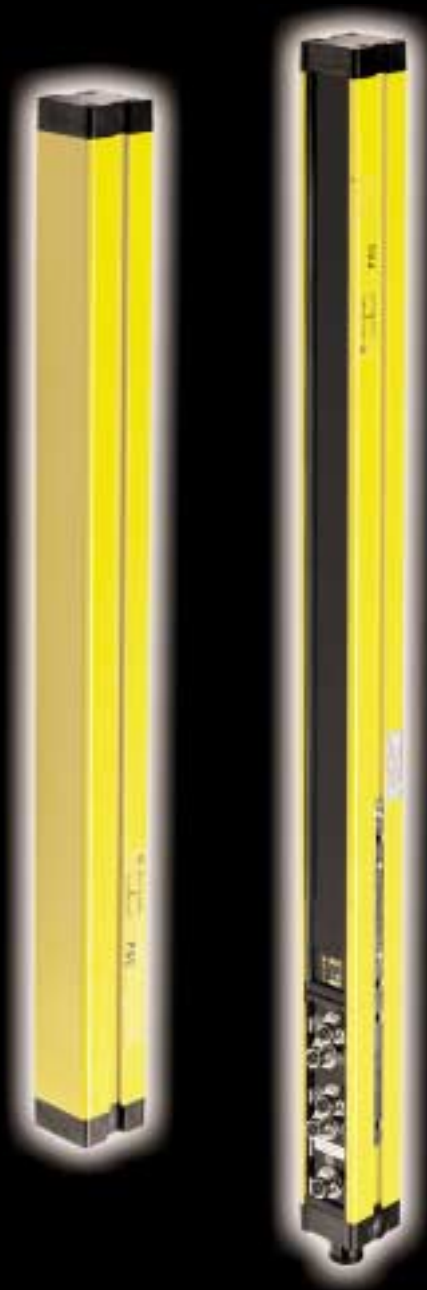


AB *Allen-Bradley*

Guardmaster®



Installation Instructions for North America

*Perimeter Access Control
(PAC) and
Perimeter Access Control
with Muting
(PAC with Muting)*

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation Allen-Bradley does not assume responsibility or liability, including intellectual property liability for actual use based upon the examples shown in this publication.

Related Safety Information

You are responsible for the safety of the entire installed control system and for meeting all applicable laws, codes, and safety requirements.



ATTENTION: As the installer of this control system, you must be knowledgeable of other applicable standards pertaining to safety recommendations related to:

- Machine Construction
- General Electrical
- Machine Guarding
- Point of Operation guards, safety light curtains, mechanical guards, and Two hand controls

In addition to local laws and codes, you are responsible for the safety recommendations detailed in all applicable codes and standards including:

- OSHA Regulations
- ANSI Standards
- NFPA
- CSA

IMPORTANT Rockwell Automation reserves the right to make revisions to these installation instructions and disclaims liability for all incidental and consequential damages related to the furnishing, performance and use of this material.

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Perimeter Access Control Installation Instructions

Agency Approvals

EU Europe

EC Prototype test conducted by

BG - Berufsgenossenschaft
(Trade Association)

Fachausschuß Eisen und Metall III
(Technical Committee for Iron and Metall III)
Graf-Recke-Str. 69
D-40239 Dusseldorf



ATTENTION!

Failure to observe may result in dangerous operation.

Throughout this manual we use the labels **ATTENTION** and **IMPORTANT** to alert you to the following:

ATTENTION: Identifies information about practices of circumstances that can lead to personal injury or death, property damage, or economic loss

ATTENTION helps you

- Identify a hazard
- Avoid a hazard
- Recognize the consequences

IMPORTANT: Identifies information that is especially important for successful application and understanding of the product.

All specifications subject to change

IMPORTANT: Save these instructions for use at a future time.

Generally recognized technical regulations and quality assurance system ISO 9000 are carefully applied during the development and production of Rockwell Automation products.

This technical description must be observed when installing and commissioning the PAC and PAC with Muting. Inspection and commissioning must be carried out by a specialist.

Conditions required for the proper installation and use of the PAC Safety Light Curtain

Please make sure you read and understand these requirements before you select and install the PAC Safety Light Curtain. PAC Safety Light Curtains are perimeter access safeguarding devices. These safety light curtains are intended to be used to provide perimeter access control safeguarding of personnel on a variety of machinery and work cells.

The PAC family of safety light curtains are general purpose presence sensing devices which are designed to protect personnel working near or around machinery, robotic cells and assembly equipment.

The installation of the PAC Safety Light Curtain must comply with all applicable federal, state and local rules, regulations, and codes.

It is the responsibility of the employer to properly install, operate and maintain the product as well as the machinery on which the PAC Safety Light Curtain is installed.

PAC Safety Light Curtains must be properly installed by qualified personnel.

PAC Safety Light Curtains are presence devices and will not protect personnel from heat, chemicals or flying parts. They are intended to signal a stop of hazardous machine motion when the sensing field is broken.

PAC Safety Light Curtains can only be used on machinery which can be stopped anywhere in it's stroke or cycle.

PAC Safety Light Curtains should never be used on full revolution clutched machinery.

The effectiveness of the PAC safety light curtain depends on the integrity of the machine control circuit. The machinery that the PAC Safety Light Curtain is installed on should have control circuitry that is fail safe in design.

All stopping mechanisms of the machinery should be inspected regularly to ensure proper operation. The protected machinery must have a consistent reliable and repeatable stopping time.



ATTENTION: Failure to read and follow these instructions can lead to misapplication or misuse of the PAC Safety Light Curtain, resulting in personal injury and damage to equipment.

Perimeter Access Control Installation Instructions

Description

Multi-beam safety light barriers from Rockwell Automation are infrared protection devices with 1 to 12 light beams. They operate on the through-beam principle, consisting of a sender and receiver unit and are suitable for access control and Perimeter guarding.

The PAC fulfils the pr EN 50 100 requirements, safety category 4. It is a self monitoring device.

The devices were designed for industrial applications and benefit from the following advantages:

- Beam coding for optimal interference immunity
- Adaptability for safe PLC
- Wide range of dimensions and beam configurations
- Robust modular construction
- Universal application possibilities
- Simple installation

The following key specifications are valid for most practical applications (Figure 1):

| | |
|------------------------|-----------|
| Maximum scanning range | 0... 70 m |
| Minimum beam gap | 50 mm |
| Maximum beam gap | 500 mm |
| Minimum beam count | 1 beam |
| Maximum beam count | 12 beams |
| Minimum housing length | 320 mm |
| Maximum housing length | 1800 mm |

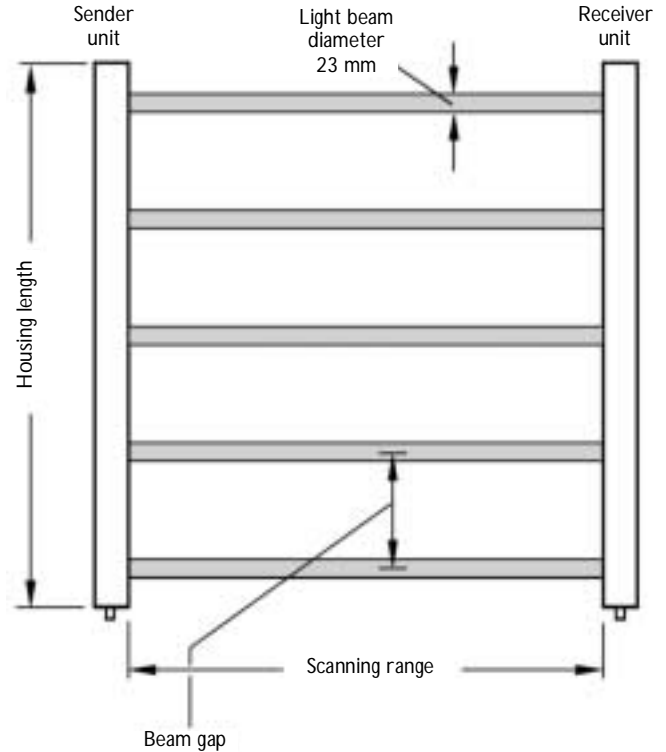


Figure 1 The key specifications of a PAC multi-beam safety light barrier

Features

Special features of the PAC multi-beam safety light barrier are listed below:

- Integrated evaluation with state-of-the-art electronics and especially developed ICs (ASICs) multi-processors
- Up to 3 different beam codes possible for increased immunity to optical interference
- Actively monitored semiconductor outputs
- Mini-style quick disconnect connectors
- Short response time (≤ 15 ms)
- Large signal reserve (factor 2)
- Optical synchronization of sender and receiver units
- Multiple safeguarding by means of corner mirrors and columns
- Compliant with pr EN 50 100 regulations
- Operating modes:
 - Electronic Device Monitoring (EDM)
 - Restart Inhibit
 - Muting configuration available

Perimeter Access Control Installation Instructions

Device/System Construction

The PAC is of modular construction. All optical and electronic elements are contained in one housing. The PAC multi-beam light barrier consists of:

- PAC sender unit
- PAC receiver unit

Both work with at least 1 and at most 12 light beams (Figure 2).

The individual light beams between sender and receiver generate a protective field which is defined by the number of beams and their radial distance from one another. The position of the individual light beams is indicated by means of markings on the housing.

Synchronization between sender unit and receiver unit is achieved optically, by means of a pre-defined encoded sequence, thus eliminating the need for electrical connection between sender and receiver.

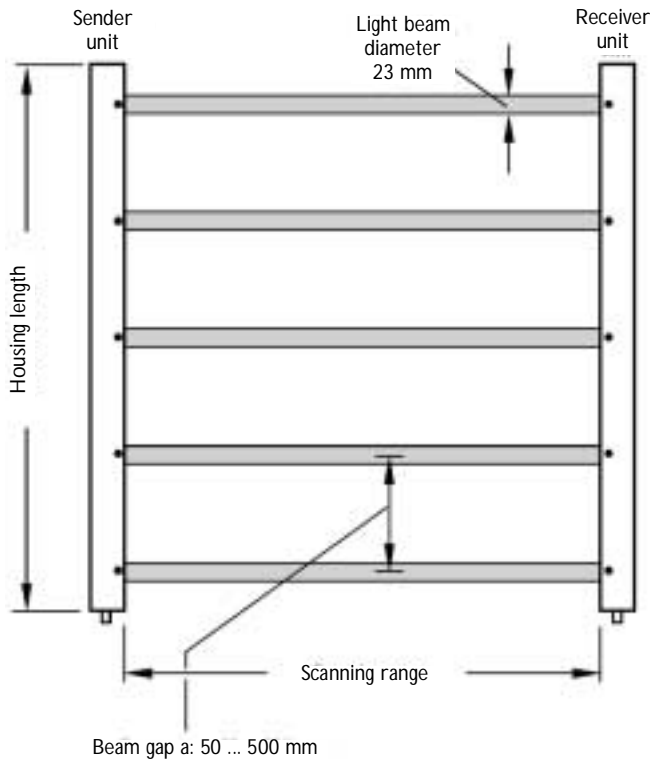


Figure 2 System construction of the PAC multi-beam safety light barrier

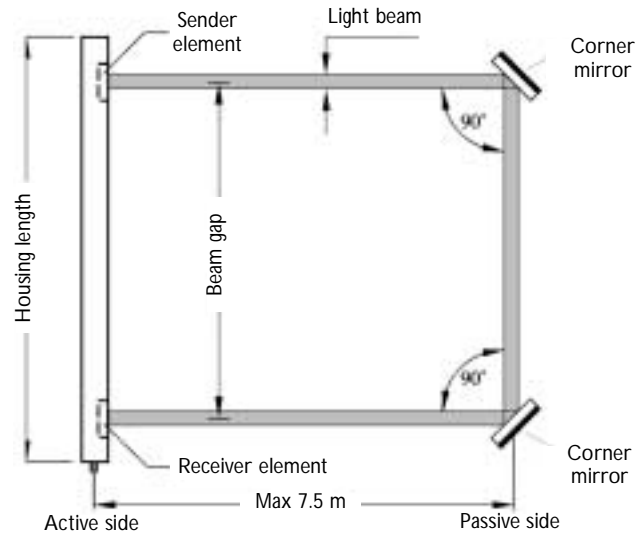


Figure 3 System construction of the PAC single beam safety light barrier

The PAC Single Beam

The PAC single beam is a unique configuration in that both the transmitter and receiver are physically located in the same housing, referred to as the active side. The opposing side, referred to as the passive side, contains two mirrors that direct the transmitted beam downward and back to the receiving element. This configuration creates two beams of infrared light with a 500mm gap between the beams of transmitted light (Figure 3).

It is suitable for access control and hazardous area protection. The PAC single beam fulfills the requirements of pr EN50 100, as a type 4 safety device.

The following key specifications are valid for the PAC single beam:

| | |
|---------------------|--------|
| Distance: | |
| Active/passive side | 7.5 m |
| Beam gap | 500 mm |

Note When using a PAC single beam the maximum scanning range is reduced to 7.5 meters

Function

Both sender and receiver units require a voltage of 24V DC. The sender unit contains the sender module, which transmits the infrared, encoded light impulses. Only a receiver unit with the same coding can recognize the encoded signal transmitted by the sender. Three different coding possibilities are available.

Operating Modes

Various operating modes can be configured through dip switch settings, as shown in the table on the following page.

The most commonly used PAC and their respective operating modes are listed in the selection table.

Perimeter Access Control Installation Instructions

The following selection of operating modes are available:

- With or without restart inhibit
- With or without EDM (external device monitoring)
- With or without muting
- With beam coding 1 type 1
- With beam coding 2 type 2
- With beam coding 3 type 3
- With inverted or non-inverted signal at output for contamination warning

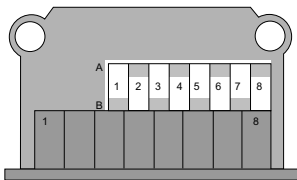
| Setting | Selected Function |
|---------|--|
| | Switch 1 in position "B", switch 2/3 in position "A" Coding 1 active |
| | Switch 2 in position "B", switch 1/3 in position "A" Coding 2 active |
| | Switch 3 in position "B", switch 1/2 in position "A" Coding 3 active |

| | |
|--|---|
| | Switch 4 in position "A" Contamination signal polarity normal |
| | Switch 4 in position "B" Contamination signal polarity inverted |

| | |
|--|--|
| | Switch 5/7 in position "A" with restart inhibit |
| | Switch 5/7 in position "B" without restart inhibit |

| | |
|--|--|
| | Switch 6/8 in position "A" with external contact monitoring |
| | Switch 6/8 in position "B" without external contact monitoring |

Setting the coding and operating modes on the PAC receiver



PAC with Muting

With an automated production procedure there is often the problem that material must be transported to the manufacturing zone without interrupting the working process.

The safety light barrier is not sufficient on its own to differentiate between materials and people.

Muting briefly de-activates the protective field, to allow uninhibited transportation of the conveyed goods. When the PAC with muting is properly configured, the system can differentiate between people

and conveyed goods, thus guaranteeing the integrity of the safety measures. Typical applications for muting are:

- Access control for high bay warehouses
- Access control for palleting areas
- Access control for welding installations
- Access control for automated processing centers.

Muting sensors can be realized by:

- Light barriers
- Inductive sensors
- Mechanical switches

Detailed information concerning functionality and connectivity can be found in Section 2, PAC with Muting.

Applications and Application Requirements

Applications

The PAC multi-beam safety light barrier can be used for safeguarding access to dangerous areas and for danger zone protection.

Typical areas of application are:

- Access control for processing areas (Figure 4).

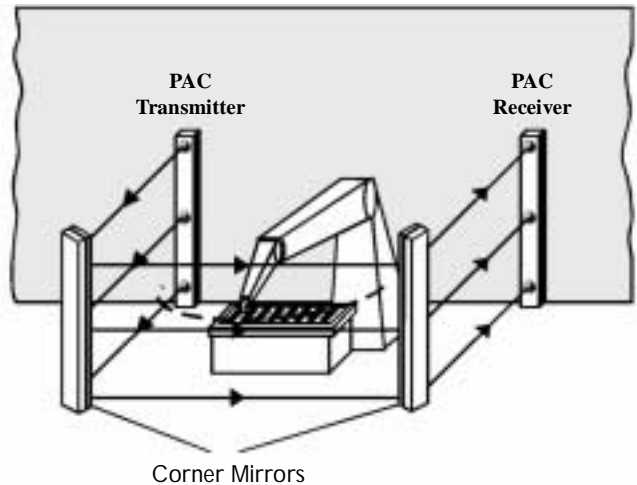


Figure 4 Three-beam PAC multi-beam safety light barrier for safeguarding access to a robot

Perimeter Access Control Installation Instructions

Application Requirements

The protective functions of the PAC can only be used properly when the following conditions are satisfied:

- The machine or installation must be controlled electrically.
- It must be possible to stop hazardous machine movement.
- The PAC must be installed so that entry into the danger zone interrupts one or more of the light beams.

The light beam diameter of 23 mm must be fully covered, to assure a change in state of outputs.

Release can only be achieved with the use of a restart switch.

The restart switch must be located such that it cannot be pressed from inside the danger zone.

The PAC should be mounted such that upon interruption of the light beam, the dangerous location can only be reached if the dangerous condition of the machine has been stopped. The requirement for this is that there is a proper safety distance between the light beams and the nearest point of danger.

Persons situated inside the danger zone, but outside the protection field are not recognized. It must therefore be ensured that a dangerous condition is only possible when there is nobody present in the danger zone.

The relevant legal and government regulations are to be complied with for the implementation of protection installations. These regulations vary, depending on areas of application.

Corner Mirrors and Columns

When the PAC is used in conjunction with one or two corner mirrors, 2 or 3 sides can be protected respectively (Figure 5). Use of mirrors reduce the maximum scanning range approximately 10% per mirror.

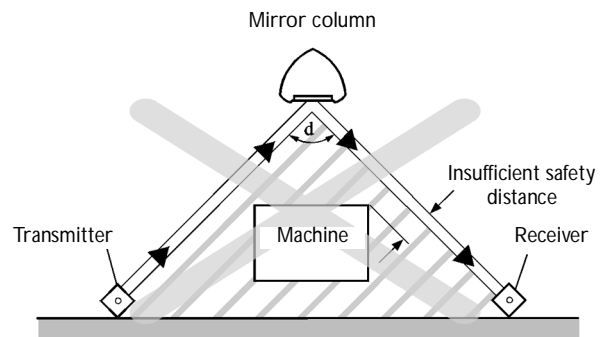
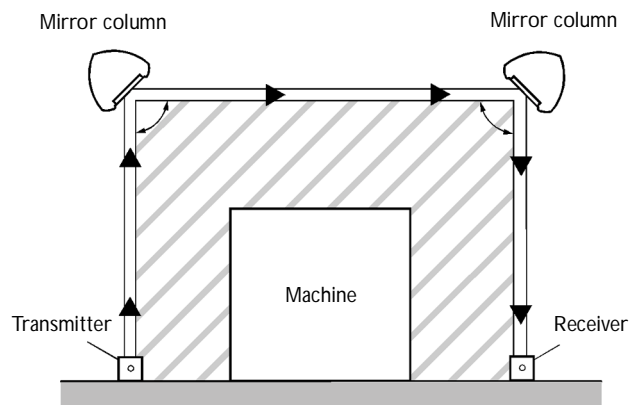
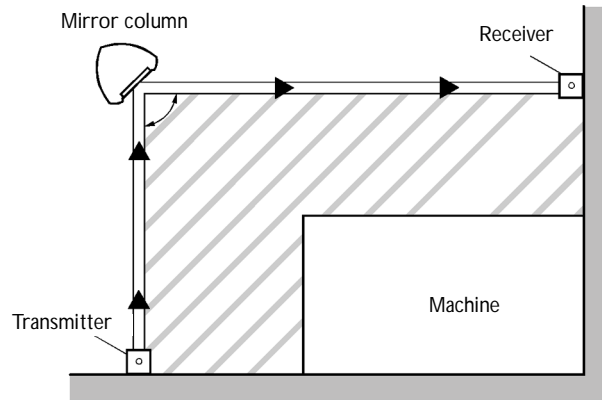


Figure 5 Multi-sided access control to danger zones with PAC multi-beam safety light barrier

Perimeter Access Control Installation Instructions

Mechanical Installation

General

The PAC can be fitted in any required position. The devices are to be mounted such that the danger zone can only be reached by interrupting at least one light beam. The choice of the PAC type, number of beams and beam gaps are determined by the requirements of the respective machine and specifications of the relevant regulating body.

When assessing the risk situation, consideration must be given on how to avoid the possibility of bypassing the protection field by:

- Crawling underneath
- Reaching over the top
- Reaching through two light beams
- Climbing through two light beams

US Safety Distance Formulas

The PAC Safety Light Curtains must be mounted at a sufficient distance from the pinch point or point of operation hazard to ensure that the machine stops before a person's finger, hand, arm(s), or body reaches the hazard. This distance, referred to as the safety distance, must be properly calculated prior to determining the safety light curtain protective height and mounting the light curtains on the machine. Failure to properly calculate this safety distance may result in operator injury.

Note Regardless of the calculated safety distance, PAC Safety Light Curtains should never be mounted closer than 6 inches from the point of operation or pinch point hazard.

In the United States there are two formulas that are used to properly calculate the safety distance. The first, the OSHA formula, is the minimum requirement for the calculation of the safety distance. The second formula, the one recommended by Rockwell Automation, is the ANSI formula, which incorporates additional factors to be considered when calculating the safety distance.

OSHA Safety Distance Calculation formula

The OSHA safety distance formula as specified in CFR Subpart O 1910.217 is as follows:

$$D_s = 63 \times T_s$$

Ds Safety Distance

63 Is the OSHA recommended hand speed constant in inches per second

Ts Is the total stop time of all devices in the safety circuit, measured in seconds. This value must include all components involved in stopping the hazardous motion of the machinery. For a mechanical power press it is the stopping time measured at approximately the 90° position of the crankshaft rotation.

Note The T_s number must include the response times of *all* devices, including the response time of the safety light curtain, the safety light curtain controller (if used), the machine's control circuit and any other devices that react to stop the hazardous motion of the machinery. Not including the response time of a device or devices in the stop time calculation will result in insufficient safety distance for the application. This may result in operator injury.

The ANSI Safety Distance Formula

The ANSI safety distance formula, which is the Rockwell Automation recommended formula, is as follows:

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

Ds Minimum safety distance between the safe guarding device and the nearest point of operation hazard, in inches.

K Hand speed constant in inches per second. The ANSI standard value is 63 inches per second when the operator begins reaching toward the point of operation hazard from rest. NOTE: ANSI B11.19 1990 E4.2.3.3.5 states "The value of the hand speed constant, K, has been determined by various studies and although these studies indicate speeds of 63 inches/second to over 100 inches/second, they are not conclusive determinations. The employer should consider all factors, including the physical ability of the operator, when determining the value of K to be used."

Ts Stop time of the machine tool measured at the final control element.

Tc Response time of the control system

Note T_s and T_c are usually measured by a stop time measuring device.

Tr Response time of the presence sensing device (safety light curtain) and its interface, if any. This value is generally stated by the device manufacturer or it can be measured by the user.

Tbm Additional time allowed for the brake monitor to compensate for variations in normal stopping time.

Dpf Depth penetration factor. It is an added distance to allow for how far into the protective field an object, such as a finger or hand, can travel before being detected. D_{pf} is related to the safety light curtain's object sensitivity. Object sensitivity is the smallest diameter object which will always be detected anywhere in the sensing field.

Perimeter Access Control Installation Instructions

Safety Distance to Point of Danger

A safety distance must be maintained between the protection field and the point of danger. This safety distance should guarantee that the point of danger can only be reached by the time the hazardous motion of the machine has come to rest (Figure 6). The safety distance (according to EN 775, 999 and 294) is dependent on:

- The stop time of the machine
- The response time of the protection installation
- The person's speed of approach

The stop time is a specification of the machine itself.

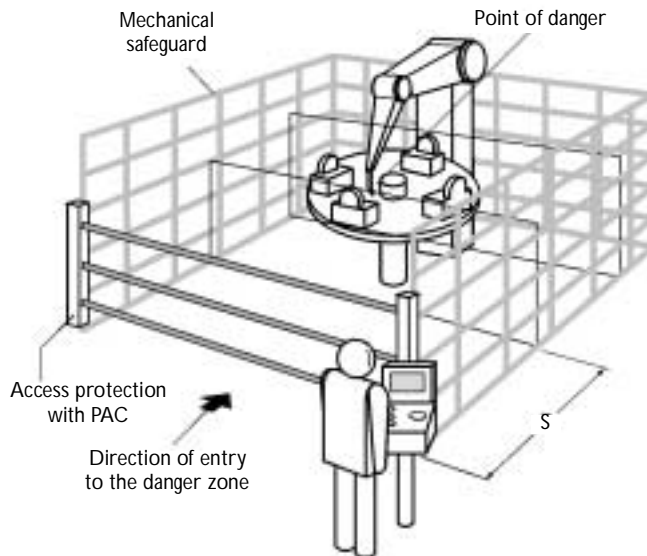


Figure 6 Safety distance and height of the point of danger for multi-beam vertical access protection

General Formula for the Safety Distance in Accordance with EN 999

The safety distance S is calculated from the formula:

$$S = (K \cdot T) + C, \text{ where}$$

- S** Safety distance in mm
- T** Stop time of machine plus response time
- C** Constant for calculated distance in mm
- K** Speed of approach

Safety Distance for Multi-Beam Access Control in Accordance with pr EN 999

Several individual beams are used to prevent invasion of the whole body or parts of the body which are larger than the minimum resolution (beam gap + 23 mm beam diameter). The approach speed is taken as 1600 mm/s and C is 850 mm.

The minimum distance to the point of danger is thus:

$$S = (1600\text{mm/s} \cdot T) + 850\text{mm}$$

The position of the beams is also to be observed (Table 1).

Table 1

Number of Light Beams, Height Above Relevant Level and Beam Gap

| Number of Beams | Height Above Reference Level (e.g. floor, in mm) | Beam Gap in mm |
|-----------------|--|----------------|
| 2 | 400, 900 | 500 |
| 3 | 300, 700, 1100 | 400 |
| 4 | 300, 600, 900, 1200 | 300 |

Distance from Reflective Surfaces

Reflective surfaces which exist or can be placed between the sender and receiver can lead to diverted reflection and consequent nonrecognition of an object. Therefore, a minimum distance (a) must be maintained between reflective objects and the optical axis (straight line from PAC Transmitter to PAC Receiver) (Figure 7). The distance (a) is dependent on the respective distance between sender and receiver (Figure 8).

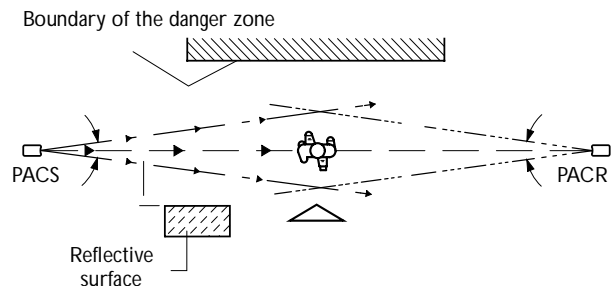


Figure 7 Correct assembly, correct alignment, no diverted reflection—mm

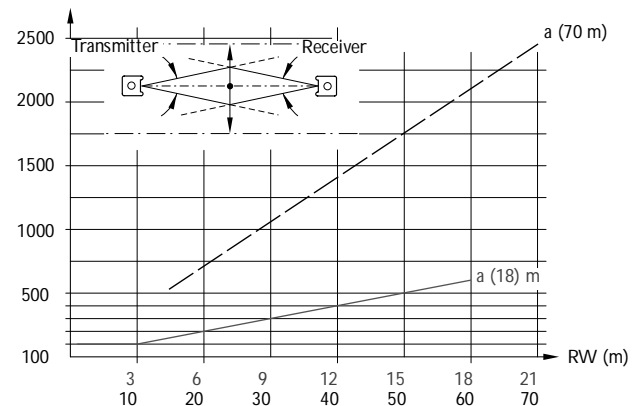


Figure 8 Safety distance (a) in relation to the distance between sender and receiver

Perimeter Access Control Installation Instructions

Multiple Safeguarding

Beam coding provides an elegant way of eliminating the effects of optical interference (*Figure 9*).

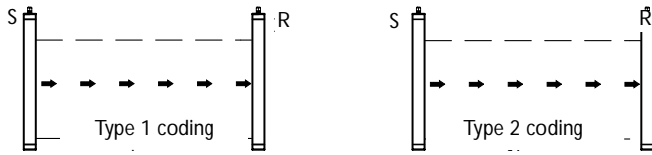


Figure 9 Assembly of two PAC systems

Use in Environments with Optical Interference

Beam coding technology allows this product to be used in environments where sources of optical interference are present.

Examples are:

- Welding sparks
- Other photoelectric equipment and laser scanners
- Robotic welding

Mechanical Attachment

In the basic kit, 4 slider nuts with M5 threads are provided for both sender unit and receiver unit.

These slider nuts are fastened into the slot on the side of the housing. Either right angle, hinged or shock absorbing mounting brackets are available as optional accessories (*Figure 10*).

The right angle bracket can be used where no large mechanical tolerances need to be compensated for. The hinged bracket allows for $\pm 2^\circ$ horizontal adjustment of the optic head.



ATTENTION! To prevent shifting of the light barrier, the brackets must be fastened at 20 ... 30 mm (60 mm on the terminal chamber side) from the end caps.

Perimeter Access Control Installation Instructions

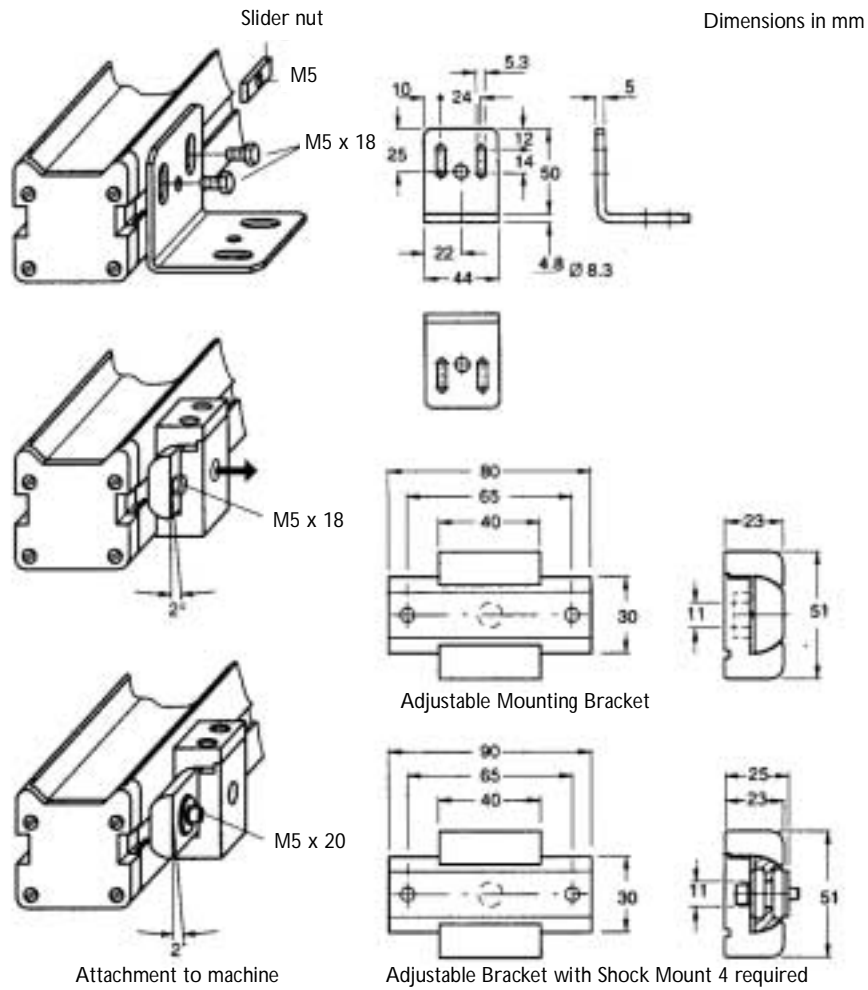


Figure 10 Mechanical mounting options for PAC (from top to bottom): Right angle bracket, hinged bracket and bracket with shock absorber

Perimeter Access Control Installation Instructions

Mounting the Mirror Columns

Column 400

Dimensions in mm

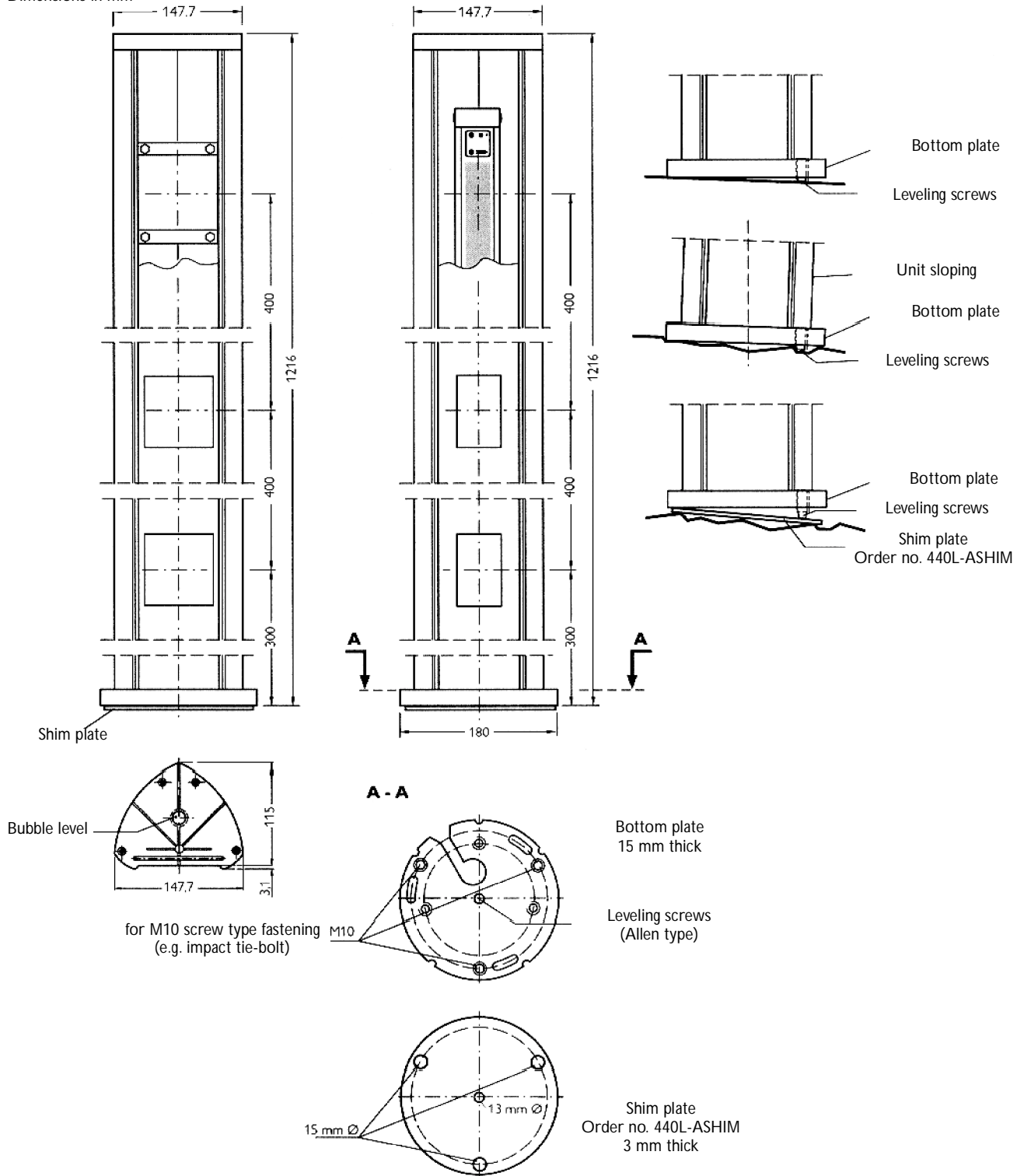


Figure 11 Column 400: left—mirror column, right—device column

Perimeter Access Control Installation Instructions

Column n 500

Dimensions in mm

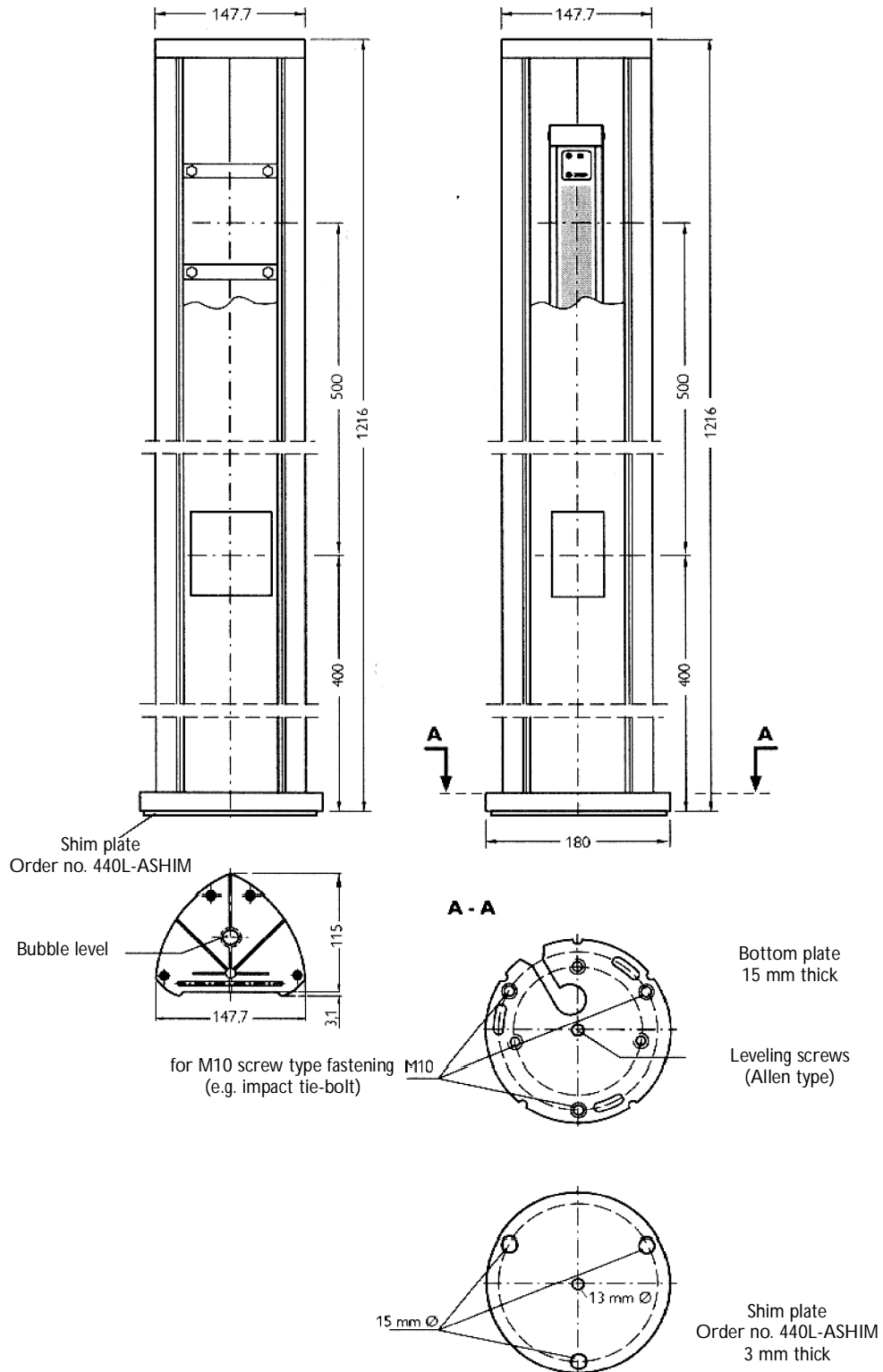


Figure 12 Column 500: left—mirror column, right—device column

Perimeter Access Control Installation Instructions

Corner Mirror

The PAC corner mirror (Figure 13) is not suitable for column mounting. The order number 440L-AMIRR2 contains an assembly kit.

The PAC corner mirror is especially suited to the single beam configuration (Figure 14). The mirrors are housed in the PAC single beam housing profile. This offers the following advantages:

- Mirror does not have to be cleaned (IP65 enclosure)
- Easy to adjust
- Tolerant to small adjustment errors

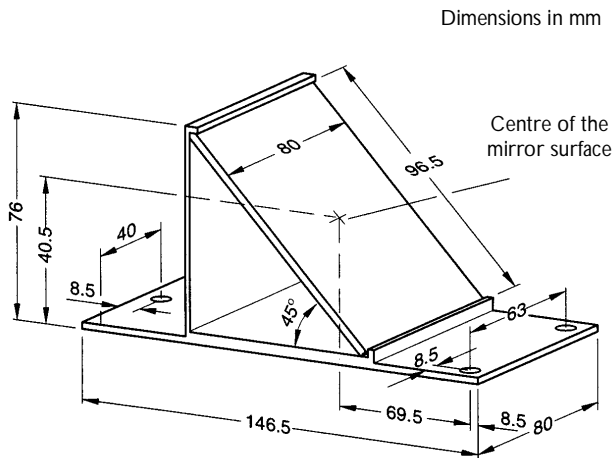


Figure 13 Dimensions of the PAC corner mirror

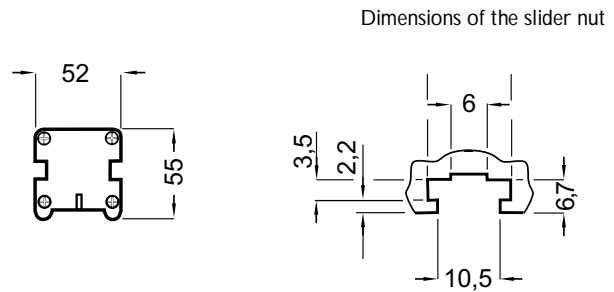
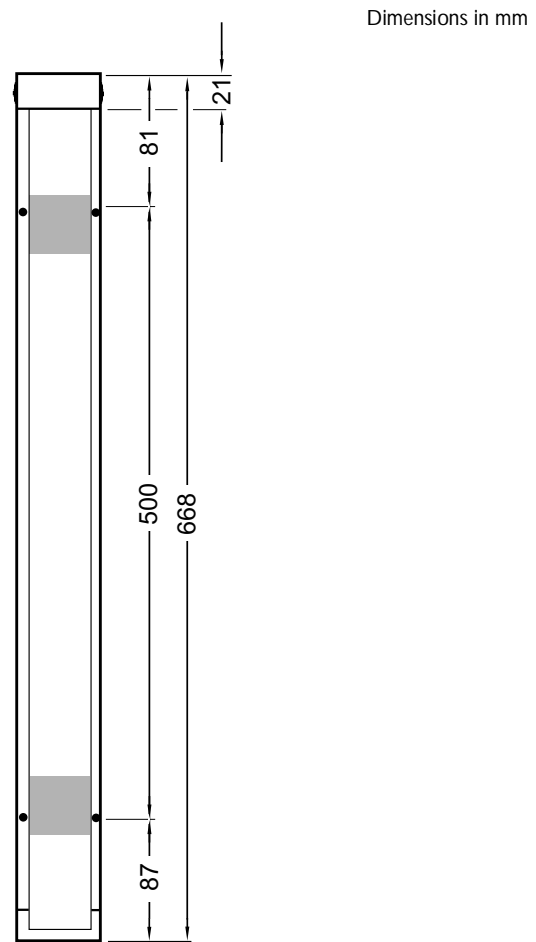


Figure 14 Dimensions of the PAC corner mirror housing



ATTENTION! The scanning range of the PAC single beam reduces to 6.1 m when used with the PAC corner mirror (larger number of boundary surfaces).

Electrical Installation

General

The sender and receiver units are connected directly to the machine control unit, through safety relays.

The machine control unit has a 7 pin connection to the sender unit and an 8 pin connection to the receiver unit.

The PAC single beam has one 8 pin connection

The maximum cross section of a conductor is 1.5 mm² or 1 mm² sleeved. Both components have mini style quick disconnect connectors.

Both components require a supply voltage of 24V +/- 20%.

The operating voltage is connected between +24V and ground.

Power supplies are available from Rockwell Automation as optional accessories.

A break contact from the machine control unit is applied to the test input (MCC = machine control contact). The test procedure is triggered when the break contact is open for at least 75 ms (Figure 16). The testing must be carried out at a time when there is no hazardous machine motion.

If the test is unsuccessful, the machine must receive a stop signal from the machine control unit.

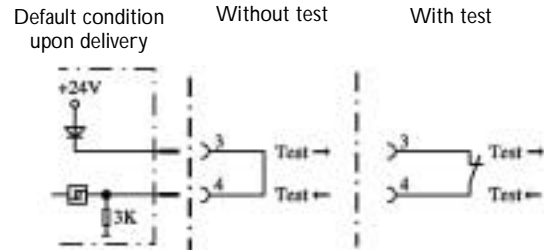


Figure 16 Testing the PAC with the MCC test input



ATTENTION! Assure that power to the machine is off before connecting the PAC to machinery



ATTENTION! There is no jumper between pin 3 and pin 4 when delivered. Therefore a short-circuit bridge or a test signal (break contact) must be applied for testing purposes.

Sender Unit

The electrical connection diagram of the sender unit is shown in Figure 15.

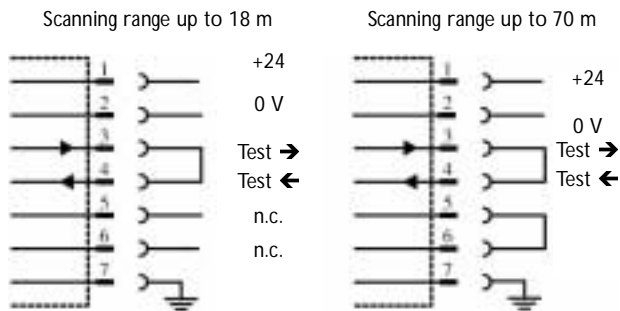


Figure 15 Connection diagram for the sender unit: left—scanning range up to 18 m, right—scanning range up to 70 m

Scanning Range of the Sender Unit

The scanning range setting (Figure 17) is indicated by the yellow LED on the sender unit (Figure 18).

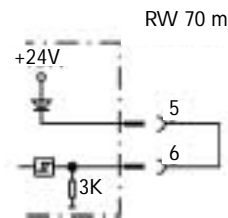


Figure 17 Conversion of the PAC for 70 m scanning range

| | |
|-------------------------------------|---|
| Sender scanning range 0 ... 18 m | No bridge between contacts 5 and 6 |
| Sender scanning range 15 m ... 70 m | Jumpered connection as shown in Figure 17 |

MCC Test Input

This test is an optical test. The test procedure enables an inspection of the switching elements. The sender unit is switched off for this process.



ATTENTION! The MCC test must only be conducted during the nonhazardous portion of a machine cycle.

Perimeter Access Control Installation Instructions

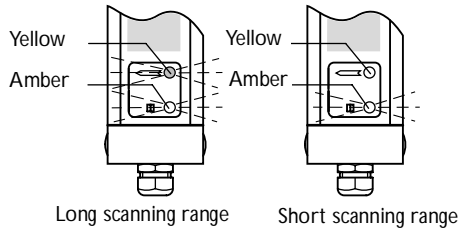


Figure 18 Scanning range indicators on the sender unit



ATTENTION! If you set the transmission power too high for small scanning ranges, there is a danger of diverted reflections.

Receiver Unit

The electrical connection diagram of the receiver unit and the PAC single beam is shown in Figure 19.

Switching Outputs

Both outputs OSSD1 and OSSD2 are actively monitored short-circuit protected PNP semiconductor outputs. The outputs can be loaded with a maximum of 0.5A and are not floating, but are referenced to 0 V. For unobstructed light beams, both outputs are active HIGH. The output voltage U_a of both channels is dependent on the supply voltage U_V and the switched load, and is at least:

$$U_a \geq U_V - 2.5 \text{ V}$$

Output: Contamination Warning (OWS)

The contamination warning output (OWS = Output Weak Signal) is a short-circuit protected PNP semiconductor output which is active (HIGH) for an unobstructed but weak light beam (Figure 20). This output is not floating but is referenced to 0V.

The OWS outputs of several PACs can be connected together to one signal receptor or a PLC input. Parallel switching of several PAC contamination warnings is possible ("wired OR").

The maximum output current is 200 mA.

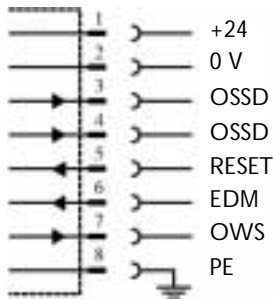


Figure 19 Wiring diagram of the receiver unit or PAC single beam



ATTENTION! Connection of the receiver outputs OSSD1 and OSSD2 (Figure 19)

Both output signals must be processed separately.

Do not connect them in parallel with other PAC outputs (Figure 24).

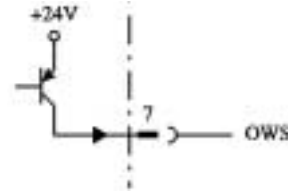


Figure 20 The contamination warning output

| | Voltage at output |
|--------------------------------|-------------------|
| Light barrier contaminated | + 24 V |
| Light barrier not contaminated | 0 V |

Input: External Device Monitoring (EDM)

The EDM monitors the switching elements (e.g. contactors), which are driven by the sensor outputs. The EDM is activated whenever the light beam is interrupted before the machine restarts and its consequent hazardous motion. The outputs of the light barrier and switching elements are active HIGH for an uninterrupted light beam.

When operating with EDM the switching element contacts to be monitored are connected to the EDM input (Figure 21).

EDM expects the contacts to be in their rest position (+24 V) and only then enables the outputs OSSD1 and OSSD2 (active HIGH for uninterrupted light beam). Electrically, this means that both break contacts (k1, k2) must close when the switching elements (K1, K2) reach their rest position due to an interrupted light beam.

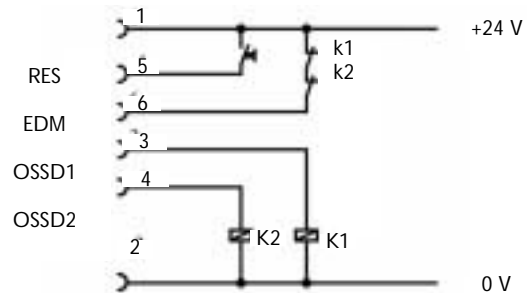


Figure 21 Schematic for restart switch and contacts with EDM



ATTENTION! The EDM switches the OSSDs off again...

...If no reaction from the switching elements is determined within 300 ms (dynamic EDM).

The contacts k1 and k2 must then be off. If this is not the case, the outputs switch off again and the red LED on the receiver unit lights up.

Input: Restart Switch (RES)

When operating with restart inhibit, a make contact restart switch is connected between +24V and the restart switch input (Figure 22).

If the light beam is unobstructed, the yellow LED on the receiver flashes to indicate that the restart switch must be activated. After the restart switch has been pressed and then released again, the sensor switches the outputs OSSD1 and OSSD2 high (active), and the green LED on the receiver lights up.

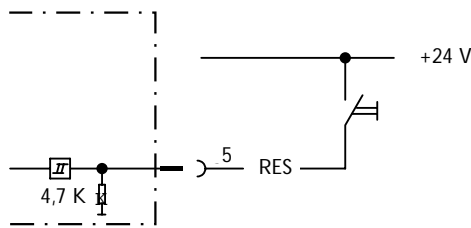


Figure 22 Connection of the restart switch to the receiver unit or to the PAC single beam



ATTENTION! When operating with Restart Inhibit, you must press the Restart Inhibit button (yellow LED flashes).

When operating without Restart Inhibit, the light beam must be interrupted and enabled. This is indicated by the continuously lit yellow LED on the receiver unit.

Example Circuits

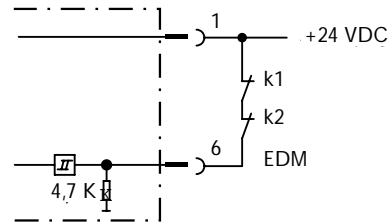
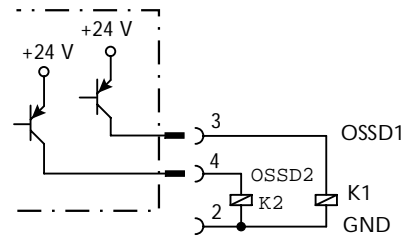


Figure 23 Connection of the contacts with EDM

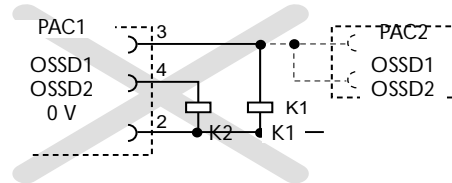
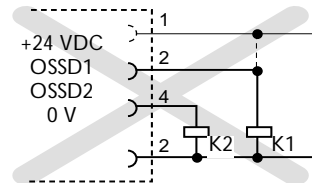
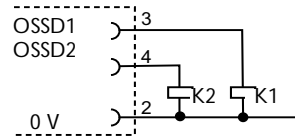
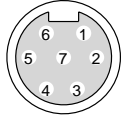


Figure 24 Correct and incorrect connection of the contacts

Perimeter Access Control Installation Instructions

Connector Diagrams

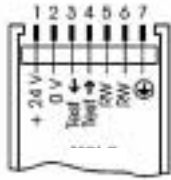
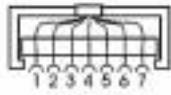
7-Pin Connector



| Pin | Color |
|-----|--------|
| 1 | Black |
| 2 | White |
| 3 | Blue |
| 4 | Brown |
| 5 | Grey |
| 6 | Yellow |
| 7 | Green |

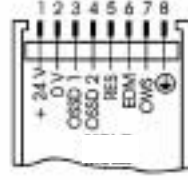
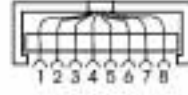
Transmitter Unit

Connection Terminal

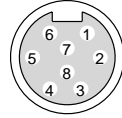


Receiver Unit and Single Beam PAC

Connection Terminal

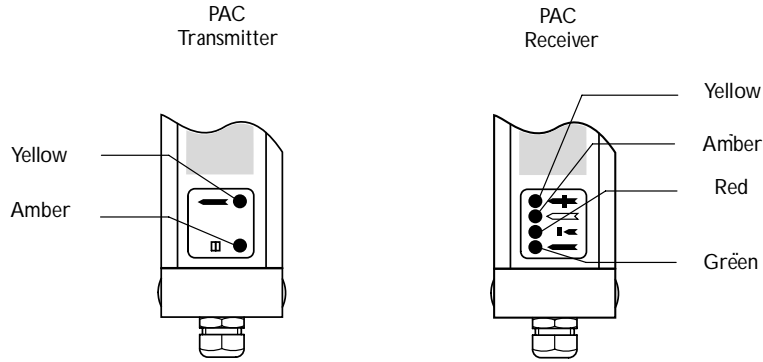


8-Pin Connector



| Pin | Color |
|-----|--------|
| 1 | Red |
| 2 | White |
| 3 | Blue |
| 4 | Brown |
| 5 | Grey |
| 6 | Yellow |
| 7 | Green |
| 8 | Pink |

Operating Conditions: Fault Chart



Yellow sender range: high/low MCC test
Amber operating voltage is applied

Yellow press restart switch
Amber contamination
Red outputs inactive
Green light beam unobstructed, outputs active

| | Fault | Cause | Test and remedy |
|--|--|--|---|
| Sender unit | Amber LED does not light up | No power supply | Check voltage |
| | Yellow LED flashes at 1/s | Open circuit between terminals 3 and 4 (test contact) | Check through-connection |
| | Yellow and amber LED flash at 8 Hz | Device in LOCKOUT mode (error condition) | Turn operating voltage off then on. Replace PAC Transmitter or call Rockwell Automation service |
| Receiver unit | None of the 4 LEDs light up on the PAC Receiver/PAC single beam | No power supply to PAC Receiver/PAC single beam | Check voltage supply to the PAC Receiver/PAC Single Beam Replace PAC Receiver or call Rockwell Automation service |
| | Red LED on the PAC receiver/PAC single beam receiver is continuously lit up (no light reception) | System misaligned PAC Receiver/PAC single beam receiver unit defect Test input PACS open circuit Contacts do not reach rest position (no + 24 V at EDM) | Realign PAC Receiver/PAC Transmitter Replace PAC Receiver/PAC single beam Check test on PAC receiver Check contacts |
| | The red and yellow LEDs on the PAC Receiver/PAC single beam are continuously lit | Only for operation without restart inhibit and with EDM: contacts have not closed | Check contacts For new start-up: interrupt light beam and re-enable |
| LEDs on sender unit must light up | Red LED on PAC Receiver/PAC single beam continuously lit up. Yellow LED does not flash despite unobstructed light beam | + 24 V on RES input during operation | Check RES Turn operating voltage off and then on |
| | Amber LED on PAC Receiver/PAC single beam lights up | Turn operating voltage off and then on Front panel of PAC Receiver/PAC transmitter/PAC single beam or corner mirror dirty | Realign system / corner mirrors Clean front panel / corner mirrors |
| | Red LED on PAC Receiver/PAC single beam lit up and the amber and yellow LEDs flash at 8 Hz | Device in LOCKOUT mode (error condition) | Operating voltage OFF/ON. If PAC Receiver/PAC single beam is not activated replace PAC Receiver/PAC single beam or call Rockwell Automation service |
| | Red LED on PAC Receiver/PAC single beam lit up and yellow LED flashes | Restart switch hasn't been pressed | Press Restart switch and release |

Perimeter Access Control Installation Instructions

Technical Data for Multi-Beam Photoelectric Safety Switch (PAC)

| | Minimum | Typical | Maximum |
|---|--|---------------|--------------|
| Protective field range | 0,5 m | | 70 m |
| Beam gap | 50 mm | | 500 mm |
| Resolution (type-dependent) | 73 mm | | |
| Protection class | I | | |
| Enclosure rating | IP 65 | | |
| Supply voltage U_V | 19,2 V | 24 V | 28,8 V |
| Ripple ¹⁾ | | | 2,5 V_{SS} |
| Voltage if power fails (20 ms) | 18 V | | |
| Synchronization | optical, without separate synchronization cable | | |
| On-transition time after applying the supply voltage of sender and receiver | | 0,8 s | |
| Sender Unit | | | |
| Test output | | $U_V - 1,4 V$ | |
| Test input | | | |
| Input resistance (HIGH) | 2,4 k Ω (in relation to 0 V) | | |
| Sender, inactive (Test) | 0 V | | 5 V |
| Sender, active | 17,8 V | | U_V |
| Reaction time on test | | 90 ms | 100 ms |
| Wave length | | 880 nm | |
| Power consumption | | | 7 W |
| Weight (for PAC transmitter 03) | | 3,14 kg | |
| Receiver unit | | | |
| Supply connections (OSSD) | 2 PNP semiconductors, short-circuit protected ²⁾ , crossed connection-monitored | | |
| Switching HIGH (U_{eff}) | $U_V - 3 V$ | | U_V |
| Switching current | 5 mA | | 500 mA |
| Leakage current ³⁾ | | | 2,4 mA |
| Load capacity | | | 2,2 μF |
| Switching frequency ⁴⁾ | | | 2,2 H |
| Load inductance | | | 4/s |
| Test impulse data ⁵⁾ | | | |
| Test impulse width | 190 μs | 220 μs | 240 μs |
| Test impulse rate | 7 ms | 14 ms | 21 ms |
| Permissible cable resistance between unit and load ⁶⁾ | | | 2,5 Ω |
| Response time | | | 15 ms |
| Switch-on time after break in light-beam | | 15 ms | 30 ms |
| Power consumption | | | 5 W |
| External contact monitoring input | | | |
| Input resistance | 3 k Ω (in relation to 0 V) | | |
| Working position at | 18,5 V | | U_V |
| Rest position at | 0 V | | 12 V |
| Permissible release time of contactors | no restriction | | |
| Permissible response time of contactors | | | 300 ms |

Voltage in DC • Reference point for measured values: connector

Perimeter Access Control Installation Instructions

| | Minimum | Typical | Maximum |
|--|--|---------|---|
| Command unit input | | | |
| Input resistance (HIGH) | 3 kΩ (in relation to 0 V) | | |
| Command unit operated at | 18,5 V | | U_V |
| Command unit released | 0 V | | 12 V |
| Duration of command unit operation | 50 ms | | |
| Contamination signalling output open collector | not short-circuit-proof | | |
| Output current | | | 200 mA |
| Max. conductor cross section | | | 1 mm ² with sleeve 1,5 mm ² without sleeve |
| Weight (for PAC receiver 03) | | 3,14 kg | |
| Cable length (to 70 m) | Dependent on load, power supply unit and wire cross-section. | | |
| Operating mode | The technical specifications must be observed shielded. | | |
| Safety category | With restart inhibit and external contact monitoring. | | |
| Tested to | Type 4 | | |
| | pr EN 50 100 Part 1 and 2 | | |
| Ambient operating temperature | 0 °C | | + 55 °C |
| Storage temperature | - 25 °C | | + 70 °C |
| Air humidity (non-condensing) | 15% | | 95% |
| Vibration resistance | 5 g, 10... 55 Hz to IEC 68-2-6 | | |
| Shock resistance | 10 g, 16 ms to IEC 68-2-29 | | |
| Dimensions | see 10, <i>Dimensional drawings</i> | | |

¹⁾ The voltage must not exceed or fall below the set limits. ⚠

²⁾ Applies for voltages between U_V and 0 V.

³⁾ In the case of an error (interruption of the 0 V cable) the output behaves like a resistor > 13 kΩ after U_V . The downstream control element must identify this state as LOW. The safe PLC detects this state. ⚠

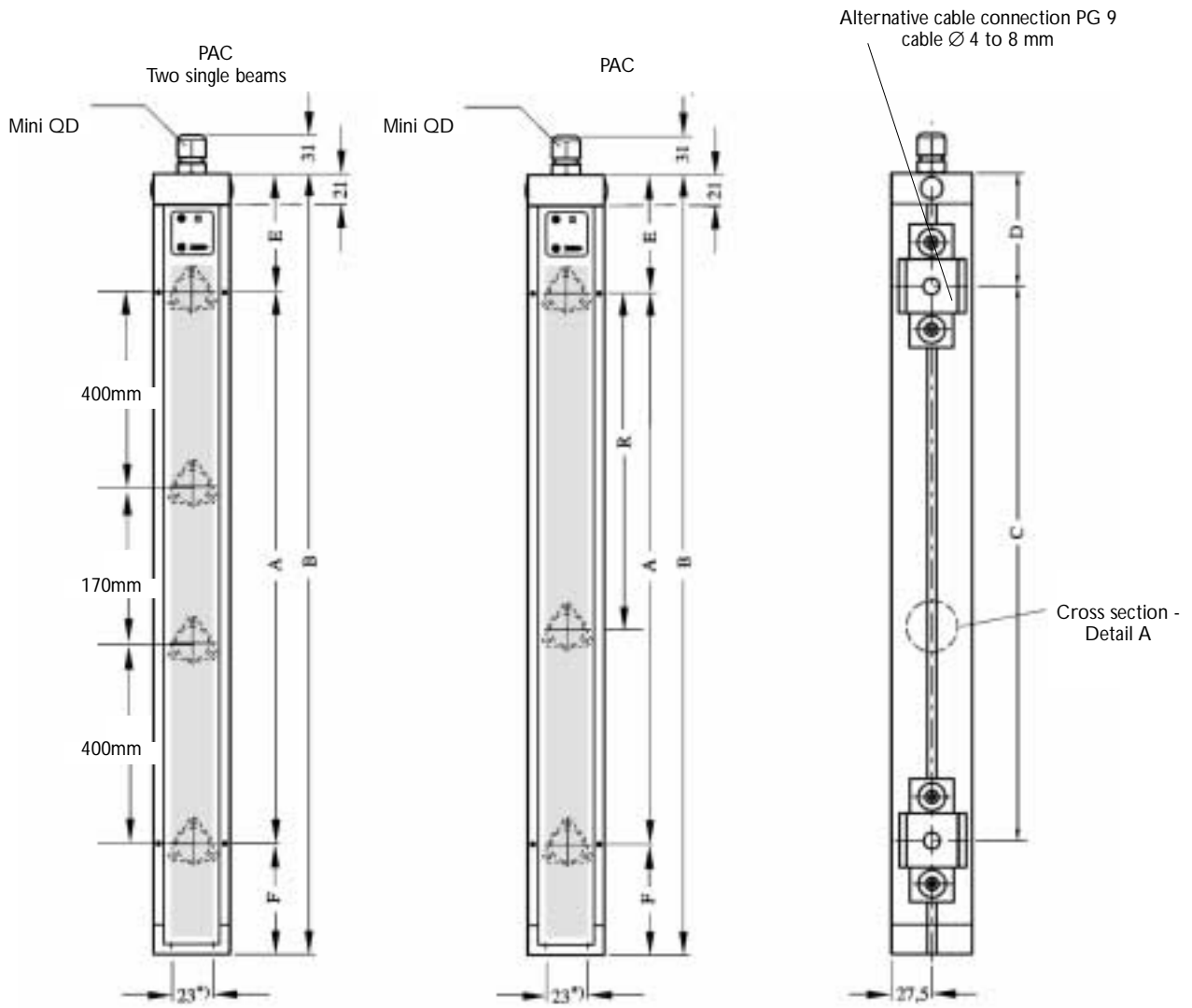
⁴⁾ With a low switching frequency, the max. permissible load inductance is higher.

⁵⁾ In the active state, the outputs are tested in a cycle (switch LOW briefly). When selecting the downstream control elements ensure that the test impulses with the parameters listed above do not lead to a shutdown.

⁶⁾ The individual conductor resistor to the downstream control element must be limited to this value so that a crossed connection between the outputs can be identified. (EN 60 204 *Electrical Equip. of Machines, Part 1: General Requirements* must be observed.) ⚠

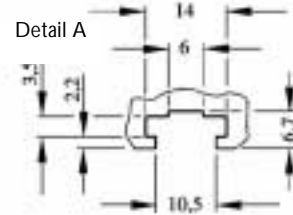
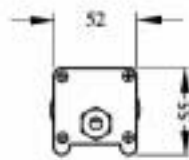
Perimeter Access Control Installation Instructions

Dimensional Diagrams



| | A | B | C | D | E | F | R |
|---------------------------------------|------|------|------|----|-----|-----|-----|
| 440L | | | | | | | |
| T4H 2500-N | 500 | 684 | 524 | 80 | 107 | 77 | 500 |
| T4H 3220-N | 440 | 597 | 437 | 80 | 107 | 50 | 220 |
| T4H 3400-N | 800 | 985 | 825 | 80 | 107 | 78 | 400 |
| T4H 4120-N | 360 | 534 | 374 | 80 | 107 | 67 | 120 |
| T4H 5220-N | 880 | 1041 | 881 | 80 | 107 | 54 | 220 |
| T4H 6220-N | 1100 | 1285 | 1125 | 80 | 107 | 78 | 220 |
| T4H 7120-N | 780 | 985 | 825 | 80 | 107 | 98 | 130 |
| T4H 7130-N | 720 | 880 | 720 | 80 | 107 | 53 | 120 |
| T4H 8120-N | 840 | 1041 | 881 | 80 | 107 | 94 | 120 |
| T4H 1212-N | 1320 | 1486 | 1326 | 80 | 107 | 59 | 120 |
| PAC single beam P4G 1500-N | 500 | 684 | 524 | 80 | 97 | 87 | 500 |
| PAC two single beams P4G 2502-N | 970 | 1285 | 1125 | 80 | 107 | 208 | 400 |

*) With respect to centre of housing



Accessory Selection Table

| Type | Description | Catalog number. |
|-------------------|---|-----------------|
| Fastening bracket | Slider nuts 4 pieces per pack (Supplied with each light curtain) | 440L-AF6105 |
| | Mounting Rigid bracket, 4 pieces per pack | 440L-AF6102 |
| | Mounting bracket, 4 pieces per pack adjustable | 440L-AF6103 |
| Power supply | Mounting bracket, with vibration and shock absorber, 4 | 440L-AF6104 |
| | 24 V DC, 3.0 A | 1794-PS3 |
| | Alignment aid | 440L-ALAT |
| PAC with muting | Adapter PAC/PAC, snap-on fastening | 440L-ALBRK |
| | Muting lamp incl. 2m cable, plug | 440L-AMUTLP2M |
| | Muting lamp incl. 10 m cable, plug | 440L-AMUTLP10M |
| | Replacement lamp | 440L-AMUTBLB |

Perimeter Access Control With Muting Installation Instructions

Section 2

About this Document

Function of this Document

This document provides instructions for operation of the PAC with muting. It contains information on

- Mounting
- Electrical installation
- Commissioning
- Maintenance

Target Group of this Document

This document is intended for persons installing, commissioning and operating the PAC with muting.

Details of Information Contained in this Document

These operating instructions contain information on installing, commissioning and operating the device. It is the responsibility of the employer to assure that all applicable official and legal regulations are observed.

Safety

The device can only fulfill a safety-related role if it is used correctly; that is, if it is properly installed and connected to be fail-safe.

The muting expansion module, in conjunction with the multibeam photoelectric safety switch PAC, conforms to the safety requirements.

- Safety category type 4 to pr EN 50 100

Areas of Use

Multibeam photoelectric safety switches (PAC) with the PAC muting module are noncontact safety devices to protect access to hazardous areas, including a muting function for automated material transport into the hazardous area.

Regulation Use of the Device

The PAC Muting module in conjunction with the PAC should only be used as a safety device. If it is used for any other purpose, or if any modifications are made to the device (including modifications made during mounting and electrical installation) all warranty claims are void.

General Safety Instructions and Safety Measures

Safety Instructions

The following procedures must be followed for correct use of the muting module:

- Installation and electrical connection is to be performed only by specialist personnel with practical technical training and knowledge of the applicable safety regulations.
- The instructions on electrical connection and commissioning must be followed.
- The device must be tested and commissioned into operation by qualified personnel, as required by any applicable rules and regulations.
- The personnel operating the machine fitted with the photoelectric safety switch must be instructed on how to properly use the device by specialist personnel prior to beginning work. The instruction is the responsibility of the employer.
- Prior to initial commissioning the following procedures must be observed:
 - The hazardous area must be in full view of any person activating the reset or override commands.
 - An adhesive **safety notice** is supplied with the device. The label with the relevant language must be affixed at a position where it is readable from the command unit during commissioning.
 - Muting sensors must be arranged such that muting cannot be triggered unintentionally by any person (*Figure 25 and 26*).

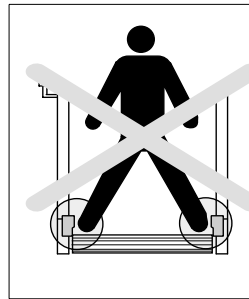


Figure 25 Opposing sensors must not be activated simultaneously

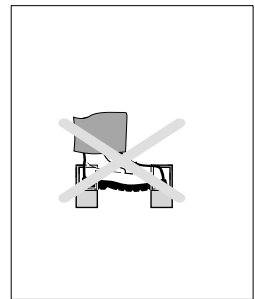


Figure 26 Adjacent sensors must not be activated simultaneously

- Muting must only be activated during the time when the conveyor with its load is blocking access to the hazardous area.
- Muting must be activated automatically, but must not be dependent on one single electrical signal.
- Muting must not be entirely dependent on software signals.
- The muting condition must be cancelled, and the safety device re-primed, as soon as the pallet has passed through.

Product Description

System Setup

The existing sender/receiver unit setup of the PAC or PAC single beam is supplemented by the PAC muting module. It is accommodated in the same housing as the photoelectric safety switch, and is attached to the receiver unit by a mounting rail (Figure 27).

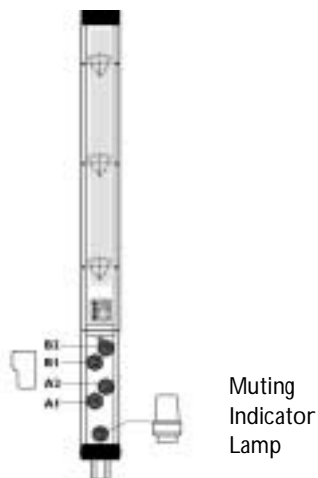


Figure 27 One unit: photoelectric safety switch and muting expansion module

In order to differentiate between people and materials, additional sensor signals are required. Two or four sensors can be connected for this purpose. The number of sensors is determined by the geometry of the object being detected and by the applicable safety requirements. The functioning of testable sensors is automatically tested by the muting module. **A muting indicator lamp is also essential for operation.** It signals the increased safety risk during muting. It must always be connected in operation, as its functioning is monitored.

The sensors and the lamp are plugged directly into the muting module and supplied with the 24 V DC operating voltage.

Mode of Functioning of the Device

The muting module logically evaluates the signals of the connected muting sensors and, when a valid muting condition is encountered, mutes the photoelectric safety switch. The conveyed material can pass through.

Muting condition

- Using **one** sensor pair:
A1 & A2 Muting of the PAC
- Using **two** sensor pairs:
A1 & A2 Muting of the PAC
B1 & B2 Muting of the PAC
- For a **short time** the following condition must apply:
A1 & A2 & B1 & B2 (for the other sensor pair to adopt the muting condition)

- It is irrelevant whether first A1 & A2 or B1 & B2 is activated.
- The muting cycle is ended when **all** muting sensors return to their basic state (free light path); only then can muting be reactivated.
- Within a muting cycle material can be conveyed several times if the muting condition is sustained, i.e. at least one sensor pair remains permanently active.

System Components

Sensors

Generally, any kind of sensor can be used:

- Optical sensors
- Inductive sensors
- Mechanical switches
- Signals from the controller

They must, however, have the following technical data (Interface: muting sensor connection on PAC Muting module):

| | Minimum | Typical | Maximum |
|------------------------------|-------------------------|-----------------------|----------------------|
| Pin 1: | | | |
| Output voltage | | | |
| Voltage supply | | $U_v - 0.7 \text{ V}$ | |
| Muting sensor | | | |
| Power consumption per sensor | | | 0.25 A |
| Pin 2: | | | |
| Test output | | | |
| Voltage: Test inactive | | $U_v - 0.7 \text{ V}$ | |
| Pull-up resistance | | 1.2 k Ω | |
| Voltage: | | | |
| Test active / diagnosis | | 0.5 V | |
| Test duration | | | 30 ms |
| Response time | | | |
| Test muting sensor | | | 15 ms |
| Pin 3: | | | |
| Ground | | | |
| Pin 4: | | | |
| Signal input | | | |
| Input resistance (HIGH) | 2.5 k Ω (to 0 V) | | |
| Switching voltage HIGH*) | 18.5 V | | U_v |
| Switching voltage LOW*) | 0 V | | 5 V |
| Signal filter time | | 50 ms | |
| Connection | | | |
| Line length | | | 10 m |
| Wire cross-section | | | 0.75 mm ² |

*) Data apply to nontestable sensors. For testable sensors the states are inverted.

In selecting the wiring ensure the above data are maintained on the PAC Muting module.

Perimeter Access Control With Muting Installation Instructions

Testable Sensors

The PAC Muting module automatically tests the sensors, but at present it can only test the following optical sensors:

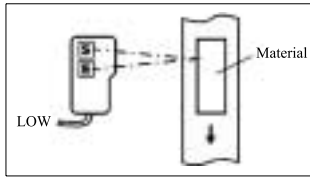


Figure 28 Optical sensor as testable sensor

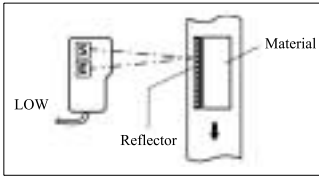


Figure 29 Photoelectric reflex switch as testable sensor

Note With the photoelectric reflex switch the reflector must be mounted on the traversing material. If this is not possible, the sensor can only be used in “nontestable” form.

Technical requirements for testable sensors:

- Test in active state (when material activates sensor).
- Sensor output signal “LOW” in active state.

Testing Function

To ensure the muting sensor is functioning and connected, when the muting sensor is active a brief test signal (LOW signal) is sent to the sensor every 20 minutes and a HIGH signal at the output is awaited in reply. The test pulse lasts 30 ms and has no effect on the muting function.

Advantages of testable sensors

- Additional security against manipulation
- Defects in the muting sensor are revealed

Nontestable sensors

The nontestable sensors include all other sensor types not mentioned in the preceding subsection. On nontestable sensors the sensor output signal is “HIGH” in the active state. The following safety rules apply to the use of nontestable sensors:

- On power-up all muting sensors must be inactive, otherwise the muting indicator lamp will flash at 2 Hz (twice per second).
- The cables between the PAC muting modules and the sensors must be laid appropriately to avoid crossed connections between the cables of the sensors of one pair.

Table 2 Selection and Setting of the Rockwell Automation Optical Muting Sensors in Muting Applications: All Outputs PNP, Other Designs Possible

| Sensor | Type | Nontestable |
|---------------------------|--|----------------|
| Transmitted Beam | 42GRL-9000-QD (powered from an external supply) | Dark Switching |
| | 42GRR-9000-QD* (connected directly to the muting module) | Dark Switching |
| Retroreflective | 42GRU-9000-QD* (connected directly to muting module) | Dark Switching |
| | 92-39 (3" standard reflector) | |
| Polarized Retroreflective | 42GRU-9200-QD* (connected directly to muting module) | Dark Switching |
| | 92-39 (3" Dia. Standard reflector) | Dark Switching |
| Mechanical Limit Switch | 802M-NX10 (connected directly to muting module) | Dark Switching |
| | Operating Lever must be selected separately. | |

* Must use with 889D-F3ACDM DC Micro Patchcord, lengths of 1m, 2m, 3m, 5m available

Muting Indicator Lamp

An external muting indicator lamp is required to signal the muting function.

Note This lamp is essential. Without it the muting function is not possible. This also applies if the lamp fails.

Dimensional drawing in appendix.

Technical data: Interface: lamp connection on PAC Muting module

| | Minimum | Typical | Maximum |
|--|---------------------------------|-----------------|--------------------------|
| Pin 1: Output voltage (Pin 1) | $U_V - 2.0 \text{ V}$ | | $U_V - 1.0 \text{ V}$ |
| Pin 2: | not connected | | |
| Pin 3: Lamp control (0 V) Lamp off Lamp on Lamp current Lamp monitor: active after | not connected 0.3 V 21 mA | behavior of NPN | 2.6 V 202 mA 50 ms |
| Pin 4: | not connected | | |

Selectable Device Functions

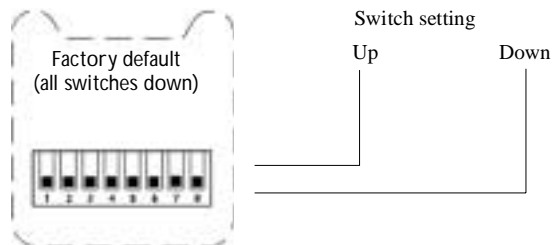
The device has selectable functions. They should be selected to suit the respective application.

Note When the cap on the PAC Muting module is unscrewed, DIP switches can be accessed to select the desired configuration. For this two DIP switches must always be set in the same position, depending on function (see Table 3).

Perimeter Access Control With Muting Installation Instructions

Table 3 Functions of the DIP Switches

| Function | Switches | Associated Function | Associated Function |
|-------------------------------|----------|---------------------|-----------------------|
| Sensor test | 1 and 5 | Off | On |
| Simultaneous monitoring (3 s) | 2 and 6 | Off | On |
| Number of sensor pairs | 3 and 7 | 1 sensor pair | 2 sensor pairs |
| Total muting time (60 s) | 4 and 8 | Off | On |



- Sensor test
- Setting of whether testable or nontestable muting sensors are connected.
- Simultaneous monitoring

The sensors of one sensor pair must be activated within 3 seconds when the function is selected; otherwise no muting is possible. The function is intended to protect against manipulation (e.g. masking of an optical sensor). Therefore only activates when the condition is satisfied.

- Number of sensor pairs

Set the number of sensor pairs used (1 or 2) on the DIP switches.

- Total muting time

The total muting time (muting of the photoelectric safety switch) must not exceed 60 seconds; otherwise muting is interrupted and the PAC is tripped. The function is intended to protect against manipulation (as simultaneous monitor). The PAC Muting module is still active even when the conveyor belt has stopped.

Mounting

The muting module is shipped mounted on the multibeam photoelectric safety switch.

The sensors and the muting indicator lamp are mounted as described in the preceding sections.

Override

The override function allows material left within the range of the photoelectric safety switch to be easily removed (e.g. after a power failure, emergency stop, etc.). For this the photoelectric safety switch is manually muted (by pressing a button).

Override with Standard PAC Muting Module

Here the override is implemented by an external circuit. By way of an additional key-operated switch relays K 1/K 2 are switched directly to 24 V and so override outputs OSSD 1 and OSSD 2.

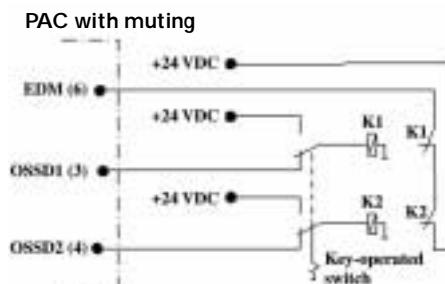


Figure 30 Circuitry example: override function



ATTENTION! Instructions for connection

The override function must only be activated by means of a key-operated switch (with forced resetting device and 2 independent switching contacts for

K 1/K 2) in machine or controller manual mode.

The override key-operated switch and the button for the restart inhibit must not be identical.

The key-operated switch must be mounted such that the hazardous area is in full view when operated.

Perimeter Access Control With Muting Installation Instructions

Electrical Installation

Photoelectric Safety Switch

The terminals of the PAC receiver unit are located on the PAC Muting module.

Muting Sensors and Muting Indicator Lamp

The muting sensors are connected via cable plugs to the PAC Muting module.

Permissible cable diameters 3.0 ... 6.5 mm.

If only one sensor pair is connected, terminals A 1 and A 2 on the PAC Muting module are used. As already described, the number of sensor pairs used must be set on the DIP switches on the PAC Muting module.

Note When connecting the muting sensors and lamp, ensure that:

- The contact assignment on the sensor and on the PAC Muting module match.
- Wire test connection only on testable sensors.
- 0 V of PAC Muting module lamp connection must not be connected to external 0 V.
- When using nontestable sensors, select suitable wiring configurations to avoid mutual interference.
- If the supply line to the muting sensor is broken, the sensor must return to an unambiguous home position.
- When connecting the LED indicator lamp pay attention to the polarity (see Figure 32).

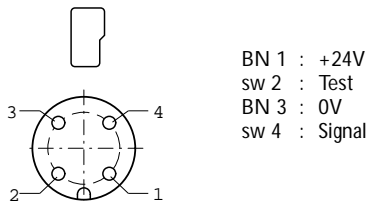
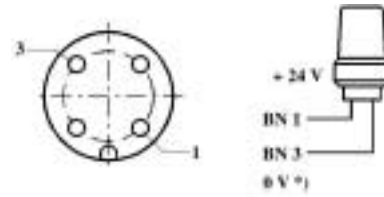


Figure 31 Connection diagram, muting sensor: device plug on PAC Muting module



Connection, LED indicator lamp

PAC Muting Module Lamp
+24V - BN 1
0V - BN 3

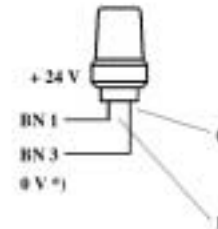


Figure 32 Connection diagram, muting indicator lamp: device plug on PAC Muting module

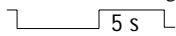

Fault Diagnosis

The illuminated signals on the display panels of the sender and receiver units of the PAC provide unambiguous fault diagnosis. Additional information is delivered by the muting indicator lamp's flash mode. If only the PAC Muting module is defective, the photoelectric safety switch remains operational on its own, with its safety function.

Diagnostic Tables

Error messages that may originate from the receiver of the photoelectric safety switch (see Table 4) and the presence or defective state of the muting indicator lamp are signaled.

Table 4 Malfunction indication on PAC receiver when muting indicator lamp defective

| LEDs Receiver unit | Condition Light beam | Cause Muting Indicator Lamp | Test and remedy |
|--|----------------------|-----------------------------|--|
| Green LED lit Yellow LED flashing  | Free | Defective | Replace muting indicator lamp, check muting lamp output (4 W). |
| Red LED lit Yellow LED flashing  | Broken | Defective | Check LED indicator lamp connection. |

Perimeter Access Control With Muting Installation Instructions

Procedure for Replacing the Muting Indicator Lamp

The muting indicator lamp should be replaced as set out in the flowchart below (Figure 33).

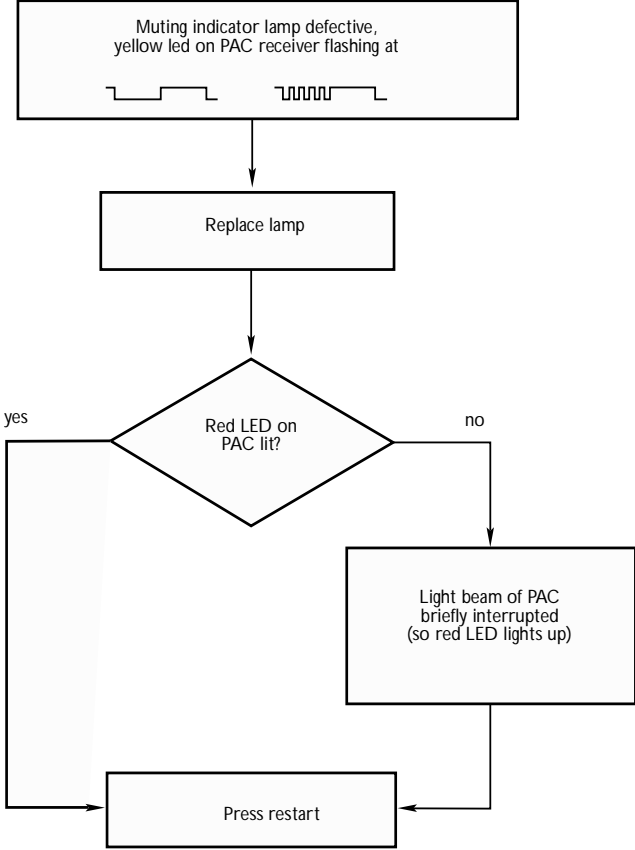


Figure 33 Flowchart for replacement of the muting indicator lamp

Perimeter Access Control With Muting Installation Instructions

Fault Diagnosis by PAC LEDs

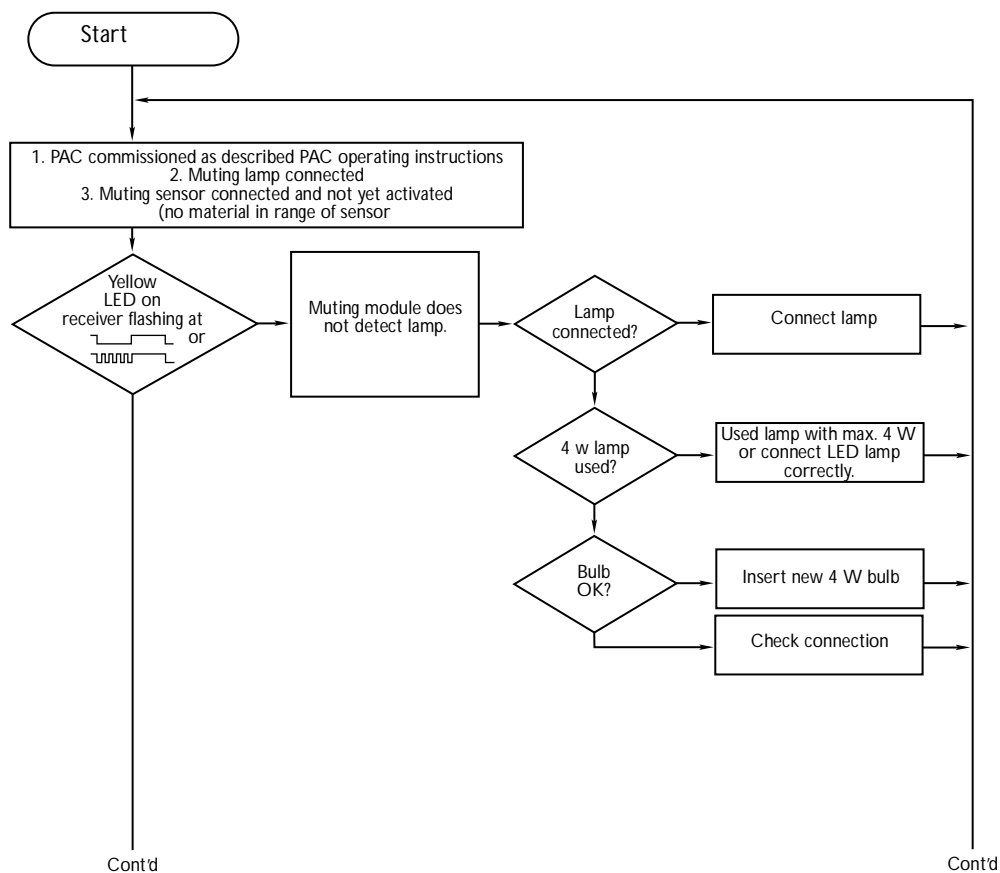


Figure 34 Flowchart for muting indication in commissioning (Sheet 1 of 2)

Perimeter Access Control With Muting Installation Instructions

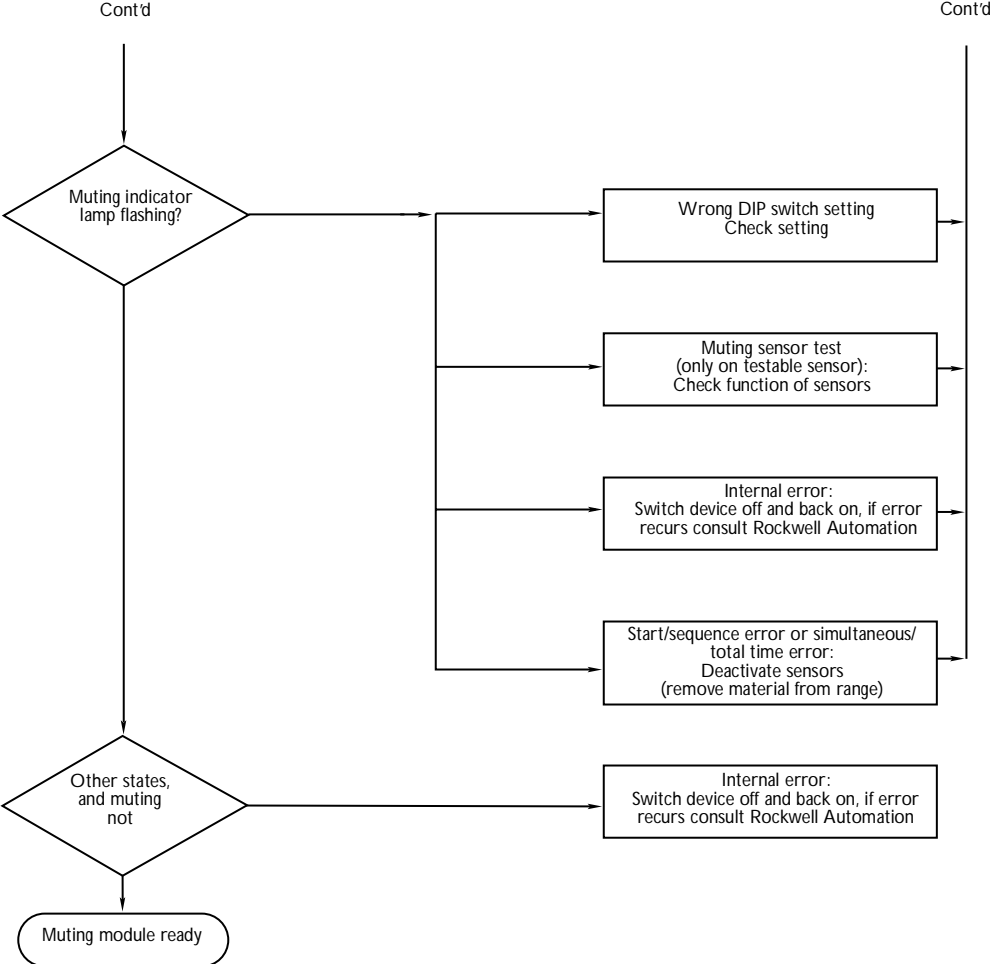


Figure 34 Flowchart for muting indication in commissioning (Sheet 2 of 2)

Perimeter Access Control With Muting Installation Instructions

Technical Data

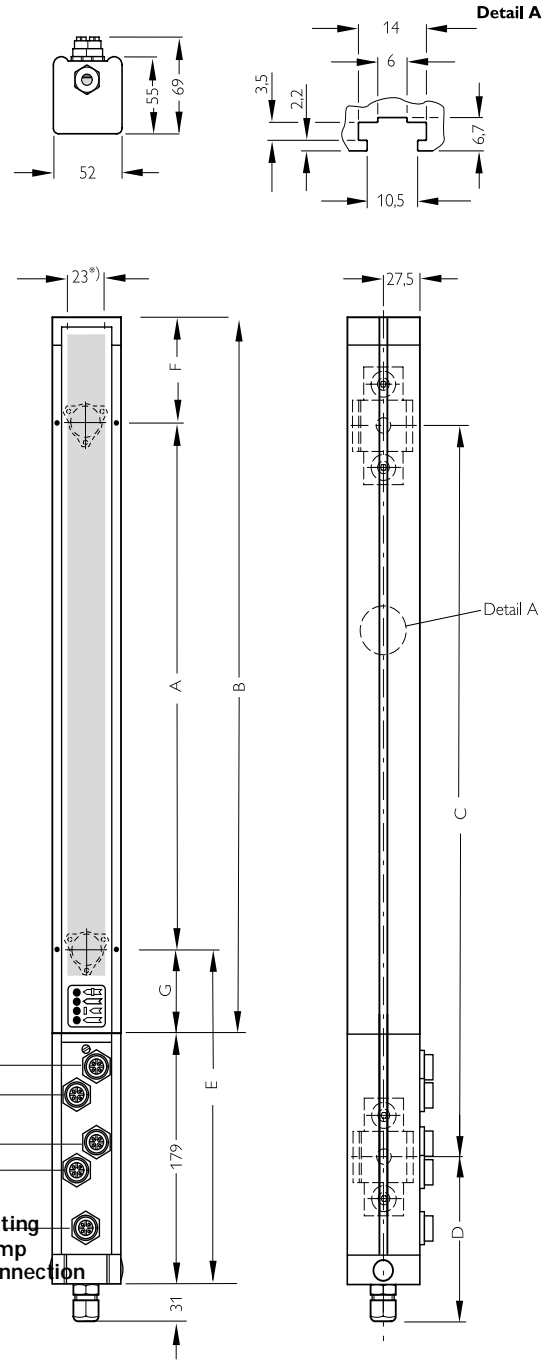
All dimensions in mm

Technical data, PAC Muting module

| | min. | typ. | max. |
|---|------------------------------------|--------|---------------------|
| Supply voltage (U_v) | 19.2 V | 24.0 V | 28.0 V |
| Polarity protected | | | |
| Permissible ripple *) | | | 2.5 V _{ss} |
| Protection class | 1 | | |
| Safety category | Typ 4 | | |
| Enclosure rating | IP 65 | | |
| Ambient operating temperature | 0°C | | 55°C |
| Air humidity | 15% | | 95% |
| Storage temperature | - 25°C | | 75°C |
| Vibration resistance | 5 g, 10 ... 55 Hz to IEC 68-2-6 | | |
| Shock resistance | 10 g, 16 ms to IEC 68-2-29 | | |
| Power consumption max. Receiver unit (without sensors and muting indicator lamp) | | | 5 W |

*) The voltage U_v must not exceed or fall below the limit values.

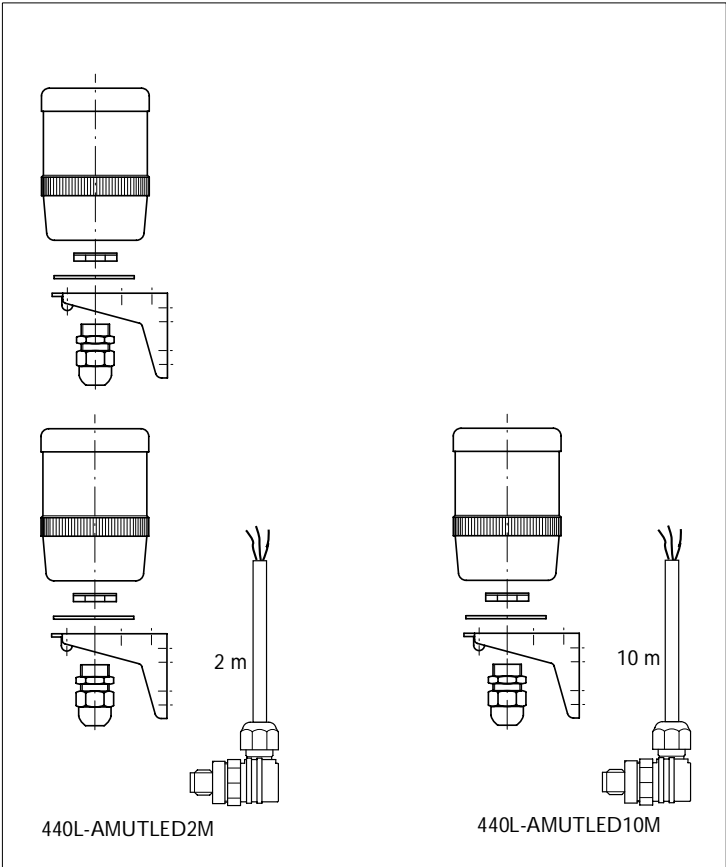
The functioning of the PAC Muting module is independent of its mounting.



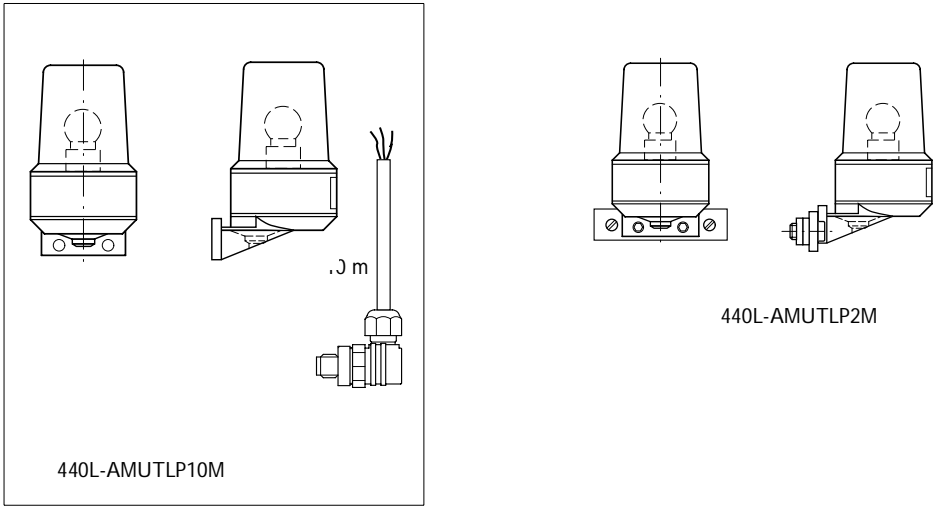
| | A | B | C | D | E | F | G |
|-------------------|-----|-----|-----|----|-----|----|----|
| 440L-R4H 2500M-N | 500 | 663 | 524 | 80 | 265 | 77 | 86 |
| 440L-R4H 3220M-N | 440 | 576 | 437 | 80 | 265 | 50 | 86 |
| 440L-R4H 34000M-N | 800 | 964 | 825 | 80 | 265 | 78 | 86 |
| 440L-R4H 1500M-N | 500 | 663 | 524 | 80 | 255 | 87 | 76 |

Dimensional drawing, PAC/PAC Muting module

Perimeter Access Control With Muting Installation Instructions



Muting indicator lamp, version with LED



Muting indicator lamp, version with bulb Muting indicator lamp, version with bulb, for attachment in side groove on PAC



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