

SAFETY PRODUCTS

Safety Lock GKey Product Manual



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.
i	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!	g! Carefully read through the <u>entire</u> 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

<u>\</u>	Warning!	All safety functions <u>shall</u> be tested before starting up the system.
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- **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.

- 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.
- 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.



ng! 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.

Before the lock out function is used, a test is needed. To ensure the lock out function and that it is not possible to close the GKey when a padlock is hung on the handle, the selected padlocks and GKey must be tested in combination.

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.



Rear handle

Figure 1: View from outside guarded area



Figure 3: View from above the GKey safety lock

Figure 2: View from inside guarded area

4 Electrical connections



Figure 4: Electrical connections

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

- 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.



Figure 7: Position of the manual unlock function

5.5 Lock out function

GKey can be padlocked off to reduce the risk of start of the machine when a person is in the guarded area (hazardous zone). When entering the guarded area, a padlock is hung on the handle to indicate the presence of a person and to prevent the closing of the door.

	Warning!	To achieve appropriate risk reduction and to be able to select suitable padlocks and other relevant measures, a risk assessment regarding the lock out function shall be performed. To ensure the lock out function and that it is not possible to close the GKey when a padlock is hung on the handle, the selected padlocks and GKey must be tested in combination.
i	Note!	Dimensions and shape of the padlock might affect the lock out function.

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



Figure 8: Padlocks hung on the sliding handle

5.6 **LED Diagnostics**

There are two LED indicators on the GKey switch.

Safety lock state	LED 1 (Green/Yellow)	Comment
Guard Open	OFF	
Guard Closed + Locked	Steady green	Safety outputs ON
Guard Closed + Unlocked	Flashing green	

Guard Closed + Misaligned/ Wrong actuator	Alternate flashing green/ yellow	
Fault	Steady yellow	See Reset instructions
Problem with reset procedure	Steady green and yellow	Make sure the RFID actuator is in contact with GKey (guard closed) and cycle the power.
Solenoid state	LED 2 (Red)	
Energized	ON	
De-energized	OFF	

5.7 **Reset instructions – RFID actuator**

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

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.

[▲] 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.

0V R+ S+ 34 44 ER	
	Reset button

Figure 9: The reset button (cover is removed)

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! 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**

Order code	Туре	Description
2TLA050304R0002	GKey4 RU	Safety lock, 4 positions, die-cast, escape release,
		manual unlock
2TLA050310R0032	FHS GKey4	Front handle, sliding incl. mounting plate for GKey4
2TLA050040R0510	RHS GKey MKey	Rear handle, sliding
2TLA050040R0511	SCS GKey MKey	Spring loaded catch

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 http://new.abb.com/low-voltage/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)

8 Technical data

Manufacturer			
Address	ABB AB, Jokab Safety		
	Varlabergsvägen 11		
	SE-434 39 Kungsbacka		
	Sweden		
Technical data			
Supply voltage	+24 VDC ±10 %		
Power consumption	R+ 1.2 W (50 mA max.)		
	S+ 12 W (500 mA max.)		
Safety circuits	+24 VDC, 200 mA max. switching		
Auxiliary circuits (34 & 44)	+24 VDC, 200 mA max. output feed		
Rated insulation voltage	500 VAC		
Rated impulse withstand	1000 VAC		
Holding force	F1 max. 3000 N		
Switch holding force (F _{zh})	2307 N		
Classification and coding level	Type 4 high		
(EN ISO 14119)			
Actuator insertion distance for	5 mm		
assured locking			
Sao (RFID)	10 mm		
S _{ar} (RFID)	20 mm		
Operating frequency	1 Hz max.		
Actuator entry minimum radius	175 mm		
Body material	Die-cast metal aluminum alloy		
Head material	Stainless steel		
Mechanical actuator material	Stainless steel		
Enclosure protection	IP65		
Operating temperature	-25 °C to +40 °C		
Mechanical life expectancy (B _{10D})	2.5 x 10° cycles at 100 mA load		
Vibration	IEC 60068-2-6, 10-55 Hz+1 Hz		
	Excursion: 0.35 mm, 1 octave/min		
Safety / Harmonized standards			
Conformity	European Machine Directive 2006/42/EC		
	EN 60947-5-3, EN ISO 13849-1, EN 62061,		
	EN ISO 14119, UL 508		
EN ISO 13849-1	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)		
EN 62061	Safety integrity level: SIL3		
(used as a subsystem)	PFH $(1/h) = 4,77.10^{-10}$ (Corresponds to 4.8% of SIL3)		
	$PFD = 4,18 \cdot 10^{-3} \text{ (Corresponds to 4.2\% of SIL3)}$		
	Proof test interval I1=20 a		
Operating assumptions	Days per year: $d_{op} = 365 d$		
Note of the use of the stady of	Hours per day: $n_{op} = 24 \text{ n}$		
requests at a the values must be adjusted accordingly			
Cortifications	e aujusteu accorumgiy.		
Certifications	COLUS, TOV KITEITIATIO		

Information for use in USA/Canada			
Enclosure	Type 1		
Maximum temperature	40 °C		
Conductors	Use 16-28 AWG copper conductors (rated +90 °C)		
Terminal torque 6 lb ins. (0.7 Nm)			
Intended for same polarity use			
Safety circuits (11-31 & 21-41)	A300 Pilot duty 240 V 3A		
	(PF 0.38 or greater tested for 6,000 cycles endurance)		
Push button ratings (optional)	120 - 240 VAC, 1.5 - 1.0 A		
	24 - 125 VDC, 0.3 - 0.2 A		
Use one polymeric conduit conne	ection. Not suitable for connection to rigid metal conduit.		
(Earth bonding terminal inside e	nclosure if required – use 16-12 AWG conductors)		

9

EC Declarations of conformity



EC Declaration of conformity

(according to 2006/42/EC, Annex 2A)

We	ABB AB JOKAB Safety Varlabergsvägen 11 SE-434 39 Kungsbacka	declare that the safety components of ABB AB manufacture with type designations and safety functions as listed below, is in conformity with the Directives
	Sweden	2006/42/EC – Machinery
	2014/53/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		Certificate
Safety interlock switch		968/FSP 1788.00/18
Gkey	/4	
Certification Body		TÜV Rheinland Industrie GmbH
		Am Grauen Stein
		51105 Köln
		Germany
Used harmonized standards		EN ISO 12100:2010, EN ISO 14119:2013,
		EN ISO 13849-1:2015, IEC 62061:2005+A2:2015,
		IEC 60947-5-3:2013, IEC 60947-1:2014, EN 60204-1:2018,
		EN 301 489-1 V2.1.1. EN 301 489-3 V1.6.1

Jum GostM.

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

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