Magne
Electromagnetic process lock
Read and understand this document

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Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, and installations subject to separate industry or government regulations.

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1 Introduction

Scope
The purpose of these instructions is to describe the electromagnetic process lock Magne and to provide the necessary information required for assembly, installation, checks and adjustments after installation, and maintenance. The instructions include the significant information necessary for the electric installation of Magne.

Audience
This document is intended for authorized installation personnel.

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 process locks.
- Knowledge of machine safety.

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.

NB: Notes are used to provide important or explanatory information.
2 Overview

General description

Magne is an electromagnetic process lock designed without any moving parts, making it durable and well suited for use in industrial applications and other harsh environments. Magne can lock a door or hatch with a holding force of up to 1500 N. When power is turned off, no magnetic material will stick on the surface of the magnet.

Magne 1A is an electromagnetic lock suited for use with any external interlock switch, if required.

Magne 2A and -2Ax are electromagnetic locks equipped with a built-in Eden sensor for guard interlocking. Magne 2A has an 8-pole M12-connector, allowing information outputs for indication signals (e.g. anchor plate locked to magnet). Magne 2Ax has a 5-pole M12-connector with pin configuration enabling connection to a Urax adaptation device for connection to the AS-i bus.

Magne 1B, 2B and 2Bx are identical to above respectively mentioned models except for a permanent magnet built into the anchor plate, which will hold the door or hatch closed with approximately 30 N of force when no power is supplied to the electromagnet. For further details see chapter Model overview.

Y-connections can be used to connect several Magne units and Eden sensors in series, enabling control and monitoring by a single Pluto safety-PLC or Vital safety module. No current peaks above rated current consumption occur at lock activation, simplifying system dimensioning.

Safety regulations

⚠️ Warning!

Carefully read through this entire manual before using the device.

The devices shall be installed by a trained electrician following the Safety regulations, standards and the Machine directive.

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.

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.

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

NB: Shielded cable is recommended between this unit and the rest of the safety circuits.

Caution! All cable colours according to ABB/Jokab Safety standard cable.

Magne 1A/B

5-pole M12-connector:

1 ) Brown: Locking, +24 VDC
2 ) White: Info-contact, common
3 ) Blue: 0 VDC
4 ) Black: Info-contact, locked
5 ) Grey: Info-contact, unlocked

NB: Magne 1A/B can be connected in series using M12-3A.

⚠️ Warning! The information outputs are non-failsafe and may never be used to control a safety application.

Magne 2A/B

8-pole M12-connector:

1 ) White: Dynamic signal input
2 ) Brown: +24 VDC
3 ) Green: Locking, +24 VDC
4 ) Yellow: Locking, 0 VDC
5 ) Grey: Info-signal, closed (max 10 mA)
6 ) Pink: Dynamic signal output
7 ) Blue: 0 VDC
8 ) Red: Info-signal, locked (max 100 mA)

NB: Two Magne 2A/B units can be connected to distribution block Tina 12A.

⚠️ Warning! The information outputs are non-failsafe and may never be used to control a safety application. To control a safety application, the safe dynamic signal from the Eden interlock switch should be used.
Magne 2Ax/Bx

5-pole M12-connector:
1) Brown: +24 VDC
2) White: Dynamic signal input
3) Blue: 0 VDC
4) Black: Dynamic signal output
5) Grey: Locking

NB: Magne 2Ax/Bx can be connected to the AS-i bus using Urax B1R.
4 Installation and maintenance

Maximum installation tolerance between magnet and anchor plate is ± 5 mm in both horizontal and vertical directions. Available fittings for conventional doors are designed for 5-15 mm door gap. Installation measurements for sliding door according to figure below.

Specific installation instructions are included with each mounting kit.

NB: All measurements in millimetres.

Installation precautions

⚠️ Warning! Follow the below instructions carefully to avoid injuries or damage to the device.

- Magne must be mounted as close as possible to the door handle. Distance between lock and door handle will cause the door frame to act as a lever, decreasing the operating force required to force the lock open. Additionally, it may cause the anchor plate to be twisted off of the magnet if the door is forced, considerably lowering the holding force of the lock.

- Connect the cable to the M12-connector after Magne has been mounted on the guard.

- Make sure Eva is aligned correctly in relation to the built-in Adam sensor (applies to Magne 2A/B, -2Ax/Bx). See section Eva position and orientation.

- All safety functions must be tested before starting up the system.

⚠️ Caution! The anchor plate may not be used as the only door stop. Additional door stop(s) must be used to prevent damage to Magne.

Maintenance

The Magnet should be cleaned regularly to maintain full holding force.

⚠️ Warning!

The safety functions and the mechanics shall be tested regularly, at least once every year to confirm that all the safety functions are working properly (EN 62061:2005).

In case of breakdown or damage to the product, contact the nearest ABB/Jokab Safety Service Office or reseller. 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.
Eva position and orientation

This section applies to Magne 2A/B, -2Ax/Bx only.

The integrated interlock switch Eden consists of two units, Adam and Eva. The two units must be aligned correctly in order for the sensor to function properly. Adam is built into the housing of Magne 2, potted between the magnet and M12 connector. When the door is closed, correct Eva position is on top of the Magne housing according to the figure below.

The safety application is dependent on the Eden sensor to determine if a guard is open or closed, making it an important task to carefully position the sensors and test the safety functions.

Testing of the safety functions

This section applies to Magne 2A/B, -2Ax/Bx only. If used, similar tests should be carried out for external interlock switches when used together with Magne 1A/B.

Make sure the safety unit is working properly by following the steps below:

- Interrupt the dynamic safety circuit before this unit. The LED will flash between green and red.
- Restore the dynamic safety circuit.
- Move Eva into position next to Adam (i.e. close the door). The LED will light green.
- Move Eva away from Adam (i.e. open the door). The LED will light red as Eva is moved out of maximum sensing distance to Adam.

An additional function test can be carried out by slowly moving Eva away from Adam (i.e. slowly open the door from fully closed position). The LED will flash fast between green and red when Eva is 2 mm from max sensing distance to Adam.

Troubleshooting

This section applies to Magne 2A/B, -2Ax/Bx only.

<table>
<thead>
<tr>
<th>LED indicator note</th>
<th>Expected causes of faults</th>
<th>Checking and measures to take</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lights red</td>
<td>Eva away from Adam</td>
<td>Move Eva within sensing distance of Adam</td>
</tr>
<tr>
<td></td>
<td>Metal between Eden sensors</td>
<td>Remove the metal</td>
</tr>
<tr>
<td></td>
<td>24 VDC input to pin-2 (no dynamic signal)</td>
<td>Check if there is 24 VDC to input (pin-2). If Yes, check cable or unit before in the safety circuit and fix it.</td>
</tr>
<tr>
<td>No lights</td>
<td>Loss of power supply</td>
<td>Check 24 VDC / 0 VDC power supply</td>
</tr>
<tr>
<td>Lights green (but no</td>
<td>Defected dynamic signal input to unit</td>
<td>Check the dynamic input or the unit before in the safety circuit</td>
</tr>
<tr>
<td>dynamic output</td>
<td>(asymmetric pulses)</td>
<td></td>
</tr>
<tr>
<td>detected)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weak lights or red and</td>
<td>The unit is defect</td>
<td>The unit needs to be replaced. Contact ABB/Jokab Safety.</td>
</tr>
<tr>
<td>green lights at the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>same time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

⚠️ Warning! Replace the defected unit with a new one and never bypass the safety circuit using Tina 1A or similar solution.
5 Operation

Locking:
1. Close the door.
2. Locking according to PLC program (e.g. by signal from push button).

Unlocking:
1. Unlocking according to PLC program (e.g. by signal from push button, or automatically when the machine/process cycle has finished as intended).
2. Open the door.

LED indication

<table>
<thead>
<tr>
<th>LED on Adam (Magne 2A/B, -2Ax/Bx)</th>
<th>Indication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Green</td>
<td>Eva close, safety circuit closed (door closed)</td>
</tr>
<tr>
<td>Green-Red (flash)</td>
<td>Green-Red (flash)</td>
<td>Eva close, safety circuit broken before this unit (door closed)</td>
</tr>
<tr>
<td>Green-Red (fast flash)</td>
<td>Green-Red (fast flash)</td>
<td>Eva within 2 mm of max sensing distance (door closed)</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
<td>Eva distant, safety circuit broken (door open)</td>
</tr>
</tbody>
</table>
6 Model overview

Magne model name description:

Magne  X Y Z

NB: Position “Z” only possible for models with integrated Eden sensor.

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Electromagnetic lock only</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Electromagnetic lock with integrated Eden interlock switch</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>Standard anchor plate</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Anchor plate with permanent magnet (30 N holding force)</td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td>8-pole connector</td>
</tr>
<tr>
<td></td>
<td>x</td>
<td>5-pole connector (compatible with some URAX adaptation devices for AS-i)</td>
</tr>
</tbody>
</table>

Fittings are available for different door types (conventional or sliding door), see Accessories and spare parts.

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magne 1A</td>
<td>2TLA042022R0000</td>
<td>Electromagnet with 5-pole M12-contact Anchor plate, cell rubber</td>
</tr>
<tr>
<td>Magne 1B</td>
<td>2TLA042022R0100</td>
<td>Electromagnet with 5-pole M12-contact Anchor plate with permanent magnet, cell rubber</td>
</tr>
<tr>
<td>Magne 2A</td>
<td>2TLA042022R1000</td>
<td>Electromagnet with 8-pole M12-contact Anchor plate, cell rubber Adam (built-in) + Eva (external) interlock switch</td>
</tr>
<tr>
<td>Magne 2B</td>
<td>2TLA042022R1200</td>
<td>Electromagnet with 8-pole M12-contact Anchor plate with permanent magnet, cell rubber Adam (built-in) + Eva (external) interlock switch</td>
</tr>
<tr>
<td>Magne 2Ax</td>
<td>2TLA042022R1300</td>
<td>Electromagnet with 5-pole M12-contact Anchor plate, cell rubber Adam (built-in) + Eva (external) interlock switch</td>
</tr>
<tr>
<td>Magne 2Bx</td>
<td>2TLA042022R1400</td>
<td>Electromagnet with 5-pole M12-contact Anchor plate with permanent magnet, cell rubber Adam (built-in) + Eva (external) interlock switch</td>
</tr>
</tbody>
</table>
## Accessories and spare parts

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory</td>
<td>2TLA042023R0100</td>
<td>Aluminium profile for door handle that completely covers a Magne unit when the door is closed. For conventional door (5-15 mm door gap). Fits all Magne. Eva is mounted inside the profile.</td>
</tr>
<tr>
<td>JSM D21B</td>
<td>2TLA042023R0500</td>
<td>Mounting kit for Magne. For conventional door (5-15 mm door gap). Fits all Magne. Note: When used with Magne 2A/B, -2Ax/Bx a mounting kit for Eva is also required (JSM D24).</td>
</tr>
<tr>
<td>JSM D23</td>
<td>2TLA042023R0200</td>
<td>Mounting kit for Magne. For sliding door. Fits all Magne.</td>
</tr>
<tr>
<td>JSM D24</td>
<td>2TLA042023R0300</td>
<td>Mounting kit for Eva. For conventional door.</td>
</tr>
<tr>
<td>Spare part</td>
<td>2TLA042023R0400</td>
<td>Anchor plate (with permanent magnet)</td>
</tr>
<tr>
<td>Spare part</td>
<td>2TLA042023R1300</td>
<td>Anchor plate (without permanent magnet)</td>
</tr>
<tr>
<td>Accessory</td>
<td>2TLA042023R1000</td>
<td>Door handle for JSM D21B</td>
</tr>
<tr>
<td>Spare part</td>
<td>2TLA042023R3600</td>
<td>Cell rubber</td>
</tr>
<tr>
<td>M12-3A</td>
<td>2TLA020055R0000</td>
<td>Y-connector to connect several units in series. Magne 1A/B only.</td>
</tr>
<tr>
<td>Tina 12A</td>
<td>2TLA020054R1800</td>
<td>Distribution block for two units. Magne 2A/B only.</td>
</tr>
<tr>
<td>Urax B1R</td>
<td>2TLA020072R0200</td>
<td>Adaptation device for connection to the AS-i bus. 1 safe input node and 3 non-failsafe outputs. Connector for local reset. AS-i AUX power required. Magne 2Ax/Bx only.</td>
</tr>
</tbody>
</table>

NB: All mounting kits include the bolts and nuts necessary to mount Magne on ABB/Jokab Safety Quick-Guard system.

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**Magne 2A including Eva sensor and JSM D21B, JSM D24 and door handle (conventional door)**

Article numbers:
- 2TLA042022R1000 – Magne 2A
- 2TLA042023R0500 – JSM D21B
- 2TLA042023R0300 – JSM D24
- 2TLA042023R1000 – Door handle

**Magne 1A with JSM D21B and door handle (conventional door)**

Article numbers:
- 2TLA042022R0000 – Magne 1A
- 2TLA042023R0500 – JSM D21B
- 2TLA042023R1000 – Door handle

**Magne 2A including Eva sensor and JSM D23 (sliding door)**

Article numbers:
- 2TLA042022R1000 – Magne 2A
- 2TLA042023R0200 – JSM D23
### 7 Technical data

| Manufacturer | ABB AB / JOKAB SAFETY  
Varlabergsvägen 11  
SE-434 39 Kungsbacka  
Sweden |
| --- | --- |

<table>
<thead>
<tr>
<th>Power supply</th>
<th></th>
</tr>
</thead>
</table>
| Operating voltage | Magnet: 24 VDC +/- 15%  
Eden: 17-27 VDC, ripple max 10% |
| Total current consumption | Magnet: 7 W (300 mA at 24 VDC)  
Eden: 45-55 mA (see data for Eden)  
Information channel output (Eden): Max 10 mA |
| Time delay t (in/out Eden) | t < 60 µs |

**NB:** Consider cable dimensions when connecting several devices in series. A standard cable from ABB/Jokab Safety has cross-section area 0.34 mm². Magne does not cause any current peaks at lock activation.

<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP67</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20...+50°C</td>
</tr>
<tr>
<td>Humidity range</td>
<td>35 to 85 % (with no icing or condensation)</td>
</tr>
</tbody>
</table>
| Holding force | 24 VDC: Min 1500 N  
0 VDC: 0 N  
Anchor plate permanent magnet: 30 N (Magne 1B, 2B, 2Bx) |
| Lock function | Electromagnet (M) |
| Contacts | Reed sensor (non-failsafe)  
Max switch current: 100 mA, resistive load |
| Size | See drawings |
| Weight | Magne 1A: 610 g  
Magne 2A: 700 g  
Anchor plate: 290 g |
| Material | Anchor plate: Iron with nickel coating  
Magne: Iron with zinc-nickel coating  
Housing: Anodized aluminium  
Potting: PUR, epoxy |
| Colour | Silver |
| Connector | M12 5-pole male (Magne 1A/B, 2A/Bx)  
M12 8-pole male (Magne 2A/B) |
| Mechanical life | > 10⁷ switch operations |

<table>
<thead>
<tr>
<th>Safety / Harmonized standards</th>
<th></th>
</tr>
</thead>
</table>
| Conformity | European Machinery Directive 2006/42/EC  
EN ISO 12100-1-2, EN 954-1, EN ISO 13849-1, EN 62061, EN 60204-1, IEC 60664-1, EN 61000-6-2, EN 61000-6-4, EN 60947-5-1, EN 1088  
IEC/EN 61508-1...7  
SIL3, PFH<sub>d</sub>: 4.50*10<sup>-9</sup>  
EN 62061  
EN ISO 13849-1  
Performance level: PL e, Category 4  
Certifications | TÜV Nord |

**Warning!** Values related to safety are based on the interlocking switch Eden and does not include the locking function.
NB: Refer to the Eden instructions manual for further details regarding the interlocking switch. The manual can be found at www.abb.com/lowvoltage.

Holding force

![Graph showing holding force relative to applied voltage]

Holding force relative applied voltage

Dimensions

**Magne 1A/B dimensions**

- \( \phi 10.7 \) DEEP 7 (2x)
- \( \phi 6.5 \) (2x)
- M12 5-pole

![Dimensions diagram of Magne 1A/B](image)

**Magne 2A/B, -2Ax/Bx dimensions**

- \( \phi 10.7 \) DEEP 7 (2x)
- \( \phi 6.5 \) (2x)
- M12 5/8-pole

![Dimensions diagram of Magne 2A/B, -2Ax/Bx](image)
Cell rubber dimensions

Anchor plate dimensions (without permanent magnet)

Anchor plate dimensions (with permanent magnet)

NB: All measurements in millimetres.
8 EC Declaration of conformity

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

We, ABB AB
JOKAB SAFETY
Varlabergsvägen 11
SE-434 39 Kungsbacka
Sweden

declare that the safety components of ABB AB make with type designations and safety functions as listed below, is in conformity with the Directives

- 2006/42/EC
- 2000/53/EC
- 2004/108/EC

Authorised to compile the technical file

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

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Certificate</th>
<th>Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-contact safety sensor Edén</td>
<td>44 207 11 372092-000</td>
<td>[000 - 000 ... 999-999]</td>
</tr>
<tr>
<td>Edén Adapta</td>
<td>44 207 11 372092-000</td>
<td>[000 - 000 ... 999-999]</td>
</tr>
<tr>
<td>T1A-2, T2A-10-12</td>
<td>44 207 11 372092-000</td>
<td>[000 - 000 ... 999-999]</td>
</tr>
<tr>
<td>Multiprotect unit FMC-Tira</td>
<td>44 207 11 372092-000</td>
<td>[000 - 000 ... 999-999]</td>
</tr>
<tr>
<td>Non-contact safety sensor Edén including locking function</td>
<td>44 207 11 372092-000</td>
<td>[000 - 000 ... 999-999]</td>
</tr>
</tbody>
</table>
| Magne 2A, 2B, 2AX, 2BX | TÜV NORD CERT GmbH | www.abb.com/lowvoltage

Used harmonized standards:


Jesper Kristenson
PRU Manager
Kungsbacka 2011-10-16

www.abb.com
www.jokabsafety.com

Original

ABB AB / JOKAB SAFETY Varlabergsvägen 11, SE-434 39 Kungsbacka, Sweden

www.abb.com/lowvoltage