

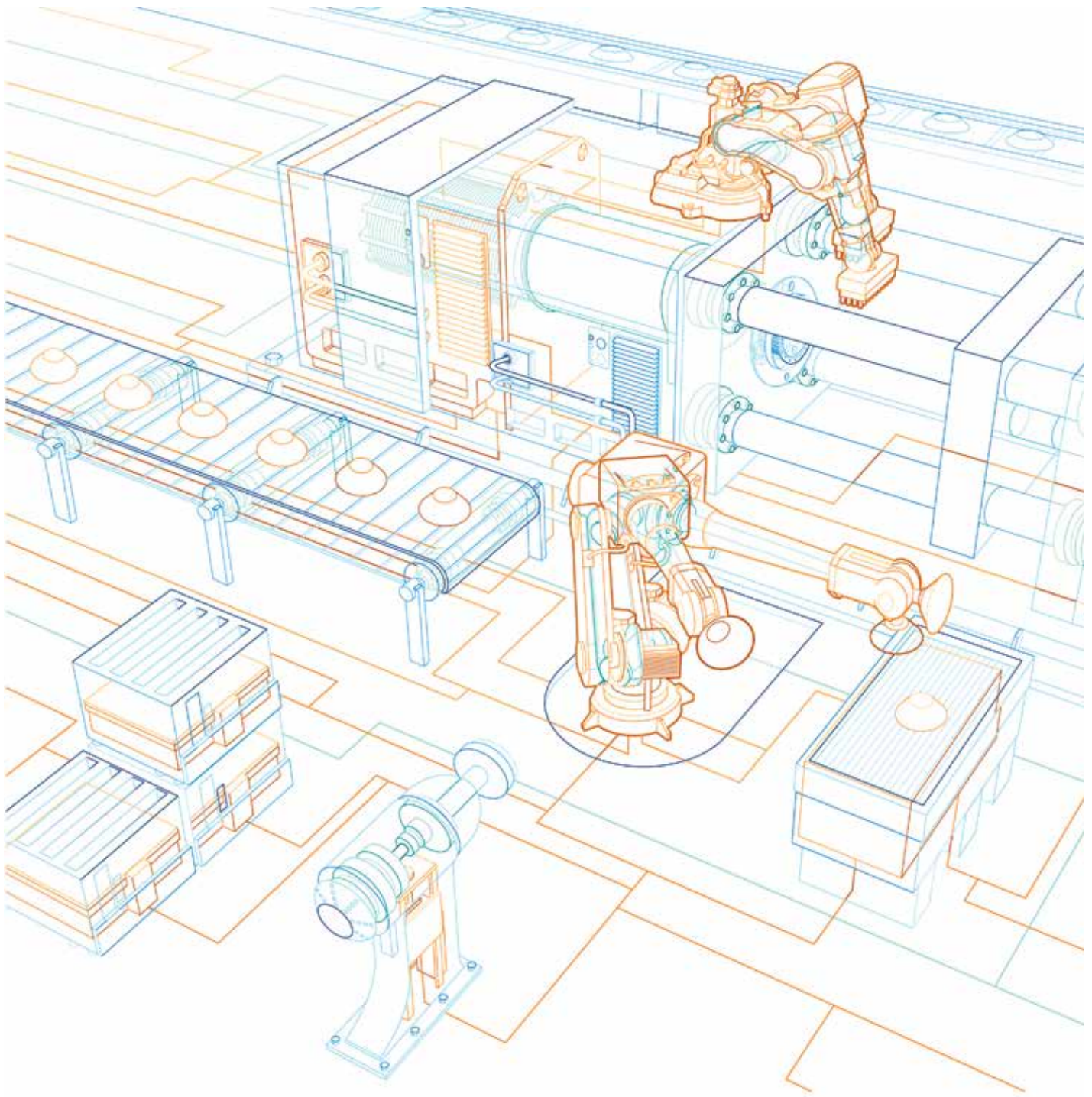


ABB JOKAB SAFETY Products

Focus II Safety Light Curtains and Grids Product overview

Power and productivity
for a better world™





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Focus II Safety Light Curtains and Grids

Table of contents

Why should I use Safety Light Curtains and Grids.....	2
How do Light Curtains and Light Grids work?.....	3
What are the safety requirements for an Optical Protective Device?	3
Reset alternatives	4
Cycle initiation with Light Curtain (PSDI).....	5
Mounting Light Curtains and Light Grids.....	6
Muting (Bypassing)	7
Minimal safe distance calculation.....	8-9
Focus II Safety Light Curtains and Light Grids Overview	10-11
Technical data	12
Focus II Muting (Bypassing)	13-15
Muting Sensors - Mute R.....	16-17
Muting accessories.....	18-19
Focus II Type 4 (FII-4) summary	20-21
Bjorn Stand System.....	22-23
Wet wash down tubes.....	24
BP1 Blanking Programmer	25
Adjustable mounting brackets	26
Spot Safety Light Beam.....	27-28
Connection examples	29-35
Ordering data	36
Component list	37-49
Catalog number alphanumeric.....	50-51

Why should I use Safety Light Curtains and Grids?

...to provide operator protection during production!

A Safety Light Curtain can be used on a machine or in a production plant in the same way as a hatch or door. There are great differences though when it comes to the component installation and functionality. When a Light Curtain is mounted on a hazardous machine, we are not only concerned with the response times of the safety systems, but also the Depth Penetration Factors. It is possible for the operator's fingers or hands to pass through the Light Curtain a certain distance before being detected. This becomes the Depth Penetration Factor. This distance must also be entered into the Minimal Safety Distance Calculation for the machine.

It is also very important that the level of safety of the Light Curtain with dual supervised outputs be continued throughout the rest of the stopping control circuit. Even valves and contactors, which ultimately control dangerous movements, normally have to be redundant and monitored.

Automatic machines

For Light Curtains on automatic machines there shall be a reset function which is active when the machine is set for automatic production, whether or not it is a passable protection. After an engagement one must first use a reset function, then the restart of the cycle should be made with a separate starting device. The same reset applies for machines with semi-automatic drives.

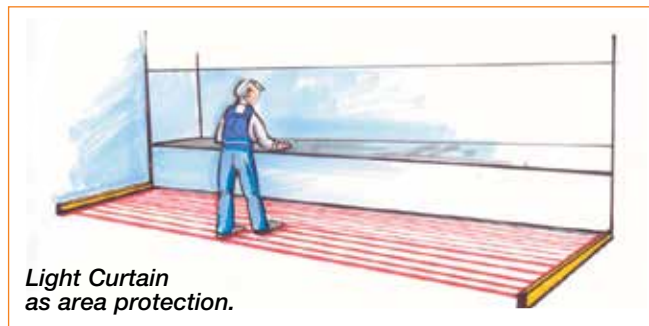
Mechanical and hydraulic presses

Light Curtain applications are often categorized by the type of guarding required. Protecting an operator from the hazards associated with material positioning or where a process is performed is called Point of Operation Guarding. The point of operation is often called the Zone of Hazardous Operation or the Pinch Point.

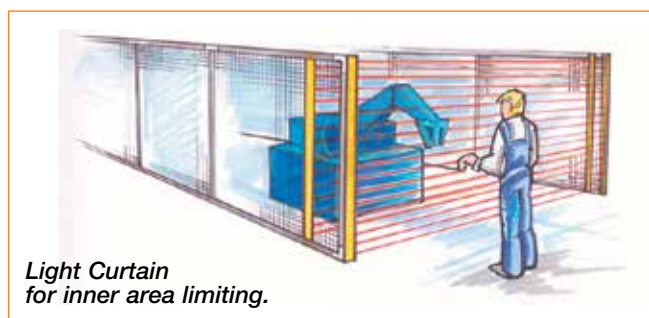
This type of guarding is associated with mechanical and hydraulic power presses, molding presses, stamping, forming, riveting, eyelet and automated assembly machinery. Light Curtains used in these applications are typically selected for finger and hand protection.

During manual servicing of machines

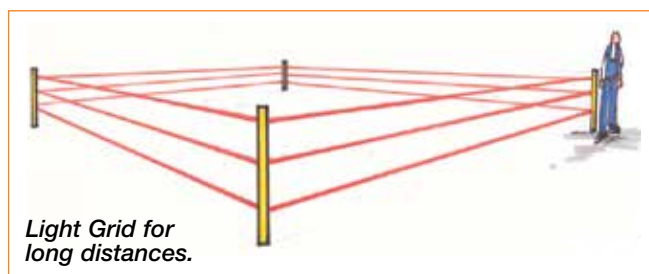
With manually operated machines where one or more operators move parts in and out between every cycle. This type of application is the most risky because the number of engagements into the machine's dangerous area is often several times per minute.



Light Curtain as area protection.



Light Curtain for inner area limiting.



Light Grid for long distances.

...to provide passable protection into risk areas!

Both Light Curtains and Light Grids can often be used as passable protection into a risk area. This is called passable protection because it is possible to get in behind the safety device. Common applications are robot installations, openings for in and out passage of material, etc. The choice between Light Curtain or Light Grid is often a question of available safety distance, reach and price. Light Curtains are often chosen for short safety distances Light Grids are chosen for long reach — up to 50 m — and for a low price.

How do Light Curtains and Light Grids work?

Both Light Curtains and Light Grids utilize optical transmitter and receiver units. Beams of infrared light are sent to the receiver from the transmitters. When a light beam is interrupted, a dual stop signal is given to the dangerous machines inside the Light Curtain/Grid protected area.

What is the difference between a Light Curtain and a Light Grid?

A Light Curtain has several beams that are placed closely together, while a Light Grid consists of only one, two, three or four Light Beams.

The beams are closest on a Light Curtain that is used for finger detection, with a resolution of 14mm. Light Curtain beams are at their widest spacing when used for hand detection, with a resolution of 30mm.

For Light Grids the beams are normally placed at a relative distance of 200 to 500mm.



What are the safety requirements for an Optical Protective Device?

High safety demands are stated in the standard EN 61496-1 which deals with light protection. The main demands are on a safe stopping function and that light from light sources other than the transmitter or other disturbances do not affect the safety function.

Depending on how the safety function is built up, there are safety components of type 2 and 4 to choose between. Type 2 and 4 relates in principle category 2/PL c and category 4/PL e according to EN ISO 13849-1.

Type 4, which has the highest safety level, states that a fault is not allowed to affect the safety function and that the fault should be detected by the outputs falling immediately or that they do not reconnect after being disconnected. Maximum allowed scattering angle for the light is $\pm 2^\circ$.

Type 2 states that a simple but monitored safety function is required, which means that the safety function should be monitored through periodic tests which break the output when a fault occurs. Although, between the testing times there can be faults which result in the safety component malfunctioning. The test function can either be built into the safety device or an external unit (e.g. the machine's control system) can initiate a test. Maximum allowed scattering angle for the light is $\pm 4^\circ$.

Light Grids and Light Curtains are included among the products in the machine directive's appendix 4, which means that an external certifying procedure with an officially recognized institution is called for.



Reset alternatives

Reset

On the servicing side (i.e. the side/sides where there is an operator who moves parts in and out) there shall be a separate reset function for the Light Curtain. If there are several Light Curtains (e.g. on the front and back) there shall be one for each. If the Light Curtain is actuated during a dangerous movement, the press should not be able to restart without being reset. During engagement after the end of the cycle no reset is needed.

For a Light Curtain which is placed as protection on both sides which are not servicing sides, there shall be a reset button which always needs to be activated after an engagement.

Supervised manual reset

When a Light Curtain/Light Grid is interrupted it will give a stop signal to dangerous machines within the risk area it protects. For a new start of the machine the Light Curtain/Light Grid has to be reset. This is done with the reset button (Figure 1) which is placed where it cannot be reached from within the area which is protected. There are high requirements on the reset function—neither a short circuit nor a component fault shall give automatic reset. When the reset button has been affected the outputs are activated and the machine can initiate.

Automatic reset

Automatic reset can only be used when it is impossible to get between the Safety Light Curtain and the hazardous pinch point. When the operator removes his hands from the protective field the dual safety outputs will energize starting the next machine cycle immediately. (Figure 2)

Pre-reset solution

If the machine start button is not located such that you have a clear view of the entire work area, additional safe guards must be used. Typical devices include Safety Laser Scanners, Safety Mats and Horizontal Safety Light Curtains.

Focus II Safety Light Curtains address this requirement without costly additional safety devices. By selecting the Pre-Reset mode through the Focus II Receiver's internal dipswitches, the primary requirement for accidental resets is satisfied. The Pre-Reset must first be cycled, which gives a clear view of the work area, then no longer than 8 seconds later the Final Reset must be cycled.

Figure 1
Reset button with light indication.

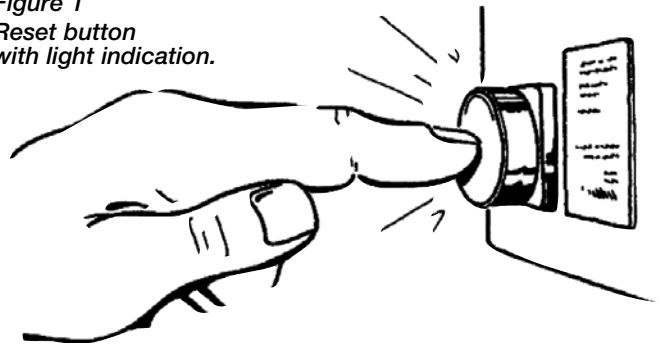
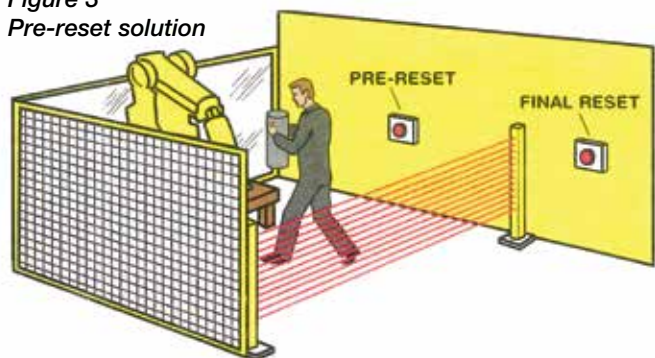


Figure 2
Automatic reset



Figure 3
Pre-reset solution



Cycle initiation with Light Curtain (PSDI)

Cycle initiation

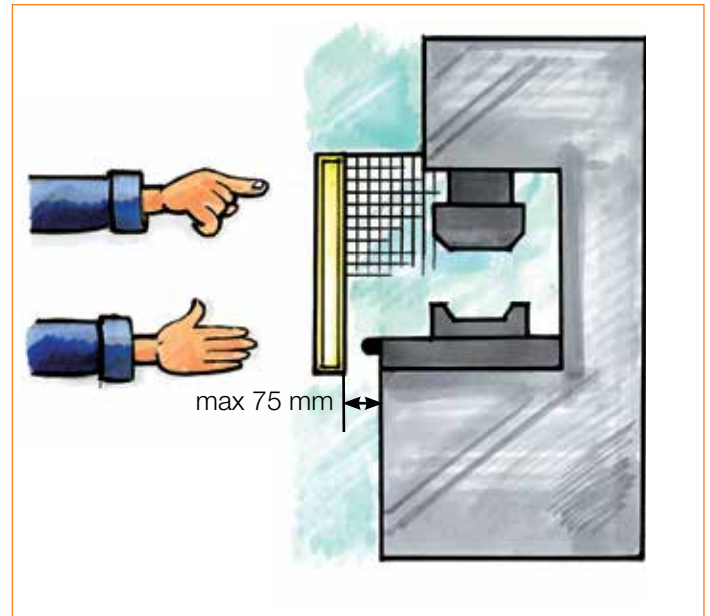
Cycle initiation is a concept when the machine is designed so that a new cycle starts when you take your hand out from the Light Curtain. A cycle is defined as the hand being placed in and taken out once. Usually it is possible to choose between one-cycle and two-cycle operation. During one-cycle a new press stroke is started when the Light Curtain has been actuated once and during two-cycle when the Light Curtain has been actuated twice. The operator thereby operates the press by the action of putting parts in and out.

Because the press starts without any particular command there are some risks involved and therefore many conditions have to be met before the machine operates.

To restrict the usage to smaller presses which cannot be entered there are the following limitations: The table height may not be lower than 750 mm, the stroking length may not be larger than 600 mm and the table depth may not be larger than 1000 mm. The Light Curtain shall have 30 mm or higher resolution. If the press is not started within approx. 30 seconds after the end of the cycle, a new cycle should not be accepted without the Light Beam being again manually reset.

Installation of Light Curtain

The Light Curtain must be installed so no-one can reach a trapping/crushing risk without actuating the Light Curtain. The most important thing is that there are no gaps under, on the sides and over the top during cycle operation. The lower edge of the Light Curtain must therefore be slightly below the press table edge. Also if it is open above the Light Curtain the height must be adapted so that it is not possible to reach over the protection area (see ISO 13855). Possible physical adjustment possibilities must be limited so that no gaps can occur.



Note. For machines with cycle initiation, the installation of the Light Curtain must be in accordance with machine parameters and all relevant standards and regulations.

Between the Light Curtains protection area and mechanical parts there shall only be max 75 mm gap to prevent a human from standing there. In practise to achieve this demand and the required safety distance one usually has to complement with e.g. additional mechanical protection or additional horizontally positioned Light Curtains i.e. step-in Light Curtain. Another solution could be a lying or an angled Light Curtain.

Correct and incorrect installation



Correctly installed

The operator cannot reach into the machine without actuating Light Curtain.



Incorrect installation

Gap below Light Curtain. The operator can reach into the machine without actuating the Light Curtain.



Incorrect installation

Gap above Light Curtain. The operator can reach into the machine without actuating Light Curtain.



Correctly installed

Light Curtain complemented with a horizontal Light Curtain to detect the operator.

Mounting Light Curtains and Light Grids

Vertical safety Light Curtains

A vertically mounted Safety Light Curtain that is used as the primary safety device must be mounted so that the bottom beam is no higher than 300mm (12") from the ground. Mounting heights above 300mm (12") may require supplemental safeguarding to prevent crawling or ducking under the Light Curtain. The top beam must be no lower than 900mm for reach over applications and 1200mm (48") for reach through applications. Mounting heights lower than this will require additional safeguarding.

Horizontal safety Light Curtains

A horizontal Safety Light Curtain that is used as the primary safety device must be mounted no higher than 300mm (12") from the ground. Mounting heights above 300mm (12") may require supplemental safeguarding to prevent crawling or ducking under the horizontal Light Curtain. The minimal length the Safety Light Curtain can be 1200mm (48") long.

The formula below is for mounting different resolutions from a horizontal surface.

$$\text{Height} = 15 \times (\text{Os} - 50\text{mm})$$

$$\text{Height} = 15 \times (\text{Os} - 2")$$

Note: Os represents the beam spacing.

Vertical perimeter safety Light Grids

A vertically mounted Safety Light Grid must be mounted such that the bottom beam is no higher than 300mm (12") from the ground.

Blanking

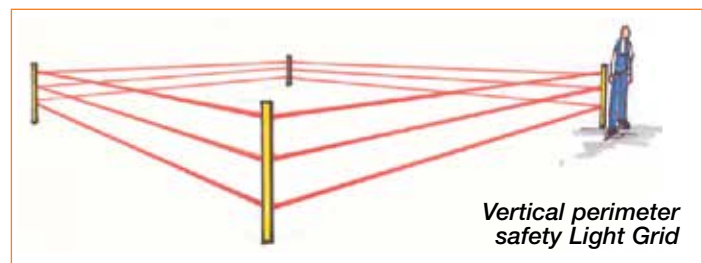
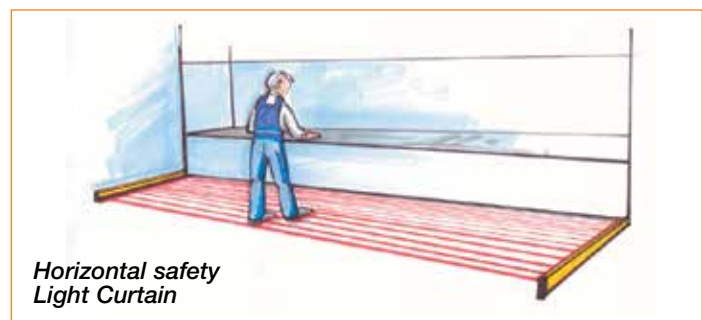
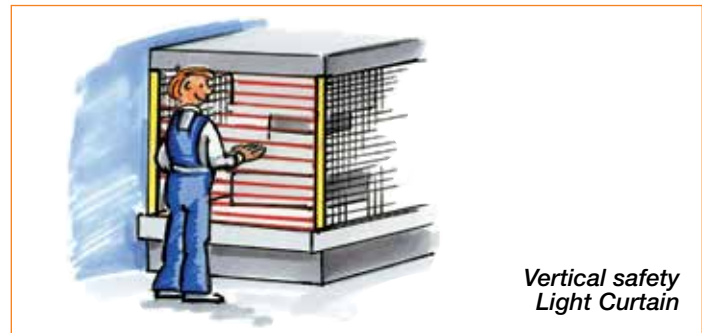
Blanking means permanent switching off of a number of beams in the detection zone of a light curtain. This is a function that is permitted and used when an object that is larger than the resolution of the light curtain is permanently located in the detection zone, without deactivating the safety outputs (OSSD). If the object is removed from the detection zone, the safety outputs are deactivated.

Blanking function has different tolerance settings that allow movement or vibration of the objects that obscure the detection zone.

One tolerance setting can be called Floating blanking, that means that the part of the zone which is intentionally blocked can be moved around in the detection zone while the machinery is operating. Other beams are active and providing normal protection, but often with reduced resolution.

When a blanking function is used, it is very important that the Light Curtain provides protection and can detect objects, as small as a finger or hand, depending on the resolution, anywhere outside the zone that is rendered inactive because the object is there.

Blanking may require an additional fixed guard and may require additional minimum distance to the dangerous movement. It must not be possible to select the blanking function without using a key, tool or similar unlocking device.

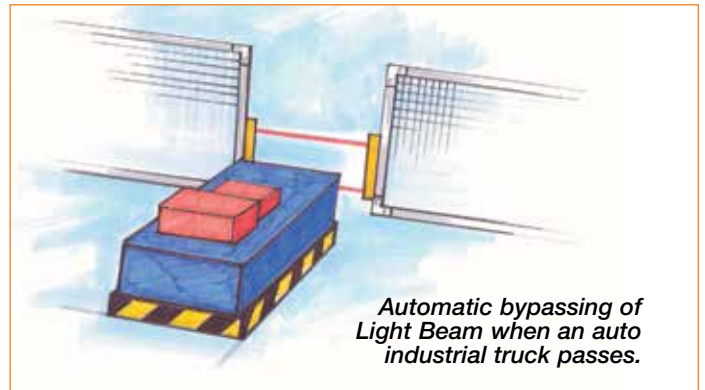


Muting (Bypassing)

Bypassing may be needed for different reasons. One of the most common reasons for muting is during in and out feeding of material on a conveyor, auto industrial trucks, etc. Another common application is bypassing while passing with a three-position device to the risk area.

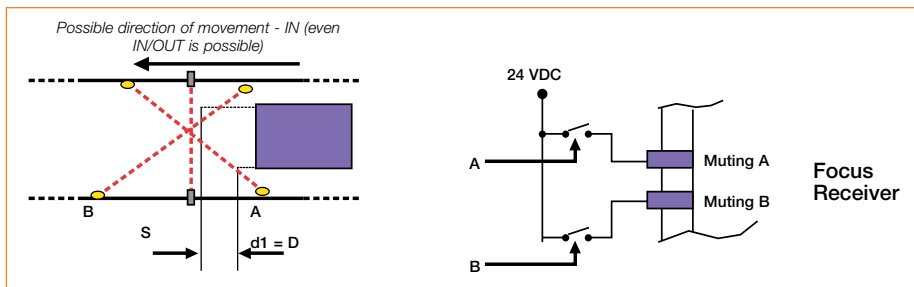
Important aspects for muting / bypassing are that it should be safe, not be activated by mistake and be difficult to defeat. In other words, it should give a reliable muting / bypassing when a loading carrier comes but not allow a human to pass. To achieve the highest safety level a dual and supervised muting / bypassing system is needed—usually with at least two independent signals.

To avoid deliberate defeating/manipulation of the bypassing sensors/signals a safety relay or a safety PLC is connected, thereby monitoring that both sensors are activated and deactivated in every bypassing cycle. This monitoring is built into Focus II.

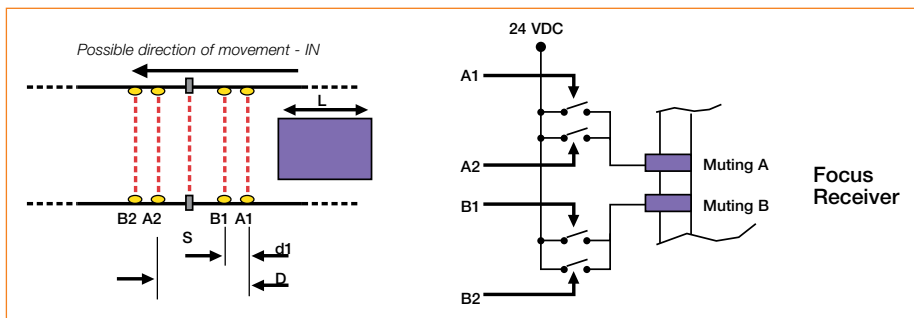


The amount of variants of muting / bypassing systems are almost infinite, depending on the specific requirements of each plant/machine. For Focus II there are a number of muting / bypassing possibilities prepared.

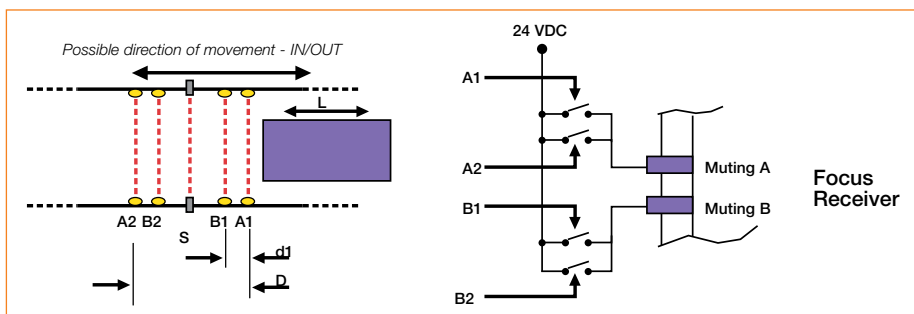
Examples on how the Muting Sensors can be placed



A solution with two sensors (photocells shown) and ONE (or TWO) movement directions for material transport.



A solution with four sensors and ONE movement direction for material transport.



A solution with four sensors and TWO movement directions for material transport.

Minimal safe distance calculation

The Minimal Safe Distance Calculation shall guarantee that a person is not able to reach a dangerous machine part before the machine movement has stopped. This is calculated with the formula as called for from the ANSI B11.19-2003 Performance Criteria for

the Design, Construction, Care and Operation of Safeguarding Standard.

Note: The calculations below are examples only and cannot be used for any specific application.

$$Ds = [K \times (Ts + Tc + Tr + Tspm)] + Dpf$$

Where:

Ds = minimum safe distance between the safeguarding device and the hazard

K = hand speed constant: 1.6 m/sec (63 inches/sec) minimum based on the movement being the hand/arm only and the body being stationary

Ts = worst stopping time of the machine/equipment

Tc = worst stopping time of the control system

Note: Ts + Tc are usually measured together with the ABB JOKAB SAFETY Stop Time Analyzer.

Tr = response time of the safeguarding device including its interface

Tspm = the additional stopping time, in seconds, allowed by the stopping performance monitor before it detects stop time deterioration

Dpf = maximum travel towards the hazard within the presence sensing safeguarding devices (PSSD) field that may occur before a stop is signaled

Note: Dpf (depth penetration factors) will change depending on the type of device and application.

K = The maximum speed at which an individual can approach the hazard, expressed in inches per second

To quote ANSI B11.19-2003: "The factor K is the speed constant and includes hand and body movements of an individual approaching a hazard area. The following factors should be considered when determining K: a) Hand and arm movement; b) Twisting of the body or shoulder, or bending at the waist; c) Walking or running.

One of the accepted values for K is the hand speed constant (it is usually considered as the horizontal motion of the hand and arm while seated). Its common value is 63 in./s although other values (typically higher) are also used. The hand speed constant does not include other body movements, which can affect the actual approach speed. Consideration of the above factors should be included when determining the speed constant for a given application."

For finger and hand detection Safety Light Curtains

$$Dpf \text{ in mm} = 3.4 \times (Os - 6.875\text{mm})$$

$$Dpf \text{ in inches} = 3.4 \times (Os - 0.275\text{"})$$

Where:

Os = minimum object sensitivity or resolution

For horizontal mounted Safety Light Curtains

$$Dpf \text{ in mm} = 1200\text{mm}$$

$$Dpf \text{ in inches} = 48\text{"}$$

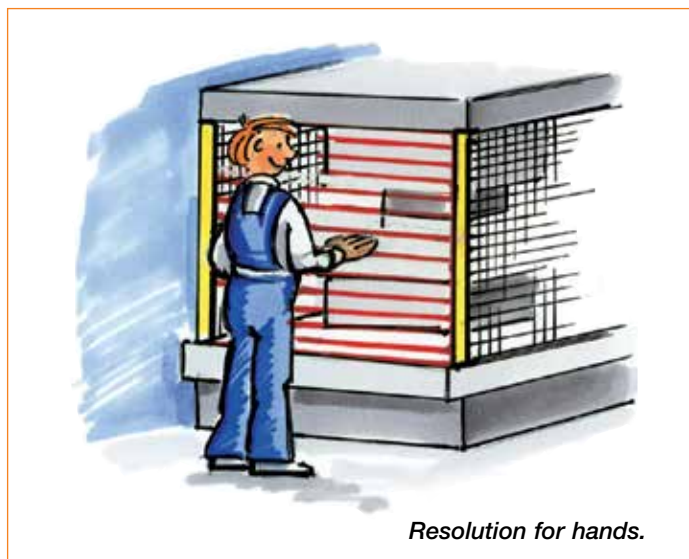
For multi beam Safety Light Grids

$$Dpf \text{ in mm} = 1200\text{mm for a 2 beam system}$$

$$Dpf \text{ in inches} = 48\text{" for a 2 beam system}$$

$$Dpf \text{ in mm} = 900\text{mm for a 3 beam system}$$

$$Dpf \text{ in inches} = 36\text{" for a 3 beam system}$$



Example 1: With the aid of the ABB JOKAB SAFETY Smart Stop Time Analyzer, a mechanical power press has a measured stopping time ($T_s + T_c$) of 325 ms. This includes both the stopping time of the machine as well as the stopping time of the control circuit. The response time of the Focus II Safety Light Curtain FII-4-30-900 with 30mm (1.18") resolution and 900mm (35.43") protective height is 25ms (T_r). The stop time break monitor is set for 400 ms.

$$\begin{aligned} D_{pf} &= 3.4 \times (30\text{mm} - 6.875\text{mm}) & D_{pf} &= 3.4 \times (1.18" - 0.275") \\ D_{pf} &= 3.4 \times 23.125\text{mm} & D_{pf} &= 3.4 \times 0.905" \\ D_{pf} &= 78.625\text{mm} & D_{pf} &= 3.077" \end{aligned}$$

$$\begin{aligned} T_{spm} &= 400\text{ms} - (T_s + T_c) \\ T_{spm} &= 400\text{ms} - 325\text{ms} \\ T_{spm} &= 75\text{ms} \end{aligned}$$

In this example the Safety Light Curtain must be mounted no closer than 767.63mm (30.22") from the hazardous pinch point.



Light Curtain as hand protection.

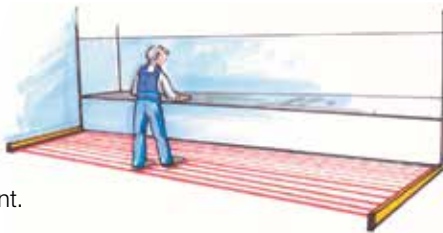
$$D_s = [K \times (T_s + T_c + T_r + T_{spm})] + D_{pf}$$

$$\begin{aligned} D_s &= [1.6\text{m/s} \times (325\text{ms} + 25\text{ms} + 75\text{ms})] + 78.625\text{mm} \\ D_s &= [63\text{inch/s} \times (325\text{ms} + 25\text{ms} + 75\text{ms})] + 3.077" \\ D_s &= [1600\text{mm/s} \times 425\text{ms}] + 78.625\text{mm} \\ D_s &= [63\text{inch/s} \times 425\text{ms}] + 3.077" \\ D_s &= [1600\text{mm/s} \times .425\text{s}] + 78.625 \\ D_s &= [63\text{inch/s} \times .425\text{s}] + 3.077" \\ D_s &= 680\text{mm} + 78.625\text{mm} \\ D_s &= 26.78" + 3.077" \\ D_s &= 758.63\text{mm} \\ D_s &= 29.86" \end{aligned}$$

Example 2: With the aid of the ABB JOKAB SAFETY Smart Stop Time Analyzer, a robotic loader has a measured stopping time ($T_s + T_c$) of 175 ms. This includes both the stopping time of the machine as well as the stopping time of the control circuit. The response time of the horizontally mounted Focus II Safety Light Curtain with 30mm (1.18") resolution is 29ms. The depth of penetration factor is fixed at

1200mm (48").

In this example the horizontal Safety Light Curtain must be at least 1518.4mm (60.54") from the hazardous pinch point.



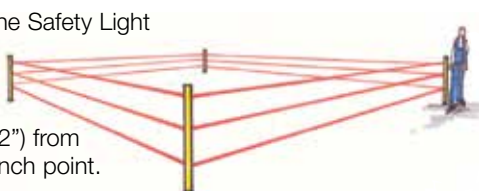
Light Curtain as area protection.

$$D_s = [K \times (T_s + T_c + T_r)] + D_{pf}$$

$$\begin{aligned} D_s &= [1.6\text{m/s} \times (175\text{ms} + 29\text{ms})] + 1200\text{mm} \\ D_s &= [63\text{inch/s} \times (175\text{ms} + 29\text{ms})] + 48" \\ D_s &= [1600\text{mm/s} \times 204\text{ms}] + 1200\text{mm} \\ D_s &= [63\text{inch/s} \times 204\text{ms}] + 48" \\ D_s &= [1600\text{mm/s} \times .204\text{s}] + 1200\text{mm} \\ D_s &= [63\text{inch/s} \times .209\text{s}] + 48" \\ D_s &= 326.4\text{mm} + 1200\text{mm} \\ D_s &= 12.85" + 48" \\ D_s &= 1526.4\text{mm} \\ D_s &= 60.85" \end{aligned}$$

Example 3: With the aid of the ABB JOKAB SAFETY Smart Stop Time Analyzer, a transfer gantry system has a measured stopping time ($T_s + T_c$) of 212 ms. This includes both the stopping time of the machine as well as the stopping time of the control circuit. The response time of the Focus II Safety Light Grid FII-4-K4-900 is 13ms (T_r). For a 4 beam Safety Light Grid the depth of penetration factor is fixed at 900mm (35.43").

In this example the Safety Light Curtain must be mounted no closer than 767.63mm (30.22") from the hazardous pinch point.



Light Curtain for long distances.

$$D_s = [K \times (T_s + T_c + T_r)] + D_{pf}$$

$$\begin{aligned} D_s &= [1.6\text{m/s} \times (212\text{ms} + 13\text{ms})] + 900\text{mm} \\ D_s &= [63\text{inch/s} \times (212\text{ms} + 13\text{ms})] + 35.43" \\ D_s &= [1600\text{mm/s} \times 227\text{ms}] + 900\text{mm} \\ D_s &= [63\text{inch/s} \times 227\text{ms}] + 35.43" \\ D_s &= [1600\text{mm/s} \times .227\text{s}] + 900\text{mm} \\ D_s &= [63\text{inch/s} \times .227\text{s}] + 35.43" \\ D_s &= 363.2\text{mm} + 900\text{mm} \\ D_s &= 14.3" + 35.43" \\ D_s &= 1263.2\text{mm} \\ D_s &= 49.73" \end{aligned}$$

Focus II Safety Light Curtains and Light Grids

Focus II is a new version of our previous Light Grid/Light Curtain Focus. Features such as muting and override are standard in all Focus II Light Curtains and Light Grids. For Light Curtains, blanking and break functions are also standard. The optical sensors on Focus II also have variable channel frequencies. The Focus II units are Light Curtains/Grids with safety functions intended for applications where it is of great importance to protect persons from a dangerous machine, robot or other automated systems where it is possible to access to a dangerous area.

Focus II creates a protection field with infrared beams. If any beam is interrupted the safety mechanism is triggered and the dangerous machine is stopped. Focus II fulfills the requirements for non-contact safety equipment type 4 (Focus II series) according to the international regulation standard EN 61496-1.

Units are available with safety heights between 150 and 2400 mm. All electronic control and monitoring functions are included in the Light Curtain profiles. External connection is made via a M12 connection at the end of the profile. Synchronization between transmitter and receiver is achieved optically. No electrical connection between the units is required. Control and monitoring of the beam transmission is carried out by two micro-processors which also give information on the status and alignment of the Light Curtain via several LEDs.

Muting and Override included in all Focus II

The “Muting” and “Override” functions are available on all Focus II Light Grids/Curtains and is enabled directly when an indication lamp is connected. Muting implies that one or more segments or the whole Light Curtain can be bypassed during in and out passage of material.

In the Focus II with Muting there is also an Override function which makes it possible to bypass the Light Grid/Curtain—i.e. activate the outputs if a machine start is necessary even if one or more Light Beams are interrupted. This is the case when the muting function is chosen and the A and B inputs are activated. If, for example, during the muting operation a loading pallet has stopped inside the safety field after a voltage loss, the override function is used to enable the pallet to be driven clear.

Floating Blanking or Fixed Blanking

The “Floating blanking or Fixed blanking” functions are available on all Focus II Light Curtains and is enabled directly via the internal dipswitches. Floating blanking makes it possible to ‘disconnect’ a defined number of beams from the safety field. The object is then free to move in the safety field without the safety function being triggered. During “fixed blanking” the object is not able to move in the safety field. The other beams are active with normal resolution.



Applications

Optical protection in an opening or around a risk area for:

- Mechanical and hydraulic power presses
- Molding presses
- Stamping, riveting and eyelet operations
- Automated machinery
- Robotic cells
- Conveyors
- Material handling equipment
- Printing presses
- Welding equipment
- Machining centers
- Packaging machinery

Features

- Type 4 according to EN 61496
- Flexible assembly
- LED indication
- High protection class (IP65)
- Range 3 to 40 m
- Time reset
- Floating/fixed blanking
- Muting
- Single/double break function (PSDI)
- External device monitoring (EDM)
- Available with different resolutions
- Up to PL e according to EN 954-1/EN ISO 13849-1



Muting with MFII-T and MFII-L Units

Approvals



Safety outputs OSSD1 and OSSD2

Focus II has two PNP outputs—OSSD1 and OSSD2. If the load to be switched is alternating current or requires a higher current than 500 mA then one should use a safety interface, e.g. E1T, Pluto PLC or the FRM-1 unit (converts the outputs to relay contacts) from ABB JOKAB SAFETY. The FMC-Tina and Tina 10A/10B/10C converts the outputs to a dynamic signal for connection to Pluto or Vital. Pluto can also work directly with the OSSD-outputs.

Single/Double Break Function (PSDI)

With the Single Break function the Light Curtain allows operation after entry and withdrawal out of the curtain. Similarly, the Double Break function allows operation after entry and withdrawal twice.

External Device Monitoring (EDM)

In all Light Grids and Light Curtains an EDM function is available which allows Focus II to test if the external control element responds correctly. A test channel is connected through the respective contactor, in order to detect any faults and thereby prevent a reset.

Focus II Light Curtain

Standard

- Muting (bypassing) partly or completely
- Supervised output for muting lamp
- Override
- Manually supervised or automatic reset
- Time-reset
- Fixed or floating blanking
- Single/double break
- EDM

Reset

On every Focus II there are inputs for reset and other functions—Reset, Alignment and Override (bypassing is only possible when muting is used.) The reset option is chosen through dual switches in the Focus II receiver. At delivery, Focus II is set to automatic reset.

- **Automatic reset** – When the light field is free the outputs are closed directly. (Setting when delivered).
- **Manual reset** – Focus II gives a ready signal when the light field is free and the reset button has been actuated.
- **Time reset** – During manual reset. To reset the Focus II a pre-reset button must first be actuated and afterwards within 8 seconds a reset button outside the risk area must be actuated.

Note: For further technical information, please reference the Focus II operating manual.

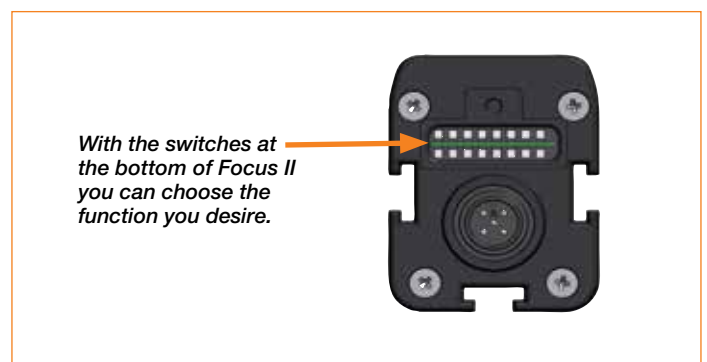
Focus II Light Grid

Standard

- Muting (bypassing) of one, two, three or four beams
- Supervised output for muting lamp
- Override
- Manually supervised or automatic reset
- Time-reset
- EDM

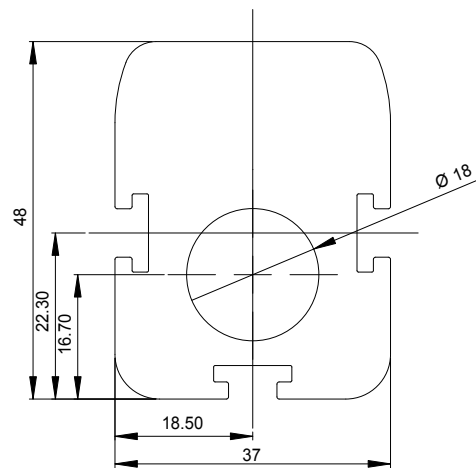
Option

- Light Grids for tough environments with parallel beams of light for improved reliability.



Technical data

Manufacturer	ABB JOKAB SAFETY
Ordering information	see page 36
Supply voltage	24VDC \pm 20%
Power consumption	
Transmitter	70 mA maximum
Receiver	100 mA maximum
Safety level	
EN/IEC 61496	Type 4
EN 954-1	Focus II type 4: Category 4
EN ISO 13849-1	Focus II type 4: PL e
EN/IEC 61508	Up to SIL 3
PFH _d	2.5×10^{-9}
Resolution	14 mm and 30 mm
Wavelength on transmitter LED	880 nm
Profile dimensions	37 x 48 mm
Protection class	IP65
Operating temperature	-10 to +55° C
Storage temperature	-25 to +70° C
Outputs	2 supervised PNP outputs with cross circuit monitoring
Max. load	500 mA (overload c.c. protection)
Response time	9 – 68 ms (depending on model)
Connection transmitter	M12 5-pin
Connection receiver	M12 8-pin
Indicator	LEDs on the transmitter and receiver indicating adjustment, dirt, power supply and outputs
Enclosure	Aluminium painted yellow
Conformity	2006/42/EG, EN/IEC 61496-1/2 EN 954-1, EN ISO 13849-1 EN/IEC 61508



Muting (bypassing)

Focus II muting types

- T-muting. Four NO muting sensors are used in two pairs (OR function), allowing bi-directional transport of material. Maximum muting time is 600 s. Muting A and Muting B need an activation time difference of 30 ms.
- L-muting. Two NO muting sensors works together with the light protection, allowing transport out from the hazardous area. Maximum muting time is 600 s. Muting A and Muting B need a activation time difference of 30 ms.
- X-muting. One NO and one NC muting sensor is like a cross through the light protection, allowing bi-directional transport of material. An alternative X-muting (only on Focus Light beams) with 2 NO muting sensor is also possible, but then with the condition of a 30 ms activation time difference on the muting sensors. Both solutions gives an infinite muting time.

Built-in muting for Focus II is available in three ways:

- Pre-made muting units MF-T and MF-L, which have integral photocells.
- Connection of muting sensors via a FMC.
- Separate connection of muting sensors (Mute R) directly to the Focus II receiver unit.

Muting-lamp

It is possible to connect the muting-lamp via a FMC. During bypassing the muting-lamp is lit. Bypassing is only possible if the muting-lamp is functioning or a resistor of 220 Ohm is used in its place.

Muting with MF-T and MF-L units

MF-T and MF-L are muting units with integrated photocells built into a aluminum profile. They work with all Focus II Light Curtain and Light Grids. No additional sensors are required because the muting units contain the required components. MF-T/MF-L is connected between the Focus II and the supervising unit (e.g safety relay, safety PLC). The cable between the Focus II and MF-T/MF-L is included with the muting unit.

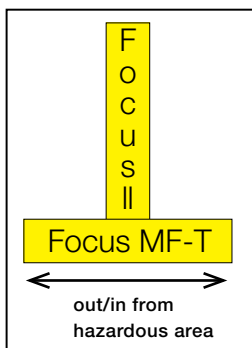
MF-T

The muting unit MF-T consist of a transmitter unit and a receiver unit with four photocells A1, B1, B2 and A2. A1 and A2 are connected in parallell and B1 and B2 connected in parallell. In this way the unit is configured for installations where material is transported into and/or out of a hazardous area.

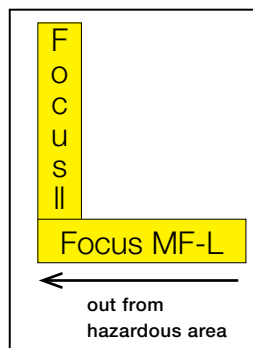
MF-L

The muting unit MF-L consist of a transmitter unit and a receiver unit with two photocells A1 and B1. The A1 and B1 sensor are actuated before the material is transported through the Light Curtain and Light Grids. The Light Grid is an active part in upholding the muting function once A1 and B1 have been passed by the material. The Light Curtain and Light Grids are being bypassed just as long as the material exiting. Unit MF-L is primarily intended for material transport out of a hazardous area.

MF-T



MF-L



M12 connection between Focus II and MF-T Reflex

MF-T Reflex

The muting unit MF-T Reflex consist of a transmitter/receiver side and a reflector unit. The active side contains four transmitters/receivers photocells. The MF-T Reflex works as the MF-T with a limited range (6m). These units, together with a Light Grid with one active and one passive side provides a good solution where electrical connections are only necessary on one side!

MF-L Reflex

The muting unit MF-L Reflex consist of a transmitter/receiver unit and a reflector unit. The active side contains two transmitters/receivers photocells. The MF-L Reflex works as the MF-L with a limited range (6m). These units, together with a Light Grid with one active and one passive side provides a good solution where electrical connections are only necessary on one side!

Muting with MFII-T/MFII-L Units

MFII-T and MFII-L are muting units with integrated photocells in the same profile type as the Focus II Light Curtain/Grid. No additional sensors are required because the muting units contain the required components. MFII-T/MFII-L is connected directly to Focus II with M12 connectors.

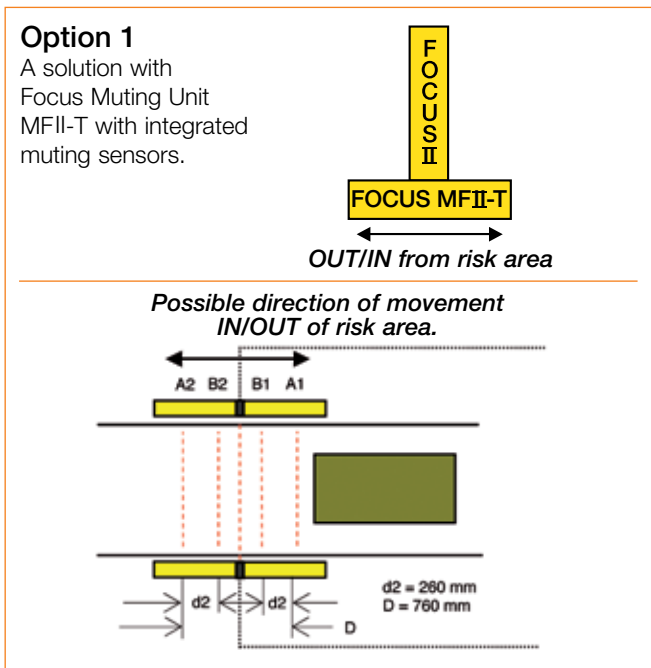
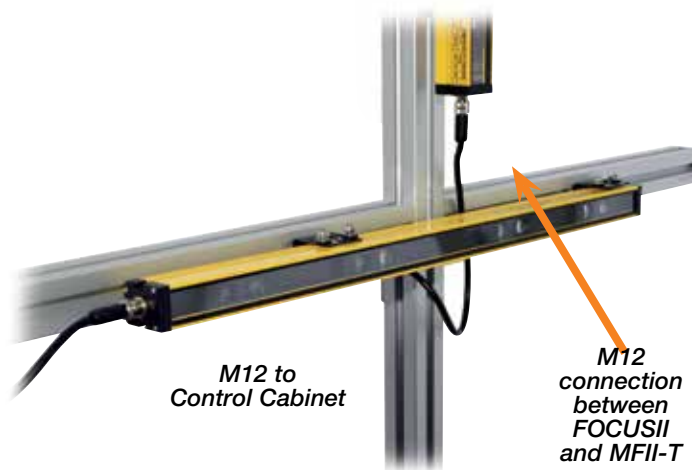
MFII-T (Option 1)

MFII-T contains four photocells—A1, B1, B2 and A2—arranged as shown. they are configured for installations where material is transported “in” or “out” — or in both directions “in and out”.

MFII-L (Option 2)

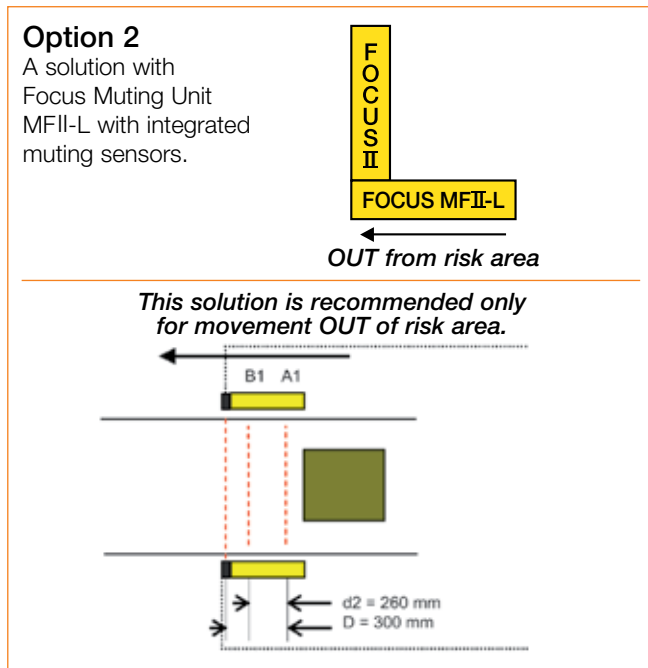
MFII-L contains two photocells—A1 and B1—which are actuated before and by material exiting through the Light Curtain/Grid. The Light Curtain/Grid remains bypassed just prior to the exit of the material.

Note: MFII-L is primarily intended for material transport “out” of a working area.



Note: The muting sensors A and B must be placed so that the sensor A is always activated at least 30 ms before sensor B.

D: indicates the minimum length of the material that is to actuate the muting sensors that must be maintained during the passage through the Light Curtain/grid.



d2: indicates the measurement between the two preassembled muting sensors within the MFII-T and MFII-L.

Muting with MFII-T Reflex/MFII-L Reflex Units

MFII-T Reflex and MFII-L Reflex are muting units with integrated retro-reflective photocells in the same profile type as the Focus Light Curtain/Grid. No additional sensors are required because the muting units contain the required components. The Reflex series simplifies the set up of muting sensors, as only 1 side requires a cable connection. The reflective side is a polarized reflector bar. MFII-T Reflex and MFII-L Reflex are connected directly to the Focus Receiver with M12 connectors.

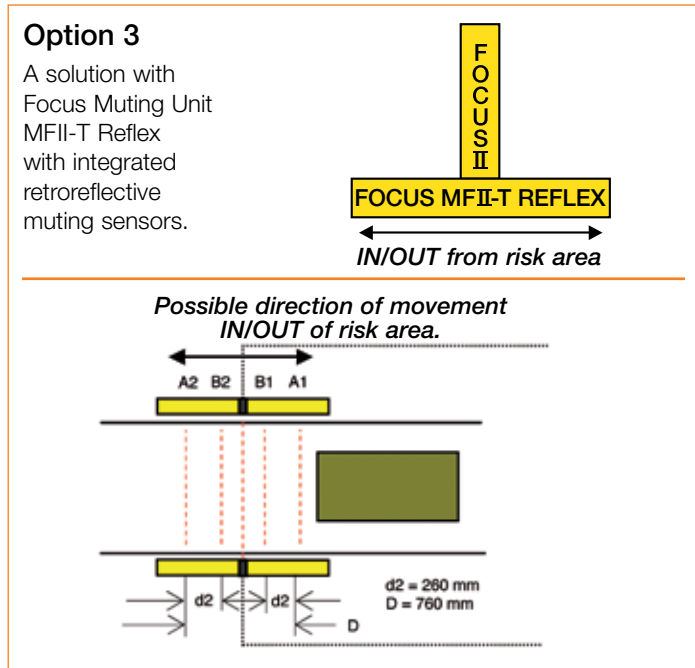
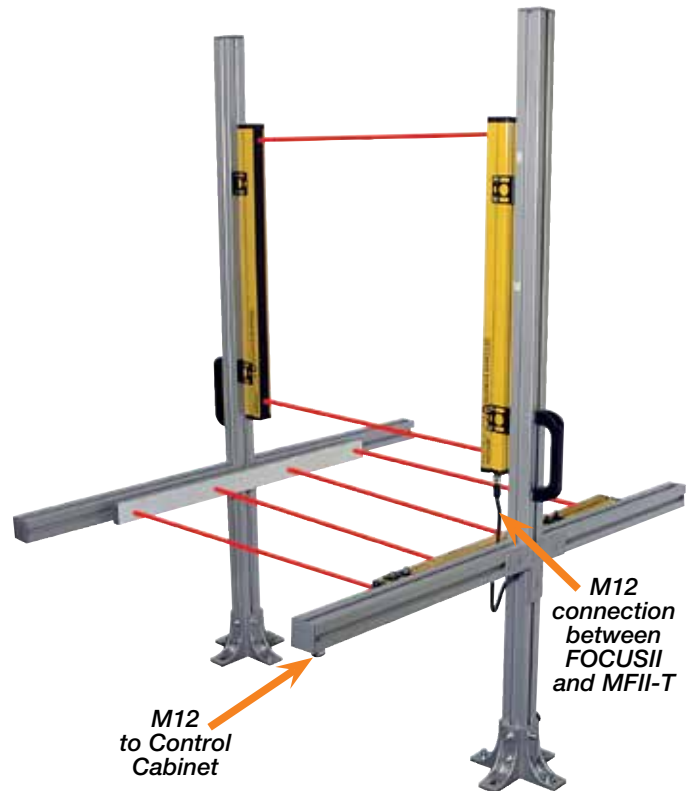
MFII-T Reflex (Option 3)

MFII-T Reflex contains four transmitters/receivers and a separate reflector unit. Range 6m. Used in the muting mode for transport of material into and/or out of hazardous areas. For other functions refer to Option 1. This unit, together with Light Beam FII-4-K1C-500 provides electrical connections on only one side.

MFII-L Reflex (Option 4)

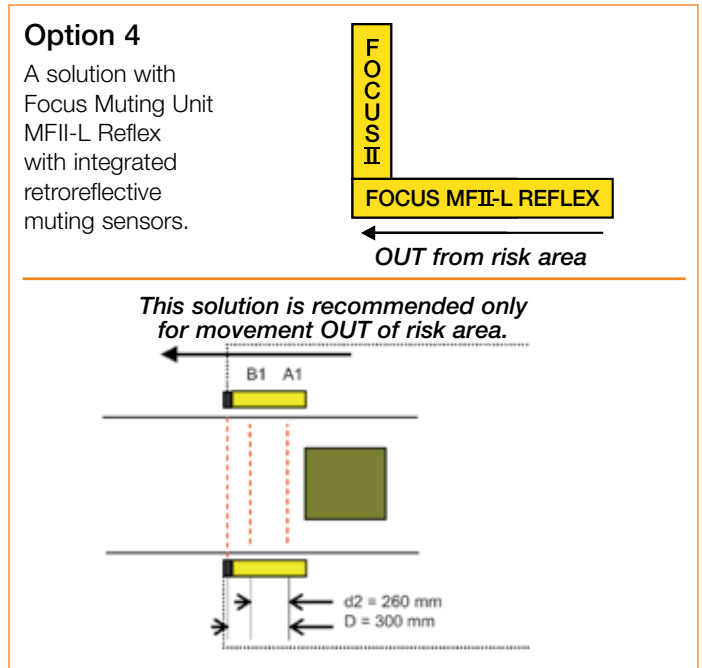
MFII-L Reflex contains two transmitters/receivers and a separate reflector unit. Range 6m. Used in the muting mode for transport of material into or out of hazardous areas. For other functions refer to Option 2. This unit, together with Light Beam FII-4-K1C-500 provides electrical connections on only one side.

Note: MFII-L Reflex unit is primarily intended for material transport "out" of a working area.



Note: The muting sensors A and B must be placed so that the sensor A is always activated at least 30 ms before sensor B.

D: indicates the minimum length of the material that is to actuate the muting sensors that must be maintained during the passage through the Light Curtain/grid.



d2: indicates the measurement between the two preassembled muting sensors within the MFII-T Reflex and MFII-L Reflex (= 150mm).

Muting sensors – Mute R

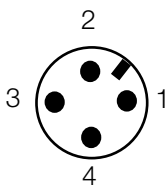
Retro-reflective with polarizing filters



Technical data

Manufacturer	ABB JOKAB SAFETY
Ordering information	see page 46
Output	PNP, dark on
Connection	Connector M12
Range adjustment	Yes
Range	0.15... 2.5 m (with reflector FZR 1) 0.15...5m (with reflector FZR 2A)
Light source	Visible-red, 660 nm, pulsed with polarizing filter
Supply voltage	10...30 VDC
Allowable ripple	± 10% of Us
Current consumption (without load)	<15 mA
Max. load current	100 mA
Residual voltage	<1.6 V
Max. switching frequency	1000 Hz
Protection class	IP67
Temperature (operating and storage)	-25 to +65° C
Weight	approx. 15 g
All technical data at 25° C and 24V.	

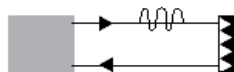
Connector M12



10...30 VDC

PNP

Dark-on output

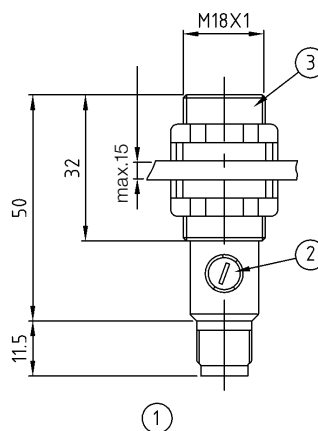


Approvals:



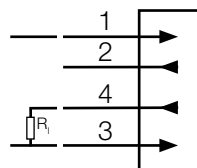
Features:

- Range adjustable
- Light reserve warning indicator
- Transistor output, PNP
- 1000 Hz switching frequency
- Short-circuit protection, reverse polarity protection and power-up output suppression
- Connector M12
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



1. Connector M12
2. Range adjustment and function indicator
3. Plastic housing

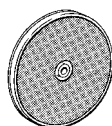
PNP output



- 1 (+) Supply voltage 10...30 V
- 2 (Dark-on output)
- 3 (-) Supply voltage
- 4 (Dark-on output)

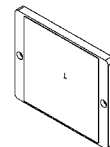
Dark-on output

The output is activated when an object interrupts the light.



FZR 1 2TLA022044R0100

Reflector Ø 80 mm incl.screw MC6S M5 x 14 + Locking nut M5.

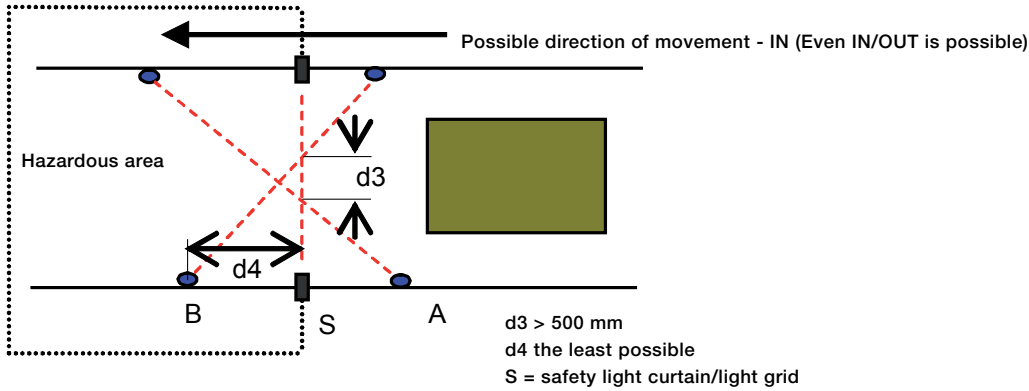


FZR 2A 2TLA022044R0400

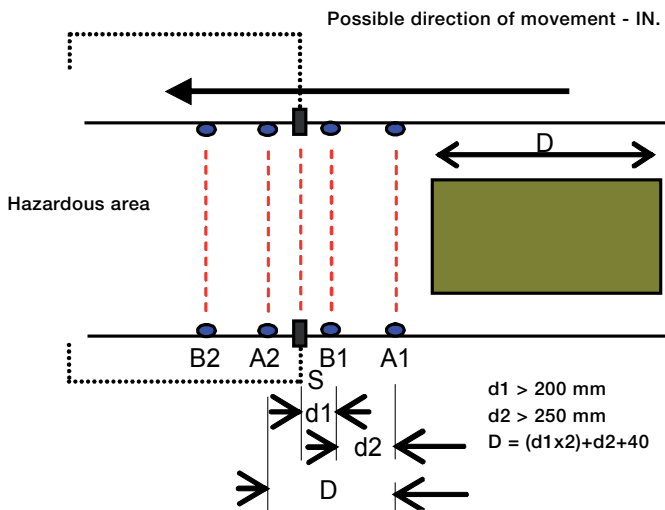
Reflector 100 x 100 mm incl. screw MC6S M5 x 14 + Locking nut M5.

Muting with Mute R

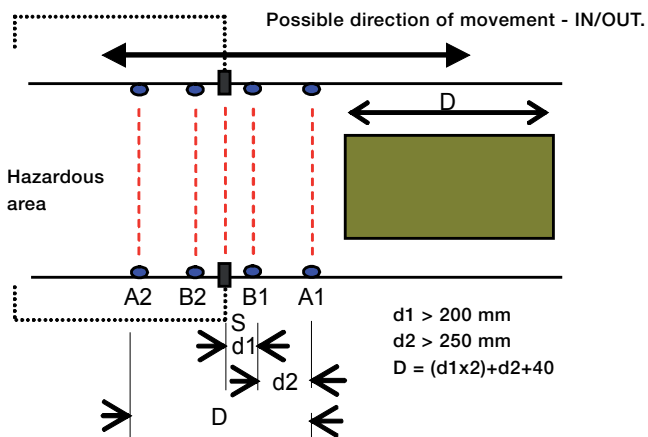
A solution with two sensors and one movement direction for material transport:



A solution with four sensors and one movement direction for material transport:



A solution with four sensors and two movement directions for material transport:



D: indicates the minimum length on the material that is to actuate the muting sensors that must be maintained during the passage through the Light Curtain or Light Grid.

d1 must be as short as possible, and definitely less than 200 mm

d2: indicates the distance between A1 and B1

Muting accessories FMC and FMI units



Approvals:



Applications:

- FMC: Muting connection box
- FMI: Muting Indicator

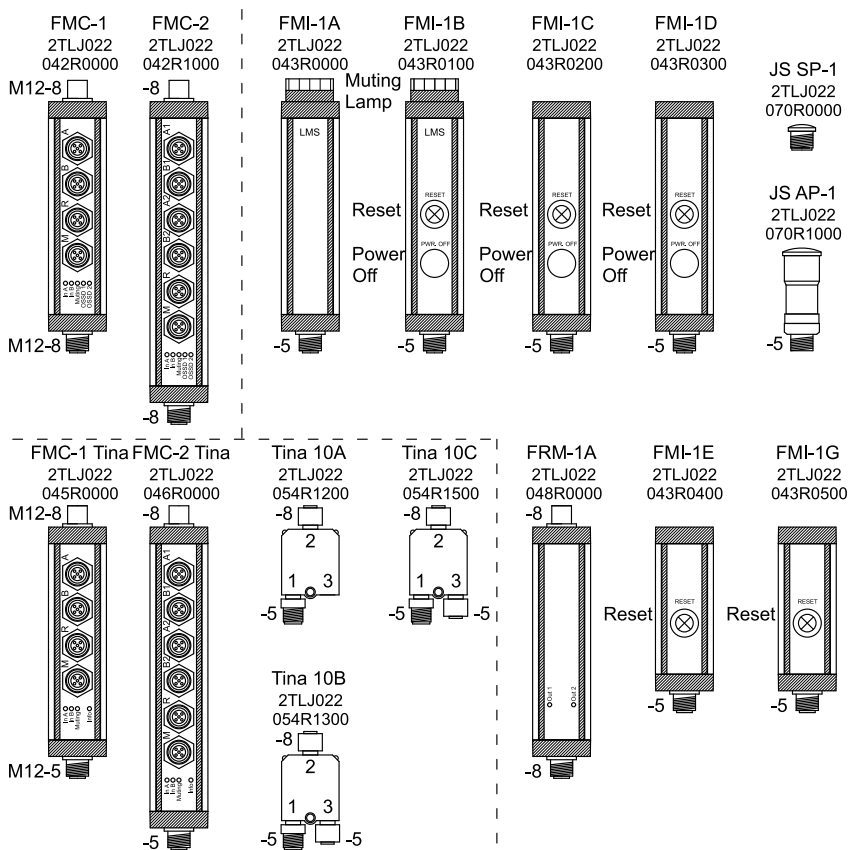
Features:

- Small
- Easy to connect

Various FMC, FMI, FRM- versions and Tina units

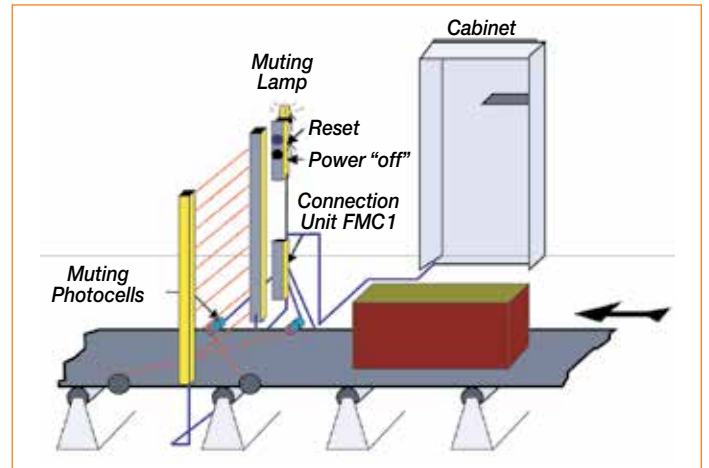
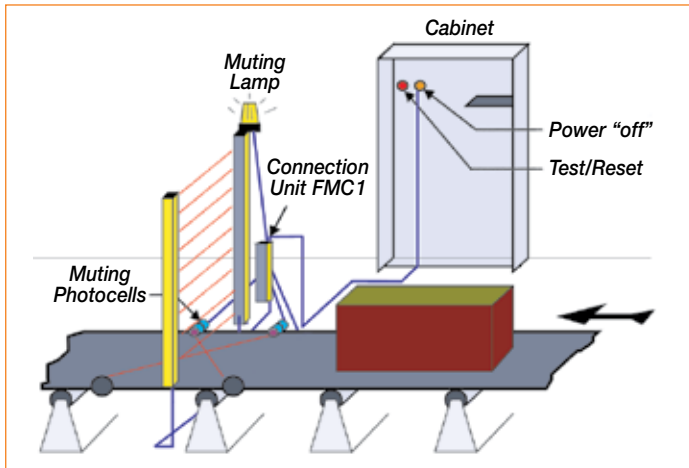
The Tina-versions have dynamic safety outputs for Vital/Pluto.

Model	Description
FMC-1(2)	with connectors for muting sensors (A+B), reset, power off and muting lamp (R) and muting lamp (M).
FMI-1A	with muting lamp only.
FMI-1B	with reset, power off and muting lamp.
FMI-1C	with reset and power off.
FMI-1D	with reset, power off and internal resistor for the muting lamp.
FMI-1E	as pre reset connected to connector A (A2) on FMC-1(2) (Tina).
FMI-1G	with reset, and internal resistor for the muting lamp.
FMC-1 (2) Tina	same as FMC-1(2) but connected to Vital or Pluto.
Tina 10A	adaptor unit for connecting Focus II to Vital or Pluto.
Tina 10B	simplified FMC-1(2) Tina including only the connector (R).
Tina 10C	simplified FMC-1(2) Tina including only power supply on con.no.3.
FRM-1A	translates the two OSSD outputs to relay outputs (and power supply).
JS SP-1	protection plug for not used connectors.
JS AP-1	adaptor for FMC units to use instead of FMI-1B or -1D on the (R) connector including muting resistor.

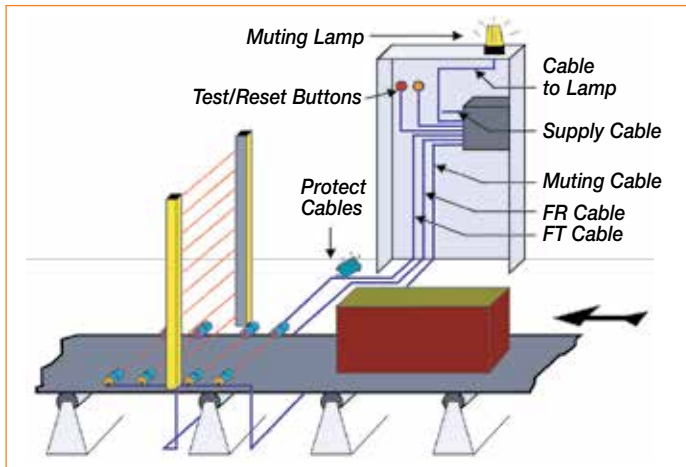


Connection of Focus II and Muting Components with FMC1 and FMI1

Connection of Light Curtain with connection block FMC 1, text/reset button 1 and switch for supply voltage placed in or by the control cabinet. Connection of Light Curtain with connection block FMC1. The FMI reset unit must be placed out of reach from the risk area.



Connection of Focus II and Muting Components directly to Control Cabinet



The test/reset button shall be placed so the operator can see the protected area during reset, testing and bypassing, It should not be possible to reach the button from within the risk area.

The lamp for indication of muting and bypassing shall be placed so that it can be seen from all directions from where it is possible to access the dangerous area.

If photocells are used as muting sensors, the sensor receivers should be assembled on the Light Curtain's transmitter side to minimize the interference risk.

The system is protected against dangerous functions caused by damage on the transmitter cable and/or the receiver cable. However, we recommend that the cables be protected so that physical damage to them can be minimized.

Focus II Modular Muting Capabilities

The Focus II Safety Light Curtain offers the selection of complete muting of the protective field during the in and out passage of material. Through dipswitch settings in the Focus standard version, it is also capable of muting only specific modules within the protective field.

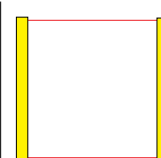
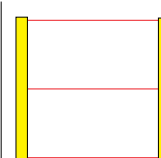
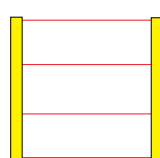
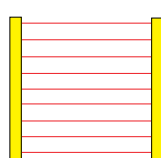
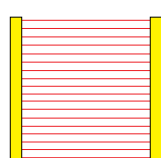
The Focus II is capable of muting independent beam module packets or a combination of them (up to 4). For example, a box travels down a conveyor and instead of muting the entire Light

Curtain you can mute only modules 1 and 2—which equates to the height of the box—allowing continual protection on the remaining Safety Light Curtain modules.

The module size is directly dependent on the Focus II Light Curtain resolution and length.

Focus II Type 4 (FII-4) summary

Note: For ordering information see the components list beginning on page 36. For more information visit www.jokabsafety.com

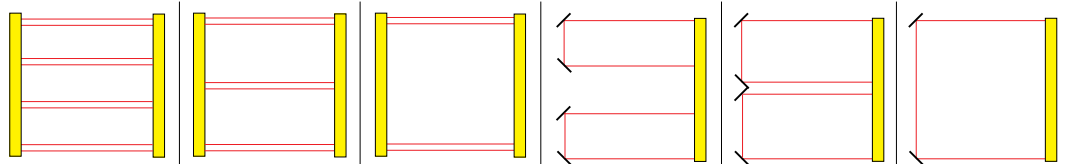


Type 4	FII-4-14-zzzz	FII-4-30-zzzz	FII-4-K4-zzzz		FII-4-K3-800	FII-4-K2-500
Resolution	14	30	300	400	400	500
Height (mm=zzzz)	150	150	900	1200	800	500
	300	300				
	450	450				
	600	600				
	750	750				
	900	900				
	1050	1050				
	1200	1200				
	1350	1350				
	1500	1500				
	1650	1650				
	1800	1800				
	1950	1950				
	2100	2100				
	2250	2250				
2400	2400					
Range (m)						
SR	0.2-3	0.2-7	0.5-20		0.5-20	0.5-20
LR	3-6	7-14	20-40		20-40	20-40
Reaction time off (ms)	12-68	9-31	13		13	13
Reaction time on (ms)	138-104	141-119	142		142	142
Manual reset	■	■	■		■	■
Automatic reset	■	■	■		■	■
Pre reset	■	■	■		■	■
Muting inputs	■	■	■		■	■
Muting lamp supervision	■	■	■		■	■
Override	■	■	■		■	■
Muting T/L/X	■	■	■		■	■
Blanking 3 types	■	■	■		■	■
Single/Double break	■	■	■		■	■
EDM	■	■	■		■	■
Dyn. Adaption to Vital/Pluto	◆	◆	◆		◆	◆

■ Standard

◆ With Tina 10A/10B/10C or FMC_Tina.

Note: For ordering information see the components list beginning on page 36. For more information visit www.jokabsafety.com



Type 4	FII-4-K4-zzzz D		FII-4-K3-800 D	FII-4-K2-500 D	FII-4-K2C-zzzz		FII-4-K2C-800	FII-4-K1C-500
Resolution	300	400	400	500	300	400	800	500
Height (mm=zzzz)	900	1200	800	500	900	1200	800	500
Range (m) SR LR	0.5-20 20-40		0.5-20 20-40	0.5-20 20-40	0.5-7		0.5-8	0.5-12
Reaction time off (ms)	13		13	13	13		13	13
Reaction time on (ms)	142		142	142	142		142	142
Manual reset	■		■	■	■		■	■
Automatic reset	■		■	■	■		■	■
Pre reset	■		■	■	■		■	■
Muting inputs	■		■	■	■		■	■
Muting lamp supervision	■		■	■	■		■	■
Override	■		■	■	■		■	■
Muting T/L/X	■ / ■ / ■		■ / ■ / ■	■ / ■ / ■	■ / ■ / ■		■ / ■ / ■	■ / ■ / ■
Blanking 3 types	- / - / -		- / - / -	- / - / -	- / - / -		- / - / -	- / - / -
Single/Double break	- / -		- / -	- / -	- / -		- / -	- / -
EDM	■		■	■	■		■	■
Dyn. Adaption to Vital/Pluto	◆		◆	◆	◆		◆	◆

■ Standard

◆ With Tina 10A/10B/10C or FMC_Tina.

Bjorn Stand System for Light Grids and Mirrors

Bjorn is a very stable and flexible stand system in which Focus II Safety Light Curtains/Grids and Mirrors are mounted in the stand. The hardware for the mirrors in the stand can be turned to provide either vertical or horizontal angles. The robust material of the Bjorn protects Focus II units from direct collisions, thus preventing unnecessary material damage and halts in production.

Bjorn technical data

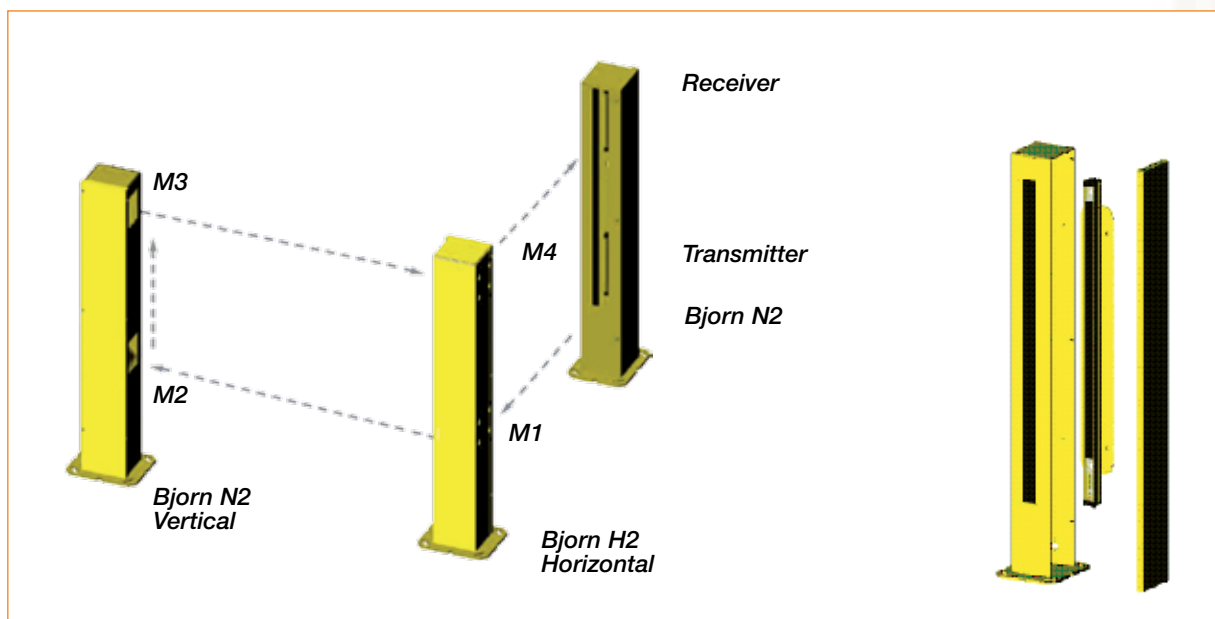
Manufacturer	ABB JOKAB SAFETY
Ordering information	see page 43
Color	Yellow powder-coated (RAL 1018)
Material	3 mm steel
Dimensions	
Cross section	146 mm x 130 mm
Foot	230 mm x 190 mm
Weight	
H2, V2 and N2	15 kg/piece
H3	17 kg/piece
H4-1, H4-2	20 kg/piece
N5	27 kg/piece
Mirror reduction	≤10 %

Applications:

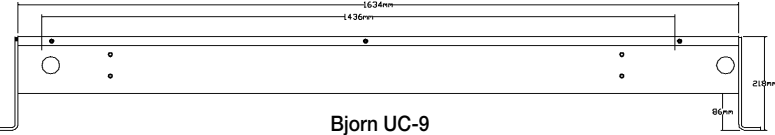
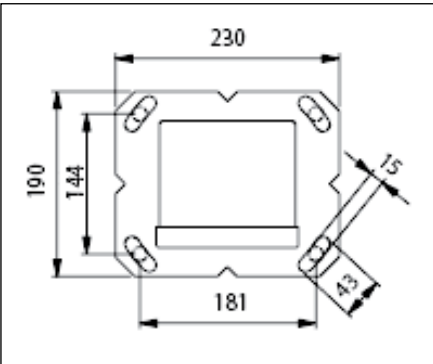
- Protects mirrors and Light Curtains and Light Grids

Features:

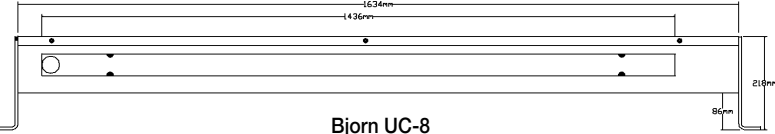
- Robust
- Adjustable



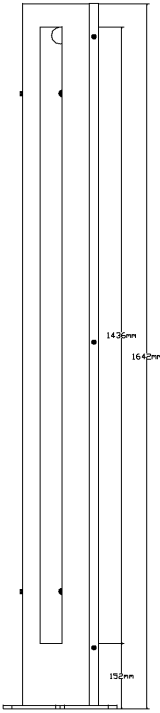
Bjorn dimensions



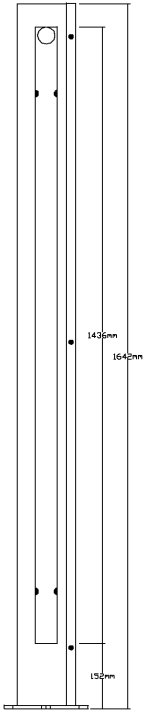
Bjorn UC-9



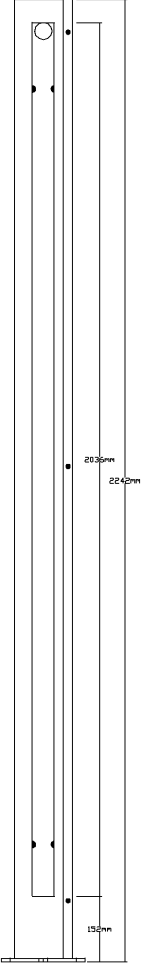
Bjorn UC-8



Bjorn UC-10



Bjorn UC-3



Bjorn UC-4

Wet wash down tubes for protection against water and dust

Wet Wash Down Tubes are used for protection against water (or dust) where extreme washing conditions are encountered. The protective encapsulation rating (IP68) now enables Focus II Light Curtains and Light Beams to be used for such applications as the food industry, where the use of high pressure washing for cleaning machinery often occurs. The draining and through ventilation capabilities mean that condensation can be avoided.

During installation on a machine, a Wet unit can be adjusted by +/- 20° with the accompanying angle bracket. The plastic tube is rotatable and the outside is easy to clean.

Wet technical data

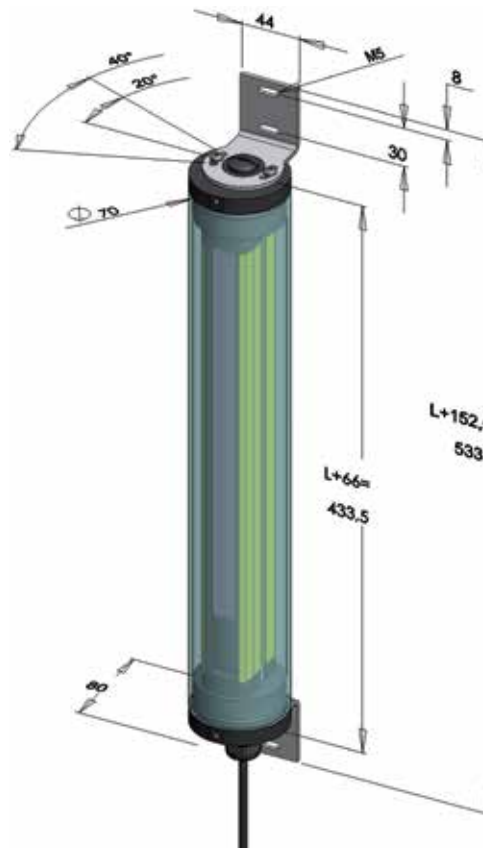
Manufacturer	ABB JOKAB SAFETY
Ordering information	see page 43
Color	Transparent plastic
Length including lid	light curtain/Light Beam + 66 mm
Material	
Tube	PC
Lid	PEHD-300
Angle bracket	Stainless steel
Max. ambient temperature	+55°C
Installation adjustment	± 20°
Protection rating	IP68 (IP69K)

Applications:

- Protection in severe environments

Features:

- Adjustable +/-20°
- Rotatable and replaceable
- Capable of draining & through ventilation



BP1 Blanking Programmer

A quick way to program Blanking

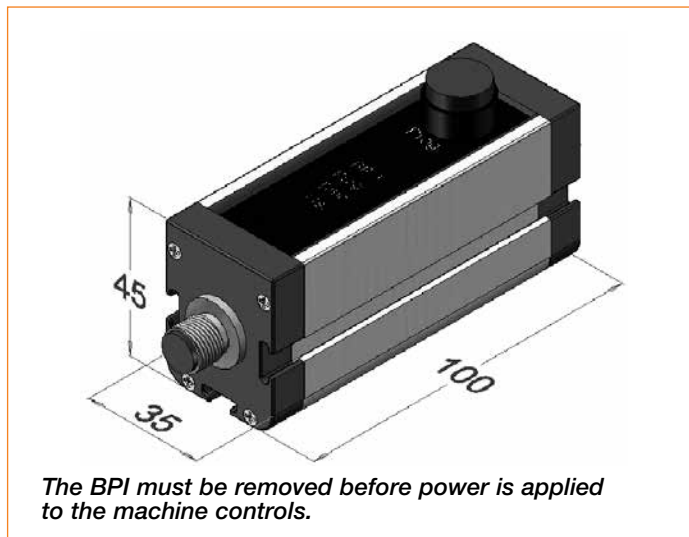
A dipswitch at the cable connection of the Light Curtain receiver enables a choice of whether a blanking function is to be used. Once this choice has been made, programming of the unit in the light field is made easy by using the Blanking Programmer BP1.

If the extent of the object in the protected field then changes, the Light Curtain can be reprogrammed — only 11 seconds after the push button on the front of the BP1 has been pressed.

The BP1 is easily connected, in series with the cable to the Light Curtain receiver unit, using the M12 connector and the free length of the unit's cable.

BP1 technical data

Manufacturer	ABB JOKAB SAFETY
Ordering information	see page 45
Color	yellow and black



Adjustable mounting brackets - Mount

The Focus II adjustable mounting brackets offer over 12 different mounting possibilities with adjustability in vertical height, pivoting, rotating and angeling. The adjustable brackets simplify the installation and set up of Focus II Safety Light Curtains and Grids

Brackets technical data

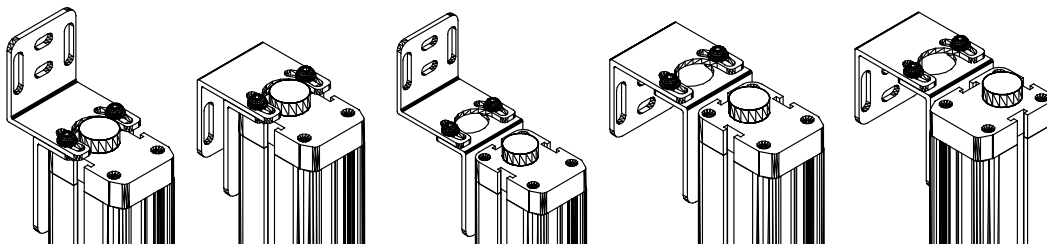
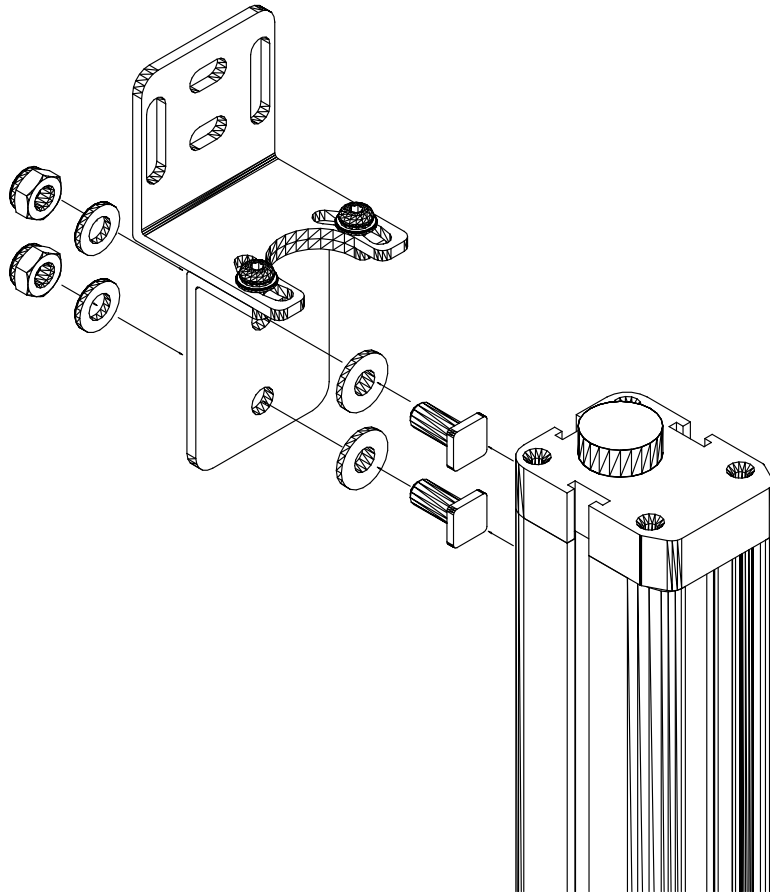
Manufacturer	ABB JOKAB SAFETY
Ordering information	see page 45
Color	Black powder coated

Applications:

- Focus Light Curtains and Light Grids mounting

Features:

- Over 12 different mounting capabilities
- High rotational radius

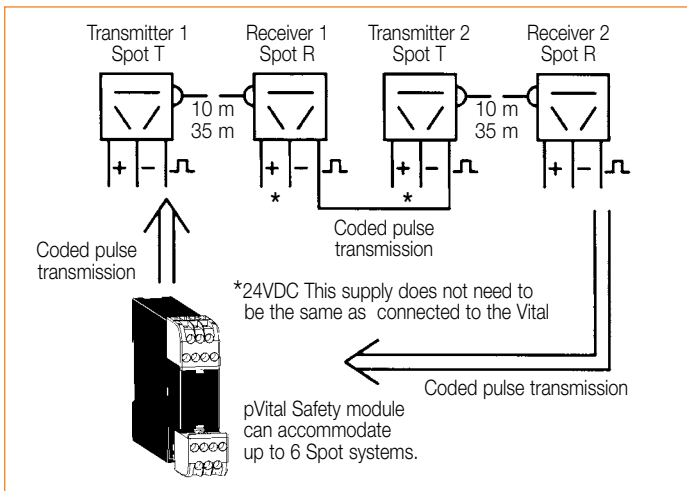


Spot safety Light Beam for the highest level of safety

The Light Beam is available in two versions—Spot 10 for distances up to 10 m and Spot 35 for up to 35 m. The Light Beams can be mounted at different heights and be angled around a machine using our mirrors and brackets.

Spot and Vital in combination fulfills the requirements for Category 4 according to EN-954-1/EN ISO 13849-1 and type 4 according to EN 61496. Several Light Beams, Eden sensors and Emergency Stops can be connected in series achieving the high safety level for the safety circuit. A number of solutions for bypassing of Light Beams for material transport are available.

For indication there are LEDs on the transmitter and on the receiver which indicate 'contact' between transmitter and receiver and safety status. The 'contact' information is available via the Light Beam receiver connection cables.



Function

The Spot Light Beam is supervised by the Vital Safety Module. A unique coded signal is sent out from the control unit (Vital) to the transmitter (Spot T). The signal which comes back from the receiver (Spot R) is then compared in the Vital. If the correct coded signal is received the Vital switches the necessary safety output contacts to permit dangerous machine movements. Coding guarantees that no output signals can be produced by light from other sources, interference or faults in components in the transmitter or receiver. The Light Beam is dynamically supervised which means that if the signal stops pulsating at the correct frequency it is immediately detected. By using this special code function in the sensors, the signal can travel via up to 6 transmitter/receiver pairs which are not electrically connected to the Vital unit.



Applications

- Photoelectric guarding of an entrance or around a risk area

Features

- Safety level type 4 according to EN 61496
- Versatile mounting
- LED indication
- Protection class IP67
- 10 m or 35 m range
- Bypassing possibility
- Can be connected with several other different safety devices in the same safety circuit at category 4 together with Vital according to EN ISO 13849-1.



Approvals

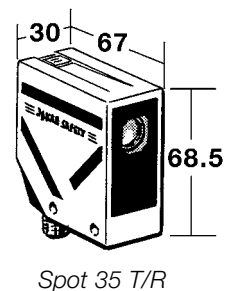
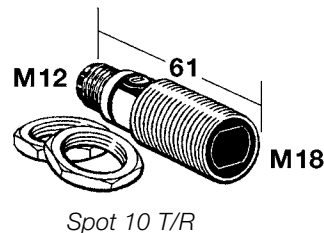
TÜV Nord



Spot technical data

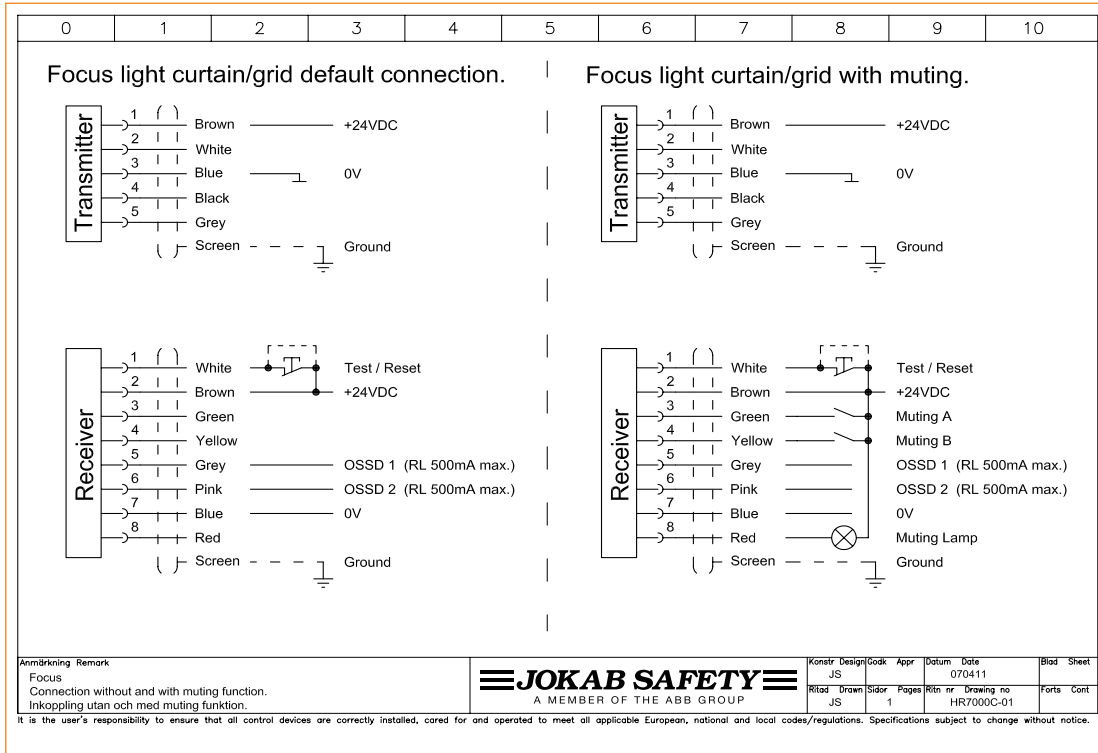
Manufacturer	ABB JOKAB SAFETY
Ordering information	see page 44
Safety level EN/IEC 61496 EN 954-1 EN ISO 13849-1	Type 4 with Vital/Pluto Category 4 PL e
PFH_d	1.14x10 ⁻⁸
Power supply	17 – 27 VDC, ripple ±10%
Current consumption Transmitter Receiver	< 25 mA < 15 mA
Output currents Info. output Dynamic signal out	10 mA max. 30 mA max.
Light source	Red visible light, 660 nm, <±2°
Optical power Spot 10 Spot 35	< 0.1 mW < 0.2 mW
Function indication Green LED on transmitter (power) Green LED on receiver status On Flashing Off	Power supply OK Alignment OK, safety circuit closed Align. OK, earlier safety circuit open Beam interrupted, safety circuit open
Protection class	IP 67
Range Spot 10 Spot 35	0 - 10 m 0 - 35 m
Range adjustment Spot 10 Spot 35	Trim pot. on transmitter Trim pot. on receiver
Installation Spot 10 Spot 35	2xM18 nuts (provided) Either via mounting holes in the casing or with angle bracket JSM63 (provided)
Operating temp. range	-25°C – +65°C
Cable connection	M12 fixed connector
Casing Material Spot 10 Spot 35	Steel housing with polyacryl lens protection Polyamide housing with polyacryl lens protection

Color Spot 10 Spot 35	Steel grey Yellow and black
Weight Spot 10 Spot 35	2 x 21 g 2 x 100 g
Connections Transmitter: Brown (1) White (2) Blue (3) Receiver: Brown (1) White (2) Blue (3) Black (4) Grey (5) 24 VDC when LED is green or flashing (tolerance -2 VDC) 0 VDC when LED is off (tolerance +2 VDC)	+24 VDC Dynamic signal in 0 VDC +24 VDC 0 VDC Dynamic signal out Info output
Conformity	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2006 + A1:2009 EN 954-1:1996, EN ISO 13849-1:2008 EN 62061:2005, EN 61496
Certifications	TÜV Nord  

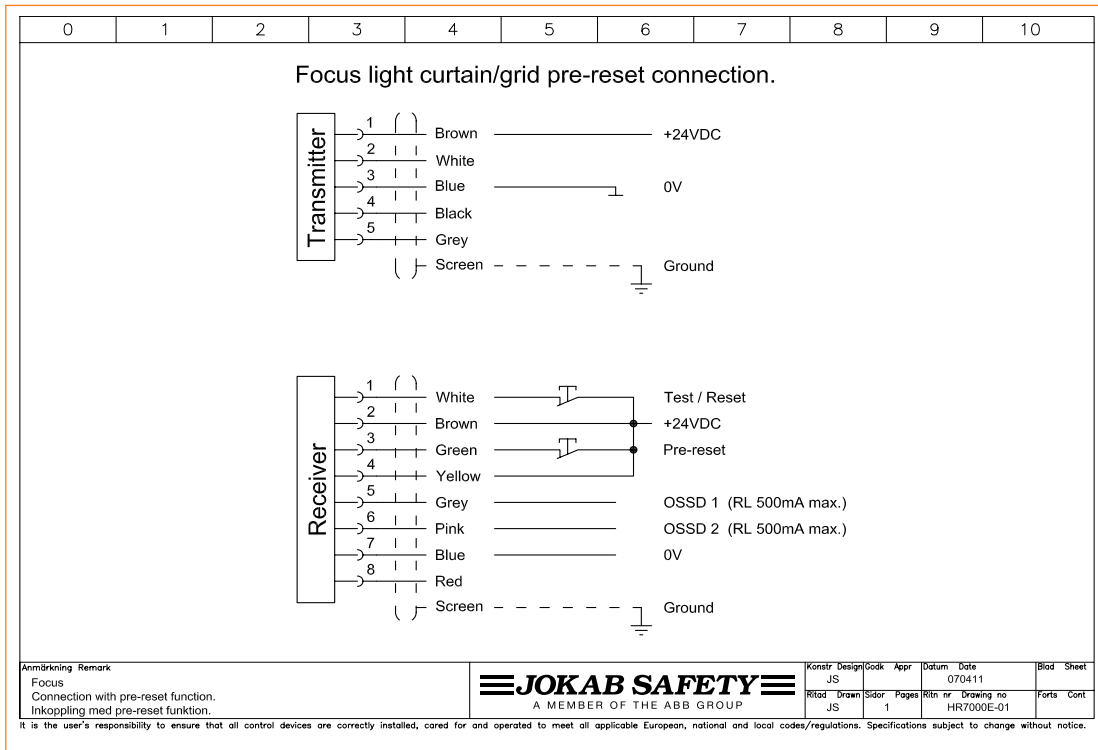


Connection examples

HR7000C-01 Focus - Connection without and with Muting Function

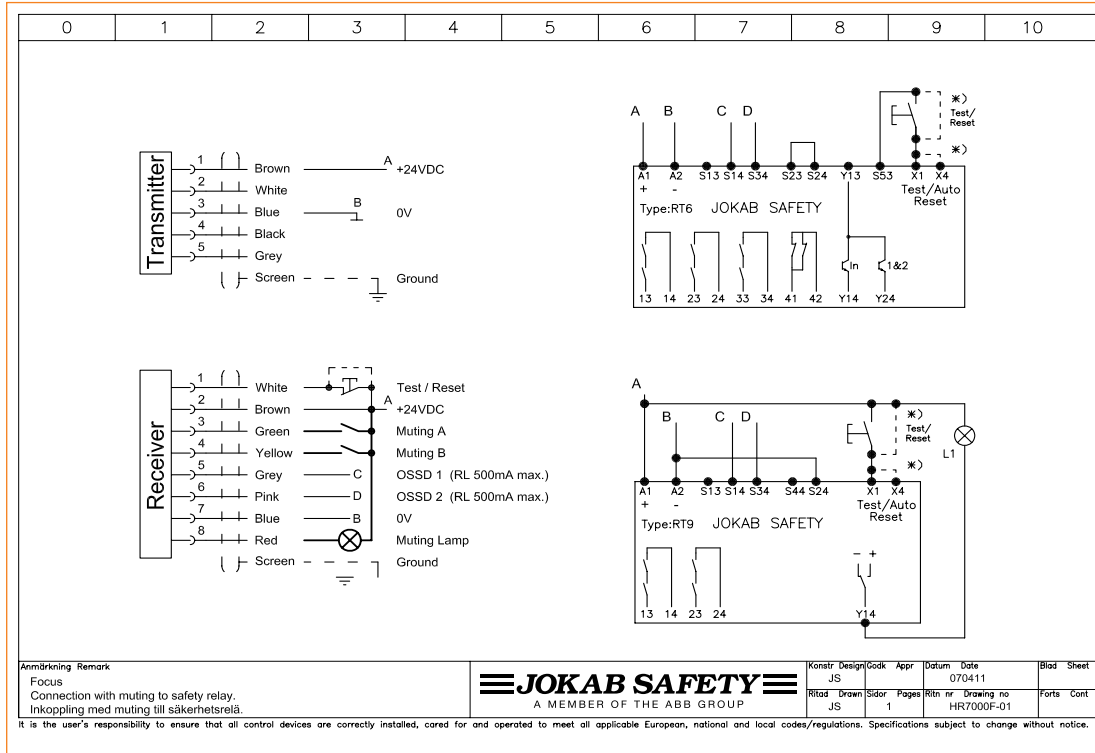


HR7000E-01 Focus - Connection with Pre-Reset Function

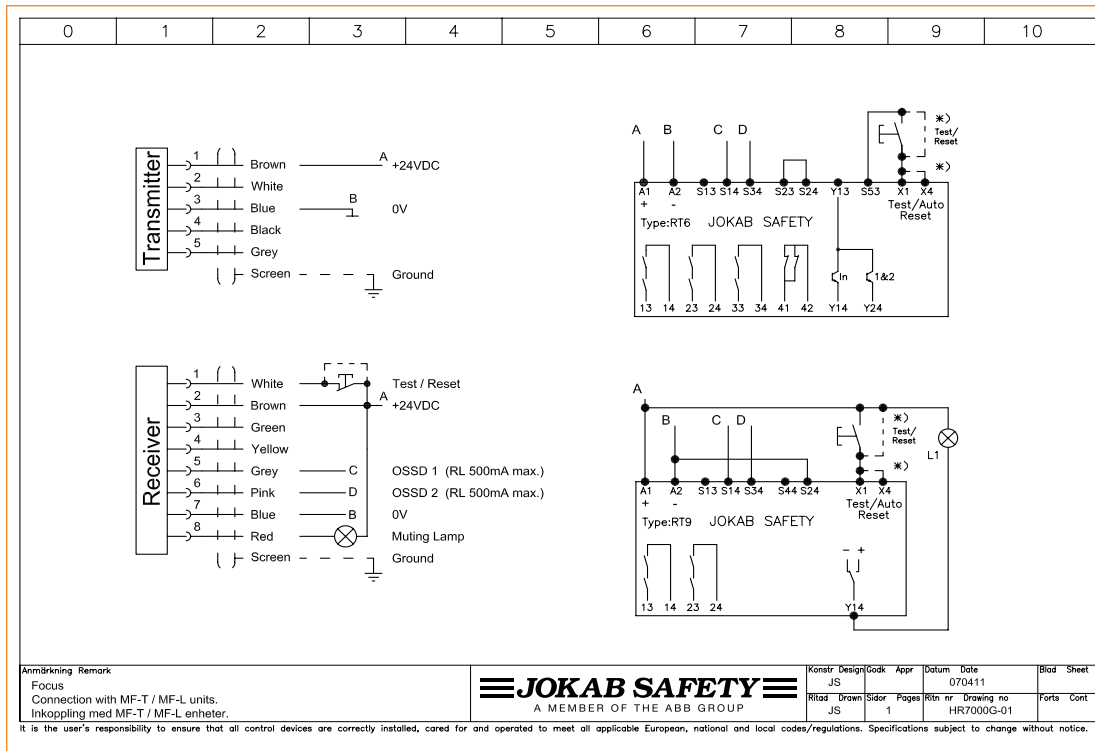


Connection examples

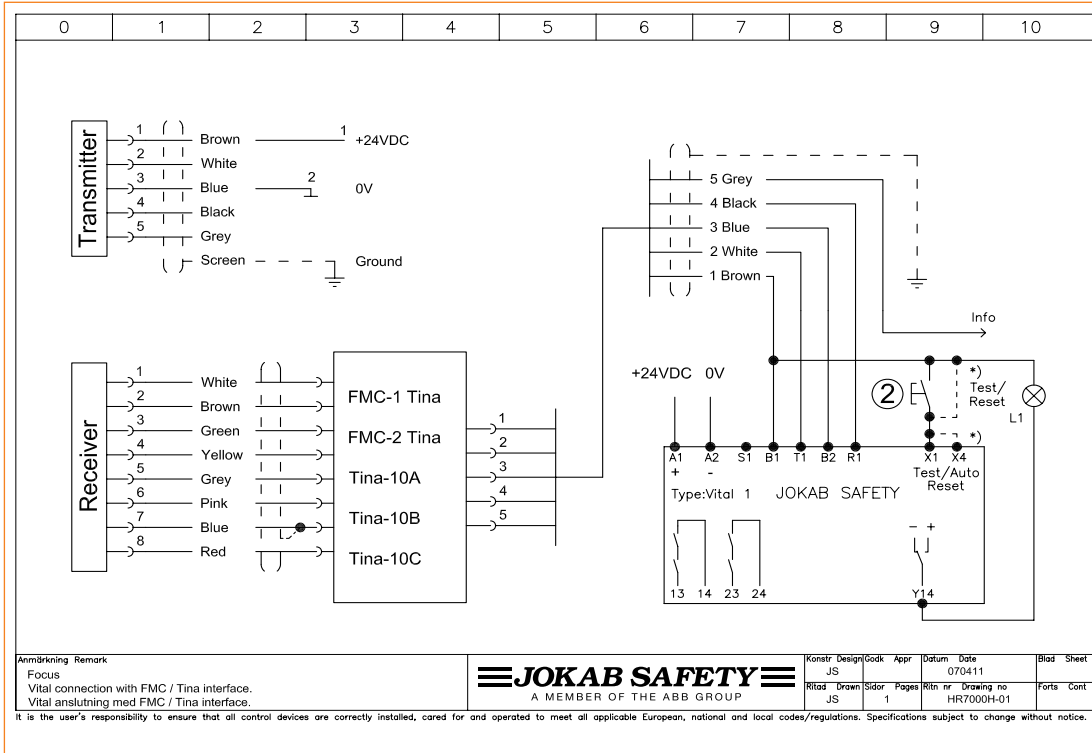
HR7000F-01 Focus - Connection with Muting to Safety Relay



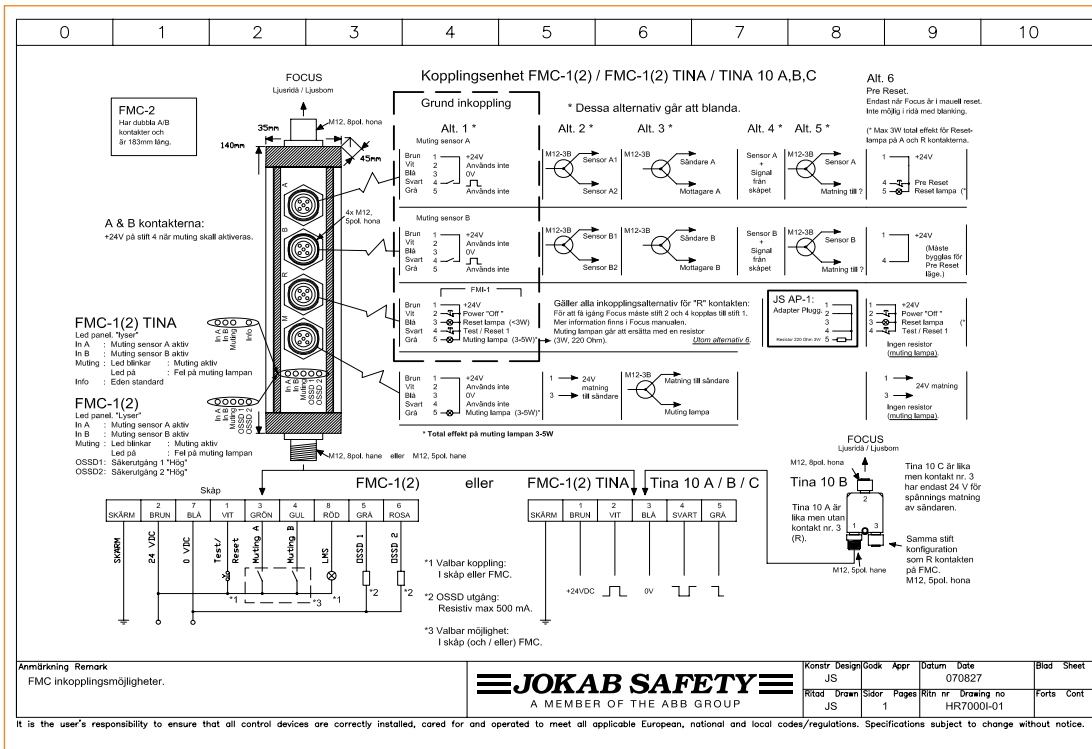
HR7000G-01 Focus - Connection with MFII-T/MFII-L Units



HR7000H-01 Focus - Connection with FMC/Tina Interface

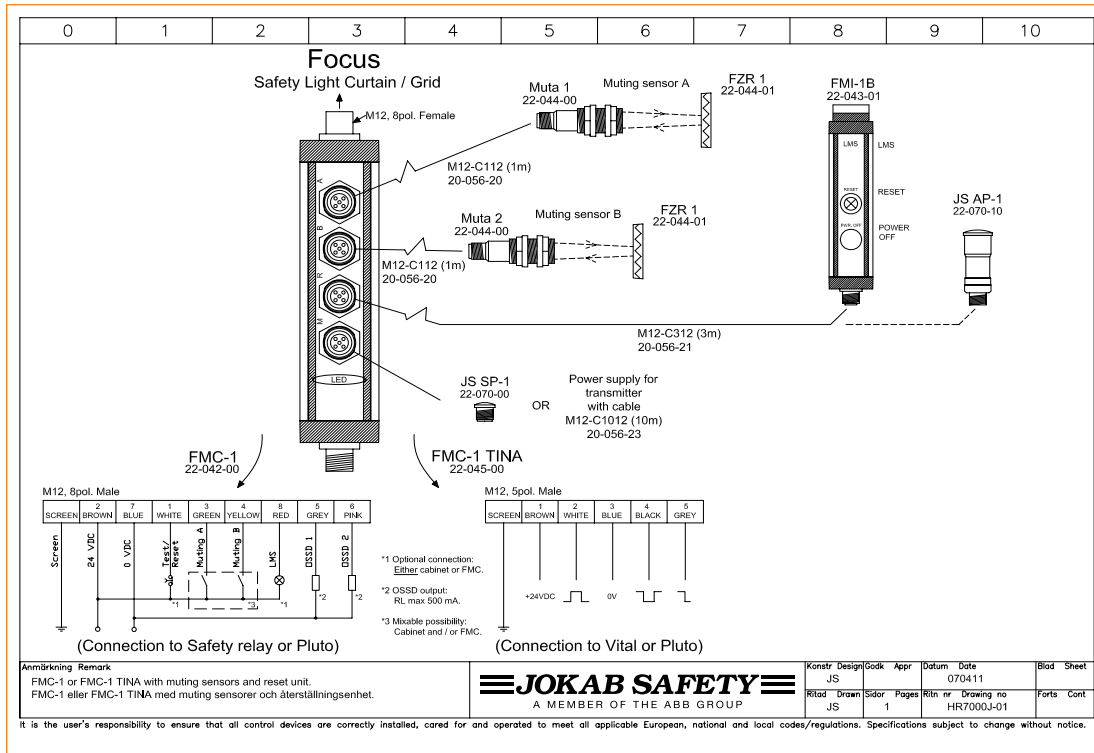


HR7000I-01 FMC

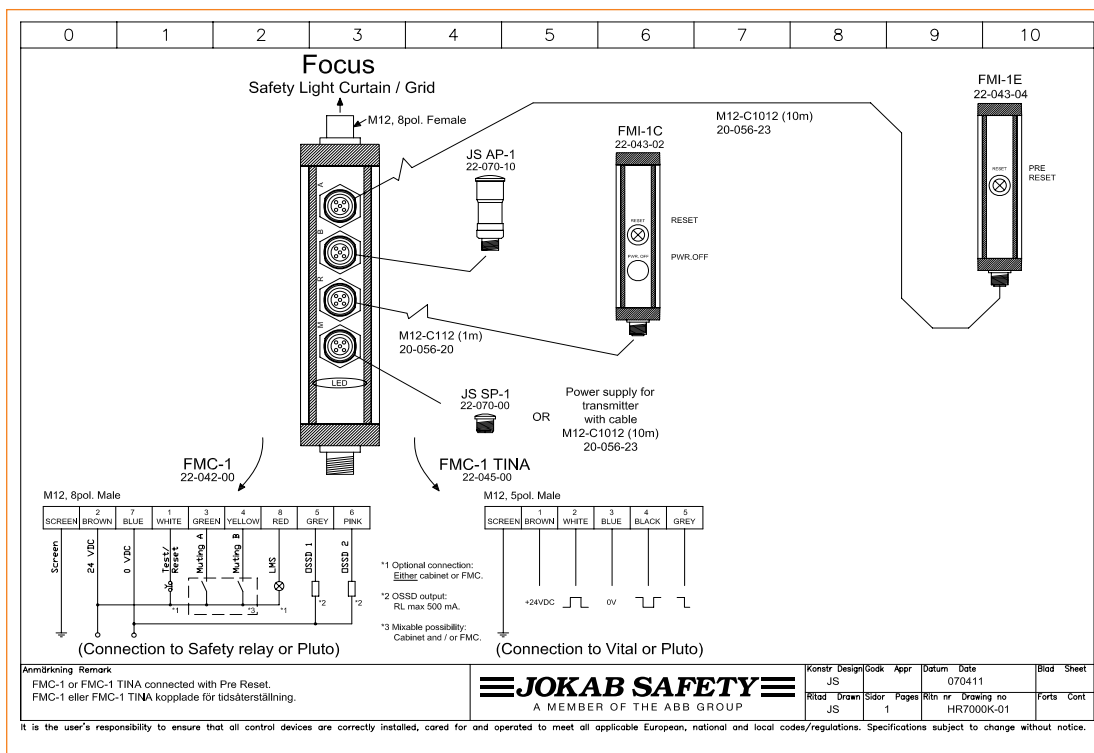


Connection examples

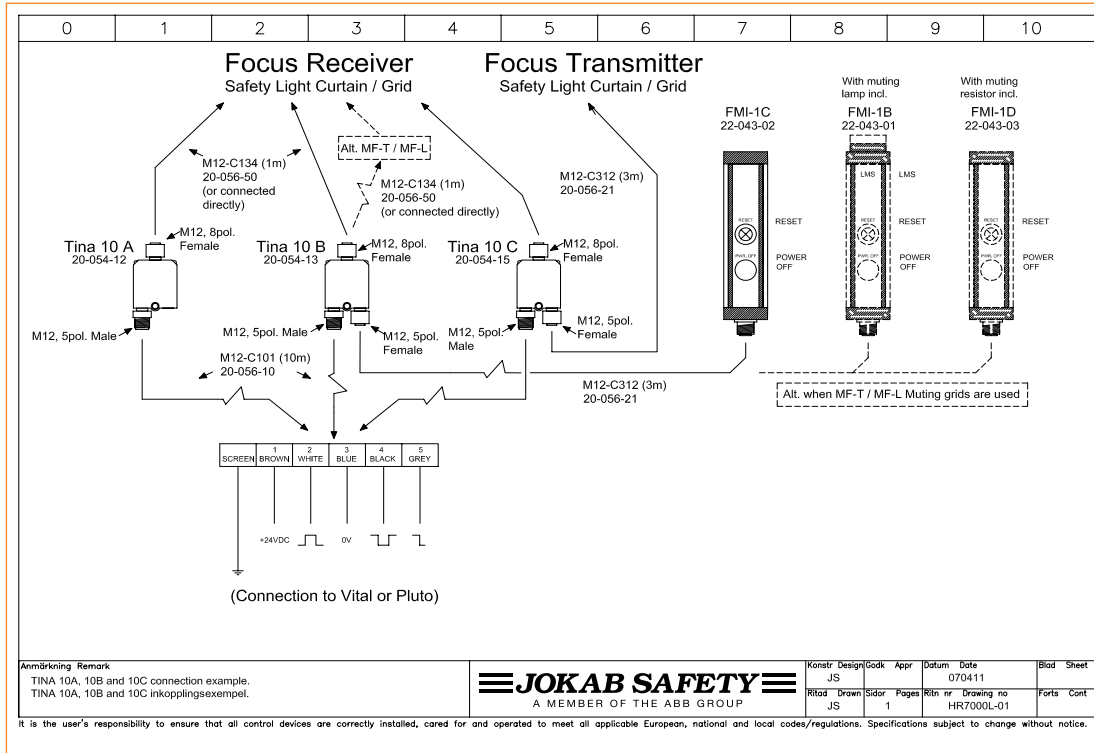
HR7000J-01 FMC-1 or FMC-1 Tina with Muting Sensors and Reset Unit



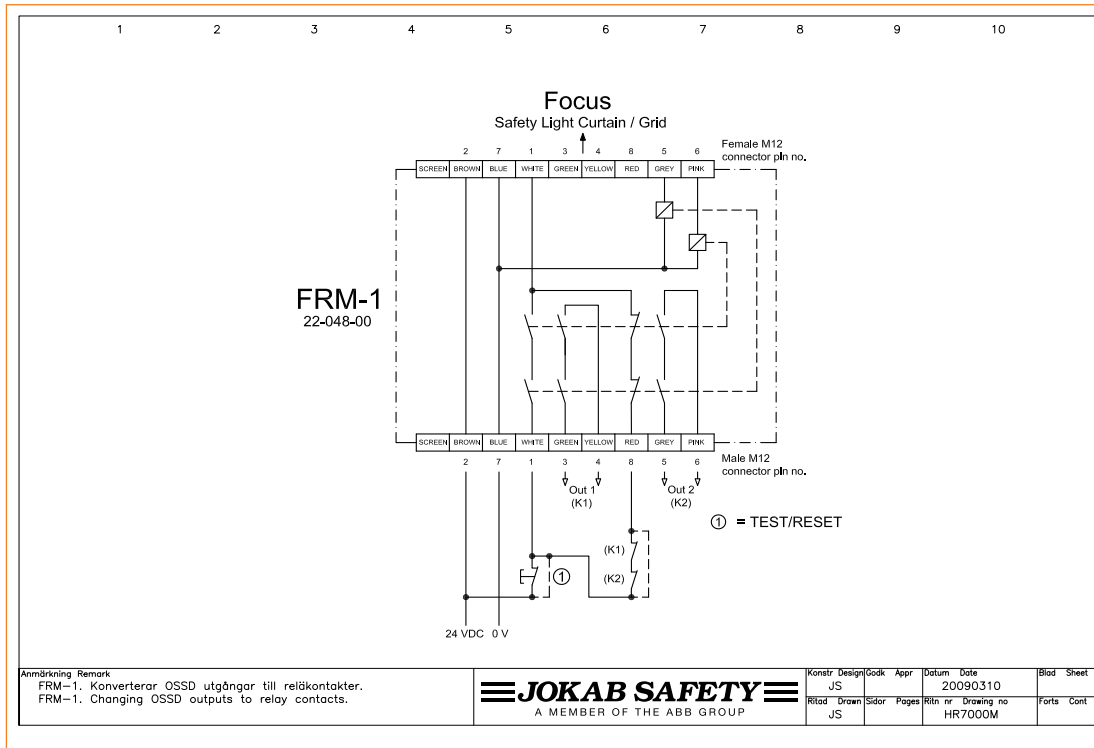
HR7000K-01 FMC-1 or FMC-1 Tina Connected with Pre Reset



HR7000L-01 Tina 10A, 10B and 10C Connection

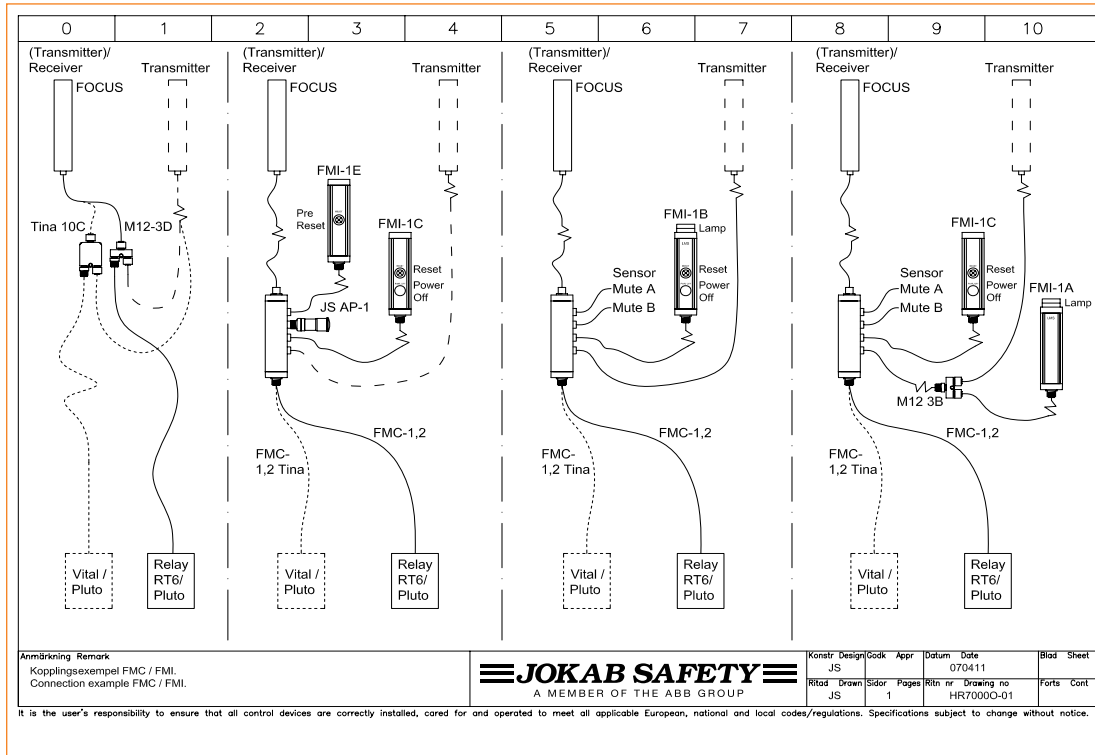


HR7000M FRM-1 Changing OSSD Outputs to Relay Contacts

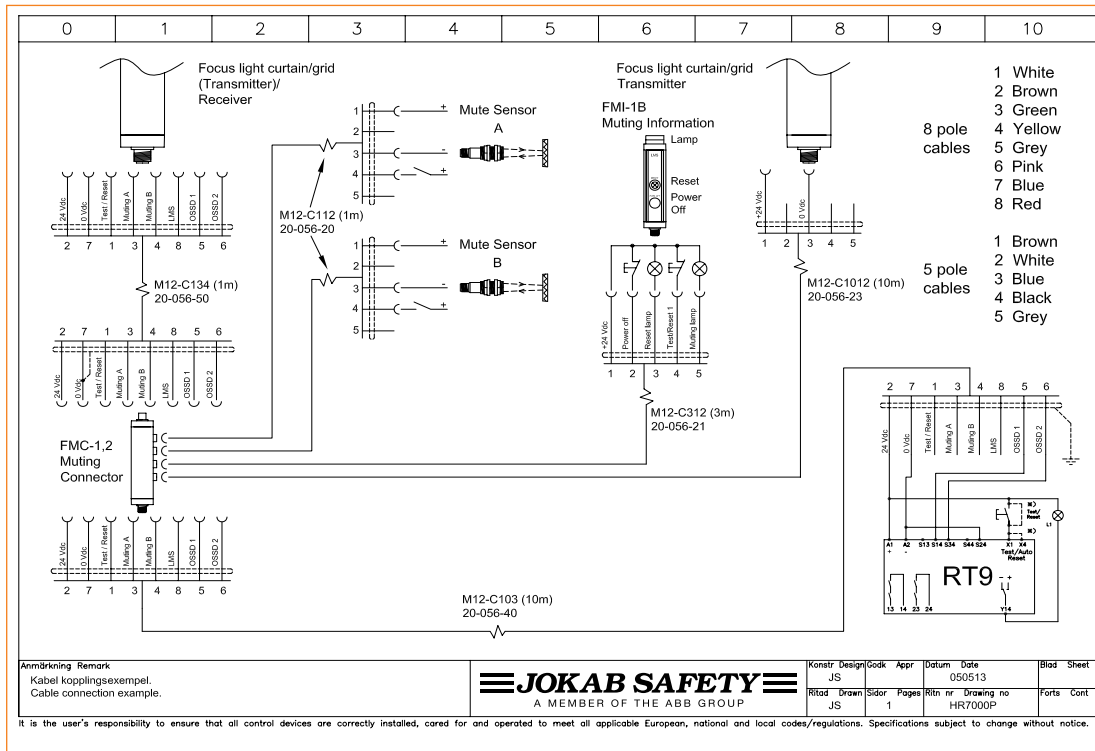


Connection examples

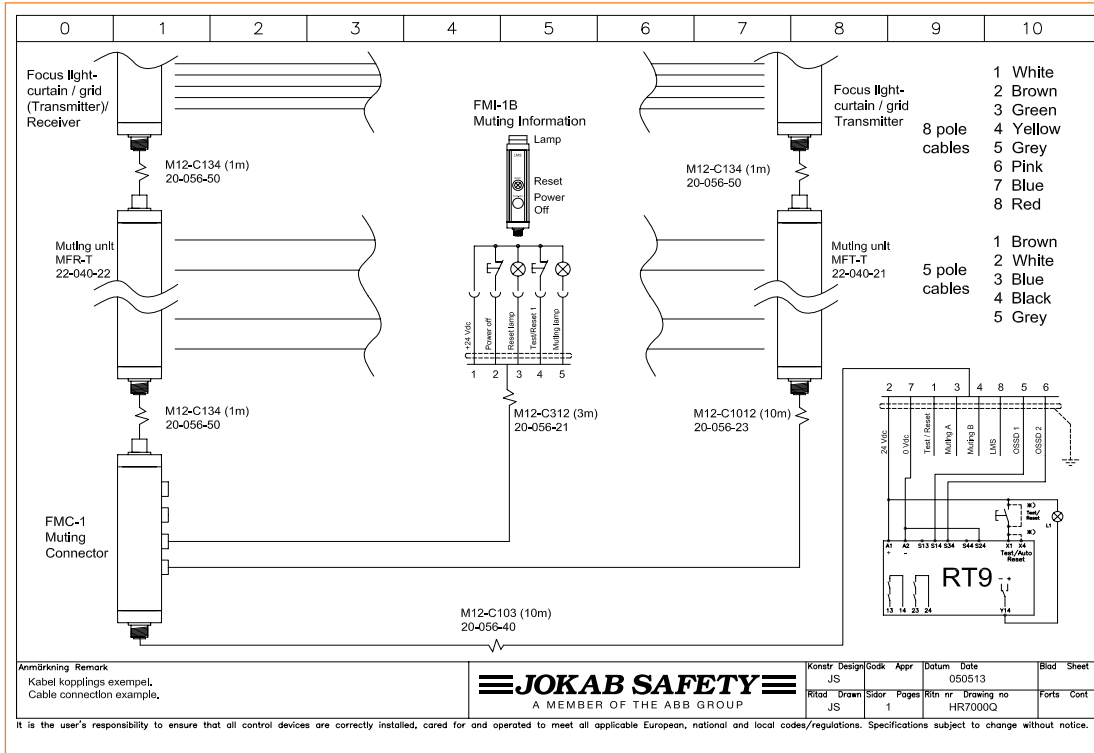
HR70000-01 FMC/FMI Connection



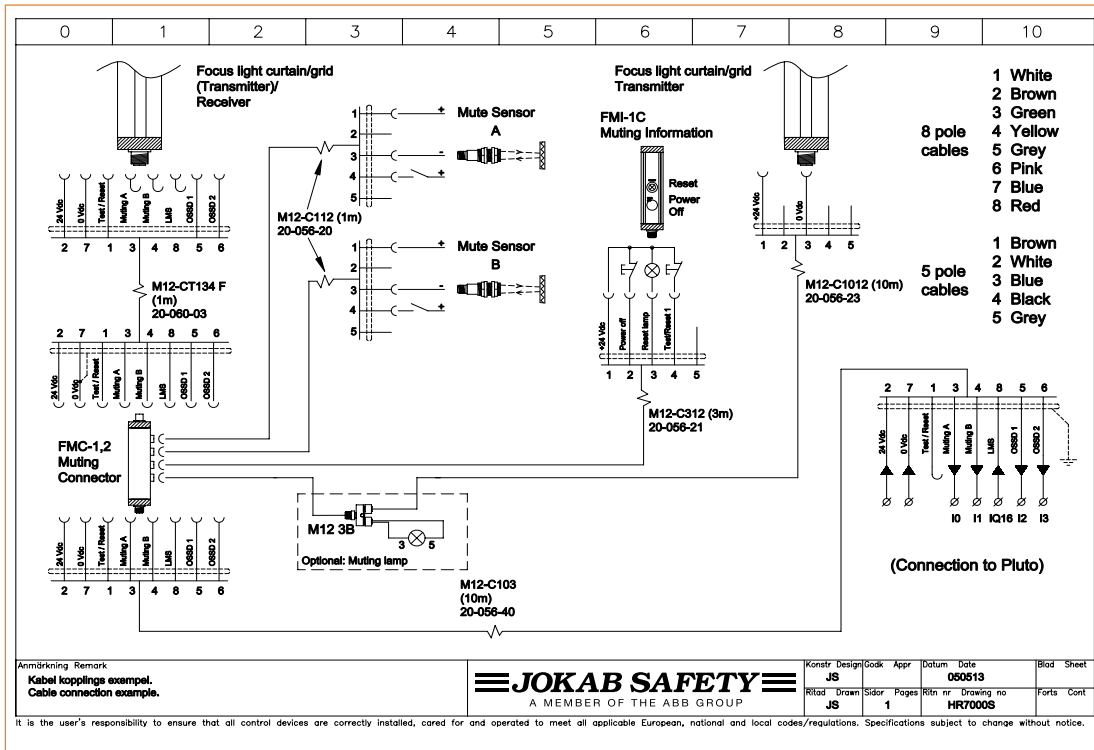
HR7000P Cable Connection



HR7000Q Cable Connection



HR7000S Focus; Muting with the Aid of Pluto, FMC and a Transfer Cable



Ordering data

Safety Light Curtains

To create a complete Focus II Safety Light Curtain part number, simply fill in the fields below.

FII-4- -
A **B**

A This letter represents the effective resolution of the Focus II Safety Light Curtain.

14	14mm (0.55") resolution for finger detection
30	30mm (1.18") resolution for hand detection

B This letter represents the protective height of the Focus II Safety Light Curtain.

150	150mm (5.91")	1350	1350mm (53.15")
300	300mm (11.81")	1500	1500mm (59.06")
450	450mm (17.72")	1650	1650mm (64.96")
600	600mm (23.62")	1800	1800mm (70.87")
750	750mm (29.53")	1950	1950mm (76.77")
900	900mm (35.43")	2100	2100mm (82.68")
1050	1050mm (41.34")	2250	2250mm (88.58")
1200	1200mm (47.24")	2400	2400mm (94.49")

Safety Light Grids

To create a complete Focus II Safety Light Grid part number, simply fill in the fields below.








FII-4-K-
A

A This letter represents the protective height of the Focus II Safety Light Grid.

4-900	4 beams spaced 300mm (11.81") apart with 900mm (35.43") protective height
4-1200	4 beams spaced 400mm (15.75") apart with 1200mm (47.24") protective height
3-800	3 beams spaced 400mm (15.75") apart with 800mm (31.50") protective height
2-500	2 beams spaced 500mm (19.69") apart with 500m (19.69") protective height






Component list

Focus II Safety Light Curtains








	Product	Catalog number	Description
 150mm	FII-4-14-150	2TLA822200R0000	Focus II Safety Light Curtain pair, Category 4, 150mm protective height, 14mm resolution.
	FTII-4-14-150	2TLA822200R0100	Focus II Safety Light Curtain Transmitter only, 150mm protective height, 14mm resolution.
	FRII-4-14-150	2TLA822200R0200	Focus II Safety Light Curtain Receiver only, 150mm protective height, 14mm resolution.
 300mm	FII-4-14-300	2TLA822200R1000	Focus II Safety Light Curtain pair, Category 4, 300mm protective height, 14mm resolution.
	FTII-4-14-300	2TLA822200R1100	Focus II Safety Light Curtain Transmitter only, 300mm protective height, 14mm resolution.
	FRII-4-14-300	2TLA822200R1200	Focus II Safety Light Curtain Receiver only, 300mm protective height, 14mm resolution.
 450mm	FII-4-14-450	2TLA822200R2000	Focus II Safety Light Curtain pair, Category 4, 450mm protective height, 14mm resolution.
	FTII-4-14-450	2TLA822200R2100	Focus II Safety Light Curtain Transmitter only, 450mm protective height, 14mm resolution.
	FRII-4-14-450	2TLA822200R2200	Focus II Safety Light Curtain Receiver only, 450mm protective height, 14mm resolution.
 600mm	FII-4-14-600	2TLA822200R3000	Focus II Safety Light Curtain pair, Category 4, 600mm protective height, 14mm resolution.
	FTII-4-14-600	2TLA822200R3100	Focus II Safety Light Curtain Transmitter only, 600mm protective height, 14mm resolution.
	FRII-4-14-600	2TLA822200R3200	Focus II Safety Light Curtain Receiver only, 600mm protective height, 14mm resolution.
 750mm	FII-4-14-750	2TLA822200R4000	Focus II Safety Light Curtain pair, Category 4, 750mm protective height, 14mm resolution.
	FTII-4-14-750	2TLA822200R4100	Focus II Safety Light Curtain Transmitter only, 750mm protective height, 14mm resolution.
	FRII-4-14-750	2TLA822200R4200	Focus II Safety Light Curtain Receiver only, 750mm protective height, 14mm resolution.
 900mm	FII-4-14-900	2TLA822200R5000	Focus II Safety Light Curtain pair, Category 4, 900mm protective height, 14mm resolution.
	FTII-4-14-900	2TLA822200R5100	Focus II Safety Light Curtain Transmitter only, 900mm protective height, 14mm resolution.
	FRII-4-14-900	2TLA822200R5200	Focus II Safety Light Curtain Receiver only, 900mm protective height, 14mm resolution.
 1050mm	FII-4-14-1050	2TLA822200R6000	Focus II Safety Light Curtain pair, Category 4, 1050mm protective height, 14mm resolution.
	FTII-4-14-1050	2TLA822200R6100	Focus II Safety Light Curtain Transmitter only, 1050mm protective height, 14mm resolution.
	FRII-4-14-1050	2TLA822200R6200	Focus II Safety Light Curtain Receiver only, 1050mm protective height, 14mm resolution.

Component list

Focus II Safety Light Curtains

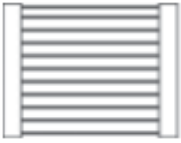
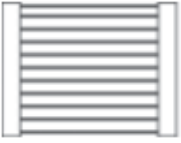

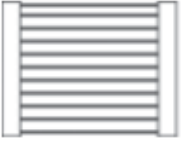



	Product	Catalog number	Description
 1200mm	FII-4-14-1200	2TLA822200R7000	Focus II Safety Light Curtain pair, Category 4, 1200mm protective height, 14mm resolution.
	FTII-4-14-1200	2TLA822200R7100	Focus II Safety Light Curtain Transmitter only, 1200mm protective height, 14mm resolution.
	FRII-4-14-1200	2TLA822200R7200	Focus II Safety Light Curtain Receiver only, 1200mm protective height, 14mm resolution.
 1350mm	FII-4-14-1350	2TLA822200R8000	Focus II Safety Light Curtain pair, Category 4, 1350mm protective height, 14mm resolution.
	FTII-4-14-1350	2TLA822200R8100	Focus II Safety Light Curtain Transmitter only, 1350mm protective height, 14mm resolution.
	FRII-4-14-1350	2TLA822200R8200	Focus II Safety Light Curtain Receiver only, 1350mm protective height, 14mm resolution.
 1500mm	FII-4-14-1500	2TLA822200R9000	Focus II Safety Light Curtain pair, Category 4, 1500mm protective height, 14mm resolution.
	FTII-4-14-1500	2TLA822200R9100	Focus II Safety Light Curtain Transmitter only, 1500mm protective height, 14mm resolution.
	FRII-4-14-1500	2TLA822200R9200	Focus II Safety Light Curtain Receiver only, 1500mm protective height, 14mm resolution.
 1650mm	FII-4-14-1650	2TLA822201R0000	Focus II Safety Light Curtain pair, Category 4, 1650mm protective height, 14mm resolution.
	FTII-4-14-1650	2TLA822201R0100	Focus II Safety Light Curtain Transmitter only, 1650mm protective height, 14mm resolution.
	FRII-4-14-1650	2TLA822201R0200	Focus II Safety Light Curtain Receiver only, 1650mm protective height, 14mm resolution.
 1800mm	FII-4-14-1800	2TLA822201R1000	Focus II Safety Light Curtain pair, Category 4, 1800mm protective height, 14mm resolution.
	FTII-4-14-1800	2TLA822201R1100	Focus II Safety Light Curtain Transmitter only, 1800mm protective height, 14mm resolution.
	FRII-4-14-1800	2TLA822201R1200	Focus II Safety Light Curtain Receiver only, 1800mm protective height, 14mm resolution.
 1950mm	FII-4-14-1950	2TLA822201R2000	Focus II Safety Light Curtain pair, Category 4, 1950mm protective height, 14mm resolution.
	FTII-4-14-1950	2TLA822201R2100	Focus II Safety Light Curtain Transmitter only, 1950mm protective height, 14mm resolution.
	FRII-4-14-1950	2TLA822201R2200	Focus II Safety Light Curtain Receiver only, 1950mm protective height, 14mm resolution.
 2100mm	FII-4-14-2100	2TLA822201R3000	Focus II Safety Light Curtain pair, Category 4, 2100mm protective height, 14mm resolution.
	FTII-4-14-2100	2TLA822201R3100	Focus II Safety Light Curtain Transmitter only, 2100mm protective height, 14mm resolution.
	FRII-4-14-2100	2TLA822201R3200	Focus II Safety Light Curtain Receiver only, 2100mm protective height, 14mm resolution.

Focus II Safety Light Curtains

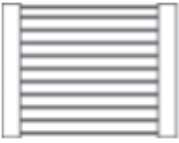
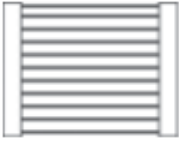





	Product	Catalog number	Description
 2250mm	FII-4-14-2250	2TLA822201R4000	Focus II Safety Light Curtain pair, Category 4, 2250mm protective height, 14mm resolution.
	FTII-4-14-2250	2TLA822201R4100	Focus II Safety Light Curtain Transmitter only, 2250mm protective height, 14mm resolution.
	FRII-4-14-2250	2TLA822201R4200	Focus II Safety Light Curtain Receiver only, 2250mm protective height, 14mm resolution.
 2400mm	FII-4-14-2400	2TLA822201R5000	Focus II Safety Light Curtain pair, Category 4, 2400mm protective height, 14mm resolution.
	FTII-4-14-2400	2TLA822201R5100	Focus II Safety Light Curtain Transmitter only, 2400mm protective height, 14mm resolution.
	FRII-4-14-2400	2TLA822201R5200	Focus II Safety Light Curtain Receiver only, 2400mm protective height, 14mm resolution.
 150mm	FII-4-30-150	2TLA822201R6000	Focus II Safety Light Curtain pair, Category 4, 150mm protective height, 30mm resolution.
	FTII-4-30-150	2TLA822201R6100	Focus II Safety Light Curtain Transmitter only, 150mm protective height, 30mm resolution.
	FRII-4-30-150	2TLA822201R6200	Focus II Safety Light Curtain Receiver only, 150mm protective height, 30mm resolution.
 300mm	FII-4-30-300	2TLA822201R7000	Focus II Safety Light Curtain pair, Category 4, 300mm protective height, 30mm resolution.
	FTII-4-30-300	2TLA822201R7100	Focus II Safety Light Curtain Transmitter only, 300mm protective height, 30mm resolution.
	FRII-4-30-300	2TLA822201R7200	Focus II Safety Light Curtain Receiver only, 300mm protective height, 30mm resolution.
 450mm	FII-4-30-450	2TLA822201R8000	Focus II Safety Light Curtain pair, Category 4, 450mm protective height, 30mm resolution.
	FTII-4-30-450	2TLA822201R8100	Focus II Safety Light Curtain Transmitter only, 450mm protective height, 30mm resolution.
	FRII-4-30-450	2TLA822201R8200	Focus II Safety Light Curtain Receiver only, 450mm protective height, 30mm resolution.
 600mm	FII-4-30-600	2TLA822201R9000	Focus II Safety Light Curtain pair, Category 4, 600mm protective height, 30mm resolution.
	FTII-4-30-600	2TLA822201R9100	Focus II Safety Light Curtain Transmitter only, 600mm protective height, 30mm resolution.
	FRII-4-30-600	2TLA822201R9200	Focus II Safety Light Curtain Receiver only, 600mm protective height, 30mm resolution.
 750mm	FII-4-30-750	2TLA822202R0000	Focus II Safety Light Curtain pair, Category 4, 750mm protective height, 30mm resolution.
	FTII-4-30-750	2TLA822202R0100	Focus II Safety Light Curtain Transmitter only, 750mm protective height, 30mm resolution.
	FRII-4-30-750	2TLA822202R0200	Focus II Safety Light Curtain Receiver only, 750mm protective height, 30mm resolution.

Component list

Focus II Safety Light Curtains




	Product	Catalog number	Description
 900mm	FII-4-30-900	2TLA822202R1000	Focus II Safety Light Curtain pair, Category 4, 900mm protective height, 30mm resolution.
	FTII-4-30-900	2TLA822202R1100	Focus II Safety Light Curtain Transmitter only, 900mm protective height, 30mm resolution.
	FRII-4-30-900	2TLA822202R1200	Focus II Safety Light Curtain Receiver only, 900mm protective height, 30mm resolution.
 1050mm	FII-4-30-1050	2TLA822202R2000	Focus II Safety Light Curtain pair, Category 4, 1050mm protective height, 30mm resolution.
	FTII-4-30-1050	2TLA822202R2100	Focus II Safety Light Curtain Transmitter only, 1050mm protective height, 30mm resolution.
	FRII-4-30-1050	2TLA822202R2200	Focus II Safety Light Curtain Receiver only, 1050mm protective height, 30mm resolution.
 1200mm	FII-4-30-1200	2TLA822202R3000	Focus II Safety Light Curtain pair, Category 4, 1200mm protective height, 30mm resolution.
	FTII-4-30-1200	2TLA822202R3100	Focus II Safety Light Curtain Transmitter only, 1200mm protective height, 30mm resolution.
	FRII-4-30-1200	2TLA822202R3200	Focus II Safety Light Curtain Receiver only, 1200mm protective height, 30mm resolution.
 1350mm	FII-4-30-1350	2TLA822202R4000	Focus II Safety Light Curtain pair, Category 4, 1350mm protective height, 30mm resolution.
	FTII-4-30-1350	2TLA822202R4100	Focus II Safety Light Curtain Transmitter only, 1350mm protective height, 30mm resolution.
	FRII-4-30-1350	2TLA822202R4200	Focus II Safety Light Curtain Receiver only, 1350mm protective height, 30mm resolution.
 1500mm	FII-4-30-1500	2TLA822202R5000	Focus II Safety Light Curtain pair, Category 4, 1500mm protective height, 30mm resolution.
	FTII-4-30-1500	2TLA822202R5100	Focus II Safety Light Curtain Transmitter only, 1500mm protective height, 30mm resolution.
	FRII-4-30-1500	2TLA822202R5200	Focus II Safety Light Curtain Receiver only, 1500mm protective height, 30mm resolution.
 1650mm	FII-4-30-1650	2TLA822202R6000	Focus II Safety Light Curtain pair, Category 4, 1650mm protective height, 30mm resolution.
	FTII-4-30-1650	2TLA822202R6100	Focus II Safety Light Curtain Transmitter only, 1650mm protective height, 30mm resolution.
	FRII-4-30-1650	2TLA822202R6200	Focus II Safety Light Curtain Receiver only, 1650mm protective height, 30mm resolution.
 1800mm	FII-4-30-1800	2TLA822202R7000	Focus II Safety Light Curtain pair, Category 4, 1800mm protective height, 30mm resolution.
	FTII-4-30-1800	2TLA822202R7100	Focus II Safety Light Curtain Transmitter only, 1800mm protective height, 30mm resolution.
	FRII-4-30-1800	2TLA822202R7200	Focus II Safety Light Curtain Receiver only, 1800mm protective height, 30mm resolution.

Focus II Safety Light Curtains

	Product	Catalog number	Description
 1950mm	FII-4-30-1950	2TLA822202R8000	Focus II Safety Light Curtain pair, Category 4, 1950mm protective height, 30mm resolution.
	FII-4-30-1950	2TLA822202R8100	Focus II Safety Light Curtain Transmitter only, 1950mm protective height, 30mm resolution.
	FRII-4-30-1950	2TLA822202R8200	Focus II Safety Light Curtain Receiver only, 1950mm protective height, 30mm resolution.
 2100mm	FII-4-30-2100	2TLA822202R9000	Focus II Safety Light Curtain pair, Category 4, 2100mm protective height, 30mm resolution.
	FTII-4-30-2100	2TLA822202R9100	Focus II Safety Light Curtain Transmitter only, 2100mm protective height, 30mm resolution.
	FRII-4-30-2100	2TLA822202R9200	Focus II Safety Light Curtain Receiver only, 2100mm protective height, 30mm resolution.
 2250mm	FII-4-30-2250	2TLA822203R0000	Focus II Safety Light Curtain pair, Category 4, 2250mm protective height, 30mm resolution.
	FTII-4-30-2250	2TLA822203R0100	Focus II Safety Light Curtain Transmitter only, 2250mm protective height, 30mm resolution.
	FRII-4-30-2250	2TLA822202R0200	Focus II Safety Light Curtain Receiver only, 2250mm protective height, 30mm resolution.
 2400mm	FII-4-30-2400	2TLA822203R1000	Focus II Safety Light Curtain pair, Category 4, 2400mm protective height, 30mm resolution.
	FTII-4-30-2400	2TLA822203R1100	Focus II Safety Light Curtain Transmitter only, 2400mm protective height, 30mm resolution.
	FRII-4-30-2400	2TLA822202R1200	Focus II Safety Light Curtain Receiver only, 2400mm protective height, 30mm resolution.
 500mm	FII-4-K2-500	2TLA022204R0000	Focus II Safety Light Grid pair, Category 4, 500mm protective height, 2 beam resolution.
	FTII-4-K2-500	2TLA022204R0100	Focus II Safety Light Grid Transmitter only, 500mm protective height, 2 beam resolution.
	FRII-4-K2-500	2TLA022204R0200	Focus II Safety Light Grid Receiver only, 500mm protective height, 2 beam resolution.
 800mm	FII-4-K3-800	2TLA022204R1000	Focus II Safety Light Grid pair, Category 4, 800mm protective height, 3 beam resolution.
	FTII-4-K3-800	2TLA022204R1100	Focus II Safety Light Grid Transmitter only, 800mm protective height, 3 beam resolution.
	FRII-4-K3-800	2TLA022204R1200	Focus II Safety Light Grid Receiver only, 800mm protective height, 3 beam resolution.
 900mm	FII-4-K4-900	2TLA022204R2000	Focus II Safety Light Grid pair, Category 4, 900mm protective height, 4 beam resolution.
	FTII-4-K4-900	2TLA022204R2100	Focus II Safety Light Grid Transmitter only, 900mm protective height, 4 beam resolution.
	FRII-4-K4-900	2TLA022204R2200	Focus II Safety Light Grid Receiver only, 900mm protective height, 4 beam resolution.

Component list


Focus II Safety Light Curtains

	Product	Catalog number	Description
 1200mm	FII-4-K4-1200	2TLA022204R3000	Focus II Safety Light Grid pair, Category 4, 1200mm protective height, 4 beam resolution.
	FTII-4-K4-1200	2TLA022204R3100	Focus II Safety Light Grid Transmitter only, 1200mm protective height, 4 beam resolution.
	FRII-4-K4-1200	2TLA022204R3200	Focus II Safety Light Grid Receiver only, 1200mm protective height, 4 beam resolution.
 500mm	FII-4-K1C-500	2TLA022204R8000	Focus II Safety Light Grid Transceiver pair, Category 4, 500mm protective height, 2 beam resolution.
	FTRII-4-K1C-500	2TLA022204R8100	Focus II Safety Light Grid Transceiver only, 500mm protective height, 2 beam resolution.
	FII-M1C-500	2TLA022204R8200	Focus II Safety Light Grid Transceiver mirror only, 500mm protective height, 2 beam resolution.
 800mm	FII-4-K2C-800	2TLA022204R9000	Focus II Safety Light Grid Transceiver pair, Category 4, 800mm protective height, 3 beam resolution.
	FTRII-4-K2C-800	2TLA022204R9100	Focus II Safety Light Grid Transceiver only, 800mm protective height, 3 beam resolution.
	FII-M2C-800	2TLA022204R9200	Focus II Safety Light Grid Transceiver mirror only, 800mm protective height, 3 beam resolution.
 900mm	FII-4-K2C-900	2TLA022205R0000	Focus II Safety Light Grid Transceiver pair, Category 4, 900mm protective height, 4 beam resolution.
	FTRII-4-K2C-900	2TLA022205R0100	Focus II Safety Light Grid Transceiver only, 900mm protective height, 4 beam resolution.
	FII-M2C-900	2TLA022205R0200	Focus II Safety Light Grid Transceiver mirror only, 900mm protective height, 4 beam resolution.
 1200mm	FII-4-K2C-1200	2TLA022205R1000	Focus II Safety Light Grid Transceiver pair, Category 4, 1200mm protective height, 4 beam resolution.
	FTRII-4-K2C-1200	2TLA022205R1100	Focus II Safety Light Grid Transceiver only, 1200mm protective height, 4 beam resolution.
	FII-M2C-1200	2TLA022205R1200	Focus II Safety Light Grid Transceiver mirror only, 1200mm protective height, 4 beam resolution.

Mirrors

	Product	Catalog number	Description
	MFII-300	2TLA022041R0200	Mirror, 362mm for Focus
	MFII-450	2TLA022041R0300	Mirror, 512mm for Focus
	MFII-600	2TLA022041R0400	Mirror, 658mm for Focus
	MFII-750	2TLA022041R0500	Mirror, 801mm for Focus
	MFII-900	2TLA022041R0700	Mirror, 958mm for Focus
	MFII-1200	2TLA022041R0800	Mirror, 1258mm for Focus
	MFII-1500	2TLA022041R0900	Mirror, 1551mm for Focus
	MFII-1650	2TLA022041R1000	Mirror, 1709mm for Focus
	MFII-1350	2TLA022041R1300	Mirror, 1408mm for Focus
		2TLA022041R2000	Bracket for MF mirror
		2TLA850010R0900	2000mm Quick Guard Stand 44mmx88mm Light Curtain/Mirror mounting post with endcaps and 2 floor mounts.

Bjorn support for Light Grids and Mirrors



	Product	Catalog number	Description
	Bjorn UC-3	2TLA850210R6100	Protective floor mounted housing for 1 vertically mounted Focus Light Curtain or Grid up to 1200mm in length.
	Bjorn UC-4	2TLA850310R1700	Protective floor mounted housing for 1 vertically mounted Focus Light Curtain or Grid up to 1800mm in length.
	Bjorn UC-8	2TLA850210R8300	Left hand protective floor mounted housing for 1 horizontally mounted Focus Light Curtain or Grid up to 1200mm in length.
	Bjorn UC-9	2TLA850210R8700	Right hand protective floor mounted housing for 1 horizontally mounted Focus Light Curtain or Grid up to 1200mm in length.
	Bjorn UC-10	2TLA850120R5500	Protective floor mounted housing for 2 vertically mounted Focus Light Curtains or Grids at 90 degrees up to 1200mm in length.

Wet Wash Down Tubes


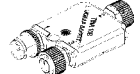
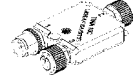
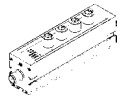
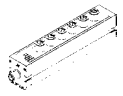
	Product	Catalog number	Description
	WET-150 FII	2TLA022038R4000	Wash down tube kit for use with 150mm Focus Safety Light Curtains
	WET-300 FII	2TLA022038R4100	Wash down tube kit for use with 300mm Focus Safety Light Curtains
	WET-450 FII	2TLA022038R4200	Wash down tube kit for use with 450mm Focus Safety Light Curtains
	WET-600 FII	2TLA022038R4300	Wash down tube kit for use with 600mm Focus Safety Light Curtains
	WET-750 FII	2TLA022038R4400	Wash down tube kit for use with 750mm Focus Safety Light Curtains
	WET-900 FII	2TLA022038R4500	Wash down tube kit for use with 900mm Focus Safety Light Curtains
	WET-1050 FII	2TLA022038R4600	Wash down tube kit for use with 1050mm Focus Safety Light Curtains
	WET-1200 FII	2TLA022038R4700	Wash down tube kit for use with 1200mm Focus Safety Light Curtains
	WET-1350 FII	2TLA022038R4800	Wash down tube kit for use with 1350mm Focus Safety Light Curtains
	WET-1500 FII	2TLA022038R4900	Wash down tube kit for use with 1500mm Focus Safety Light Curtains
	WET-1650 FII	2TLA022038R5000	Wash down tube kit for use with 1650mm Focus Safety Light Curtains
	WET-1800 FII	2TLA022038R5100	Wash down tube kit for use with 1650mm Focus Safety Light Curtains
	WET-K500 FII	2TLA022038R5200	Wash down tube kit for use with 500mm Focus Safety Light Grids
	WET-K800 FII	2TLA022038R5300	Wash down tube kit for use with 800mm Focus Safety Light Grids
	WET-K900 FII	2TLA022038R5400	Wash down tube kit for use with 900mm Focus Safety Light Grids
	WET-K1200 FII	2TLA022038R5500	Wash down tube kit for use with 1200mm Focus Safety Light Grids.
	WET-MF-T FII	2TLA022038R1700	Wash down tube kit for use with 500mm Focus Safety Light Transceivers
	WET-MF-L FII	2TLA022038R1800	Wash down tube kit for use with 500mm Focus Safety Light Transceivers

Component list










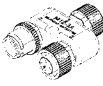
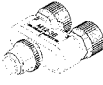
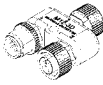


Spot light beams

	Product	Catalog number	Description
	Spot 10T/R	2TLA020009R0600	Safety light beam with 10m range, 24VDC supply, multi-function status 10T/R indicator LEDs, integrated information output 24VDC - 10mA on receiver, IP67 protection class, M18 barrel style steel housing, 5 pole M12 male quick disconnect. Requires Vital 1 controller/Pluto to function. Provides safety category level 4 according to EN954-1 with Vital 1 controller/Pluto. Maximum of 6 light beam pairs connected to one controller possible while maintaining category 4 level of safety.
	Spot 35T/R	2TLA020009R0500	Safety light beam with 35m range, 24VDC supply, multi-function status 35T/R indicator LEDs, integrated information output 24VDC - 10mA on receiver, IP67 protection class, plastic housing, 5 pole M12 male quick disconnect. Requires Vital 1 controller/Pluto to function. Provides safety category level 4 according to EN954-1 with Vital 1 controller/Pluto. Maximum of 6 light beam pairs connected to one controller possible while maintaining category 4 level of safety. 2 pieces of JSM 63 brackets are included.

Focus quick connections




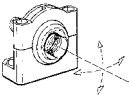
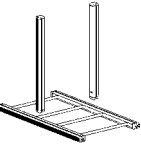
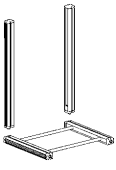
	Product	Catalog number	Description
	TINA 10A	2TLA020054R1200	Tina dynamic adapter with 5 pole M12 male quick disconnect for connecting transistor output safety devices to the Vital 1 controller. 8 pole M12 female quick disconnect for direct connection to the safety device or safety device enclosure, 24VDC supply, multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
	TINA 10B	2TLA020054R1300	Tina dynamic adapter with 5 pole M12 male quick disconnect for connecting transistor output safety devices to the Vital 1 controller. 8 pole M12 female quick disconnect for direct connection to the safety device or safety device enclosure. Additional 5 pole M12 connector for local reset capabilities, 24VDC supply, multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
	TINA 10C	2TLA020054R1600	Tina dynamic adapter with 5 pole M12 male quick disconnect for connecting transistor output safety devices to the Vital 1 controller. 8 pole M12 female quick disconnect for direct connection to the safety device or safety device enclosure. Additional 5 pole M12 connector for connection of light curtain transmitter, 24VDC supply, multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
	FMC-1	2TLA022042R0000	Focus Muting Connector, connects from the Focus receiver. 4 M12, 5 pin female connections for 2 muting sensors, muting lamp and reset push button. M12, 8 pin male connector for machine interface.
	FMC-1 Tina	2TLA022045R0000	Focus Muting Connector, connects from the Focus receiver. 4 M12, 5 pin female connections for 2 muting sensors, muting lamp and reset push button. Integrated Vital Tina M12, 5 pin male connector for machine interface.
	FMC-2	2TLA022042R1000	Focus Muting Connector, connects from the Focus receiver. 6 M12, 5 pin female connections for 4 muting sensors, muting lamp and reset push button. M12, 8 pin male connector for machine interface.
	FMC-2 Tina	2TLA022046R0000	Focus Muting Connector, connects from the Focus receiver. 6 M12, 5 pin female connections for 4 muting sensors, muting lamp and reset push button. Integrated Vital Tina M12, 5 pin male connector for machine interface.

Focus quick connections (continued)


	Product	Catalog number	Description
	FMI-1A	2TLA022043R0000	Focus Muting Lamp, 24VDC, 5W integrated muting lamp in a protective Focus housing.
	FMI-1B	2TLA022043R0100	Focus Muting Connector, integrated 24VDC, 5W muting lamp, reset push button and power interrupt in a protective Focus housing.
	FMI-1C	2TLA022043R0200	Focus Muting Connector, integrated reset push button and power interrupt in a protective Focus housing.
	FMI-1D	2TLA022043R0300	Focus Muting Connector, integrated reset push button and power interrupt in a protective Focus housing. Muting resistor included.
	FMI-1E	2TLA022043R0400	Focus Muting Connector, integrated reset push button for pre-reset or Tina Duo 2 in a protective Focus housing.
	FMI-1G	2TLA022043R0500	Focus Muting Initiator, Integrated reset push button in a protective Focus housing. Internal resistor for muting lamp.
	JSSP-1	2TLA022070R0000	FMC empty port cover.
	JSAP-1	2TLA022070R1000	FMC "R" port terminator with terminal jumpers and integrated muting resistor.
	FRM-1A	2TLA022048R0000	Focus converter from 2 transistor outputs to relay outputs in a protective Focus housing. M12, 8 pole male/female connectors for integration between Focus and the control circuit.
	M12-3A	2TLA020055R0000	M12 Y Connector for series connection. 2 M12 5 pole female connectors and 1 M12 5 pole male connector.
	M12-3B	2TLA020055R0100	M12 Y Connector for parallel connection. 2 M12 5 pole female connectors and 1 M12 5 pole male connector.
	M12-3D	2TLA020055R0300	M12 Y Connector, parallel Connection. 1 M12 8 pole female connector for connection of the Focus Receiver, 1 M12 5 Pole female connector for connection of the Focus Transmitter and 1 M12 8 pole male connector for panel connection.
	BP1	2TLA022090R2300	Focus FB version external teach box for inline connection to the Focus receiver for single push button teaching of fixed/floating blanking.
	Mount	2TLA850110R2900	Focus II adjustable mounting bracket kit. Comes with 4 complete bracket kits with adjustment screws.

Component list


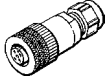
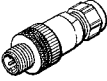
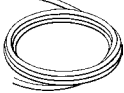
Muting sensors and indicators

	Product	Catalog number	Description
	FSTR1 - Mute R	2TLA022044R0000	Retro-reflective muting sensor with polarized filter. 24VDC 18mm barrel style with range adjustments from 0.15 to 5m, light reserve warning indicator, 1000Hz switching frequency and M12 4 pole male connector.
	FZR 1	2TLA022044R0100	Polarized 80mm circular reflector for use with the FSTR1 muting sensors. Offers a range of 0.15 to 2.5m. 5mm center mount through hole for mounting capabilities.
	FZR 2	2TLA022044R0400	Polarized 100mm x 100mm reflector for use with the FSTR1 muting sensors. Offers a range of 0.15 to 5m.
	JSM64	2TLA040007R0200	Adjustable mounting bracket with rotational knuckle for 18mm barrel style sensors.
	MF-T	2TLA022040R2000	Focus Muting Actuator 669mm overall length with 4 preadjusted and integrated muting sensors. Applicable for entry and exit of material through the Focus Light Curtain or Grid.
	MFT-T	2TLA022040R2100	Focus transmitter bar with 669mm overall length with 4 preadjusted and integrated muting transmitting sensors. Applicable for entry and exit of material through the Focus Light Curtain or Grid. Must be used with the MFR-T receiving bar.
	MFR-T	2TLA022040R2200	Focus receiver bar with 669mm overall length with 4 preadjusted and integrated muting receiver sensors. Applicable for entry and exit of material through the Focus Light Curtain or Grid. Must be used with the MFT-T transmitting bar.
	MF-L	2TLA022040R3000	362mm overall length with 2 preadjusted and integrated muting sensors. Applicable for exit of material through the Focus Light Curtain or Grid.
	MF-T Reflex	2TLA022040R4000	Focus Muting Actuator with 4 preadjusted and integrated, retro-reflective muting sensors and retro-reflective passive target. Applicable for entry and exit of material through the Focus Light Curtain or Grid with wiring only to one side.
	MFTR-T Reflex	2TLA022040R4100	Focus Muting Actuator with 4 preadjusted and integrated, retro-reflective muting sensors. Applicable for entry and exit of material through the Focus Light Curtain or Grid with wiring only to one side. Requires the M-T REFLEX passive target to operate.
	M-T Reflex	2TLA022040R4200	Focus Muting Actuator, retro-reflective passive target. Applicable for entry and exit of material through the Focus Light Curtain or Grid with wiring only to one side. Requires the MFTR-T-REFLEX active sensor bar to operate.


Transmitter cables

	Product	Catalog number	Description
	M12-C61	2TLA020056R0000	Cable single ended 6 meters black PVC jacket with straight 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.
	M12-C101	2TLA020056R1000	Cable single ended 10 meters black PVC jacket with straight 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.
	M12-C201	2TLA020056R1400	Cable single ended 20 meters black PVC jacket with straight 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.

Transmitter extension cables

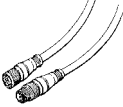
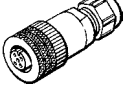
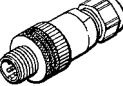

	Product	Catalog number	Description
	M12-C112	2TLA020056R2000	Extension cable, 1 meter, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.
	M12-C312	2TLA020056R2100	Extension cable, 3 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.
	M12-C612	2TLA020056R2200	Extension cable, 6 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.
	M12-C1012	2TLA020056R2300	Extension cable, 10 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.
	M12-C2012	2TLA020056R2400	Extension cable, 20 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.
	M12-C01	2TLA020055R1000	5 pole M12 female field retrofittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.
	M12-C02	2TLA020055R1100	5 pole M12 male field retrofittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.
	C5	2TLA020057R0000	5 conductors, 22AWG, black PVC jacket cable with overall braid shield. Per meter.

Receiver cables


	Product	Catalog number	Description
	M12-C63	2TLA020056R3000	Cable single ended 6 meters black PVC jacket with straight 8 pole M12 female molded connector, 22AWG conductors, overall braid shield.
	M12-C103	2TLA020056R4000	Cable single ended 10 meters black PVC jacket with straight 8 pole M12 female molded connector, 22AWG conductors, overall braid shield.
	M12-C203	2TLA020056R4100	Cable single ended 20 meters black PVC jacket with straight 8 pole M12 female molded connector, 22AWG conductors, overall braid shield.

Component list


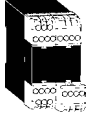
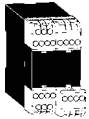


Receiver extension cables

	Product	Catalog number	Description
	M12-C134	2TLA020056R5000	Extension Cable, 1 meter, black PVC jacket with straight 8 pole M12 male/female connectors, 22AWG conductors, overall braid shield.
	M12-C334	2TLA020056R5100	Extension Cable, 3 meter, black PVC jacket with straight 8 pole M12 male/female connectors, 22AWG conductors, overall braid shield.
	M12-C03	2TLA020055R1600	8 pole M12 female field retrofittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.
	M12-C04	2TLA020055R1700	8 pole M12 male field retrofittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.
	C8	2TLA020057R1000	8 conductors, 22AWG, black PVC jacket cable with overall braid shield. Per meter.

FMC/FMI connector cables

	Product	Catalog number	Description
	M12-C62	2TLA020056R0200	Cable single ended 6 meters black PVC jacket with straight 5 pole M12 male molded connector, 22AWG conductors, overall braid shield.
	M12-C102	2TLA020056R1200	Cable single ended 10 meters black PVC jacket with straight 5 pole M12 male molded connector, 22AWG conductors, overall braid shield.

Optional interface units

	Product	Catalog number	Description
	RT9-24VDC	2TLA010029R0000	Safety Relay with 2 safety outputs, 5 selectable input options (single or dual channel), automatic or manual supervised reset, test input for monitoring of external positive guided relays/contactors, 5 LED indicators, 1 dual purpose information output, quick release terminal blocks, 22.5mm wide, 24VDC supply. Meets safety category 1 to 4.
	RT6-24VDC	2TLA010026R0000	Safety Relay with 3 safety outputs, 5 selectable input options (single or dual channel), automatic or manual supervised reset, test input for monitoring of external positive guided relays/contactors, 5 LED indicators, 1 NC information
	RT6-115VAC	2TLA010026R0400	Safety Relay with 3 safety outputs, 5 selectable input options (single or dual channel), automatic or manual supervised reset, test input for monitoring of external positive guided relays/contactors, 5 LED indicators, 1 NC information output and 2 potential free transistor information outputs, quick release terminal blocks, 45mm wide, 115VAC supply. Meets safety category 1 to 4.
	VITAL 1	2TLA020052R1000	Safety Controller with 2 safety outputs, uses unique dynamic signal technology, automatic or manual supervised reset, test input for monitoring of external positive guided relays/contactors, 5 LED indicators, 1 dual purpose information output, quick release terminal blocks, 22.5mm wide, 24VDC supply. Meets safety category 4, dynamic self test.
	PLUTO		See Pluto Safety PLC catalog for proper product selection.
	E1T-OS	2TLA010030R0000	Expansion relay with 4 safety outputs for expansion of Safety Light Curtains, 2 LED indicators, quick release terminal blocks, 22.5mm wide, 24VDC supply.

Catalog number alphanumeric

Catalog number	Page number	Catalog number	Page number	Catalog number	Page number	Catalog number	Page number
2TLA010026R0000	49	2TLA022038R4300	24, 43	2TLA022044R0100	16, 46	2TLA822200R2000	36, 37
2TLA010026R0400	49	2TLA022038R4400	24, 43	2TLA022044R0400	16, 46	2TLA822200R2100	36, 37
2TLA010029R0000	49	2TLA022038R4500	24, 43	2TLA022045R0000	18, 44	2TLA822200R2200	36, 37
2TLA010030R0000	49	2TLA022038R4600	24, 43	2TLA022046R0000	18, 44	2TLA822200R3000	36, 37
2TLA020009R0500	24, 44	2TLA022038R4700	24, 43	2TLA022048R0000	18, 45	2TLA822200R3100	36, 37
2TLA020009R0600	24, 44	2TLA022038R4800	24, 43	2TLA022070R0000	18, 45	2TLA822200R3200	36, 37
2TLA020052R1000	49	2TLA022038R4900	24, 43	2TLA022070R1000	18, 45	2TLA822200R4000	36, 37
2TLA020054R1200	18, 44	2TLA022038R5000	24, 43	2TLA022090R2300	25, 45	2TLA822200R4100	36, 37
2TLA020054R1300	18, 44	2TLA022038R5100	24, 43	2TLA022204R0000	36, 41	2TLA822200R4200	36, 37
2TLA020054R1600	18, 44	2TLA022038R5200	24, 43	2TLA022204R0100	36, 41	2TLA822200R5000	36, 37
2TLA020055R0000	45	2TLA022038R5300	24, 43	2TLA022204R0200	36, 41	2TLA822200R5100	36, 37
2TLA020055R0100	45	2TLA022038R5400	24, 43	2TLA022204R1000	36, 41	2TLA822200R5200	36, 37
2TLA020055R0300	45	2TLA022038R5500	24, 43	2TLA022204R1100	36, 41	2TLA822200R6000	36, 37
2TLA020055R1000	47	2TLA022040R2000	14, 46	2TLA022204R1200	36, 41	2TLA822200R6100	36, 37
2TLA020055R1100	47	2TLA022040R2100	14, 46	2TLA022204R2000	36, 41	2TLA822200R6200	36, 37
2TLA020055R1600	48	2TLA022040R2200	14, 46	2TLA022204R2100	36, 41	2TLA822200R7000	36, 38
2TLA020055R1700	48	2TLA022040R3000	14, 46	2TLA022204R2200	36, 41	2TLA822200R7100	36, 38
2TLA020056R0000	47	2TLA022040R4000	15, 46	2TLA022204R3000	36, 42	2TLA822200R7200	36, 38
2TLA020056R0200	48	2TLA022040R4100	15, 46	2TLA022204R3100	36, 42	2TLA822200R8000	36, 38
2TLA020056R1000	47	2TLA022040R4200	15, 46	2TLA022204R3200	36, 42	2TLA822200R8100	36, 38
2TLA020056R1200	48	2TLA022041R0200	43	2TLA022204R8000	42	2TLA822200R8200	36, 38
2TLA020056R1400	47	2TLA022041R0300	43	2TLA022204R8100	42	2TLA822200R9000	36, 38
2TLA020056R2000	47	2TLA022041R0400	43	2TLA022204R8200	42	2TLA822200R9100	36, 38
2TLA020056R2100	47	2TLA022041R0500	43	2TLA022204R9000	42	2TLA822200R9200	36, 38
2TLA020056R2200	47	2TLA022041R0700	43	2TLA022204R9100	42	2TLA822201R0000	36, 38
2TLA020056R2300	47	2TLA022041R0800	43	2TLA022204R9200	42	2TLA822201R0100	36, 38
2TLA020056R2400	47	2TLA022041R0900	43	2TLA022205R0000	42	2TLA822201R0200	36, 38
2TLA020056R3000	47	2TLA022041R1000	43	2TLA022205R0100	42	2TLA822201R1000	36, 38
2TLA020056R4000	47	2TLA022041R1300	43	2TLA022205R0200	42	2TLA822201R1100	36, 38
2TLA020056R4100	48	2TLA022041R2000	43	2TLA022205R1000	42	2TLA822201R1200	36, 38
2TLA020056R5000	48	2TLA022042R0000	18, 44	2TLA022205R1100	42	2TLA822201R2000	36, 38
2TLA020056R5100	48	2TLA022042R1000	18, 44	2TLA022205R1200	42	2TLA822201R2100	36, 38
2TLA020057R0000	47	2TLA022043R0000	18, 45	2TLA040007R0200	46	2TLA822201R2200	36, 38
2TLA020057R1000	48	2TLA022043R0100	18, 45	2TLA822200R0000	36, 37	2TLA822201R3000	36, 38
2TLA022038R1700	24, 43	2TLA022043R0200	18, 45	2TLA822200R0100	36, 37	2TLA822201R3100	36, 38
2TLA022038R1800	24, 43	2TLA022043R0300	18, 45	2TLA822200R0200	36, 37	2TLA822201R3200	36, 38
2TLA022038R4000	24, 43	2TLA022043R0400	18, 45	2TLA822200R1000	36, 37	2TLA822201R4000	36, 39
2TLA022038R4100	24, 43	2TLA022043R0500	18, 45	2TLA822200R1100	36, 37	2TLA822201R4100	36, 39
2TLA022038R4200	24, 43	2TLA022044R0000	16, 46	2TLA822200R1200	36, 37	2TLA822201R4200	36, 39

Catalog number	Page number	Catalog number	Page number
2TLA822201R5000	36, 39	2TLA822202R7100	36, 40
2TLA822201R5100	36, 39	2TLA822202R7200	36, 40
2TLA822201R5200	36, 39	2TLA822202R8000	36, 41
2TLA822201R6000	36, 39	2TLA822202R8100	36, 41
2TLA822201R6100	36, 39	2TLA822202R8200	36, 41
2TLA822201R6200	36, 39	2TLA822202R9000	36, 41
2TLA822201R7000	36, 39	2TLA822202R9100	36, 41
2TLA822201R7100	36, 39	2TLA822202R9200	36, 41
2TLA822201R7200	36, 39	2TLA822203R0000	36, 41
2TLA822201R8000	36, 39	2TLA822203R0100	36, 41
2TLA822201R8100	36, 39	2TLA822203R1000	36, 41
2TLA822201R8200	36, 39	2TLA822203R1100	36, 41
2TLA822201R9000	36, 39	2TLA850010R0900	43
2TLA822201R9100	36, 39	2TLA850110R2900	26, 45
2TLA822201R9200	36, 39	2TLA850120R5500	22, 43
2TLA822202R0000	36, 39	2TLA850210R6100	22, 43
2TLA822202R0100	36, 39	2TLA850210R8300	22, 43
2TLA822202R0200	36, 39	2TLA850210R8700	22, 43
2TLA822202R0200	36, 41	2TLA850310R1700	22, 43
2TLA822202R1000	36, 40		
2TLA822202R1100	36, 40		
2TLA822202R1200	36, 40		
2TLA822202R1200	36, 41		
2TLA822202R2000	36, 40		
2TLA822202R2100	36, 40		
2TLA822202R2200	36, 40		
2TLA822202R3000	36, 40		
2TLA822202R3100	36, 40		
2TLA822202R3200	36, 40		
2TLA822202R4000	36, 40		
2TLA822202R4100	36, 40		
2TLA822202R4200	36, 40		
2TLA822202R5000	36, 40		
2TLA822202R5100	36, 40		
2TLA822202R5200	36, 40		
2TLA822202R6000	36, 40		
2TLA822202R6100	36, 40		
2TLA822202R6200	36, 40		
2TLA822202R7000	36, 40		

Notes

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