

Original instructions

Magne

Electromagnetic process lock



Read and understand this document

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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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While every effort has been taken to ensure the accuracy of the information contained in this manual ABB/JOKAB SAFETY cannot accept responsibility for errors or omissions and reserves the right to make changes and improvements without notice. Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of ABB/JOKAB SAFETY'S test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the ABB/JOKAB SAFETY Warranty and Limitations of Liability.

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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.

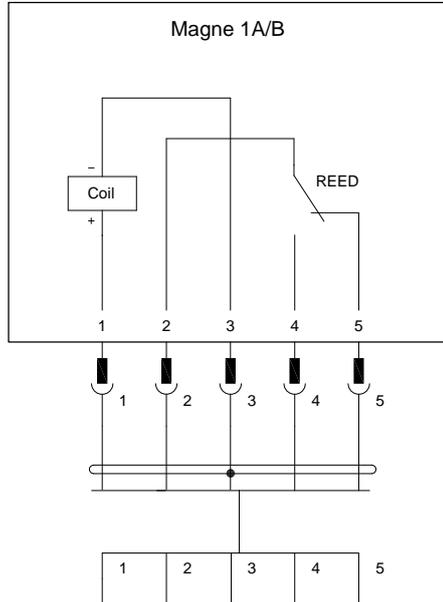
In case of failure to comply with the instructions or standards, especially when tampering with and/or modifying the product, any liability is excluded.

3 Connections

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

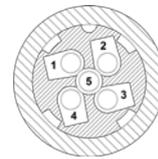
Caution! All cable colours according to ABB/Jokab Safety standard cable.

Magne 1A/B

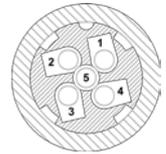


5-pole M12-connector:

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



M12 5-pole male seen from cable side

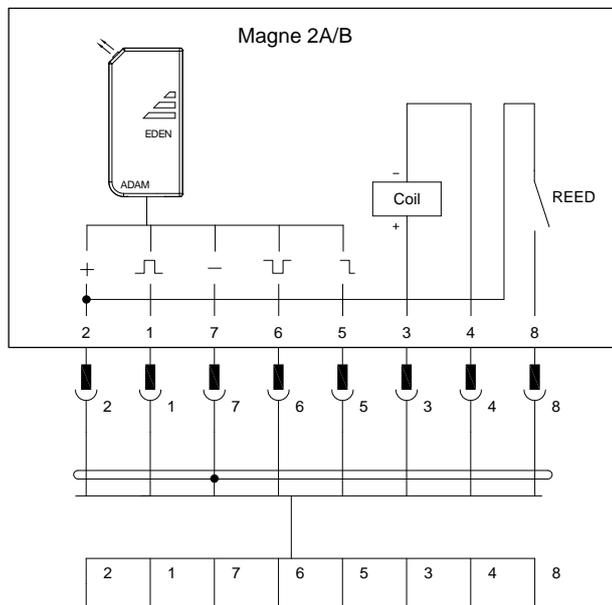


M12 5-pole female seen from cable side

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

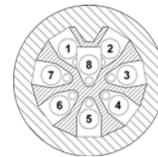
Warning! The information outputs are non-failsafe and may **never** be used to control a safety application.

Magne 2A/B

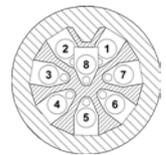


8-pole M12-connector:

- 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)



M12 8-pole male seen from cable side

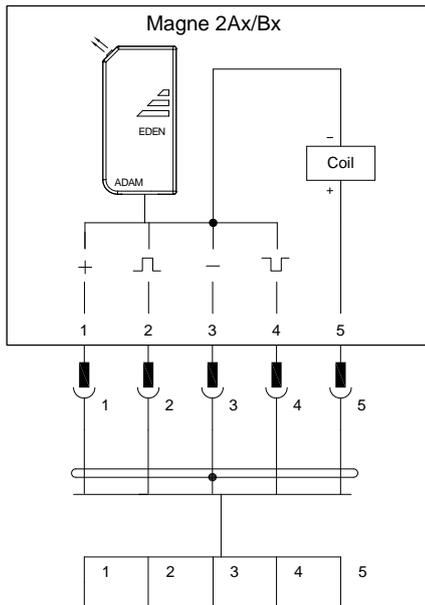


M12 8-pole female seen from cable side

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

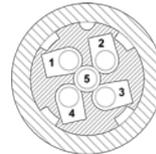
Warning! The information outputs are non-failsafe and may **never** be used to control a safety application. To control a safety application, the safe dynamic signal from the Eden interlock switch should be used.

Magne 2Ax/Bx

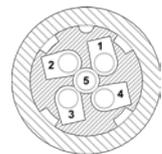


5-pole M12-connector:

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



M12 5-pole male seen
from cable side



M12 5-pole female
seen from cable side

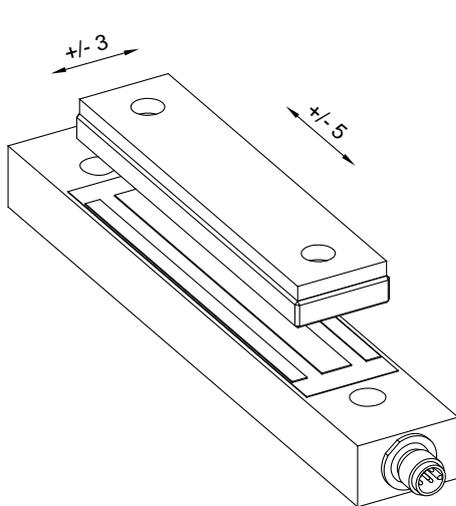
NB: Magne 2Ax/Bx can be connected to the AS-i bus using Urax B1R.

4 Installation and maintenance

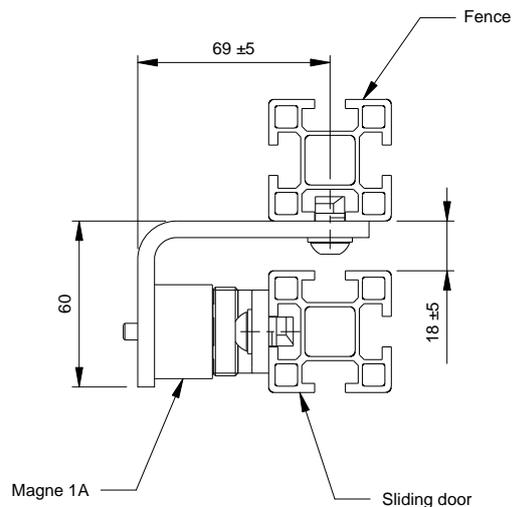
Maximum installation tolerance between magnet and anchor plate is ± 5 mm in direction along Magne body and ± 3 mm sideways. Available fittings for conventional doors are designed for 5-15 mm door gap. Installation measurements for sliding door according to figure below.

Mount the anchor plate with 2pc M8 screws from the backside. These M8 screws may not be tightened so that the cell rubber is compressed down to a thickness of less than 8mm. Choose suitable screws that reach the bottom of the anchor plate and leaves enough free room for the cell rubber to ensure movement of the anchor plate. Recommended tightening torque for the screws is 7+-2Nm

Specific installation instructions are included with each mounting kit.



Installation tolerance (general)



Installation tolerance (sliding door)

NB: All measurements in millimetres.

Installation precautions

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

- After mounting the magnet and anchor plate, make sure the surfaces are flat and parallel, so that full contact is obtained when the door closes.
- 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.
- The lock holding force can be significantly lowered if the anchor plate and cell rubber are unable to move, make sure that full contact is always obtained.
- 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!

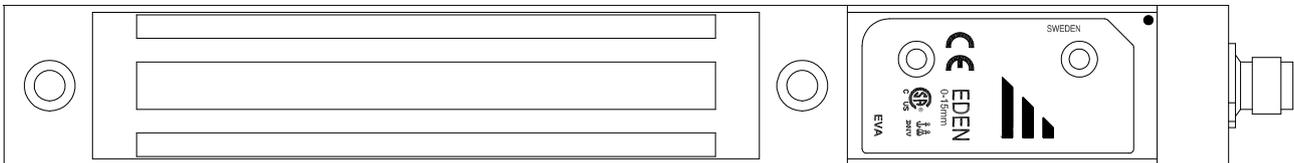
The safety functions and the mechanics shall be tested regularly, at least once every year to confirm that all the safety functions are working properly (EN 62061:2005).

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.



Eva unit in correct position and orientation on top of the Adam unit built into Magne 2A/B or Magne 2Ax/Bx.

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.

LED indicator note	Expected causes of faults	Checking and measures to take
Lights red	Eva away from Adam	Move Eva within sensing distance of Adam
	Metal between Eden sensors	Remove the metal
	24 VDC input to pin-2 (no dynamic signal)	Check if there is 24 VDC to input (pin-2). If Yes, check cable or unit before in the safety circuit and fix it.

No lights	Loss of power supply	Check 24 VDC / 0 VDC power supply
Lights green (but no dynamic output detected)	Defected dynamic signal input to unit (asymmetric pulses)	Check the dynamic input or the unit before in the safety circuit
Weak lights or red and green lights at the same time	The unit is defect	The unit needs to be replaced. Contact ABB/Jokab Safety.

 **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

LED	Indication	Description
LED on Adam (Magne 2A/B, -2Ax/Bx)	Green	Eva close, safety circuit closed (door closed)
	Green-Red (flash)	Eva close, safety circuit broken before this unit (door closed)
	Green-Red (fast flash)	Eva within 2 mm of max sensing distance (door closed)
	Red	Eva distant, safety circuit broken (door open)

6 Model overview

Magne model name description:

Magne X Y Z

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

Position	Designation	Description
X	1	Electromagnetic lock only
	2	Electromagnetic lock with integrated Eden interlock switch
Y	A	Standard anchor plate
	B	Anchor plate with permanent magnet (30 N holding force)
Z		8-pole connector
	x	5-pole connector (compatible with some URAX adaptation devices for AS-i)

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

Type	Article number	Description
Magne 1A	2TLA042022R0000	Electromagnet with 5-pole M12-contact Anchor plate, cell rubber
Magne 1B	2TLA042022R0100	Electromagnet with 5-pole M12-contact Anchor plate with permanent magnet, cell rubber
Magne 2A	2TLA042022R1000	Electromagnet with 8-pole M12-contact Anchor plate, cell rubber Adam (built-in) + Eva (external) interlock switch
Magne 2B	2TLA042022R1200	Electromagnet with 8-pole M12-contact Anchor plate with permanent magnet, cell rubber Adam (built-in) + Eva (external) interlock switch
Magne 2Ax	2TLA042022R1300	Electromagnet with 5-pole M12-contact Anchor plate, cell rubber Adam (built-in) + Eva (external) interlock switch
Magne 2Bx	2TLA042022R1400	Electromagnet with 5-pole M12-contact Anchor plate with permanent magnet, cell rubber Adam (built-in) + Eva (external) interlock switch

Accessories and spare parts

Type	Article number	Description
Accessory	2TLA042023R0100	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.
JSM D21B	2TLA042023R0500	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).
JSM D23	2TLA042023R0200	Mounting kit for Magne. For sliding door. Fits all Magne.
JSM D24	2TLA042023R0300	Mounting kit for Eva. For conventional door.
Spare part	2TLA042023R0400	Anchor plate (with permanent magnet)
Spare part	2TLA042023R1300	Anchor plate (without permanent magnet)
Accessory	2TLA042023R1000	Door handle for JSM D21B
Spare part	2TLA042023R3600	Cell rubber
M12-3A	2TLA020055R0000	Y-connector to connect several units in series. Magne 1A/B only.
Tina 12A	2TLA020054R1800	Distribution block for two units. Magne 2A/B only.
Urax B1R	2TLA020072R0200	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.

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



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



Aluminium profile for door handle. Fits all Magne (conventional door)

Article number:

2TLA042023R0100 – Aluminium profile



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

Article numbers:

2TLA042022R1000 – Magne 2A
 2TLA042023R0200 – JSM D23

7 Technical data

Manufacturer

Address	ABB AB / JOKAB SAFETY Varlabergsvägen 11 SE-434 39 Kungsbacka Sweden
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Power supply

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.

General

Degree of protection	IP67
Ambient temperature	-20...+50°C
Humidity range	35 to 85 % (with no icing or condensation)
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 Magnet: Iron with zinc-nickel coating Housing: Anodized aluminium Potting: PUR, epoxy
Colour	Silver
Connector	M12 5-pole male (Magne 1A/B, 2Ax/Bx) M12 8-pole male (Magne 2A/B)
Mechanical life	> 10 ⁷ switch operations

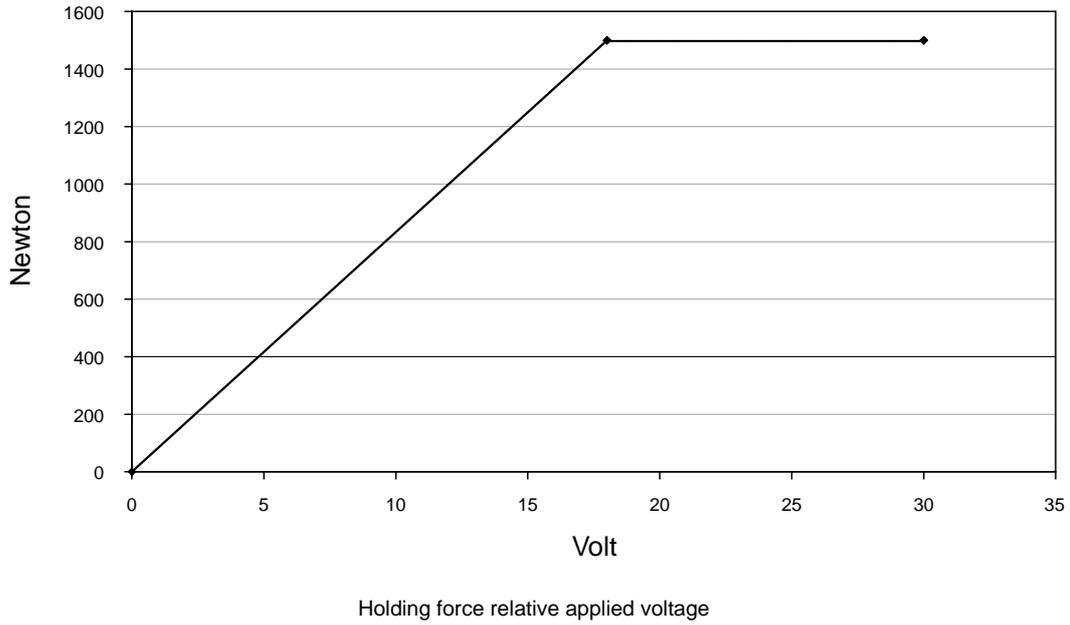
Safety / Harmonized standards

Conformity	European Machinery Directive 2006/42/EC CE 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 _d : 4.50*10 ⁻⁹
EN 62061	SIL3
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.

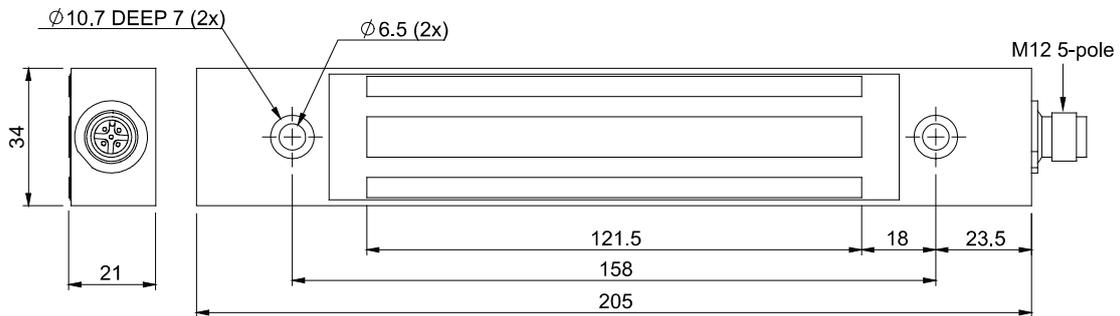
NB: Refer to the Eden instructions manual for further details regarding the interlocking switch. The manual can be found at www.abb.com/lowvoltage.

Holding force

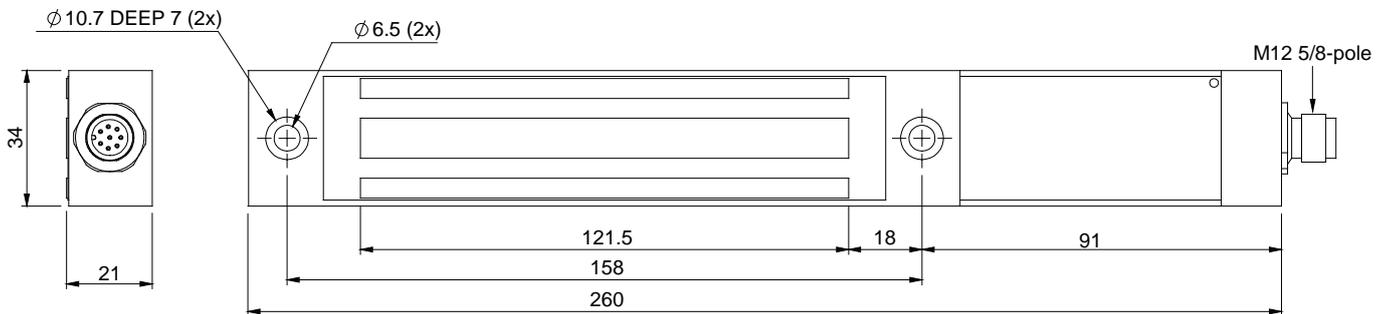


Dimensions

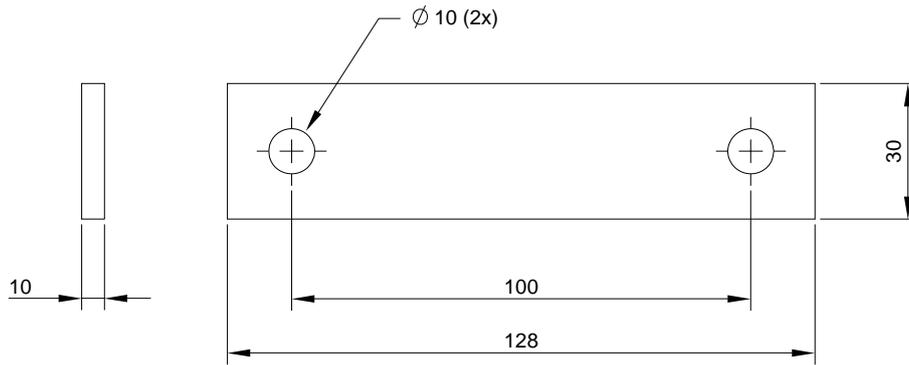
Magne 1A/B dimensions



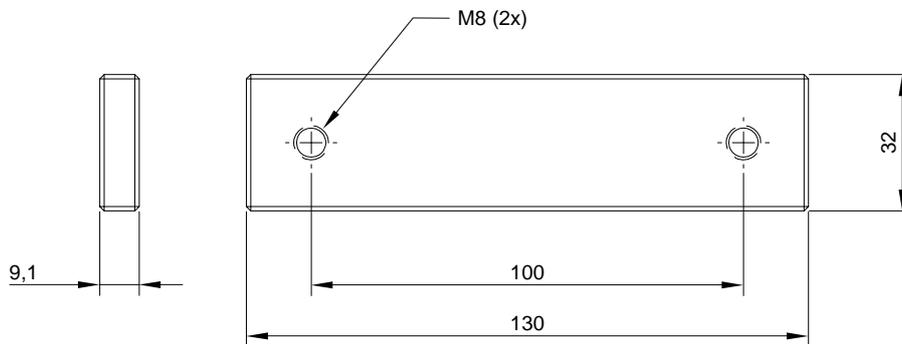
Magne 2A/B, -2Ax/Bx dimensions



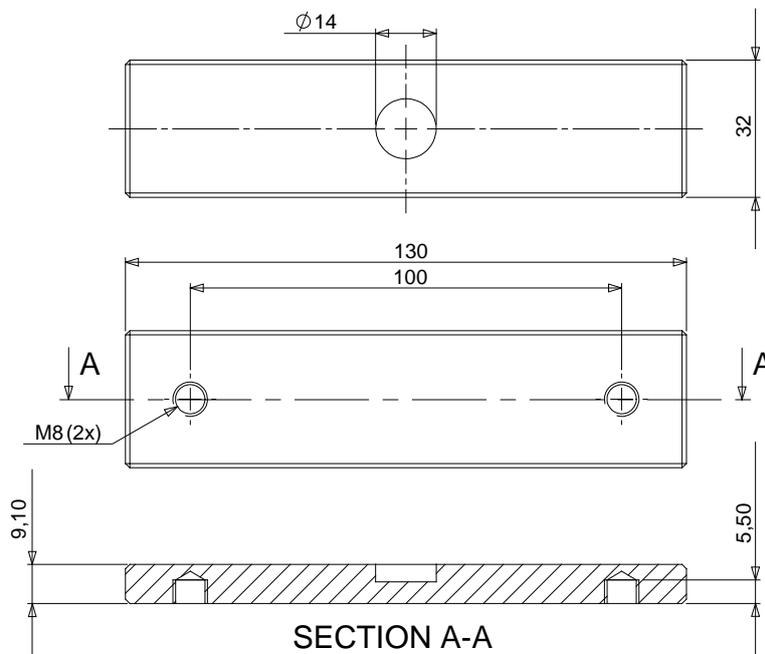
Cell rubber dimensions



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
 2006/95/EC
 2004/108/EC

Authorised to compile the technical file

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

<u>Product</u>	<u>Certificate</u>	<u>Serialnumber</u>
Non-contact safety sensor Eden (Adam, Eva) E/C/EC	44 799 12 408341-003	[000 – 000 ... 999-999]
Adapter unit Tina 1-8, Tina 10-12	44 799 12 408341-003	[000 – 000 ... 999-999]
Muting unit FMC-Tina	44 799 12 408341-003	[000 – 000 ... 999-999]
Non-contact safety sensor Eden including locking function Magne 2A, 2B, 2AX, 2BX	44 799 12 408341-003	[000 – 000 ... 999-999]

Certification body

TÜV NORD CERT GmbH
 Langemarckstrasse 20
 45141 Essen
 Germany

Used harmonized standards

EN ISO 12100-1:2010, EN ISO 13849-1:2008, EN ISO 13849-2:2008, EN 62061:2005, EN 60204-1:2006+A1:2009, EN 60664-1:2007, EN 61000-6-2:2005, EN 61000-6-4:2007, EN 60947-5-1:2004, EN 1088+A2:2008

Other used standards

EN 61508:2010



Jesper Kristensson
 PRU Manager
 Kungsbacka 2012-05-31

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Original

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