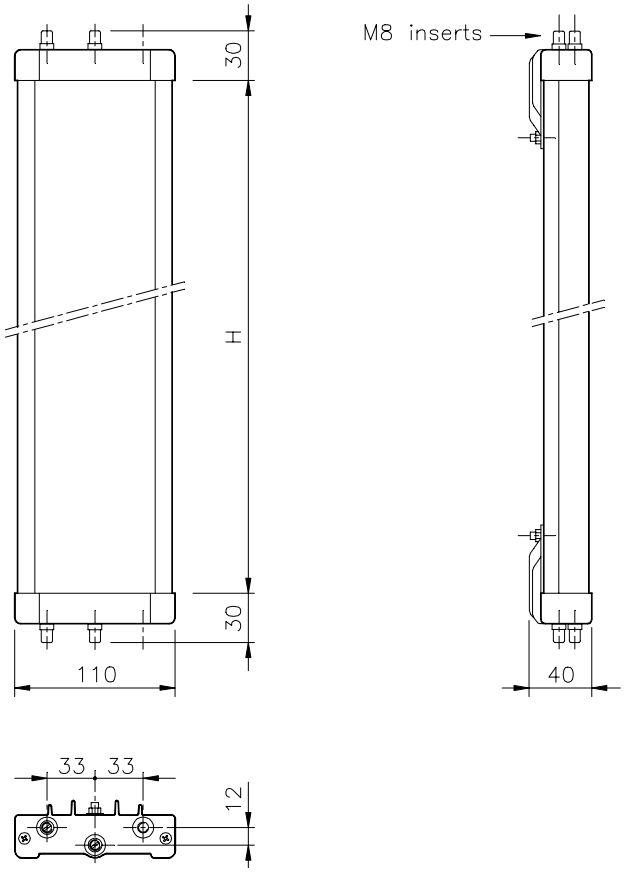
Mounting pin and connectors.



Control unit AU S3.

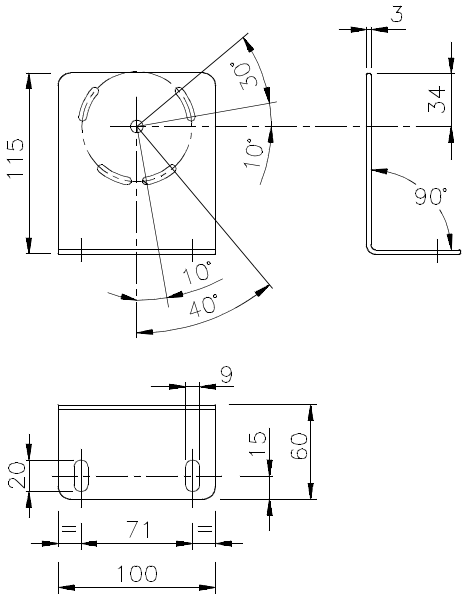


Deflection mirrors.



Model	H
SP 200S	370
SP 400S	540
SP 600S	715
SP 700S	885
SP 900S	1060
SP 1100S	1230
SP 1200S	1400
SP 1400S	1575
SP 1600S	1750

Brackets for mirrors.



INSTALLATION

Referring to the EN 61496-1 European norm, a possible failure of a type 2 optoelectronic protective device is detected when the next test is applied.

Therefore, the following must be checked before installing the ARGOLUX AS series barrier:

☞ **the risk assessment for the considered machine allows the use of a type 2 optoelectronic protective device.**

For a type 2 protective device, the test sequence must be generated before any new energising of the output relays. Output relays are energized if no failure is detected during the test sequence.

Before installing the ARGOLUX AS series barrier, make sure that:

☞ **the machine or the working cycle is adapted to the mode of operation of a type 2 protective device.**

The working cycle of the machine or any dangerous movement must be set in motion using a specific command device such as a pushbutton.

Therefore:

☞ **the ARGOLUX AS safety barrier must be used as a protective device that outputs stop signals and not as a command device that outputs control signals.**

When the test needs to be generated by the operator himself using a pushbutton, the following applies:

- The pushbutton should be fixed outside the dangerous area;
- The pushbutton must be installed at a point that gives the operator the best visibility of the dangerous zone.

Before installing the ARGOLUX AS safety barrier, the following must be checked:

- The moving part of the machine can be electrically controlled;
- It is possible to stop immediately any dangerous movement of the machine. Stopping time of the machine must be known;
- The machine cannot create dangerous situations related to the falling or the ejection of objects. If this is the case, additional mechanical guards must be installed;
- The minimum size of the detected object must be greater or equal to the selected model resolution.

The dimensions of the opening that gives access to the dangerous area and the calculated safety distance help in the choice of the right model.

☞ **These characteristics must be compared to the scanning distance, the protection height and the different resolutions of the ARGOLUX AS system.**

The ARGOLUX AS light curtain should protected against moving equipment, oil, dust, etc.

☞ **The control unit AU S3 should be installed in an enclosure at least IP54.**

Before installing the safety barrier, the following conditions should be observed:

- Ambient temperature should be compatible with the specified operating temperature.
- The emitter and the receiver should be protected against excessive light source intensity (greater than the specified ambient light immunity).
- Fog, rain, smoke or dust may influence optoelectronic devices. Therefore, we recommend to apply a correction value *Fc* to the specified nominal scanning range in order to guarantee a correct operation of the system:

$$Pu = Pm \times Fc$$

Pu: maximum scanning range in meters.

Pm: nominal scanning range in meters for a clear environment.

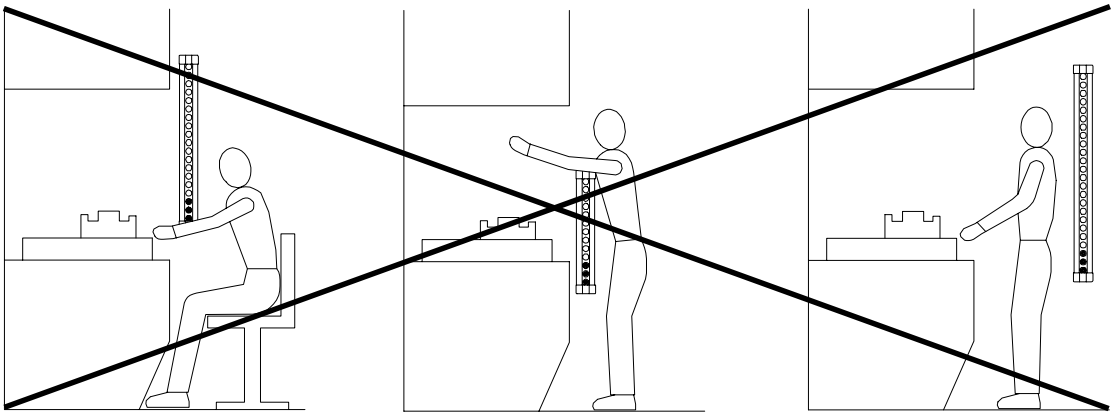
The following table shows the recommended correction values.

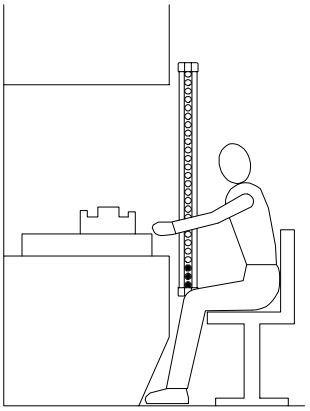
ENVIRONMENT	CORRECTION VALUE *Fc*
Fog	0,25
Vapour	0,50
Dust	0,50
Thick smoke	0,25

- If sudden temperature variations are foreseen, proper measures should be taken to avoid condensation accumulation on lens. Excessive accumulation could generated unexpected alarm.

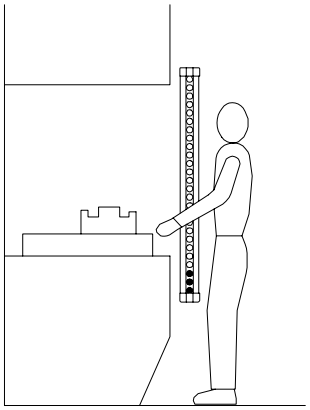
POSITIONING AND SAFETY DISTANCES

The emitter and the receiver unit must be installed in such a way that any possible access to the danger zone leads to the occultation of at least one beam of the ARGOLUX AS system. The detection zone defined by the protection height and the scanning distance of the emitter and the receiver must prevent any possible access from the top, the bottom or the sides. The use of additional guards might be necessary (interlocked or fixed mechanical guards or additional safety light curtain).

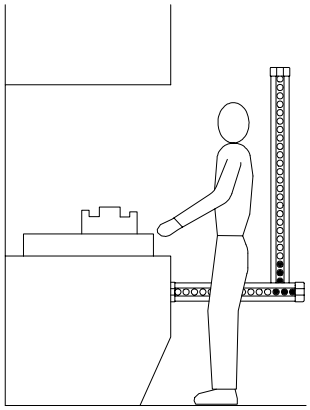




Access to the danger zone from the bottom should not be possible without occulting the light curtain.



Access to the danger zone from the top should not be possible without occulting the light curtain.



Right-angle mounting: the horizontal barrier detects the operator body presence between the danger zone and the vertical detection field.

Safety distances.

The safety distance between the protection field and the danger zone (figure 7, page 18) should be large enough to ensure that if the protection field is entered, the danger zone cannot be reached before the hazardous movement has ended or is interrupted. For the safety distance *S*, the EN 999 (Safety of machinary - The positioning of protective equipment in respect of

approach speeds of parts of the human body) European norm defines the following formula:

$$S = K(t_1 + t_2) + C$$

with:
S: minimum safety distance between the detection field and the danger zone (in mm).

K: approach speed of the operator (in mm/s).

Model	**AS 203**	**AS 403**	**AS 603**	**AS 703**	**AS 903**	**AS 1103**	**AS 1203**	**AS 1403**	**AS 1603**
Total response time t_1 (s)	0,028	0,029		0,030		0,031		0,032	

Model	**AS 405 AS 418**	**AS 605 AS 618**	**AS 705 AS 718**	**AS 905 AS 918**	**AS 1105 AS 1118**	**AS 1205 AS 1218**	**AS 1405 AS 1418**	**AS 1605 AS 1618**
Total response time t_1 (s)	0,028		0,029			0,030		

t1: response time of the barrier (in s), i.e.response time of the control unit AU S3 plus response time of the ARGOLUX AS light curtain. The following table shows for each model the value ***t1***.

t2: stopping time of the machine (in s).

C: guarding space (in mm).

If possible access to danger zone is still foreseen, the Argolux AS safety barrier must be completed with additional mechanical guards.

Versions with a 35 mm resolution.

According to the EN 999 norm, the 35mm resolution is suitable for hand detection, when the barrier is not used for the initiation of the machine.

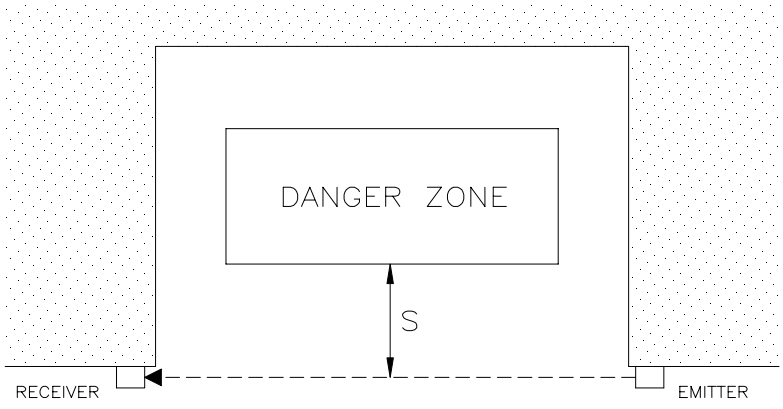


Fig. 7
Minimum safety distance should be observed.

Vertical mounting (fig. 8).

The minimum safety distance *S* allowed from the danger zone to the vertical detection plane should be no less than that calculated using the following formula:

$$S = 2000(t_1 + t_2) + 168$$

This formula applies for all safety distances of *S* greater than 100mm and up to and including 500mm. If *S* is found to be greater than 500mm using the above-mentioned formula, then the distance may be reduced using the following formula with a minimum distance of 500mm:

$$S = 1600(t_1 + t_2) + 168$$

When access to the danger zone can be gained over the top or the bottom of the barrier or laterally, additional safeguarding devices should be provided to prevent access. They should comply with requirements of both EN 294 and prEN 811 European norms.

Horizontal mounting (fig. 9).

If the direction of approach is parallel to the plane of detection, e.g. if the barrier is horizontally mounted, the minimum safety distance *S* from the danger zone to the outer beam depends on the height *H* of the curtain above the ground. This safety distance *S* should be calculated using the following formula:

$$S = 1600(t_1 + t_2) + 1200 - 0.4H$$

The height *H* should be a maximum of 1000mm from the ground. However, if the installation height *H* is greater than 300mm, there is a risk of inadvertent undetected access beneath the curtain, and additional safety measures are required.

Versions with a 55mm resolution.

☞ **Devices with a 55mm resolution are considered by the EN 999 standard to be sets of multiple indipendent beams. They will no detect intrusion of the hands, and therefore shall only be used where the risk assessment indicated that detection of the hands is inappropriate. The ARGOLUX AS with 55mm resolution is designed to detect arms, legs or the whole body of the operator.**

Vertical mounting (fig. 8).

The minimum safety distance *S* allowed from the danger zone to the vertical detection plane should be calculated using the following formula:

$$S = 1600(t_1 + t_2) + 850$$

The risk of inadvertent access should be taken into account during the risk assessment stage, but in all cases, the height *H* of the uppermost beam should be greater or equal to 900mm, and the height *P* of the lowest beam should be lower or equal to 300mm.

Horizontal mounting (fig. 9).

If the direction of approach is parallel to the plane of detection, e.g. if the barrier is horizontally mounted, the minimun safety distance *S* from the danger zone to the outer beam depends on the height *H* of the curtain above the ground. This safety distance *S* should be calculated using the following formula:

$$S = 1600(t_1 + t_2) + 1200 - 0.4H$$

The height *H* should be a maximum of 1000mm from the ground and the lowest allowable installation height of the 55mm resolution device is 75mm from the ground. However, if the installation height H is greater than 300mm there is a risk of inadvertent undetected access beneath the curtain, and this must be taken into account in the risk assessment.

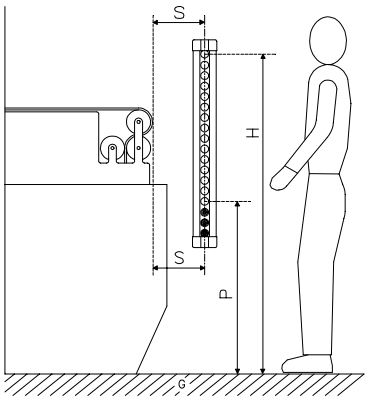


Fig. 8

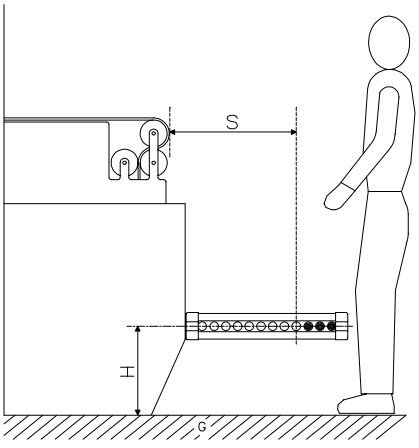


Fig. 9

MULTIBEAM models.

☞ **The Argolux AS MULTIBEAM models shall be used only to detect intrusion of the whole body of a person and not parts of the body (hands, legs, ...).**

Vertical mounting (fig. 10).

This safety distance *S* should be calculated using the following formula:

$$S = 1600(t_1 + t_2) + 850$$

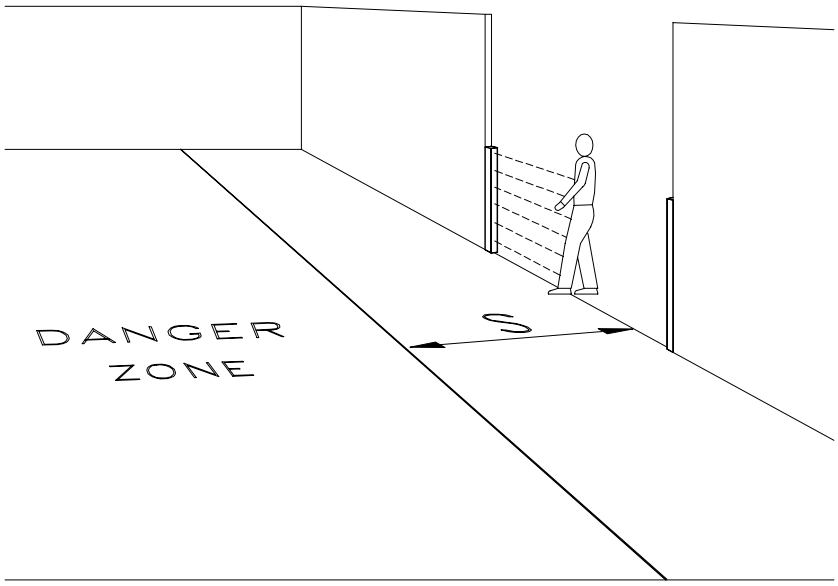


Fig. 10

MULTIBEAM models: trip sensing and safety distance.

Horizontal mounting.

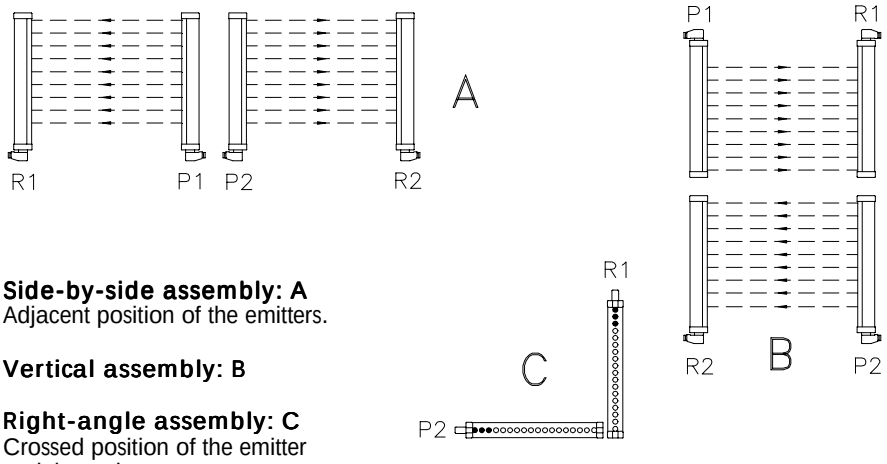
Due to the optical characteristic (pitch of the beams), the MULTIBEAM models shall not be used as presence sensing AOPDs.

For the horizontal mounting please refer to the models with an ODC of 35 or 55 mm.

GROUPING OF SEVERAL SETS

When several sets of the ARGOLUX AS system are used in the same area, it is necessary to avoid mutual interference between sets. Figure 11 shows a few simple rules to avoid mutual interference which may cause unexpected alarms.

The neighbouring sets should be operated in the reverse direction with synchronisation beams in opposition as shown below (figure 11).



Side-by-side assembly: A
Adjacent position of the emitters.

Vertical assembly: B

Right-angle assembly: C
Crossed position of the emitter and the reciver.

P1, P2: emitters. R1, R2: receivers.

Fig. 11
Correct assembly of two neighbouring sets.

REFLECTING SURFACES

The effective opening angle of the beams and the alignment tolerance for the emitter and the receiver are approximately ±4° in compliance with the prEN 61496-2 European project norm.

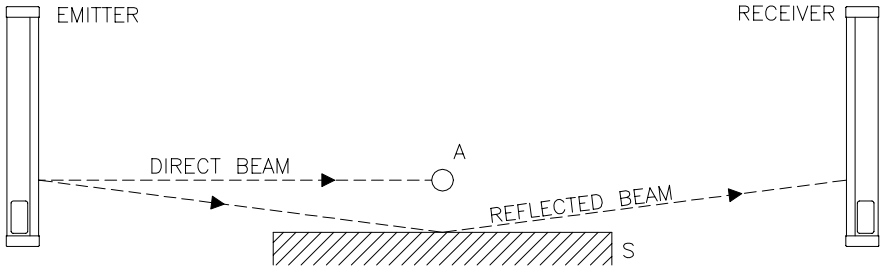


Fig. 12
Reflecting surface S can cause light deflection.

Since reflecting surfaces within the detection zone can cause light deflection (see fig. 12) and therefore non-detection of an obstacle, a minimum distance *d* should be observed.

For a distance *l* between the emitter and the receiver, the figure 13 gives values for *d*.

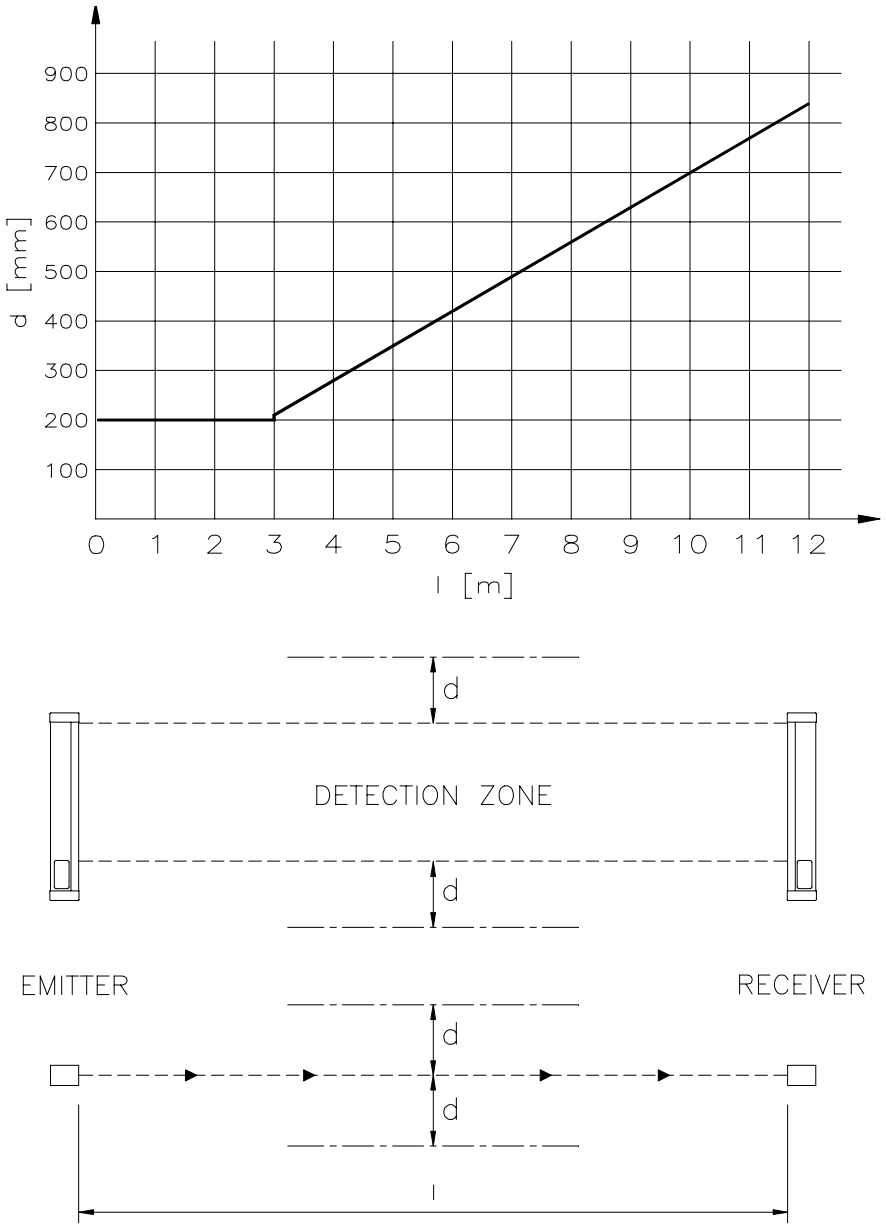


Fig. 13

The reflective surfaces must be at a distance ≥d.

Just after the installation, check the absence of any reflecting surface using the test rod delivered with the safety barrier. If no light is deflected, the test rod should be continuously detected all over the detection field.

The red LED of the receiver unit should never switch off while the test rod is being moved in the central area of the detection field and near the emitter and receiver units.

DEFLECTION MIRRORS

For the protection or control of dangerous zones with openings on several sides, deflection mirrors can be used.

If emitted light must be deflected with a 90° angle, the mirrors surface and the beam's path must form a 45° angle.

The figure below shows an application using 2 deflection mirrors in a "U" shape configuration.

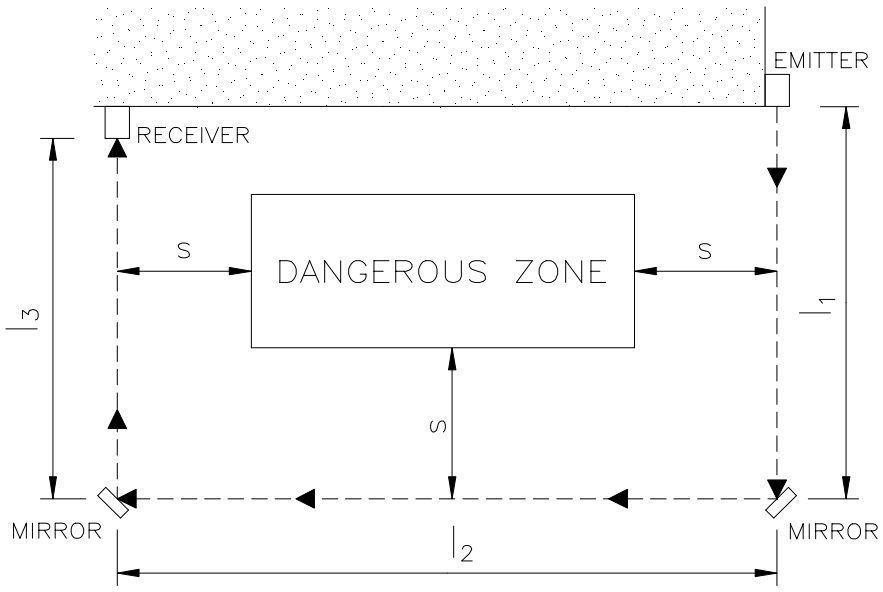


Fig. 14
Use of two deflection mirrors.

Instructions for mirrors use:

- Mirrors should be installed in such a way that the minimum calculated safety distance *S* is achieved on each side of the perimeter (see figure 14).
- Total lenght of the perimeter should be smaller or equal to the scanning range taking into account the attenuation due to mirrors (expect a 10% decrease on the scanning range per added mirror).
- Optical alignment of the emitter unit, the receiver unit and mirror(s) must be carefully carried out.
- It is recommended to use a maximum of 3 mirrors.

ELECTRICAL CONNECTION

Wiring should be carried out according to wiring diagram shown on page 27. Before connecting the device, make sure your power supply features correspond to the product specifications:

☞ **Emitter, receiver and control unit should be powered with 24V_{dc} ± 20% (refer to power consumptions on page 11 and 12).**

No other devices shall be connected to the emitter and receiver connectors.

For a good reliability, the output capacitance of the power supply should have at least a value of 2000μF for ampere of current input (refer to power consumptions on page 11).

Load features.

The control unit AU S3 is equipped with two output relays A and B (with guided contacts). Even if these relays are specified for higher coil voltages and load currents, make sure that the load features comply with the indications of the following table to guarantee a correct operation and avoid damage or quick ageing of A and B internal relays.

For loads with higher switching characteristics use K1 and K2 additional relays.

Minimum switching voltage	15V_{dc}
Minimum switching current	20mA
Maximum switched voltage	125V_{ac}
Maximum switched current	2A

Use of additional relays K1 and K2.

If additional relays K1 and K2 are used to increase the number of contacts available on the AU S3 control unit or to increase the switching capacity of its inner relays A and B, connection diagram B (page 27) must be used.

- K1 and K2 must be safety relays with guided contacts.
- Used K1 and K2 contacts as indicated in the following table.
- The feedback control is set if K1-1(NO) and K2-1 (NC) are connected in serial between terminal 5 and 6 on the control unit (commutated signal: 20mA/24V_{dc}).

	K1 relay	K2 relay
Feedback control	K1-1 normally open	K2-1 normally closed
Machine stopping circuitry	K1-2 normally closed	K2-2 normally open

- The interference suppressors must be connected in parallel with K1 and K2 relay coils.

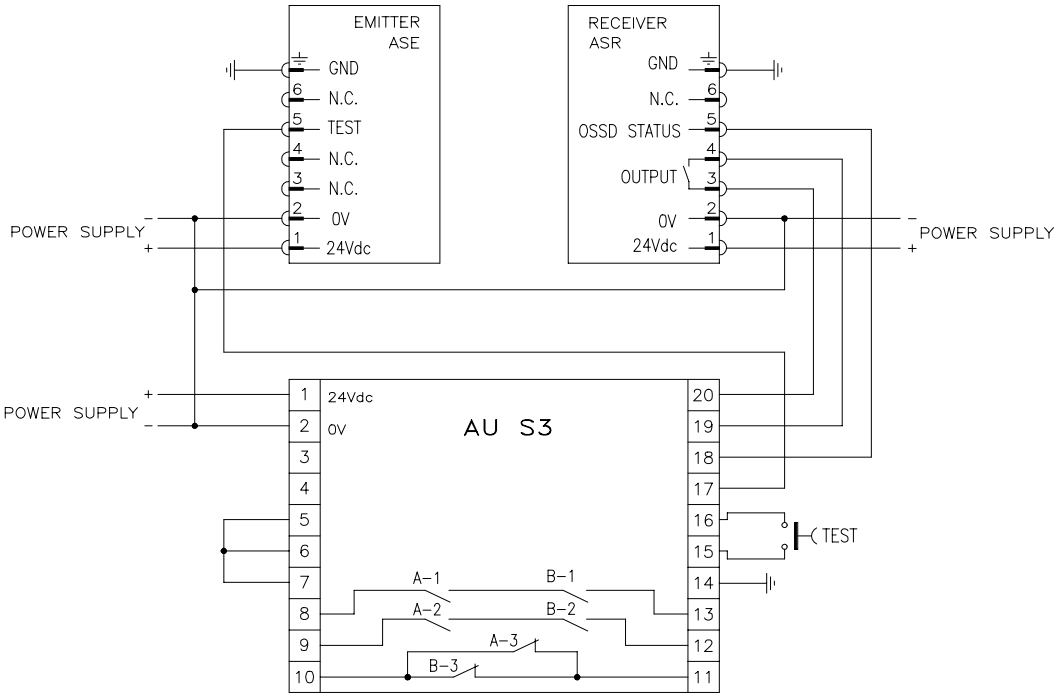
Instruction related to the connection cable.

- For cable length longer than 50m, use cables with a ø1mm^2 section.
- Connect earth terminals of the emitter, the receiver and the control unit to the main earth of the machine.
- The emitter and receiver cables should be installed far from any high-power cables. This is also valid for cables used for the test command and the self-diagnostic signal.
- If the control unit is located far from the emitter and receiver (for a distance longer than 50m), it is recommended to use shielded cables.
- The safety barrier should be installed far from any high-power supply or any electromagnetic field source.

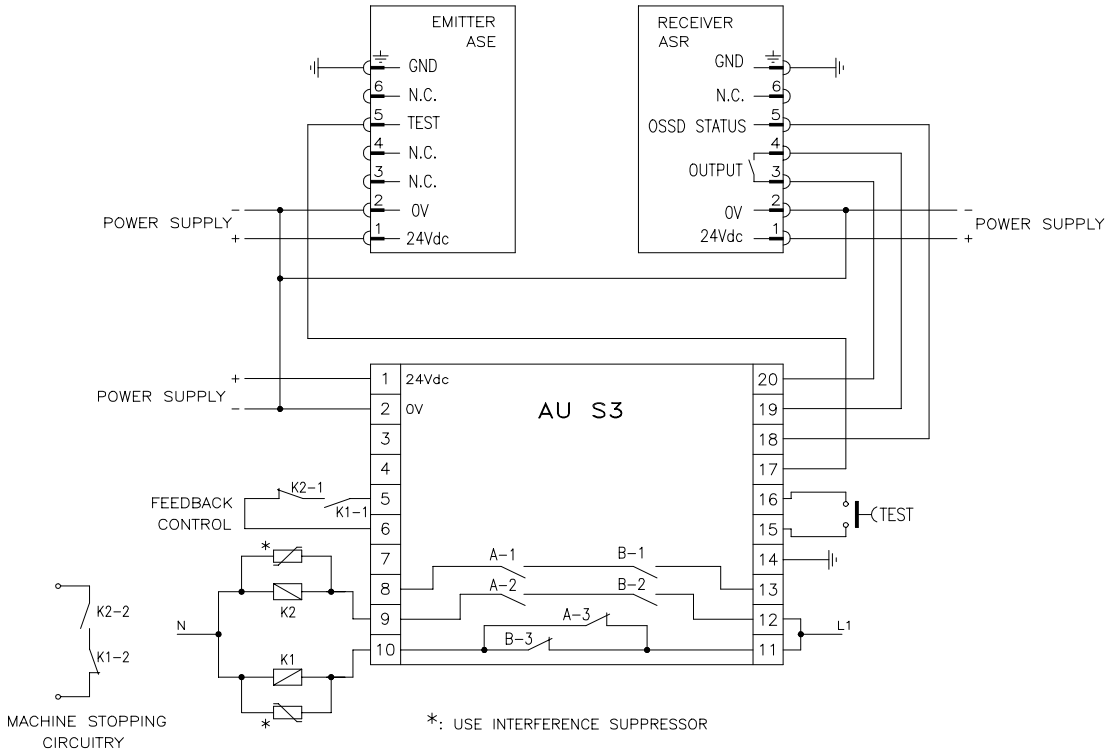
Test command.

- Test is applied when connection between terminals 15 and 16 is made. Normally open contact of an external push-button can be used. The temporary closing of that normally open contact generates a test sequence.
- The contact between terminals 15 and 16 must be maintained for at least 10ms to generate a test sequence. This must be observed particularly if the test sequence is automatically generated by a Programmable Logical Controller (PLC).
- Test duration is 100ms which means that relays A and B will be energized 100ms after the test is applied.
- If the test command is activated while a test sequence is being performed, it will interrupt the current test sequence and a new test sequence will start for another 100ms period. Activating the test command twice within the 100ms period is therefore not recommended.
- Contact used to generate a test sequence must be able to switch a 20mA/24V_{dc} signal.

Connection diagram A: Direct use of control unit relay outputs.



Connection diagram B: Use of additional relays K1 and K2.



MOUNTING AND OPTICAL ALIGNMENT

The emitter and the receiver must be installed opposite each other. The distance between the emitter and the receiver must not exceed the specified nominal scanning range. Brackets are delivered with AS emitter and receiver units. The emitter and the receiver should be parallel in the same plane, at the same height and with connectors on the same side.

Emitter and receiver modules are equipped with M6 screws (see Dimensions) fixed at the back of the housing. These M6 screws can be used either for direct mounting with the provided nuts, or in conjunction with brackets (see figure 15 and figure 16).

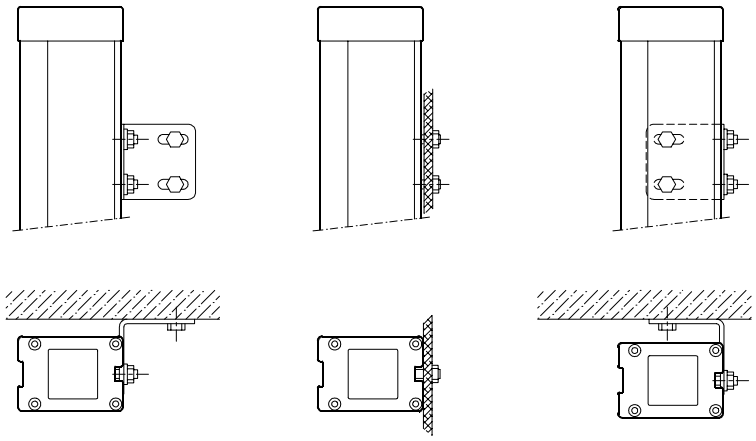


Fig. 15
Mounting of the emitter and receiver units.

The optimum optical alignment between emitter and receiver is essential for the correct operation of the system. The emitter and the receiver are equipped with LED's which help adjust the optical alignment.

To achieve an optimum alignment, the optical axis of the outer beams of both emitter and receiver must mix up.

Install the receiver and adjust the emitter as follows:

- Adjustment of the synchronisation beam: sight the emitter in direction of the receiver. Then move the emitter from top to bottom and from left to right in order to find extreme positions of the synchronisation beam for which the green LED of the emitter switches off. This green LED provides information on the synchronisation beam reception. The optimum position is the intermediary position between extreme positions.
- Adjustment of protective beams: use the synchronisation beam as a pivot and move laterally the opposite outer beam in order to find the extreme positions, for which the yellow LED of the receiver switches off. The optimum position is the intermediary position between extreme positions.

When the optimum adjustment is achieved, rigidly fix both emitter and receiver.

If the emitter and the receiver are installed on machines exposed to high vibrations, it is recommended to use antivibration dampers to keep optics aligned (see figure 16).

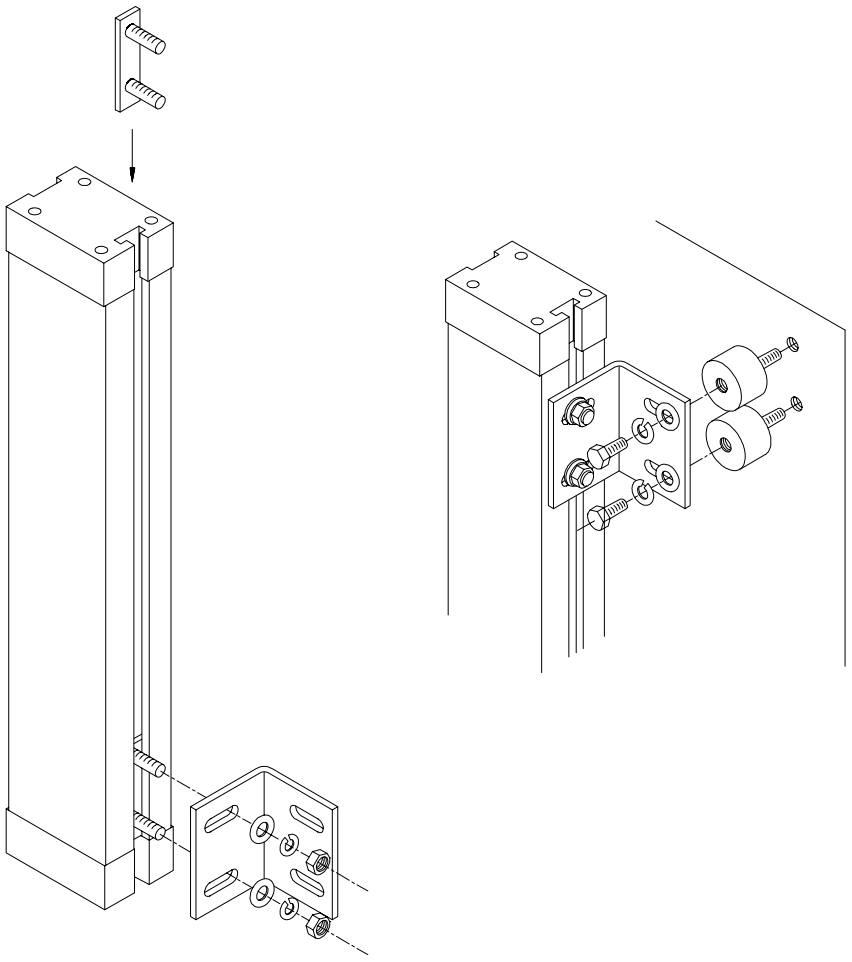


Fig. 16
Mounting of brackets and antivibration dampers.

INSPECTION AND MAINTENANCE

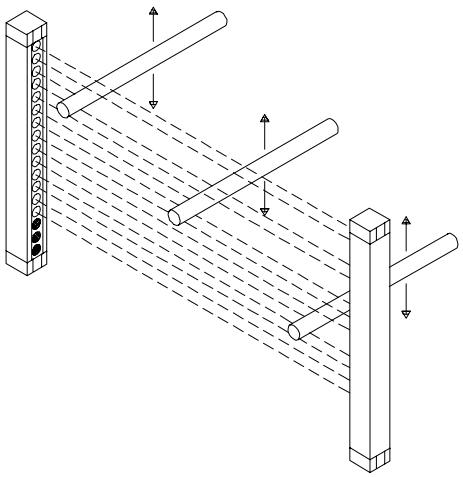
Inspection.

☞ **Each time the machine is powered up, it is necessary to test the correct response of the safety curtain over the whole protection field.**

The following procedure using the test rod provided with the Argolux AS system must be carried out.

With reference to figure 17:

- Introduce the test rod in the detection zone and move it from top to bottom in the center of the detection zone first, then near the emitter and the receiver.
- The red LED of the receiver should be permanently lit during the move of the test rod in the detection zone.



	Test rod	
	P/N	Dimension
Models 35mm	7170119	Ø35mm
Models 55mm	7170122	Ø55mm

Fig. 17
Functional test of the barrier.

The ARGOLUX AS safety curtain does not require any specific maintenance intervention. However, it is recommended to clean transparent front plates to avoid excessive dust accumulation.

The cleaning must be done with a soft, clean and wet cloth. In a dusty environment, it is recommended to spray an antistatic product on trasparent front plates after cleaning.

Never use abrasive or corrosive products, solvents or alcohol or any other product which would obscure the transparent front plates. Never use a woollen cloth in order to avoid accumulation of electrostatic charges on transparent front plates.

TROUBLE SHOOTING

Information displayed by LED's on the emitter, the receiver and the control unit help diagnosing malfunctions of the system.

If an unexpected alarm occurs, generate a test sequence through the test command to check if the alarm signal is due to random electrical disturbances. If the test activation does not solve the problem, it might be necessary to switch off and restore the power supply.

If no improvement is observed, check the following points:

- check all the wiring;
- check that the supply features meet the ARGOLUX AS system supply tolerance;
- check the presence of the interference suppressors connected in parallel with the additional relay coils;
- check the correct alignment of the emitter and receiver and the cleanness of their transparent front plates.

If the system remains out of order despite all the above mentioned controls, please get in touch with us and provide us with the following information:

- serial number;
- purchasing date;
- working period;
- details of the installation;
- symptoms of failure.

ORDERING CODE, ACCESSORIES AND SPARE PARTS

Ordering code.

ITEM		CODE	ITEM		CODE	ITEM		CODE
Emitter and receiver ø35mm (*)	AS 203	1201430	Emitter ø35mm (°)	ASE 203	1401430	Receiver ø35mm (°)	ASR 203	1501430
	AS 403	1201431		ASE 403	1401431		ASR 403	1501431
	AS 603	1201436		ASE 603	1401436		ASR 603	1501436
	AS 703	1201432		ASE 703	1401432		ASR 703	1501432
	AS 903	1201437		ASE 903	1401437		ASR 903	1501437
	AS 1103	1201433		ASE 1103	1401433		ASR 1103	1501433
	AS 1203	1201435		ASE 1203	1401435		ASR 1203	1501435
	AS 1403	1201434		ASE 1403	1401434		ASR 1403	1501434
	AS 1603	1201438		ASE 1603	1401438		ASR 1603	1501438
ITEM		**CODE**	**ITEM**		**CODE**	**ITEM**		**CODE**
Emitter and receiver ø55mm (*)	AS 405	1201451	Emitter ø55mm (°)	ASE 405	1401451	Receiver ø55mm (°)	ASR 405	1501451
	AS 605	1201456		ASE 605	1401456		ASR 605	1501456
	AS 705	1201452		ASE 705	1401452		ASR 705	1501452
	AS 905	1201457		ASE 905	1401457		ASR 905	1501457
	AS 1105	1201453		ASE 1105	1401453		ASR 1105	1501453
	AS 1205	1201455		ASE 1205	1401455		ASR 1205	1501455
	AS 1405	1201454		ASE 1405	1401454		ASR 1405	1501454
	AS 1605	1201458		ASE 1605	1401458		ASR 1605	1501458
ITEM		**CODE**	**ITEM**		**CODE**	**ITEM**		**CODE**
Emitter and receiver Multibeam (*)	AS 418	1201481	Emitter Multibeam (°)	ASE 418	1401481	Receiver Multibeam (°)	ASR 418	1501481
	AS 618	1201486		ASE 618	1401486		ASR 618	1501486
	AS 718	1201482		ASE 718	1401482		ASR 718	1501482
	AS 918	1201487		ASE 918	1401487		ASR 918	1501487
	AS 1118	1201483		ASE 1118	1401483		ASR 1118	1501483
	AS 1218	1201485		ASE 1218	1401485		ASR 1218	1501485
	AS 1418	1201484		ASE 1418	1401484		ASR 1418	1501484
	AS 1618	1201488		ASE 1618	1401488		ASR 1618	1501488

ITEM	CODE
Control unit AU S3	1201702

(*) With two female connectors, brackets and screws, installation manual.
(°) With one female connector, brackets and screws, installation manual.

Accessories.

PRODUCT		CODE
Deflection mirrors	SP 200S (AS 203)	1201800
	SP 400S (AS 403 – AS 405 – AS 418)	1201801
	SP 600S (AS 603 – AS 605 – AS 618)	1201811
	SP 700S (AS 703 – AS 705 – AS 718)	1201802
	SP 900S (AS 903 – AS 905 – AS 918)	1201812
	SP 1100S (AS 1103 – AS 1105 – AS 1118)	1201803
	SP 1200S (AS 1203 – AS 1205– AS 1218)	1201810
	SP 1400S (AS 1403 – AS 1405– AS 1418)	1201804
	SP 1600S (AS 1603 – AS 1605)	1201813
Kit of 4 antivibration dampers SAV-1 for LL brackets (with screws and nuts)		1200084
Kit of 6 antivibration dampers SAV-2 for LH brackets (with screws and nuts)		1200085
Test rod (ø35mm)		7170119

Spare parts.

PRODUCT	CODE
Kit of 4 LL bracket with nuts	7200037
Kit of 4 LH bracket with nuts	7200081
Kit of 4 mounting pin	7200038
Female connector	7200062

WARRANTY

For every newly produced ARGOLUX series AS system, in normal utilisation conditions, the REER company provides a 12 (twelve) month warranty against material and manufacturing defects.

Over said time period, REER undertakes to eliminate any product faults through repair or replacement of defective parts, totally free of charge, where both materials and labour are concerned.

REER reserves the right to replace, in lieu of repairing, the defective system in its entirety with another of the same type and characteristics.

This warranty is valid under the following conditions:

- The fault is notified to REER within twelve months of the date of delivery of the product.
- The equipment and its components are in the conditions in which they have been delivered by REER.
- Part numbers are clearly legible.
- The fault or malfunctioning has not been generated, directly or indirectly, by:
  - Use for inappropriate purposes;
  - Failure to comply with utilisation instructions;
  - Negligence, erroneous use, incorrect maintenance;
  - Repairs, changes, adaptations not performed by REER personnel, tampering, etc.;
  - Accidents or collisions (also due to transport or force majeure events);
  - Other causes which cannot be ascribed to REER.

Repairs shall be performed at the REER laboratories, where the material must be delivered or shipped: transport expenses and possible risks of the material being lost or damaged during transport shall be borne by the customer.

All products and components replaced shall become the property of REER.

REER does not recognise any other warranties or rights other than those expressly described above; in no case shall REER be liable for damages, disruption of activities or other factors or circumstances in any way correlated with the malfunctioning of its products or any parts thereof.

The main requisite to get a correct operating function of a photoelectric barrier is the precise and full observance of all rules, directions and prohibitions shown in these technical sheets.

REER s.p.a., consequently, declines all responsabilities for any complaint due to the unrespect (even if partial) of such instructions.