Read and understand this document

Please read and understand this document before using the products. Please consult your ABB Jokab Safety representative for any questions or comments.

Suitability for use

ABB Jokab Safety shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer’s application or use of the product. Third party certificates for the products are available at https://new.abb.com/low-voltage/products/safety-products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE ABB JOKAB SAFETY PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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1 Introduction

1.1 Scope
The purpose of these Original Instructions is to describe the GKey safety lock and to provide the necessary information required for installation and use.

1.2 Audience
This document is intended for authorized installation personnel.

1.3 Prerequisites
It is assumed that the reader of this document has knowledge of the following:

- Basic knowledge of ABB Jokab Safety products.
- Knowledge of safety devices and safety locks.
- Knowledge of machine safety.

1.4 Special notes
Pay attention to the following special notes in the document:

⚠️ **Warning!** Danger of severe personal injury!
An instruction or procedure which, if not carried out correctly, may result in injury to the technician or other personnel.

⚠️ **Caution!** Danger of damage to the equipment!
An instruction or procedure which, if not carried out correctly, may damage the equipment.

ℹ️ **Note!** Important or explanatory information.
2 Overview

2.1 General description

GKey safety lock incorporate an RFID interlock switch and is designed to fit to the leading edge of machine guard doors to provide robust guard locking and double tamper resistant interlock mechanism.

It is designed to provide position interlock detection for moving guards and will keep the guard locked until a voltage is applied to the switch solenoid.

GKey safety lock will hold guards closed up to 3000 N. It can be used in conjunction with delay timers to provide the solenoid energize signal only after a pre-determined time has run down. GKey housing can incorporate positions for mounting of standard 22 mm pushbuttons, switches or lamps to facilitate machine request functions and diagnostics all in one housing. These pilot devices are ordered separately.

2.2 Safety information

It is the responsibility of the user to ensure the correct overall functionality of its systems and machines.

**Warning!** Carefully read through the entire manual before using the device.

**Warning!** The devices shall be installed by a trained electrician following the Safety regulations, standards and the Machinery directive.

**Warning!** Failure to comply with instructions, operation that is not in accordance with the use prescribed in these instructions, improper installation or handling of the device can affect the safety of people and the plant.

**Warning!** For installation and prescribed use of the product, the special notes in the instructions must be carefully observed and the technical standards relevant to the application must be considered.

**Warning!** In case of failure to comply with the instructions or standards, especially when tampering with and/or modifying the product, any liability is excluded.

- Record any RFID codes as required by factory rules or with reference to any risk assessment for the application.
- The risk assessment for the application should include the risk of spare actuators. Spare actuators should not be readily available and must be securely controlled.
- The safety functions and mechanics must be tested regularly. For application where infrequent guard access is foreseeable, the system must have a manual function test to detect a possible accumulation of faults. At least tested once per month for PL e Cat 3/4 or once per year for PL d Cat 3 (EN ISO 13849-1). Where possible it is recommended that the control system of the machine, demands and monitors these tests and stops or prevents the machine from starting if the tests are not done (see EN ISO 14119).
- Ensure that the switch holding force ($F_{zh}$) is sufficient to withstand the static forces applied during normal use and dynamic effects caused by bouncing of the guard shall not create an impact reaction force which exceeds the holding force. If the expected impact reaction forces are higher than the specified holding force for the switch, then design measures must be applied to avoid the force.
3 Installation

3.1 Installation precautions

⚠️ Warning! All safety functions shall be tested before starting up the system.

⚠️ Warning! Follow the instructions carefully to avoid personal injury or damage to the device.

⚠️ Warning! Do not defeat, tamper or bypass the safety function. Failure to do so can result in death or serious injury.

3.2 Installation

Installation of all GKey safety locks shall be in accordance with a risk assessment for the individual application.

Installation shall only be carried out by competent personnel and in accordance with these instructions.

Use 16-28 AWG copper conductors. Terminal torque 0.7 Nm.

⚠️ Caution! Make sure the Manual unlock function selector is in “Locked” position before putting the cover back on.

3.2.1 Mechanical mounting

Mount the GKey rigidly to the fixed frame of the guard or machine. Fit the actuator to the moving part of the guard and align it to the switch entry aperture.

1. M5 mounting bolts must be used to fix the switch and actuator mounting. The tightening torque to ensure reliable fixing is 4.0 Nm.

   Tightening torque for the lid screws and cable glands must be 1.5 Nm to ensure the IP seal.

   Always fit the aperture plug to the unused entry aperture to prevent debris entering the switch mechanism.

2. Always fit a mechanical stop to the guard to prevent damage to the switch.

   Ensure correct alignment of actuator and handle with front apertures of the switch and guide. Use alignment guides to ensure that the actuator enters the switch without interfering with the sides of the aperture.

   Do not mount adjacent switches or actuators closer than 100 mm.

3. The manual unlock function is achieved by using a tool and is to be used in exceptional circumstances. The release can be protected by use of a tamper coating to prevent unintended operation. If operated, this tamper protection is damaged and must be restored to ensure protection.

4. When fitting a handle, ensure that M6 mounting bolts are used to fix the mounting plate. The tightening torque to ensure reliable fixing is 4.0 Nm.

⚠️ Warning! When cutting the panel to allow the movement of the rear handle:

   • Consider the opening when calculating the safety distance

   • Make sure that there are no remaining sharp cutting edges
3.2.2  Check after installation

After installation operation of all control circuits, the locking function and rear escape release functions shall be checked.

For applications with a run-down time after removing power, ensure that the correct timing allowance has been made before the solenoid is energized.

3.2.3  Mounting example

GKey4 RU safety lock fitted with four optional buttons with sliding front handle, rear handle and spring loaded catch.

![Figure 1: View from outside guarded area](image1)

![Figure 2: View from inside guarded area](image2)

![Figure 3: View from above the GKey safety lock](image3)
4 Electrical connections

![Electrical connections diagram]

Figure 4: Electrical connections

<table>
<thead>
<tr>
<th>Terminal connections</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 V</td>
<td>Supply 0 V</td>
</tr>
<tr>
<td>R+</td>
<td>Supply +24 VDC</td>
</tr>
<tr>
<td>S+</td>
<td>Unlock signal (solenoid) +24 VDC in</td>
</tr>
<tr>
<td>11/12</td>
<td>Safety interlock and lock monitoring circuit</td>
</tr>
<tr>
<td>21/22</td>
<td>Safety interlock and lock monitoring circuit</td>
</tr>
<tr>
<td>44</td>
<td>Guard opened signal +24 VDC out</td>
</tr>
<tr>
<td>34</td>
<td>Guard unlocked signal +24 VDC out</td>
</tr>
<tr>
<td>ER</td>
<td>External Reset Signal</td>
</tr>
</tbody>
</table>

- Contacts 11-31 and 21-41 are closed when the switch is locked (solenoid). Contacts 12-32 and 22-42 are closed when the guard is closed (mechanical tongue and RFID actuator).
- GKey is supplied with removable conductor links fitted 41/42 and 31/32. If required by the control circuit, these may be removed to offer independent monitoring of the solenoid locking function or the actuator position.
- Always check the electrical ratings of any 22 mm pilot devices fitted. Never exceed these ratings.
5 Functions

5.1 General function

The mechanical tongue actuator profile is designed to match a cam mechanism within the switch head and provides a positively operated not easily defeatable mechanical interlock.

When the solenoid is energized, the safety contacts are positively opened, and the machine control circuit is broken.

5.2 RFID coding

A RFID coded actuator aligns with a programmed receiver inside the switch housing during closing of the guard. Both the mechanical tongue actuator and the RFID actuator must be in place and the RFID coding verified correctly for the safety contacts to close and allow the machine start circuit to be enabled.

The RFID code is factory set.

5.3 Escape release

The escape release button is used to exit the guarded area (the hazardous zone) when the GKey safety lock is locked.

Example: GKey4 RU with rear handle and sliding front handle fitted with spring loaded catch to prevent accidental closing after opening of the guard.

Figure 5: View from outside guarded area

Figure 6: View from inside guarded area

1. Press and hold the escape release button
2. Pull rear handle to open the door
5.4 Manual unlock function (auxiliary release)

The manual unlock function (auxiliary release according to EN ISO 14119) is achieved by using a tool and is to be used in exceptional circumstances. The release can be protected by use of a tamper coating to prevent unintended operation. If operated, this tamper protection is damaged and must be restored to ensure protection.

![Manual unlock function](image)

Figure 7: Position of the manual unlock function

5.5 Lock out function

GKey can be padlocked off for safe working. When entering the guarded area (the hazardous zone) a padlock is hung on the lock to indicate the presence of a person and to prevent the closing of the door and the start of the machine.

Up to four padlocks can be hung on the sliding handle.

![Padlocks hung on the sliding handle](image)

Figure 8: Padlocks hung on the sliding handle

5.6 LED Diagnostics

There are two LED indicators on the GKey switch.

<table>
<thead>
<tr>
<th>Safety lock state</th>
<th>LED 1 (Green/Yellow)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guard Open</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Guard Closed + Locked</td>
<td>Steady green</td>
<td>Safety outputs ON</td>
</tr>
<tr>
<td>Guard Closed + Unlocked</td>
<td>Flashing green</td>
<td></td>
</tr>
<tr>
<td>Guard Closed + Misaligned/</td>
<td>Alternate flashing green/yellow</td>
<td></td>
</tr>
<tr>
<td>Wrong actuator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault</td>
<td>Steady yellow</td>
<td>See Reset instructions</td>
</tr>
<tr>
<td>Problem with reset procedure</td>
<td>Steady green and yellow</td>
<td>Make sure the RFID actuator is in contact with GKey (guard closed) and cycle the power.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solenoid state</th>
<th>LED 2 (Red)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energized</td>
<td>ON</td>
</tr>
<tr>
<td>De-energized</td>
<td>OFF</td>
</tr>
</tbody>
</table>
5.7 **Reset instructions – RFID actuator**

When a fault condition requires a reset, proceed with either of the two procedures: internal or external reset.

⚠️ **Warning!** After completing the reset procedure, normal operation of the switch is resumed. This includes enabling the outputs if interlocking and locking conditions are fulfilled.

5.7.1 **Reset using internal reset button**

1. Open the guard.
2. Turn OFF all power to GKey.
3. Remove the cover from GKey.
4. Use a 2 mm terminal screwdriver to hold down the Reset button inside the housing and turn the power ON (see Fig. 9).
5. Release the Reset button - the yellow LED will flash.
   Close the guard - the yellow LED will turn steady yellow. (If the yellow LED continues to flash, check for mechanical fault, e.g. damaged actuator or GKey head.)
6. Turn power OFF and then ON - the green LED will illuminate, and normal operation is resumed.

⚠️ **Caution!** Make sure the Manual unlock function selector is in “Locked” position before putting the cover back on.

7. Re-fit the cover on GKey.
8. Open and close the guard ensuring all safety functions are correct – refer to risk assessments for the application.

![Figure 9: The reset button (cover is removed)](image)

5.7.2 **Reset using external reset input (Terminal “ER”)**

1. Provide a +24 VDC signal with a rising edge (0 V to +24 VDC) to the external reset input terminal “ER”.
2. Once the correct reset signal is detected at the “ER” terminal, the yellow LED will flash for two seconds before normal operation is resumed.
6 Maintenance

Every month: Check correct operation of all circuits and the Lock function. If any part of the GKey product displays mechanical damage, then remove and replace.

Every six months: Isolate power and remove cover. Check screw terminal tightness and check for signs of moisture ingress. Re-check according to the installation instructions in this manual.

⚠️ Warning! The safety functions and the mechanics shall be tested regularly.

⚠️ Warning! In case of breakdown or damage to the product, contact the nearest ABB Jokab Safety representative. Do not try to repair the product yourself since it may accidentally cause permanent damage to the product, impairing the safety of the device which in turn could lead to serious injury to personnel.
7 Model overview

7.1 GKey series

<table>
<thead>
<tr>
<th>Order code</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TLA050304R0002</td>
<td>GKey4 RU</td>
<td>Safety lock, 4 positions, die-cast, escape release, manual unlock</td>
</tr>
<tr>
<td>2TLA050310R0032</td>
<td>FHS GKey4</td>
<td>Front handle, sliding incl. mounting plate for GKey4</td>
</tr>
<tr>
<td>2TLA050040R0510</td>
<td>RHS GKey MKey</td>
<td>Rear handle, sliding</td>
</tr>
<tr>
<td>2TLA050040R0511</td>
<td>SCS GKey MKey</td>
<td>Spring loaded catch</td>
</tr>
</tbody>
</table>

The GKey safety lock and sliding front handle can be mounted on both left and right hand doors, on hinged doors and on sliding doors, as long as the door and the frame are aligned (next to each other). GKey4 RU is delivered with a mechanical tongue actuator, a RFID actuator, an entry lock and a bit for opening the cover.

The spring loaded catch prevents closing the sliding handle by mistake. When the handle is in open position, the catch must be pulled to be able to slide the handle in to closed position.

7.2 Pilot devices

Push buttons, emergency stop buttons and blanking plugs are ordered separately. More information can be found at ABB Safety Products - Pilot devices
7.3 Dimensions

Figure 10: GKey4 RU dimensions (all in millimeter)

Figure 11: FHS GKey4 handle and spring loaded catch dimensions (all in millimeter)
## Technical data

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>ABB AB, Jokab Safety Varlabergsvägen 11 SE-434 39 Kungsbacka Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical data</strong></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>+24 VDC ±10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>R+ 1.2 W (50 mA max.)</td>
</tr>
<tr>
<td></td>
<td>S+ 12 W (500 mA max.)</td>
</tr>
<tr>
<td>Safety circuits</td>
<td>+24 VDC, 200 mA max. switching</td>
</tr>
<tr>
<td>Auxiliary circuits (34 &amp; 44)</td>
<td>+24 VDC, 200 mA max. output feed</td>
</tr>
<tr>
<td>Rated insulation voltage</td>
<td>500 VAC</td>
</tr>
<tr>
<td>Rated impulse withstand</td>
<td>1000 VAC</td>
</tr>
<tr>
<td>Holding force</td>
<td>F1 max. 3000 N</td>
</tr>
<tr>
<td>Switch holding force ($F_{Zh}$)</td>
<td>2307 N</td>
</tr>
<tr>
<td>Classification and coding level</td>
<td>Type 4 high</td>
</tr>
<tr>
<td>(EN ISO 14119)</td>
<td></td>
</tr>
<tr>
<td>Actuator insertion distance for</td>
<td>5 mm</td>
</tr>
<tr>
<td>assured locking</td>
<td></td>
</tr>
<tr>
<td>$S_a$ (RFID)</td>
<td>10 mm</td>
</tr>
<tr>
<td>$S_r$ (RFID)</td>
<td>20 mm</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>1 Hz max.</td>
</tr>
<tr>
<td>Actuator entry minimum radius</td>
<td>175 mm</td>
</tr>
<tr>
<td>Body material</td>
<td>Die-cast metal aluminum alloy</td>
</tr>
<tr>
<td>Head material</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Mechanical actuator material</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Enclosure protection</td>
<td>IP65</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-25 °C to +40 °C</td>
</tr>
<tr>
<td>Mechanical life expectancy ($B_{100}$)</td>
<td>2.5 x 10⁶ cycles at 100 mA load</td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC 60068-2-6, 10-55 Hz+1 Hz</td>
</tr>
<tr>
<td></td>
<td>Excursion: 0.35 mm, 1 octave/min</td>
</tr>
<tr>
<td><strong>Safety / Harmonized standards</strong></td>
<td></td>
</tr>
<tr>
<td>EN ISO 13849-1</td>
<td>Performance level: PL e (If both channels are used in conjunction with a SIL3/PL e control device) Category 4, $MTTF_d = 1100$ a Diagnostic coverage: DC = 99% (High)</td>
</tr>
<tr>
<td>EN 62061 (used as a subsystem)</td>
<td>Safety integrity level: SIL3</td>
</tr>
<tr>
<td></td>
<td>PFH (1/h) = 4.77·10⁻¹⁰ (Corresponds to 4.8% of SIL3)</td>
</tr>
<tr>
<td></td>
<td>PFD = 4.18·10⁻⁵ (Corresponds to 4.2% of SIL3)</td>
</tr>
<tr>
<td></td>
<td>Proof test interval $T_1 = 20$ a</td>
</tr>
<tr>
<td>Operating assumptions</td>
<td>Days per year: $d_{op} = 365$ d</td>
</tr>
<tr>
<td></td>
<td>Hours per day: $h_{op} = 24$ h</td>
</tr>
<tr>
<td>Note: If the usage of the product</td>
<td>If the usage of the product differs from these assumptions (different load, operating frequency, etc.) the values must be adjusted accordingly.</td>
</tr>
<tr>
<td>Certifications</td>
<td>cULus, TÜV Rheinland</td>
</tr>
</tbody>
</table>
### Information for use in USA/Canada

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>Type 1</td>
</tr>
<tr>
<td>Maximum temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>Conductors</td>
<td>Use 16-28 AWG copper conductors (rated +90 °C)</td>
</tr>
<tr>
<td>Terminal torque</td>
<td>6 lb ins. (0.7 Nm)</td>
</tr>
<tr>
<td>Intended for same polarity use</td>
<td></td>
</tr>
<tr>
<td>Safety circuits (11-31 &amp; 21-41)</td>
<td>A300 Pilot duty 240 V 3A</td>
</tr>
<tr>
<td></td>
<td>(PF 0.38 or greater tested for 6,000 cycles endurance)</td>
</tr>
<tr>
<td>Push button ratings (optional)</td>
<td>120 - 240 VAC, 1.5 - 1.0 A</td>
</tr>
<tr>
<td></td>
<td>24 - 125 VDC, 0.3 - 0.2 A</td>
</tr>
<tr>
<td>Use one polymeric conduit connection. Not suitable for connection to rigid metal conduit. (Earth bonding terminal inside enclosure if required – use 16-12 AWG conductors)</td>
<td></td>
</tr>
</tbody>
</table>
### EC Declaration of conformity

**EC Declaration of conformity**

(according to 2006/42/EC, Annex ZA)

**We**

ABB AB JOKAB Safety
Varlabergsvägen 11
SE-434 39 Kungsbacka
Sweden

**declare that the safety components of ABB AB manufacture with**

type designations and safety functions as listed below, is in

conformity with the Directives

- 2006/42/EC – Machinery
- 2014/63/EU – RED
- 2011/65/EU – RoHS2
- 2015/863 – RoHS3

**Authorised to compile the technical file**

ABB AB JOKAB Safety
Varlabergsvägen 11
SE-434 39 Kungsbacka
Sweden

**Product**

Safety interlock switch Gkey4

**Certificate**

968/FSP 1788.00/18

**Certification Body**

TÜV Rheinland Industrie GmbH
Am Grauen Stein
51105 Köln
Germany

**Used harmonized standards**

- EN ISO 12100:2010, EN ISO 14119:2013,
- EN 301 489-1 V2.1.1, EN 301 489-3 V1.6.1

Tobias Gentzell
R&D Manager
Kungsbacka 2019-03-22

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www.abb.com/jokabsafety

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