



Multifunctional Access Box with CIP Safety over EtherNet/IP

Catalog Numbers 442G-MABH-x, 442G-MABxB-Ux-x, 442G-MABE1



ATTENTION: Read this document and the documents that are listed in [Additional Resources on page 7](#) about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with the installation and wiring instructions and the requirements of all applicable codes, laws, and standards including:

- ISO 14119: Interlocking devices that are associated with guards;
- ISO 14120: General requirements for the design, construction, and selection of guards;
- ISO 13857: For the positioning of safeguards;
- ISO 13855: For the calculation of minimum (safe) distances;
- For functional safety, either IEC 62061 or ISO 13849-1 and ISO 13849-2;
- And other applicable standards.

Only suitably trained personnel can perform activities including installation, adjustments, commissioning, use, assembly, disassembly, and maintenance in accordance with the applicable code of practice.

This device is intended to be part of the safety-related control system of a machine. Improper selection or installation of the device affects the integrity of the safety-related control system. First, a risk assessment must be performed to determine whether the specifications of this device are suitable for all foreseeable operational and environmental characteristics of the application. Use appropriate screws, bolts, or nuts that are fitted by tools to mount the switch and actuators to avoid the risk of tampering. Do not over torque the mounting hardware.

Management controls, working procedures, training, and extra protective measures must be used to minimize the motivation to defeat and to manage the use and availability of spare actuators.

Personnel injury or death, property damage, or economic loss can result if this document and applicable codes, laws, and standards are not followed.

CE The products that are shown on this document conform with the Essential Health and Safety Requirements (EHSRs) of the European Machinery Directive.

Summary of Changes

This publication contains new and updated information as indicated in the following table.

Topic	Page
Updated title of Table 1 .	2
Added Table 3 and Table 4 .	3
Updated Approximate Dimensions [mm (in.)] drawing	6
Removed Preparing the Escape Release section. See publication 442G-IN003 .	—

Introduction

The Guardmaster® 442G Multifunctional Access Box (MAB) with CIP Safety™ over EtherNet/IP™ implements the CIP Safety protocol to enable integration into a safety-control system. This device provides guard position monitoring and lock monitoring in accordance with ISO 14119.

General Considerations

Only qualified personnel must install in accordance with this publication. The access box guard locking switch system is intended to be part of the safety-related control system of a machine. Before installation, a thorough risk assessment must be performed to determine whether the specifications (see [page 7](#)) of this device are suitable for all foreseeable operational and environmental characteristics of the application.

Environmental Protection

Lasting and correct safety function requires that the system must be protected against debris (filings, shavings, and so on), which can become lodged in the locking and handle modules. For this purpose, a suitable installation position must be selected.

- | | |
|------------------|---|
| IMPORTANT | System Requirements: <ul style="list-style-type: none">• To achieve the stated degree of protection, the cover screws must be tightened to a tightening torque of 1 N·m (8.85 lb·in).• Tighten the screw for the cover for the auxiliary release to 0.5 N·m (4.42 lb·in). |
|------------------|---|

Power Supply Requirements

- IMPORTANT**
- If the device does not appear to function when the operating voltage is applied (for example, Pwr status indicator does not illuminate), the safety switch must be returned to the manufacturer.
 - A Class 2 PELV power supply must be used. Alternative solutions must comply with the following requirements.
 - Electrically isolated power supply unit with a maximum open-circuit voltage of 30V DC and a limited current of 8 A maximum.
 - Electrically isolated power supply unit in combination with the fuse as per UL 248. This fuse should be designed for a maximum of 3.3 A and should be integrated into the 30V DC voltage section.
 - The functional earth ground must be connected. An M6 threaded bore is available on the mounting plate of the lock/bus module for this purpose.

Electrical Connection



WARNING: Connect and disconnect wiring cables:

- If you connect or disconnect wiring or cables while the field-side power is on, an electric arc can occur. This arc could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.
- If you connect or disconnect the communication cables while power is applied to this module or any device on the network, an electric arc can occur. This arc could cause an explosion in hazardous location installations.



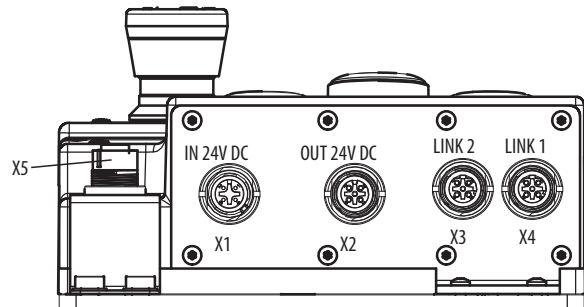
ATTENTION: Wiring Guidelines

- All electrical connections must be isolated from the main supply by a safety transformer (according to EN IEC 61558-2-6) with limited output voltage if there is a fault or by other equivalent isolation measures.
- Power devices, which are a powerful source of interference, must be installed in a separate location away from the input and output circuits for signal processing. The cable routing for safety circuits must be as far away as possible from the cables of the power circuits.
- To avoid EMC interference, the physical environment and operating conditions at the installation site of the device must comply with the requirements according to the standard DIN EN 60204-1:2006, section 4.4.2/EMC.
- The mounting of conduits directly on the access box is not allowed. Cables are only allowed to be connected via suitable cable glands. Use a UL Listed (QCRV) cable gland suitable for the related cable diameter (22...17 AWG).
- The functional earth must be connected. An M6 threaded bore is available on the mounting plate for this purpose.

Connections on Bus Module

This section describes the power connectors, EtherNet/IP connectors, and recommended cables.

Figure 1 - Connections on Bus Module



Power Connections

The bus module includes the EtherNet/IP connections (X3 and X4, M12 D-coded) and the power supply connections (X1 and X2).

Table 1 - Pinout for Power Connectors (M12 A-coded models)

Pin		Description
X1.1	X2.1	24V DC
X1.2	X2.2	Pass through
X1.3	X2.3	0V DC (GND)
X1.4	X2.4	Pass through
X1.5	X2.5	Functional earth
X1		X2
Power supply connector assignment. Connectors X1 and X2, M12 A-coded.		

Table 2 - Recommended Micro Power Cables

Description	Cat. No. ⁽¹⁾
Micro straight female to flying leads cordset	889D-F4AC-2
Micro straight male to flying leads cordset	889D-M4AC-2
Micro right-angle female to flying leads cordset	889D-R4AC-2
Micro right-angle male to flying leads cordset	889D-E4AC-2

(1) Replace -2 (2 m [6.6 ft]) with -5 (5 m [16.4 ft]) or -10 (10 m [32.8 ft]) for additional standard cable lengths.

Table 3 - Pinout for Power Connectors (7/8 in. Mini style connector, cat. nos. that end in -N4)

Pin		Description
X1.1	X2.1	Output +24V DC power
X1.2	X2.2	Input +24V DC power
X1.3	X2.3	Input power, common
X1.4	X2.4	Output power, common
		
X1		X2

Table 4 - Recommended Mini Power Cables

Description	Cat. No. ⁽¹⁾
Mini straight female to flying leads cordset	889N-F4AE-6F
Mini straight male to flying leads cordset	889N-M4AE-6F
Mini right-angle female to flying leads cordset	889N-R4AE-6F
Mini right-angle male to flying leads cordset	889N-E4AE-6F

(1) Replace -6F (1.8 m [6 ft]) with -12F (3.7 m [12 ft]) or -20F (6.1 m [20 ft]) for additional standard cable lengths.

EtherNet/IP Connections

Table 5 - Pinout for EtherNet/IP Connectors

Pin		Description
X3.1	X4.1	TxD+
X3.2	X4.2	RxD+
X3.3	X4.3	TxD-
X3.4	X4.4	RxD-



X3/X4

EtherNet/IP connector assignment. Connectors X3 and X4, M12 D-coded.

Table 6 - Sample EtherNet/IP Cables

Description	Cat. No. ⁽¹⁾
M12 D-coded straight to RJ45 patchcord	1585D-M4UBJM-2
M12 D-coded straight to flying leads cordset	1585D-M4UB-2
M12 D-coded straight to M12 straight patchcord	1585D-M4UBDM-2
M12 D-coded right angle to M12 right angle patchcord	1585D-E4UBDE-2

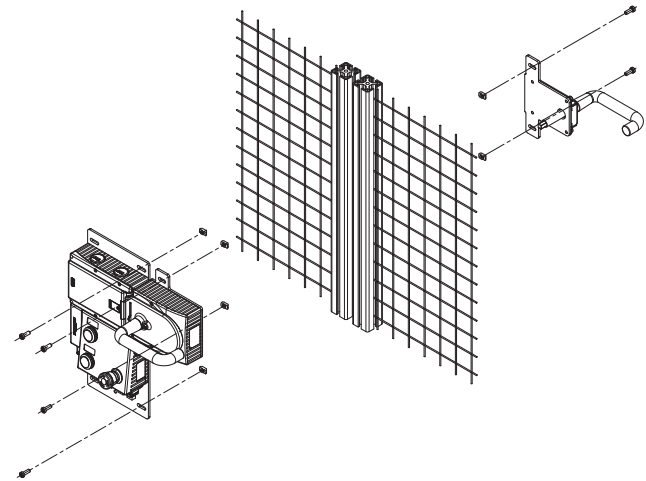
(1) Replace -2 (2 m [6.6 ft]) with -5 (5 m [16.4 ft]) or -10 (10 m [32.8 ft]) for additional standard cable lengths.

Mount the Access Box

The access box can be mounted on hinged or sliding doors. Use appropriate screws, bolts, or nuts that are fitted by tools to mount the lock/bus module and handle assembly to avoid tampering. Do not over-torque the mounting hardware.



ATTENTION: With two-wing hinged guard doors, one of the two guard door wings must also be latched mechanically. For example, use a rod latch (Item) or a double-door latch (Bosch Roxroth) for this purpose.

Figure 2 - Installation Example for Guard Door That Is Hinged on the Right

TIP For easier installation, we recommend that the handle assembly is mounted to the guard door before the silver handle is attached to the handle assembly.

Indicator Lens Set Installation

Figure 3 - Install Lens Cover

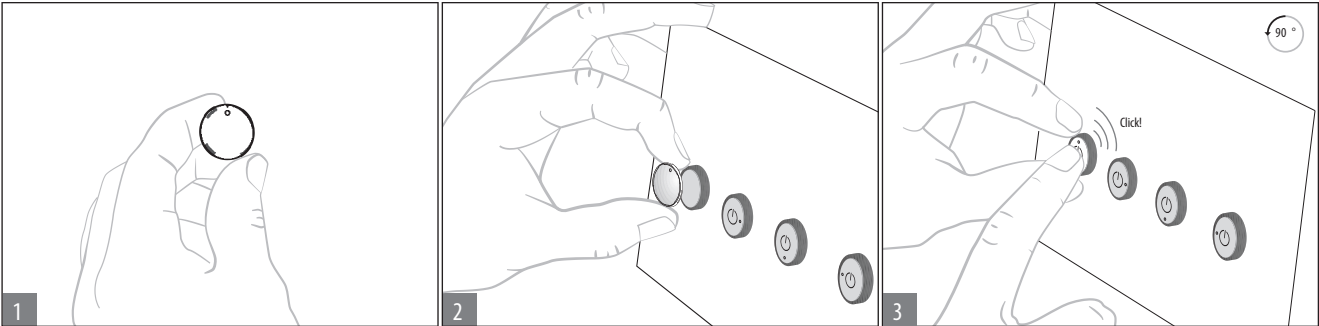
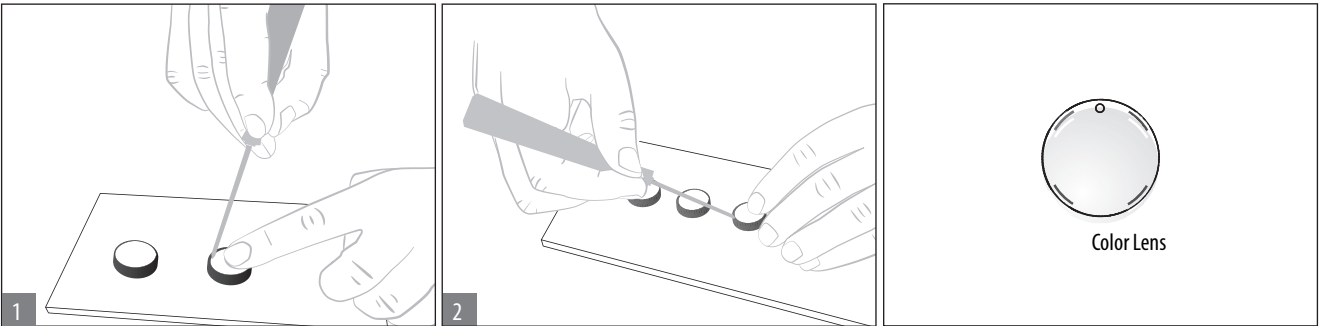


Figure 4 - Remove Lens Cover



Handle Configuration

The unique-coded handle assembly must be assigned to the locking module before the system is functional.

IMPORTANT

The system is in a safe state (input signals GuardClosed, GuardInterlocked, and GuardLocked are turned off) during handle configuration.

1. Insert bolt tongue in the locking module.
2. Apply operating voltage to the device.
3. Programming begins when the State status indicator flashes (1 Hz). After approximately 60 seconds, the State status indicator turns off.
4. To complete the configuration, turn on input signal LockSequenceFaultUnlatch to activate the new code. Alternatively, remove the power from the access box for a few seconds.

IMPORTANT

The locking module disables the code for the previous handle assembly if configuration is conducted for a new handle assembly. A disabled handle assembly can be configured again only after a third handle assembly has been configured.

Connect an Enabling Switch

A standard enabling switch (catalog number 440J-N21TNPM or equivalent) can be attached to connector X5 on select models.

Table 7 - Recommended Cordset

Description	Color	Pinout
Recommended Cordset Cat. No. 889D-M4AC-2 ⁽¹⁾ Micro straight male to flying leads cordset	Brown	Safety A
	Blue	
	White	Safety B
	Black	

(1) Replace -2 (2 m [6.6 ft]) with -5 (5 m [16.4 ft]) or -10 (10 m [32.8 ft]) for additional standard cable lengths.

Mechanical Function Test

IMPORTANT It must be possible to insert the bolt actuator in the locking module. To check, close the safety guard several times and actuate the guard door handle.

If available, check the function of the escape release. It must be possible to operate the escape release from the inside without excessive force (approximately 40 N (8.99 lbf)).



ATTENTION: The escape release must only be accessible from inside the safeguarded area. Access to the escape release from outside the safeguarded area must not be allowed.

Electrical Function Test

Perform following steps.

1. Switch on operating voltage.
2. Close all safety guards and insert the bolt actuator into the locking module. For Power to Lock versions, activate guard locking.
 - The machine must not start automatically.
 - It must not be possible to open the safety guard.
 - The State status indicator and the Lock status indicator are illuminated continuously.
3. Use the control system to start the machine.
 - It must not be possible to open the guard door as long as the machine is running.
4. To stop the machine and unlock the door, use the control system.
 - The safety guard must remain locked until there is no longer any risk of injury.
 - It must not be possible to start the machine as long as the guard locking is deactivated.
 - It must be possible to open the safety guard.

Repeat steps 2...4 for each safety guard.

Connect the Multifunctional Access Box to the EtherNet/IP Network

The MAB has two Ethernet ports that support 10/100/1000 Mbps. Connect a CAT 5e or CAT 6 Ethernet cable with M12 connectors to the Ethernet ports (X3 and X4) on the underside of the Bus module.

For information on how to select the proper cable, see publication [ENET-WP007](#).

You must also configure an Ethernet driver for your workstation by using RSLinx® Classic Software. See Add a Driver in the RSLinx Classic software Help.

Inspection and Service

Periodically check the correct operation of the switching function. Also check for signs of abuse or tampering. Inspect the switch casing for damage. Check the safe function of the device particularly after any of the following:

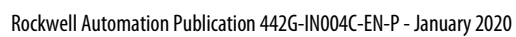
- Set-up work
- The installation or replacement of any hardware
- An extended period without any use
- A fault condition



WARNING: Safety components perform a personal protection function. They must not be bypassed, removed, or otherwise rendered ineffective. Only the intended handle assembly that is properly mounted to the safety guard is allowed to trigger the switching operation.



ATTENTION: If there is a malfunction or damage to the product, attempts at repair must not be made. The unit must be replaced or alternative safeguarding must be implemented before machine operation is allowed.



Specifications

Table 8 - Safety Ratings

Standards	IEC 60947-5-3, EN ISO 13849-1, ISO 14119, UL 508 (evaluated for risks of electrical shock and fire; only suitable for NFPA 79 applications)		
Safety Classification	Type 4 interlocking device with guard locking and high-coded RFID actuators according to ISO 14119		
Functional Safety Data	PL _e , Cat. 4 (according to ISO 13849-1)		
	MTTF _d	Monitoring of guard locking	746 years
		Control of guard locking	475 years
		Evaluation of emergency stop	787 years
		Evaluation of enabling switch	753 years
	PFH _d	Monitoring of guard locking	3.37 x 10 ⁻⁹
		Control of guard locking	4.91 x 10 ⁻⁹
		Evaluation of emergency stop	3.05 x 10 ⁻⁹
		Evaluation of enabling switch	3.05 x 10 ⁻⁹
	B10 _d :	Emergency stop	1.0 x 10 ⁵
		Enabling switch	According to manufacturer specifications
	Mission time	20 years	
Certifications	c-UL-us (UL 508) and CE Marked for all applicable EU directives		
Safety Outputs	CIP Safety		

Table 9 - Operating Characteristics

Torque Settings, max	- Lock module cover screws (6x): 1 N·m (8.85 lb·in) - Manual release locking screw: 0.5 N·m (4.42 lb·in) - Handle set screw (handle and escape release): 2 N·m (17.70 lb·in)
Holding Force F _{zh} (ISO 14119)	2000 N
Locking Bolt Alignment Tolerance	Horizontal: ±4 mm (0.16 in.); Vertical: ±5 mm (0.2 in.)
Operating Voltage	Class 2 PELV 24V DC +10/-15% required ⁽²⁾
EMC Protection Requirements	In accordance with EN 61000-4 and DIN EN 61326-3-1
Current Consumption, maximum	500 mA
Power Connector Rating	4 A (IEC 61076-2-101:2013) maximum value
External Fuse	Minimum 1 A, slow-blow
EMC Protection Requirements	In accordance with EN 61000-4 and DIN EN 61326-3-1
Risk Time (per IEC 60947-5-3) ⁽¹⁾	- E-stop: 100 ms - Enabling switch: 100 ms - Guard position: 250 ms - Bolt position: 250 ms - Guard locking: 250 ms
Switching Frequency, maximum	1 Hz
Insulation Voltage U _i (IEC 60947-1)	75V
Impulse Withstand Voltage U _{imp}	0.5 kV
Pollution Degree (IEC 60947-1)	3
Manual Release	Built-in (ISO 14119)
Mechanical Life	1,000,000 operations

(1) The risk time is the maximum difference between the time the input status changes and the time the corresponding bit in the input assembly is turned on.

(2) See [Power Supply Requirements on page 2](#).

Table 10 - Environmental

Ambient Temperature at UB = DC 24V	-20...+55 °C (-4...+131 °F)
Storage Temperature	-20...+65 °C (-4...+149 °F)
Enclosure Rating	IP54
Operating Humidity	5...80% relative
Vibration/Shock	IEC 60068-2-27 30 g (1.06 oz), 11 ms/IEC 60068-2-6 10...55 Hz

Table 11 - Physical Characteristics

Weight	- Lock/bus assembly on mounting plate: 3.6 kg (7.9 lb) - Handle assembly on mounting plate: 1.2 kg (2.6 lb) - Escape release 500 g (17.6 oz)
Materials	Glass fiber reinforced plastic, nickel-plated die-cast zinc, anodized aluminum handle, stainless steel, powder-coated sheet steel

Declaration of Conformity and Certification

For the latest certificate, see rok.auto/certifications.

Additional Resources

Resource	Description
Multifunctional Access Box with CIP Safety Over EtherNet/IP User Manual, publication 442G-UM002 (translations available)	Provides information for the design, installation, programming, or troubleshooting of systems that use the multi-functional access box.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation® industrial system.
Product Certifications website: rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at rok.auto/literature.

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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Waste Electrical and Electronic Equipment (WEEE)



At the End of Life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at <http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page>.

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