### ABB Jokab Safety Switches

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Safety switches from ABB Jokab Safety

About Machine Interlocking Safety

International Standards / European Standards

Basic Safety Standards:

- **EN ISO 12100-1** EN ISO 12100-2 (supersedes EN 292-1 EN 292-2) Safety of Machinery- Basic Terminology and concepts for Design
  Outlines the concepts for Risk Assessment, Interlocking, Emergency Stops, and references other standards and directives e.g. EN 60204-1, EN ISO 13850.

- **ISO 14121-1** (supersedes EN 1050) Safety of Machines – Risk Evaluation
  Outlines the requirements for assessing Hazard analysis and Risk reduction for the Machine.

- **EN 60204-1** Electrical Equipment of Machines – General requirements.
  Outlines the requirements for Electrical wiring safety on machines and specifies the Emergency Stop functions and requirements.

Design Standards:

- **EN 1088 Safety of Machinery – Safety of Machinery – Interlocking Devices**
  Outlines the principles for the design and selection of Interlock and Emergency Stop devices. Provides references to the other basic standards and to standards for verifying the performance of various devices e.g. IEC 947-5-1 for positive break switching elements and IEC 947-5-3 for Non Contact devices with defined behaviour.

- **EN ISO 13849-1** (supersedes EN954-1) Safety of Machines – Safety related parts of control systems – General principles for Design
  EN954-1 described the categories which apply to Safety related parts of the controls. It describes risk evaluation by means of which the required Safety Categories (B,1,2,3,4) are met. This standard will be superseded late in 2011 by ISO13849-1 which is based on the familiar categories from EN 954-1 but examines complete safety functions, including all the components involved in their design. ISO 13849-1 goes beyond the qualitative approach of EN 954-1 to include a quantitative assessment of the safety functions. A performance level (PL) is used for this, building upon the categories. There are five PL (a to e) replacing the five EN954-1 Categories (B to 4).

- **IEC 947-5-1 Low voltage switchgear and controlgear – Electro-Mechanical control circuit devices.**
  Describes the Mechanical Design and Test requirements for control circuit devices incorporating positive break contacts. Designates Electrical switching characteristics e.g. AC15 10A.

- **IEC 947-5-5 Low voltage switchgear and controlgear: Emergency Stop devices with mechanical latching.**
  In addition to the requirements of IEC 947-5-1, describes the Mechanical Design and Test requirements for Control circuit devices with Emergency Stop Functions with mechanical latching. Provides specific requirements relating to Safety Rope switches and systems.

- **IEC 947-5-3 Low voltage switchgear and controlgear: Proximity devices with defined behaviour under fault conditions**
  Describes the Design and Test requirements for Non Contact devices with defined behaviour under fault conditions. Specifies 4 categories to define Fault behaviour D T S or M.

- **EN ISO 13850 (supersedes EN 418) - Emergency Stop Design guidelines.**
  Provides principles for design of latching Emergency Stop devices. Specifies the requirement for Emergency stop devices to be latching with a mechanical reset.

- **UL 508 Industrial Control Equipment.**
  Describes the Electrical performance requirements and material specification used for Industrial Control switchgear in USA.

  A generic standard covering various industries – Measures the Safety of an E/E/PES by using Safety Integrity Levels (SIL’s).
  Provides a SIL based upon the Probability of Failure on demand (PFH) or the Probability of Failure per hour (PFH) up to SIL 4.

- **EN 62061 Safety of Machines – Safety related parts of controls.**
  In addition to IEC 61508 and specifically for Machine Safety Systems this standard covers the entire life cycle of a ‘system’ or devices used to make up a system from concept through to shutdown. Measures Safety the same as IEC 61508 by using Safety Integrity Level up to SIL 3. Provides a SIL based upon the Probability of Failure on demand (PFH) or the Probability of Failure per hour (PFH) up to SIL 3. IDEM devices will be specified as up to SIL 3 for devices provided as sub systems or intended to be used in sub systems by the end user.

EC Directives

All products are supplied with a Declaration of Conformity to the following EC Directive:

- **RoHS 02/95/EC**

and to one or more of the following EC Directives:

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

Third Party Approvals

All products are supplied with independent testing and approval by one or more of the following organisations:
Safety switches from ABB Jokab Safety

About Safety Levels for Machinery – the transition to ISO13849-1 and EN62061 from EN954-1.

Companies involved in building, refurbishing or maintaining machinery need to consider the transition to the new standards especially when designing new machinery or planning a major upgrade. In terms of the established machinery safety standard EN954-1 (Safety of Machinery – Safety related aspects of Control Systems), this standard currently categorizes safety levels, but will be superseded by two new standards that will coexist. The original standard EN954-1 will remain valid until late 2011 to provide a period of transition to the new standards.

Designers and installers of safety systems can choose to conform to the requirements of any of the three standards. Figure 1 shows the design process and how the three standards relate. For most non electrical or simple electrical machine controls EN954-1 or ISO13849-1 will be sufficient. EN/IEC62061 is a derivative from the software based standard EN/ISO61508 which covers programmable devices such as Safety PLCs or sophisticated safety electronics.

Before these standards can be applied, a risk assessment as defined in EN/ISO 14121 should have been performed, to identify potential risks and risk reduction measures. Best practice dictates that the assessments are documented and in many cases produced in addition to the equipment operating instructions and technical documentation.

EN/ISO 13849-1 Machine Safety - safety-related parts of control systems non electrical and simple electrical.

This standard is a development of EN954-1 and provides safety requirements and guiding principles for design and integration of safety-related parts of control systems. Introduced in 1996, EN954-1 was considered by some as an over simplistic approach and failed to force designers to assess the reliability of the safety components. The new standard EN/ISO13849-1 adds a quantitative calculation to the qualitative requirements of EN954-1 and considers the likelihood of safety system component failure. As with EN954-1 an estimation of risk is used to determine the required performance level (PL). EN954-1 establishes Safety Categories B, 1, 2, 3, 4 (highest). EN ISO 13849-1 establishes Performance Levels PLa to PLe (highest).

SIL data for each ABB Jokab Safety device is shown in the specification table on the product page.

Following on from this graph, further guidance is included in the new standards to assist with the system design, meaning that the math’s required is minimal.

In general terms, EN/ISO13849-1 takes a four-stage approach to the design of safety-related control systems.

1. Perform a risk assessment (EN/ISO14121) 2. For the identified risks, allocate the safety measure, Performance Level (PL) 3. Devise a system architecture that is suitable for the Performance Level or Category. 4. Validate the design to check that it meets the requirements of the initial risk assessment.

For ISO 13849-1 and EN/IEC62061 (this last step involves using manufacturers’ data for the reliability of the components, including the calculation of MTTFd (Mean time to Dangerous Failure) and DC (Diagnostic capability) and accounting for common mode failure of components, ABB Jokab Safety device is shown in the specification table on the product page.


Safety-related electrical control systems in machines (SRECS) are playing an increasing role in ensuring the overall safety of machines and are more and more frequently using complex electronic technology. EN/IEC62061 is a machinery sector standard and is derived from the more complex EN/IEC61508 (Functional safety of electrical/electronic/programmable electronic safety-related systems). EN/IEC62061 describes both the amount of risk to be reduced and the ability of a control system to reduce that risk in terms of SIL (Safety Integrity Level). There are 3 SILs used in the machinery sector, SIL 1 is the lowest and SIL 3 is the highest. Risks of greater magnitude can occur in other sectors such as the process industry and for that reason EN/IEC61508 includes SIL 4. A SIL applies to a safety function. The subsystems that make up the system that implements the safety function must have an appropriate SIL capability. This is sometimes referred to as the SIL Claim Limit (SLCL).

The detailed requirements and steps to ensure compliance with EN/IEC62061 are too complex to be covered in detail here. SIL data for each ABB Jokab Safety device is shown in the specification table on the product page.

PL and SIL Level

EN/ISO 13849-1 uses the term PL (Performance Level), EN/IEC 62061 will use SIL, and in many respects the five performance levels PLa to PLe can be related to SIL. Figure 3 shows the approximate relationship between PL and SIL when applied to typical circuit structures achieved by low complexity electro-mechanical technology e.g. a Torque Switch with a Safety Monitoring relay. This is for general guidance and to help show the relationship between the two standards. It should not be used for direct conversion purposes.

<table>
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<tr>
<th>PL (Performance Level)</th>
<th>PFHs (Probability of a failure to danger per hour)</th>
<th>SIL (Safety Integrity Level)</th>
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<tr>
<td>a</td>
<td>$\geq 10^9$ to $&lt; 10^6$</td>
<td>None</td>
</tr>
<tr>
<td>b</td>
<td>$3 \times 10^6$ to $&lt; 10^4$</td>
<td>1</td>
</tr>
<tr>
<td>c</td>
<td>$10^4$ to $&lt; 3 \times 10^4$</td>
<td>1</td>
</tr>
<tr>
<td>d</td>
<td>$10^4$ to $&lt; 10^3$</td>
<td>2</td>
</tr>
<tr>
<td>e</td>
<td>$10^3$ to $&lt; 10^2$</td>
<td>3</td>
</tr>
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Figure 3. ABB Jokab Safety Switches | 3
Explosion-proof safety switches

ABB Jokab Safety’s range of Explosion Proof switches have been developed to satisfy the latest IECEx and ATEX standards and provide Explosion Proof switching to atify the hazardous conditions created within the oil, chemical and food processing industries. They combine Explosion Proof protection and satisfy high Functional Safety requirements all in one device.

Safety Switches for use in Hazardous Areas. Gas and Dust

Functional Safety up to Ple ISO13849-1
IP69K suitable for harsh environments

Application:
Interlock and Emergency Stop Safety Switches for use in Hazardous Areas – positively operated contacts or high life non contact dry reed switching.

For use in hazardous areas IECEx and ATEX Exd IIC T6. (Gas and Dust). Designed for Petro-chemical and food applications where explosive atmospheres are present.

Exd IIC T6 (-20°C to +60°C) Gb
Ex tb IIIC T85°C (-20°C to +60°C) Db
Il 2G Ex mb IIC T6 Gb
Il 2D Ex mb IIIC T80°C Db

Mechanical Interlock Switches and Emergency Stop Switches
Non Contact Magnetic Interlock Switches

ABB Jokab Safety’s Explosion Proof Safety Interlock switches are designed to fit the leading edge of sliding, hinged or life off machine guards to provide safe electrical switching within explosion risk environments like petro-chemical and food production. ABB Jokab Safety’s Explosion Proof Rope Pull switches are designed to provide protection to conveyors used in hazardous areas like beverage production and chemical handling. In addition to Explosion Proof switching, and depending upon the risk assessment for the application, they can also be used on combination with any dual channel safety monitoring relays to provide high functional safety up to Category 4 and Ple ISO 13849-1 or SIL3 EN62061.

General Features:
Housings are either durable High Strength Plastic. Die cast painted or Stainless Steel 316
High temperature stability up to 80°C. Resistant to high temperature hosing and detergent washdown – IP67 and IP69K
Electrical switching elements are fully encapsulated

Tongue and Emergency Stop Switches
Zones 1,2,1,22
High Power Switching up to 230V ac 4A.
Positive break contacts to IEC 947-5-1

Non Contact Switches
Zones 0,20,1,21,2,22
Highly reliable high power reed switching elements
Contacts de-rated and protected by internal fuses
High tolerance to guard misalignment
Explosion-proof non-contact safety interlock switches

Sense 6ZX Flex Conduit
- 2TLA050074R5125: Sense 6, Ex rated SS 5m cable, 2NC/1NO
- 2TLA050074R6125: Sense 6, Ex rated SS 10m cable, 2NC/1NO

Electrical Rating
- Normally Closed Circuits
  - Actuator present
  - Red/Blue: NC1
  - White/Black: NC2
- 230V ac / 24V dc
- 0.6A, Max.
- Internally fused

Electrical Rating
- Normally Open Circuit
  - Actuator present
  - Orange/Brown: NO
- 230V ac / 24V dc
- 200mA, Max.

Sense 6ZX Standard Cable
- 2TLA050075R5125: Sense 6, Ex rated SS 5m cable, 2NC/1NO
- 2TLA050075R6125: Sense 6, Ex rated SS 10m cable, 2NC/1NO

Electrical Rating
- Normally Closed Circuits
  - Actuator present
  - Red/Blue: NC1
  - White/Black: NC2
- 230V ac / 24V dc
- 2A, Max.
- Internally fused

Electrical Rating
- Normally Open Circuit
  - Actuator present
  - Orange/Brown: NO
- 230V ac / 24V dc
- 200mA, Max.

* Product is fully encapsulated which is considered to provide Ingress Protection to at least IP67
Explosion-proof non-contact safety interlock switches

**Sense 10ZX**

2TLA050078R5125: Sense 10, Ex rated SS 5m cable, 2NC/1NO
2TLA050078R6125: Sense 10, Ex rated SS 10m cable, 2NC/1NO

<table>
<thead>
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<th>Electrical Rating</th>
<th>Electrical Rating</th>
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</thead>
<tbody>
<tr>
<td>Normal Closed Circuits</td>
<td>Normally Open Circuits</td>
</tr>
<tr>
<td>(Actuator Present)</td>
<td>(Actuator Present)</td>
</tr>
<tr>
<td>NC</td>
<td>NO</td>
</tr>
<tr>
<td>230V.ac / 24Vdc</td>
<td>230V.ac / 24Vdc</td>
</tr>
<tr>
<td>0.6A, Max.</td>
<td>200mA, Max.</td>
</tr>
<tr>
<td>Internally Fused</td>
<td></td>
</tr>
</tbody>
</table>

**Sense 8ZX**

2TLA050076R5125: Sense 8, Ex rated SS 5m cable, 2NC/1NO
2TLA050076R6125: Sense 8, Ex rated SS 10m cable, 2NC/1NO

<table>
<thead>
<tr>
<th>Electrical Rating</th>
<th>Electrical Rating</th>
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<tr>
<td>Normal Closed Circuits</td>
<td>Normally Open Circuits</td>
</tr>
<tr>
<td>(Actuator Present)</td>
<td>(Actuator Present)</td>
</tr>
<tr>
<td>Red/Blue NC1 White/Black NC2</td>
<td>Orange/Brown NO</td>
</tr>
<tr>
<td>230V.ac / 24Vdc</td>
<td>230V.ac / 24Vdc</td>
</tr>
<tr>
<td>0.6A, Max.</td>
<td>200mA, Max.</td>
</tr>
<tr>
<td>Internally Fused</td>
<td></td>
</tr>
</tbody>
</table>

*Product is fully encapsulated which is considered to provide Ingress Protection to at least IP67*
Explosion-proof non-contact safety interlock switches

Sense 12ZX
2TLA050080R5125 Sense 12, Ex rated SS 5m cable, 2NC/1NO
2TLA050080R6125 Sense 12, Ex rated SS 10m cable, 2NC/1NO

Stainless Steel 316 M30 x 1.5mm threaded body

Summary Specification and selection guide

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<th>Housing Material</th>
<th>Maximum Current</th>
<th>Zones</th>
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<td>Sense 6ZX</td>
<td>Stainless Steel 316 and fitted with Stainless Steel Flexible conduit</td>
<td>0.6A</td>
<td>Zone 0 Gas, Zone 20Dust (An area where Gas and Dust are continuously present)</td>
</tr>
<tr>
<td>Sense 6ZX</td>
<td>Stainless Steel 316</td>
<td>2.0A</td>
<td>Zone 1 Gas, Zone 21 Dust, Zone 2 Gas (An area where Gas and Dust is likely to occur in use)</td>
</tr>
<tr>
<td>Sense 10ZX</td>
<td>Stainless Steel 316</td>
<td>0.6A</td>
<td></td>
</tr>
<tr>
<td>Sense 12ZX</td>
<td>Stainless Steel 316</td>
<td>0.6A</td>
<td></td>
</tr>
<tr>
<td>Sense 12ZX</td>
<td>Stainless Steel 316</td>
<td>0.6A</td>
<td></td>
</tr>
</tbody>
</table>

Technical and Safety Specification:

- Standards:
  - IEC/EN 60079-0
  - IEC/EN 60079-18
  - EN 60079-0
  - IEC 60079-3
  - EN 60079-61
  - ISO 13849-1
  - EN 62061
  - IEC 61508

- Safety Classification and Reliability Data:
  - Mechanical Reliability: 810d
  - EN 954-1
  - IEC 13481-1
  - EN 62061
  - Safety Data - Annual Usage: 2.12 x 10^4
  - Safety Data - Proof Test Interval: 47 years
  - M11Fd: 470 years

- Electrical Ratings:
  - Normally Closed Circuits
    - Red/Blue: NC
    - White/Black: NC
  - Normally Open Circuits
    - Orange/Brown: NO

- Specifications:
  - Contact release time: <2ms
  - Initial contact resistance: <500 mOhm
  - Minimum switched current: 10V, dc: 1mA
  - Insulation Resistance: 100 MOhms
  - Switching Distance: 30 mm
  - Contact resistance: >500 mOhm
  - Approach speed: 200mm/sec.
  - Temperature: -20 °C to 60°C
  - Enclosure Protection: IP67
  - Shock Resistance: IEC 68-2-27
  - Vibration Resistance: IEC 68-2-6
  - Cable Type: Any
  - Mounting Position: Any
  - Approval Body: BASEEFA, UK

* Product is fully encapsulated which is considered to provide Ingress Protection to at least IP67
Notes
Explosion-proof emergency stop switches

Emergency Stop Switches with ATEX EExd IIC T6 certified explosion proof contact blocks.

These switches conform to European harmonized standards EN 60079-0 and EN 60079-1 and can be used in European Zone 1, 2, 21, 22 environments. (Gas and Dust).

Designed to the latest standard ISO13850, the switch mechanism will latch the instant the safety contacts open.

Designed for use in oil, petro-chemical and food applications where potential explosive atmospheres are present.

Ex iIC T6 (-20°C ≤ Ta ≤ +60°C) Gb
Ex tA IIIC T85C (-20°C ≤ Ta ≤ +60°C) Db

Heavy Duty Mushroom Button Switches - EStrong ZX

EStrong ZX

Protection shroud and lock off versions
Special Lid Safety Trip Mechanism – contacts will open if the lid is removed
Positive break contacts to IEC 947-5-1
Resistant to high temperature hosing and detergent washdown.
Enclosure Protected to IP67 and IP69K
Robust Stainless Steel 316 Housings
Pre-wired 2NC contacts

Standard Duty Rope Pull Switches - LineStrong 2ZX, LineStrong 2X

LineStrong 2ZX
Protect up to 100m

LineStrong 2X
Protect up to 80m

Die Cast (painted yellow) or S/Steel 316
Positive break contacts to IEC 947-5-1
Resistant to high temperature hosing
Enclosure Protected to IP67 and IP69K
High Impact Robust Stainless Steel 316 Housings
2NC contacts

Heavy Duty Rope Pull Switches - LineStrong 3LX, LineStrong 3RX

LineStrong 3DX
Protect up to 250m

LineStrong 3LX

LineStrong 3DZX
Protect up to 250m

Standards:
IEC/EN 60079-0  IEC/EN 60079-1
EN1088  IEC 947-5-1  EN 60204-1
ISO 13849-1  EN62061  EN 954-1  UL508

Safety Classification and Reliability Data:
Mechanical Reliability 810d
EN 606-1
ISO 13849-1
EN 602061
Safety Data - Annual Usage
PFHd
Proof Test Interval (Life)
MTTFd
1.5 x 10^6 operations at 100mA load
up to Category 4 with Safety Relay
up to PLa depending upon system architecture
upto SIL3 depending upon system architecture
8 cycles per hour / 24 hours per day / 365 days
≤ 1.0 x 10^-7
21 years
214 years

Endorse Protection
Operating Temperature
Vibration
Classification
Rated Voltage
Rated Current
Cable length
IP69K  IP67
-20°C to +60°C
IEC 68-2-6, 10-65Hz x 1Hz
Excursion: 0.35mm, 1 octave/min
Ex iIC T6 (-20°C ≤ Ta ≤ +60°C) Gb
Ex tb IIIC T85C (-20°C ≤ Ta ≤ +60°C) Db
250V a.c
2 Pole 4A.ac 4 Pole 2.5A.ac
3m.

ABB Jokab Safety Switches | 9
Explosion-proof emergency stop switches

(P) versions include button protection shroud and padlock holes for lock off.

EStrong ZX

EStrong ZX

EStrong ZX

Zones 1 and 2
Zones 21 and 22
Gas and Dust
IP67

Fixing Holes for M4 Screws

Estrong ZX
2TLA050220R0025 EstrongZX E-Stop 2NC, NPT, SS, EX
2TLA050220R0125 EstrongZX E-Stop 2NC, M20, SS Locked, EX

All switches are pre-wired with 3m length of cabling through the cable glands as shown.
Explosion-proof emergency stop switches

Rope Pull Emergency Stop Switches

Zones 1 and 2
Zones 21 and 22
Gas and Dust
IP67

LineStrong 3LX
LineStrong 3DX
LineStrong 3RX

LineStrong 3DZX

LineStrong 3LZX (LineStrong 3RZX not shown)

LineStrong 2X

LineStrong 2ZX

LineStrong X
2TLA050202R7135 LineStrong2X, EX rated, 2NC, ESTOP
2TLA050202R7125 LineStrong2ZX, EX, 2NC, ESTOP, SS
2TLA050208R7135 LineStrong2DX, EX rated, 2NC/2NO, ESTOP
2TLA050208R7125 LineStrong2DZX, EX, 2NC/2NO ESTOP SS
2TLA050204R7135 LineStrong3LX, EX rated, 2NC/2NO, ESTOP
2TLA050206R7135 LineStrong3RX, EX rated, 2NC/2NO, ESTOP
2TLA050204R7125 LineStrong3LZX, EX, 2NC/2NO ESTOP SS
2TLA050206R7125 LineStrong3RZX, EX, 2NC/2NO ESTOP SS

All switches are pre-wired with 3m. length of cabling through the cable glands as shown. Other lengths and cable exits available upon request.
MKey 5ZX Explosion-proof tongue interlock switches

Tongue Interlock Switches for use in Hazardous Areas.
ATEX approved contact blocks. Gas and Dust (Zones 1, 2, 21, 22)

Functional Safety up to PLe ISO13849-1
IP69K suitable for harsh environments

Tongue Interlock Safety Switches for use in Hazardous Areas – positively operated ATEX Certified contact blocks
For use in hazardous areas IECEx and ATEX EExd IIC T6, (Gas and Dust).
These switches conform to harmonized standards IEC/EN 60079-0 and IEC/EN 60079-1.
Suitable for European Zones 1, 2, and 21, 22. Designed for Petro-chemical and food applications where explosive atmospheres are present.

Ex IIC T6 (-20 ≤ Ta ≤ +60°C) Gb
Ex tb IIIC T85C (-20 ≤ Ta ≤ +60°C) Db

Application:
ABB Jokab Safety ATEX approved Tongue-operated Safety Interlock switches are designed to fit to the leading edge of sliding, hinged or lift off machine guards to provide positively operated switching contacts and provide a tamper resistant, not easily defeatable key mechanism. They are designed to provide robust position interlock detection for moving guards within areas which have an explosion risk atmosphere. Depending upon the risk assessment for the application, they can be used independently to provide positive interlocking to IEC-947-5-1 or they can be used in combination with any dual channel safety monitoring relays to provide functional safety up to PLe ISO 13849-1 or SIL3 EN62061.

Operation:
The switch is rigidly mounted to the frame of the guard or machine. The actuator is fitted to the moving part (frame) of the guard and is aligned to the switch entry aperture. The actuator profile is designed to match a cam mechanism within the switch head and provides a positively operated not easily defeatable interlock switch. When the actuator is inserted into the switch the safety contacts close and allow the machine start circuit to be enabled. When the actuator is withdrawn from the switch the safety contacts are positively opened and the machine circuit is broken. The internal contact blocks are robust are fully encapsulated and pre-wired.

Features:
High Power Switching up to 230V.ac 4A
2NC Contacts
High tolerance to guard misalignment
Enclosure Protected to IP67 and IP69K
Conformance to IEC 947-5-1 Positively operated
Rotatable heads to give up to 8 actuator entry positions
Resistant to high temperature hosing and detergent washdown
Choice of actuators to suit mounting conditions and alignment

2 enclosure shapes are available providing Plastic, Die cast painted or Stainless Steel
High temperature stability up to 60°C.
Resistance to many organic and inorganic chemicals

Standard Flat Plastic Flexible Heavy Duty Flexible

Actuator options

Stainless Steel
### MKey 5ZX Explosion proof tongue interlock switches

#### General Features
- **Stainless Steel Housing**: Zones 1 and 2, Zones 21 and 22, Gas and Dust, IP67

#### Technical Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050003R0025</td>
<td>MKey5Z, SS Ex. 3m Cab. 2NC No Key</td>
</tr>
<tr>
<td>2TLA050003R0125</td>
<td>MKey5Z, SS Ex. 3m Cab. 2NC Std. Key</td>
</tr>
<tr>
<td>2TLA050003R0225</td>
<td>MKey5Z, SS Ex. 3m Cab. 2NC Flat Key</td>
</tr>
<tr>
<td>2TLA050003R0325</td>
<td>MKey5Z, SS Ex. 3m Cab. 2NC Pla.Flex Key</td>
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<tr>
<td>2TLA050003R0425</td>
<td>MKey5Z, SS Ex. 3m Cab. 2NC Met. Flex Key</td>
</tr>
<tr>
<td>2TLA050003R0525</td>
<td>MKey5Z, SS Ex. 3m Cab. 2NC SS Flex Key</td>
</tr>
</tbody>
</table>

#### Standards and Classification

- **IEC 60799-0**
- **IEC 60799-1**
- **EN 954-1**
- **ISO 13849-1**
- **EN 60661-1**
- **UL 508**

**Mechanical Reliability**:
- 2.5 x 10^6 operations at 100mA load
- Up to Category 4 with Safety Relay
- Up to PLa depending upon system architecture
- Up to SIL3 depending upon system architecture

**Safety Data - Annual Usage**:
- 8 cycles per hour / 24 hours per day / 365 days
- 3.4 x 10^4 cycles
- 35 years

**Proof Test Interval (MTTFd)**: 35 years

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**Conformity Marks**:
- IEC
- ATEX

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**Technical Details**

- **Travel for Positive Opening**: 8mm
- **Actuator entry minimum radius**: 175mm Standard
- **IP56K**
- **IP67**
- **-20°C +65°C**
- **IEC 68-2-6, 10-55Hz x 1Hz, Exulsion: 0.35mm, 1 octave/min**
- **Ex b IEC T55°C (-20°C to +65°C)**
- **Db 250V a.c**

**Rated Voltage**: 2 Pole 4A, 4 Pole 2.5A

**Rated Current**: 3m
MKey Tongue operated safety interlock switches

Application:

ABB Jokab Safety Tongue operated Safety Interlock switches are designed to fit to the leading edge of sliding, hinged or lift off machine guards to provide positively operated switching contacts and provide a tamper resistant, not easily defeatable key mechanism. They are designed to provide robust position interlock detection for moving guards. Depending upon the risk assessment for the application, they can be used independently to provide positively operated contacts to IEC-947-5-1 or they can be used in combination with any dual channel safety monitoring relays to provide up to Category 4 Ple ISO 13849-1 or SIL3 EN62061. They are available in various materials and housing styles to provide complete flexibility of choice depending upon the application. They offer a choice of actuators to aid installation and maintain durability.

Operation:

The switch is rigidly mounted to the frame of the guard or machine. The actuator is fitted to the moving part (frame) of the guard and is aligned to the switch entry aperture. The actuator profile is designed to match a cam mechanism within the switch head and provides a positively operated not easily defeatable interlock switch. When the actuator is inserted into the switch the safety contacts close and allow the machine start circuit to be enabled. When the actuator is withdrawn from the switch the safety contacts are positively opened and the machine circuit is broken. Standard versions use high specification plastic or die-cast housings and are sealed to IP67 and provide long term protection against moisture ingress. For harsh applications like Food Processing, Pharmaceutical and Chemical Industries the Stainless Steel 316 range offers protection up to IP69K for use in high pressure chemical cleaning or CIP/SIP applications.

MKey 1 (Plastic)
8 actuator entry positions - rotatable head
3 pole contact block
32mm wide, 97mm long, 22mm fixing
IP67

MKey 5 (Plastic)
4 actuator entry positions - rotatable head
3 conduit entries
3 pole contact blocks
52mm wide, 98mm long, 40mm fixing
Plastic or Stainless Steel Head
IP67

MKey 2 (Plastic)
4 actuator entry positions - rotatable head
3 conduit entries
3 pole contact blocks
52mm wide, 98mm long, 40mm fixing
Plastic or Stainless Steel Head
IP67

MKey 3 (Plastic)
4 actuator entry positions - rotatable head
3 pole contact blocks
52mm wide, 98mm long, 40mm fixing
Plastic or Stainless Steel Head
IP67

MKey 6 (Metal)
8 actuator entry positions - rotatable head
3 pole contact block
40mm wide, 118mm long, 30mm fixing
Die Case Alloy
IP67

MKey 5Z (Fully Stainless Steel)
4 actuator entry positions - rotatable head
3 conduit entries
3 pole contact blocks
52mm wide, 98mm long, 40mm fixing
IP69K high temperature hose down

MKey 6Z (Fully Stainless Steel)
8 actuator entry positions - rotatable head,
3 pole contact block
42mm wide, 118mm long, 30mm fixing
IP69K high temperature hose down
MKey 1 Tongue interlock safety switches

ABB Jokab Safety MKey1 Compact Safety Interlock switches are designed to provide position detection for small moving guards.

They are designed to fit to the leading edge of sliding, hinge or lift off machine guards.

The rugged Stainless Steel actuator profile is designed to match a cam mechanism to provide a positively operated not easily defeatable interlock mechanism.

The compact body, 22mm fixing profile and rotatable head make them easy to install where space is restricted.

A Plastic Flexible Actuator is available for tight radius guards.

Contact blocks are replaceable with optional slow or snap break operation.

### Standards
- EN1088
- IEC 947-5-1
- EN 60204-1
- ISO 13849-1
- EN62061

### Safety Classification and Reliability Data:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Reliability B10d</td>
<td>2.5 x 10^6 operations at 100mA load</td>
</tr>
<tr>
<td>EN 6095-1</td>
<td>up to Category 4 with Safety Relay</td>
</tr>
<tr>
<td>EN 62061</td>
<td>up to PLe depending upon system architecture</td>
</tr>
<tr>
<td>Safety Data - Annual Usage</td>
<td>8 cycles per hour / 24 hours per day / 365 days</td>
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<tr>
<td>Proof Test Intervals (Life)</td>
<td>35 years</td>
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<tr>
<td>MTTFd</td>
<td>355 years</td>
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<tr>
<td>Utilization Category</td>
<td>AC15, A300, 3A</td>
</tr>
<tr>
<td>Thermal Current (W)</td>
<td>5A</td>
</tr>
<tr>
<td>Rated Insulation / Withstand Voltage</td>
<td>600VAC / 2500 VAC</td>
</tr>
<tr>
<td>Travel for Positive Opening</td>
<td>6mm</td>
</tr>
<tr>
<td>Actuator arm/min-nut radius</td>
<td>175mm/Standard 100mm Flexible</td>
</tr>
<tr>
<td>Maximum Approach / Withdrawal speed</td>
<td>600mm/s</td>
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<tr>
<td>Body Material</td>
<td>Polyester</td>
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<tr>
<td>Enclosure Protection</td>
<td>IP67</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-25C to +65C</td>
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<tr>
<td>Vibration</td>
<td>IEC 68-2-6, 10-55Hz+1Hz, Excursion: 3.33mm, 1 octave/minute</td>
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<tr>
<td>Conduit Entry</td>
<td>Various (See Sales Part Numbers)</td>
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<tr>
<td>Fixing</td>
<td>2x M4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>M12 8 Way Male (on Flying Lead 250mm) Pin view from switch</th>
<th>Switch Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/7</td>
<td>7/11</td>
<td>1/7 / 11</td>
</tr>
<tr>
<td>5/6</td>
<td>21/22</td>
<td>5/6 / 21/22</td>
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<td>4/3</td>
<td>33/34</td>
<td>4/3 / 33/34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MKey 1</th>
<th>2TLA05021R0100 MKey1, Compact M20, 2NC/1NO Angle Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA05021R1100 MKey1, Compact NPT, 2NC/1NO Angle Key</td>
<td></td>
</tr>
<tr>
<td>2TLA05021R2100 MKey1, Compact QC, 2NC/1NO Angle Key</td>
<td></td>
</tr>
<tr>
<td>2TLA05021R0200 MKey1, Compact M20, 2NC/1NO Flat Key</td>
<td></td>
</tr>
<tr>
<td>2TLA05021R1200 MKey1, Compact NPT, 2NC/1NO Flat Key</td>
<td></td>
</tr>
<tr>
<td>2TLA05021R2200 MKey1, Compact QC, 2NC/1NO Flat Key</td>
<td></td>
</tr>
<tr>
<td>2TLA05021R0300 MKey1, Compact M20, 2NC/1NO Flex Key</td>
<td></td>
</tr>
<tr>
<td>2TLA05021R1300 MKey1, Compact NPT, 2NC/1NO Flex Key</td>
<td></td>
</tr>
<tr>
<td>2TLA05021R2300 MKey1, Compact QC, 2NC/1NO Flex Key</td>
<td></td>
</tr>
</tbody>
</table>
MKey 2 Hinge interlock safety switches

ABB Jokab Safety MKey 2 Compact Hinge Safety Interlock switches are designed to provide interlock detection for moving guards. They are designed to fit to the hinged axis of machine guard doors. The switch body fits to the door frame and the leaf actuator fits to the door.

The rugged Stainless Steel actuator profile is designed to fix to the door and provide a positively operated not easily defeatable interlock mechanism. They can be mounted unobtrusively away from direct vision or contact.

The compact body and 22mm fixing profile make them easy to install where space is restricted.

The head can be rotated through 90 degree increments to provide ease of mounting in 4 positions.

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>2TLA050020R0000 Mkey2, Compact Hinge M20, 2NC/1N0</th>
<th>Switch Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin view from switch</td>
<td>1 7</td>
<td>11 12</td>
</tr>
<tr>
<td></td>
<td>6 5</td>
<td>21 22</td>
</tr>
<tr>
<td></td>
<td>4 3</td>
<td>33 34</td>
</tr>
</tbody>
</table>

MKey 2

2TLA050020R1000 Mkey2, Compact Hinge NPT, 2NC/1N0
2TLA050020R2000 Mkey2, Compact Hinge QC, 2NC/1N0

Standards
Safety Classification and Reliability Data:
Mechanical Reliability B10d
EN 954-1
EN 13849-1
EN 62061
Safety Data - Annual Usage
PFHd
Proof Test Interval (Life)
MTTFd
Utilization Category
AC15 A300 3A.
Rated Insulation / Withstand Voltage
AC 600VAC / 2500 VAC
7 degrees 0.5Nm
175mm Standard 60mm Heavy Duty
UL approved glass-filled polyester
IP67
-25°C. +80°C.
IEC 60 8-2, 10-55Hz+1Hz.
Excursion: 0.35mm, 1 octave/min
Various (See Sales Part Numbers)
Fixing 2 x M4

Universal fitting – opening angle 180 degrees for swing doors
ABB Jokab Safety’s MKey 4 Safety interlock switches are designed to provide position interlock detection for moving guards. They are designed to fit to the leading edge of sliding, hinge or lift off machine guards.

They offer a compact 86mm long body to fit to applications where space is restricted, yet offer 3 pole contacts and choice of 3 conduit entries for wiring versatility. The head can be rotated to give actuator entry positions. For extra durability, Flexible Actuators and Stainless Steel head versions are available. Available with 40N holding force. Contact blocks are replaceable.
MKey 4 Tongue interlock safety switches

<table>
<thead>
<tr>
<th>Contact Block Options:</th>
<th>Quick Connect (QC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow Make Break 2NC 1NO</td>
<td>Pin View from switch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MKey 4 Standard</th>
<th>MKey 4 Stainless Steel Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050001R0000</td>
<td>2TLA050001R0010 Mkey4, M20, 2NC/1NO No Key</td>
</tr>
<tr>
<td>2TLA050001R1000</td>
<td>2TLA050001R1010 Mkey4, NPT, 2NC/1NO No Key</td>
</tr>
<tr>
<td>2TLA050001R2000</td>
<td>2TLA050001R2010 Mkey4, QC, 2NC/1NO No Key</td>
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<tr>
<td>2TLA050001R0100</td>
<td>2TLA050001R0110 Mkey4, M20, 2NC/1NO Std. Key</td>
</tr>
<tr>
<td>2TLA050001R1100</td>
<td>2TLA050001R1110 Mkey4, NPT, 2NC/1NO Std. Key</td>
</tr>
<tr>
<td>2TLA050001R2100</td>
<td>2TLA050001R2110 Mkey4, QC, 2NC/1NO Std. Key</td>
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<tr>
<td>2TLA050001R0200</td>
<td>2TLA050001R0210 Mkey4, M20, 2NC/1NO Flat Key</td>
</tr>
<tr>
<td>2TLA050001R1200</td>
<td>2TLA050001R1210 Mkey4, NPT, 2NC/1NO Flat Key</td>
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<tr>
<td>2TLA050001R2200</td>
<td>2TLA050001R2210 Mkey4, QC, 2NC/1NO Flat Key</td>
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<td>2TLA050001R0300</td>
<td>2TLA050001R0310 Mkey4, M20, 2NC/1NO Pla.Flex Key</td>
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<td>2TLA050001R1310 Mkey4, NPT, 2NC/1NO Pla.Flex Key</td>
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<td>2TLA050001R2300</td>
<td>2TLA050001R2310 Mkey4, QC, 2NC/1NO Pla.Flex Key</td>
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<td>2TLA050001R0400</td>
<td>2TLA050001R0410 Mkey4, M20, 2NC/1NO Met. Flex Key</td>
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<td>2TLA050001R1400</td>
<td>2TLA050001R1410 Mkey4, NPT, 2NC/1NO Met. Flex Key</td>
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<td>2TLA050001R2410 Mkey4, QC, 2NC/1NO Met. Flex Key</td>
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<td>2TLA050001R0510 Mkey4, M20, 2NC/1NO SS Flex Key</td>
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<td>2TLA050001R0011 Mkey4, M20, 2NC/1NO No Key 40N</td>
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<td>2TLA050001R1011 Mkey4, NPT, 2NC/1NO No Key 40N</td>
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<td>2TLA050001R2001</td>
<td>2TLA050001R2011 Mkey4, QC, 2NC/1NO No Key 40N</td>
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<td>2TLA050001R0101</td>
<td>2TLA050001R0111 Mkey4, M20, 2NC/1NO Std. Key 40N</td>
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<td>2TLA050001R1111 Mkey4, NPT, 2NC/1NO Std. Key 40N</td>
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<td>2TLA050001R2111 Mkey4, QC, 2NC/1NO Std. Key 40N</td>
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<td>2TLA050001R2411 Mkey4, QC, 2NC/1NO Met. Flex Key 40N</td>
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<tr>
<td>2TLA050001R0501</td>
<td>2TLA050001R0511 Mkey4, M20, 2NC/1NO SS Flex Key 40N</td>
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<td>2TLA050001R1511 Mkey4, NPT, 2NC/1NO SS Flex Key 40N</td>
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<tr>
<td>2TLA050001R2501</td>
<td>2TLA050001R2511 Mkey4, QC, 2NC/1NO SS Flex Key 40N</td>
</tr>
</tbody>
</table>

ABB Jokab Safety Switches | 19
MKey 5 Tongue interlock safety switches

ABB Jokab Safety MKey 5 Interlock switches are designed to provide position interlock detection for moving guards. They are designed to fit to the leading edge of sliding, hinge or lift off machine guards. They provide a forced disconnect of the safety contacts at the withdrawal of the actuator and have an anti-tamper mechanism.

The head can be rotated to give 4 actuator entry positions. For extra durability, Flexible Actuators and Stainless Steel head versions are available.

Contact blocks are replaceable with optional explosion proof versions. They are sealed to IP67 and survive most wash down solutions due to the high material specification.

**Functional Specification:**
Positive break contacts to IEC947-5-1
High Functional Safety to ISO 13849-1
3 pole Contact Blocks

**Contact Block Options:**
- 2NC
- 1NO

**Standards**
- EN1088
- IEC 947-5-1
- EN 80204-1
- ISO 13849-1
- EN62061
- UL508

**Safety Classification and Reliability Data:**
- Mechanical Reliability B10cEN 954-1
- ISO 13849-1
- EN 62061
- Safety Data - Annual Usage: PPhd
- Proof Test Interval (Life): MT1F
- Utilization Category: AC15 A300 3A
- Thermal Current (Ith): 5A
- Rated Insulation / Withdrawal Voltage: 500VAC / 2500 VAC
- Travel for Positive Opening: 6mm
- Actuator entry minimum radius: 175mm Standard 100mm Flexible
- Maximum Approach / Withdrawal speed: 600mm/min.
- Body Material: Polyester
- Head Material: Polyester or Stainless Steel 316
- IP67
- Temperature: -25°C +80°C
- Excursion: 0.35mm, 1 octave/min
- Conduit Entry: Various (See Sales Part Numbers)
- Fixing: 2 x M5

ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted.
MKey 5 Tongue interlock safety switches

Quick Connect (QC) M12 8 Way Male
Pin view from switch

<table>
<thead>
<tr>
<th>Switch Circuit</th>
<th>Quick Connect (QC)</th>
<th>M12 8 Way Male (on Flying Lead 25mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 / 12</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>21 / 22</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>33 / 34</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Contact operation at withdrawal of Actuator

<table>
<thead>
<tr>
<th>2NC 1NO</th>
<th>7.8</th>
<th>7.0</th>
<th>0 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/12</td>
<td>Open</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21/22</td>
<td>Open</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33/34</td>
<td>Open</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MKey 5 Stainless Steel Head

| 2TLA050003R0000 | Mkey5, M20, 2NC/1NO No Key |
| 2TLA050003R0100 | Mkey5, NPT, 2NC/1NO No Key |
| 2TLA050003R2000 | Mkey5, QC, 2NC/1NO No Key |
| 2TLA050003R0010 | Mkey5, M20, 2NC/1NO Std. Key |
| 2TLA050003R1100 | Mkey5, NPT, 2NC/1NO Std. Key |
| 2TLA050003R2100 | Mkey5, QC, 2NC/1NO Std. Key |
| 2TLA050003R0200 | Mkey5, M20, 2NC/1NO Flat Key |
| 2TLA050003R1200 | Mkey5, NPT, 2NC/1NO Flat Key |
| 2TLA050003R2200 | Mkey5, QC, 2NC/1NO Flat Key |
| 2TLA050003R0300 | Mkey5, M20, 2NC/1NO Pla.Flex Key |
| 2TLA050003R1300 | Mkey5, NPT, 2NC/1NO Pla.Flex Key |
| 2TLA050003R2300 | Mkey5, QC, 2NC/1NO Pla.Flex Key |
| 2TLA050003R0400 | Mkey5, M20, 2NC/1NO Met. Flex Key |
| 2TLA050003R1400 | Mkey5, NPT, 2NC/1NO Met. Flex Key |
| 2TLA050003R2400 | Mkey5, QC, 2NC/1NO Met. Flex Key |
| 2TLA050003R0500 | Mkey5, M20, 2NC/1NO SS Flex Key |
| 2TLA050003R1500 | Mkey5, NPT, 2NC/1NO SS Flex Key |
| 2TLA050003R2500 | Mkey5, QC, 2NC/1NO SS Flex Key |
| 2TLA050003R0001 | Mkey5+, M20, 2NC/1NO No Key 40N |
| 2TLA050003R1001 | Mkey5+, NPT, 2NC/1NO No Key 40N |
| 2TLA050003R2001 | Mkey5+, QC, 2NC/1NO No Key 40N |
| 2TLA050003R0101 | Mkey5+, M20, 2NC/1NO Std. Key 40N |
| 2TLA050003R1101 | Mkey5+, NPT, 2NC/1NO Std. Key 40N |
| 2TLA050003R2101 | Mkey5+, QC, 2NC/1NO Std. Key 40N |
| 2TLA050003R0201 | Mkey5+, M20, 2NC/1NO Flat Key 40N |
| 2TLA050003R1201 | Mkey5+, NPT, 2NC/1NO Flat Key 40N |
| 2TLA050003R2201 | Mkey5+, QC, 2NC/1NO Flat Key 40N |
| 2TLA050003R0301 | Mkey5+, M20, 2NC/1NO Pla.Flex Key 40N |
| 2TLA050003R1301 | Mkey5+, NPT, 2NC/1NO Pla.Flex Key 40N |
| 2TLA050003R2301 | Mkey5+, QC, 2NC/1NO Pla.Flex Key 40N |
| 2TLA050003R0401 | Mkey5+, M20, 2NC/1NO Met. Flex Key 40N |
| 2TLA050003R1401 | Mkey5+, NPT, 2NC/1NO Met. Flex Key 40N |
| 2TLA050003R2401 | Mkey5+, QC, 2NC/1NO Met. Flex Key 40N |
| 2TLA050003R0501 | Mkey5+, M20, 2NC/1NO SS Flex Key 40N |
| 2TLA050003R1501 | Mkey5+, NPT, 2NC/1NO SS Flex Key 40N |
| 2TLA050003R2501 | Mkey5+, QC, 2NC/1NO SS Flex Key 40N |

MKey 5 Standard

| 2TLA050003R0000 | Mkey5, M20, 2NC/1NO No Key |
| 2TLA050003R1000 | Mkey5, NPT, 2NC/1NO No Key |
| 2TLA050003R2000 | Mkey5, QC, 2NC/1NO No Key |
| 2TLA050003R0100 | Mkey5, M20, 2NC/1NO Std. Key |
| 2TLA050003R1100 | Mkey5, NPT, 2NC/1NO Std. Key |
| 2TLA050003R2100 | Mkey5, QC, 2NC/1NO Std. Key |
| 2TLA050003R0200 | Mkey5, M20, 2NC/1NO Flat Key |
| 2TLA050003R1200 | Mkey5, NPT, 2NC/1NO Flat Key |
| 2TLA050003R2200 | Mkey5, QC, 2NC/1NO Flat Key |
| 2TLA050003R0300 | Mkey5, M20, 2NC/1NO Pla.Flex Key |
| 2TLA050003R1300 | Mkey5, NPT, 2NC/1NO Pla.Flex Key |
| 2TLA050003R2300 | Mkey5, QC, 2NC/1NO Pla.Flex Key |
| 2TLA050003R0400 | Mkey5, M20, 2NC/1NO Met. Flex Key |
| 2TLA050003R1400 | Mkey5, NPT, 2NC/1NO Met. Flex Key |
| 2TLA050003R2400 | Mkey5, QC, 2NC/1NO Met. Flex Key |
| 2TLA050003R0500 | Mkey5, M20, 2NC/1NO SS Flex Key |
| 2TLA050003R1500 | Mkey5, NPT, 2NC/1NO SS Flex Key |
| 2TLA050003R2500 | Mkey5, QC, 2NC/1NO SS Flex Key |
| 2TLA050003R0001 | Mkey5+, M20, 2NC/1NO No Key 40N |
| 2TLA050003R1001 | Mkey5+, NPT, 2NC/1NO No Key 40N |
| 2TLA050003R2001 | Mkey5+, QC, 2NC/1NO No Key 40N |
| 2TLA050003R0101 | Mkey5+, M20, 2NC/1NO Std. Key 40N |
| 2TLA050003R1101 | Mkey5+, NPT, 2NC/1NO Std. Key 40N |
| 2TLA050003R2101 | Mkey5+, QC, 2NC/1NO Std. Key 40N |
| 2TLA050003R0201 | Mkey5+, M20, 2NC/1NO Flat Key 40N |
| 2TLA050003R1201 | Mkey5+, NPT, 2NC/1NO Flat Key 40N |
| 2TLA050003R2201 | Mkey5+, QC, 2NC/1NO Flat Key 40N |
| 2TLA050003R0301 | Mkey5+, M20, 2NC/1NO Pla.Flex Key 40N |
| 2TLA050003R1301 | Mkey5+, NPT, 2NC/1NO Pla.Flex Key 40N |
| 2TLA050003R2301 | Mkey5+, QC, 2NC/1NO Pla.Flex Key 40N |
| 2TLA050003R0401 | Mkey5+, M20, 2NC/1NO Met. Flex Key 40N |
| 2TLA050003R1401 | Mkey5+, NPT, 2NC/1NO Met. Flex Key 40N |
| 2TLA050003R2401 | Mkey5+, QC, 2NC/1NO Met. Flex Key 40N |
| 2TLA050003R0501 | Mkey5+, M20, 2NC/1NO SS Flex Key 40N |
| 2TLA050003R1501 | Mkey5+, NPT, 2NC/1NO SS Flex Key 40N |
| 2TLA050003R2501 | Mkey5+, QC, 2NC/1NO SS Flex Key 40N |
MKey 5Z Tongue interlock stainless steel safety switches

ABB Jokab Safety MKey 5Z Series interlock switches have a rugged Stainless Steel 316 body and have been designed to cope with the rigorous applications of the Food Processing and Chemical Industries.

They have IP69K enclosure protection (maintained by a double seal lid gaskets and seals) and can be high pressure hosed with detergent at high temperature.

They are designed to fit to the leading edge of sliding, hinge or lift off machine guards. They provide a forced disconnect of the safety contacts at the withdrawal of the actuator and have an anti-tamper mechanism.

The head can be rotated to give 4 actuator entry positions. For extra durability, Flexible Actuators and Stainless steel head versions are available. They are sealed to IP69K and survive most caustic wash down solutions.

**Functional Specification:**

Positive break contacts to IEC947-5-1

High Functional Safety to ISO 13849-1

Will fit on 40mm fixing centres – industry standard housing

**Contact Block Options:**

2NC 1NO

21 22 11 12

34 33

98 8 5

58 30.50

Fixing Holes for M5 Screws

**Standards:**

EN1088 IEC 947-5-1 EN 60941-1 EN 60204-1

**Safety Classification and Reliability Data:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Reliability B10d</td>
<td>2.5 x 10⁹ operations at 100mA load</td>
</tr>
<tr>
<td>EN 954-1</td>
<td></td>
</tr>
<tr>
<td>ISO 13849-1</td>
<td>up to Category 4 with Safety Relay</td>
</tr>
<tr>
<td>EN 62061</td>
<td>up to SIL3 depending upon system architecture</td>
</tr>
<tr>
<td>Safety Data - Annual Usage</td>
<td>8 cycles per hour / 24 hours per day / 365 days</td>
</tr>
<tr>
<td>PF/Hd</td>
<td>3.44 x 10⁴</td>
</tr>
<tr>
<td>Proof Test Interval (Life)</td>
<td>35 years</td>
</tr>
<tr>
<td>MTTFd</td>
<td>356 years</td>
</tr>
<tr>
<td>Utilization Category</td>
<td>AC15 A300 3A</td>
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<tr>
<td>Thermal Current (Itt)</td>
<td>5A</td>
</tr>
<tr>
<td>Insulation / Withstand Voltages</td>
<td>500VAC / 2000 VAC</td>
</tr>
<tr>
<td>Travel for Positive Opening</td>
<td></td>
</tr>
<tr>
<td>Rated Actuator entry minimum radius</td>
<td>8mm</td>
</tr>
<tr>
<td>Maximum Approach / Withdrawal speed</td>
<td>175mm Standard / 100mm Flexible</td>
</tr>
<tr>
<td>Body Material</td>
<td>600mm/s</td>
</tr>
<tr>
<td>Stainless Steel 316</td>
<td></td>
</tr>
<tr>
<td>Head Material</td>
<td>Stainless Steel 316</td>
</tr>
<tr>
<td>Stainless Steel 316</td>
<td></td>
</tr>
<tr>
<td>Endorsement Protection</td>
<td>2.567 IP69K</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td></td>
</tr>
<tr>
<td>-25°C, +80°C</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC 68-2-6, -10-55±1/1Hz</td>
</tr>
<tr>
<td>Exclusion: 0.365mm, 1 octave/min</td>
<td></td>
</tr>
<tr>
<td>Conduit Entry/Fixing</td>
<td>Various (See Sales Part Numbers)</td>
</tr>
<tr>
<td>4 x M5</td>
<td></td>
</tr>
</tbody>
</table>

---

22 | ABB Jokab Safety Switches
MKey 5Z Tongue interlock stainless steel safety switches

Contact operation at withdrawal of Actuator

Quick Connect
Pin view from switch

<table>
<thead>
<tr>
<th>Switch Circuit</th>
<th>Quick Connect (QC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050003R0020 MkeySZ, SS M20 2NC/1N0 No Key</td>
<td>11 / 12</td>
</tr>
<tr>
<td>2TLA050003R0120 MkeySZ, SS NPT 2NC/1N0 No Key</td>
<td>11 / 12</td>
</tr>
<tr>
<td>2TLA050003R0220 MkeySZ, SS QC 2NC/1N0 No Key</td>
<td>11 / 12</td>
</tr>
<tr>
<td>2TLA050003R0121 MkeySZ, SS M20 2NC/1N0 Std. Key</td>
<td>21 / 22</td>
</tr>
<tr>
<td>2TLA050003R1220 MkeySZ, SS NPT 2NC/1N0 Std. Key</td>
<td>21 / 22</td>
</tr>
<tr>
<td>2TLA050003R1120 MkeySZ, SS QC 2NC/1N0 Std. Key</td>
<td>21 / 22</td>
</tr>
<tr>
<td>2TLA050003R0320 MkeySZ, SS M20 2NC/1N0 Flat Key</td>
<td>33 / 34</td>
</tr>
<tr>
<td>2TLA050003R1320 MkeySZ, SS NPT 2NC/1N0 Flat Key</td>
<td>33 / 34</td>
</tr>
<tr>
<td>2TLA050003R2320 MkeySZ, SS QC 2NC/1N0 Flat Key</td>
<td>33 / 34</td>
</tr>
<tr>
<td>2TLA050003R0321 MkeySZ, SS M20 2NC/1N0 Pla.Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1321 MkeySZ, SS NPT 2NC/1N0 Pla.Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2321 MkeySZ, SS QC 2NC/1N0 Pla.Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0420 MkeySZ, SS M20 2NC/1N0 Met. Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1420 MkeySZ, SS NPT 2NC/1N0 Met. Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2420 MkeySZ, SS QC 2NC/1N0 Met. Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0520 MkeySZ, SS M20 2NC/1N0 SS Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1520 MkeySZ, SS NPT 2NC/1N0 SS Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2520 MkeySZ, SS QC 2NC/1N0 SS Flex Key</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0021 MkeySZ, SS M20 2NC/1N0 No Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1021 MkeySZ, SS NPT 2NC/1N0 No Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2021 MkeySZ, SS QC 2NC/1N0 No Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0121 MkeySZ, SS M20 2NC/1N0 Std. Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1121 MkeySZ, SS NPT 2NC/1N0 Std. Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2121 MkeySZ, SS QC 2NC/1N0 Std. Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0221 MkeySZ, SS M20 2NC/1N0 Flat Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1221 MkeySZ, SS NPT 2NC/1N0 Flat Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2221 MkeySZ, SS QC 2NC/1N0 Flat Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0321 MkeySZ, SS M20 2NC/1N0 Pla.Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1321 MkeySZ, SS NPT 2NC/1N0 Pla.Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2321 MkeySZ, SS QC 2NC/1N0 Pla.Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0421 MkeySZ, SS M20 2NC/1N0 Met. Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1421 MkeySZ, SS NPT 2NC/1N0 Met. Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2421 MkeySZ, SS QC 2NC/1N0 Met. Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R0521 MkeySZ, SS M20 2NC/1N0 SS Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R1521 MkeySZ, SS NPT 2NC/1N0 SS Flex Key 40N</td>
<td>Earth</td>
</tr>
<tr>
<td>2TLA050003R2521 MkeySZ, SS QC 2NC/1N0 SS Flex Key 40N</td>
<td>Earth</td>
</tr>
</tbody>
</table>
MKey 6 Tongue interlock safety switches

ABB Jokab Safety MKey 6 Interlock switches are designed to provide position interlock detection for medium to heavy duty moving guards. They have robust die-cast housings and are designed to fit to the leading edge of sliding, hinge or lift off machine guards. They provide a forced disconnect of the safety contacts at the withdrawal of the actuator and have an anti-tamper mechanism.

The rotatable heads have dual actuator entry positions to give up to 8 different entry positions. For extra durability, Flexible Actuators and Stainless Steel head versions are available.

High holding force versions are available for applications where vibration can be a nuisance.

Functional Specification:

Positive break contacts to IEC947-5-1

High Functional Safety to ISO 13849-1

3 pole, 4 pole or Explosion Proof Contact Blocks

For all ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted.

Standards

- EN1088
- IEC 947-5-1
- EN 60204-1
- EN 62061
- EN 954-1
- UL508

Safety Classification and Reliability Data:

- Mechanical Reliability B10d: 2.5 x 10^8 operations at 100mA bad up to Category 4 with Safety Relay
- EN 954-1: up to PLe depending upon system architecture
- EN 60204-1: up to SIL3 depending upon system architecture
- Safety Data - Annual Usage: 8 cycles per hour / 24 hours per day / 365 days
- PFH: 3.4 x 10^4
- Proof Test Interval (Life): 35 years
- Utilization Category: MTTfD
- AC 15, A300, 3A
- 5A
- Thermal Current (Ith): 800VAC / 2500 VAC
- Rated Insulation / Withstand Voltages: 8mm
- Travel for Positive Opening: 175mm Standard 100mm Flexible
- Actuator entry minimum radius: 600mm/s
- Maximum Approach / Withdrawal speed: Die Cast Painted Red
- Body Material: Painted Red or Stainless Steel 316
- Die Cast
- Head Material: IP67
- Enclosure Protection: -25°C...+80°C
- Operating Temperature: IEC 66-2-6, 10-55Hz, 1Hz
- Vibration: Excursion: 0.35mm, 1 octave/min Various
- Conduit Entry: (See Sales Part Numbers)
- 4 x M5

118mm long 40mm wide 30mm fixing
Available with 40N holding force

Stainless Steel Head version available

Connects to most Safety Relays to give up to up to PLe Cat.4.

Industry Fitting

To view the full document, please refer to the original source.
### MKey 6 Tongue interlock safety switches

**QC Quick Connect Versions**

<table>
<thead>
<tr>
<th>Quick Connect</th>
<th>Quick Connect (QC)</th>
<th>Pin view from switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC</td>
<td>M12 8 Way Male (on Flying Lead 25mm)</td>
<td></td>
</tr>
<tr>
<td>Pin view from switch</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch Circuit</th>
<th>11/12</th>
<th>21/22</th>
<th>33/34</th>
<th>Earth</th>
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<tbody>
<tr>
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<td>1</td>
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**Contact operation at withdrawal of Actuator**

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<thead>
<tr>
<th>2NC 1NO</th>
<th>7.8</th>
<th>7.5</th>
<th>0 mm</th>
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<tbody>
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</tr>
<tr>
<td>33/34</td>
<td>Open</td>
<td></td>
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</tr>
</tbody>
</table>

#### MKey 6 Standard

- 2TLA050005R0030 Mkey6, M20, 2NC/1NO No Key
- 2TLA050005R1030 Mkey6, NPT, 2NC/1NO No Key
- 2TLA050005R2030 Mkey6, QC, 2NC/1NO Std. Key
- 2TLA050005R0230 Mkey6, QC, 2NC/1NO Flat Key
- 2TLA050005R0330 Mkey6, QC, 2NC/1NO Pla.Flex Key
- 2TLA050005R0430 Mkey6, QC, 2NC/1NO Met. Flex Key
- 2TLA050005R0530 Mkey6, QC, 2NC/1NO SS Flex Key
- 2TLA050005R0041 Mkey6+, M20, 2NC/1NO No Key 40N
- 2TLA050005R1041 Mkey6+, NPT, 2NC/1NO No Key 40N
- 2TLA050005R2041 Mkey6+, QC, 2NC/1NO No Key 40N
- 2TLA050005R0141 Mkey6+, M20, 2NC/1NO Std. Key 40N
- 2TLA050005R1141 Mkey6+, NPT, 2NC/1NO Std. Key 40N
- 2TLA050005R2141 Mkey6+, QC, 2NC/1NO Std. Key 40N
- 2TLA050005R0241 Mkey6+, QC, 2NC/1NO Flat Key 40N
- 2TLA050005R1241 Mkey6+, QC, 2NC/1NO Flat Key 40N
- 2TLA050005R2241 Mkey6+, QC, 2NC/1NO Flat Key 40N
- 2TLA050005R0341 Mkey6+, M20, 2NC/1NO Pla.Flex Key 40N
- 2TLA050005R1341 Mkey6+, NPT, 2NC/1NO Pla.Flex Key 40N
- 2TLA050005R2341 Mkey6+, QC, 2NC/1NO Pla.Flex Key 40N
- 2TLA050005R0441 Mkey6+, QC, 2NC/1NO Met. Flex Key 40N
- 2TLA050005R1441 Mkey6+, NPT, 2NC/1NO Met. Flex Key 40N
- 2TLA050005R2441 Mkey6+, QC, 2NC/1NO Met. Flex Key 40N
- 2TLA050005R0541 Mkey6+, M20, 2NC/1NO SS Flex Key 40N
- 2TLA050005R1541 Mkey6+, NPT, 2NC/1NO SS Flex Key 40N
- 2TLA050005R2541 Mkey6+, QC, 2NC/1NO SS Flex Key 40N

#### MKey 6 Stainless Steel Head

- 2TLA050005R0040 Mkey6, M20, 2NC/1NO No Key
- 2TLA050005R1040 Mkey6, NPT, 2NC/1NO No Key
- 2TLA050005R2040 Mkey6, QC, 2NC/1NO Std. Key
- 2TLA050005R0240 Mkey6, QC, 2NC/1NO Flat Key
- 2TLA050005R0340 Mkey6, QC, 2NC/1NO Pla.Flex Key
- 2TLA050005R0440 Mkey6, QC, 2NC/1NO Met. Flex Key
- 2TLA050005R0540 Mkey6, QC, 2NC/1NO SS Flex Key
- 2TLA050005R0041 Mkey6+, M20, 2NC/1NO No Key 40N
- 2TLA050005R1041 Mkey6+, NPT, 2NC/1NO No Key 40N
- 2TLA050005R2041 Mkey6+, QC, 2NC/1NO No Key 40N
- 2TLA050005R0141 Mkey6+, M20, 2NC/1NO Std. Key 40N
- 2TLA050005R1141 Mkey6+, NPT, 2NC/1NO Std. Key 40N
- 2TLA050005R2141 Mkey6+, QC, 2NC/1NO Std. Key 40N
- 2TLA050005R0241 Mkey6+, QC, 2NC/1NO Flat Key 40N
- 2TLA050005R1241 Mkey6+, QC, 2NC/1NO Flat Key 40N
- 2TLA050005R2241 Mkey6+, QC, 2NC/1NO Flat Key 40N
- 2TLA050005R0341 Mkey6+, M20, 2NC/1NO Pla.Flex Key 40N
- 2TLA050005R1341 Mkey6+, NPT, 2NC/1NO Pla.Flex Key 40N
- 2TLA050005R2341 Mkey6+, QC, 2NC/1NO Pla.Flex Key 40N
- 2TLA050005R0441 Mkey6+, QC, 2NC/1NO Met. Flex Key 40N
- 2TLA050005R1441 Mkey6+, NPT, 2NC/1NO Met. Flex Key 40N
- 2TLA050005R2441 Mkey6+, QC, 2NC/1NO Met. Flex Key 40N
- 2TLA050005R0541 Mkey6+, M20, 2NC/1NO SS Flex Key 40N
- 2TLA050005R1541 Mkey6+, NPT, 2NC/1NO SS Flex Key 40N
- 2TLA050005R2541 Mkey6+, QC, 2NC/1NO SS Flex Key 40N
ABB Jokab Safety MKey 6Z Series Interlock Switches have a rugged Stainless Steel 316 body and have been designed to cope with the rigorous applications of the Food Processing and Packaging Industries. The surface finish is mirror polished to Ra10 to resist the accumulation of food, debris and is suitable for high pressure hosing at high temperature.

They offer compact slimline housing which will fit to areas where there are space restrictions and are sealed to IP69K enclosure protection. They can be high pressure hosed with most detergents at high temperature.

They are designed to fit to the leading edge of sliding, hinge or liftoff machine guards. They provide a forced disconnect of the safety contacts at the withdrawal of the actuator and have an anti-tamper mechanism.

The rotatable heads have dual actuator entry positions to give up to 4 different entry positions. High holding force versions are available for applications where vibration can be a nuisance.

**Functional Specification:**

Positive break contacts to IEC947-5-1

High Functional Safety to ISO 13849-1

Will fit on 30mm fixing centres - DIN standard body mounting

**Contact Block Options:**

2NC 1NO

For all ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted.

Mirror Finish Stainless Steel 316 Body

Connects to most Safety Relays to give up to up to PLe Cat.4.

IP69K Suitable for SIP and CIP processes

Available with 40N holding force
MKey 6Z Tongue interlock stainless steel safety switches

Contact operation at withdrawal of Actuator

QC  Quick Connect Versions

Quick Connect
Pin view from switch

<table>
<thead>
<tr>
<th>Switch Circuit</th>
<th>Quick Connect (QC) M12 8 Way Male (on Flying Lead 250mm)</th>
<th>Pin view from switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 / 12</td>
<td>1 7</td>
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</tr>
<tr>
<td>21 / 22</td>
<td>6 5</td>
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<td>33 / 34</td>
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<table>
<thead>
<tr>
<th>MKey 6Z</th>
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<tr>
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<tr>
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<td>2TLA050005R2220 Mkey6Z, SS QC 2NC/1N0 Flat Key</td>
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<td>2TLA050005R0520 Mkey6Z, SS M20 2NC/1N0 SS Flex Key</td>
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<td>2TLA050005R1520 Mkey6Z, SS NPT 2NC/1N0 SS Flex Key</td>
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<td>2TLA050005R2221 Mkey6+Z, SS QC 2NC/1N0 Flat Key 40N</td>
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<td>2TLA050005R2421 Mkey6+Z, SS QC 2NC/1N0 Met.Flex Key 40N</td>
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<tr>
<td>2TLA050005R0521 Mkey6+Z, SS M20 2NC/1N0 SS Flex Key 40N</td>
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<tr>
<td>2TLA050005R1521 Mkey6+Z, SS NPT 2NC/1N0 SS Flex Key 40N</td>
</tr>
<tr>
<td>2TLA050005R2521 Mkey6+Z, SS QC 2NC/1N0 SS Flex Key 40N</td>
</tr>
</tbody>
</table>
MKey Guard locking safety interlock switches

Application:

ABB Jokab Safety MKey Guard Locking switches are designed to provide robust position interlock detection for moving guards and provide a lock mechanism to keep the guard closed until the hazard has been removed.

They are Tongue operated and are designed to fit to the leading edge of sliding or hinged machine guards to provide positively operated switching contacts and provide a tamper resistant, not easily defeatable key mechanism.

Depending upon the risk assessment for the application, they can be used independently to provide positively operated contacts to IEC-947-5-1 or they can be used in combination with any dual channel safety monitoring relays to provide up to Pte Category 4 to ISO 13849-1 or SIL3 EN62061. They are available in various materials and housing styles to provide complete flexibility of choice depending upon the application. They offer a choice of contact blocks, LED diagnostics and various actuators to aid installation and maintain durability throughout the rigorous applications of Factory Automation, Packaging, Food Processing, Pharmaceutical and Petro-Chemical Industries.

Operation:

The switch is rigidly mounted to the frame of the guard or machine. The actuator is fitted to the moving part (frame) of the guard and is aligned to the switch entry aperture. The actuator profile is designed to match a cam mechanism within the switch head and provides a positively to the switch operated interlock switch. When the actuator is inserted into the switch the safety contacts can be closed and allow the machine start circuit to be enabled. When the solenoid receives the required signal the safety contacts are positively opened, the machine circuit is broken and the guard door can be opened. They can be used in combination with safety timers to provide a delay before allowing the guard to open (e.g. for machines which require run down).

Standard versions automatically spring locked at the insertion of the actuator and will only unlock when power is applied to the solenoid.

Power to Lock versions are available for special applications where the hazard is immediately removed (no run down necessary) and it is favourable to have the switch unlock if a power failure occurs.

They offer a choice of high specification plastic or die-cast housings and are sealed to IP67 and provide long term protection against moisture ingress. For harsh applications like Food Processing, Pharmaceutical and Chemical Industries the Stainless Steel 316 range offers protection up to IP69K for use in high pressure chemical cleaning or CIP/SIP applications.

![MKey 9 Solenoid Locking (Plastic)](image1)

MKey 9 Solenoid Locking (Plastic)
- 8 actuator entry positions – rotatable head
- High Holding Force: 1800N.
- 2 lock monitoring safely contacts
- 46mm wide 150mm long 30mm fixing
- LED 1 status of solenoid applied power
- LED 2 status of guard lock
- 2 Emergency manual release points
- IP67

![MKey 8 Solenoid Locking (Metal)](image2)

MKey 8 Solenoid Locking (Metal)
- 8 actuator entry positions – rotatable head
- 46mm wide 176mm long 30mm fixing
- 2 lock monitoring safety contacts
- Die Cast Alloy
- High Holding Force: 2000N.
- LED 1 status of solenoid applied power
- LED 2 status of guard lock
- 2 Emergency manual release points
- IP67

![MKey 8Z Solenoid Locking (Fully stainless Steel)](image3)

MKey 8Z Solenoid Locking (Fully stainless Steel)
- 8 actuator entry positions – rotatable head
- 48mm wide 177mm long 30mm fixing
- 2 lock monitoring safety contacts
- High Holding Force: 2000N.
- LED 1 status of solenoid applied power
- LED 2 status of guard lock
- 2 Emergency manual release points
- IP69K high temperature hose down

Stainless Steel 316 versions have been developed for guard interlocking in the applications of Food Processing, Pharmaceutical, Packaging and Chemical Industries. They are tested to ingress protection degree IP69K (high pressure hosing with detergent at 60C. and 100psi).
MKey Guard locking safety interlock switches

Function Guide:
All Guard Locking Switches are intended to prevent an operator accidentally opening a guard door and being exposed to a hazard. When choosing the correct switch it is necessary to take into account the dimensions and weight of the guard door and to install the switch so as to avoid applying unnecessary forces to the switch locking mechanism during normal use.
Door catches, stops and guides should always be fitted in addition to the safety switch to prevent unnecessary damage to the switch.

Standard Versions - (Energise the switch solenoid to unlock).

When the guard is closed the switch actuator is automatically locked and the switch safety contacts close.
The guard will be held closed and can only be opened after the switch solenoid is energised causing the actuator to unlock.
The operator cannot accidentally open the guard until the hazard is removed. When the solenoid is energised the safety contacts open and the actuator can be released.
Depending upon a risk assessment for the application, the solenoid is usually energised either by:
A request push button (for applications with immediate removal of the hazard),
A request pushbutton and safety timer (for applications with a run down hazard after removing the machine power).
From a PLC or if necessary a Safety PLC via a machine control command.

Standard Versions with Rear Manual release buttons:

All the features and specifications of the standard MKey 8 and MKey 8Z are maintained.
Where the risk assessment for the application permits, a non-latching manual escape release is provided to enable quick release of the switch lock in case of emergency.
The switch can be mounted such that access to the release button is available from inside the active guard area.
Pressing and holding the red button will release the lock mechanism and open the lock monitoring safety contacts and allow the guard to be pushed open.

Power to Lock Versions – (Energise the switch solenoid to keep locked)
Only suitable for applications where immediate unlocking is required at removal or loss of solenoid power.
Not suitable for machines with a running down time.

When the guard is closed the switch actuator will only lock and allow the safety contacts to close after the solenoid is energised.
The guard will be held closed and can only be opened after the solenoid is de-energised either by controlled request (or by power loss).
A latching Stop/Start circuit or a PLC or Safety PLC machine command usually energises the solenoid.
MKey 8 Guard locking metal safety switches

Solenoid Locking interlock Safety Switches featuring Guard Holding up to 2000N. (200Kg.)

The MKey 8 Series Guard Locking switches have rugged Die Cast housings and have been developed with a high Holding Force of 2000N to keep medium to large Guard Doors closed until hazards have been removed.

They have a slim profile and are designed to fit on 50mm (2 in.) frame sections or to applications where space is restricted.

The head will rotate to provide up to 8 actuator entry positions.

They have 2 independent contact blocks to individually monitor the Lock status and Door Status.

An LED is available to indicate Lock Status.

Versions are available offering a Rear Manual Escape Release.

Accessories include a Sliding Handle Bolt to provide holding of heavy or hinged doors and lock off actuators.

Functional Specification:
Positive break contacts to IEC947-5-1

High Functional Safety to ISO 13849-1

4NC Safety Circuits - 2 Solenoid/Lock 2 Actuator/Guard
1NO Circuit Auxiliary circuit for indication of actuator status (Guard open)
1NO Circuit Auxiliary circuit for Lock Status (selectable with LED2)

8 actuator entry positions rotatable head

For all ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed without actuator inserted.

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN1088</th>
<th>IEC 947-5-1</th>
<th>EN 60204-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 13849-1</td>
<td>EN 602061</td>
<td>EN 954-1</td>
<td>UL 508</td>
</tr>
</tbody>
</table>

Safety Classification and Reliability Data:

- Mechanical Reliability 810d
- EN 954-1
- ISO 13849-1
- EN 602061
- Safety Data - Annual Usage
- 2,5 x 10^6 operations at 100mA load up to Category 4 with Safety Relay
- up to PLe depending upon system architecture
- up to SIL3 depending upon system architecture
- 8 cycles per hour / 24 hours per day / 365 days
- 3,64 x 10^6
- Proof Test Interval (Life)
- 25 years
- MTTFh
- 356 years
- Solenoid Voltage (by part number)
- 24V (AC/DC) or 110V, ac or 230V, ac
- 12V.
- 24V (DC.
- LED 2 Supply Voltage
- AC/DC 300 3A
- 5A
- Thermal Current (Ith)
- 650VAC / 2500 VAC
- 10mm
- Rated Insulation / Withstand Voltage
- 175mm Standard 60mm Heavy Duty
- 600Vrms.
- Body Material
- Die Cast
- Painted Red
- Die Cast Painted Red or Stainless Steel 316
- Ex 8-2-26, 10-55Hz1Hz
- Vibration: 0.35mm, 1 octave/min
- Endurance Protection
- Various (See Sales Part Numbers)
- Operating Temperature
- -25°C. 5°C
- Conduit Entry
- IP67
- Fixing
- 4 x M5
MKey 8 Guard locking metal safety switches

**Mikey 8 Standard**

- 2TLA05001R0032 Mkey 8, Sol M20, 24V No Key
- 2TLA05001R0033 Mkey 8, Sol M20, 110V No Key
- 2TLA05001R0034 Mkey 8, Sol M20, 230V No Key
- 2TLA05001R0035 Mkey 8, Sol M20, 24V Std. Key
- 2TLA05001R0036 Mkey 8, Sol M20, 110V Std. Key
- 2TLA05001R0037 Mkey 8, Sol M20, 230V Std. Key
- 2TLA05001R0038 Mkey 8, Sol M20, 24V Flat Key
- 2TLA05001R0039 Mkey 8, Sol M20, 110V Flat Key
- 2TLA05001R0040 Mkey 8, Sol M20, 230V Flat Key
- 2TLA05001R0041 Mkey 8, Sol M20, 24V Met. Flex Key
- 2TLA05001R0042 Mkey 8, Sol M20, 110V Met. Flex Key
- 2TLA05001R0043 Mkey 8, Sol M20, 230V Met. Flex Key
- 2TLA05001R0044 Mkey 8, Sol M20, 24V SS Flex Key
- 2TLA05001R0045 Mkey 8, Sol M20, 110V SS Flex Key
- 2TLA05001R0046 Mkey 8, Sol M20, 230V SS Flex Key

**Mikey 8 Stainless Steel Head**

- 2TLA05001R0047 Mkey 8, Sol M20, 24V No Key
- 2TLA05001R0048 Mkey 8, Sol M20, 110V No Key
- 2TLA05001R0049 Mkey 8, Sol M20, 230V No Key
- 2TLA05001R0050 Mkey 8, Sol M20, 24V Std. Key
- 2TLA05001R0051 Mkey 8, Sol M20, 110V Std. Key
- 2TLA05001R0052 Mkey 8, Sol M20, 230V Std. Key
- 2TLA05001R0053 Mkey 8, Sol M20, 24V Flat Key
- 2TLA05001R0054 Mkey 8, Sol M20, 110V Flat Key
- 2TLA05001R0055 Mkey 8, Sol M20, 230V Flat Key
- 2TLA05001R0056 Mkey 8, Sol M20, 24V Met. Flex Key
- 2TLA05001R0057 Mkey 8, Sol M20, 110V Met. Flex Key
- 2TLA05001R0058 Mkey 8, Sol M20, 230V Met. Flex Key
- 2TLA05001R0059 Mkey 8, Sol M20, 24V SS Flex Key
- 2TLA05001R0060 Mkey 8, Sol M20, 110V SS Flex Key
- 2TLA05001R0061 Mkey 8, Sol M20, 230V SS Flex Key

**Quick Connect (DC):**

- M23 12 way Male Plug (Pin view from switch)

<table>
<thead>
<tr>
<th>Switch Circuit</th>
<th>Quick Connect (DC)</th>
</tr>
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<tbody>
<tr>
<td>1 3 A1 A2</td>
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<tr>
<td>4 6 5 11/12</td>
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<tr>
<td>7 8 21 22</td>
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<tr>
<td>9 10 33 34</td>
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<tr>
<td>12 Earth</td>
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</tbody>
</table>

ABB Jokab Safety Switches | 31
MKey 8Z Guard locking stainless steel safety switches

Solenoid Locking | Interlock Safety Switches featuring Guard Holding up to 2000N. (200Kg.)

The MKey 8Z Series Guard Locking switches have a rugged Stainless Steel 316 body and have been developed with a holding force of 2000N to keep medium to large Guard Doors closed until hazards have been removed.

They are designed in accordance with EHEDG guidelines for hygienic design (EHEDG European Hygienic Engineering & Design Group). The mirror-polished surface to Ra10 is designed to cope with direct food splash and cleaning found in the tough applications of the Food Processing Industries. They have IP69K enclosure protection and can be high pressure hosed with detergent at high temperature.

They have a slim body design under 50mm wide and can be fitted to 50mm (2in.) frame sections or to applications where space is restricted. The Head will rotate to provide up to 8 actuator entry positions.

2 Manual override points are provided (by using anti-tamper key).

A unique mechanical design featuring 2 independent contact blocks gives a high function and diagnostic specification:

4NC Safety Contacts
1NO Auxiliary Contact (Guard open)
LED1 Solenoid Power
LED2 Lock Status indication or 1NO Auxiliary Contact (Lock Open)

Functional Specification:

Positive break contacts to IEC947-5-1

High Functional Safety to ISO 13849-1

4NC Safety Contacts independently selectable

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN1098</th>
<th>IEC 947-5-1</th>
<th>EN 60204-1</th>
<th>ISO 13849-1</th>
<th>EN 62061</th>
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<tbody>
<tr>
<td>Safety Classification and Reliability Data:</td>
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<tr>
<td>Mechanical Reliability B10t</td>
<td>2.5 x 10^6 operations at 100mA load</td>
<td>up to Category 4 with Safety Relay</td>
<td>up to PLe depending upon system architecture</td>
<td>up to SIL3 depending upon system architecture</td>
<td>8 cycles per hour / 24 hours per day / 385</td>
<td>3.44 x 10^4</td>
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<td>ISO 13849-1</td>
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<td>Safety Data - Annual Usage</td>
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<td>Solenoid Voltage (by part number)</td>
<td>24V ac: 30V ac or 110V, ac or 230V, ac</td>
<td>12V, 24V ac</td>
<td>24V dc</td>
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<tr>
<td>Actuator entry minimum radius</td>
<td>175mm Standard</td>
<td>60mm Heavy Duty</td>
<td>600mm/m/s.</td>
<td>Stainless Steel 316</td>
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<tr>
<td>Maximum Approach / Withdrawal speed</td>
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</tr>
</tbody>
</table>

For all ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted.
MKey 8Z Guard locking stainless steel safety switches

MKey 8Z
2TLA050011R0022 Mikey8Z, SS Sol M20, 24V No Key
2TLA050011R1022 Mikey8Z, SS Sol NPT, 24V No Key
2TLA050011R2022 Mikey8Z, SS Sol QC, 24V No Key
2TLA050011R0023 Mikey8Z, SS Sol M20, 110V No Key
2TLA050011R1023 Mikey8Z, SS Sol NPT, 110V No Key
2TLA050011R2023 Mikey8Z, SS Sol QC, 110V No Key
2TLA050011R0024 Mikey8Z, SS Sol M20, 230V No Key
2TLA050011R1024 Mikey8Z, SS Sol NPT, 230V No Key
2TLA050011R2024 Mikey8Z, SS Sol QC, 230V No Key
2TLA050011R0122 Mikey8Z, SS Sol M20, 24V Std. Key
2TLA050011R1122 Mikey8Z, SS Sol NPT, 24V Std. Key
2TLA050011R2122 Mikey8Z, SS Sol QC, 24V Std. Key
2TLA050011R0123 Mikey8Z, SS Sol M20, 110V Std. Key
2TLA050011R1123 Mikey8Z, SS Sol NPT, 110V Std. Key
2TLA050011R2123 Mikey8Z, SS Sol QC, 110V Std. Key
2TLA050011R0124 Mikey8Z, SS Sol M20, 230V Std. Key
2TLA050011R1124 Mikey8Z, SS Sol NPT, 230V Std. Key
2TLA050011R2124 Mikey8Z, SS Sol QC, 230V Std. Key
2TLA050011R0222 Mikey8Z, SS Sol M20, 24V Flat Key
2TLA050011R1222 Mikey8Z, SS Sol NPT, 24V Flat Key
2TLA050011R2222 Mikey8Z, SS Sol QC, 24V Flat Key
2TLA050011R0223 Mikey8Z, SS Sol M20, 110V Flat Key
2TLA050011R1223 Mikey8Z, SS Sol NPT, 110V Flat Key
2TLA050011R2223 Mikey8Z, SS Sol QC, 110V Flat Key
2TLA050011R0224 Mikey8Z, SS Sol M20, 230V Flat Key
2TLA050011R1224 Mikey8Z, SS Sol NPT, 230V Flat Key
2TLA050011R2224 Mikey8Z, SS Sol QC, 230V Flat Key
2TLA050011R0422 Mikey8Z, SS Sol M20, 24V Met. Flex Key
2TLA050011R1422 Mikey8Z, SS Sol NPT, 24V Met. Flex Key
2TLA050011R2422 Mikey8Z, SS Sol QC, 24V Met. Flex Key
2TLA050011R0423 Mikey8Z, SS Sol M20, 110V Met. Flex Key
2TLA050011R1423 Mikey8Z, SS Sol NPT, 110V Met. Flex Key
2TLA050011R2423 Mikey8Z, SS Sol QC, 110V Met. Flex Key
2TLA050011R0424 Mikey8Z, SS Sol M20, 230V Met. Flex Key
2TLA050011R1424 Mikey8Z, SS Sol NPT, 230V Met. Flex Key
2TLA050011R2424 Mikey8Z, SS Sol QC, 230V Met. Flex Key
2TLA050011R0522 Mikey8Z, SS Sol M20 24V SS Flex Key
2TLA050011R1522 Mikey8Z, SS Sol NPT, 24V SS Flex Key
2TLA050011R2522 Mikey8Z, SS Sol QC, 24V SS Flex Key
2TLA050011R0523 Mikey8Z, SS Sol M20, 110V SS Flex Key
2TLA050011R1523 Mikey8Z, SS Sol NPT, 110V SS Flex Key
2TLA050011R2523 Mikey8Z, SS Sol QC, 110V SS Flex Key
2TLA050011R0524 Mikey8Z, SS Sol M20, 230V SS Flex Key
2TLA050011R1524 Mikey8Z, SS Sol NPT, 230V SS Flex Key
2TLA050011R2524 Mikey8Z, SS Sol QC, 230V SS Flex Key

Quick Connect (QC)
M23 12 way Male Plug
(Pro view from switch)

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<tr>
<th>No.</th>
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Switch Circuit

AABB Jokab Safety Switches | 33
MKey 8ER and MKey 8ERZ Guard locking with manual escape release safety switches

Features:
All the features and specifications of the standard MKey 8 and MKey 8Z are maintained, an extra Rear Manual Release button is provided at the rear of the housing.

Application:
Where the risk assessment for the application permits, a non-latching manual escape release is provided to enable quick release of the switch lock in case of emergency. The switch can be mounted such that access to the release button is available from inside the active guard area.

Pressing and holding the red button will release the lock mechanism and open the lock monitoring contacts whilst the guard can be pushed open.

For all ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted.

Standards
- EN 1088
- IEC 947-5-1
- EN 60947
- EN 60204-1
- ISO 13849-1
- EN 62061
- EN 954-1
- UL 508

Safety Classification and Reliability Data:
- Mechanical Reliability B10d
- EN 954-1
- ISO 13849-1
- EN 60947
- Proof Test Interval (Life)
- MTTfG
- Solenoid Voltage (by part number)
- 24V ac/dc or 110V, ac or 230V, ac
- 12V
- LED 2 Supply Voltage
- 24V dc
- Utilization Category
- AC15 A300 3A
- Thermal Current (Ith)
- 5A
- Rated Insulation / Withstand Voltages
- 600VAC / 2500 VAC
- Travel for Positive Opening
- 10mm
- Actuator entry minimum radius
- 175mm Standard / 60mm Heavy Duty
- Maximum Approach / Withdrawal speed
- 600mm/s
- Body Material
- Mkey 8ER / Die Cast Painted Red / Mkey 8ERZ Stainless Steel 316
- Head Material
- Die Cast Painted Red or Stainless Steel 316
- Enclosure Protection
- Mkey 8ER IP67 / Mkey 8ERZ IP69K
- Operating Temperature
- -25C / 55C
- Vibration
- IEC 68-2-6, 10-55Hz x 11Hz
- Excursion: 0.35mm; 1 octave/min
- Conduit Entry
- Various (See Sales Part Numbers)
- Fixing
- 4 x M5
MKey 8ER and MKey 8ERZ Guard locking with manual escape release safety switches

<table>
<thead>
<tr>
<th>MKey 8ER Standard</th>
<th>MKey 8ERZ Stainless Steel</th>
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</table>
MKey 8M Guard locking metal safety switches

Solenoid Locking Interlock Safety Switches featuring POWER TO LOCK Guard Holding up to 2000N. (200Kg.)

The MKey 8 Series Guard Locking switches have rugged die cast housings and have been developed with a holding force of 2000N to keep large Guard Doors closed until hazards have been removed.

They are Power to Lock – Spring to unlock – suitable for applications where immediate unlocking is required at removal or loss of power. (They are NOT suitable for machines with a running down time).

The rugged Die Cast body provides a durable robust hold closed interlock protection and is available with Stainless Steel Heads for extra durability. Flexible actuators are available to aid where some alignment is a problem.

IP67 enclosure protection is maintained by a double seal lid gasket design and metal fixings.

They have a slim profile and are designed to fit on 50mm (2in.) frame sections or to applications where space is restricted. The Head will rotate to provide up to 8 actuator entry positions.

A LED is available to indicate Lock Status.

Functional Specification:
Positive break contacts to IEC947-5-1
2NC Safety circuits – 2 Solenoid (1 Actuator in series)
1NC 1NO Auxiliary circuits – Actuator / Door Status

For all ABB Jokab Safety Power to Lock switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted and power is applied to the solenoid.

Machine Safety Contacts open when power is released.

High specification polyester housings - Stainless Steel Head

Standards

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN1088</th>
<th>IEC 947-5-1</th>
<th>EN 60204-1</th>
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<td>EN 60201-1</td>
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</table>

Safety Classification and Reliability Data:

- Mechanical Reliability B10d
  - EN 954-1
  - ISO 13849-1

- Safety Data - Annual Usage
  - 8 cycles per hour / 24 hours per day / 365 days
  - 3.44 x 10⁶

- Proof Test Interval (Life)
  - 35 years

- Solenoid Voltage (by part number)
  - 24V ac/dc, or 110V, ac or 230V, ac

- Solenoid Wattage
  - 12W, (12W, 9W, 6W, 3W)

- Utilization Category
  - AC15 A20 3A

- Thermal Current (Ith)
  - 5A

- Rated Insulation / Withstand Voltages
  - 2500VAC / 2500 VAC

- Actuator entry minimum radius
  - 10mm

- Maximum Approach / Withdrawal Speed
  - 600mm/s

- Body Material
  - Die Cast: Painted Red

- Head Material
  - Die Cast: Painted Red

- Enclosure Protection
  - IP67
  - IP56

- Operating Temperature
  - -25°C, 40°C

- Vibration
  - IEC 68-2-6, 10-60Hz<1Hz,
  - Excursion: 0.35mm, 1 octave/min

- Conduit Entry
  - Various (See Sales Part Numbers)

- Fixing
  - 4 x M5
MKey 8M Guard locking metal safety switches

MKey 8M Standard

<table>
<thead>
<tr>
<th>Connector (QC)</th>
<th>M20 12 way Male Plug (Pin view from switch)</th>
<th>Switch Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1 A2</td>
<td>2TLA050013R0032 Mkey8M, Sol M20, 24V No Key</td>
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<td>7</td>
<td>8</td>
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<td>9</td>
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<td>12</td>
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<td>2TLA050013R0034 Mkey8M, Sol M20, 230V No Key</td>
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</tbody>
</table>

MKey 8M Stainless Steel Head

<table>
<thead>
<tr>
<th>Connector (QC)</th>
<th>M20 12 way Male Plug (Pin view from switch)</th>
<th>Switch Circuit</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Schematic Circuit

Dimensions:

- Fixing Holes for MS Screws (4 places)
- END ENTRY
- FRONT ENTRY

ABB Jokab Safety Switches | 37
MKey 9 Guard locking plastic safety switches

Solenoid Locking Interlock Safety Switches featuring Guard Holding up to 1800N. (180Kg.)

The MKey 9 Series Guard Locking switches have a slim plastic body design and have been developed with a holding force of 1800N to keep medium guard Doors closed until hazards have been removed.

The high specification plastic body has a high resistance to chemical and washdown solutions, and the Stainless Steel Head provides a durable robust protection of the cam interlock.

IP67 enclosure protection is maintained by a double seal lid gasket design and metal fixings.

They have a slim profile and are designed to fit on 50mm (2in.) frame sections or to applications where space is restricted. The Head will rotate to provide up to 8 actuator entry positions.

An LED is available to indicate Lock Status.

Accessories include a Sliding Handle Bolt and lock off actuators.

---

Functional Specification:

Positive break contacts to IEC947-5-1

High Functional Safety to ISO 13849-1

2NC Safety Circuits - Solenoid/Lock and Actuator/Guard wired in series
1NO Circuit Auxiliary circuit for indication of actuator status (Guard open)
1NO Circuit Auxiliary circuit for Lock Status (selectable with LED)

---

For all ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted.

---

High specification polyester housings Stainless Steel Head

Connects to most Safety Relays to give up to up to PLe Cat.4.
MKey 9 Guard locking plastic safety switches

<table>
<thead>
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<th>Part Code</th>
<th>MKey 9 Details</th>
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<td>Mkey9, Sol NPT, 24V SS Flex Key</td>
</tr>
<tr>
<td>2TLA050007R2024</td>
<td>Mkey9, Sol QC, 24V SS Flex Key</td>
</tr>
<tr>
<td>2TLA050007R0025</td>
<td>Mkey9, Sol M20, 110V SS Flex Key</td>
</tr>
<tr>
<td>2TLA050007R1025</td>
<td>Mkey9, Sol NPT, 110V SS Flex Key</td>
</tr>
<tr>
<td>2TLA050007R2025</td>
<td>Mkey9, Sol QC, 110V SS Flex Key</td>
</tr>
<tr>
<td>2TLA050007R0026</td>
<td>Mkey9, Sol M20, 230V SS Flex Key</td>
</tr>
<tr>
<td>2TLA050007R1026</td>
<td>Mkey9, Sol NPT, 230V SS Flex Key</td>
</tr>
<tr>
<td>2TLA050007R2026</td>
<td>Mkey9, Sol QC, 230V SS Flex Key</td>
</tr>
</tbody>
</table>
MKey 9M Guard locking plastic safety switches

Solenoid Locking Interlock Safety Switches featuring POWER TO LOCK Guard Holding up to 1800N (180kg.)

The MKey 9M Series Guard Locking switches have a slim plastic body design and have been developed with a holding force of 1800N to keep medium guard doors closed until hazards have been removed.

They are Power to Lock - Spring to unlock - suitable for applications where immediate unlocking is required at removal or loss of power. (They are NOT suitable for machines with a running down time).

The high specification plastic body has a high resistance to chemical and washdown solutions, and the Stainless Steel Head provides a durable robust protection of the cam interlock.

IP67 enclosure protection is maintained by a double seal lid gasket design and metal fixings.

They have a slim profile and are designed to fit on 50mm (2in.) frame sections or to applications where space is restricted.

The Head will rotate to provide up to 8 actuator entry positions.

An LED is available to indicate Lock Status.

**Functional Specification:**

Positive break contacts to IEC947-5-1

2NC Safety Circuits - 2 Solenoid (1 Actuator in series)

1NO Auxiliary circuit - Actuator status

1NO Auxiliary circuit - Selenoid de-energised / unlocked

High specification polyester housings Stainless Steel Head

Machine Safety Contacts open when power is released.

LED Status of solenoid power

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN1088</th>
<th>EEC 947-5-1</th>
<th>EN 60204-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Classification and Reliability Data:</td>
<td>EN 954-1</td>
<td>ISO 13849-1</td>
<td></td>
</tr>
<tr>
<td>Mechanical Reliability B10d</td>
<td>EN 60661</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Data - Annual Usage</td>
<td>MTTfD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof Test Interval (life)</td>
<td>35 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solenoid Voltage (by part number)</td>
<td>24V ac/dc or 110V, ac or 230V, ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solenoid Wattage</td>
<td>12W, (brushe 50W)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilisation Category</td>
<td>AC15 A300 3A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Current (Ith)</td>
<td>5A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated Insulation / Withstand Voltages</td>
<td>600VAC / 2500 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel for Positive Opening</td>
<td>10mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actuator entry minimum radius</td>
<td>175mm Standard 60mm Heavy Duty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Approach / Withdrawal speed</td>
<td>600mm/min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Material</td>
<td>Polystyrene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head Material</td>
<td>Stainless Steel 316</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure Protection</td>
<td>IP67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-25°C, 40°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>50-60Hz+1Hz, Excursion: 0.35mm, 1 octanelim</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduit Entry</td>
<td>Various (See Sales Part Numbers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixing</td>
<td>4 x M5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For all ABB Jokab Safety switches the normally closed (NC) circuits are closed when the guard is closed actuator inserted.
MKey 9M Guard locking plastic safety switches

<table>
<thead>
<tr>
<th>MKey 9M</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050009R0012 Mkey9M, Sol M20, 24V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R1012 Mkey9M, Sol NPT, 24V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R2012 Mkey9M, Sol QC, 24V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R0013 Mkey9M, Sol M20, 110V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R1013 Mkey9M, Sol NPT, 110V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R2013 Mkey9M, Sol QC, 110V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R0014 Mkey9M, Sol M20, 230V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R1014 Mkey9M, Sol NPT, 230V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R2014 Mkey9M, Sol QC, 230V No Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R0015 Mkey9M, Sol M20, 24V Std. Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R1015 Mkey9M, Sol NPT, 24V Std. Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R2015 Mkey9M, Sol QC, 24V Std. Key</td>
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<tr>
<td>2TLA050009R0016 Mkey9M, Sol M20, 110V Std. Key</td>
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<tr>
<td>2TLA050009R1016 Mkey9M, Sol NPT, 110V Std. Key</td>
<td></td>
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<tr>
<td>2TLA050009R2016 Mkey9M, Sol QC, 110V Std. Key</td>
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<tr>
<td>2TLA050009R0017 Mkey9M, Sol M20, 230V Std. Key</td>
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<tr>
<td>2TLA050009R1017 Mkey9M, Sol NPT, 230V Std. Key</td>
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<tr>
<td>2TLA050009R2017 Mkey9M, Sol QC, 230V Std. Key</td>
<td></td>
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<tr>
<td>2TLA050009R0018 Mkey9M, Sol M20, 24V Flat Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R1018 Mkey9M, Sol NPT, 24V Flat Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R2018 Mkey9M, Sol QC, 24V Flat Key</td>
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<tr>
<td>2TLA050009R0019 Mkey9M, Sol M20, 110V Flat Key</td>
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<tr>
<td>2TLA050009R1019 Mkey9M, Sol NPT, 110V Flat Key</td>
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<tr>
<td>2TLA050009R2019 Mkey9M, Sol QC, 110V Flat Key</td>
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<td>2TLA050009R1020 Mkey9M, Sol NPT, 230V Flat Key</td>
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<tr>
<td>2TLA050009R2020 Mkey9M, Sol QC, 230V Flat Key</td>
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<tr>
<td>2TLA050009R0021 Mkey9M, Sol M20, 24V Met. Flex Key</td>
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<tr>
<td>2TLA050009R1021 Mkey9M, Sol NPT, 24V Met. Flex Key</td>
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<td>2TLA050009R2021 Mkey9M, Sol QC, 24V Met. Flex Key</td>
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<td>2TLA050009R0022 Mkey9M, Sol M20, 110V Met. Flex Key</td>
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<td>2TLA050009R2022 Mkey9M, Sol QC, 110V Met. Flex Key</td>
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<tr>
<td>2TLA050009R0023 Mkey9M, Sol M20, 230V Met. Flex Key</td>
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<td>2TLA050009R2023 Mkey9M, Sol QC, 230V Met. Flex Key</td>
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</tr>
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<td>2TLA050009R0024 Mkey9M, Sol M20, 24V SS Flex Key</td>
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<td>2TLA050009R2024 Mkey9M, Sol QC, 24V SS Flex Key</td>
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</tr>
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<td>2TLA050009R0025 Mkey9M, Sol M20, 110V SS Flex Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R1025 Mkey9M, Sol NPT, 110V SS Flex Key</td>
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</tr>
<tr>
<td>2TLA050009R2025 Mkey9M, Sol QC, 110V SS Flex Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R0026 Mkey9M, Sol M20, 230V SS Flex Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R1026 Mkey9M, Sol NPT, 230V SS Flex Key</td>
<td></td>
</tr>
<tr>
<td>2TLA050009R2026 Mkey9M, Sol QC, 230V SS Flex Key</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>Switch Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>M23 12 way Male Plug (Pin view from switch)</td>
<td></td>
</tr>
<tr>
<td>1 3</td>
<td>A1 A2</td>
</tr>
<tr>
<td>4 6</td>
<td>11 / 12</td>
</tr>
<tr>
<td>7 8</td>
<td>21 / 22</td>
</tr>
<tr>
<td>2 5</td>
<td>43 / 44</td>
</tr>
<tr>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>44</td>
</tr>
</tbody>
</table>

Schematic circuit:

Dimensions:

Fixing Holes for M5 Screws (4 places)
MKey Tongue switches with actuator options

**Actuator Dimensions**

<table>
<thead>
<tr>
<th>Actuator Type</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Actuator</td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td>Flat Actuator</td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**MKey Accessories**

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050040R0200</td>
<td>MKey1 Angled Actuator</td>
</tr>
<tr>
<td>2TLA050040R0201</td>
<td>MKey 4,5 Std. Key</td>
</tr>
<tr>
<td>2TLA050040R0202</td>
<td>MKey 4,5,6,8,9 Pla. Flex Key</td>
</tr>
<tr>
<td>2TLA050040R0203</td>
<td>MKey 4,5,6,8,9 Met. Flex Key</td>
</tr>
<tr>
<td>2TLA050040R0204</td>
<td>MKey 6,8,9 SS Flex Key</td>
</tr>
<tr>
<td>2TLA050040R0400</td>
<td>Manual release key</td>
</tr>
<tr>
<td>2TLA050040R0220</td>
<td>MKey 4,5,6,8,9 Flat Actuator</td>
</tr>
<tr>
<td>2TLA050040R0221</td>
<td>MKey 4,5,6 Plastic Flexible Actuator</td>
</tr>
</tbody>
</table>

**Plastic Flexible Actuator**

- **Adjust angle by screw**
- Stainless Steel 316
- Plastic Housing

**Metal Heavy Duty Actuator**

- Heavy Duty Flexible
- Stainless Steel 316
- Die Cast Metal Housing (Black colour)
- Mirror Polished Finish
Notes
## Coded non-contact safety switches

### Operation:
All ABB Jokab Safety Coded Non-Contact Safety Switches are designed to conform to IEC 947-5-3 and be used as directed by ISO12100, ISO14121 and EN 60204-1.

They have coded magnetic sensing which provides a wide sensing distance and provides a high tolerance to misalignment after sensing. They can be fitted behind stainless steel fittings and can operate from 4 directions even in extreme environments of temperature and moisture.

When used in combination with most Dual Channel Safety Monitoring Relays they can be used to provide up to PLe / Category 4 to ISO 13849-1.

They offer a choice of high specification plastic or Stainless Steel 316.

### Features:
- Dual channel electronic safety output 2NC (1NO auxiliary optional)
- Visual LED indication of switch status
- Enclosure Protected to IP67 or IP69K - wash down suitable
- Conformance to IEC 947-5-3, PDF-S
- No moving parts to give high reliability and long life
- Wide sensing distance 14mm

### Plastic versions:
The Plastic Sense range has been developed for non-contact guard door interlocking in the applications of general factory automation packaging and some food processing industries.

### Application:
ABB Jokab Safety Coded Non-Contact switches are designed to interlock hinge, sliding or removal guard doors. They are specifically advantageous when:

- a) poor guard alignment exists
- b) anti tamper sensing is required
- c) high hygiene requirements exist, e.g. food industry hose down
- d) long life is required (no moving or touching parts)
- e) LED status indication is desirable

### Principle:

![Diagram of ABB Jokab Safety Coded Non-Contact switches](image)

Supplied with Screw Cap covers to prevent contamination from food deposits.

Sense 1
- Miniature industry standard design, 22mm fixing centres, available with Left or Right cable exit.

Sense 3
- Universal 22mm fixing centres.

Sense 5
- Industry standard wide fitting, Front face actuation for large guards.

Sense 7
- European industry standard fitting, End cable exit.

Sense 9
- Compact slim fitting housing - suitable for fitting to applications where space is limited.

Sense 11
- M30 threaded body - easy to mount.
Coded non-contact safety switches

Stainless Steel 316 versions:

The Stainless Steel 316 Sense range has been developed for non-contact guard door interlocking in the applications of food processing, pharmaceutical, packaging and chemical industries.

Stainless Steel 316
Can be high pressure hosed at high temperature - IP69K
Designed in accordance with EHEDG guidelines for hygienic design (EHEDG European Hygienic Engineering & Design Group)

The housing designs, surface finish and styling means they can be used in almost any environments subject to high levels of cleaning following contamination from foreign particles.

They are offered with various types of mounting styles to cover different levels of food contact (as described by the EHEDG Design Group),

- Direct contact zone - The switch mounting is designed according to EHEDG hygienic guidelines and also fulfils the requirements of the splash zone
- Splash zone - The switch must be easy to clean and withstand the CIP and SIP cleaning processes found in the food industry (tested IP69K).

Mirror polished finish – Ra4
Can be high pressure hosed at high temperature - IP69K
Designed in accordance with EHEDG guidelines for hygienic design (EHEDG European Hygienic Engineering & Design Group)
Sense 1 Coded non-contact safety switches

Coded Magnetic Actuation
Switching Tolerance up to 10mm

Compact yet robust fitting suitable for all small guard applications.
LED indication.

Hygienic screw covers ensure suitability for Food Processing washdown.
Cost effective interlock solution.
Wide sensing at 10mm.

High Specification polyester housing with backplate
Can be mounted unobtrusively in channels or behind doors left or right cable exit

Up to: Ple ISO 13849-1 SIL 3 EN 62061 Cat.4 EN 954-1
2NC 1NO circuits - High switching life - no moving parts

<table>
<thead>
<tr>
<th>Quick Connect (QC) M12 8 way Male Plug (Pin view from switch)</th>
<th>Flying Lead Colours</th>
<th>Circuit (Actuator Present)</th>
<th>Output Types Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Orange Auxiliary NO</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Brown Auxiliary NO</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Yellow Safety NC2 +ve</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Green Safety NC2 -ve</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Black Safety NC1 +ve</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 White Safety NC1 -ve</td>
<td>Supply 24Vdc +/- 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Red Supply 24Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Blue Supply 24Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Screw Cap Covers

Quick Connect M12 versions fitted with 250mm (10") cable

Specifications
- Switched to 80°C but designed to work up to 100°C
- Will operate with most EN 954-1 Cat.4 Safety Relays

Standards
- EN1088 IEC 947 5 3 EN 60204 1
- ISO 13849-1 IEC 62061 EN 904-1 UL508

Safety Classification and Reliability Data:
- Switching Reliability
  - EN 954-1
  - ISO 13849-1
  - EN 62061
- Safety Data - Annual Usage
  - 8 cycles per hour / 24 cycles per day / 365 days
  - PPHd 2.52 x 10^-4
- MTTFd 47 years
- Safety Channel 1 NC
  - 24V dc 0.2 A Max. Rating
- Safety Channel 2 NC
  - 24V dc 0.2 A Max. Rating
- Safety Channel 3 NO
  - 24V dc 0.2 A Max. Rating
- Minimum switched current
  - 10V dc 1mA
- Electric withstand
  - 250Vac
- Insulation Resistance
  - 100MΩ
- Recommended setting gap
  - 5mm
- Switching Distance
  - 5mm (Target to target)
  - 12mm (Target to guard)
- Tolerance to misalignment
  - 5mm in any direction from 5mm setting gap
- Switching frequency
  - 1.0 Hz maximum
- Approach speed
  - 200mm/s, to 1000mm/s,
- Body Material
  - UL approved polyethylene
- Temperature Range
  - 25°C - 80°C
- Enclosure Protection
  - IP57
- Shock Resistance
  - IEC 68-2-27 11ms 30g
- Vibration Resistance
  - IEC 68-2-6 10-55 Hz, 1mm
- Cable Type
  - PVC 6 or 8 core 6mm O.D.
- Mounting Bolts
  - 2 x M4
- Tightening torque
  - 1.0 Nm
- Mounting Position
  - Any

ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present
Sense 3 Coded non-contact safety switches

**Coded Magnetic Actuation**  **Switching Tolerance up to 14mm**

Will operate with most Safety Relays

Specified to 80°C but designed to work up to 100°C

Universal fitting - established 22mm fixing footprint suitable for most general applications.

Withstands environments where high humidity or hose down is required.

Durable polyester housing.

Wide 14mm sensing and high tolerance to misalignment.

Up to: Ple ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1

2NC 1NO circuits - High switching life - no moving parts

Quick connect versions.

---

**Standards**

Safety Classification and Reliability Data:

- Switching Reliability: 3.3 x 10^7 operations at 100mA load
- EN 954-1
- ISO 13849-1
- Safety Data - Annual Usage: 8 cycles per hour / 24 hours per day / 365 days
- PF/t: 2.5 x 10^-9
- MT/t: 470 years
- Safety Channel 1 NC: 24V, dc 0.2 A Max. Rating
- Safety Channel 2 NC: 24V, dc 0.2 A Max. Rating
- Safety Channel 3 NO: 24V, dc 0.2 A Max. Rating
- Minimum switched current: 1.0V, dc 1mA
- Dielectric withstand: 250V, ac
- Insulation Resistance: 100 Mohms
- Recommended setting gap: 5mm
- Switching Distance: 5mm Close
- Tolerance to misalignment: 5mm in any direction from 5mm setting gap
- Switching frequency: 1.0 Hz maximum
- Approach speed: 100mm/min. to 1000mm/m.
- Body Material: UL approved polyester
- Temperature Range: -25°C to +80°C
- Enclosure Protection: IP66K, IP67
- Shock Resistance: IEC 68-2-27 11ms 30g
- Vibration Resistance: IEC 68-2-6 10-55 Hz, 1mm
- Cable Type: PVC 6 or 8 core 6mm O.D.
- Mounting Bolts: 2 x M4 Tightening torque: 1.0 Nm
- Mounting Position: Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present
Sense 3Z Coded non-contact safety switches

Coded Magnetic Actuation  Switching Tolerance up to 14mm
Will operate with most Safety Relays

Robust Stainless Steel 316 enclosure designed to survive the tough environments of Food and Pharmaceutical applications.

LED indication. Stainless Steel 316 Mirror polish finish (Ra4).

Survives high pressure hosing at high temperature.

High temperature specification 105°C.

Wide 14mm sensing and high tolerance to misalignment.

Universal fitting - established 22mm fixing footprint suitable for most general applications.

Up to:  Ple ISO 13849-1  SIL 3 EN 62061  Cat 4  EN 954-1

2NC 1NO circuits - High switching life - no moving parts

Quick connect versions.

Suitable for CIP SIP cleaning - Food Splash zones EHEDG guidelines

Specifications

- EN1088  IEC 61813-1  EN 62041-1
- ISO 13849-1  EN 62061  EN 954-1  UL508

Safety Classification and Reliability Data:

- Switching Reliability: 3.3 x 10^4 operations at 100mA load
- EN 954-1 up to Category 4 with Safety Relay
- ISO 13849-1 up to Ple depending upon system architecture
- EN 62061 up to SIL3 depending upon system architecture

- Safety Data - Annual Usage: 8 cycles per hour / 24 hours per day / 365 days
- Proof Test Interval (Life): 47 years
- MTTF: 470 years

- Safety Channel 1 NC: 24V dc 0.2 A Max. Rating
- Safety Channel 2 NC: 24V dc 0.2 A Max. Rating
- Safety Channel 3 NO: 24V dc 0.2 A Max. Rating

- Minimum Switched Current: 10V, dc 1mA
- Deflection withstand: 250V ac
- Insulation Resistance: 100 Mohms

- Recommended setting gap: 5mm
- Switching Distance: 500 10mm Close
- Switching Time: 5ar 20mm Open
- Tolerance to misalignment: 5mm in any direction from 5mm setting gap

- Switching frequency: 1.0 Hz maximum
- Approach speed: 200mm/m. to 1000mm/s.
- Body Material: Stainless Steel 316 Mirror polished finish (Ra4)

- Temperature Range: -25 to +105°C
- Enclosure Protection: IP65K IP67
- Shock Resistance: EC 65-2-27 11ms 30g
- Vibration Resistance: EC 65-2-6 10-55 Hz. 1mm
- Cable Type: Pvc 6 or 8 core 6mm O.D.
- Mounting Bolts: 2 x M4 Tightening torque 1.5 Nm
- Mounting Position: Any

- Quick Connect QC (Cable Lengths in Table)
- M12 8 way Male Plug (Pin view from switch)
- Yellow Flyer Lead Colours
- Green Circuit (Actuator Present)
- Black Output Types
- Blue Solid State

<table>
<thead>
<tr>
<th>No.</th>
<th>Lead Colour</th>
<th>Circuit (Actuator Present)</th>
<th>Output Type</th>
<th>Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Orange</td>
<td>Auxiliary NO</td>
<td>200mA Max.</td>
<td>24Vdc</td>
</tr>
<tr>
<td>5</td>
<td>Brown</td>
<td>Auxiliary NO</td>
<td>200mA Max.</td>
<td>24Vdc</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>Safety NC2 +ve</td>
<td>200mA Max.</td>
<td>24Vdc</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>Safety NC2 -ve</td>
<td>200mA Max.</td>
<td>24Vdc</td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>Safety NC1 +ve</td>
<td>200mA Max.</td>
<td>24Vdc</td>
</tr>
<tr>
<td>1</td>
<td>White</td>
<td>Safety NC1 -ve</td>
<td>Supply +24Vdc</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>Supply +24Vdc</td>
<td>Supply 0Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Supply 0Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
<td></td>
</tr>
</tbody>
</table>

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

Stainless Steel Housing

- Tested IP69K (high pressure hosing with detergent at 80°C and 100psi)

- Quick Connect M12 versions fitted with 250mm (1") cable

Sense 3Z Standard

- 2TLA050052R4120 Sense 3Z, SS 2m cable, 2NC/1NO LED
- 2TLA050052R5120 Sense 3Z, SS 5m cable, 2NC/1NO LED
- 2TLA050052R6120 Sense 3Z, SS 10m cable, 2NC/1NO LED
- 2TLA050052R2120 Sense 3Z, SS QC cable, 2NC/1NO LED
- 2TLA050040R0207 Sense 3Z, SS Spare Actuator

ABB Jokab Safety Switches
Sense 3Z Coded non-contact safety switches

**Coded Magnetic Actuation**

**Switching Tolerance up to 14mm**

Stainless Steel 316 housing  
IP69K

Specified to 105C, but designed to work up to 125C.

Specifically designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4).

Suitable for CIP and SIP cleaning - mounting holes are at the rear - no food traps

Universal housing - 22mm fixing hole centre - 50mm wide body

Rear fixing - 2 x M4 tapped holes

Can be high pressure hosed at high temperature - IP69K

Wide 14mm sensing high tolerance to misalignment.

LED indication

Up to:  
- PLe ISO 13849-1 SIL 3 EN 62061 Cat.4 EN 954-1
- 2NC 1NO circuits - High switching life - no moving parts

**Sense 3Z Food Industry**

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>Flying Lead Colours</th>
<th>Circuit (Actuator Present)</th>
<th>Output Types Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Orange</td>
<td>Auxiliary ND</td>
<td>200mA Max., 24Vdc</td>
<td></td>
</tr>
<tr>
<td>5 Brown</td>
<td>Auxiliary NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Yellow</td>
<td>Safety NC2 +ve</td>
<td>200mA Max., 24Vdc</td>
<td></td>
</tr>
<tr>
<td>6 Green</td>
<td>Safety NC2 -ve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Black</td>
<td>Safety NC1 +ve</td>
<td>200mA Max., 24Vdc</td>
<td></td>
</tr>
<tr>
<td>1 White</td>
<td>Safety NC1 -ve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Red</td>
<td>Supply +24Vdc</td>
<td>Supply 24Vdc +/-10%</td>
<td></td>
</tr>
<tr>
<td>3 Blue</td>
<td>Supply 0Vdc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sense 3Z Stainless Steel Housing**

Tested IP69K (high pressure hosing with detergent at 80°C and 100psi)

**Standards**

EN1088  
IEC 947-5-3  
EN 60204-1

**Safety Classification and Reliability Data:**

Switching Reliability  
3.3 x 10⁴ operations at 100mA bad up to Category 4 with Safety Relay

Safety Data - Annual Usage:
8 cycles per hour / 24 hours per day / 365 days

Proof Test Interval (Life): 47 years

Safety Characteristics:
- Safety Channel 1 NC 24V dc 0.2 A Max. Rating
- Safety Channel 2 NC 24V dc 0.2 A Max. Rating
- Safety Channel 3 NO 24V dc 0.2 A Max. Rating
- Minimum switched current 10V, dc 1mA

Dielectric withstand  
250V ac

Insulation Resistance  
100 Mohms

Recommended setting gap  
5mm

Switching Distance:  
Soo 10mm Close  
Sar 20mm Open

Tolerance to misalignment  
5mm in any direction from 5mm setting gap

Switching Frequency  
1.0 Hz maximum

Approach speed  
200mm/min. to 1000mm/min.

Temperature Range  
-25 - 105°C

Temperature Protection  
IIP69K IPR7

Shock Resistance  
IEC 68-2-27 11ms 30g

Vibration Resistance  
IEC 68-2-6 10-55 Hz, 1mm

Cable Type  
PVC - 6 or 8 core 5mm O.D.

Mounting Bolts  
2 x M4  
Tightening torque 1.0 Nm

Mounting Position  
Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Sense 5 Coded non-contact safety switches

Coded Magnetic Actuation  Switching Tolerance up to 14mm
Will operate with most Safety Relays
Slim fitting suitable for all industry applications.
Wide 14mm sensing high tolerance to misalignment.
LED indication - no moving parts - survives shock and vibration
Up to:  Ple ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
2NC  1NO circuits - High switching life - no moving parts
Quick connect versions.

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>M12 8 way Male Plug (Pin view from switch)</th>
<th>Flying Lead Colours</th>
<th>Circuit (Actuator Present)</th>
<th>Output Types</th>
<th>Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Orange</td>
<td>Auxiliary NO</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brown</td>
<td>Auxiliary NO</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>Safety NC2 +ve</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>Safety NC2 -ve</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>Safety NC1 +ve</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>White</td>
<td>Safety NC1 -ve</td>
<td>200mA Max. 24Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>Supply +24Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Supply -0Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sense 5
2TLA050054R100  Sense 5, 2m cable, 2NC/1NO LED
2TLA050054R5100  Sense 5, 5m cable, 2NC/1NO LED
2TLA050054R6100  Sense 5, 10m cable, 2NC/1NO LED
2TLA050054R2100  Sense 5, QC cable, 2NC/1NO LED
2TLA050040R0209  Sense 5, Spare Actuator

Standards
EN1088  IEC 947-5-3  EN 6204-1
ISO 13849-1 EN62061 EN 954-1 UL 508

Safety Classification and Reliability Data:
Switching Reliability
3.3 x 10^9 operations at 100mA load
EN 954-1 up to Category 4 with Safety Relay
ISO 13849-1 up to PLE depending upon system architecture
EN 62061 up to SIL3 depending upon system architecture
Safety Data - Annual Usage
10 cycles per hour / 24 hours per day / 365 days
PFD = 2.52 x 10^-4
Maintenance Intervals (Life)
47 years
MTTFd 470 days
Safety Channel 1 NC
24V, 0.2A, Max. Rating
Safety Channel 2 NC
24V, 0.2A, Max. Rating
Minimum switched current
10V, dc 1mA
Dielectric withstand
250V ac
Insulation Resistance
100 Mohms
Recommended setting gap
5mm
Switching Distance (Target to target)
Soo 10mm Close
Sar 20mm Open
Tolerance to misalignment
5mm in any direction from 5mm setting gap
Switching frequency
1.5 Hz maximum
Approach speed
200mm/min., to 1000mm/s.
Body Material
UL approved polyester
Temperature Range
-25 to +60C
Endurance Pretension
IP 67
Shock Resistance
IEC 68-2-27 11ms 30g
Vibration Resistance
IEC 68-2-6 10-55 Hz, 1mm
Cable Type
PVC 6 or 8 core 5mm O.D.
Mounting Bolts
2 x M4
Mounting Position
Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

50 | ABB Jokab Safety Switches
Sense 5Z Coded non-contact safety switches

Coded Magnetic Actuation       Switching Tolerance up to 14mm

Will operate with most Safety Relays

Specifically designed for Food Processing applications - Stainless Steel 316 Mirror polished (Ra4).
Robust 32mm wide housing - no moving parts - survives shock and vibration
Can be high pressure hosed at high temperature - IP69K
Wide 14mm sensing high tolerance to misalignment.

LED indication
Up to: Ple ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
2NC 1NO circuits - High switching life - no moving parts
Suitable for CIP SIP cleaning - food splash zones EHEDG guidelines

**Sense 5Z**
- 2TLA050054R4120 Sense 5Z, SS 2m cable, 2NC/1NO LED
- 2TLA050054R5120 Sense 5Z, SS 5m cable, 2NC/1NO LED
- 2TLA050054R6120 Sense 5Z, SS 10m cable, 2NC/1NO LED
- 2TLA050054R2120 Sense 5Z, SS QC cable, 2NC/1NO LED
- 2TLA050040R0210 Sense 5Z, SS Spare Actuator

**Specifications**

**Standards**
- EN1088, IEC 947-5-3, EN 60204-1
- ISO 13849-1, EN 62061, EN 954-1, UL508

**Safety Classification and Reliability Data:**
- Switching Reliability: 3.3 x 10^6 operations at 100mA load up to Category 4 with Safety Relay
- EN 954-1: up to SIL3 depending upon system architecture
- EN 62061: up to SIL3 depending upon system architecture
- Safety Data - Annual Usage: 8 cycles per hour / 24 hours per day / 365 days
- Proof Test Interval (Life): 2.52 x 10^3
- MTTF: 47 years
- Safety Channel 1 NC: 24Vdc: 0.2 A Max. Rating
- Safety Channel 2 NC: 24Vdc: 0.2 A Max. Rating
- Safety Channel 3 NO: 24Vdc: 0.2 A Max. Rating
- Minimum switched current: 10V, dc: 1mA
- Dielectric withstand: 250V ac
- Insulation Resistance: 100 Mohms
- Recommended setting gap: 5mm
- Switching Distance: 5mm (Target to target)
- Switching frequency: 1.0 Hz maximum
- Approach speed: 200mm/m, to 1000mm/s
- Body Material: Stainless Steel 316 Mirror polished finish (Ra4)
- Temperature Range: -25 to 105°C
- Enclosure Protection: IP69K
- Shock Resistance: IEC 68-2-27: 11ms 30g
- Vibration Resistance: IEC 68-2-6: 10-55 Hz, 1mm
- Cable Type: PVC: 5 or 8 core, fire retardant O.D.
- Mounting Bolts: 2 x M4: Tightening torque 1.0Nm
- Mounting Position: Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

**Quick Connect (QC)**
- M12 8 way Male Plug (Pin view from switch)
- Flying Lead Colours:
  - 8: Orange - Auxiliary NO
  - 5: Brown - Auxiliary NO
  - 4: Yellow - Safety NC2 +ve
  - 6: Green - Safety NC2 -ve
  - 7: Black - Safety NC1 +ve
  - 1: White - Safety NC1 -ve
  - 2: Red - Supply +24Vdc
  - 3: Blue - Supply 0Vdc

**Output Types Solid State**
- 200mA Max. 24Vdc
- 200mA Max. 24Vdc
**Sense 7 Coded non-contact safety switches**

**Coded Magnetic Actuation**

- Popular European fitting suitable for all industry applications.
- Can be high pressure hosed at high temperature - IP69K
- Wide 14mm sensing - high tolerance to misalignment
- LED indication

**Switching Tolerance up to 14mm**

- Up to: Please ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
- 2NC 1NO circuits - High switching life - no moving parts
- Quick connect versions.

<table>
<thead>
<tr>
<th>Sense 7</th>
<th>2TLA050056R4100 Sense 7, 2m cable, 2NC/1NO LED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2TLA050056R5100 Sense 7, 5m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td></td>
<td>2TLA050056R6100 Sense 7, 10m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td></td>
<td>2TLA050056R2100 Sense 7, QC cable, 2NC/1NO LED</td>
</tr>
<tr>
<td></td>
<td>2TLA050040R0211 Sense 7, Spare Actuator</td>
</tr>
</tbody>
</table>

**Specifications**

- Switching Reliability: 3.3 x 10^5 operations at 100mA load
- EN 954-1 up to Category 4 with Safety Relay
- EN 62061 up to SIL3 depending upon system architecture
- Safety Data - Annual Usage: 8 cycles per hour / 24 hours per day / 365 days
- PPHd: 2.5 x 10^-6
- Proof Test Interval (Life): 47 years
- MTTfD: 470 years
- Safety Channel 1 NC: 24V dc 0.2 A Max. Rating
- Safety Channel 2 NC: 24V dc 0.2 A Max. Rating
- Safety Channel 3 NO: 24V dc 0.2 A Max. Rating
- Minimum switched current: 10V, dc 1mA
- Dielectric withstand: 250V ac
- Insulation Resistance: 100 Mohms
- Recommended setting gap: 5mm
- Switching Distance: 5mm (target to target)
- Tolerance to misalignment: 5mm in any direction from 5mm setting gap
- Switching frequency: 1.0 Hz maximum
- Approach speed: 200mm/s. to 1000mm/s.
- Body Material: UL approved polyester
- Temperature Range: -25 +60°C
- Enclosure Protection: IP66k IP67
- Shock Resistance: IEC 68-2-27 11ms 30g
- Vibration Resistance: IEC 68-2-6 10-55 Hz, 1mm
- Cable Type: PVC 6 or 8 core 6mm O.D.
- Mounting Bolts: 2 x M4, Tightening torque 1.0 Nm
- Mounting Position: Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Sense 7Z Coded non-contact safety switches

Coded Magnetic Actuation  Switching Tolerance up to 14mm

Specifically designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4).
Suitable for CIP cleaning - Food Splash zones EHEGD guidelines
Wide 14mm sensing high tolerance to misalignment.

LED indication
Up to:  Plug ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
2NC 1NO circuits - High switching life - no moving parts
Quick connect versions.

<table>
<thead>
<tr>
<th>Sense 7Z</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050056R4120</td>
<td>Sense 7Z, SS 2m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050056R5120</td>
<td>Sense 7Z, SS 5m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050056R6120</td>
<td>Sense 7Z, SS 10m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050056R2120</td>
<td>Sense 7Z, SS QC cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050040R2122</td>
<td>Sense 7Z, SS Spare Actuator</td>
</tr>
</tbody>
</table>

Standards EN1088  IEC 60479-3, EN 60204-1
ISO 13849-1 EN62061 EN 954-1 UL508

Safety Classification and Reliability Data:

- Switching Reliability 3.3 x 10^6 operations at 100mA load
- EN 954-1 up to Category 4 with Safety Relay
- ISO 13849-1 up to PLe depending upon system architecture
- EN 62061 up to SIL 3 depending upon system architecture

Safety Data - Annual Usage

- Proof Test Interval (Life) 47 years
- MTTF 470 years

- Safety Channel 1 NC 24Vdc 0.2 A Max, Rating
- Safety Channel 2 NC 24Vdc 0.2 A Max, Rating
- Safety Channel 3 NO 24Vdc 0.2 A Max, Rating
- Minimum switched current 10V, dc 1mA
- Dielectric withstand 250V, ac
- Insulation Resistance 100 Mohms

- Recommended setting gap 5mm
- Switching Distance: Max 10mm Close
- (Target to target) Ser 20mm Open
- Tolerance to misalignment 5mm in any direction from 5mm setting gap
- Switching frequency 1.0 Hz maximum
- Approach speed 200mm/m, to 1000mm/s
- Body Material Stainless Steel 316 Mirror polished finish (Ra4)
- Temperature Range -25 to +105C
- Enclosure Protection IP69K IP67
- Shock Resistance IEC 68-2-27 11ms 30g
- Vibration Resistance IEC 68-2-6 10-55 Hz, 1mm
- Cable Type PVC 6 or 8 core 0.5mm O.D.
- Mounting Bolts 2 x M4 Tightening torque 1.0 Nm
- Mounting Position Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

Specified to 105C, but designed to work up to 125C. Will operate with most EN 954-1 Cat.4 Safety Relays

Stainless Steel Housing

Quick Connect M12 versions fitted with 250mm (10") cable

Tested IP69K (high pressure housing with detergent at 80C and 100psi)

Quick Connect (QC)
M12 8 way Male Plug
(Pin view from switch)

<table>
<thead>
<tr>
<th>Flying Lead Colours</th>
<th>Circuit (Actuator Present)</th>
<th>Output Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>Auxiliary NO</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>Brown</td>
<td>Auxiliary NO</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>Yellow</td>
<td>Safety NC2 +ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>Green</td>
<td>Safety NC2 -ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>Black</td>
<td>Safety NC1 +ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>White</td>
<td>Safety NC1 -ve</td>
<td>Supply 24Vdc +/- 10%</td>
</tr>
<tr>
<td>Red</td>
<td>Supply +24Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
</tr>
<tr>
<td>Blue</td>
<td>Supply 0Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
</tr>
</tbody>
</table>
Sense 9 Coded non-contact safety switches

Coded Magnetic Actuation  Switching Tolerance up to 14mm

Slim fitting suitable for all industry applications.
Easy to install within narrow frame structures.
Durable polyester housing.
Wide 14mm sensing and high tolerance to misalignment.
LED indication
Up to: Ple ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
2NC 1NO circuits - High switching life - no moving parts
Quick connect versions.

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>Flying Lead Colours</th>
<th>Circuit (Actuator Present)</th>
<th>Output Types Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 8 way Male Plug (Pin view from switch)</td>
<td>8</td>
<td>Orange</td>
<td>Auxiliary NO</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Brown</td>
<td>Auxiliary NO</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Yellow</td>
<td>Safety NC 1 +ve</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Green</td>
<td>Safety NC 2 -ve</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Black</td>
<td>Safety NC 1 +ve</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>White</td>
<td>Safety NC 1 -ve</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Red</td>
<td>Supply 24Vdc</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Blue</td>
<td>Supply 0Vdc</td>
</tr>
</tbody>
</table>

Specified to 80C, but designed to work up to 100C. Will operate with most Safety Relays

Quick Connect M12 versions fitted with 250mm (10") cable
Sense 9Z Coded non-contact safety switches

Coded Magnetic Actuation
Will operate with most Safety Relays

Switching Tolerance up to 14mm
IP69K

Specified to 105C.
but designed to work up to 125C.

Specifically designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4).

Suitable for CIP cleaning

Industry standard slim 20mm wide housing - can be fitted in narrow channels

Can be high pressure hosed at high temperature - IP69K

Wide 14mm sensing high tolerance to misalignment.

LED indication

Up to: Ple ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
2NC 1NO circuits - High switching life - no moving parts

Suitable for CIP SIP cleaning - Food Splash zones EHEDG guidelines

Sense 9Z Standard

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050058R4120</td>
<td>Sense 9Z, SS 2m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050058R5120</td>
<td>Sense 9Z, SS 5m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050058R6120</td>
<td>Sense 9Z, SS 10m cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050058R2120</td>
<td>Sense 9Z, SS QC cable, 2NC/1NO LED</td>
</tr>
<tr>
<td>2TLA050040R0214</td>
<td>Sense 9Z, SS Spare Actuator</td>
</tr>
</tbody>
</table>

 Standards EN1088 IEC 947-5-3 EN 60204-1
 ISO 13849-1 EN62061 EN 954-1 UL508

Safety Classification and Reliability Data:

- Switching Reliability: 3.3 x 10^6 operations at 100mA load
- EN 954-1: up to Category 4 with Safety Relay
- ISO 13849-1: up to Ple depending upon system architecture
- EN 62061: up to SIL 3 depending upon system architecture
- Safety Data - Annual Usage: 8 cycles per hour x 24 hours per day x 365 days
- PFHd: 2.52 x 10^4
- Proof Test Interval (L/t): 47 years
- MTT/Fd: 470 years
- Safety Channel 1: NC 24 V dc; 0.2 A Max. Rating
- Safety Channel 2: NC 24 V dc; 0.2 A Max. Rating
- Safety Channel 3: NO 24 V dc; 0.2 A Max. Rating
- Minimum switched current: 10 V dc; 1 mA
- Defective withstand: 250 V ac
- Insulation Resistance: 100 Mohms
- Recommended setting gap: 5 mm
- Switching Distance: S 10 mm Close
- (Target to target) S 20 mm Open
- Tolerance to misalignment: 5 mm in any direction from 5 mm setting gap
- Switching frequency: 1.0 Hz maximum
- Approach speed: 200 mm/min. to 1000 mm/s.
- Body Material: Stainless Steel 316 Mirror polished finish (Ra4)
- Temperature Range: –25°C to 105°C.
- Endurance Protection: IP69K IP67
- Shock Resistance: IEC 68-2-27 11ms 30g
- Vibration Resistance: IEC 68-2-6 10-55 Hz 1mm
- Cable Type: PVC 6 or 8 core 4 mm O.D.
- Mounting Bolts: 2 x M4 Tightening torque 1.5 Nm
- Mounting Position: Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

Quick Connect (QC)
M12 8 way Male Plug
(Pin view from switch)

Flying Lead Colours:

- Circuit (Actuator Present)
- Output Types
- Solid State

<table>
<thead>
<tr>
<th>Pin</th>
<th>Colour</th>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Orange</td>
<td>8</td>
<td>Auxiliary NO</td>
<td>8</td>
<td>200mA Max, 24Vdc</td>
</tr>
<tr>
<td>5</td>
<td>Brown</td>
<td>5</td>
<td>Auxiliary NO</td>
<td>5</td>
<td>200mA Max, 24Vdc</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>4</td>
<td>Safety NC2 +ve</td>
<td>4</td>
<td>200mA Max, 24Vdc</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>6</td>
<td>Safety NC2 +ve</td>
<td>6</td>
<td>200mA Max, 24Vdc</td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>7</td>
<td>Safety NC1 +ve</td>
<td>7</td>
<td>200mA Max, 24Vdc</td>
</tr>
<tr>
<td>1</td>
<td>White</td>
<td>1</td>
<td>Safety NC1 -ve</td>
<td>1</td>
<td>Supply 24Vdc +/-10%</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>2</td>
<td>Supply +24Vdc</td>
<td>2</td>
<td>Supply 24Vdc +/-10%</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>3</td>
<td>Supply 0Vdc</td>
<td>3</td>
<td>Supply 24Vdc +/-10%</td>
</tr>
</tbody>
</table>
Sense 9Z Coded non-contact safety switches

Coded Magnetic Actuation  Switching Tolerance up to 14mm

Stainless Steel 316 housing  |  IP69K

- Specified to 105°C, but designed to work up to 125°C.
- Will operate with most Safety Relays

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

<table>
<thead>
<tr>
<th>Quick Connect (QC) M12 8 way Male Plug (Pin view from switch)</th>
<th>Flying Lead Colours</th>
<th>Circuit (Actuator Present)</th>
<th>Output Types Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Orange</td>
<td>Auxiliary NO</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>Safety NC2 +ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>Safety NC2 -ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>Safety NC1 +ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>1</td>
<td>White</td>
<td>Supply +24Vdc</td>
<td>Supply 24Vdc +/- 10%</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>Supply 0Vdc</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standards:
- EN1088  IEC 947-5-3  EN 60204-1
- ISO 13849-1  EN62061  EN 954-1  UL508

Safety Classification:
- Type 4

Environmental Protection:
- IP69K

Mounting Holes:
- Rear mounting holes

Switch Type:
- Switchable

Approach Speed:
- 200mm/min. 1500mm/min.

Body Material:
- Stainless Steel 316 Mirror polished finish (Ra4)

Temperature Range:
- -25 to +105°C

Endorsement Protection:
- P69K, P67

Shock Resistance:
- 60G 2-27 11ms 30g

Vibration Resistance:
- 60-16/6 10-55 Hz, 1mm

Cable Type:
- PVC 6 or 8 core 6mm O.D.

Mounting Bolts:
- 2 x M4 Tightening torque 1.0Nm

Mounting Position:
- Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Sense 11 Coded non-contact safety switches

Coded Magnetic Actuation

Cylindrical fitting suitable for all industry applications.
Easy to install - M30 threaded body - easy to set
Wide 10mm sensing
Robust, suitable for harsh environments
Can be flush mounted
LED indication
Up to: Ple ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
2NC 1NO circuits - High switching life - no moving parts
Quick connect versions.

| Sense 11 | 2TLA050060R4100 | Sense 11, 2m cable, 2NC/1NO LED |
| 2TLA050060R5100 | Sense 11, 5m cable, 2NC/1NO LED |
| 2TLA050060R6100 | Sense 11, 10m cable, 2NC/1NO LED |
| 2TLA050060R2100 | Sense 11, QC cable, 2NC/1NO LED |
| 2TLA050040R0215 | Sense 11, Spare Actuator |

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

Quick Connect M12 versions fitted with 250mm (10") cable

Sensitivity at recommended 4mm setting

Switching Tolerance up to 10mm

Specified to 80C, but designed to work up to 100C.

Will operate with most Safety Relays

Quick Connect (QC) M12 8 way Male Plug
(Pin view from switch)

<table>
<thead>
<tr>
<th>Circuit (Actuator Present)</th>
<th>Output Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Safety NC2 +ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>Black Safety NC1 +ve</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>White Safety NC1 -ve</td>
<td>24Vdc +/-10%</td>
</tr>
<tr>
<td>Red Supply +24Vdc</td>
<td></td>
</tr>
<tr>
<td>Blue Supply 0Vdc</td>
<td></td>
</tr>
<tr>
<td>Orange Auxiliary NO</td>
<td></td>
</tr>
<tr>
<td>Brown Auxiliary NO</td>
<td></td>
</tr>
</tbody>
</table>

Flying Lead Colours

Standards
EN1068 IEC 947-5-3 EN 62064-1
ISO 13849-1 EN50201 EN 954-1 UL508

Safety Classification and Reliability Data:

Switching Reliability
3.3 x 10⁶ operations at 100mA load
up to Category 4 with Safety Relay
up to PL e depending upon system architecture

Safety Data - Annual Usage
8 cycles per hour / 24 hours per day / 365 days
2.5 x 10⁴

Proof Test Interval (Life)
47 years

MTTFd
470 years

Safety Channel 1 NC
24V dc 0.2 A Max. Rating

Safety Channel 2 NC
24V dc 0.2 A Max. Rating

Minimum switched current
10V, dc 1mA

Delectric withstand
2500V ac

Insulation Resistance
100 MΩ minimum

Recommended setting gap
5mm

Switching Distance
Sao 8mm Close
Sat 22mm Open

(Tolerance to misalignment)
5mm in any direction from 5mm setting gap

Switching frequency
1.0 Hz maximum

Approach speed
200mm/mm. to 1000mm/s.

Body Material
UL approved polyester

Temperature Range
−25 to +60C

Endurance Protection
IP66K IP67

Shock Resistance
IEC 68-2-27 11ms 30g

Vibration Resistance
IEC 68-2-6 10-55 Hz, 1mm

Cable Type
PVC 6 or 6 core 6mm O.D.

Mounting Position
Any
Sense 11Z Coded non-contact safety switches

Coded Magnetic Actuation  Switching Tolerance up to 10mm

Cylindrical fitting suitable for all industry applications.
Easy to install - M30 threaded body - easy to set
Wide 10mm sensing - low hysteresis - no moving parts
Suitable to be harsh environments of Food processing and packaging
Can be flush mounted - solid stainless steel 316 housing
LED indication Stainless Steel 316
Up to: Ple ISO 13849-1 SIL 3 EN 62061 Cat 4 EN 954-1
2NC 1NO circuits
Quick connect versions.

Sense 11Z
2TLA050060R4120 Sense 11Z, SS 2m cable, 2NC/1NO LED
2TLA050080R5120 Sense 11Z, SS 5m cable, 2NC/1NO LED
2TLA050060R6120 Sense 11Z, SS 10m cable, 2NC/1NO LED
2TLA050060R2120 Sense 11Z, SS QC cable, 2NC/1NO LED
2TLA050040R0216 Sense 11Z, SS Spare Actuator

Specifications

- Coded Magnetic Actuation
- Switching Tolerance up to 10mm

- Sense 11Z
- 2TLA050060R4120: Sense 11Z, SS 2m cable, 2NC/1NO LED
- 2TLA050080R5120: Sense 11Z, SS 5m cable, 2NC/1NO LED
- 2TLA050060R6120: Sense 11Z, SS 10m cable, 2NC/1NO LED
- 2TLA050060R2120: Sense 11Z, SS QC cable, 2NC/1NO LED
- 2TLA050040R0216: Sense 11Z, SS Spare Actuator

- Specified to 105°C, but designed to work up to 125°C.
- Will operate with most Safety Relays

- Stainless Steel Housing
- Quick Connect M12 versions fitted with 250mm (10") cable
- Tested IP69K (high pressure hosing with detergent at 80°C and 100psi)
- Sensitivity at recommended 4mm setting

- Can be flush mounted

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present

Standards
- EN1088  IEC 947-5-3  EN 60204-1
- ISO 13849-1  EN 62061  EN 954-1  UL508

Safety Classification and Reliability Data:
- Switching Reliability: 3.3 x 10^-6 operations at 100mA load
  up to Category 4 with Safety Relay
- EN 954-1  ISO 13849-1
- up to Ple depending upon system architecture
- EN 62061  up to SIL3 depending upon system architecture
- Safety Data - Annual Usage
  - PFTd 6 cycles per hour / 24 hours per day / 365 days
  - PFTd 2.52 x 10^-8
- Proof Test Interval (Life): 47 years
- MTTFd: 470 years
- Safety Channel 1: NC
  - 24Vdc 0.2 A Max. Rating
- Safety Channel 2: NC
  - 24Vdc 0.2 A Max. Rating
- Safety Channel 3: NO
  - 24Vdc 0.2 A Max. Rating
- Minimum switched current: 10V, dc 1mA
- Dielectric withstand: 250Vac
- Insulation Resistance: 100 Mohms
- Recommended setting gap: 5mm
- Switching Distance: 3mm
  - 2mm Close
  - 5mm Open
- Tolerance to misalignment: 5mm in any direction from 5mm setting gap
- Switching frequency: 1.0 Hz maximum
- Approach speed: 200mm/min, to 1000mm/s
- Body Material: Stainless Steel 316 Mirror polished finish (Ra4)
- Temperature Range: -25 +105°C
- Enclosure Protection: IP69K IP67
- Shock Resistance: EC 68-2-27 11ms 30g
- Vibration Resistance: EC 68-2-6 10-55 Hz. 1mm
- Cable Type: PVC 6 or 8 core 6mm O.D.
- Mounting Bolts: 2 x M4 Tightening torque 1.0 Nm
- Mounting Position: Any

Quick Connect (QC)
- M12 8 way Male Plug
- (Pin view from switch)

Flying Lead Colours

<table>
<thead>
<tr>
<th>Circuit (Actuator Present)</th>
<th>Output Types Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Orange</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>5 Brown</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>4 Yellow</td>
<td>200mA Max. 24Vdc</td>
</tr>
<tr>
<td>6 Green</td>
<td>Supply +24Vdc</td>
</tr>
<tr>
<td>7 Black</td>
<td>Supply -24Vdc</td>
</tr>
<tr>
<td>1 White</td>
<td>Supply 0Vdc</td>
</tr>
<tr>
<td>2 Red</td>
<td>Supply 24Vdc +/- 10%</td>
</tr>
</tbody>
</table>

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Notes
Magnetic non-contact safety switches

Operation:

All ABB Jokab Safety Magnetic Non-Contact Safety Switches are designed to conform to IEC 947-5-3 and be used as directed by ISO12100, ISO14121 and EN 60204-1.

They have magnetic sensing which provides a wide (>12mm) sensing distance and provides a high tolerance to misalignment after sensing.

They can operate from 4 directions even in extreme environments of temperature and moisture.

They have volt free high power switching capability (either 1A. or 2A. ac/dc) and can be used independently to switch low risk applications, or connect to a Safety Relay to provide higher safety levels.

Features:

Magnetic High Power Switching up to 230V.ac 2A.
Dual channel safety output 2NC (1NO auxiliary optional)
Wide switching distance up to 12mm
High tolerance to guard misalignment
Enclosure Protected to IP67 or IP69K
Conformance to IEC 947-5-3 PDF-S PDF-D

Plastic versions:

The Plastic Sense range has been developed for non-contact guard door interlocking in the applications of general factory automation, packaging and some food processing industries.

Supply with Screw Cap prevent contamination from deposits.

Sense 2
Miniature industry standard design.
22mm fixing centres, available with Left or Right cable exit.

Sense 4
Universal 22mm fixing centres.

Sense 6
Industry standard wide fitting,
Front face actuation for large guards.

Sense 8
European industry standard fitting,
End cable exit.

Sense 10
Compact slim fitting housing - suitable for fitting to applications where space is limited.

Sense 12
M30 threaded body – easy to mount

Application:

ABB Jokab Safety Coded Non-Contact switches are designed to interlock hinge, sliding or removal guard doors.

They are specifically advantageous when:

a) poor guard alignment exists and a wide tolerance to misalignment is required
b) high hygiene is required e.g. food industry hose down
c) high switching capacity is required

When used in combination with Dual Channel Safety Relays they can be used to provide up to: Plc / Category 4 to ISO 13849-1

Choice of miniature, compact, wide or barrel type housings.

Choice of high specification plastic or Stainless Steel 316 (Food Industry Compatible)

High temperature stability up to 80°C (Plastic) and 105°C (Stainless Steel)

Resistance to many organic and inorganic chemicals

Resistant to high temperature hosing and detergent washdown

Volt free contacts – up to 230V.ac 2A. and 24V.dc 2A. (Internally Fused)
Sense Z Magnetic non-contact safety switches

**Stainless Steel 316 versions:**
The Stainless Steel 316 Sense Z range has been developed for non-contact guard door interlocking in the application for Food Processing, Pharmaceutical, Packing and Chemical Industries.

**Stainless Steel 316**
Can be high pressure hosed at high temperature - IP69K

**Sense Z**
Wide 12mm sensing high tolerance to misalignment

**Sense 6Z**
Designed in accordance with EHEDG guidelines for hygienic design (EHEDG European Hygienic Engineering & Design Group)

The housing designs, surface finish and styling means they can be used in almost any environments subject to high levels of cleaning following contamination from foreign particles.

They are offered with various types of mounting styles to cover different levels of food contact (as described by the EHEDG Design Group).

- Direct contact zone - The switch mounting is designed according to EHEDG hygienic guidelines and also fulfils the requirements of the splash zone
- Splash zone - The switch must be easy to clean and withstand the CIP and SIP cleaning processes found in the food industry (tested IP69K).

**Mirror polished finish – Ra4**
Can be high pressure hosed at high temperature - IP69K

**Suitable for CIP and SIP cleaning**
Can be mounted on steel structures

**Designed in accordance with EHEDG guidelines for hygienic design (EHEDG European Hygienic Engineering & Design Group)**

---

**Sense 4Z**
Universal 22mm fixing centres - suitable for food splash zones.

**Sense 4Z (Food)**
Universal 22mm fixing centres.
Rear fixing - M4 tapped holes at rear of housing.
Suitable for food contact zones.

**Sense 6Z**
Industry standard wide fitting - suitable for food splash zones.
Front face actuation.

**Sense 8Z**
European industry standard fitting - suitable for food splash zones.

**Sense 10Z**
Compact slim fitting housing - suitable for food splash zones. Can be fitted to applications where space is restricted.

**Sense 10Z (Food)**
Compact slim fitting housing.
Rear fixing - M4 tapped holes at rear of housing.
Suitable for food contact zones.

**Sense 12Z**
M30 thread - suitable for some food contact zones.
Sense 2 Magnetic non-contact safety switches

**Magnetic Actuation**

Will operate with most Safety Relays

Compact yet robust fitting suitable for all small guard applications.

Can be mounted unobtrusively in channels or behind doors – left or right cable exit

Hygienic screw cap covers ensure suitability for Food Processing washdown.

Cost effective interlock solution.

Wide sensing at 12mm and high tolerance to misalignment.

High current switching capability to 0.5A,

Up to: PLe ISO 13849 1  SIL 3 EN 62061  Cat.4 EN 954 1

2NC 1NO circuits

Quick connect versions M12 - 8 way or M8 - 4 way

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**Specified to 80C. but designed to work up to 100C.**

**Plastic Housing**

Screw Cap Covers

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**Sense 2**

- 2TLA050070R4108 Sense 2, 2m cable Rt. 2NC/1NO
- 2TLA050070R5108 Sense 2, 5m cable Rt. 2NC/1NO
- 2TLA050070R6108 Sense 2, 10m cable Rt. 2NC/1NO
- 2TLA050070R2108 Sense 2, QC cable Rt. 2NC/1NO
- 2TLA050070R4107 Sense 2, 2m cable Lt. 2NC/1NO
- 2TLA050070R5107 Sense 2, 5m cable Lt. 2NC/1NO
- 2TLA050070R6107 Sense 2, 10m cable Lt. 2NC/1NO
- 2TLA050070R2107 Sense 2, QC cable Lt. 2NC/1NO
- 2TLA050070R3108 Sense 2, M8 QC Lt. 2NC/1NO
- 2TLA050070R3107 Sense 2, M8 QC Lt. 2NC/1NO
- 2TLA050040R0217 Sense 2, Spare Actuator

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For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Magnetic Actuation - Power series

Medium Duty versions 230V.ac / 24V.dc 1A.

Switching Tolerance up to 12mm

Universal fitting - established 22mm fixing footprint suitable for most general applications.
Can be high pressure hosed at high temperature - IP69K.
Withstands environments where high humidity or hose down is required.
Durable polyester housing.
Wide 12mm sensing – high tolerance to misalignment.
Long life high switching capability to 1A.
Up to: PLe ISO 13849-1 SIL 3 EN 62061 Cat.4 EN 954-1
2NC 1NO circuits

Quick connect versions

Quick Connect (QC)

<table>
<thead>
<tr>
<th>M12 8 Way Male Pkg</th>
<th>Pin view from switch</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yellow</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>NC2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>White</td>
<td>NC2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>NC1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>NC1</td>
<td></td>
</tr>
</tbody>
</table>

Specifications:
- Specified to 80C, but designed to work up to 100C.
- Will operate with most Safety Relays
- Quick Connect M12 versions fitted with 250mm (10") cable
- Sense 4, 2m cable, 2NC/1NO
- Sense 4, 5m cable, 2NC/1NO
- Sense 4, 10m cable, 2NC/1NO
- Sense 4, QC cable, 2NC/1NO

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Sense 4Z Magnetic non-contact safety switches

**Magnetic Actuation - Power series**  230V.ac 1.0A. / 24V.dc 1.0A.  IP69K

**Switching Tolerance up to 12mm**

- Specifically designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4).
- Suitable for CIP SIP cleaning - Food Splash Zones EHEDG guidelines
- Universal Housing - 22mm fixing hole centre - 50mm wide body
- Can be high pressure hosed at high temperature - IP69K
- Wide 12mm sensing high tolerance to misalignment
- High switching capability - up to 1A.

Up to : P. L.e ISO 13849-1 SIL 3 EN 62061 Cat. 4 EN 954-1

Quick connect versions

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 8 Way Male Plug Pin view from switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>NO</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>NO</td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>NC2</td>
</tr>
<tr>
<td>1</td>
<td>White</td>
<td>NC2</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>NC1</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>NC1</td>
</tr>
</tbody>
</table>

**Sense 4Z Standard**

- 2TLA050072R4120 Sense 4, SS 2m cable, 2NC/1NO
- 2TLA050072R5120 Sense 4, SS 5m cable, 2NC/1NO
- 2TLA050072R6120 Sense 4, SS 10m cable, 2NC/1NO
- 2TLA050072R2120 Sense 4, SS QC cable, 2NC/1NO

**Specifications**

- Standards: EN60079-5-2, EN 60204-1, ISO 13849-1
- Safety Classification and Reliability Data:
  - Mechanical Reliability: 3.3 x 10^6 operations at 100mA load
  - EN 954-1
  - ISO 13849-1
  - EN 62061
  - Safety Data - Annual Usage: 8 cycles per hour / 24 hours per day / 365 days: 2.52 x 10^4
  - Proof Test Interval (Life): 47 years
  - MTTF: 470 years
  - Safety Channel 1 NC: Voltage free: 250V, 1.0 A Max. Rating
  - Safety Channel 2 NC: Voltage free: 250V, 1.0 A Max. Rating
  - Safety Channel 3 NO: Voltage free: 24V, 0.2 A Max. Rating
  - Internal 1.0 A, (F): External 0.8 A (F) (User)
  - Contact release time: <5ms
  - Initial contact resistance: <500 milliohm
  - Minimum switched current: 10V, dc 1mA
  - Dielectric withstand: 250V ac
  - Insulation Resistance: 100 Mohms
  - Recommended setting gap: 5mm
  - Switching Distance (Target to target): 10mm Close
  - Sar: 22mm Open
  - Tolerance to misalignment: 5mm in any direction from 5mm setting gap
  - Switching frequency: 1.0 Hz maximum
  - Approach speed: 200mm/min. to 1000mm/s.
  - Body Material: Stainless Steel 316 Mirror polished finish (Ra4)
  - Temperature Range: -25 +105C
  - Enclosure Protection: IP69K (NEMA PW12) / IP67 (NEMA 5)
  - Shock Resistance: IEC 68-2-27 11ms
  - Vibration Resistance: IEC 68-2-6 10-55 Hz, 1mm
  - Cable Type: PVC, 6 core, 6mm OD
  - Mounting Bolts: 2 x M4
  - Mounting Position: Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Sense 4Z Magnetic non-contact safety switches

**Magnetic Actuation - Power series**

Medium Duty 230V.ac 1.0A. / 24V.dc 1.0A.

**Switching Tolerance up to 12mm**

Temperatures up to 105°C.

Specified to 105C, but designed to work up to 125C.

Will operate with most Safety Relays

No Food Trap Housing - Rear Mounting Holes

Stainless Steel Housing

**Sense 4Z (Food industry)**

2TLA050072R4150 Sense 4, SS 2m cable, 2NC/1NO

2TLA050072R5150 Sense 4, SS 5m cable, 2NC/1NO

2TLA050072R6150 Sense 4, SS 10m cable, 2NC/1NO

2TLA050072R2150 Sense 4, SS QC cable, 2NC/1NO

---

**Quick Connect (QC)**

<table>
<thead>
<tr>
<th>Pin view from switch</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Yellow</td>
<td>NO</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>NO</td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>NC2</td>
</tr>
<tr>
<td>8</td>
<td>White</td>
<td>NC2</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>NC1</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>NC1</td>
</tr>
</tbody>
</table>

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present

---

**Sense 4Z Magnetic non-contact safety switches**

Specifically designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4), Suitable for CIP SIP cleaning - mounting holes are at the rear - no food traps Suitable for Food Contact Zones - EHEDG guidelines

Universal Housing - 22mm fixing hole centre - 50mm wide body

Can be high pressure hosed at high temperature - IP69K

Wide 12mm sensing high tolerance to misalignment

High switching capability - up to 1A.

Up to : PLe ISO 13849-1 SIL 3 EN 62061 Cat. 4 EN 954-1

2NC + 1NC circuits

Quick connect versions

---

**Standards**

EN1088 IEC 947-5-3 EN 60204-1

ISO 13849-1 EN 60841 UL508

Safety Classification and Reliability Data:

Mechanical/Reliability B10h

3,3 x 10^6 operations at 100nm load up to Category 4 with Safety Relay

up to PLe depending upon system architecture

up to SIL3 depending upon system architecture

Safety Data - Annual Usage

PFHd

0.75%

Proof Test Interval (L6)

47 years

MTTFd

470 years

Safety Channel 1 NC Voltage free : 250V.ac 1.0 A Max. Rating

Safety Channel 2 NC Voltage free : 250V.ac 1.0 A Max. Rating

Safety Channel 3 NO Voltage free : 240Vdc 0.2 A Max. Rating

Fuse Internal 1.0 A (F) External 0.5A (F) (User)

Contact release time: <2ms

Initial contact resistance: <500 milliohm

Minimum switching current: 16V, dc 1mA

Dielectric withstand: 250V.ac

Insulation Resistance: 100 Megohms

Recommended setting gap: 5mm

Switching Distance: 50 10mm Close

50 22mm Open

Tolerance to misalignment: 5mm in any direction from 5mm setting gap

Switching Frequency: 1.0 Hz maximum

Approach speed: 250mm/min to 1000mm/min

Body Material: Stainless Steel 316 Mirror polished finish (Ra4)

Temperature Range: -25 to 105°C.

Endurance Protection: P69K (NEMA PW12) P67 (NEMA 6)

Shock Resistance: EC 68-2-27 11ms 30g

Vibration Resistance: EC 68-2-6 10-45 Hz. 1mm

Cable Type: PVC 6 core 6mm O.D.

Mounting Bolts: 2 x M4 Tightening torque 1.0 Nm

Mounting Position: Any
Sense 6 Magnetic non-contact safety switches

Magnetic Actuation - Power series

Heavy Duty 230V.ac / 24V.dc 2.0A.

Switching Tolerance up to 12mm

Robust wide fitting suitable for all industry applications.
Can be high pressure hosed at high temperature - IP69K
Wide 12mm sensing high tolerance to misalignment.
High switching capability - Heavy Duty 2A.

Up to: PLe ISO 13849-1  SIL 3  EN 62061  Cat.4  EN 954-1

Quick Connect M12 versions fitted with 250mm (10") cable

Specified to 80C, but designed to work up to 100C.
Will operate with most Safety Relays

---

Sense 6
2TLA050074R4100 Sense 6, 2m cable, 2NC/1NO
2TLA050074R5100 Sense 6, 5m cable, 2NC/1NO
2TLA050074R6100 Sense 6, 10m cable, 2NC/1NO
2TLA050074R2100 Sense 6, QC cable, 2NC/1NO
Sense 6Z Magnetic non-contact safety switches

Magnetic Actuation - Power series

Heavy Duty 230V.ac / 24V.dc 2.0A.

Switching Tolerance up to 12mm IP69K

Specially designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4).
Suitable for CIP SIP cleaning - Food splash Zones EHEDG guidelines
Industry standard fixings - can be high pressure hosed at high temperature - IP69K
Wide 12mm sensing high tolerance to misalignment
High switching capability - Heavy Duty 2A.

Up to : Ple ISO 13849-1 SIL 3 EN 62061 Cat. 4 EN 954-1

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 8 Way Male Plug</td>
<td>Yellow</td>
<td>NO</td>
</tr>
<tr>
<td>Pin view from switch</td>
<td>6</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Sense 6Z

2TLA050074RA120 Sense 6, SS 2m cable, 2NC/1NO
2TLA050074RS120 Sense 6, SS 5m cable, 2NC/1NO
2TLA050074RB120 Sense 6, SS 10m cable, 2NC/1NO
2TLA050074RC120 Sense 6, SS QC cable, 2NC/1NO
Sense 8 Magnetic non-contact safety switches

**Magnetic Actuation - Power series**

**Switching Tolerance up to 12mm**

**Medium Duty versions**  230V.ac / 24V.dc 1A.

Popular European fitting suitable for all industry applications.

Wide 12mm sensing – high tolerance to misalignment

Narrow fitting for flush mounting

Long Life High Power switching capability up to 1A.

Up to:  PLe ISO 13849-1  SIL 3  EN 62061  Cat.4  EN 954-1

2NC + 1NO circuits

Quick connect versions

**Sense 8**

<table>
<thead>
<tr>
<th>Code</th>
<th>M12 8 Way Male Plug</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050076R1100</td>
<td>Sense 8, 2m cable, 2NC/1NO</td>
<td>Yellow</td>
<td>NO</td>
</tr>
<tr>
<td>2TLA050076R5100</td>
<td>Sense 8, 5m cable, 2NC/1NO</td>
<td>Green</td>
<td>NO</td>
</tr>
<tr>
<td>2TLA050076R6100</td>
<td>Sense 8, 10m cable, 2NC/1NO</td>
<td>Black</td>
<td>NC2</td>
</tr>
<tr>
<td>2TLA050076R2100</td>
<td>Sense 5, QC cable, 2NC/1NO</td>
<td>White</td>
<td>NC2</td>
</tr>
<tr>
<td>2TLA050076R3100</td>
<td>Sense 3, QC cable, 2NC/1NO</td>
<td>Red</td>
<td>NC1</td>
</tr>
<tr>
<td>2TLA050076R4100</td>
<td>Sense 4, QC cable, 2NC/1NO</td>
<td>Blue</td>
<td>NC1</td>
</tr>
</tbody>
</table>

**Quick Connect M12 versions fitted with 250mm (10”) cable**

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
**Sense 8Z Magnetic non-contact safety switches**

**Magnetic Actuation - Power series**

**Medium Duty versions** 230V.ac / 24V.dc 1A.

**Switching Tolerance up to 12mm**

Specially designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4).

Suitable for CIP SIP cleaning - Food splash Zones EHEDG guidelines - IP69K

Popular European fitting suitable for all industry applications.

Wide 12mm sensing - high tolerance to misalignment

Narrow fitting for flush mounting and high temperature hosing

Long Life High Power switching capability up to 1A.

Up to PLe ISO 13849-1 SIL 3 EN 62061 Cat. 4 EN 954-1

2NC + 1NC circuits

Quick connect versions

---

**Sense 8Z**

- 2TLA050076R4120 Sense 8, SS 2m cable, 2NC/1NO
- 2TLA050076R5120 Sense 8, SS 5m cable, 2NC/1NO
- 2TLA050076R6120 Sense 8, SS 10m cable, 2NC/1NO
- 2TLA050076R2120 Sense 8, SS QC cable, 2NC/1NO

---

**Quick Connect (QC)**

<table>
<thead>
<tr>
<th>M12 8 Way Male Plug</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin view from switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>NO</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>NC2</td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>NC2</td>
</tr>
<tr>
<td>1</td>
<td>White</td>
<td>NC2</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>NC1</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>NC1</td>
</tr>
</tbody>
</table>

---

**Specifications**

- **Standards**: EN 60947-5-3, EN 60204-1, EN 954-1, UL508
- **Safety Classification and Reliability Data**:
  - Mechanical Reliability B10d: 3.3 x 10⁹ operations at 100mA load
  - EN 954-1: up to Category 4 with Safety Relay
  - ISO 13849-1: up to PLe depending upon system architecture
  - EN 62061: up to SIL 3 depending upon system architecture
- **Safety Data - Annual Usage**:
  - 8 cycles per hour / 24 hours per day / 365 days
  - PFHd: 2.52 x 10⁴
- **Proof Test Interval (Life)**: 47 years
- **MTT/Fd**: 470 years

**Medium Duty Safety Channel 1 NC**
- Voltage: Free, 250V ac 1.0 A Max. Rating
- Safety Channel 2 NC
- Voltage: Free, 250V ac 1.0 A Max. Rating
- Safety Channel 3 NO
- Voltage: Free, 250V dc 0.2 A Max. Rating
- Medium Duty Fuse
  - Internal 1.0 A, F (External 0.8 A, F (User))
- Contact release time: <2ms
- Initial contact resistance: <500 milliohm
- Minimum switched current: 10V, dc 1mA
- Dielectric withstand: 250V ac
- Insulation Resistance: 100 Mohms
- Recommended setting gap: 5mm
- Switching Distance:
  - (Target to target): 10mm Close
  - (Target to open): 22mm Open
- Tolerance to misalignment: 5mm in any direction from 5mm setting gap
- Switching frequency: 1.0 Hz maximum
- Approach speed: 200mm/sec. to 1000mm/sec.
- Body Material: Stainless Steel 316 Mirror polished finish (Ra4).
- Temperature Range: -25 to +65°C
- Endurance Protection: IP69K (NEMA, IP67)
- Shock Resistance: IEC 68-2-27; 11ms 30g
- Vibration Resistance: IEC 68-2-6; 10-55 Hz, 1mm
- Cable Type: PVC 6 core 6mm 0.22
- Mounting Bolts: 2 x M4, Tightening torque 1.0 Nm
- Mounting Position: Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Sense 10 Magnetic non-contact safety switches

Magnetic Actuation – Power series

Switching Tolerance up to 12mm

Can be high pressure hosed at high temperature - **IP69K**

Slim fitting suitable for all industry applications.

Easy to install within narrow frame structures.

Operates from 2 sides for ease of application.

Wide 12mm sensing high tolerance to misalignment.

High switching capability - Medium Duty 1A.

Up to: **PLe ISO 13849-1**  **SIL 3**  **EN 62061**  **Cat.4**  **EN 954-1**

2NC + 1NO circuits

Quick connect versions

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 8 Way Male Plug Pin view from switch</td>
<td>Yellow</td>
<td>NO</td>
</tr>
<tr>
<td>4</td>
<td>Green</td>
<td>NC</td>
</tr>
<tr>
<td>7</td>
<td>White</td>
<td>NC2</td>
</tr>
<tr>
<td>1</td>
<td>Red</td>
<td>NC1</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>NC1</td>
</tr>
</tbody>
</table>

**Sense 10**

- 2TLA050078R4100 Sense 10, 2m cable, 2NC/1NO
- 2TLA050078R5100 Sense 10, 5m cable, 2NC/1NO
- 2TLA050078R6100 Sense 10, 10m cable, 2NC/1NO
- 2TLA050078R2100 Sense 10, QC cable, 2NC/1NO

Specified to 80°C, but designed to work up to 100°C. Will operate with most Safety Relays

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.
Sense 10Z Magnetic non-contact safety switches

**Magnetic Actuation - Power series**

Switching Tolerance up to 12mm

Specified to 105°C, but designed to work up to 125°C.
Will operate with most Safety Relays

**Stainless Steel Housing**

Quick Connect M12 versions fitted with 250mm (10") cable

Standards
- EN1088
- IEC 947-5-3
- EN 60204-1
- ISO 13849-1
- EN 62061
- EN 50155

Safety Classification and Reliability Data:
- Mechanical Reliability BT6d: 3.3 x 10^9 operations at 100mA load
- EN 954-1
- ISO 13849-1
- EN 62061
- Safety Data - Annual Usage
- PPHd: up to Category 4 with Safety Relay
- MTTFd: up to PLe depending upon system architecture
- 3 cycles per hour / 24 hours per day / 365 days
- 2.6 x 10^4
- 47 years
- 470 years

Medium Duty Safety Channel 1 NC
- Safety Channel 2 NC
- Safety Channel 3 NO
- Fuse: 10Vdc, 1mA
- Contact release time: 2ms
- Initial contact resistance: <500 milliOhms
- Minimum switched current: 10Vdc, 1mA
- Dielectric withstand: 250Vac
- Insulation Resistance: 100 MegOhms
- Recommended setting gap: 5mm
- Switching Distance: 10mm clearance
- (Target to target)
- Tolerance to misalignment: 5mm in any direction from 5mm setting gap
- Switching frequency: 1.0 Hz maximum
- Approach speed: 200mm/min. to 1000mm/min.
- Body Material: Stainless Steel 316 Mirror polished finish (Ra4)
- Temperature Range: -25°C +105°C
- Endurance Protection: IP65K (NEMA PW12)
P67 (NEMA 6)
- Shock Resistance: IEC 68-2-27 11ms 30g
- Vibration Resistance: IEC 68-2-6 10-55 Hz 1mm
- Cable Type: PVC, 6 core 5mm O.D.
- Mounting Bolts: 2 x M4
- Mounting Position: Any

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present.

<table>
<thead>
<tr>
<th>Quick Connect (QC)</th>
<th>Standard Lead</th>
<th>Circuit (Actuator Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 8 Way Male Plug</td>
<td>Yellow</td>
<td>NO</td>
</tr>
<tr>
<td>Pin view from switch</td>
<td>4</td>
<td>Yellow</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>NO</td>
</tr>
<tr>
<td>7</td>
<td>Black</td>
<td>NC2</td>
</tr>
<tr>
<td>1</td>
<td>White</td>
<td>NC2</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>NC1</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>NC1</td>
</tr>
</tbody>
</table>

**Sense 10Z Standard**

- 2TLA05007BR4120 Sense 10, SS 2m cable, 2NC/1NO
- 2TLA05007BSR5120 Sense 10, SS 5m cable, 2NC/1NO
- 2TLA05007BSR6120 Sense 10, SS 10m cable, 2NC/1NO
- 2TLA05007BSR2120 Sense 10, SS QC cable, 2NC/1NO
Sense 10Z Magnetic non-contact safety switches

Magnetic Actuation - Power series
Switching Tolerance up to 12mm

No Food Trap Housing Rear Mounting Holes
IP69K

Specified to 105C, but designed to work up to 125C.
Will operate with most Safety Relays

Specially designed for Food Processing applications - Stainless Steel 316 Mirror polished finish (Ra4).
Suitable for CIP SIP cleaning - mounting holes are at the rear - no food traps
Suitable for Food Contact Zones - EHEDG guidelines
Industry standard fixings - can be high pressure hosed at high temperature
Wide 12mm sensing high tolerance to misalignment
High switching capability - up to 1A.
Up to : PLe ISO 13849-1 SIL 3 EN 62061 Cat. 4 EN 954-1

Sense 10Z Food Industry
2TLA050078R4150 Sense 10, SS 2m cable, 2NC/1NO
2TLA050078R5150 Sense 10, SS 5m cable, 2NC/1NO
2TLA050078R6150 Sense 10, SS 10m cable, 2NC/1NO
2TLA050078R2150 Sense 10, SS QC cable, 2NC/1NO

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present

Quick Connect (QC) M12 8 Way Male Plug Pin view from switch

<table>
<thead>
<tr>
<th>Quick Connect (QC) M12 8 Way Male Plug Pin view from switch</th>
<th>Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
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<td>4</td>
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<td>NC</td>
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</tr>
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<td>NC1</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>NC1</td>
</tr>
</tbody>
</table>

STAINLESS STEEL HOUSING
Quick Connect M12 versions fitted with 250mm (1") cable

Standards
EN/IEC 947-5-3 EN 60204-1
ISO 13849-1 EN62061 EN 954-1 UL508

Safety Classification and Reliability Data:
Mechanical Reliability 810G
EN 954-1 up to Category 4 with Safety Relay
ISO 13849-1 up to PLe depending upon system architecture
EN 62061 up to SIL3 depending upon system architecture
Safety Data - Annual Usage
8 cycles per hour / 24 hours per day / 365 days
2.5 x 10^6
Proof Test Interval (Life)
MTTFd 47 years
MTTFd 470 years
Medium Duty Safety Channel 1 NC
Voltage free : 250V/ac 1.0 A Max. Rating
Voltage free : 250V/ac 1.0 A Max. Rating
Safety Channel 2 NC
Voltage free : 240V/dc 0.2 A Max. Rating
Fuse Internal 1.0 A (F) External 0.8A (F) (User)
Initial release time <2ms
Minimum switched current 10V; dc 1mA
Dielectric withstand 2500V.ac
Insulation Resistance 100 Mohms
Recommended setting gap 5mm
Switching Distance (Target to target) 0.5mm
Sar 22mm Open
Tolerance to misalignment 5mm in any direction from 5mm setting gap
Approach speed 200mm/min, to 1000mm/min
Body Material Stainless Steel 316 Mirror polished finish (Ra4)
Temperature Range -25°C - 105°C
Enclosure Protection IP68 (NEMA PW12) IP67 (NEMA 6)
Shock Resistance IEC 68-2-27 11ms 30g
Vibration Resistance IEC 68-2-6 10-65 Hz 1mm
Cable Type PVC 6 core 6mm (0.2)
Mounting Bolts 2 x M4 Tightening torque 1.0 Nm
Mounting Position Any

ABB Jokab Safety Switches
Sense 12 Magnetic non-contact safety switches

Magnetic Actuation  Switching Tolerance up to 10mm

Cylindrical fitting suitable for all industry applications.
Easy to install - M30 threaded body - easy to set
Wide 10mm sensing
Suitable for the harsh environments of Food processing and packaging
Red Polyester housing
UP to: PLe ISO 13849-1 SIL3 EN 62061 Cat. 4 EN 954-1
2NC 1NO circuits
Quick connect versions.

Sense 12 MAGNETIC NON-CONTACT SAFETY SWITCH

Quick Connect M12 versions fitted with 250mm (10") cable

For all ABB Jokab Safety switches the NC circuits are
closed when the guard is closed and the actuator present.
Sense 12Z Magnetic non-contact safety switches

Magnetic Actuation  Switching Tolerance up to 10mm

Cylindrical fitting suitable for all industry applications.
Easy to install - M30 threaded body - easy to set
Wide 10mm sensing
Suitable for the harsh environments of Food processing and packaging
Stainless Steel 316 housing
UP to: PLe ISO 13849-1 SIL3 EN 62061 Cat. 4 EN 954-1
2NC 1NO circuits
Quick connect versions.

<table>
<thead>
<tr>
<th>Sense 12Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050080R4120 Sense 12, SS 2m cable, 2NC/1NO</td>
</tr>
<tr>
<td>2TLA050080R5120 Sense 12, SS 5m cable, 2NC/1NO</td>
</tr>
<tr>
<td>2TLA050080R6120 Sense 12, SS 10m cable, 2NC/1NO</td>
</tr>
<tr>
<td>2TLA050080R2120 Sense 12, SS QC cable, 2NC/1NO</td>
</tr>
</tbody>
</table>

Will operate with most Safety Relays

S/Steel Housing

Quick Connect M12 versions fitted with 250mm (10") cable

Quick Connect (QC)

<table>
<thead>
<tr>
<th>M12 8 Way Male Plug Standard Lead Colour</th>
<th>Circuit (Actuator Present)</th>
</tr>
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<tr>
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<td>Black</td>
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<td>1</td>
<td>White</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
</tr>
</tbody>
</table>

For all ABB Jokab Safety switches the NC circuits are closed when the guard is closed and the actuator present
Line Strong Series - Grab wire safety rope switches

Application:

Safety Rope Emergency Stop switches are mounted on machines and sections of plant conveyors which cannot be protected by guards. In contrast to traditional mushroom head type Emergency Stop buttons, Safety Rope Switches can initiate the emergency command from any point along the installed rope length.

In combination with any dual channel safety monitoring controller, ABB Jokab Safety Rope Systems can be used as emergency stop devices and monitored for up to Category 4 / Ple to ISO 13849.

Operation:

All ABB Jokab Safety Rope Emergency stop switches conform to European Standard ISO 13850 (EN418) and IEC 947-5-5. They have a positive mechanical linkage between the switch contacts and the wire rope as per IEC 947-5-1. The emergency stop switches are brought into the operational condition by pre-tensioning the rope by use of a tensioner / gripper device which clamps the rope and then hooks to the switch eyebolts. Correct tension can be observed by viewing the tension indicator on the switch housing. Once tensioned, the switch contact blocks can be set to the operational condition (safety contacts closed, auxiliary contacts open) by pressing a blue reset button on the switch cover. All of the Safety Rope Switches have wire-breaking monitoring. On pulling or breakage (tension loss) of the rope, the safety contacts are positively opened and the auxiliary contacts are closed. The switches are mechanically latched and can then only be returned to the operational condition by pressing the reset button a required by EN418, (ISO 13850).

Features:

LED visual indication of Rope status: Steady Green – Machine running
Steady or Flashing Red – Machine stopped.

Rugged die-cast metal body - Yellow colour
Stainless steel 317 Housings are available (Z versions) - ideal for the food industry
All internal and external screws and fittings are Stainless Steel
Enclosure protected to IP67 - washdown suitable (IP69K on Stainless Steel Versions)
Easy to wire – up to 4 conduit entries

A patented Tensioner / Gripper accessory is available in Stainless Steel to provide rapid installation significantly reducing installation connection to the switch eyebolts and prevents frequent re-tensioning or maintenance caused by cable tension loss, therefore reducing machine down time.

Screw fitting mushroom type E Stop Button
Using safety rope switches

Use of Safety Rope Switches.

ABB Jokab Safety Line Strong switches are designed to be mounted on machines and sections of conveyors which cannot be protected by guards. In contrast to traditional mushroom head type Emergency Stop buttons, Safety Rope Switches can initiate the emergency command from any point along the installed rope length and provide robust Emergency Stop Rope Pull protection for exposed conveyors or machines.

In combination with a dual channel safety monitoring relay, ABB Jokab Safety Rope Systems can be used as emergency stop devices monitored for up to Category 4 to EN 954-1 or PLe ISO13849-1. All ABB Jokab Safety Rope Emergency stop switches conform to ISO13850 and IEC 947-5-5. They have a positive mechanical linkage between the switch contacts and the wire rope. The switches have wire-breaking monitoring.

On pulling the rope the safety contacts are positively opened and the auxiliary contacts are closed. The switches are mechanically latched and can then only be returned to the operational condition by a pressing the blue reset button as required by ISO13850. An optional 2 colour LED indicator is available to enable switch status to be viewed from a distance.

Mushroom Type Emergency Stop Button.
Can be installed or repositioned Left or Right after installation.

Tension Indicator.
Ensures the system is easy to set up and maintain the correct Rope tension.

Reset Button.
The Blue Button must be pushed to reset the switch following activation by pulling or slackening of the Rope.

Indicator LED.
Can be wired to flash Red in the event of the Rope being pulsed – switch activated, or illuminate steady Green to indicate a reset switch in Machine ‘Run’ state. Visible from long distances.

System set up:

Rope support eye bolts must be fitted at 2.5 m. min. to 3m. maximum intervals along all rope lengths between switches. The rope must be supported no more than 500mm from the switch eye bolt or Safety Spring (if used). It is important that this first 500mm is not used as part of the active protection coverage. When using one switch the rope must be anchored at the other end using a Safety Spring. When using a Safety Spring a maximum of one corner pulley only may be used to ensure complete lengths of rope are visible to either the switch or the spring anchorage.
Using safety rope switches

Reliable connectivity:

Tensioning of rope is achieved by the use of ABB Jokab Safety’s new patented Tensioner / Gripper accessory. Traditional turnbuckle and and clamp systems are difficult to tension and adjust and frequent re-tensioning or maintenance is normally required of either the turnbuckle or the clamps. Viewing of the switch tension window is difficult.

For greater reliability and ease of installation the Tensioner / Gripper accessory significantly reduces the installation time by offering an eyebolt and tensioner thimble and high strength gripper in one assembly to enable rapid connection to the switch eyebolts and fast and accurate tensioning of the Rope. By being in close proximity to the switch viewing window systems can be easily tensioned accurately and quickly. The double clamp mechanism prevents rope slippage and significantly reduces machine ‘down time’ which can occur with traditional turnbuckle systems.

The end of the safety rope is fed through a central hole in a cone shaped guide which protrudes from the main housing.

After being fed through the guide hole the rope enters the main housing by going through a feed hole and then is looped back through 180 degrees and is fed through a second feed hole on the opposite side of the mechanism.

The rope is then pulled for maximum tension and is locked in position by a locking bar inside the main housing which is moved by turning an Allen type locking bolt.

Navigating Corners:

Because of the added friction on the eyebolts and rope when navigating corners, ABB Jokab Safety’s unique “universal” pulley can be used to navigate inside or outside corners without causing damage to the rope. They are stainless steel and can be rigidly mounted.

Examples of using the Universal Pulley:
Line Strong 1 Mini-duty switches

Protection up to 50 meters

Line Strong 1 is a compact, yet robust die-cast Mini Duty Safety Rope Pull switch designed to protect short conveyor lengths where protection is required up to 50m using two switches or up to 30m using a single switch.

They provide reliable, cost effective safety solutions for conveyor systems and can be enhanced by adding external mushroom Type E Stope at the switch or bi-color LED available to show switch status from a distance.

They have 4 pole contact to ensure flexibility with all modern control applications. Rugged integral sealing bellows means they can be high pressure hosed.

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### Line Strong 1

- **2TLA050200R0030** LineStrong1, 2NC/2NO, M20
- **2TLA050200R0130** LineStrong1, 2NC/2NO, NPT
- **2TLA050200R1130** LineStrong1, 2NC/2NO, M20, ESTOP
- **2TLA050200R1232** LineStrong1, 2NC/2NO, NPT LED 24VDC
- **2TLA050200R0233** LineStrong1, 2NC/2NO, M20 LED 110VAC
- **2TLA050200R0332** LineStrong1, 2NC/2NO, M20 ESTOP/LED 24VDC
- **2TLA050200R0333** LineStrong1, 2NC/2NO, NPT LED 110VAC
- **2TLA050200R0234** LineStrong1, 2NC/2NO, M20 LED 230VAC
- **2TLA050200R1133** LineStrong1, 2NC/2NO, M20 ESTOP/LED 110VAC
- **2TLA050200R1233** LineStrong1, 2NC/2NO, NPT LED 110VAC
- **2TLA050200R0232** LineStrong1, 2NC/2NO, M20 LED 24VDC
- **2TLA050200R0334** LineStrong1, 2NC/2NO, M20 ESTOP/LED 230VAC
- **2TLA050200R1232** LineStrong1, 2NC/2NO, NPT LED 24VDC
- **2TLA050200R0333** LineStrong1, 2NC/2NO, M20 ESTOP/LED 110VAC
- **2TLA050200R0334** LineStrong1, 2NC/2NO, M20 ESTOP/LED 230VAC
- **2TLA050200R0233** LineStrong1, 2NC/2NO, M20 LED 24VDC
- **2TLA050200R1233** LineStrong1, 2NC/2NO, NPT LED 24VDC
- **2TLA050200R0234** LineStrong1, 2NC/2NO, M20 LED 230VAC
- **2TLA050200R1333** LineStrong1, 2NC/2NO, NPT LED 110VAC
- **2TLA050200R1334** LineStrong1, 2NC/2NO, NPT ESTOP/LED 230VAC
- **2TLA050200R0334** LineStrong1, 2NC/2NO, M20 ESTOP/LED 230VAC

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.
Line Strong 2 Standard duty switches

Protection up to 80 meters
Line Strong 2 is a General Duty robust die-cast Safety Rope Pull switch designed to protect conveyor lengths where protection is required up to 80m using two switches or up to 60m using a single switch. They provide a reliable general purpose safety solution for conveyors and offer a choice of fittings depending upon the application. They can be supplied with a mushroom type emergency Stop button which can be fitted to the side of the switch to offer an extra traditional Emergency Stop function close to the switch or can be fitted later after installation without any extra wiring.

A Bi-color LED is available to show switch status from a distance and they have 4 pole contact blocks to ensure flexibility with all modern control applications. Rugged integral sealing bellows means they can be high pressure hosed and the choice of materials makes them suitable for inside or outside use.

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.

For all ABB Jakob Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.

__Line Strong 2__

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For all ABB Jakob Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.
Line Strong 2Z Standard duty switches

Protection up to 100 meters

The Line Strong 2Z is a General Duty Safety Rope Pull switch designed to protect long conveyor lengths up to 100m. The Stainless Steel 316 housings are designed specifically to withstand the tough environments found in the Food and Pharmaceutical Industries. The fixing holes are under the cover of the switch to prevent food trap areas. They are all purpose switches and will survive chemical and detergent washdown by providing all stainless steel parts and robust IP67 and IP69K sealing by using integral bellows and gaskets.

An easily seen bi-color LED is available to show switch status from a distance and they have 4 pole contact blocks to ensure flexibility with all modern control applications. Shorter rope spans up to 80m can be achieved by using just one switch therefore making a cost effective solution and also reducing electrical wiring runs.

It is recommended when using a Safety Spring that a maximum of one corner pulley is used.

Specifications:
- Protection up to 100 meters
- Stainless Steel
- Bi-color LED available
- 4 pole contact blocks
- Robust IP67 and IP69K sealing
- Easy installation

Standards:
- IEC 61497-5-1
- EN 60841-1
- EN 60841-2
- UL 508
- ISO 13849-1
- EN 62061

Protection and Reliability Data:
- Mechanical Reliability: 99.999%
- Safety Data - Annual Use: 10^9 operations at 100mA load
- Proof Test Interval (Life): 1 year
- MTFd: 21 years
- Enclosure: Cover Stainless Steel 316
- External Parts: Stainless Steel
- IP Rating: IP67 (NEMA 4X)
- Rope Span: 100m
- Rope Tensioner: Quick Fixing
- Rope Type: 4.0mm Outside Dia, Steel inner - PVC sheath
- 4 x M6

Specifications:
- Mounting position: Any
- Conduit entries: 3 x M20 or 3 x ½” NPT by part number
- Torque settings: 9.5Nm
- Ambient Temperature: -20°C to +40°C
- Vibration resistance: 5mm at 50Hz
- Shock resistance: 15g at 11ms
- Tension Force: 120N
- Typical Operating Force: 120N
- Contact type: IEC 947-5-1 Double break Type Zb
- Contact Material: Silver
- Termination: Clamp up to 2 sq. mm conductors
- Utilization Category: AC15 A300
- Operational Rating: 10A
- Rated Insulation Voltage: 500V
- Withstand Voltage: 2500V
- Short Circuit Overload Protection: Fuse 10A, FF

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.
**Line Strong 3L and 3R Heavy duty switches**

**Protection up to 125 meters**

The Line Strong 3L/R is a robust die-cast Heavy Duty Safety Rope Pull switch designed to protect long conveyor lengths where protection is required up to 125m using two switches or up to 100m using a single switch.

The die-cast housings are robust to survive indoor or outdoor use. A bi-color LED ensures switch status can be seen easily from a distance. They have 4NC 2NO contacts to ensure flexibility with all modern control applications.

They can be used to compliment the Line Strong 3D versions at each end of the rope span.

**Specifications**

- **Model**: Line Strong 3L/R
- **Contacts**: 4NC 2NO
- **Rated Voltage**: 24VDC
- **Rated Current**: 1A
- **Contact Resistance**: 50mΩ
- **Insulation Resistance**: 1000MΩ
- **Dielectric Strength**: 2500V
- **Contact Form**: Non-Fuseable
- **Operational Rate**: 3000 cycles per hour
- **Environmental Rating**: IP67
- **Enclosure**: Die-Cast, Painted Yellow
- **Mounting Type**: 4x M5
- **Operating Life**: 10 years

**Applications**

- **Conveyor Systems**: Long conveyor lengths
- ** защита конвейера**: Long conveyor lengths

**Dimensions**

- **Height**: 96 mm
- **Width**: 100 mm
- **Depth**: 82 mm

**Technical Data**

- **Protection Class**: IP67
- **Enclosure**: Die-Cast, Painted Yellow
- **Ambient Temperature**: -50 to +80°C
- **Vibration Resistance**: 10-500Hz, 0.35m/s²
- **Shock Resistance**: 15g, 11ms
- **Operating Life**: 10,000 cycles
- **Contact Form**: Non-Fuseable
- **Ambient Temperature**: -25 to +80°C
- **Vibration Resistance**: 10-500Hz, 0.35m/s²
- **Shock Resistance**: 15g, 11ms

**Safety Certification**

- **UL**: E964, E964-1, E964-2
- **CSA**: E964, E964-1, E964-2
- **TUV**: E964, E964-1, E964-2

**Compatibility**

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are always reset when the system is tensioned correctly and the switch has been reset.

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The Line Strong 3LZ / RZ is a robust Heavy Duty Safety Rope Pull switch designed to protect long conveyor lengths where protection is required up to 125m using two switches or up to 100m using a single switch.

The Stainless Steel 316 housings are designed specifically to withstand the tough environments found in the Food and Pharmaceutical industries. They will survive chemical and detergent washdown by providing all stainless steel parts and robust IP67 and IP69K sealing by using integral bellows and gaskets.

They can be used to compliment the Line Strong 3DZ versions at each end of the rope span.

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.

### Line Strong 3LZ and 3RZ

#### Protection up to 125 meters

The Line Strong 3LZ / RZ is a robust Heavy Duty Safety Rope Pull switch designed to protect long conveyor lengths where protection is required up to 125m using two switches or up to 100m using a single switch.

The Stainless Steel 316 housings are designed specifically to withstand the tough environments found in the Food and Pharmaceutical industries. They will survive chemical and detergent washdown by providing all stainless steel parts and robust IP67 and IP69K sealing by using integral bellows and gaskets.

They can be used to compliment the Line Strong 3DZ versions at each end of the rope span.

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.
Line Strong 3D Heavy duty switches

Protection up to 250 meters

The Line Strong 3D is a Heavy Duty Safety Rope Pull switch designed to protect long conveyor lengths. The die-cast housings are robust to survive indoor or outdoor use including washdown (IP67 rating).

Lengths over 2 Km can be achieved with less than 20 switches. A bi-color LED ensures switch status can be seen easily from a distance. They have 4NC 2NO contacts to ensure flexibility with all modern control applications.

Shorter rope spans up to 200m can be achieved by using just one switch, therefore making a cost effective solution and also reducing electrical wiring runs.

It is recommended when using a Safety Spring that a maximum of one corner pulley is used.

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.

Specifications:
- Distance: up to 125 meter (410 ft)
- Every 3 meter (10 ft)
- Safety Spring
- Eyebolt

Standards:
- IEC 947-5-1
- EN 5064-1
- EN 62061
- IP67 (NEMA 4)

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For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.
Line Strong 3DZ Heavy duty switches

Protection up to 250 meters

The Line Strong 3DZ is a robust Heavy Duty Safety Rope Pull switch designed to protect long conveyor lengths up to 250m. The Stainless Steel 316 housings are designed specifically to withstand the tough environments found in the Food and Pharmaceutical industries. They will survive chemical and detergent washdown by providing all stainless steel parts and robust IP67 and IP69K sealing by using integral bellows and gaskets.

A bi-color LED ensures switch status can be seen easily from a distance. They have 4NC 2NO contacts to ensure flexibility with all modern control applications.

Shorter rope spans up to 200m can be achieved by using just one switch, therefore making a cost effective solution and also reducing electrical wiring runs.

![Diagram of Line Strong 3DZ Heavy duty switches](image)

It is recommended when using a Safety Spring that a maximum of one corner pulley is used.

For all ABB Jokab Safety Rope Switches, the normally closed (NC) circuits are closed when the system is tensioned correctly and the switch has been reset.

**Line Strong 3DZ**

- **2TLA050204R0322** LineStrong3DZ, 4NC/4NO, M20 ESTOP/LED SS 24VDC
- **2TLA050204R1322** LineStrong3DZ, 4NC/4NO, NPT ESTOP/LED SS 24VDC
- **2TLA050204R0323** LineStrong3DZ, 4NC/4NO, M20 ESTOP/LED SS 110VAC
- **2TLA050204R1323** LineStrong3DZ, 4NC/4NO, NPT ESTOP/LED SS 110VAC
- **2TLA050204R0324** LineStrong3DZ, 4NC/4NO, M20 ESTOP/LED SS 230VAC
- **2TLA050204R1324** LineStrong3DZ, 4NC/4NO, NPT ESTOP/LED SS 230VAC
- **2TLA050204R0222** LineStrong3DZ, 4NC/4NO, M20 LED, SS 24VDC
- **2TLA050204R1222** LineStrong3DZ, 4NC/4NO, NPT LED, SS 24VDC
- **2TLA050204R0223** LineStrong3DZ, 4NC/4NO, M20 LED, SS 110VAC
- **2TLA050204R1223** LineStrong3DZ, 4NC/4NO, NPT LED, SS 110VAC
- **2TLA050204R0224** LineStrong3DZ, 4NC/4NO, M20 LED, SS 230VAC
- **2TLA050204R1224** LineStrong3DZ, 4NC/4NO, NPT LED, SS 230VAC
- **2TLA050204R0120** LineStrong3DZ, 4NC/4NO, M20, ESTOP, SS
- **2TLA050204R1120** LineStrong3DZ, 4NC/4NO, NPT ESTOP, SS
- **2TLA050204R0020** LineStrong3DZ, 4NC/4NO, M20, SS
- **2TLA050204R1020** LineStrong3DZ, 4NC/4NO, NPT, SS
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<tr>
<td>2TLA050210R8030</td>
<td>LineStrong Acces. Eyebolt M8x1.25, Galv.</td>
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<tr>
<td>2TLA050210R8020</td>
<td>LineStrong Acces. Pulley, SS</td>
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<td>LineStrong Acces. Pulley, Galv.</td>
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<tr>
<td>2TLA050211R0001</td>
<td>LineStrong Acces. LED Green/Red 24 VDC</td>
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<tr>
<td>2TLA050211R0002</td>
<td>LineStrong Acces. LED Green/Red 110 VDC</td>
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<tr>
<td>2TLA050211R0003</td>
<td>LineStrong Acces. LED Green/Red 230VDC</td>
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<tr>
<td>2TLA050211R0004</td>
<td>LineStrong Acces. Spring, 220mm, SS</td>
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<tr>
<td>2TLA050211R0005</td>
<td>LineStrong Acces. E-Stop Button</td>
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<tr>
<td>2TLA050211R0006</td>
<td>LineStrong Acces. Anti-Tamper, Torx T20</td>
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### Accessories - Contact Blocks and fittings

#### Line Strong Contact Blocks

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>2TLA050240R0101</td>
<td>LineStrong Acces. Contact Block 2NC/1NO</td>
</tr>
<tr>
<td>2TLA050240R0102</td>
<td>LineStrong Acces. Contact Block 3NC</td>
</tr>
<tr>
<td>2TLA050240R0103</td>
<td>LineStrong Acces. Contact Block 2NC/2NO</td>
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<tr>
<td>2TLA050240R0104</td>
<td>LineStrong Acces. Contact Block 3NC/1NO</td>
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<tr>
<td>2TLA050240R0105</td>
<td>LineStrong Acces. Contact Block 4NC</td>
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<tr>
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<td>LineStrong Acces. Contact Block 2NC/1NO</td>
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<td>LineStrong Acces. Contact Block 3NC</td>
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<td>2TLA050240R0105</td>
<td>LineStrong Acces. Contact Block 4NC</td>
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#### Line Strong Glands and Plugs

<table>
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<th>Item Code</th>
<th>Description</th>
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<tr>
<td>2TLA050240R0101</td>
<td>LineStrong Acces. Contact Block 2NC/1NO</td>
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<tr>
<td>2TLA050240R0102</td>
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<td>LineStrong Acces. Contact Block 2NC/2NO</td>
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<td>2TLA050240R0104</td>
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<tr>
<td>2TLA050240R0105</td>
<td>LineStrong Acces. Contact Block 4NC</td>
</tr>
</tbody>
</table>
E-Strong Z Heavy duty emergency stop switches

ABB Jokab Safety’s Heavy Duty Emergency Stop Switches are designed to provide robust Emergency Stop protection for exposed conveyors or machines.

Stainless Steel 316 housings (IP69K)
Conformance to ISO 13850, IEC 947-5-1 and IEC 947-5-5

A special lid safety trip mechanism means that the safety contacts will open if the lid is removed.

Button protection shroud mechanism with Padlock holes for ‘Lock off’ during maintenance.

Optional 2 colour LED

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**Estrong Z**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>2TLA050220R020</td>
<td>EstrongZ E-Stop 2NC/2NO, M20, SS</td>
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<tr>
<td>2TLA050220R0120</td>
<td>EstrongZ E-Stop 2NC/2NO, NPT, SS</td>
</tr>
<tr>
<td>2TLA050220R0422</td>
<td>EstrongZ E-Stop 2NC/2NO, M20, SS Locked</td>
</tr>
<tr>
<td>2TLA050220R1422</td>
<td>EstrongZ E-Stop 2NC/2NO, NPT, SS Locked</td>
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<tr>
<td>2TLA050220R0222</td>
<td>EstrongZ E-Stop 2NC/2NO, M20, SS, LED 24VDC</td>
</tr>
<tr>
<td>2TLA050220R1222</td>
<td>EstrongZ E-Stop 2NC/2NO, NPT, SS, LED 24VDC</td>
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<tr>
<td>2TLA050220R0223</td>
<td>EstrongZ E-Stop 2NC/2NO, M20, SS, LED 110VAC</td>
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<tr>
<td>2TLA050220R1223</td>
<td>EstrongZ E-Stop 2NC/2NO, NPT, SS, LED 110VAC</td>
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<tr>
<td>2TLA050220R0224</td>
<td>EstrongZ E-Stop 2NC/2NO, M20, SS, LED 230VAC</td>
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<tr>
<td>2TLA050220R1224</td>
<td>EstrongZ E-Stop 2NC/2NO, NPT, SS, LED 230VAC</td>
</tr>
</tbody>
</table>

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**Specifications**

- **Mechanical Reliability**: 1.5 x 10⁶ operations at 100mA load
- **Safety Data - Annual Usage**: up to Category 4 with Safety Relay, up to SIL3 depending upon system architecture
- **Safety Data - Annual Usage**: 8 cycles per hour / 24 hours per day / 365 days
- **Proof Test Interval (Life)**: 10 x 10⁶
- **MTTFd**: 214 years
- **Enclosure / Cover**: Stainless Steel 316
- **IP Rating**: IP67, IP69K
- **Mounting**: 4 x M5
- **Mounting position**: Any
- **Vibration resistance**: 0.35mm
- **Shock resistance**: 15g, 11ms
- **Weight**: 820 g
- **Contact type**: IEC 947-5-1 Double break Type Zb
- **Operational Rating**: Snap Action up to 2NO (positive break)
- **Terminal**
- **Utilisation Category**: AC15
- **Operational Voltage**: 240V, 3A
- **Thermal Current (Ith)**: 10A
- **Rated Insulation Voltage (Uij)**: 500V
- **Withstand Voltage (Uimp)**: 2500V
- **Short Circuit Overload Protection**: Fuse externally 10A (FF)

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ABB Jokab Safety Switches | 87
Features:
Positive opening safety contacts to IEC 947-5-1
Choice of 11 actuator heads Linear, Rotary and Flexible actions
High Mechanical Life - 10,000,000 cycles
Head position adjustment any of 4 positions
Enclosure Protected to IP 67 - washdown suitable
Conduit entries: M20 ½” NPT or Quick connect

Application:
ABB Jokab Safety limit switches are designed to be mounted for position sensing of moving applications, e.g., guard doors, conveyors, machine beds, and elevators. They are available with linear plungers, rotary levers or roller plungers and either slow or snap action contacts.

Operation:
Operation of the switches is achieved by a sliding actuation of the moving object to cause deflection of the switch plungers or levers. For safety applications it is important that the moving object does not pass completely over the switch actuators so as to either cause damage to the actuator or allow it to return to its original position.

Standards
EN1088  IEC 947-5-1  EN 60204-1
ISO 13849-1  EN62061  EN 954-1  UL508

Safety Classification and Reliability Data:
- Mechanical Reliability B10d 2.5 x 10⁶ operations at 100mA load
- EN 954-1 up to Category 4 with Safety Relay
- ISO 13849-1 up to PLe depending upon system architecture
- EN 60204-1 up to SIL3 depending upon system architecture
- Safety Data - Annual Usage 8 cycles per hour / 24 hours per day / 365 days
- PFHd 3.44 x 10⁻⁶
- Proof Test Interval (Life) 35 years
- MTTFd 356 years
- Utilization Category AC15 A300 240V, 3A
- Thermal Current (In) 10A
- Rated Insulation Voltage 300VAC
- Rated Impulse Withstand Volt 2500VAC
- Insulation Resistance 100MOhm
- Max. Switching Speed 250mm/s
- Case Material UL approved glass-fiber polyester
- Roller Material Various Polymers
- Enclosure Protection IP67
- Operating Temperature Min. -25°C Max. 80°C
- Vibration IEC 68-2-6, 10-50Hz 3.35mm 1 octave/min
- Conduit Entry M20 or ½” NPT
Edge 1 Safety limit switches

Edge 1 Pin Plunger
2TLA050100R0000 Edge1, Pin Plunger M20, 2NC/1NO
2TLA050100R0100 Edge1, Pin Plunger NPT, 2NC/1NO
2TLA050100R0200 Edge1, Pin Plunger QC, 2NC/1NO

Edge 1 Roller Plunger
2TLA050101R0000 Edge1, Roller Plunger M20, 2NC/1NO
2TLA050101R0100 Edge1, Roller Plunger NPT, 2NC/1NO
2TLA050101R0200 Edge1, Roller Plunger QC, 2NC/1NO

Edge 1 Hinge Lever
2TLA050102R0000 Edge1, Hinge Lever M20, 2NC/1NO
2TLA050102R0100 Edge1, Hinge Lever NPT, 2NC/1NO
2TLA050102R0200 Edge1, Hinge Lever QC, 2NC/1NO

Edge 1 Long Hinge Lever
2TLA050103R0000 Edge1, Long Hinge Lever M20, 2NC/1NO
2TLA050103R0100 Edge1, Long Hinge Lever NPT, 2NC/1NO
2TLA050103R0200 Edge1, Long Hinge Lever QC, 2NC/1NO

Edge 1 Roller Lever
2TLA050111R0000 Edge1, Roller Lever M20, 2NC/1NO
2TLA050111R0100 Edge1, Roller Lever NPT, 2NC/1NO
2TLA050111R0200 Edge1, Roller Lever QC, 2NC/1NO

Edge 1 Long Roller Lever
2TLA050104R0000 Edge1, Long Roller Lever M20, 2NC/1NO
2TLA050104R0100 Edge1, Long Roller Lever NPT, 2NC/1NO
2TLA050104R0200 Edge1, Long Roller Lever QC, 2NC/1NO

Edge 1 Adjustable Roller Lever
2TLA050105R0000 Edge1, Adj. Roller Lever M20, 2NC/1NO
2TLA050105R0100 Edge1, Adj. Roller Lever NPT, 2NC/1NO
2TLA050105R0200 Edge1, Adj. Roller Lever QC, 2NC/1NO

Edge 1 Lever Arm
2TLA050106R0000 Edge1, Lever Arm M20, 2NC/1NO
2TLA050106R0100 Edge1, Lever Arm NPT, 2NC/1NO
2TLA050106R0200 Edge1, Lever Arm QC, 2NC/1NO

Edge 1 Spring Lever
2TLA050107R0000 Edge1, Spring Lever M20, 2NC/1NO
2TLA050107R0100 Edge1, Spring Lever NPT, 2NC/1NO
2TLA050107R0200 Edge1, Spring Lever QC, 2NC/1NO

Edge 1 Spring Whisker
2TLA050108R0000 Edge1, Spring Whisker M20, 2NC/1NO
2TLA050108R0100 Edge1, Spring Whisker NPT, 2NC/1NO
2TLA050108R0200 Edge1, Spring Whisker QC, 2NC/1NO

Edge 1 Plastic Spring Lever
2TLA050110R0000 Edge1, Plas. Spring Lever M20, 2NC/1NO
2TLA050110R0100 Edge1, Plas. Spring Lever NPT, 2NC/1NO
2TLA050110R0200 Edge1, Plas. Spring Lever QC, 2NC/1NO

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Edge 1R Safety limit switches with reset

Features:
- Lockable head mechanism
- Requires manual reset after the lock is engaged
- Positive opening safety contacts to IEC 947-5-1
- Choice of 8 actuator heads: Linear or Rotary actions
- Head position adjustment any of 4 positions
- Enclosure Protected to IP 67 - washdown suitable

Conduit entries: M20 ½" NPT or Quick connect

Technical specification as Edge 1
Edge 2 and Edge 3 Safety limit switches

Features:
- Standard Duty Plastic body - red color
- Heavy Duty Die Cast Metal Bodies - black color
- Positive opening NC safety contacts to IEC 945-5-1
- Unique 3 pole positively operated contacts
- Choice of 7 actuator heads Linear and Rotary
- High Mechanical Life 5,000,000 cycles
- Side or End cable exit
- Enclosure Protected to IP67 - wash down suitable
- Wide operating temperature -25°C to 80°C.
- Contact Blocks : 2NC 1NO Slow break

Application:
ABB Jokab Safety limit switches are designed to be mounted for position sensing of moving applications, e.g., guard doors, conveyors, machine beds, elevators. They are available with linear plungers, rotary levers or roller plungers and either slow or snap action contacts.

Operation:
Operation of the switches is achieved by a sliding actuation of the moving object to cause deflection of the switch plungers or levers. For safety applications it is important that the moving object does not pass completely over the switch actuators so as to either cause damage to the the actuator or allow it to return to it's original position.

Standards
- EN1088
- IEC 947-5-1
- UL508

Approvals
- cULus
- TÜV

Utilization Category
- AC15
- A300
- 240V, 3A

Thermal Current (Ith)
- 10A

Rated Insulation Voltage
- 300VAC

Rated Impulse Withstand Volt
- 2500VAC

Insulation Resistance
- 1000MΩ min.

Max. Switching Speed
- 250mm/s

Max. Switching Frequency
- 6000 operation per hour

Case Material
- Die Cast Metal or Plastic

Rocker Material
- Various Polymers

Enclosure Protection
- IP67

Operating Temperature
- Min. -25°C Max 80°C

Mechanical Life Expectancy
- 5,000,000

Vibration
- IEC 68-2-6, 10-55Hz 0.35m/s²
- 1.5 sq/mm 4 core or 5 core

Cable OD
- 8mm max.

Fixing
- 2 x M4

Cable Length
- 2 Meter
Edge 2 Safety limit switches

**Edge 2 Pin**
- 2TLA050120R4008: Edge2, Pin 3m side cable, 2NC/1NO
- 2TLA050120R4000: Edge2, Pin 3m end cable, 2NC/1NO

**Edge 2 Roller Plunger 1**
- 2TLA050121R4008: Edge2, Roller 3m side cable, 2NC/1NO
- 2TLA050121R4000: Edge2, Roller 3m end cable, 2NC/1NO

**Edge 2 Roller Plunger 2**
- 2TLA050122R4008: Edge2, Roller 3m side cable, 2NC/1NO
- 2TLA050122R4000: Edge2, Roller 3m end cable, 2NC/1NO

**Edge 2 Roller Lever**
- 2TLA050123R4008: Edge2, Lever 3m side cable, 2NC/1NO
- 2TLA050123R4000: Edge2, Lever 3m end cable, 2NC/1NO

**Edge 2 Panel Mount Pin**
- 2TLA050124R4008: Edge2, Panel Pin 3m side cable, 2NC/1NO
- 2TLA050124R4000: Edge2, Panel Pin 3m end cable, 2NC/1NO

**Edge 2 Panel Roller 1**
- 2TLA050125R4008: Edge2, Panel Roll 3m side cable, 2NC/1NO
- 2TLA050125R4000: Edge2, Panel Roll 3m end cable, 2NC/1NO

**Edge 2 Panel Roller 2**
- 2TLA050126R4008: Edge2, Panel Roll 3m side cable, 2NC/1NO
- 2TLA050126R4000: Edge2, Panel Roll 3m end cable, 2NC/1NO
### Edge 3 Safety limit switches

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<td>Edge3, Pin 3m side cable, 2NC/1NO</td>
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<td>2TLA050120R4030</td>
<td>Edge3, Pin 3m end cable, 2NC/1NO</td>
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<tr>
<td><strong>Edge 3 Roller Plunger 1</strong></td>
<td>2TLA050121R4038</td>
<td>Edge3, Roller 3m side cable, 2NC/1NO</td>
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<td>2TLA050121R4030</td>
<td>Edge3, Roller 3m end cable, 2NC/1NO</td>
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<td><strong>Edge 3 Roller Plunger 2</strong></td>
<td>2TLA050122R4038</td>
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<td>2TLA050122R4030</td>
<td>Edge3, Roller 3m end cable, 2NC/1NO</td>
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<tr>
<td><strong>Edge 3 Roller Lever</strong></td>
<td>2TLA050123R4038</td>
<td>Edge3, Lever 3m side cable, 2NC/1NO</td>
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<td></td>
<td>2TLA050123R4030</td>
<td>Edge3, Lever 3m end cable, 2NC/1NO</td>
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<tr>
<td><strong>Edge 3 Panel Mount Pin</strong></td>
<td>2TLA050124R4038</td>
<td>Edge3, Panel Pin 3m side cable, 2NC/1NO</td>
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<td>2TLA050124R4030</td>
<td>Edge3, Panel Pin 3m end cable, 2NC/1NO</td>
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<tr>
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<td>2TLA050125R4038</td>
<td>Edge3, Panel Roll 3m side cable, 2NC/1NO</td>
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<td>2TLA050125R4030</td>
<td>Edge3, Panel Roll 3m end cable, 2NC/1NO</td>
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<tr>
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<td>2TLA050126R4038</td>
<td>Edge3, Panel Roll 3m side cable, 2NC/1NO</td>
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<td></td>
<td>2TLA050126R4030</td>
<td>Edge3, Panel Roll 3m end cable, 2NC/1NO</td>
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1. General. The terms and conditions contained herein, together with any additional or different terms contained in ABB’s Proposal, if any, submitted to Purchaser (which Proposal shall control over any conflicting terms), constitute the entire agreement (the “Agreement”) between the parties with respect to the order and supersede all prior communications and agreements regarding the order. Acceptance by ABB of the order, or Purchaser’s acceptance of ABB’s Proposal, is expressly limited to and conditioned upon Purchaser’s acceptance of these terms and conditions, payment for or acceptance of any performance by ABB being acceptance. These terms and conditions may not be changed or superseded by any different or additional terms and conditions proposed by Purchaser to which terms ABB hereby objects. Unless the context otherwise requires, the term “Equipment” as used herein means all of the equipment, parts, accessories sold, and all software and software documentation, if any, licensed to Purchaser by ABB (“Software”) under the order. Unless the context otherwise requires, the term “Services” as used herein means all labor, supervisory, technical and engineering, installation, repair, consulting or other services provided by ABB under the order. As used herein, the term “Purchaser” shall include the initial end user of the Equipment and/or services; provided, however, that Paragraph 13(a) shall apply exclusively to the initial end user.

2. Prices.
   (a) Unless otherwise specified in writing, all Proposals expire thirty (30) days from the date thereof.
   (b) Unless otherwise stated herein, Services prices are based on normal business hours (8 a.m. to 5 p.m. Monday through Friday). Overtime and Saturday hours will be billed at one and one-half (1 1/2) times the hourly rate; and Sunday hours will be billed at two (2) times the hourly rate; holiday hours will be billed at three (3) times the hourly rate. If a Services rate sheet is attached hereto, the applicable Services rates shall be those set forth in the rate sheet. Rates are subject to change without notice.
   (c) The price does not include any federal, state or local property, license, privilege, sales, use, excise, gross receipts, or other like taxes which may now or hereafter be applicable. Purchaser agrees to pay or reimburse any such taxes which ABB or its suppliers are required to pay or collect. If Purchaser is exempt from the payment of any tax or holds a direct payment permit, Purchaser shall, upon order placement, provide ABB a copy, acceptable to the relevant governmental authorities of any such certificate or permit.
   (d) The price includes customs duties and other importation or exportation fees, if any, at the rates in effect on the date of ABB’s Proposal. Any change after that date in such duties, fees, or rates, shall increase the price by ABB’s additional cost.

3. Payment.
   (a) Unless specified to the contrary in writing by ABB, payment terms are net cash, payable without offset, in United States Dollars, 30 days from date of invoice by wire transfer to the account designated by ABB in the Proposal.
   (b) If in the judgment of ABB the financial condition of Purchaser at any time prior to or delivery does not justify the terms of payment specified, ABB may require payment in advance, payment security satisfactory to ABB, or may terminate the order, whereupon ABB shall be entitled to receive reasonable cancellation charges. If delivery is delayed by Purchaser, payment shall be due on the date ABB is prepared to make delivery. Delays in delivery or nonconformities in any installments delivered shall not relieve Purchaser of its obligation to accept and pay for remaining installments.
   (c) Purchaser shall pay, in addition to the overdue payment, a late charge equal to the lesser of 1 1/2% per month or any part thereof or the highest applicable rate allowed by law on all such overdue amounts plus ABB’s attorneys’ fees and court costs incurred in connection with collection.

   (a) Any changes requested by Purchaser affecting the ordered scope of work must be accepted by ABB and resulting adjustments to affected provisions, including price, schedule, and guarantees mutually agreed in writing prior to implementation of the change.
   (b) ABB may, at its expense, make such changes in the Equipment or Services as it deems necessary, in its sole discretion, to conform the Equipment or Services to the applicable specifications. If Purchaser objects to any such changes, ABB shall be relieved of its obligation to conform to the applicable specifications to the extent that conformance may be affected by such objection.

5. Delivery.
   (a) All Equipment manufactured, assembled or warehoused in the continental United States is delivered F.O.B. point of shipment. Equipment shipped from outside the continental United States is delivered F.O.B. United States port of entry. Purchaser shall be responsible for any and all demurrage or detention charges.
   (b) If the scheduled delivery of Equipment is delayed by Purchaser or by Force Majeure, ABB may move the Equipment to storage for the account of and at the risk of Purchaser whereupon it shall be deemed to be delivered.
   (c) Shipping and delivery dates are contingent upon Purchaser’s timely approvals and delivery by Purchaser of any documentation required for ABB’s performance hereunder.
   (d) Claims for shortages or other errors in delivery must be made in writing to ABB within ten (10) days of delivery. Equipment may not be returned except with the prior written consent of and subject to terms specified by ABB. Claims for damage after delivery shall be made directly by Purchaser with the common carrier.

6. Title & Risk of Loss. Except with respect to Software (for which title shall not pass, use being licensed) title to Equipment shall remain in ABB until fully paid for. Notwithstanding any agreement with respect to delivery terms or payment of transportation charges, risk of loss or damage shall pass to Purchaser upon delivery.

   (a) Any inspection by Purchaser of Equipment on ABB’s premises shall be scheduled in advance to be performed during normal working hours.
   (b) If the order provides for factory acceptance testing, ABB shall notify Purchaser when ABB will conduct such testing prior to shipment. Unless Purchaser states specific objections in writing within ten (10) days after completion of factory acceptance testing, completion of the acceptance test constitutes Purchaser’s factory acceptance of the Equipment and its authorization for shipment.
   (c) If the order provides for site acceptance testing, testing shall be performed by ABB personnel to verify that the Equipment has arrived at site complete, without physical damage, and in good operating condition. Completion of site acceptance testing constitutes full and final acceptance of the Equipment. If, through no fault of ABB, acceptance testing is not completed within thirty (30) days after arrival of the Equipment at the site, the site acceptance test shall be deemed completed and the Equipment shall be deemed accepted.

8. Warranties and Remedies.
   (a) Equipment and Services Warranty. ABB warrants that Equipment (excluding Software, which is warranted as specified in paragraph (d) below) shall be delivered free of defects in material and workmanship and that Services shall be free of defects in workmanship. The Warranty Remedy Period for Equipment (excluding Software, Spare Parts and Refurbished or Repaired Parts) shall end twelve (12) months after installation or eighteen (18) months after date of shipment, whichever first occurs. The Warranty Remedy Period for new spare parts shall end twelve (12) months after date of shipment. The Warranty Remedy Period for refurbished or repaired parts shall end ninety (90) days after date of shipment. The Warranty Remedy Period for Services shall end ninety (90) days after the date of completion of Services.

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ABB General terms and conditions of sale

(b) Equipment and Services Remedy. If a nonconformity to the foregoing warranty is discovered in the Equipment or Services during the applicable Warranty Remedy Period, as specified above, under normal and proper use and provided the Equipment has been properly stored, installed, operated and maintained and written notice of such nonconformity is provided to ABB promptly after such discovery and within the applicable Warranty Remedy Period, ABB shall, at its option, either (i) repair or replace the nonconforming portion of the Equipment or re-perform the nonconforming Services or (ii) refund the portion of the price applicable to the nonconforming portion of Equipment or Services. If any portion of the Equipment or Services so repaired, replaced or re-performed fails to conform to the foregoing warranty, and written notice of such nonconformity is provided to ABB promptly after discovery and within the original Warranty Remedy Period applicable to such Equipment or Services or 30 days from completion of such repair, replacement or re-performance, whichever is later, ABB will repair or replace such nonconforming Equipment or re-perform the nonconforming Services. The original Warranty Remedy Period shall not otherwise be extended.

(c) Exceptions. ABB shall not be responsible for providing working access to the nonconforming Equipment, including disassembly and re-assembly of non-ABB supplied equipment, or for providing transportation to or from any repair facility, all of which shall be at Purchaser’s risk and expense. ABB shall have no obligation hereunder with respect to any Equipment which (i) has been improperly repaired or altered; (ii) has been subjected to misuse, negligence or accident; (iii) has been used in a manner contrary to ABB’s instructions; (iv) is comprised of materials provided by or a design specified by Purchaser; or (v) has failed as a result of ordinary wear and tear. Equipment supplied by ABB but manufactured by others is warranted only to the extent of the manufacturer’s warranty, and only the remedies, if any, provided by the manufacturer will be allowed.

(d) Software Warranty and Remedies. ABB warrants that, except as specified below, the Software will, when properly installed, execute in accordance with ABB’s published specification. If a nonconformity to the foregoing warranty is discovered during the period ending one (1) year after the date of shipment and written notice of such nonconformity is provided to ABB promptly after such discovery and within that period, including a description of the nonconformity and complete information about the manner of its discovery, ABB shall correct the nonconformity by, at its option, either (i) modifying or making available to the Purchaser instructions for modifying the Software; or (ii) making available at ABB’s facility necessary corrected or replacement programs. ABB shall have no obligation with respect to any nonconformities resulting from (i) unauthorized modification of the Software or (ii) Purchaser-supplied software or interfacing. ABB does not warrant that the functions contained in the software will operate in combinations which may be selected for use by the Purchaser, or that the software products are free from errors in the nature of what is commonly cataloged by the computer industry as “bugs”.

(e) The foregoing warranties are exclusive and in lieu of all other warranties of quality and performance, whether written, oral or implied, and all other warranties including any implied warranties of merchantability or fitness for a particular purpose or usage of trade are hereby disclaimed. The remedies stated herein constitute Purchaser’s exclusive remedies and ABB’s entire liability for any breach of warranty.


(a) ABB shall defend at its own expense any action brought against Purchaser alleging that the Equipment or the use of the Equipment to practice any process for which such Equipment is specified by ABB (a “Process”) directly infringes any claim of a patent of the United States of America and to pay all damages and costs finally awarded in any such action, provided that Purchaser has given ABB prompt written notice of such action, all necessary assistance in the defense thereof and the right to control all aspects of the defense thereof including the right to settle or otherwise terminate such action in behalf of Purchaser.

(b) ABB shall have no obligation hereunder and this provision shall not apply to:
(i) any other equipment or processes, including Equipment or Processes which have been modified or combined with other equipment or process not supplied by ABB; (ii) any equipment or Process supplied according to a design, other than an ABB design, required by Purchaser; (iii) any products manufactured by the Equipment or Process; (iv) any patent issued after the date hereof; or (v) any action settled or otherwise terminated without the prior written consent of ABB.

(c) If, in any such action, the Equipment is held to constitute an infringement, or the practice of any Process using the Equipment is finally enjoined, ABB shall, at its option and its own expense, procure for Purchaser the right to continue using said Equipment; or modify or replace it with non infringing equipment or, with Purchaser’s assistance, modify the Process so that it becomes non infringing; or remove it and refund the portion of the price allocable to the infringing Equipment. THE FOREGOING PARAGRAPHS STATE THE ENTIRE LIABILITY OF ABB AND EQUIPMENT MANUFACTURER FOR ANY PATENT INFRINGEMENT.

(d) To the extent that said Equipment or any part thereof is modified by Purchaser, or combined by Purchaser with equipment or processes not furnished hereunder (except to the extent that ABB is a contributory infringer) or said Equipment or any part thereof is used by Purchaser to perform a process not furnished hereunder by ABB or to produce an article, and by reason of said modification, combination, performance or production, an action is brought against ABB, Purchaser shall defend and indemnify ABB in the same manner and to the same extent that ABB would be obligated to indemnify Purchaser under this “Patent Indemnity” provision.

10. Limitation of Liability.

(a) In no event shall ABB, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, whether in contract, warranty, tort, negligence, strict liability or otherwise, including, but not limited to, loss of profits or revenue, loss of use of the Equipment or any associated equipment, cost of capital, cost of substitute equipment, facilities or services, downtime costs, delays, and claims of customers of the Purchaser or other third parties for any damages. ABB’s liability for any claim whether in contract, warranty, tort, negligence, strict liability, or otherwise for any loss or damage arising out of, connected with, or resulting from this Agreement or the performance or breach thereof, or from the design, manufacture, sale, delivery, resale, repair, replacement, installation, technical direction of installation, inspection, operation or use of any equipment covered by or furnished under this Agreement, or from any services rendered in connection therewith, shall in no case (except as provided in the section entitled “Patent Indemnity”) exceed one-half (1/2) of the purchase price allocable to the Equipment or part thereof or Services which gives rise to the claim.

(b) All causes of action against ABB arising out of or relating to this Agreement or the performance or breach hereof shall expire unless brought within one year of the time of accrual thereof.

(c) In no event, regardless of cause, shall ABB be liable for penalties or penalty clauses of any description or for indemnification of Purchaser or others for costs, damages, or expenses arising out of or related to the Equipment and/or Services.

11. Laws and Regulations. ABB does not assume any responsibility for compliance with federal, state or local laws and regulations, except as expressly set forth herein, and compliance with any laws and regulations relating to the operation or use of the Equipment or Software is the sole responsibility of the Purchaser. All laws and regulations referenced herein shall be those in effect as of the Proposal date. In the event of any subsequent revisions or changes thereto, ABB assumes no responsibility for compliance therewith. If Purchaser desires a modification as a result of any such change or revision, it shall be treated as a change per Article 4. Nothing contained herein shall be construed as imposing responsibility or liability upon ABB for obtaining any permits, licenses or approvals from any agency required in connection with the supply, erection or operation of the Equipment. This Agreement shall be governed by the laws of the State of New York, but excluding the provisions of ABB Jokab Safety Switches | 95
ABB General terms and conditions of sale

the United Nations Convention on Contracts for the International Sale of Goods and excluding New York law with respect to conflicts of law. Purchaser agrees that all cases of action against ABB under this Agreement shall be brought in the State Courts of the State of New York, or the U.S. District Court for the Southern District of New York. If any provision hereof, partly or completely, shall be held invalid or unenforceable, such invalidity or unenforceability shall not af-
fect any other provision or portion hereof and these terms shall be construed as if such invalid or unenforceable provision or portion thereof had never existed.

12. OSHA. ABB warrants that the Equipment will comply with the relevant standards of the Occupational Safety and Health Act of 1970 ("OSHA") and the regulations promulgated thereunder as of the date of the Proposal. Upon prompt written notice from the Purchaser of a breach of this warranty, ABB will replace the affected part or modify it so that it conforms to such standard or regulation. ABB's obligation shall be limited to such replacement or modifica-
tion. In no event shall ABB be responsible for liability arising out of the violation of any OSHA standards relating to or caused by Purchaser's design, location, operation, or maintenance of the Equipment, its use in association with other equipment of Purchaser, or the alteration of the Equipment by any party other than ABB.

13. Software License.
(a) ABB owns all rights in or has the right to sublicense all of the Software, if any, to be delivered to Purchaser under this Agreement. As part of the sale made hereunder Purchaser hereby obtains a limited license to use the Software, subject to the following: (i) The Software may be used only in conjunction with equipment specified by ABB; (ii) The Software shall be kept strictly confidential; (iii) The Software shall not be copied, reverse engineered, or modified; (iv) The Purchaser's right to use the Software shall terminate immediately when the specified equipment is no longer used by the Purchaser or when otherwise ter-
mminated, e.g., for breach, hereunder; and (v) the rights to use the Software are non-exclusive and non-transferable, except with ABB's prior written consent.
(b) Nothing in this Agreement shall be deemed to convey to Purchaser any title to or ownership in the Software or the intellectual property contained therein in whole or in part, nor to designate the Software a "work made for hire" under the Copyright Act, nor to confer upon any person who is not a named party to this Agreement any right or remedy under or by reason of this Agreement. In the event of termination of this License, Purchaser shall immediately cease using the Software and, without retaining any copies, notes or excerpts thereof, return to ABB the Software and all copies thereof and shall remove all machine read-
able Software from all of Purchaser's storage media.

14. Inventions and Information. Unless otherwise agreed in writing by ABB and Purchaser, all right, title and interest in any inventions, developments, improve-
ments or modifications of or for Equipment and Services shall remain with ABB. Any design, manufacturing drawings or other information submitted to the Purchaser remains the exclusive property of ABB. Purchaser shall not, without ABB's prior written consent, copy or disclose such information to a third party. Such information shall be used solely for the operation or maintenance of the Equipment and not for any other purpose, including the duplication thereof in whole or in part.

15. Force Majeure. ABB shall neither be liable for loss, damage, detention or delay nor be deemed to be in default for failure to perform when prevented from doing so by causes beyond its reasonable control including but not limited to acts of war (declared or undeclared), Acts of God, fire, strike, labor difficulties, acts or omissions of any governmental authority or of Purchaser, compliance with government regulations, insurrection or riot, embargo, delays or shortages in transportation or inability to obtain necessary labor, materials, or manufactur-
ing facilities from usual sources or from defects or delays in the performance of its suppliers or subcontractors due to any of the foregoing enumerated causes.

In the event of delay due to any such case, the date of delivery will be extend-
ed by period equal to the delay plus a reasonable time to resume production, and the price will be adjusted to compensate ABB for such delay.

16. Cancellation. Any order may be cancelled by Purchaser only upon prior written notice and payment of termination charges, including but not limited to, all costs identified to the order incurred prior to the effective date of notice of termination and all expenses incurred by ABB attributable to the termination, plus a fixed sum of ten (10) percent of the final total price to compensate for disruption in scheduling, planned production and other indirect costs.

17. Termination. No termination by Purchaser for default shall be effective un-
less, within fifteen (15) days after receipt by ABB of Purchaser's written notice specifying such default, ABB shall have failed to initiate and pursue with due diligence correction of such specified default.

18. Export Control.
(a) Purchaser represents and warrants that the Equipment and Services provided hereunder and the "direct product" thereof are intended for civil use only and will not be used, directly or indirectly, for the production of chemical or biological weapons or of precursor chemicals for such weapons, or for any direct or indirect nuclear end use. Purchaser agrees not to disclose, use, export or re-export, directly or indirectly, any information provided by ABB or the "direct product" thereof as defined in the Export Control Regulations of the United States Department of Commerce, except in compliance with such Regulations.
(b) If applicable, ABB shall file for a U.S. export license, but only after appropri-
ate documentation for the license application has been provided by Purchaser. Purchaser shall furnish such documentation within a reasonable time after order acceptance. Any delay in obtaining such license shall suspend performance of this Agreement by ABB. If an export license is not granted or, if once granted, is thereafter revoked or modified by the appropriate authorities, this Agreement may be canceled by ABB without liability for damages of any kind resulting from such cancellation. At ABB's request, Purchaser shall provide to ABB a Letter of Assurance and End-User Statement in a form reasonably satisfactory to ABB.

19. Assignment. Any assignment of this Agreement or of any rights or obliga-
tions under the Agreement without prior written consent of ABB shall be void.

20. Nuclear Insurance – Indemnity. For applications in nuclear projects, the
Purchaser and/or its end user customer shall have complete insurance protec-
tion against liability and property damage resulting from a nuclear incident.

21. Resale. If Purchaser resells any Equipment, the sale terms shall limit the liability of the buyer to the same extent that ABB’s liability to Purchaser is limited hereunder.

22. Entire Agreement. This Agreement constitutes the entire agreement be-
tween ABB and Purchaser. There are no agreements, understandings, restric-
tions, warranties, or representations between ABB and Purchaser other than those set forth herein or herein provided.
Contact us

ABB Inc.
ABB Jokab Safety Products
6471 Commerce Drive
Westland, MI US 48185
Phone: 888-282-2123
Fax: 800-565-9302
Web: www.jokabsafetyna.com

ABB Inc.
Low Voltage Products
2117 32nd Ave.
Lachine, Quebec, Canada H8T 3J1
Phone: 514-420-3100
Toll Free: 800-567-0283
Fax: 514-420-3137
Technical Support:
800-567-0283
lvp.support@ca.abb.com