



# Safety Sensors and Switches

Meet existing safety standards!  
Supervise doors and hatches!  
Safe stops and reliable restarts!

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# Why should I use Safety Sensors and Switches?

## ...to supervise doors and hatches around dangerous machines!

Assurance that a machine stops when a door or a hatch is opened can be solved by using different types of switches and sensors which are monitored with a safety relay or safety PLC. Switches and sensors are available both as non-contact (dynamic or magnetic) and various types of interlocking devices. Interlocking devices can be used when it is required, via a signal, to lock a gate during processes that cannot be stopped during certain operations. They are also used with machines that have a long stopping time.



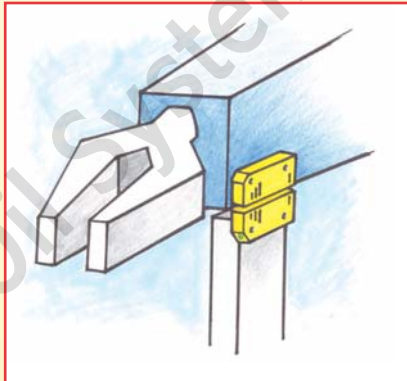
## ...to manage safety in harsh environments!

Non-contact dynamic sensors have a long life-time because they are not physically mechanically operated. They also endure very harsh environments (i.e. cold, heat, high-pressure wash-down) which is important in the food industry. Because the sensors are small, they are very easy to position and even completely conceal on doors and hatches.



## ...to ensure that a position is reached!

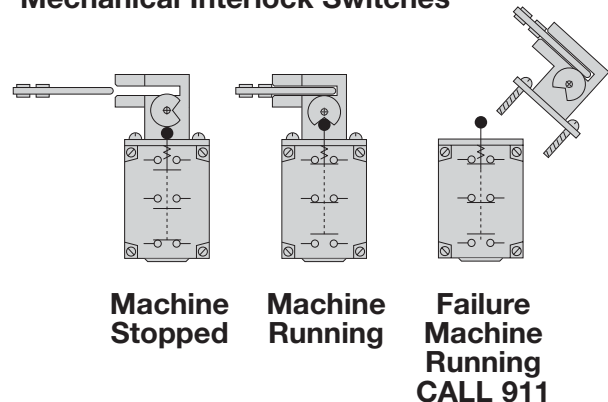
The sensor monitors that the robot is standing still in a monitored position when someone enters the robot's working area. The robot is then only stopped by the program. If the robot leaves the position, the power will directly be cut. This is used when the robot does not stop safely without restarting problems.



## ...to prevent mechanical failures!

When a door or hatch loses proper tolerance due to wear or debris building up in the slot for the key, mechanical interlock switches have the probability of failing. Sagging or misalignment can cause the key to break or the screws that hold the head of the switch in position to loosen. This may lead to the interlock switch not giving a stop signal when the door or hatch is opened. For non-contact sensors these risks do not exist. If any of these conditions occur it will lead to a stop signal.

### Mechanical Interlock Switches



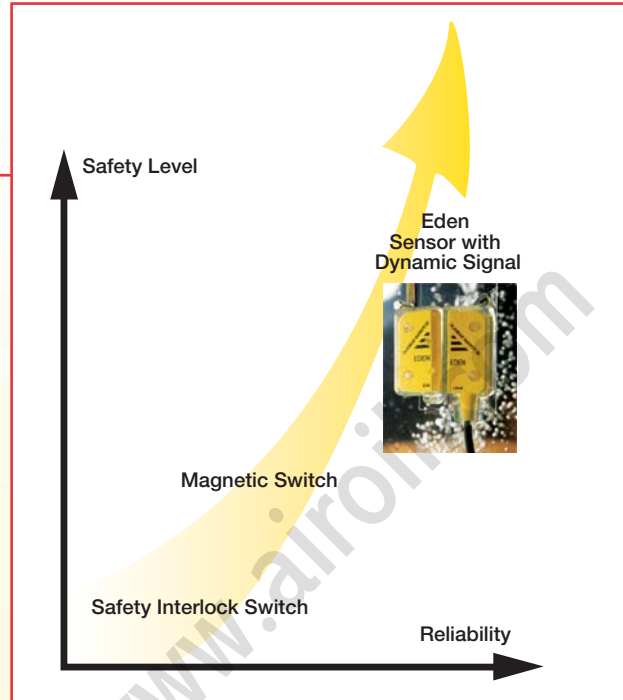
# Eden provides the Highest Safety Level and Reliability

Our recommendation is to use the Eden sensor because it is the safest and most reliable solution. The Eden sensor is both a non-contact switch and it has a dynamic function. It is also possible to connect up to 30 Eden sensors in series and still achieve a safety category 4.

## What requirements should one have on sensors/switches?

The sensor/switch shall be reliable in both the safety and production point of view.

- A person must be able to trust that dangerous movements and functions are safely stopped by the sensors/switches.
- In the production point of view, unintentional stops should be avoided.



## How safe is a Sensor/Switch?

*In order to trust the safety function, it is essential to be aware that a safety sensor/switch must be mounted and used according to the specifications. The certification authorities only test the product according to the appropriate standards and to the specifications from the manufacturer.*

### Mechanical Switches

For mechanical switches (e.g. key operated), a door or hatch has to be constructed to small tolerances in order for the switch, the key or the mounting brackets to last according to the life time specification from the supplier. The screws holding the parts have to be locked in such a way that they cannot be loosened. In order to prevent material from getting into the slot for the key, the environment has to be clean.

If a door goes outside the design tolerances from wear, the screws loosen or material comes into the slot, this may lead to the interlocked switch not giving a stop signal when the door is opened. Even two mechanical switches on a door could break to an unsafe state if the door somehow gets outside the tolerances of the switches. To prevent accidents the mechanical switch normally needs continuous checks of both the switch and the installation.

### Non-Contact Sensors/Switches

For non-contact sensors the risks associated with mechanical switches do not exist. If screws, brackets or sensors get loose, it will lead to a stop signal. Therefore only one sensor with dual or dynamic function is needed in order to reach the highest safety level.

There are two types of non-contact sensors — active and passive. The active sensor, Eden, is constantly communicating with a dynamic signal between the two parts and any failure will directly lead to a stop signal. The passive type, a magnet switch, has two reed contacts which are activated by a coded magnet. Both the passive and the active sensors are checked every time a door is opened. From a safety point of view, the active sensor, Eden, is preferred because it is checked constantly whereas the passive sensor is only checked when a door opens.

From the reliability point of view, a long detection distance with large tolerances and a well-defined on and off position is needed. The active sensor, Eden, fulfills these demands. A magnet switch has smaller tolerances and an intermediate position where only one contact opens. A bad installation or vibrations can lead to an unintentional stop if one contact opens and closes again. The supervision of a two-channel system is based on both contacts having to be operated in order to permit a new start. In a dynamic safety circuit, there is only one pulsed signal and therefore no intermediate position.

# Eden Non-Contact Non-Magnetic Safety Sensor for the Highest Level of Safety

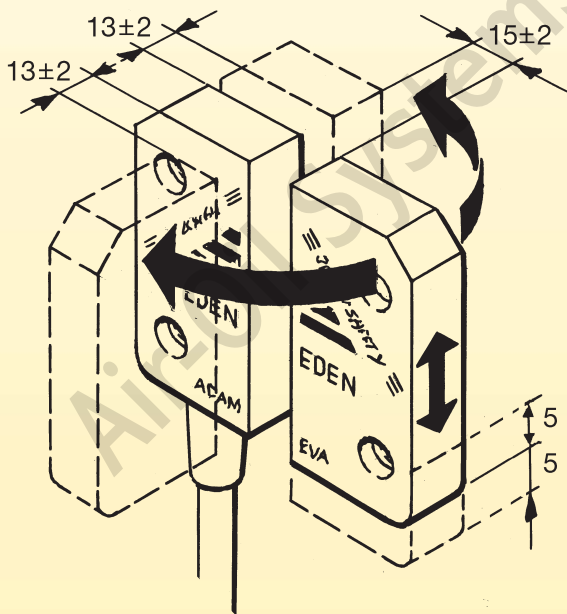
Eden — Adam and Eva — is a non-contact safety sensor for use on interlocked gates, hatches, etc. A coded signal is transmitted from the control device Vital or from the safety PLC Pluto via Adam to Eva, which modifies the signal and sends it back again. The maximum sensing distance between Adam and Eva is currently 15mm +/- 2 mm.

Up to 30 Edens can be connected in series to Vital and still achieve the same safety level in the safety circuit. It is also possible to connect safety light beams and E-stops in the same safety circuit.

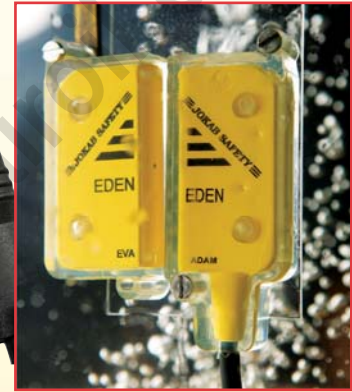
Adam is available with cable lengths up to 20 m and with M12 connectors. The LED on Adam provides indication of four different conditions, contact/non-contact between Adam and Eva, alignment, and safety status. The same information is also available via the Adam connection cable. For harsh environments, Jokab Safety offers Eden E — Adam E and Eva E. There is also a coded version Eden EC, Adam EC and Eva EC.

## Flexible Mounting

The ability to operate at distances of up to 15mm and at different detection directions allows a wide range of mounting possibilities.



Eden E for harsh environments



## Applications

- Doors and Hatches
- Position Control
- Sector Detection
- Slot Detection

## Features

- Safety category 4 according to EN 954-1/EN ISO 13849-1 together with Vital or Pluto
- Non-contact detection, large sensing distance 0 - 15 mm +/- 2 mm
- Up to 30 sensors connected in series at safety category 4
- Versatile mounting, 360° detection
- Protection class IP67 (Eden E - IP69K)
- Signal will penetrate through non-metallic materials (wood, plastic, etc.)
- Safety light beams, E-stops and Eden can be connected in the same safety circuit together with Vital or Pluto meeting safety category 4 (EN 954-1/EN ISO 13849-1)
- LED indication on sensor and status information via the connector cable
- Small hysteresis (< 1mm)
- Eden C and Eden EC - available coded versions

## Approvals



## Eden Application Examples

### Eden to Detect Position

Adam and Eva has contact only if they are within 15 mm from each other.

### Eden Used for Sector Detection

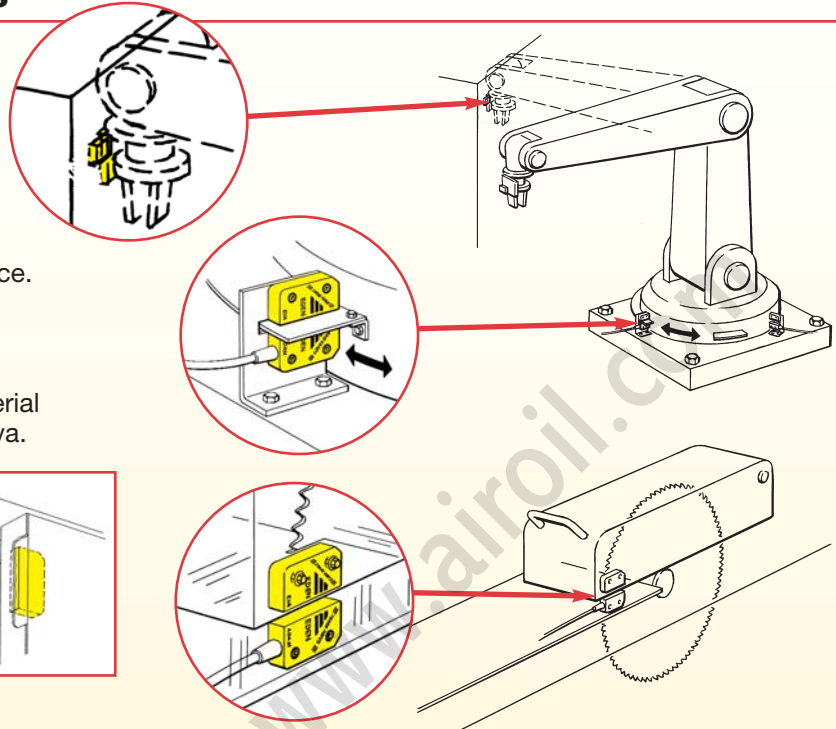
Metal stops the signal between Adam and Eva. Additional Eden sensor(s) can be mounted to detect metal plate(s) in place.

### Eden Used for Detection of Position of Saw Guard

Wood, plastic and other non-metallic material lets the signal pass between Adam and Eva.

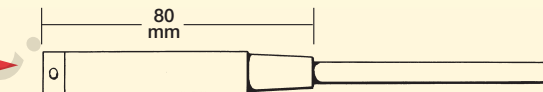
### Eden Hidden in Doors and Hatches

Non-metallic door material between Adam and Eva allows signal through.

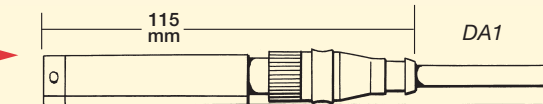


## Eden Mounting

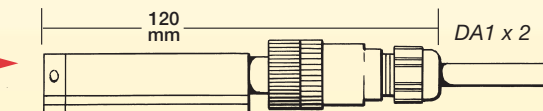
Mounting Adam with integral cable. →



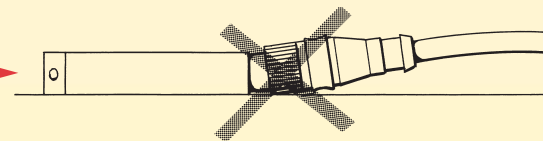
Mounting with one protection plate (DA1) for Adam M12 using prewired molded M12 connector. →



Mounting with two protection plates (DA1) for Adam M12 using field wirable M12 connector. →

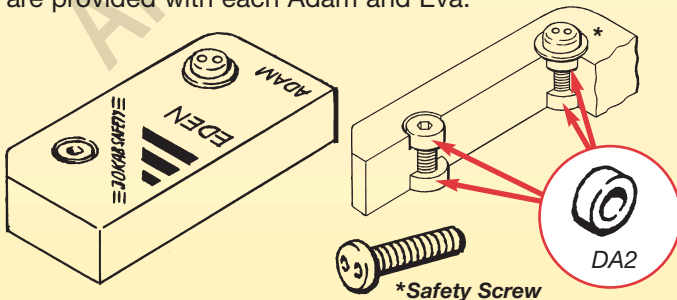


Wrong mounting without protection plate may cause permanent damage to sensor. →



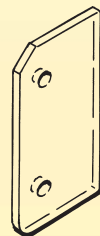
### DA2 Mounting Spacer

The DA2 mounting spacer must be used in order to physically protect Eden from damage. Four spacers are provided with each Adam and Eva.



### DA1 Protection Plate

Four protection plates (2.5 mm) are supplied with Adam M12. To protect Adam and Eva protection plate (DA1) can be used on both sides.



# Eden Technical Data

**Manufacturer**..... JOKAB SAFETY

**Ordering Data/Article Numbers**..... see page 25-36

**Safety Category together with Vital or Pluto**  
(according to EN 954-1/EN ISO 13849-1)..... 4

**Color**..... yellow and black

**Weight**

Adam M12.....30 g  
 Adam 3 m..... 220 g (including cable)  
 Adam 10 m..... 650 g (including cable)  
 Adam E/Adam EC..... 660 g (including cable)  
 Adam EC.....660 g (including cable)  
 Eva.....26 g  
 Eva E.....36 g  
 Eva EC.....36 g

**Power Supply**..... 24VDC +15%/-25%

**Power Consumption**

Adam without info output.....45 mA  
 Adam with info output..... max. 55 mA

**Max. Cable Length**..... see Vital Technical Data

**Ambient Temperature**

Eden/Eden C..... -40°C to +70°C (operation)  
 -25°C to +70°C (storage)  
 Adam E/Adam EC..... -40°C to +70°C (operation)  
 -25°C to +70°C (storage)  
 (Test OK +90°C to 100°C)

**Protection Class**

Eden..... IP67  
 Eden E/Eden EC..... IP69K

**Mounting**..... M4 screw, e.g. safety screw  
 20-053-42. Max torque 2 Nm  
 (screws should be locked with Loctite or similar)

**Detection Distance Max**

Adam/Eva 15+/-2 mm.....Flash 2 mm before red position  
 Adam C/Eva C 12+/-2 mm.....Flash 2 mm before red position  
 Adam E/Eva E 12+/-2 mm.....Flash 2 mm before red position  
 Adam/Eva EC 10+/-2 mm.....Flash 2 mm before red position  
 Hysteresis..... approx. 1 mm

*Metal may have influence on detection distance.  
 This can be prevented by protection plates, DA1.*

**Minimum Distance between Eden Pairs**.....50 mm

**Life**..... >10<sup>7</sup> cycles

**Minimum distance to metal when there is metal on one or more sides.**

Adam/Eva, Adam EC/Eva EC (1)..... 0 mm  
 Adam/Eva, Adam EC/Eva EC (more)..... 2.5 mm  
 Adam E/Eva E (1)..... 0 mm  
 Adam E/Eva E (more)..... 0 mm  
 Adam C/Eva C (1)..... 5 mm  
 Adam C/Eva C (more)..... 5 mm

**Material**..... Macromelt (based on polyamid)  
 (Eden E and Eden EC is also covered by PUR, polyurethane)

**Chemical Resistance**

Macromelt.....cutting oils, vegetable and animal oils,  
 hydrogen peroxide, diluted acids and bases: good  
 (alcohol and strong acids: not recommended)  
 PU (Eden E and Eden EC) cutting oils, vegetable and  
 animal oils, hydrogen peroxide, diluted  
 acids and bases, alcohols: good  
 (strong oxidating acids: not recommended)

**LED on Adam**

Green..... Eva within range, safety  
 circuit closed (door closed)  
 Flashing.....Eva within range, earlier  
 safety circuit open (door closed)  
 Red.....Eva out of range, safety  
 circuit open (door open)  
 Fast Flashing..... Eva within 2 mm from maximum  
 sensing distance (door closed)

**Cable**.....3 or 10 m, Ø5.7 mm, black PVC  
 5 x 0.34 mm<sup>2</sup> + screen, UL 2464

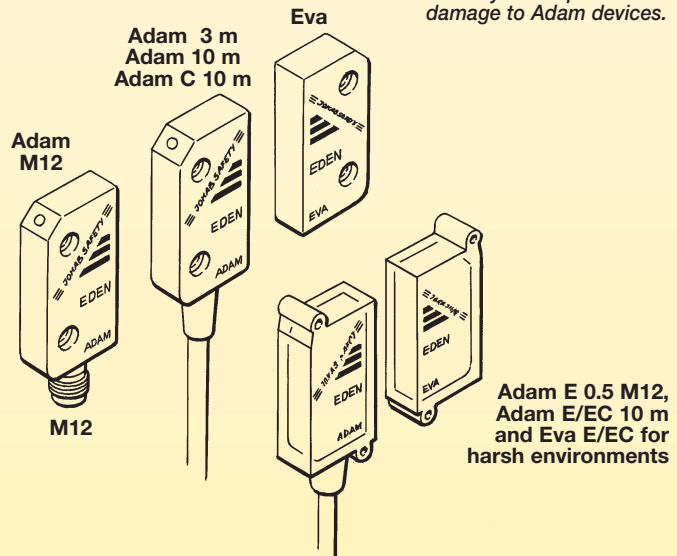
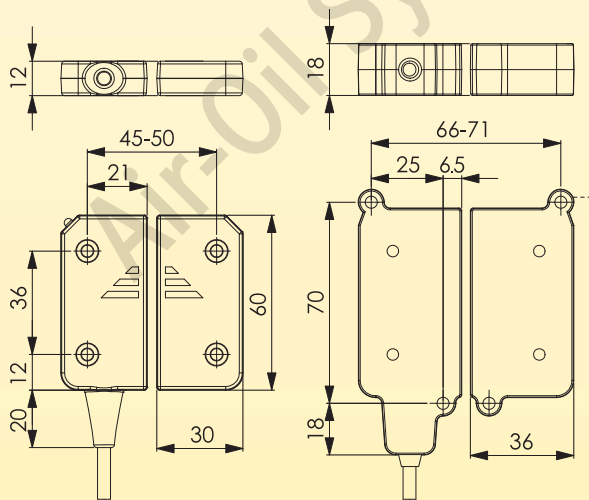
**Connector**.....M12: 5-pin male contact

**Connections**

Brown (1).....+24 VDC  
 White (2)..... dynamic signal in  
 Blue (3).....0 VDC  
 Black (4).....dynamic signal out  
 Grey (5)..... info output (see below)

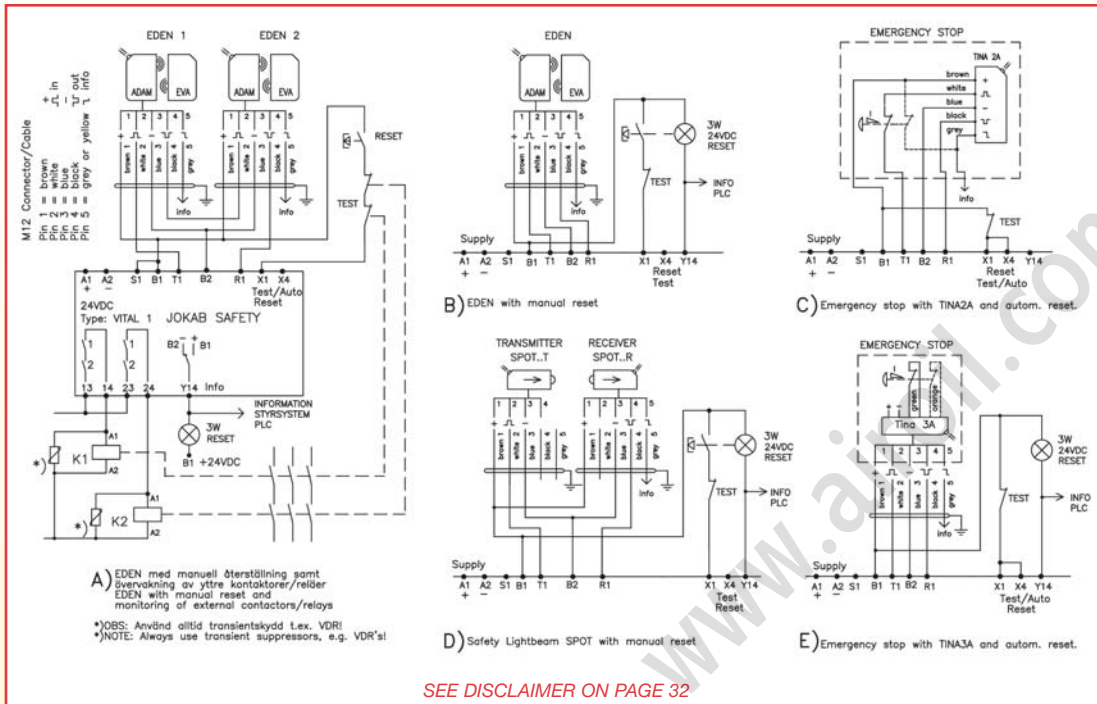
24 VDC when LED is green or flashing  
 (tolerance -2 VDC) 10mA max  
 0 VDC when LED is red (tolerance +2 VDC)

**Warning: Incorrect connection  
 may cause permanent  
 damage to Adam devices.**



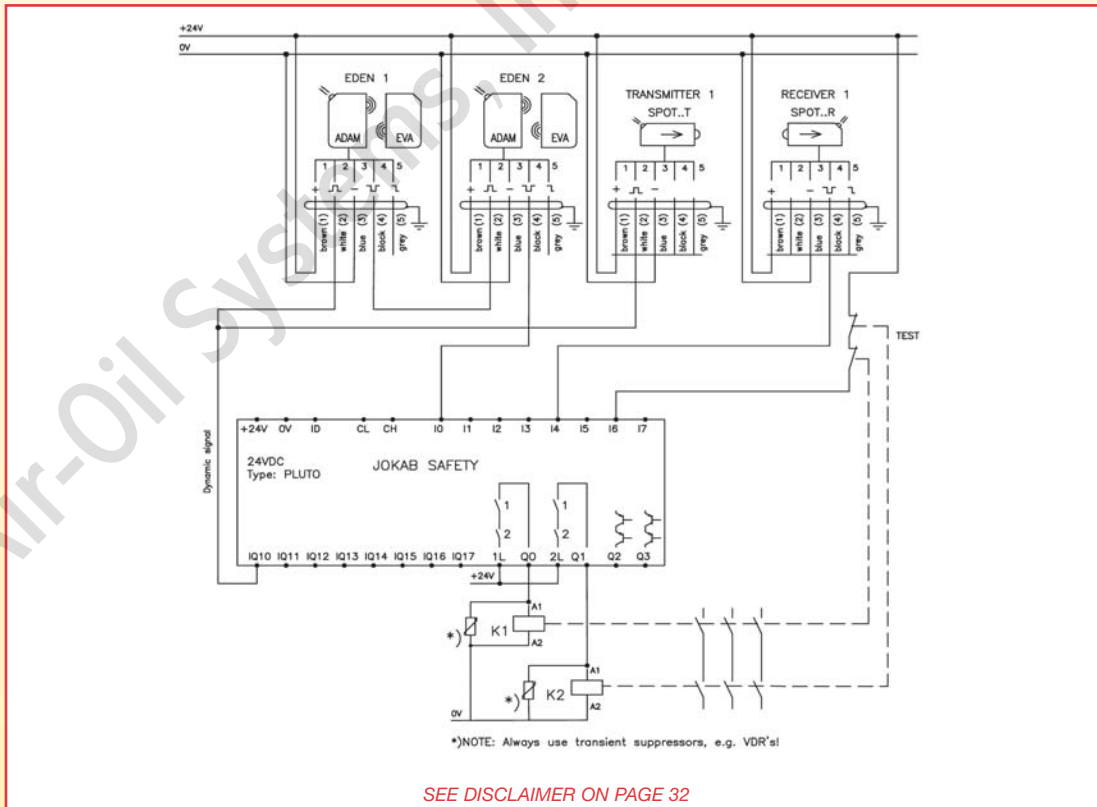
# Eden Connection Example

## Connection of Eden to Vital 1



# Eden Connection Example

## Connection of Eden to Pluto



# SafeSlide™ Safety Lockout System

SafeSlide, a unique Safety Lockout System, was designed and developed by Jokab Safety North America to be used in conjunction with Jokab Safety's Eden non-contact, non-magnetic electronic safety sensor.

The product is engineered to be installed on doors, gates and hatches of all types used on machine guarding, barrier and fencing systems to provide safe entry and exit.

When the SafeSlide is engaged while the door is open and secured with a single or multiple padlocks, the system prevents the door from inadvertently closing which would cause the Eden Adam and Eva to reestablish contact creating an unsafe situation.

When the SafeSlide is engaged while the door is closed, it slides down over the flange on the bracket attached to the door and secures the door until the SafeSlide is disengaged.

The handle on the front of the slide allows for opening of the door, gate or hatch from the outside of the guarded area and a metal tab allows opening from the inside.



*With the door closed and SafeSlide engaged, the Eden Adam and Eva are able to make contact and the door is secured.*



*With the door open and SafeSlide engaged, the Eden Adam and Eva are unable to make contact preventing an unsafe situation.*



*When SafeSlide is engaged it completely eliminates the possibility of the Eden Adam and Eva making contact. A simple padlock can secure the position for further safety.*

## Applications

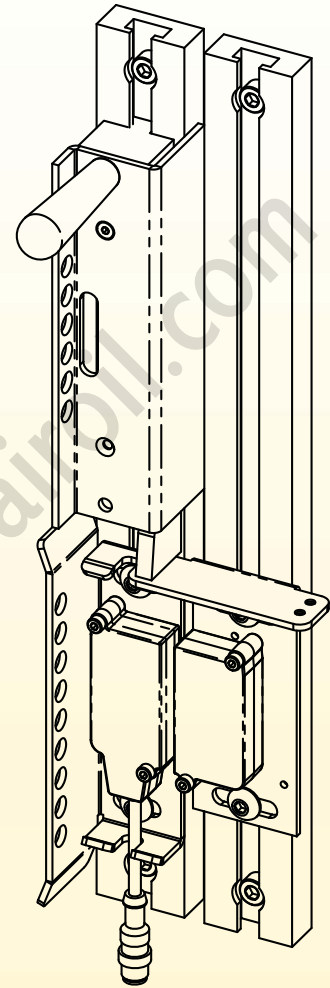
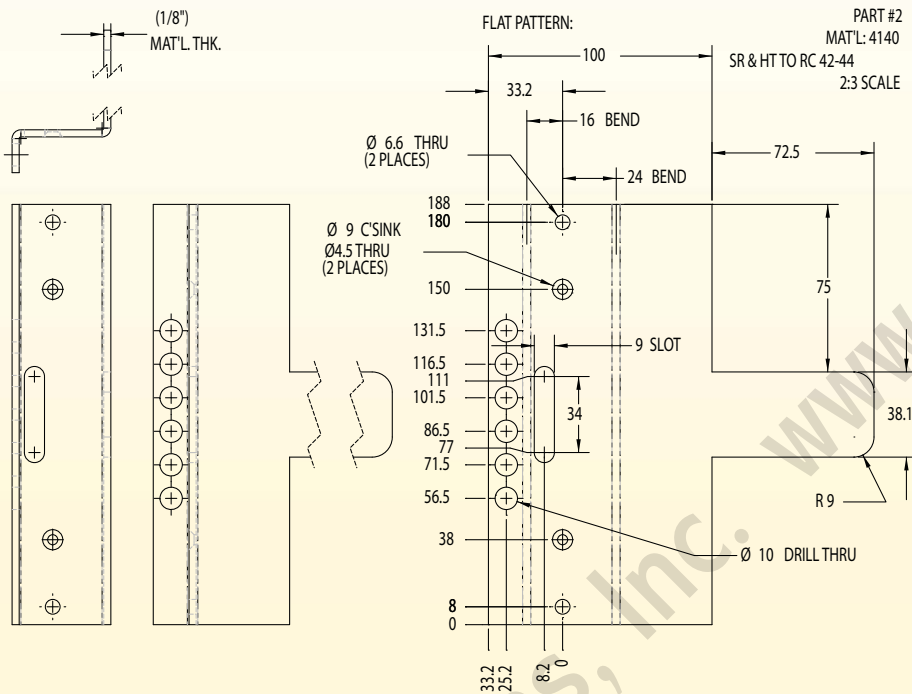
- Hinged or Sliding Doors, Hatches and Gates for Machine Guarding, Barrier and Fencing Systems

## Features

- Lock out holes for padlocks and scissor type lockout devices
- Mounting holes to accommodate installation of Eden—Adam and Eva Safety Sensor
- Adjustable slots for door, gate or hatch gap differences
- Upper slide with handle provides an automatic or manual lock cover upon opening of door gate or hatch
- Tabs located on device allow for wire and cable connections to the Eden switches
- Slots provided to allow viewing of LEDs located on the switches

## SafeSlide Technical Data

**Manufacturer**..... JOKAB SAFETY  
**Ordering Data/Article Numbers**..... see page 27  
**Color**..... yellow and black  
**Weight**..... 1.9 kg  
**Mounting**..... Quick-Guard Fencing Profile  
*(can be mounted to other handles or locking devices)*  
**Material**..... steel with UHMW slide block



## SafeSlide Isolates Hazardous Motion and Offers Control Reliability during Non-Lockout/Tagout Applications

SafeSlide meets safety standards that apply to the control of energy during servicing and/or maintenance of machines and equipment.

Normal production operations are not covered by OSHA 1910 - Subpart O - Lockout/Tagout. Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if one of these situations occurs:

- An employee is required to remove or bypass a guard or other safety device
- An employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard if they are routine, repetitive and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

# JSNY5 Safety Interlock Switch

## Switch Operational Description

Increasing automation and more demanding safety regulations have led to the development of the JSNY5 safety switch. This switch enhances the range of Safety Switches, incorporating advanced features and benefits making this switch a market leader. This switch offers three contacts which gives both the two contacts needed for high safety level as well as a contact for the indication of operating status.

The advanced design offers the choice of four operating positions from only two actuator entries by simply rotating the head through 180°.

However, when installed and in it's working condition only one entry can be used, ensuring no other element can tamper with the switch function.

When mounting the switch from the front two elongated holes are provided to aid alignment with two set screw holes for accurate fixing. Top fixing is also possible.

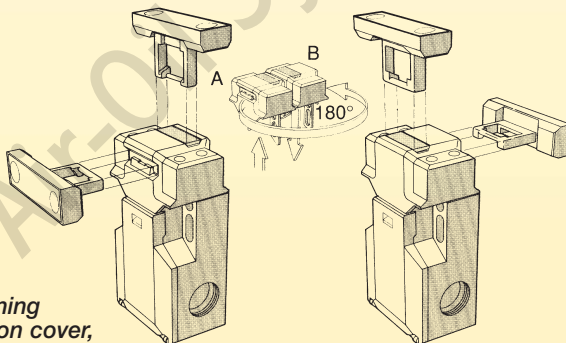
Two M20 cable entries allow for a variety of cabling options including through wiring.

## Positive Forced Disconnected Contacts

The design assures that the contacts will not fail or be held in a normally closed position, due to failure of the spring mechanism or the welding/sticking of the contacts.

## Safety Level

The positive forced disconnect contacts give a high electrical safety level. By combining the JSNY5 with one of our suitable safety relay in the RT-series, Pluto Safety PLC or Vital (Tina) the requirements for both hatch and gate switch supervision can be fulfilled. To obtain the same level of safety as Eden, two switches per gate are required.



After opening the snap-on cover, the head portion can be removed (version A), after turning the head through 180° (version B) it can be replaced onto the body of the switch and be locked into position by closing the snap-on cover. This ensures 4 actuating positions are possible.



## Applications

- Gates and Hatches
- Removable Cover

## Features

- 2 NC + 1 NO (actuator in)
- 4 actuating positions
- Actuator force 10 or 30 N

## Protection from Unauthorized or Incidental Access

To avoid unauthorized operation, the JSNY5 switch is manufactured using multi-coding to GS-ET 15. The switch cannot be defeated by screwdrivers, magnets or any other mechanism.

## Connection Examples

For examples of how our safety switches can solve various safety problems, see "Connection Examples" beginning on page 48 of the Safety Relay Section.

## Regulations and Standards

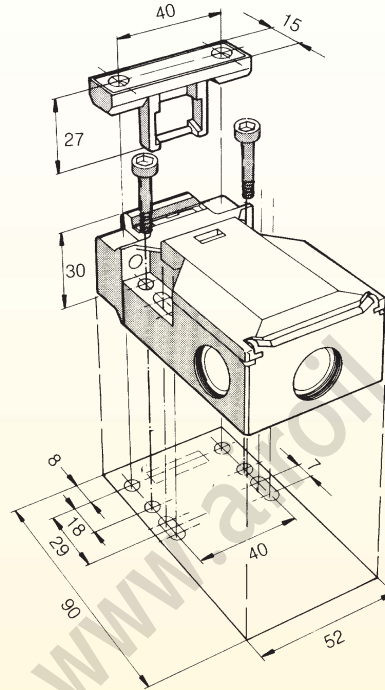
The JSNY5 is designed and approved in accordance with appropriate directives and standards. Examples of such are: 98/37/EC, EN ISO 12100-1/-2, EN 60204-1 and EN 954-1/ EN ISO 13849-1, EN 1088 and GS-ET 15.

## Approvals



## JSNY5A/B Technical Data

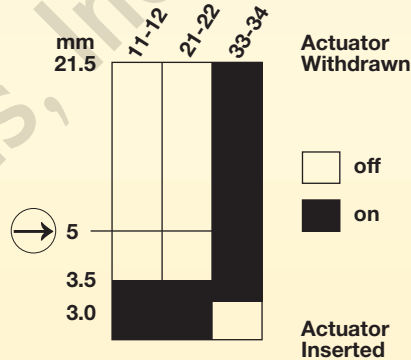
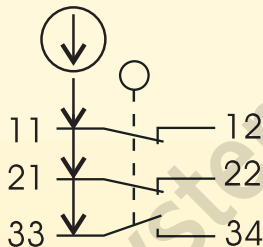
**Manufacturer**.....JOKAB SAFETY  
**Ordering Data/Article Numbers**..... see page 28  
**Color**..... black and yellow label  
**Weight**.....approximately 0.13kg  
**Enclosure/Cover**.....PA 6 (UL94-VO)  
**Actuator**.....steel actuator  
**Min. Opening Radius for Actuator on a Hatch**.....150 mm  
**Ambient Air Temperature**.....-30°C to +80°C  
**Contacts (actuator in)**.....2 NC + 1 NO  
*(NC are direct opening action)*  
**Mechanical Life**..... 1 million switch operations  
**Max. Switching Frequency**.....30/min  
**Fixing**.....body 2 x M5, actuator 2x M5  
**Cable Entry**..... 2 x M20 x 1.5  
**Degree of Protection**.....IP65 IEC 529/DIN VDE 0470 T1  
**Rated Insulation Voltage**..... 400 V AC  
**Rated Operational Current**.....5A  
**Utilization Category**.....AC-15/DC-13  
**Short-Circuit Protection**.....Fuse 6A slow acting, 16A quick acting  
**CSA**.....5A 300V AC B300 (same pol.)  
**Protection Class**.....IP65



## JSNY5A/B Contact Description

### Overlapping Contact 33-34

The overlapping contact 33-34 enables operational status indication of e.g. incorrect adjustment of switch before the positive forced disconnect NC contacts open.



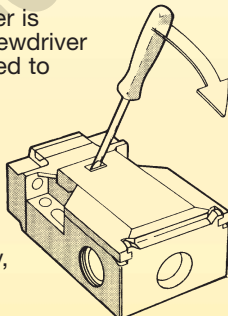
## Accessories and Spare Parts

- Standard actuator
- Flexible key for smaller opening radius
- Cable gland
- Snap-on cover
- Tina 2A with M20 connection for a dynamic loop
- Tina 2B with cable connection
- Tina 3A with M12 and M20 connections for a dynamic loop

## JSNY5A/B Contact Description

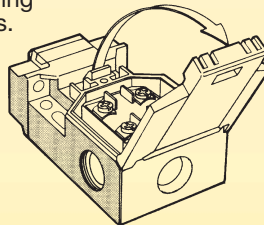
### Easy Accessibility for Wiring

The snap-on cover is released by a screwdriver and can be opened to an angle of 135° providing easy access to the wiring terminals. Should the snap-on cover not provide adequate security, a retaining screw can be used.



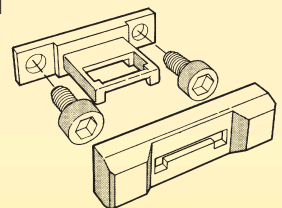
### Protected Contact Block

A transparent cover protects the contact block from external elements during the installation and wiring process.



### Prevention of Actuator Dismantling

A cover plate with a one-way snap-fit which seals the mounting screws prevents unauthorized dismantling of the actuator assembly. The cover plate **must** be mounted to prevent overtravel of the switching mechanism.



# JSNY7 Magnetic Switch

## Switch Operational Description

The magnetic switch is designed to operate in dirty industrial environments and is certified to the highest level of safety regulation when working together with a suitable Jokab Safety safety relay.

The magnetic switch is small and resistant to both dirt and water, and has no dust collecting cavities making it useful in environments where hygiene is paramount. The small size of the switch makes it easy to position and hide on gates and hatches. The magnetic switch has a long working life since no mechanical contact is made during operation.

## Contacts

The magnetic switch has one closing and one opening contact. Both contacts have to be monitored. The contacts may be monitored by either the RT9 safety relay or other suitable relays in the new RT-series, i.e. RT6, RT9 or Safety PLC Pluto. By using the RT-series it is possible to choose between the reset (R) and test-input (T) functions. The 'R' stands for reset, supervised reset, which can be used on safety installations allowing passage, for instance gates. In addition to the input from the magnetic sensor, the reset-input has to be both closed and opened before the output contacts can close. This means that neither a short circuit nor a stuck button can give a reset.

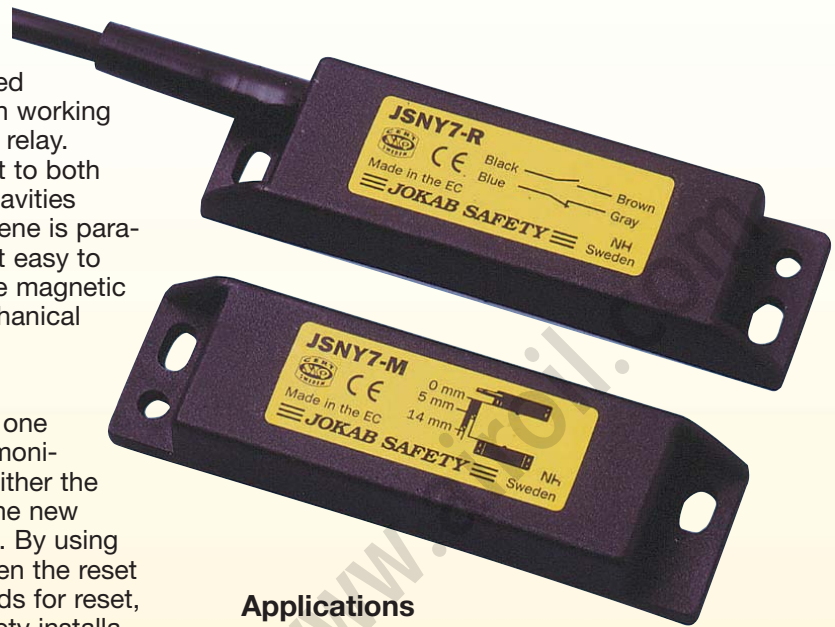
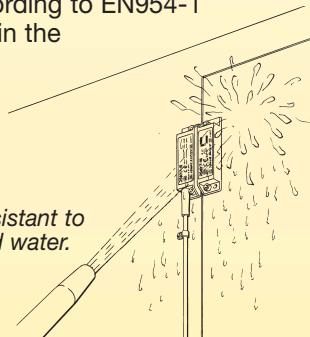
To disable the reset function, the two connection blocks on the safety relay have to be hardwire connected. The Reset input will become a Test-input (T), the output will then operate when the input contacts change state.

Both the Test and Reset inputs can also be used to test the functionality of relays and contactors connected to the relay outputs. By connecting a normally closed contact to the Reset/Test input it is possible to test that contactors/relays have returned to their 'reset' state before a new 'start' signal is given. For further information please see separate data sheet regarding Safety Relays in the RT-series.

## Safety Level

The JSNY7 is approved to the highest level of safety regulations, category 4 according to EN954-1 together with a safety relay in the RT-series, Pluto Safety PLC or Vital. The magnetic switch is approved and certified by Inspecta.

*JSNY7 is resistant to both dirt and water.*



## Applications

- Gates and Hatches
- Position Control

## Features

- Small size
- IP 67
- Certified for highest level of safety regulations

## Protection from Unauthorized or Incidental Access

To avoid unauthorized operation of the JSNY7 switch it is only possible to actuate the JSNY7R with the coded magnet, JSNY7M. Other magnets, screwdrivers and tools have no effect on the switch contacts.

## Connection Examples

For examples of how our safety switches can solve various safety problems, see "Connection Examples" beginning on page 48 of the Safety Relay Section.

## Regulations and Standards

The JSNY7 is designed and approved in accordance with appropriate directives and standards. Examples of such are: 98/37/EC, EN ISO 12100-1/-2, EN 60204-1 and EN 954-1/ EN ISO 13849-1, EN 1088 and GS-ET 15.

## Approvals









































