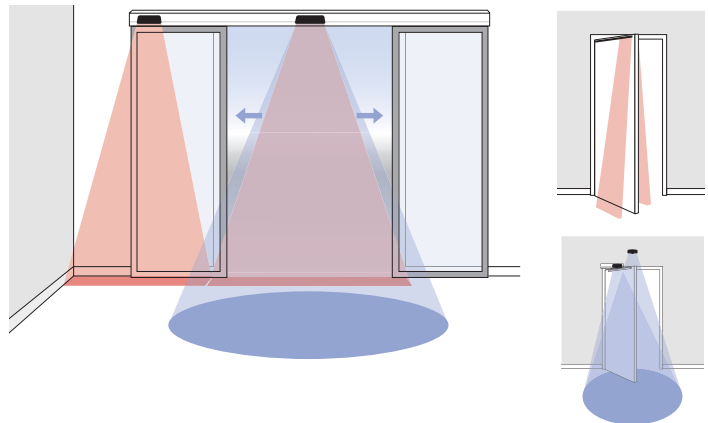


sensing the future



## EU legislation and requirements for doors and gates

### Safety guide to power operation and Bircher Reglomat sensors



- Declaration of Performance
- CE marking and Declaration of Conformity
- Risk analysis
- Modifications, inspection, service and repairs
- Logbook contents
- Safety and activation of pedestrian and industrial doors, gates and barriers
- Energy saving functions
- Risk assessment for a specific location and usage

## About Bircher Reglomat

Bircher Reglomat develops, manufactures and supplies detector systems to protect increasingly large flows of people and traffic all around the world. In addition, Bircher Reglomat creates intelligent access systems that are both energy efficient and convenient to install and maintain. The innovative detector manufacturer is constantly working on new solutions to overcome future challenges in industry and public transport.

Represented across the world, Bircher Reglomat works passionately to implement customer-specific requirements and concerns on an individual basis. Taking the values of commitment, integrity, teamwork and courage as its starting point, Bircher Reglomat earns the trust of its customers and partners day in, day out, while also proving themselves as a reliable partner, manufacturer and supplier. Bircher Reglomat is certified in according to ISO9001 and ISO14001.

## What is the purpose and ambition of this safety guide?

Over the past years there has been increasing discussions in Europe on how to interpret and understand the EU regulations. It seems to us that there is uncertainty on how to interpret and implement the standards.

This guide was released to assist specifiers, buyers, engineers, installers and end users by collecting and presenting the information in an easy to understand format. We present the most relevant information from EU standards concerning the safety in use of motorised/power operated pedestrian and industrial doors and gates. It is the responsibility of the companies and individuals in the industry to acquire knowledge of the full regulations and standards. Therefore, this document shall only be seen as an introduction and guide and does not replace the EU regulations.

Our ambition is to help raising the awareness of the hazards and solutions in the market place, making the market place safer for all. By showing our wide product range and system solutions, we would like to clearly illustrate for the reader, possible ways of using our products in the industry, meeting and fulfilling the current EU standards and regulations. Countries concerned by European door standards are all EU-member states plus the EFTA members (Iceland, Norway, Switzerland) and other states (Macedonia, Turkey).

We trust that this safety guide aids and supports everyone in the pedestrian door, industrial door & gates markets to improve their understanding of the ever increasing legal requirements.

## Content

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# CE marking explained

The CE marking is an important indicator of a product's conformity with the current legislative regulations of the EU and enables the free movement of goods within the European market. By affixing the CE marking, the manufacturer confirms in its own responsibility that the product fulfills all the conditions for the CE marking required by law, and that the product can be sold within the European Economic Area. An essential element is the compliance of the product with the harmonised safety standards.



CE marking as illustrated in the Machinery Directive 2006/42/EC

## Legal Requirements to obtain the CE marking

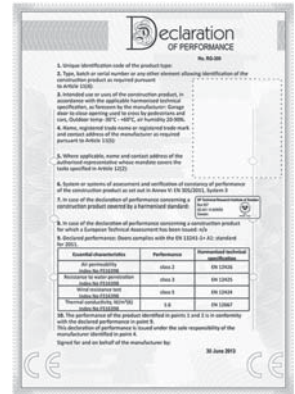
All power operated doors and gates must adhere to the Machinery Directive 2006/42/EC.

**New motor operated industrial doors and gates** shall have a Declaration of Performance, for they are covered by the harmonised standard EN 13241-1 relating to the Construction Products Regulation (CPR). Doors and gates shall be CE marked by the manufacturer as a declaration that the product meets the declared values as well as relevant directives and standards.

**New motor operated pedestrian doors (except swing doors)** shall have a Declaration of Performance, for they are covered by the harmonised product standard EN 16361 (obligatory as of June 30<sup>th</sup> 2015). Declaration of Performance is obligatory as of July 1<sup>st</sup> 2013 for all construction products covered by a harmonised standard relating to the CPR.

**Motor operated swing doors** are CE marked in relation to the Machinery Directive and EN 16005 / DIN 18650 with no Declaration of Performance.

The **safety features** that need a Declaration of Performance are the closing force of pedestrian and industrial doors and gates, and for pedestrian doors also the endurance of the force over time. Vertically moving industrial doors shall also have a declaration of safe opening. A single error may not lead to uncontrolled movement or the door falling, and there shall also be safety against derailing.



The Declaration of Performance is presented on delivery. Otherwise the delivery documents refer to the declaration on a website, provided that the accessibility of the site is guaranteed and the document is kept unaltered and accessible for at least 10 years.

## Content of CE declaration

**Declaration of Performance shall, in a language acknowledged by the country, include:**

- a) Type designation
- b) Production number which facilitates identification
- c) Manufacturer's name and contacts (the compiler of technical documentation) and possible representative with a mandate to represent the manufacturer with name and contacts
- e) System used for assessing and verifying of performance, for example closing forces
- f) Reference to the relevant harmonised standard
- g) Name and ID of the test institution, what they tested and which certification they issued
- h) The stated performance, for ex. closing forces. Performance irrelevant to declaring is marked with NPD (No Performance Declared)

### CE mark example – Pedestrian door

AnyCo Ltd, PO Box 21, B-1050, Brussels
13
<b>EN 16361</b>
Pedestrian doorsets, other than swing type, initially designed for installation with power operation without resistance to fire and smoke leakage for internal use with energy requirements.

### CE mark example – Industrial door

Manufacturers name and address	
13 (last two digits of the year the CE mark was affixed)	
EN 13241-1	
Product description and intended usage	
Serial number or other unique ID	
Watertightness	(technical class)
Resistance to Wind load	(technical class)
Thermal transmittance	(value)
Air permeability	(technical class)
(EU) No305/2011; 2006/42/EC; 2014/30/EC	

### Essential safety features to declare

<b>Product:</b> Industrial doors and gates covered by EN 13241-1			
<b>Intended usage:</b> For specific declared uses or uses with specific requirements, especially noise, energy tightness and safety in use.			
Essential features	Requirements (Clause in EN13241-1)	Mandated levels and/or classes	Test results stated as
Safe opening (for vertically moving doors)	4.2.8	-	Approved/Not approved
Closing force (for power operated industrial doors)	4.3.3	-	Approved/Not approved

<b>Product:</b> Pedestrian door sets, other than swing type, initially designed for installation with power operation, covered by EN 16361			
<b>Intended usage:</b> for internal communication, use in escape routes, and other specific declared uses or uses with special requirements, especially noise, energy tightness and safety in use			
Essential features	Requirements (Clause in EN 16361)	Mandated levels and/or classes	Quotations
Impact forces (safety in use)	4.6	-	-
Durability of impact forces (safety in use) against aging/degradation	4.11	-	PPD-class (number of usage cycles with impact forces still acc. to 4.6)

# Risk assessment

A risk analysis shall be conducted in connection with the CE marking. Risk assessment is a systematic procedure to identify the hazards and assess the risks that can arise and list the health and safety requirements that apply to pedestrian and industrial doors as well as control measures taken. The risks shall (acc. to EN ISO 12100) be identified, removed, controlled and reduced with protective measures, like sensors. Users shall be informed in the instruction manual and technical file of residual risks that can not be completely removed or controlled. Risk assessment and Risk Management are the keys to compliance with the law and safety in use.

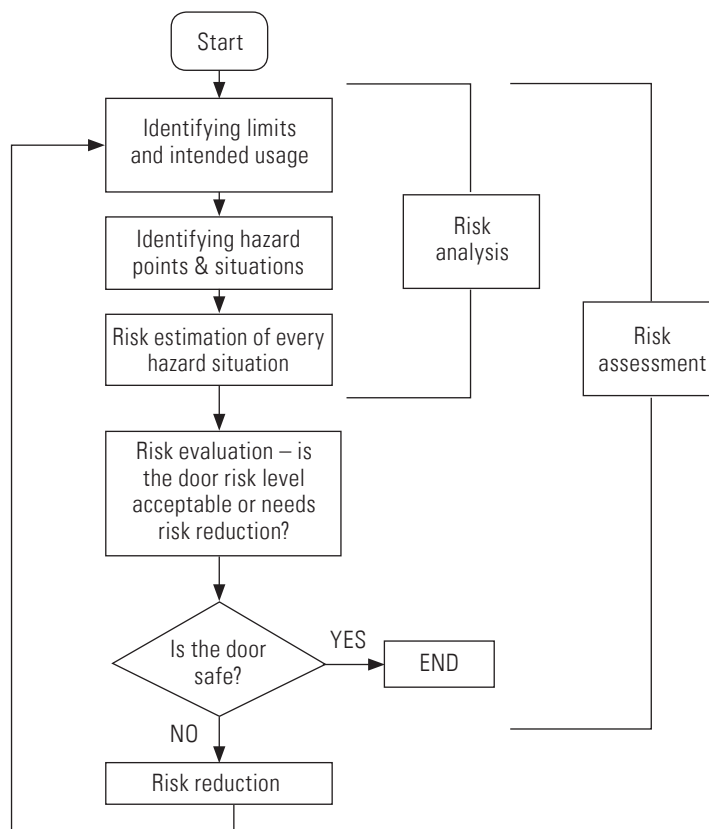
## Pedestrian and industrial doors and gates in conformity with harmonised product standards

have presumption of conformity with the essential health and safety requirements. To be in conformity with the standards includes to assess and control specific risks in each individual environment and relating to the type of users. All motor operated pedestrian and industrial doors must conform to essential health and safety requirements in the Machinery Directive Annex 1.

**Safety-critical functions** identified in the risk analysis and based on the steering system receive an appropriate level of risk reduction by EN ISO 13849-1 or EN IEC 62061. The concept of PL (Performance Level) is used in EN ISO 13849 to describe the contribution to risk reduction of the safety-critical functions established.

## CPR Basic Work Requirement BWR 4. Safety and accessibility in use

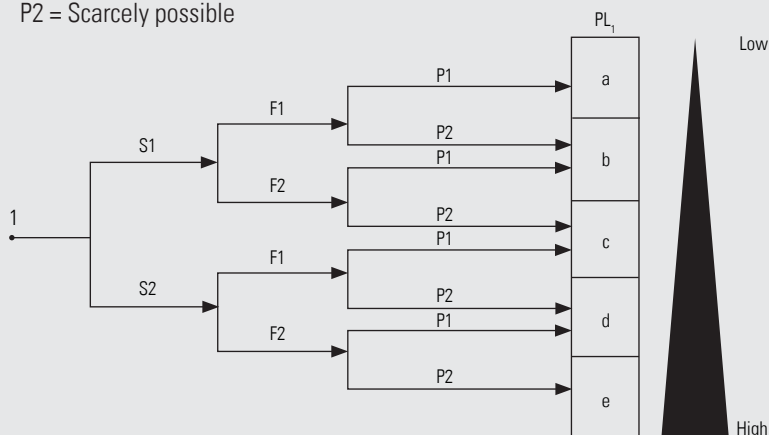
Buildings (construction works as a whole and in their separate parts) must be designed and constructed with no unacceptable risk or risks of injury. Buildings must especially be designed and constructed so they are accessible and can be used by disabled people.



Risk assessment flow scheme according to EN ISO 12100:2010

## Risk estimation = which risk reduction/performance level is needed?

- S = Severity of injury
- S1 = Slight (normally reversible injury)
- S2 = Serious (usually irreversible injury or death)
- F = How often is the product used/hazard exposure
- F1 = Used seldom to less often/short-term exposure
- F2 = Used frequently to constantly/long-term exposure
- P = Possibility of avoiding hazard and preventing injury
- P1 = Possible under specific conditions
- P2 = Scarcely possible



ISO 13849-1 Figure A.1 - Risk assessment

# CE marking liability

CE marking responsibility and potential liability lies on the manufacturer and European market vendor. The buyer is to inspect the performance of the pedestrian/industrial doors essential features. The responsibility for complying with the law rests with the responsible person which will be either the manufacturer, supplier or installer, depending on the circumstances.

If the buyer does not ensure that the product bears CE marking and the supplier presents documentation in form of "Declaration of Performance" and "Declaration of Conformity", liability in case of an accident and resulting injury might be directed towards the property owner or the persons with control inside the facilities with a power operated door not marked or declared. Non-evident CE marking can according to the Work Environment Act lead to a fine and even prohibition from using the product, should it be deemed unsafe.

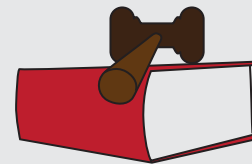
"Declaration of Conformity" identifies the one legally liable for supplying the pedestrian/industrial door. An installation company issuing the document in its own name adopts substantial liability as "manufacturer" and shall be able to present necessary CE marking documentation. In case of an accident, the technical file, e.g. a suppliers Declaration of Incorporation or a Declaration of Conformity and other documentation will serve as defence evidence in case of legal action. It is essential for the company to ensure that the combination of motor, controller, door/gate and safety equipment all together with the surrounding structure meet the safety requirements.

The CE marking documentation shall on request by a public "enforcement" authority be presented at short notice during a period of at least 10 years after the pedestrian/industrial door was manufactured. Installation companies representing a door manufacturer shall make sure they receive a "Declaration of Conformity" from the pedestrian/industrial door supplier. They should also document that the installation instructions were followed, for example a signed and dated checklist on inspections and tests performed.

The issuer of a "Declaration of Conformity" that includes the installation of the motor operated pedestrian or industrial door shall ensure that the installation technician has the necessary product and professional knowledge and competence to perform the work. Installation, service and repairs may only be performed by a person with sufficient professional competence.



*Components, such as sensors, do not need a Declaration of Conformity to accompany on delivery of the pedestrian/industrial door, but shall be available to present on 3 days notice (usually they are CE marked under Low Voltage Directive [LVD] and Electromagnetic Compatibility Directive [EMC]). Sensors are safety components as described within the Machinery Directive and the EN ISO/ EN IEC and should be documented in the technical file.*



*Some simplifications regarding the CE marking process are allowed for micro-enterprises with less than 10 employees and an annual turnover of max 2 million euros. They can rely on Specific Technical Documentation (STD) to show that the product conforms to the current requirements.*

# INDUSTRIAL DOORS AND GATES

## Minimum safety requirements for industrial door closing edges

EN 12453 5.5.1 table 1

Control \ Location	"Hold to run" control mode of operation (door in sight)	Impulse activation		Automatic control
		Door in sight	Door out of sight	
The door is out of public area with a limited group of trained users	"Hold to run" control (no requirements on force limitation)	Force limitation with safety ① edges or in the motor		Force limitation plus ① light barrier/light curtain ②
		or guaranteed the door leaf is not touched up to 2.5 meters height		
The door is located in a public area with a limited group of trained users	Operated with Key switch (no requirements on force limitation)	Force limitation ① with safety edges or in the motor		Force limitation with safety edges or in the motor plus light barrier/light curtain
		or guaranteed the door leaf is not touched up to 2.5 meters height		
The door is in contact with the general public and anyone is free to use it	Force limitation with safety edges or in the motor plus light barrier/light curtain ①+②			or guaranteed the door leaf is not touched up to 2.5 meters height

Combining force limitation and light barrier/light curtain, the light barrier/light curtain function does not have to be monitored when functions are inspected at least every 6 month. "Door in sight" is control from a position that allows full, direct and permanent view of the door during operation.

## Force limitation

### ① Max closing forces

Maximum permissible closing force is always measured against another closing edge or a flat surface near the industrial gate of at least 0.1 m<sup>2</sup> area with minimum 100 mm long sides. No crushing against sharp edges around the pedestrian/industrial door can be accepted. Should sharp edges be close to the door and cause hazards, such risks must be eliminated before CE marking.

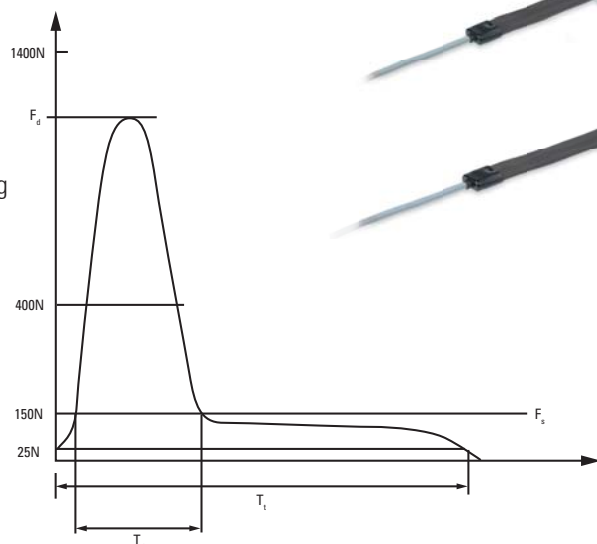
### Maximum dynamic closing edge forces according to EN 12453 for industrial doors and gates

Industrial sliding doors and gates, industrial folding doors and gates, industrial swing doors and gates

- Max 400 N right before closing 50–500 mm
- Max 1400 N rest of the door movem. > 500 mm (plus door leaf against solid obstacles up to 2 m height around the door)

Overhead sectional door, up and over doors, rolling doors and grills, other vertical industrial doors and gates

- Max 400 N at all heights > 50 mm
- Max 1400 N for door leaves against surrounding flat surfaces

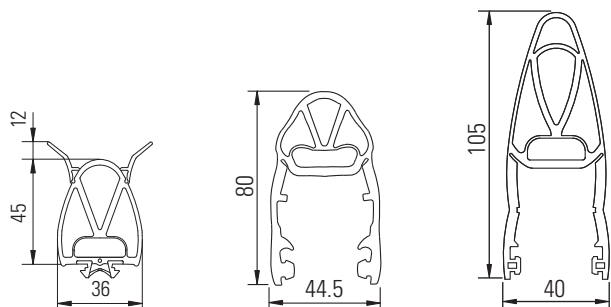


$F_d$  = max dynamic (brief) force,  $F_s$  = max static (oppressive) force  
 $T_d$  = max 0,75 sec and  $T_t$  = max 5 sec



Although not required as minimum safety level, in individual cases, the risk assessment might conclude that further risk reduction with different touchless safety devices is needed. E.g. light barriers on both sides of the door or other sensors that further reduces the risk of getting touched by the door leaf.

# Force limitation with safety edges

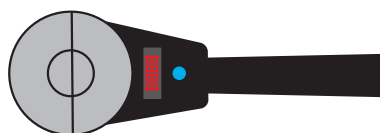


Electric edges for resistance monitoring

The difference between safety edges is the reaction time (activation distance), the force needed for activation and how much closing force reduction (stopping distance) they offer during the industrial door reaction and deceleration time.

Electric edges are often monitored with resistance measurement. When using pneumatic edges a test is performed against the ground when the door closes that confirms function and generate a test signal to the controller.

Safety edges shall become usable 30 seconds after having been fully compressed by a test body for 24 hours. Safety edges shall be marked with manufacturer, type reference and traceability code. Testing closing forces is done for different industrial door types and gates on points defined in standard EN 12445.



Closing force test is done with an instrument that has a flat 80 mm diameter sensing element.

Some industrial door and gate drives offers built-in closing force limitation approved under specific circumstances. If the strength of the device must be adjusted upwards due to wind load, weight or inertia in a product construction, safety edges might still be needed to fulfill the closing force requirements.



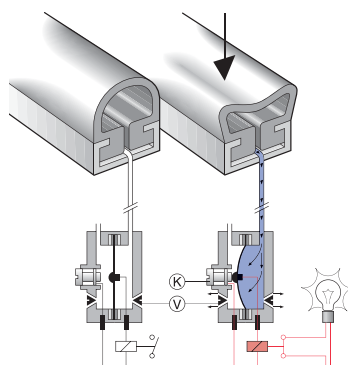
## Electric safety edges with resistance or a diode

Bircher Reglomat's safety edges have an exchangeable and sealed contact strip inside. The contact strip is placed in a rubber profile with suitable dimensions and muffling. The rubber profile is also carefully sealed to block humidity from getting in. The safety edge is watertight and has high tolerance against condensation.

Inside the ENT-R strip is a small built-in resistance also when activated.



## Pneumatic safety edges with air pressure switch



NC = Normally closed function

Stand by state (closed circuit)

Active state (broken circuit)

NO = Normally open function

## Monitoring safety edges

A door controller can have a designated design architecture according to category 2 (EN ISO 13849-1) and safety edge defects shall be triggered within the same open-close cycle at the latest. That means if the edges are not constantly monitored, they shall be activated and functions inspected at the closed position.

When safety edge faults occur the industrial door shall be stopped and altered to "hold to run" control operation mode. If the safety function has architecture category 3 the function shall be redundant and not cease because of a single component error.



If industrial door controllers cannot monitor electric resistance edges, it can be supplemented with a monitoring relay of type ESD3 or EsGate, which constantly monitors the safety edge. With category 2 architecture the industrial door controller shall monitor the relay function with a test signal and with category 3 architecture the relay monitors its own function. To reach a certain risk reduction or Performance Level for a safety function, the architecture category is one of a few important parameters to define.



## Touchless safety

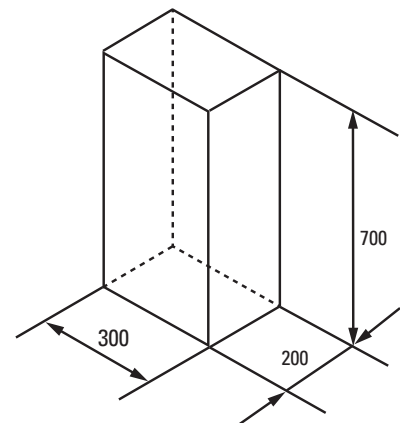
### ② Light barriers and light curtains

Light barrier and light curtain function is assumed by detecting a test body of 300 x 200 x 700 mm simulating users including children. The test body is placed according to different pedestrian and industrial door types in EN 12445 and EN 16005 / DIN 18650.

Sensors for industrial doors and gates with comprehensive fields guaranteeing no contact with the door leaf up to 2.5 m height (and therefore allowing use without force limitation) are tested with a smaller cylinder body of 50 mm in diameter and 300 mm in length. Test bodies shall have both reflecting and matte black surfaces.

Light barriers are tested between and near the transmitter and receiver. Retro-reflective light barriers with mirror are tested 1 m from the light barrier.

A light curtain for presence detection, for example PrimeScan, shall, if replacing a light barrier, meet the same requirements of presence detection as a light barrier with a test body placed near the industrial door according to EN 12445. PrimeScan light curtain has a deeper field than an ordinary light barrier and therefore less risk of walking head first into a closing door leaf. PrimeScan, however, has no constant presence detection but accepts idle objects and changes on ground surface after a set time period, and then permits door movement.



**UniScan** safety sensor for moving pedestrian and industrial door leaves.  
**TopScan** for door opening or touchless stop function.



**LBGate TB18** transmitter and receiver. Max 30 m range. The small sensors can easily be integrated into door frames and are easy to install.



**LBGate R25** reflector light barrier 12–240 V. Max 10 m range. Operates with reflectors, which means only one device requires electrical connection and installation.



# Activation and safety sensors for industrial doors & gates

## Examples of sensor solutions for overhead sectional doors

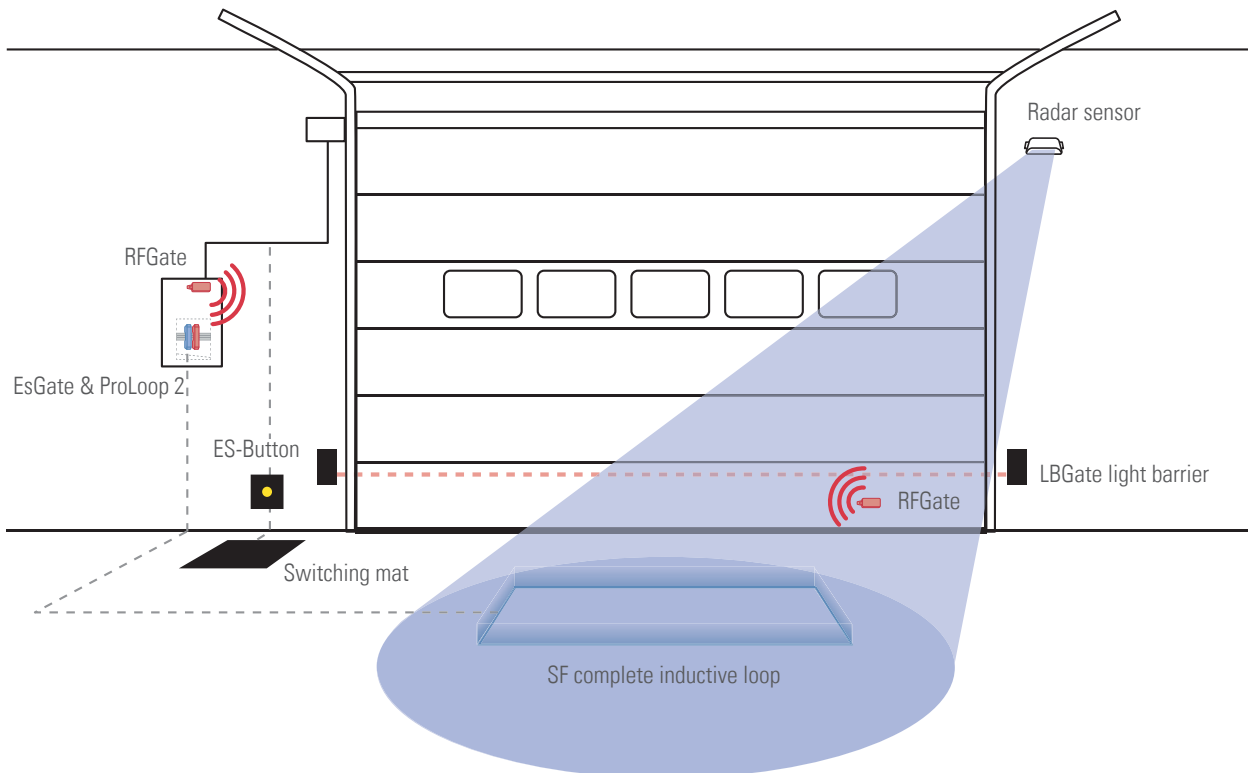
- LBGate 25 or LBGate 18 light barrier with transmitter/receiver in the doorway
- ProLoop 2 loop detector and inductive ground loop for vehicle safety or opening impulse
- Electrical or pneumatic safety edge on the industrial door closing edge
- RFGate radio transmission of safety edge signal to the door controller
- Herkules 2 radar for opening impulse from moving person or vehicle
- ES-Button foot switch or switching mat for opening impulse



**Herkules 2** radar for automatic opening of industrial doors. Install at max. 7 meters height. Differentiates between people and vehicles.

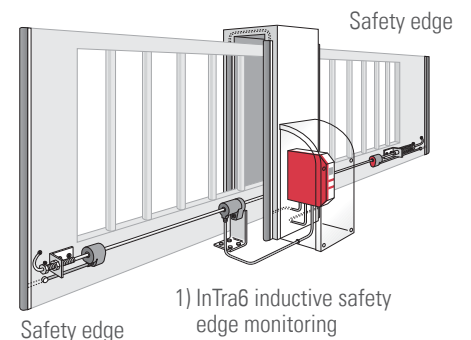


**Merkur 2 ES** radar for automatic opening of industrial doors. Install at max. 4 meters height.

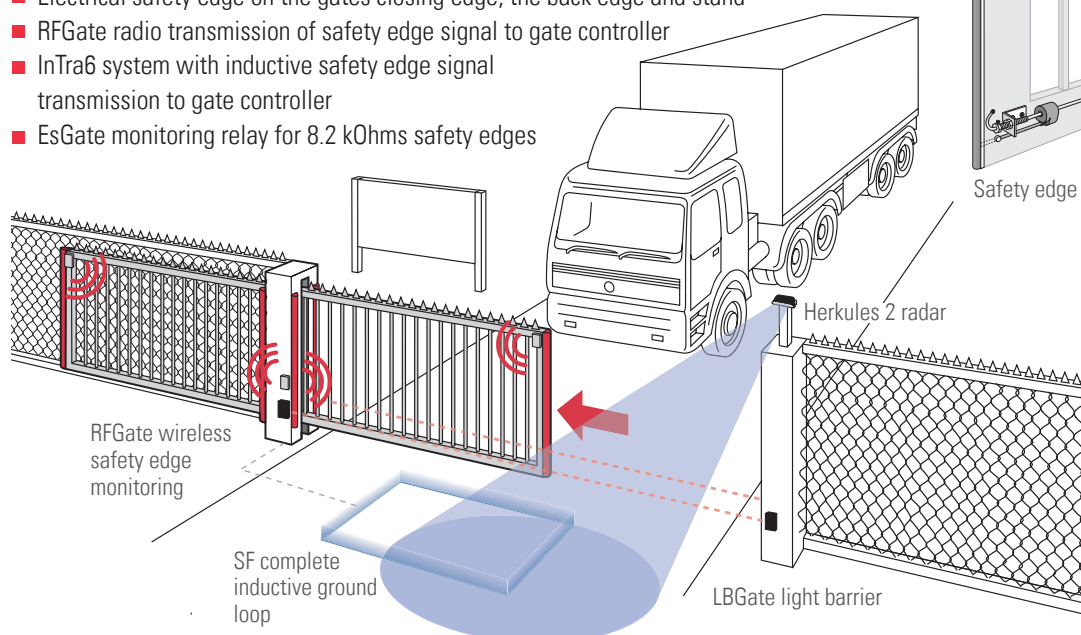


## Examples of sensor solutions for gates

- LBGate light barrier with transmitter/receiver on one or both sides of the gate opening
- ProLoop 2 loop detector and SF inductive ground loop for vehicle safety or opening impulse
- Electrical safety edge on the gates closing edge, the back edge and stand
- RFGate radio transmission of safety edge signal to gate controller
- InTra6 system with inductive safety edge signal transmission to gate controller
- EsGate monitoring relay for 8.2 kOhms safety edges

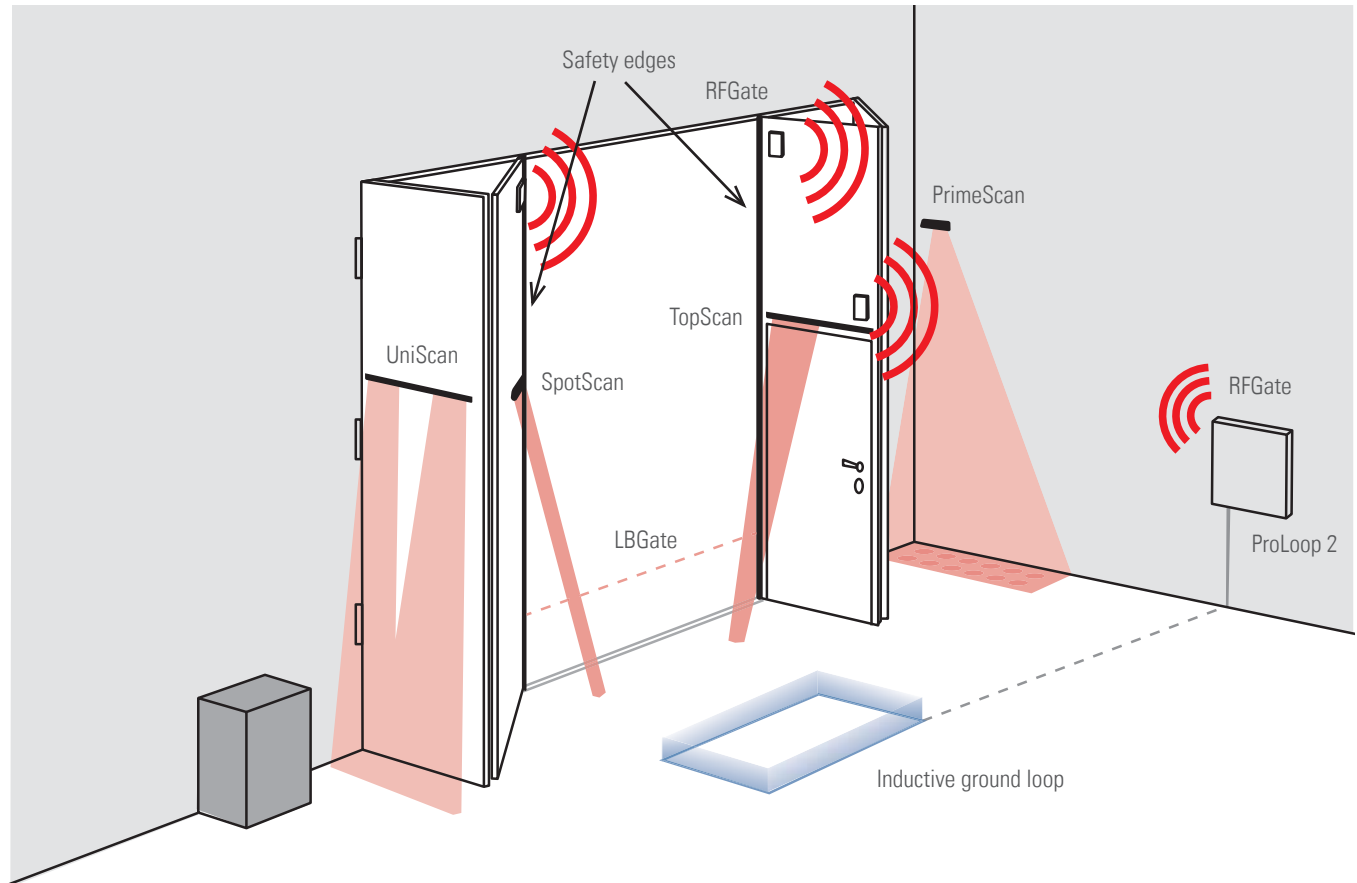


- 1) InTra6 inductive safety edge monitoring
- 2) EsGate safety edge monitoring
- 3) ProLoop 2 loop detector

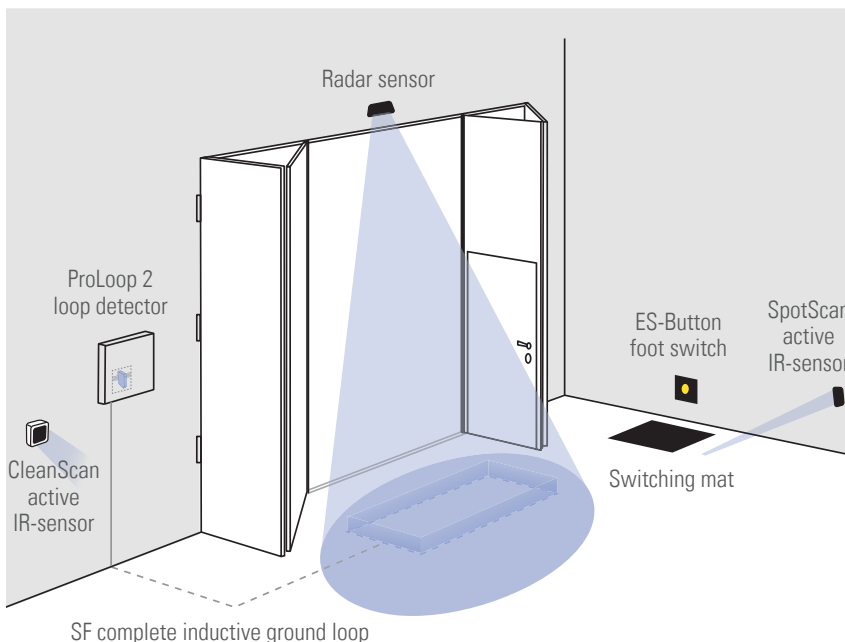


## Examples of safety solutions for industrial folding doors

- UniScan mobile light curtain in front of the door leaf
- TopScan or SpotScan mobile light beams in front of the closing edge
- PrimeScan light curtain on the wall behind the door leaf
- LBGate light barriers with transmitter/receiver at the door opening
- ProLoop 2 loop detector and inductive ground loop for vehicle safety
- Electrical or pneumatic safety edge on closing edges of the door
- RFGate safety edge signal radio transmission to the industrial door controller device



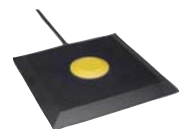
## Examples of activation solutions for industrial doors



**Switching mat** gives opening signal or safety area between door and wall.



**ES-Button** foot switch for floor and wall. Waterproof and robust.



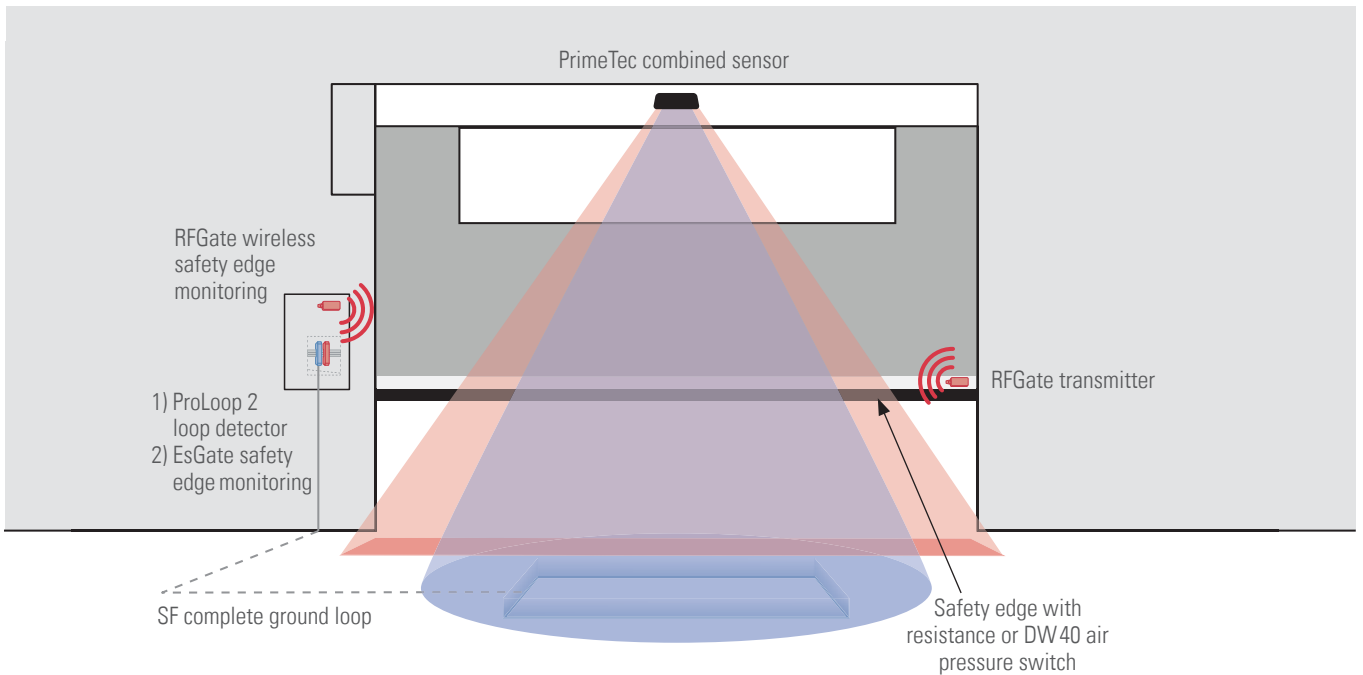
**CleanScan** touchless opening for best hygiene and comfort.



**SpotScan** active IR-sensor for opening impulse or touchless door leaf stops before obstacle.



## Examples of sensors on rolling doors



## Examples of hazards and risks that should be controlled during installation of industrial doors

### 1. Balancing, lever arms or motor is placed low and crush hazard exists

If the technical solution comes with crush hazard the industrial door cannot be CE marked. Covers or other safety measures are required for CE marking. CE marking documentation is not presented before these measures are taken.

### 2. Obstacles too close to the industrial door, for example an overhead crane

Can not be CE marked if the distance is less than in valid standards, see standard EN349; Safety of machinery – Minimum gaps to avoid crushing of parts of the human body.

### 3. Dangerously sharp edges next to the industrial door

If edges are so close to the industrial door that a person can be

trapped between the door and an edge, a CE marking cannot be affixed before these are covered or removed. CE marking documentation is not presented before these measures are taken. Covering is normally done by the customer. If there are sharp edges near the door it is pointed out during final inspection. Sharp edges are, for example, a metal sheet cut without removing scrapings.

### 4. Increased safety requirements in certain environments

Check that safety requirements in EN 12453 5.5.1 table 1 are met.

### 5. Industrial doors installed in an environment with requirements for blast proof performance

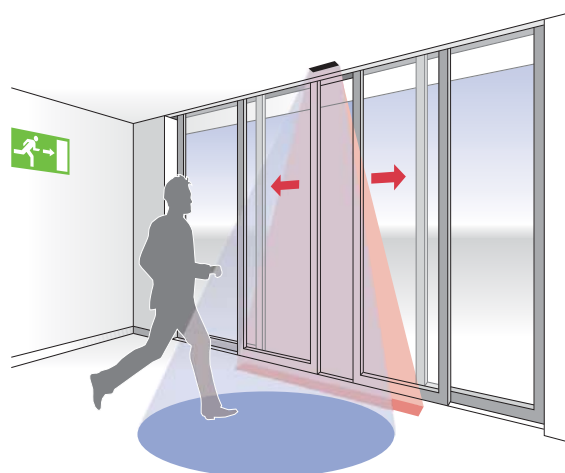
Cannot be CE marked if the industrial door is not suitable for this environment. Door is not installed. If the industrial door is intended for use in such environment, this shall be indicated on the door.

# PEDESTRIAN DOORS

Power operated doors shall be designed so that hazards due to crushing, shearing, impact and drawing in during the opening and closing cycles are avoided or so that safeguards and risk control measures against such hazards are provided.

Power operated doors shall be designed in such a way that they can be installed, used, inspected, maintained and dismantled safely. Warning signs shall be used to draw the users' attention to residual risks, if any. Safety provision and risk assessment should be proportional to the cost of compliance and the balance is to be reasonably practicable. Solutions given in the standards are considered best practice with today's state of the art technology.

PLC class sensors are usually required for automatic operated pedestrian doors however sensors used for escape route functionality shall according to EN 16005 / DIN 18650 comply with PLd. In general safety sensors shall be tested at least once per opening-closing cycle.



*PrimeTec A ES.SM escape route sensors – when connected to a failsafe system.*

Permissible forces of automatic doors are stated by the EN 16005 / DIN 18650. If these maximum forces cannot be guaranteed, safety measures shall always be taken.

The following may be used:

- Guards
- Barriers
- Limitation of leaf forces (does not apply to shearing and drawing-in hazards)
- Electro-sensitive protective equipment (ESPE) **e.g. PrimeTec, UniScan**
- Pressure sensitive protective equipment (PSPE) **e.g. Safety Edges**
- Safety distances

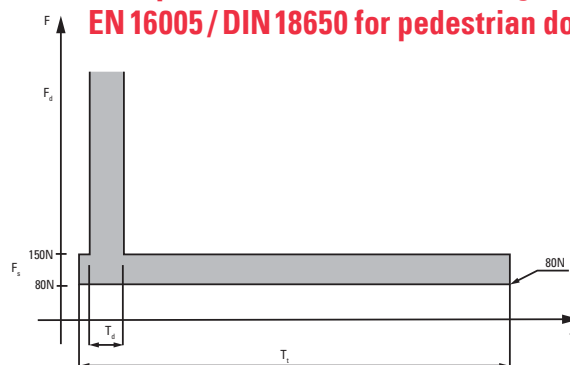
Sufficiently dimensioned safety distances to prevent crushing or drawing in are:

- $\leq 8$  mm or  $\geq 25$  mm for fingers,
- $\geq 200$  mm for the head,
- $\geq 500$  mm for the body.
- Further safety distances are specified in EN 349.

- Low energy movement

General risk assessments and Bircher Reglomat solutions for automatic doors will be shown on the next pages for different applications.

## Max permissible force according to EN 16005 / DIN 18650 for pedestrian doors



At pedestrian folding, sliding and revolving doors a dynamic impact force (max 0.75 seconds) from the closing edge is permitted as follows:

- Max 1400 N at a distance of  $> 500$  mm
- Max 700 N at a distance of 200–500 mm
- Max 400 N last part before closing  $< 200$  mm

If these maximum forces cannot be guaranteed, safety measures shall always be taken (for example sensors).

Although force limitation and low energy use are permissible safety measures, in certain environments with certain users, risk assessment may identify that further risk reduction measures are necessary/essential to avoid impact or contact with the door leaf.



PrimeTec A/B



PrimeScan A/B



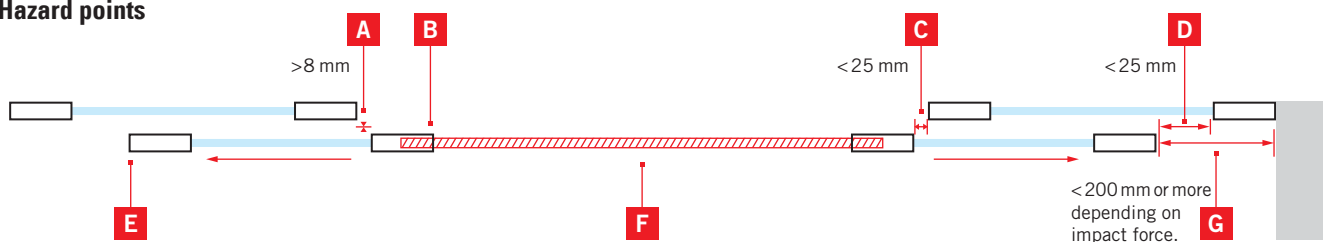
UniScan



Safety edges

# Risk assessment for power operated sliding doors

## Hazard points



**1) Door contact:** In environments with a large proportion of elderly, infirm and disabled persons or small children all contact between the door leaf/door construction and the user is acc. to EN 16005 / DIN 18650 viewed as unacceptable – safety measures shall be taken to prevent contact with the door leaf.

**2) General:** For power operated pedestrian doors that do not conform to EN 16005 / DIN 18650 low energy requirements or if low energy use without additional ESPE is not assessed as safe or suitable, safety measures shall be taken and safety distance kept on a level with the standard.

On full energy doors the closing edge B and door opening F shall be protected by safety sensors. Presence sensors shall monitor a zone of at least 20 cm in front of the door on both sides of the door opening.

If the safety distance or maximum closing forces on other hazard points are not kept, these risks shall always be secured.

Shearing and drawing in hazards for fingers shall always be secured if the distance is between 8 and 25 mm. Applies to height up to 2.5 m at the closing edge and at least 2 m at the rear edge.

**3) Low energy use:** When slow opening and closing is acceptable, low energy use is a permissible safety measure for automatic doors if in accordance with EN 16005 / DIN 18650. The weight of the door leaf sets a limit to the maximum speed rated as low energy. In such case normally no sensor is considered to add protection in the door opening as well as for the opening and closing edges. Low energy use also requires a maximum opposing force of 607 N at 1.69 J to continue to halt a stopped door.

## 4) Minimum closing and opening time allowed on low energy use is calculated accordingly:

- a) Max speed in m/sec =  $\sqrt{3,38/\text{door weight in kg}}$
- b) Minimum opening time in sec =  $\frac{0,9 \times \text{door travel in m}}{\text{speed}}$

## Example of a risk assessment check sheet for power operated doors

No contact with door leaf accepted

Escape door, failsafe system or breakout type   
Activation distances suitable

### Selected safety measures

Risk	Cover/guard	Barrier	Safety sensor	Safety distance and max impact forces	Approved low energy settings
<b>A</b> hazard point					
<b>B</b> hazard point					
<b>C</b> hazard point					
<b>D</b> hazard point					
<b>E</b> hazard point					
<b>F</b> hazard point					
<b>G</b> hazard point					
Date:		Signature:			

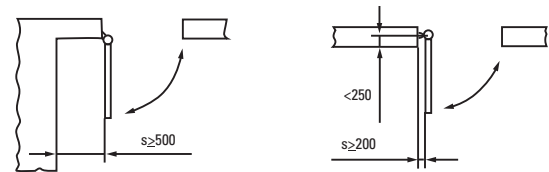
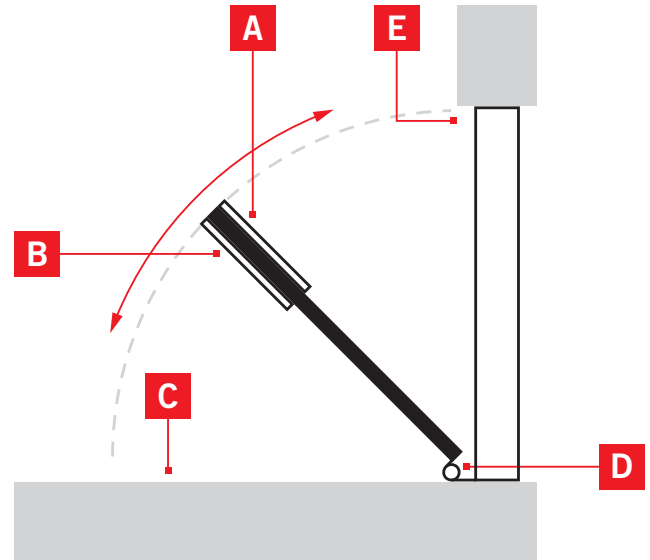
# Risk assessment of power operated swing doors

**1) Door contact:** In environments with a large proportion of elderly, infirm and disabled persons or small children, safety sensors conforming to standard EN 16005 / DIN 18650 (Prevent contact with the door) shall be used.

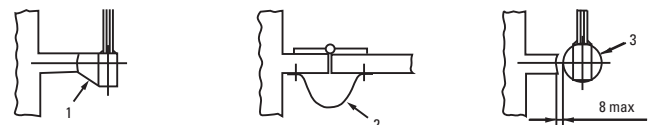
**2) Unexpected obstacle:** On doors opening to an area with people passing by, a safety sensor shall always be used.

**3) Safety measures:** with normal full energy automatic door drives. Sensors shall be used on the door front edge with field width depending on door speed. Safety distances to the surroundings shall in combination with max forces fulfill the standard or additional sensor protection should be used. Shearing and drawing in risks for fingers at the door's back edge shall be secured up to 2 m height and at least 2,5 m at the front edge.

**4) Low energy use:** Instead of full energy automatic door drives with safety sensors, it is possible as a safety measure to use an automatic door drive with low energy forces conf. to EN 16005 / DIN 18650. Max. speed allowed for low energy settings is determined by the weight and width of the door leaf.



Safety distance



Example of crush protection

Minimum time allowed in seconds for opening or closing 80 degrees on low energy settings is calculated accordingly:

$$t = \text{door width (m)} \times \sqrt{\text{door weight (kg)} / 2.26}$$

There shall be added at least 1.5 s for the last 10 degrees. Higher speed always needs a sensor (f.ex. UniScan) that prevents the front part of the door leaf from hitting the user. Even with low energy use there can be a need of further safety measures for different hazard points.

Note: See the risk assessment check sheet template on page 13.



UniScan sensor

## EN 16005 / DIN 18650 – Minimum protection in front of the door leaf

Installing height (cm)	Field width (cm)	Minimum distance from door front edge to be monitored by a safety sensor conforming to EN 16005 / DIN 18650 (cm)									
		Door leaf width (cm)	Time for door opening 0–80 degrees or time for door closing 90–10 degrees								
			1,2 sec	1,7 sec	2,3 sec	3,0 sec	3,6 sec	4,2 sec	4,8 sec	5,5 sec	6,1 sec
170	36	70	51	43	33	22	12	3			
180	39	80	61	53	43	32	22	13	3		
190	41	90	71	63	53	42	32	23	13	2	
200	43	100	81	73	63	52	42	33	23	12	2
210	45	110	91	83	73	62	52	43	33	22	12
220	47	120	101	93	83	72	62	53	43	32	22
230	49	130	111	103	93	82	72	63	53	42	32
240	51	140	121	113	103	92	82	73	63	52	42
250	53	150	131	123	113	102	92	83	73	62	52
260	56	160	141	133	123	112	102	93	83	72	62
270	58										
280	60										
290	62										
300	64										

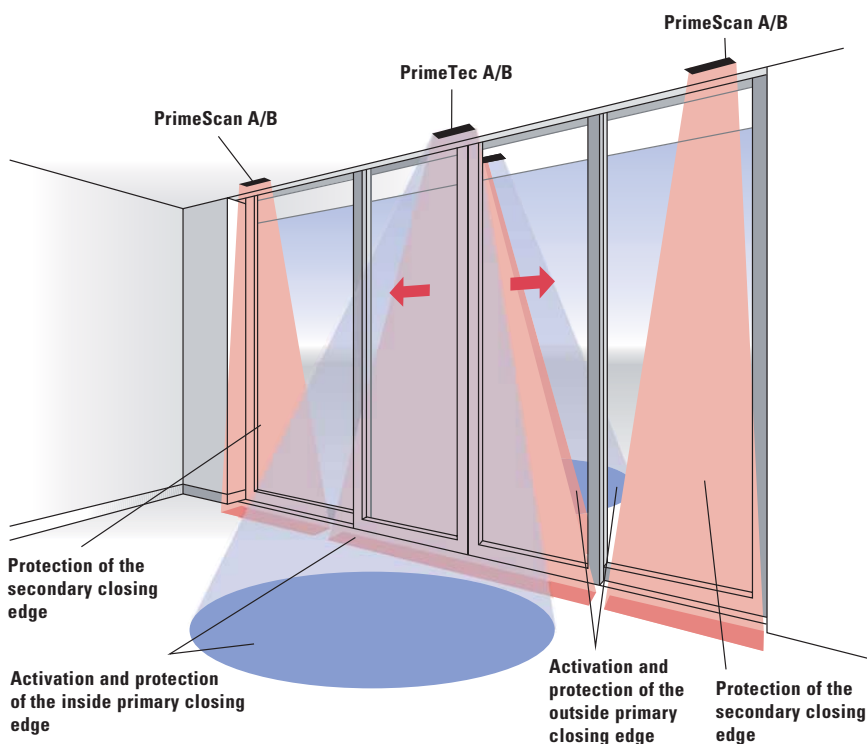
low energy area

Blue field = Example at installation height 200 cm. UniScan 1 with 1 optical unit and field width 43 cm can be used.  
 Purple field = Example at installation height 200 cm. UniScan 2 with 2 optical units required (max 10 cm between fields, sensitivity 3).  
 Red field = Example at installation height 200 cm. UniScan 3 med 3 optical units required (max 10 cm between fields, sensitivity 3).

# Activation & safety applications on pedestrian doors

## Example of sensor solutions for power operated sliding doors

- Sliding door safety with PrimeTec A or PrimeTec B for primary closing edge
- Sliding door safety with PrimeScan A or PrimeScan B for secondary closing edge
- Opening impulse with PrimeTec A or PrimeTec B
- Opening impulse with radar Merkur 2 ES or Prime Motion B (on low energy doors)



**PrimeTec** combined sensor with both radar and light curtain in one unit.



**PrimeScan** light curtain to secure unsafe area. On pedestrian and industrial doors or gates.



**PrimeMotion** radar for automatic opening on movement towards the door.



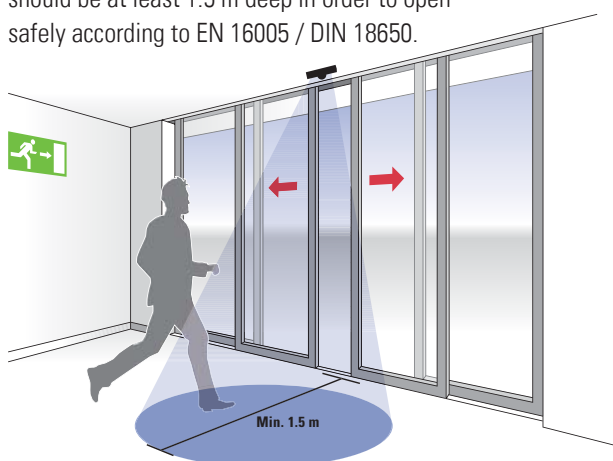
**Merkur 2 ES** radar for automatic opening.



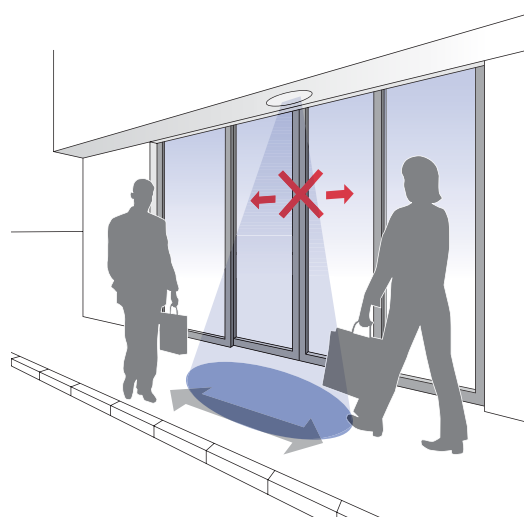
**ArtMotion 2** radar for automatic opening.



Note: On escape route doors the activation field should be at least 1.5 m deep in order to open safely according to EN 16005 / DIN 18650.



*PrimeTec A ES.SM escape route sensors – when connected to a failsafe system.*



*Merkur 2 ES, PrimeTec or PrimeMotion with cross traffic optimisation.*

### Important note:

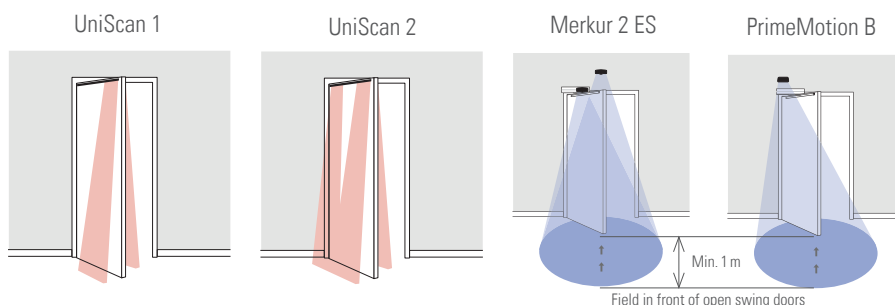
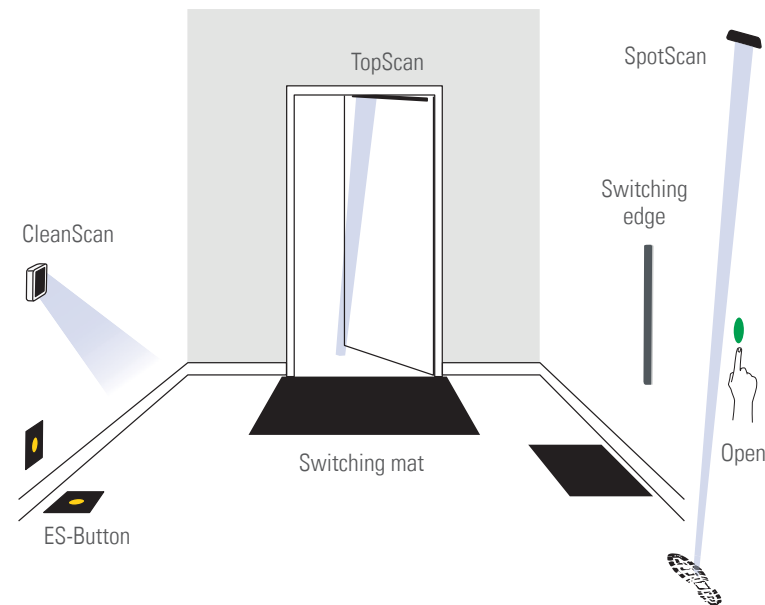
On new sliding door installations according to EN 16005 / DIN 18650, the doors need a safety presence field inside and outside of the door opening, e.g. PrimeTec sensors. Radars without presence detection can still be used for swing doors, low energy sliding doors and for replacement business on older door installations.

## Example of sensor solutions for power operated swing doors

- Swing door safety with UniScan 1 or UniScan 2
- Opening impulse with radar Merkur 2 ES or PrimeMotion B
- Opening impulse with foot switch ES-Button or touchless CleanScan
- Opening impulse with TopScan installed on the door or with SpotScan on the wall
- Opening impulse with Switching mat or Switching edge installed on the wall
- Sliding door opening and safety with PrimeTec and PrimeScan



Possible protection of a swing door with Bircher Reglomat sensors.



- Blue field on illustration = opening function
- Red field on illustration = safety function

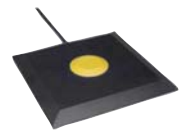
**UniScan** safety sensor for moving pedestrian and industrial door leaves.



**CleanScan** touchless activation sensor with adjustable activation distance up to 60 cm.



**ES-Button** foot switch for step or kick activation on the floor or on the wall. Robust and watertight (IP 67).



**Switching edges** for installation vertically or horizontally on the wall in selectable size and length. Door activation by pushing anywhere along the edge.



**Merkur 2 ES** radar for automatic opening. Advanced setting options with remote control.



**PrimeMotion** radar for automatic opening on movement towards the door.



**Switching mat** gives opening signal or safety area.



**TopScan** for door opening or touchless stop function on a low energy drive (comfort use).



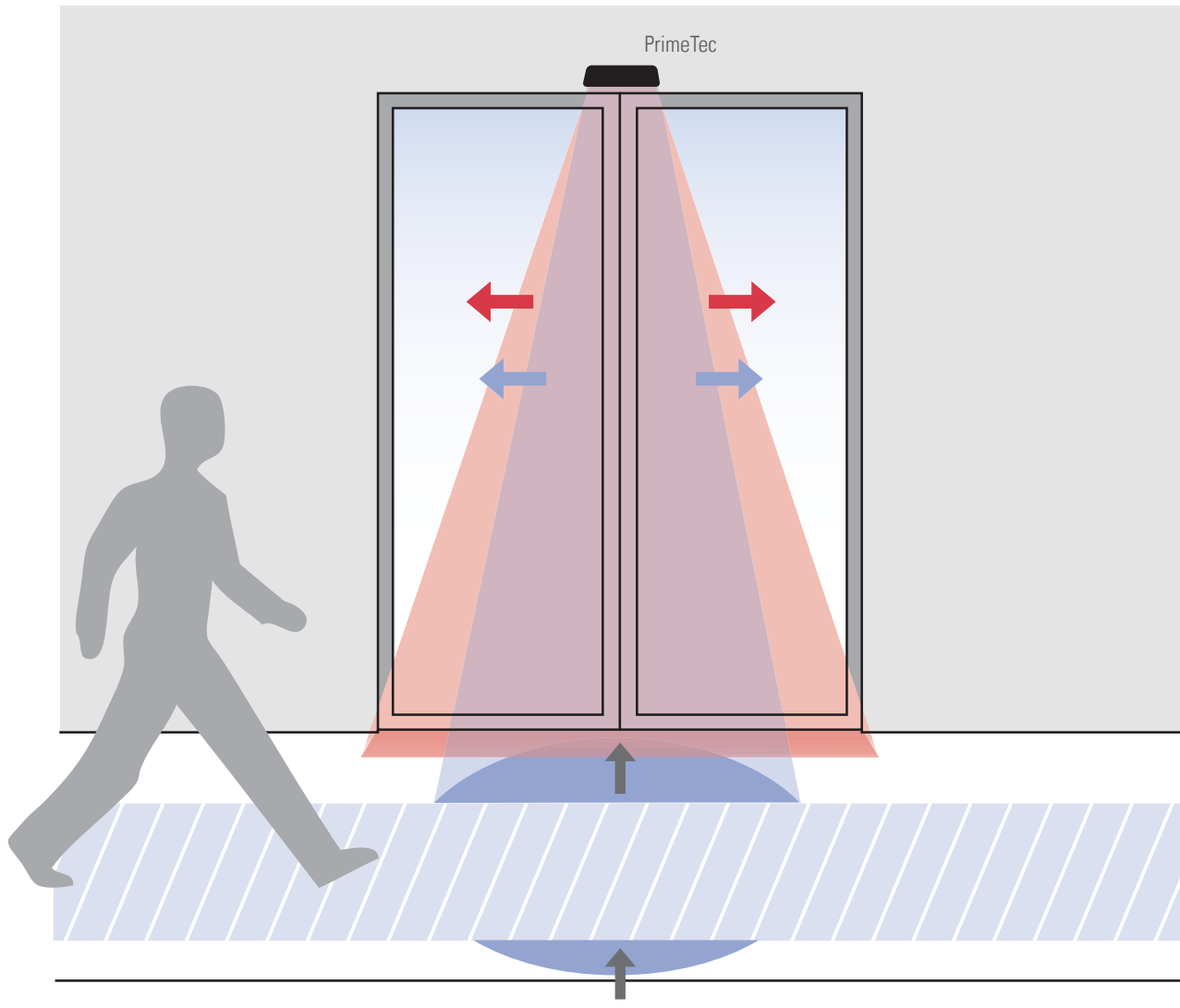
**RegloBeam 2** remote control with spotfinder makes setting easier of sensors like Merkur 2, UniScan, Herkules 2, PrimeTec A and PrimeScan A. Locates the IR-field of any sensor brand.





## Energy saving and controlling functions – pedestrian doors

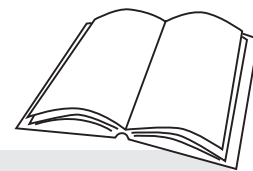
Sensors ensuring that the pedestrian and industrial facade doors do not stay open longer than necessary can contribute to measurable energy saving in the building. Functions to seriously consider are that the impulse sensor opening the pedestrian and industrial doors in the building facade is direction sensitive and has an option for cross-traffic filtering, so people moving away from the door or passing by are not detected. The door closing cycle can commence faster and does not open unintentionally for passers by.



## Energy saving functions – industrial doors

By installing two inductive ground loops with at least one meter distance the ProLoop 2 loop detector can recognise the order in which the loops are activated and only give signal to vehicles driving towards the door but not vehicles driving away from the door. This reduces opening time and energy loss. Alternatively, direction sensitive radar only reacting to vehicles and not people (for example Herkules 2) can be used. Reaction to cross-traffic can be avoided by using "on delay" on loop detectors. The minimum time of presence for the door to open can then be adjusted.

# INSPECTION, SERVICE, REPAIR, REFURBISHMENT



## Inspection of power operated doors and gates

In Europe it is expected that installers are competent and that they make installation according to the manufacturer's instructions and that a risk assessment is made and verifications are made on site.

The installer shall normally sign off the verifications/assessments performed. Then no further inspection of the installation itself is deemed necessary. Sweden however has specific rules about technical inspections of new industrial door and gate installations. Always check National Legislation.

After installation the industrial doors and gates shall, according to national regulations, be inspected repeatedly. There are a few countries that have national regulations about recurring technical inspections of industrial doors and gates, e.g. by an accredited third party in order to ensure safety, but so far there are no harmonised rules for the European market.

There are so far no third party inspection requirements for garage doors and gates for private use in detached residential dwellings, or for pedestrian sliding doors, swing doors and revolving doors with a verification that they conform to all relevant EU norms and regulations.

In the European market after the correct installation of the door/gate the building owner and or the building occupier (or in some cases the tenant in rented buildings) is responsible for the continued safe function of the doorsets – this includes regular service and safety checks.

**Power operated pedestrian and industrial doors and gates shall be accompanied by a logbook with following information:**

- a) Manufacturer's name and contacts
- b) Unique ID number marked on new pedestrian and industrial doors
- c) Reference to the doors location, if necessary
- d) Name and contacts of the installation company, where applicable
- e) Date of installation
- f) Identification of the door controller device and safety sensors
- g) Signed and dated results of verifications and commissioning tests performed by the manufacturer or an installation company installing the already CE marked products
- h) Reference to the doors instruction manual

**It shall also include:**

- Documentation on performed services and reparations including recommendation to upgrade/change parts
- Documentation on all performed upgrades and changes
- All work performed on the industrial door
- Names, dates and signatures of the persons answering for the performed work

## Service and supplementing of doors and gates

The "manufacturer" (as defined within the Machinery Directive) of the industrial/pedestrian doors specifies service and maintenance intervals and requirements in his documentation. With no manufacturer instructions the recommended interval for supervision with safety functions control on industrial doors and gates is at least two times per year. EN 16005 / DIN 18650 recommends intervals of at least once per year for pedestrian door sets. It is essential to develop service and maintenance procedures, usually together with a competent service company. There are no requirements of new CE marking on repairing power operated industrial doors and gates if essential safety parameters are not changed.

When replacing sensors and safety edges with non-original parts it is essential to verify the functions and closing force. This can be done with force measuring on the location, for example. Test methods are stated in EN 12445 for industrial doors and gates, and in EN 16005 / DIN 18650 for pedestrian doors. Replacement parts shall always conform to the essential health and safety requirements in the Machinery Directive and the declared performance must be maintained.

**Example 1:** Supplementing an industrial door with "hold to run" control with an automatic impulse sensor such as a remote control, inductive loops, radar or light barrier, minimum supplementation shall normally take place also with a light barrier. See table in EN 12453. Risk analysis does not normally conclude a new CE marking is needed, however the change shall be documented in the industrial door logbook and a review inspection performed.

**Example 2:** Supplementing with an automatic closing involves minimum supplementation also with a light barrier. See table in EN 12453. Risk analysis does not normally conclude a new CE marking is needed, however the change shall be documented in the industrial door logbook and a review inspection performed.

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## Example of checklist for safety devices

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### Functional checks of:

1. Pressure sensitive protective equipment such as safety edges and mats.
2. Force limitation (force measuring with instrument is currently not mandatory on service).
3. Electro-sensitive protective equipment such as light barriers and light curtains.

### Other checks:

1. Safety distances between leaves and fixed parts in the vicinity.
  2. Cable connection/wiring between safety device and controller.
  3. The condition of guards/covers.
- 

## Repairing and rebuilding doors and gates

All changes and work shall be recorded in the pedestrian/industrial door logbook. The performer of changes on a power operated industrial door shall carry out a risk analysis and document that all original closing forces are retained or improved. More extensive changes and alterations especially where any additional hazards or risks can be identified can require a new CE marking in relation to Machinery Directive and "Declaration of Conformity".

Risk assessment shall assure that moving parts on pedestrian and industrial doors with danger points up to 2.5 meters height are covered or secured with sensors. According to EN 16005 / DIN 18650 danger points between the leaf and frame presenting a fingertrap hazard can be protected up to only 2 m height. A guide slot in the drive cover, or drive arm or closing action at the top of power operated pedestrian doors is permitted.

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## Supplementary motorising and extensive modifications

When motorising an existing manual door, automating or making an extensive modification on a motor operated pedestrian or industrial door it should be seen as a new product. The same safety requirements then apply as for new pedestrian or industrial doors. Reconstruction documentation for industrial doors and gates shall be compiled acc. to EN 12635 Annex C. Declaration of Conformity is issued and CE mark affixed. Requirements for new pedestrian and industrial doors in product standards that refer to the Construction

Production Regulation (CPR) are mandatory. Safety requirements in a harmonised standard referring to the Machinery Directive like EN 16005 / DIN 18650 for power operated pedestrian doors permit selecting other solutions than described in the standard. In such case the manufacturer must have written proof and be able to provide evidence that the deviations that are made from the standard meets at least the same safety level as the solutions that are specified in the standard.

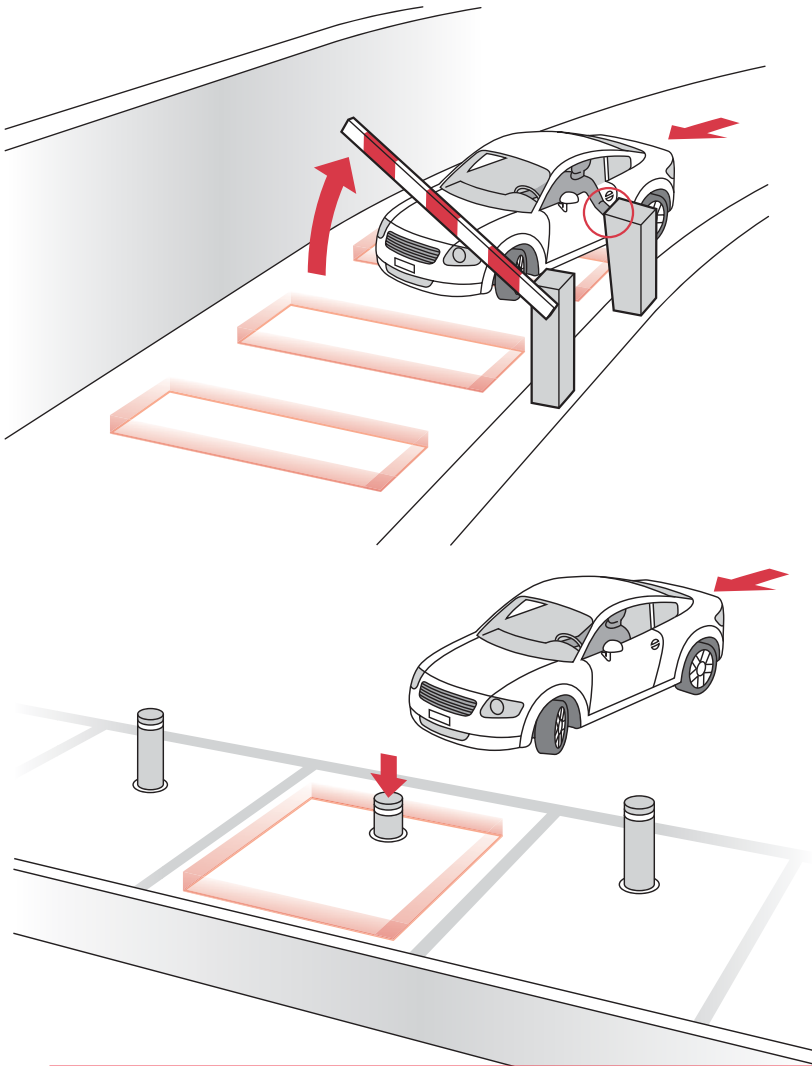
### Reconstruction documentation shall include

- a) Unique project/ID-number
- b) Copy of the information marked on the door
- c) Performed calculations and drawings
- d) Photograph or a drawing to scale of the installation with connection schematics
- e) Copy of the motors/controllers Declaration of Incorporation/ CE marking
- f) Documentation from the door manufacturer confirming the door is suitable for motor operated use, if possible
- g) Copies of relevant test reports or certificates concerning the door and automatics, if possible
- h) Description of the used method of risk elimination for users
- i) Copy of risk assessment listing the current health and safety requirements
- j) General and construction specific instructions for use
- k) General and construction specific maintenance instructions
- l) A list over relevant standards taken into consideration
- m) A copy of commissioning test report

*PS: So called Micro-enterprises with less than 10 employees and an annual turnover of max 2 million euros can for power operated pedestrian and industrial doors replace the third party type-testing (for example closing force measurements) with simplified procedures and rely on specific technical documentation instead. (Does not apply to pedestrian/industrial fire doors and emergency exit doors).*

# Power operated barriers and bollards

Inductive ground loops are often used with barriers and bollards to control presence of a vehicle. Combination of two loops makes it possible to monitor the direction of travel. With motor operated bollards the loop makes sure the bollard does not rise while the car is directly on top of it. ProLoop 2 has many useful functions for the installation technician such as loop measuring and diagnostics, as well as selectable signal times and delay times.



ProLoop 2 loop detectors



Pre-fabricated induction loop

**Note:** Information in this publication is an attempt to compile and highlight the most important of safety standards and CE marking of pedestrian and industrial doors and gates. We give advice on risk assessment on installation and our interpretation regarding liability, but simply following this information does not mean the current directives and standards are met. It is important for the reader to inform themselves with complete standards and any associated regulations and make his own judgements with risk analysis and risk management.

## European reference documents

### Directives and Regulations referred to in the leaflet

(EU) No 305/2011	Construction Products Regulation (CPR)
2006/42/EC	Machinery Directive (MD)
2014/30/EC	Electromagnetic Compatibility Directive (EMC)
2014/30/EC	Low Voltage Directive (LVD)
2014/53/EC	Radio Equipment Directive (RGD)
2011/65/EC	Restriction of Hazardous Substances (RoHS)

### Standards referred to in the leaflet

EN 16005 / DIN 18650	Power operated pedestrian doorsets. Safety in use. Requirements and test methods.
EN 16361	Power operated pedestrian doors. Product standard, performance characteristics. Pedestrian doorsets, other than swing type, initially designed for installation with power operation without resistance to fire and smoke leakage characteristics.
EN 13241-1	Industrial, commercial and garage doors and gates. Product standard. Products without fire resistance or smoke control characteristics.
EN 12445	Industrial, commercial and garage doors and gates. Safety in use of power operated doors. Test methods.
EN 12453	Industrial, commercial and garage doors and gates. Safety in use of power operated doors. Requirements.
EN 12978	Industrial, commercial and garage doors and gates. Safety devices for power operated doors and gates. Requirements and test methods.
EN 12635	Industrial, commercial and garage doors and gates. Installation and use.
EN 349	Safety of machinery – Minimum gaps to avoid crushing of parts of the human body.
EN ISO 12100	Safety of machinery. General principles for design. Risk assessment and risk reduction.
EN ISO 13849-1	Safety of machinery. Safety-related parts of control systems. General principles for design.
EN ISO 13856-2	Safety of machinery – Pressure sensitive protective devices – Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars.
EN 62061	Safety of machinery. Functional safety of safety-related electrical, electronic and programmable electronic control systems (Usually EN ISO 13849-1 is used for doors).

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