

User Manual

Original Instructions



Allen-Bradley

Guardmaster®

Multifunctional Access Box

Catalog Numbers 442G-MABH-x, 442G-MABx-Uxx-Cxx, 442G-MABE1



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Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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Read this preface to become familiar with the rest of the manual. It provides information concerning:

- Who would use this manual
- The purpose of this manual
- Related documentation
- Conventions that are used in this manual

Who Should Use This Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting systems that use the 442G Multi-functional Access Box.

You must have a basic understanding of electrical circuitry and familiarity with safety-related systems. If you do not, obtain the proper training before using this product.

Purpose of This Manual

This manual is a reference guide for the 442G Multi-functional Access Box. It describes the procedures to use to install, wire, and troubleshoot the device. This manual:

- Explains how to install and wire your 442G Multi-functional Access Box
- Provides an overview of the 442G Multi-functional Access Box

Conventions Used in This Manual

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide steps or hierarchical information.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Allen-Bradley Industrial Automation Glossary, publication AG-7.1	Glossary of industrial automation terms and abbreviations
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/global/literature-library/overview.page>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Terminology

OSSD	Output Signal Switching Device. Typically designates a pair of solid-state signals pulled up to the DC source supply. The signals are tested for short circuits to the DC power supply, short circuits to the DC common, and short circuits between the two signals.
Standard coding	Same as Low coding as defined in EN/ISO 14119:2013
Unique coding	Same as High coding as defined in EN/ISO 14119:2013

Chapter 1

General Description

442G MAB Overview

The Guardmaster® Multifunctional Access Box is an electromagnetic interlocking device with guard locking. The system consists of one locking module and one handle assembly. An escape release is available as an option.

The Access Box functions by extending the locking bolt from the handle assembly into the lock module. When the locking bolt is fully extended into the lock module, the locking arm locks the bolt in this position, preventing the opening of the guard. The version will determine whether it's spring force or solenoid force.

For Power to Release versions, the locking arm is kept in the locked position by spring force and unlocked by solenoid force when the solenoid is switched ON. For Power to Lock versions, the locking arm is kept in the locked position by solenoid force and unlocked by spring force when the solenoid is switched OFF.

Guard lock monitoring can be deactivated with DIP switches (see [Change Device Configuration \(using DIP switches\) on page 34](#)).



ATTENTION: For use as a guard locking device in accordance with EN ISO 14119, the guard lock monitoring must be ACTIVE.

With ACTIVE Guard Lock Monitoring:

In combination with a movable safety guard and the control system, this safety device can prevent opening of the safety guard while a dangerous machine movement is performed. The position of the guard locking is monitored during this process.

Safety outputs (FO1A, FO1B) are enabled only when the locking bolt is sensed in its extended position in the lock module AND the locking arm is in position (for example, the guard is closed and the bolt is both extended and locked).

With INACTIVE Guard Lock Monitoring:

In combination with a movable separating safety guard and the control system, this safety device prevents dangerous machine movements from occurring while the safety guard is open. A stop command is triggered if the safety guard is opened during the dangerous machine function. The position of the guard locking is not considered during this process.

Safety outputs (FO1A, FO1B) are enabled only when the locking bolt is sensed in its extended position in the lock module (i.e, the guard door is closed and the bolt is extended). In this mode, the status of the guard locking is not considered.

IMPORTANT The safety outputs (FO1A, FO1B) are not enabled until a handle assembly has been configured (see [Handle Configuration on page 15](#)). After configuration is completed, the lock module will only recognize the unique code of the configured handle.

Assembly Overview

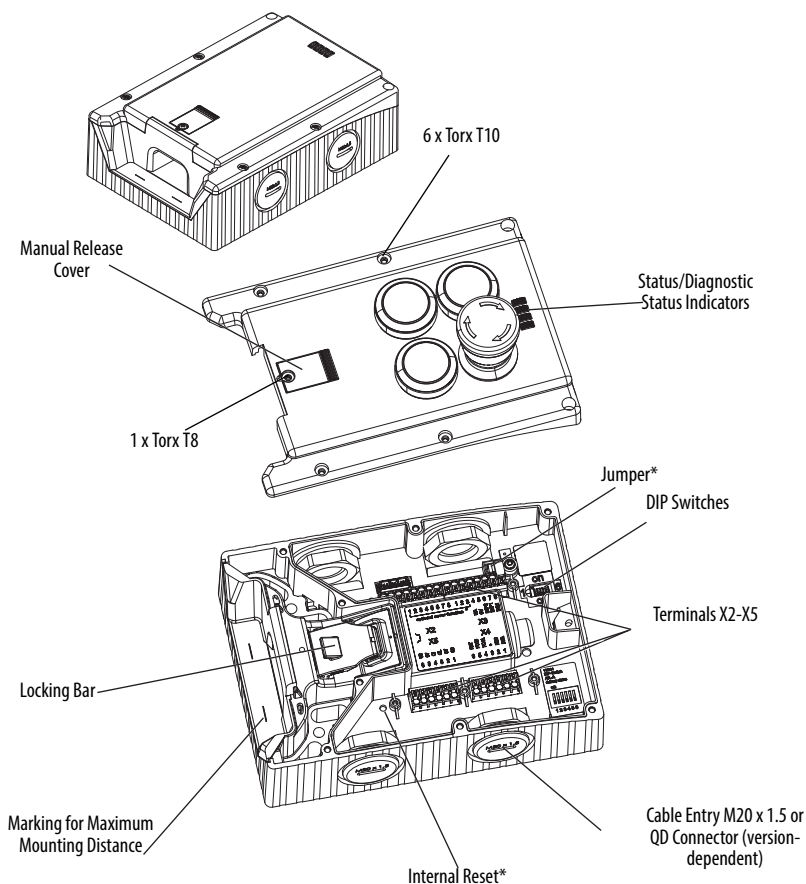
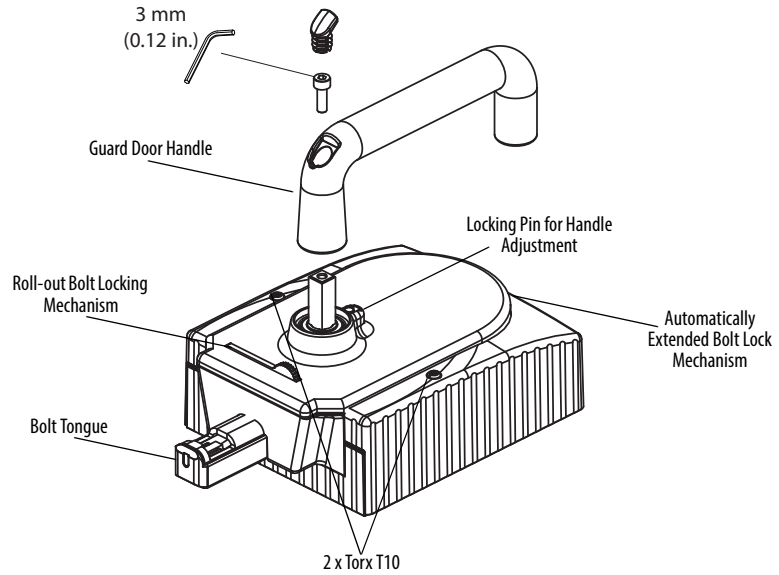
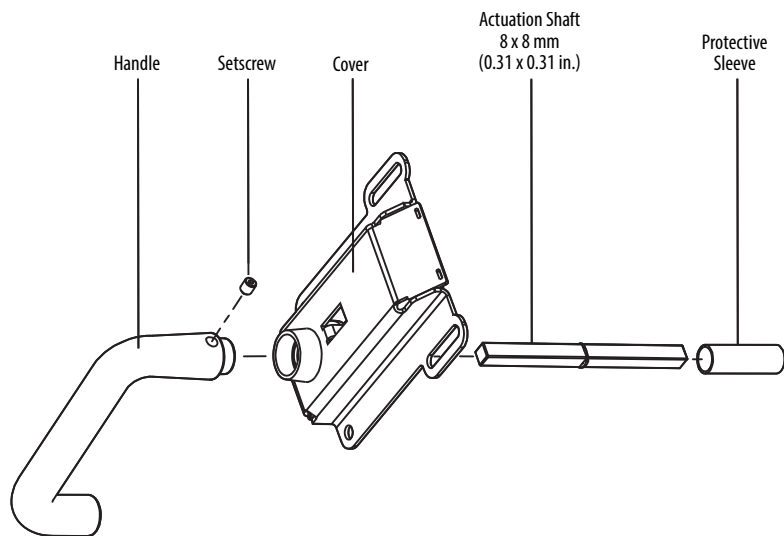


Figure 1 - Locking Module with Control Cover

* Apply to hardware revision B and higher.

**Figure 2 - Handle Assembly****Figure 3 - Escape Release (optional)**

IMPORTANT The length of the actuation shaft (115 mm (4.53 in.)) is optimized for mounting on a 45 mm (1.77 in.) profile. An extended shaft is available (442G-MABASHFT). See Chapter 3, [Installation and Wiring on page 15](#) for instructions regarding mounting on smaller or larger profiles.

IMPORTANT The use of mounting plates is optional.

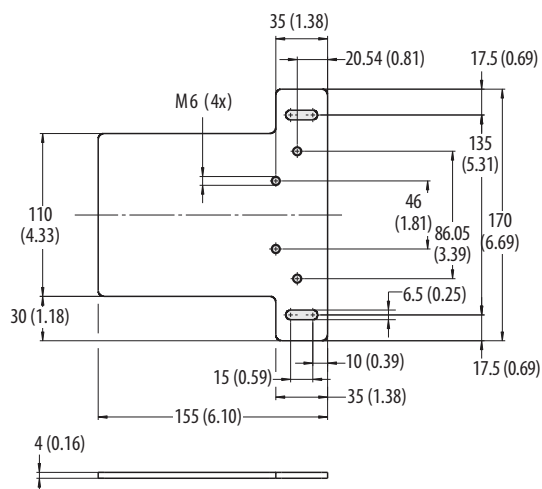


Figure 4 - Lock Module Mounting Plate [mm (in.)]

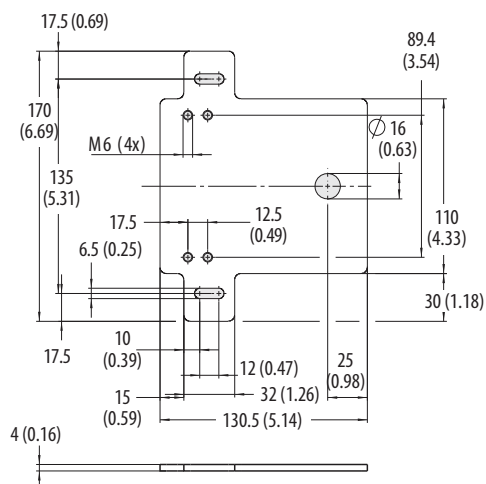


Figure 5 - Handle Assembly Mounting Plate [mm (in.)]

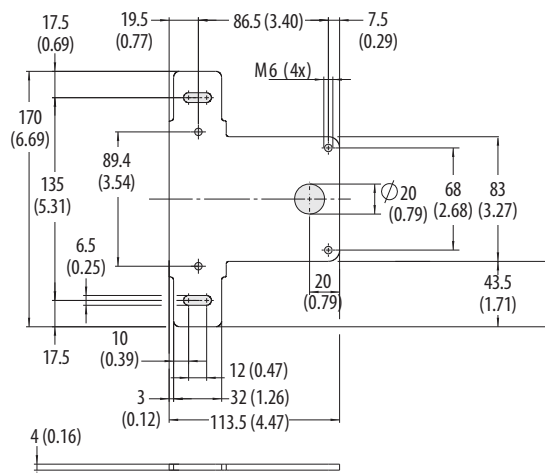


Figure 6 - Escape Release Mounting Plate [mm (in.)]

Mounting Hardware Reference

Handle Module Mounting Plate is supplied with the following hardware:

- 4X DIN 7984-M6X12 ZN (screw)
- 4X DIN 433-6 NI (washer)
- 4X DIN 6797-JZ-D6,4 (lock washer)

Locking Module Mounting Plate is supplied with the following hardware:

- 4X DIN 912-M6X25-8.8 ZN (screw)
- 4X DIN 433-6 NI (washer)
- 4X DIN 6797-JZ-D6,4 (lock washer)

Escape Release Mounting Plate is supplied with the following hardware:

- 4X DIN 7984-M6X8 (screw)
- 4X DIN 433-6 NI (washer)
- 4X DIN 6797-JZ-D6,4 (lock washer)

Notes:

Chapter 2

Safety Concept

Standards Applied to the Guardmaster 442G Multi-functional Access Box

The Guardmaster® Access Box satisfies applicable requirements in the following standards that are related to functional and machinery assembly:

- IEC 60947-5-3: 1999/A: 2005
- EN/ISO 13849-1:2008/AC: 2009
- EN/ISO 14119:2013
- UL 508 17th Edition dated 3/19/2013

Safety Certification

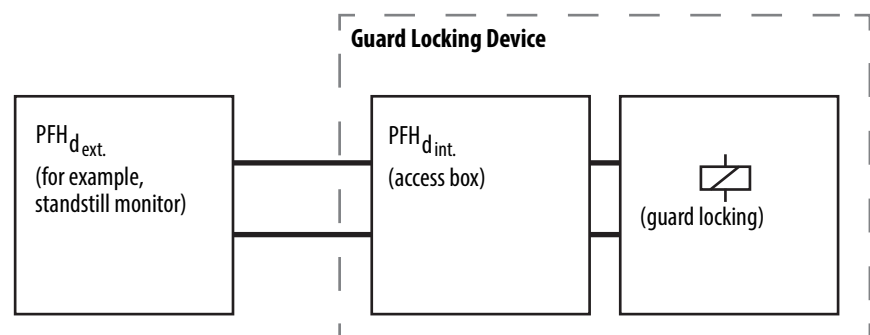
The Guardmaster Access Box is a Type 4 interlocking device with guard locking and high-coded RFID actuators according to EN ISO 14119.

The device is certified for use in safety applications up to and including Performance Level PL e and Category 4 (EN ISO 13849-1) ISO 13849-1, for guard position and guard lock monitoring, including when connected in series.

From hardware revision B, this device is also certified for use in safety applications up to and including PLe, Cat. 4 for guard locking control when dual-channel solenoid control is utilized (refer to Connection Guard Locking Control).

The safety level of guard locking control is determined by the device $PFH_{d.int.}$ and by the external control (for example, $PFH_{d.int.}$ of the standstill monitor).

Figure 1 -



The Access Box must be installed in accordance with the applicable regulation and standards.

While the Access Box can be used for PLe and Category 4 applications, the installer must comply with guard requirements (for example, EN/ISO 13854 and EN/ISO 13857) and in some cases also minimum (safe) distance requirements (for example, EN/ISO 13855).

The installed system, including the safety control system and the means by which the machine stops, must achieve the needed safety performance. The Access Box is one element in the safety system.

Before safety components are used, a risk assessment must be performed on the machine in accordance with:

- EN ISO 13849-1, Safety of machinery. Safety related parts of control systems. General principles for design, Annex B
- EN ISO 12100, Safety of machinery – Basic concepts - General principles for design - Risk assessment and risk reduction.

Correct use includes compliance with the relevant requirements for installation and operation, in particular

- EN ISO 13849-1, Safety of machinery. Safety related parts of control systems. General principles for design
- EN ISO 14119, Safety of machinery. Interlocking devices that are associated with guards. Principles for design and selection
- EN 60204-1, Safety of machinery. Electrical equipment of machines. General requirements.

Additional guidance on guards, guard locking and guard interlocking is found in:

- EN/ISO 12100 Safety of machinery—General principles for design—Risk assessment and risk reduction
- EN/ISO 13855 Safety of machinery—Positioning of safeguards concerning the approach speeds of parts of the human body
- EN/ISO 13857 Safety of machinery—Safety distances to prevent hazard zones from being reached by upper and lower limbs
- EN/ISO TR 24119 Technical report that is associated with EN ISO 14119 addressing the logical serial connection of interlocking devices
- EN/ISO 14120 General requirements for the design and construction of guards

Installation and Wiring

General Considerations

Installation must be in accordance with the present manual and must be performed by qualified personnel exclusively. 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 53) 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 lock module and handle assembly to avoid tampering. Do not over-torque the mounting hardware.

Handle Configuration

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

During configuration of the handle, the safety outputs are switched off.

- Insert bolt tongue in the locking module.
- Apply operating voltage (U_A and U_B).
- The State status indicator flashes (5 Hz) as the device performs a self-test (up to 8 seconds).
- Programming begins when the State status indicator flashes (1 Hz). After approximately 60 seconds, the State status indicator turns off.
- To complete the configuration, switch off the operating voltage (U_B) for a minimum of 3 seconds or apply 24V to the input RST for a minimum of 3 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.

Mounting

The Access Box can be mounted on hinged or sliding doors. The use of the mounting plates is optional.



ATTENTION: With two-wing hinged guard doors, one of the two guard door wings must also be latched mechanically.

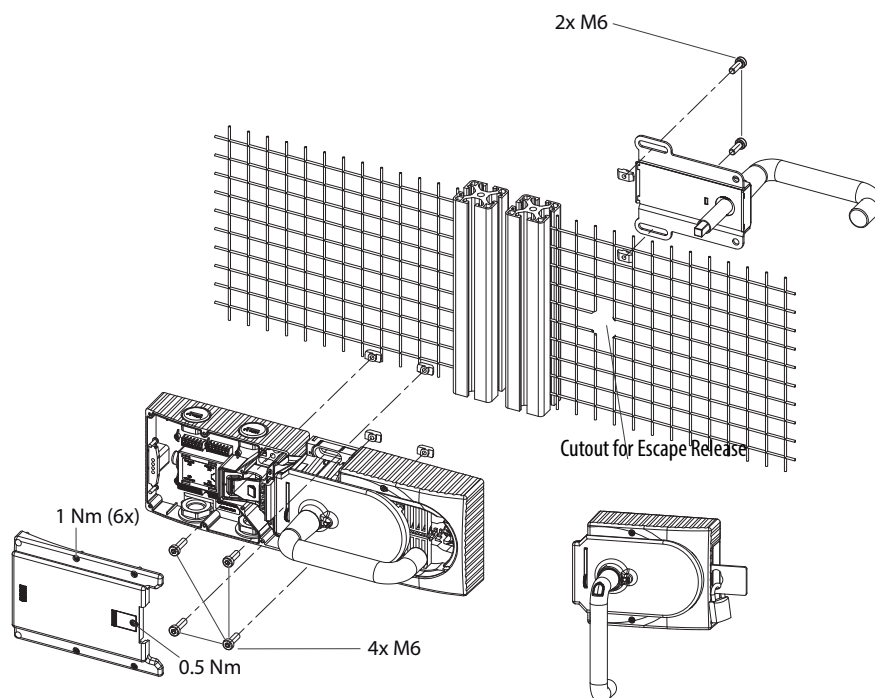


Figure 1 - Installation Example for Guard Door That Is Hinged on the Right

IMPORTANT Be careful when mounting the lock module cover to avoid pinching the ribbon cable.

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

IMPORTANT It must be possible to insert the bolt tongue 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).



ATTENTION: The escape release must **ONLY** be accessible from inside the safeguarded area. The installation must not allow access to the escape release from outside the safeguarded area.

Terminal Assignment and Wiring

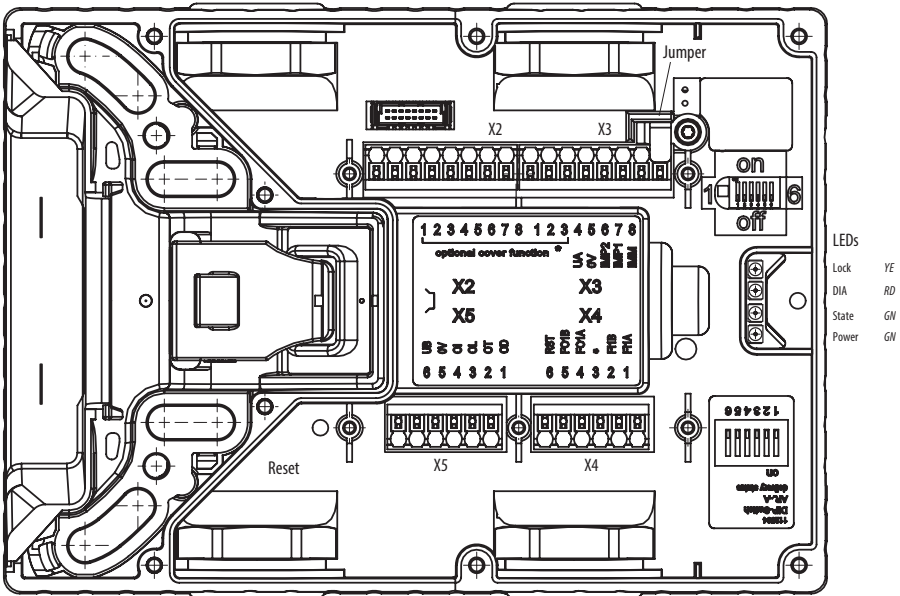
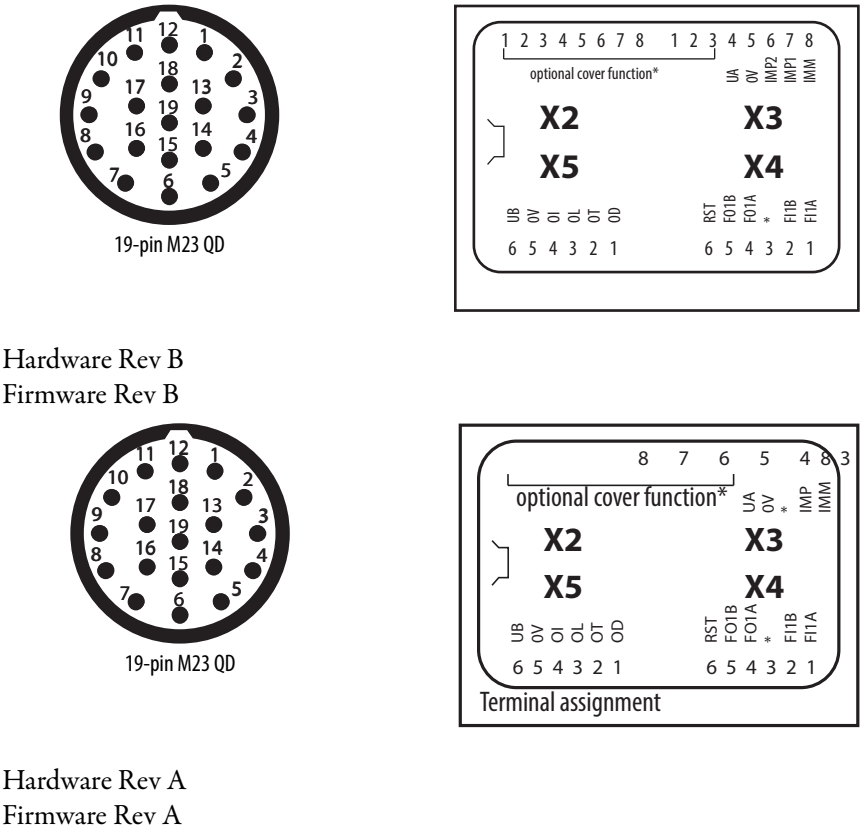


Figure 2 - Connections and Status Indicators



M23 QD	19-Conductor Cordset ¹	MAB Internal Wire Color	Terminal	Function	Description
1	Violet	Brown	X3.7	IMP1 ^{2, 5}	Lock command A
2	Red	Yellow	X2.1	S1.A1	E-stop circuit A
3	Grey	White	X2.2	S1.B1	E-stop circuit B
N/A	N/A	No Connection	X4.1	F11A	Safety input channel A ³
N/A	N/A	No Connection	X4.2	F11B	Safety input channel B ³
4	Red/Blue	Green	X4.4	F01A	Safety output channel A, ON when guard is locked
5	Green/Black	Grey	X4.5	F01B	Safety output channel B, ON when guard is locked
6	Blue	Black	X3.5	0V	Connected internally to X5.5
7	Grey/Pink	Pink	X4.6	RST	Reset, apply 24V for at least 3 seconds
8	White/Green	Violet	X5.2	OT	Bolt monitoring output, ON when guard is closed and bolt is extended
9	White/Yellow	Brown/Green	X5.4	OI	Fault diagnostic, ON when the switch is in a fault state
10	White/Grey	Red/Blue	X2.3	S1.A2	E-stop circuit A
11	Black	Grey/Pink	X2.4	S1.B2	E-stop circuit B
N/A	N/A	No Connection	X2.6	S1 Aux.	E-stop monitoring contact
12	Green/Yellow	N/A	N/A	GND	Connector housing GND
13	Yellow/Brown	Grey/Brown	X2.7	S2	Push button switching element (S2)
14	Brown/Green	White/Yellow	X3.1	H2	Push button LED (H2)
15	White	Yellow/Brown	X3.2	S3	Push button switching element (S3)
16	Yellow	White/Grey	X3.3	H3	Push button LED (H3)
N/A	N/A	No Connection	x5.1	OD	Door monitoring output, ON when the guard is closed
17	Pink	White/Green	X5.3	OL	Lock Monitoring output, ON when guard door is locked
18	Grey/Brown	Yellow/Black	X3.6	IMP2 ^{2, 5}	Lock Command B
N/A	N/A		x3.8	IMM	Alternate Lock Command B ⁵
19	Brown	Blue	X3.4	UA	Power for solenoid and monitoring outputs
			X5.6	UB	Power for safety outputs ⁴

¹ 19-pin mating cordset Cat. No. 889M-F19RM-*

² Lock modules are shipped from the factory with a jumper connecting IMP1 and IMP2 ("IMP1" was "IMP" for hardware revision A).

³ The lock modules are factory preset for standalone operation. See the user manual for configuring the device for series operation.

⁴ On QD models, terminal X5.6 is connected internally to terminal X3.4.

⁵ Refer to Connection of Guard Locking Control section in the user manual.

For models with E-stop and three push buttons (lock module catalog numbers ending in -C04):

17	Pink	White/Green	X2.5	S4	Push button switching element (S4)
18	Grey/Brown	Yellow/Black	X2.8	H4	Push button LED (H4)

Table 1 - Terminal Assignment

Connection of Cover Controls and Indicators

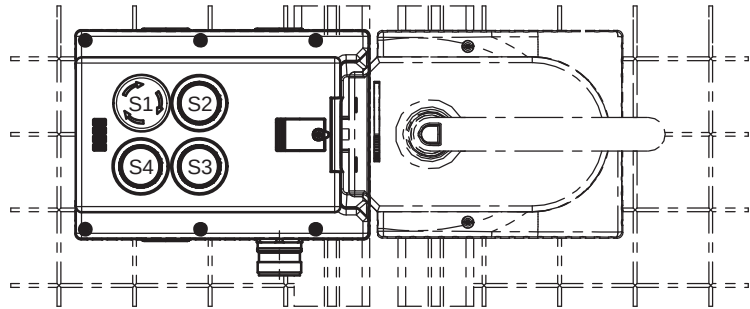


Figure 3 - As Mounted on a Right-hinged Guard

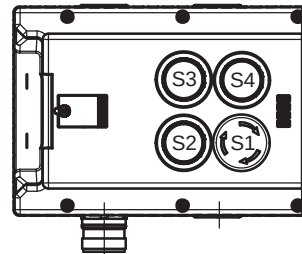


Figure 4 - As Mounted on a Left-hinged Guard

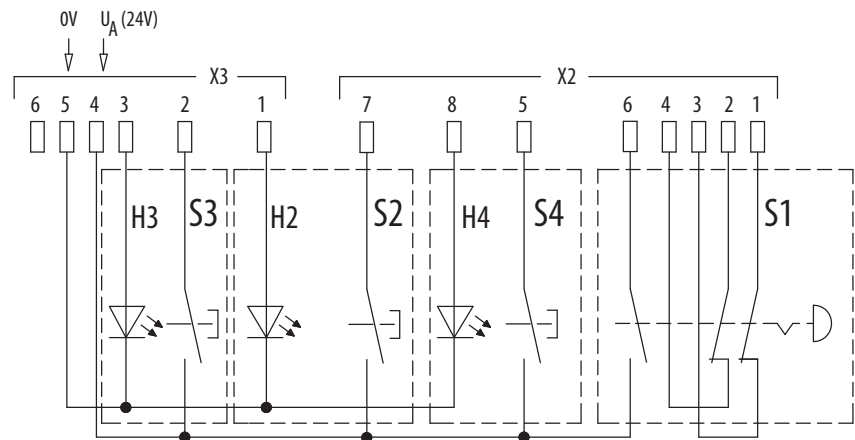


Figure 5 - Connection of Controls and Indicators

Indicator Lens Set Installation

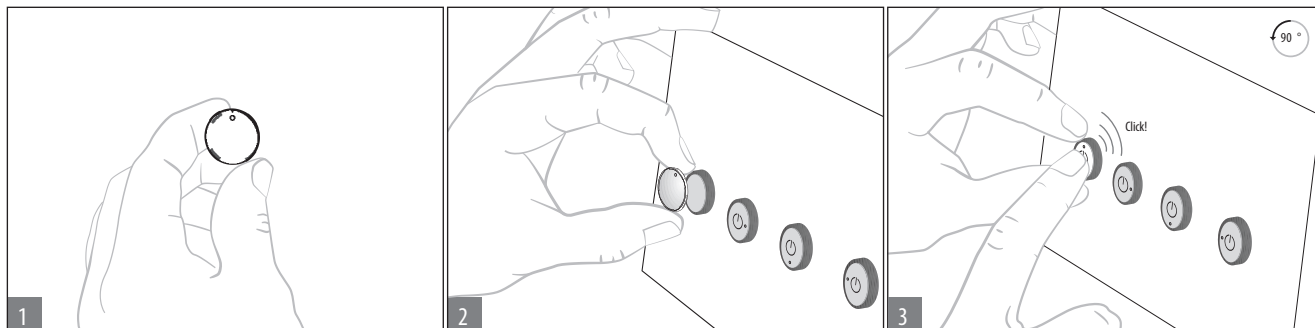


Figure 6 - Installing Lens Cover

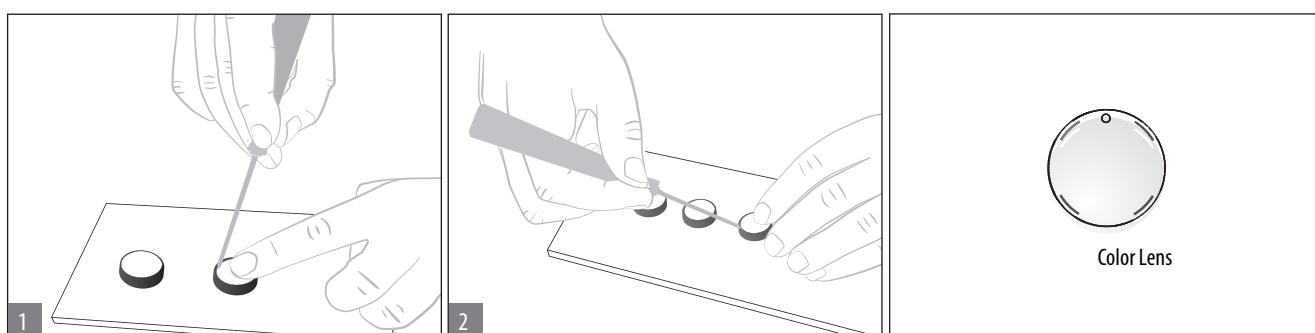


Figure 7 - Removing Lens Cover

Escape Release

The escape release is used to open a locked safety guard from inside the safeguarded area without tools.

With release monitoring active (default factory setting), the system enters into a latching fault when the escape release is actuated. To reset the device, turn the power off for at least three seconds or apply 24V to the input RST for a minimum of three seconds.

IMPORTANT The guard door must be in the open position to clear a latching fault.

Note: A latching fault may not occur if the escape release is actuated slowly.

IMPORTANT The escape release is not a safety function.
The machine manufacturer must select and use a suitable release according to the risk assessment.
The correct operation must be checked at regular intervals.

IMPORTANT The length of the actuation shaft (115 mm (4.53 in.)) is optimized for mounting on 40 mm (1.57 in.) and 45 mm (1.77 in.) profiles. For mounting on profiles larger than 45 mm (or if using mounting plates on a 45 mm profile), an extended shaft is required (order separately, 442G-MABASHFT). See the table below for instructions about sizing the extended shaft and mounting the escape release on smaller or larger profiles.

Use the following table to determine if the extended shaft is needed (442G-MABASHFT ordered separately) to prepare the escape release for smaller or larger profiles.

Profile Width	Length Required for Actuation Shaft		Shaft Required? ³	Necessary Work Steps
	Without Mounting Plates	With Mounting Plates (4 mm each)		
D	D+13.5	D + 17.5 ¹ D+21.5 ²		
30 mm	43 mm	51 mm	Standard shaft	Shorten to required length
40 mm	53 mm	61 mm	Standard shaft or extended shaft	- Without mounting plates: shorten standard shaft to required length - With two mounting plates: Shorten extended shaft and protective sleeve to required length
45 mm	58 mm	66 mm	Standard shaft or extended shaft	- Without mounting plate: none - With mounting plates: shorten extended shaft and protective sleeve to required length
50 mm	63 mm	71 mm	Extended shaft	Shorten extended shaft and protective sleeve to required length

¹ Shaft length that is required when only one mounting plate is used.

² Shaft length that is required when two mounting plates are used for the escape release and the handle assembly.

³ The extended shaft (442G-MABASHFT) must be ordered separately.

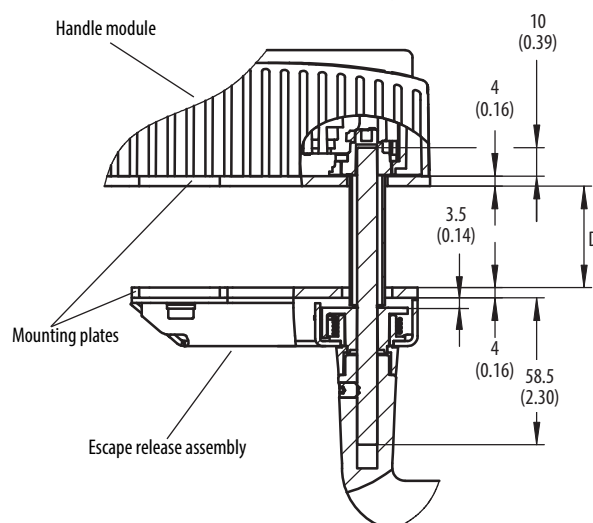


Figure 8 - Example with Mounting Plates [mm (in.)]

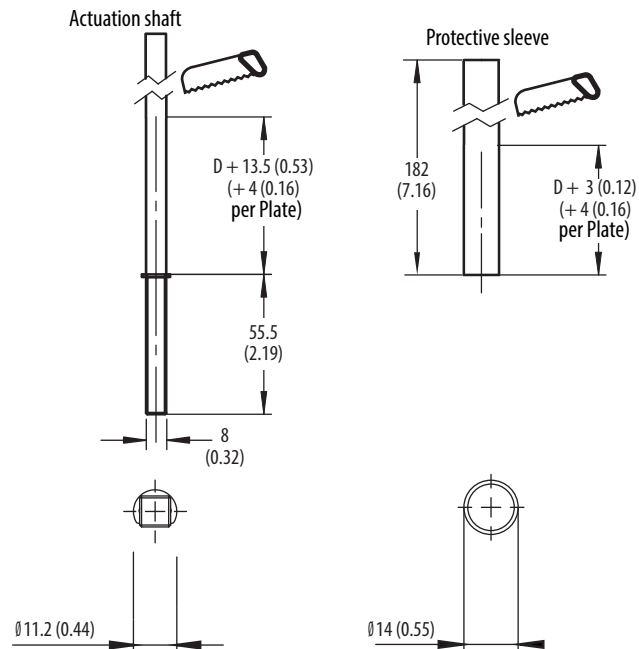
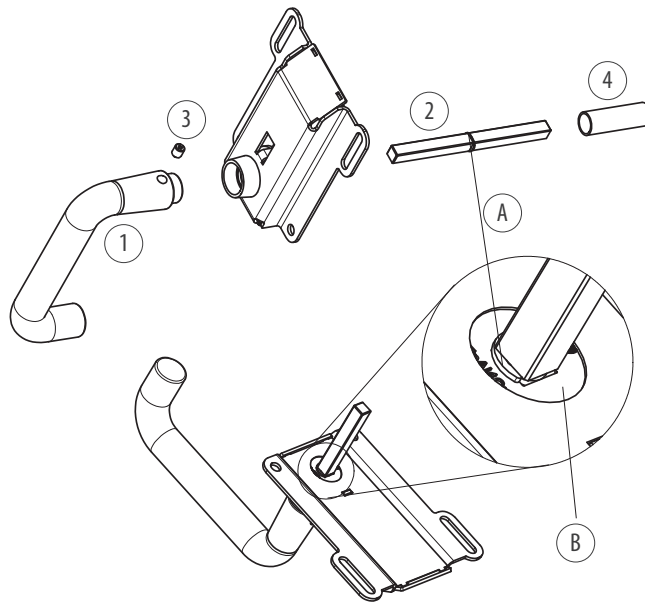


Figure 9 - Shortening the Extended Actuation Shaft [mm (in.)]

Prepare the Escape Release



1. Attach door handle
2. Insert actuation shaft. The locking ring A must be in contact with the escape release B.
3. Tighten setscrew to 2 Nm
4. Slide protective sleeve over actuation shaft

Figure 10 - Preparing the Escape Release

Electrical Connection

**WARNING:**

- To help ensure safety, both safety outputs (F01A/F01B) must always be evaluated.
- Diagnostic outputs OD, OT, OL, and OI must not be used as safety outputs.
- Lay the connection cables with protection to prevent the risk of short circuits (see [Requirements for Connection Cables on page 24](#)).



ATTENTION: Incorrect electrical connections can lead to damage or malfunction of the device.

Electrical connections must either be isolated from the main supply by a safety transformer according to IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent isolation measures.

A 24V DC Class 2 power supply is required. Alternative solutions must comply with the following requirements:

- a) Electrically isolated power supply with a maximum open-circuit voltage of 30V DC and a limited current of maximum 8 A.
- b) Electrically isolated power supply in combination with fuse as per UL248. This fuse should be designed for max. 3.3 A and should be integrated into the 30V DC voltage section.

The mounting of conduits directly on the Access Box is not allowed. Cables are only allowed to be connected using a suitable cable gland. Cable glands can be used if they are UL Listed (QCRV) and are suitable for the related cable diameter (22...17 AWG).

All electrical outputs must have an adequate protective circuit for inductive loads. The outputs must be protected with a free-wheeling diode for this purpose. RC interference suppression units must not be used.

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 should be as far away as possible from the cables of the power circuits.

To prevent EMC problems, it is imperative you follow the [Requirements for Connection Cables on page 24](#). Follow EMC guidelines on devices in the immediate vicinity of the Access Box system and their cables.

To avoid EMC interference, the physical environmental and operating conditions at the installation site of the device must comply with the requirements according to the standard DIN EN/IEC 60204-1:2006, section 4.4.2/EMC).

IMPORTANT

- To help ensure the stated degree of protection is achieved, the cover screws must be tightened to a tightening torque of 1 Nm.
- Tighten screw for the cover for the mechanical release to 0.5 Nm.

Safety in Case of Faults

- The operating voltage UB is reverse polarity protection.
- The safety inputs (FI1A/FI1B) and safety outputs (FO1A/FO1B) are short circuit-protected.
- A short circuit between FI1A and FI1B or FO1A and FO1B is detected by the device.
- A short circuit in the cable can be excluded by laying the cable with protection.

Fuse Protection for Power Supply

The power supply must be provided with fuse protection depending on the number of devices and current required for the outputs. The following rules apply:

Maximum current consumption of an individual device

$$I_{\max} = I_{UB} + I_{UA} + I_{FO1A+FO1B}$$

$$I_{UB} = \text{Device operating current (80 mA)}$$

$$I_{UA} = \text{Load current of monitoring outputs OD, OT, OL, and OI (4 x max. 50 mA) + solenoid + switches}$$

$$I_{FO1A+FO1B} = \text{Load current of safety outputs FO1A + FO1B (2 x max. 200 mA)}$$

Maximum current consumption of multiple devices connected in series

$$I_{\max} = I_{FO1A+FO1B} + n \times (I_{UB} + I_{UA})$$

$$n = \text{Number of connected devices}$$

Requirements for Connection Cables

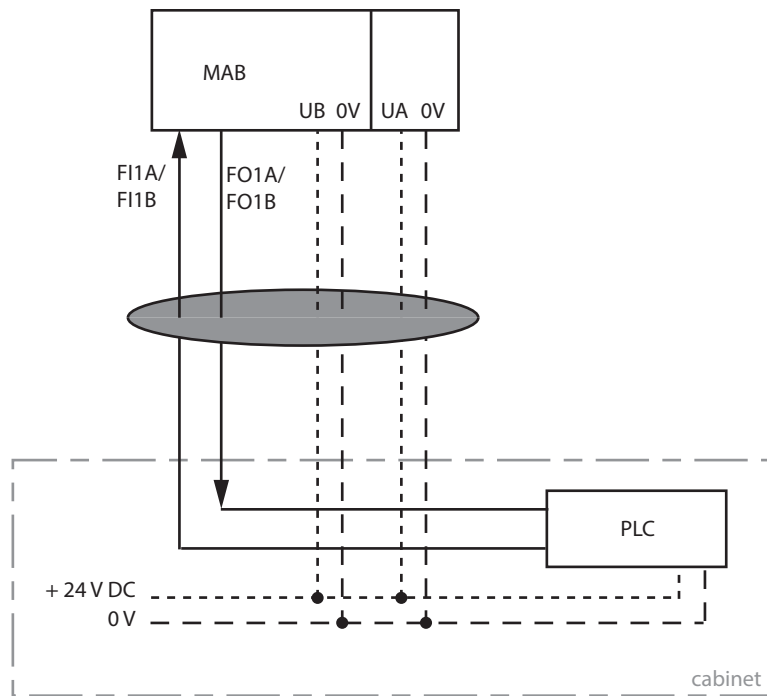


ATTENTION: Incorrect connections can result in equipment damage or malfunction.

Observe the following requirements regarding the connection cables:

Parameter	Value	Unit
Wire cross-section minimum	0.13 (26 AWG)	mm ²
R maximum	60	Ω/km
C maximum	120	nF/km
L maximum	0.65	mH/km

Lay all Access Box connection cables in a common cable harness.



IMPORTANT Lay cables in a common harness

Figure 11 - Mandatory Cable Laying

Notes:

Description of Operation

Key to Symbols

○	Status indicator not illuminated
●	Status indicator illuminated
☼	Status indicator flashes
X	Any state

Status/Diagnostic Status Indicators

Operating Mode	LED Indicator				State ¹
	Power (Green)	State (Green)	Diagnostic (Red)	Lock (Yellow)	
Diagnostics	On	Green flash 1 x	On	Off	Error during handle configuration or invalid DIP switch setting
		Green flash 2 x		Off	Input error (only applies when switch is configured for series operation) ²
		Green flash 3 x		Off	Handle assembly read error
		Green flash 4 x		Off	Output error ²
		Off		Yellow flash 1 Signal	Signal sequence erroneous, escape release or manual release was actuated ²
		Off		Off	Internal fault ²
Setup		Off	Off	Off	Handle configuration completed. Cycle power to resume normal operation.
Normal Operation		Flashes green approximately every three seconds	Off	Off	Normal operation, door is open

¹ See the user manual (pub. no. 442G-UM001A-EN-P) for more information on Troubleshooting.

² Latching faults. All other faults are non-latching. Reset according to the "Clearing Faults" section.

Status/Diagnostic Status Indicators Table A (Standalone Operation)

Operating Mode	Door Position	Position of the Bolt Tongue	Guard Locking	Safety Outputs F01A and F01B	Door Mounting Output (OD)	Bolt Tongue Monitoring (OT)	Guard Locking Monitoring Output (OL)	Diagnostics Monitoring Output (OI)	Power (green)	State (green)		DIA (red)	Lock (yellow)		State
Normal Operation	Open	Not in-serted	OFF	OFF	OFF	OFF	OFF	OFF	●	☀	Long OFF Short ON	○	○		Normal operation, door is open
	Closed	Not in-serted	OFF	OFF	ON	OFF	OFF	OFF		☀	Long ON, short OFF		○		Normal operation, door closed
	Closed	In-serted	OFF	OFF	ON	ON	OFF	OFF		☀	Long ON, Short OFF		☀	Long ON, Short OFF	With active guard lock monitoring: Normal operation, door closed, bolt inserted. Safety outputs F01A and F01B are OFF.
				ON						●	With inactive guard lock monitoring: Normal operation, door closed, bolt inserted. Safety outputs F01A and F01B are ON.				
	Closed	Inserted	ON	ON	ON	ON	ON	OFF		●			●		Normal operation, door closed and locked.
Handle Config. Standby	Open	Not inserted	OFF	OFF	OFF	OFF	OFF	OFF	●	☀	3 x	○	○		Door is open; unit is ready to configure another handle assembly (only 3 minutes after power-up).
Setup	Closed	Inserted	ON	ON	ON	ON	ON	OFF		☀	2 Hz		○		Handle configuration, tip: to prevent the interruption of the handle configuration, close door and switch on guard locking.
	X	X	X	OFF	OFF	OFF	OFF	OFF		○			○		Positive acknowledgement after completion of the handle configuration. Cycle power or apply 24V to RST for at least 3 seconds to resume normal operation.

* Latching fault; to reset, use the RST input or briefly disconnect the device from the power supply.

** Non-latching fault; open safety guard and close it again to reset.

***See Troubleshooting and Assistance in Appendix A on [page 59](#).

○ Status indicator not illuminated

● status indicator illuminated

 Status indicator flashes

x Any state

Status/Diagnostic Status Indicators Table A (Standalone Operation) (continued)

Operating Mode	Door Position	Position of the Bolt Tongue	Guard Locking	Safety Outputs F01A and F01B	Door Mounting Output (OD)	Bolt Tongue Monitoring (OT)	Guard Locking Monitoring Output (OL)	Diagnostics Monitoring Output (OI)	Power (green)	State (green)		D/A (red)		Lock (yellow)	State
Diagnostics	X	X	X	OFF	OFF	OFF	OFF	ON	●		1 x	●			Error during configuration or invalid DIP switch setting.
	X	X	X	OFF	X	X	X	OFF			3 x				Handle assembly read error (for example, error in code)**
	X	X	X	OFF	OFF	OFF	OFF	ON			4 x				Output error (for example, short circuit or loss of switching capability) or short circuit at the outputs* or short circuit at the outputs*
	X	X	X	OFF	OFF	OFF	OFF	ON							Internal fault (for example, component faulty, data fault)*
	X	X	X	OFF	OFF	OFF	OFF	ON						1 x	Signal sequence erroneous (for example, broken bolt) *** With active release monitoring: escape release or manual release was actuated.*
	X	X	X	X	X	X	X	X		Power is ON for a long time with short interruption				One million operating cycles exceeded.	
	X	X	X	X	OFF	OFF	OFF	ON						2 x	Control inputs IMP1, IMP2, IMM invalid; switch off control inputs for minimum half second and switch on again to reset.

* Latching fault; to reset, use the RST input or briefly disconnect the device from the power supply.

** Non-latching fault; open safety guard and close it again to reset.

***See Troubleshooting and Assistance in Appendix A on [page 59](#).

○ Status indicator not illuminated

● status indicator illuminated



Status indicator flashes

x

Any state

Status Diagnostic Status Indicators Table B (Series Operation)

Operating Mode	Safety Inputs FIA and	Door Position	Position of the Bolt Tongue	Guard Locking	Safety Outputs F01A and F01B	Door Mounting Output (OD)	Monitoring Output Bolt Tongue (OT)	Guard Locking Monitoring Output (OI)	Diagnostics Monitoring Output (OI)	Power (green)	State (green)	DIA (red)	Lock (yellow)	State
Self-test	X	X	X	X	OFF	OFF	OFF	OFF	OFF		5 Hz			Self-test after power-up
Normal Operation	X	Open	Not inserted	OFF	OFF	OFF	OFF	OFF	OFF		Long OFF Short ON		○	Normal operation, door is open
	X	Closed	Not inserted	OFF	OFF	OFF	OFF	OFF	OFF		Long ON, short OFF			Normal operation, door closed
	OFF	Closed	In-serted	OFF	OFF	ON	ON	OFF	OFF	☀	Long ON, Short OFF		☀	Normal operation, door closed, bolt inserted safety inputs F11A/F11B OFF
	ON	Closed	In-serted	OFF	OFF	ON	ON	OFF	OFF		Long ON, short OFF		☀	With active guard lock monitoring: Normal operation, door closed, bolt inserted. Safety inputs F11A/F11B are ON. Safety outputs F01A and F01B are OFF.
					ON					●				With inactive guard lock monitoring: Normal operation, door closed, bolt inserted. Safety inputs F11A/F11B are ON. Safety outputs F01A and F01B are ON.
	OFF	Closed	In-serted	ON	OFF	ON	ON	ON	OFF	●	☀	Long ON, Short OFF	●	Series Operation: Normal operation, door closed and locked. Safety outputs on the previous device OFF.
Handle Config. Standby	X	Open	Not inserted	OFF	OFF	OFF	OFF	OFF	OFF		☀	3 x	○	Door is open: unit is ready for configuration of another handle assembly (only 3 minutes after power-up).
	X	Closed	In-serted	ON	OFF	OFF	OFF	OFF	OFF		☀	2 Hz	○	Handle configuration tip: to prevent interruption during configuration, close door and switch on guard locking.
Handle Configuration Set-up	X	X	X	X	OFF	OFF	OFF	OFF	OFF		○		○	Position acknowledgement after completion of handle configuration. Cycle power or apply 24V to RST for at least 3 seconds to resume normal operation.

* Latching fault; to reset, use the RST input or briefly disconnect the device from the power supply.

** Non-latching fault; open safety guard and close it again to reset.

***See Troubleshooting and Assistance in Appendix A on [page 59](#).

○ Status indicator not illuminated

● status indicator illuminated

☀ Status indicator flashes

x Any state

Status Diagnostic Status Indicators Table B (Series Operation) (continued)

Operating Mode	Safety Inputs FIA and	Door Position	Position of the Bolt Tongue	Guard Locking	Safety Outputs F01A and F01B	Door Mounting Output (OD)	Monitoring Output Bolt Tongue (OT)	Guard Locking Mon- itoring Output (OL)	Diagnostics Moni- toring Access Box	Power (green)	State (green)		DIA (red)		Lock (yellow)		State
Diagnostics	X	X	X	X	OFF	OFF	OFF	OFF	ON			1 x				Error during configuration or invalid DIP switch setting.	
	Erroneous	X	X	X	OFF	OFF	OFF	OFF	ON			2 x				Input error (for example, missing test pulses, illogical switch state from previous switch)*	
	X	X	X	X	OFF	X	X	X	OFF			3 x				Handle assembly read error (for example, error in code)**	
	X	X	X	X	OFF	OFF	OFF	OFF	ON			4 x				Output error (for example, short circuit or loss of switching capability) or short circuit at the outputs*	
	X	X	X	X	OFF	OFF	OFF	OFF	ON							Internal fault (for example, component faulty, data fault)*	
	X	X	X	X	OFF	OFF	OFF	OFF	ON						1 x	Signal sequence erroneous (for example, broken bolt) *** With active release monitoring: escape release or manual release was actuated.*	
	X	X	X	X	X	X	X	X	X		Power is ON for a long time with short interruption					One million operating cycles exceeded.	
	X	X	X	X	X	OFF	OFF	OFF	ON						2 x	Control inputs IMP1, IMP2, IMM invalid; switch off control inputs for minimum of half second and switch on again to reset.	

* Latching fault; to reset, use the RST input or briefly disconnect the device from the power supply.

** Non-latching fault; open safety guard and close it again to reset.

*** See Troubleshooting and Assistance in Appendix A on [page 59](#).

○ Status indicator not illuminated

● status indicator illuminated

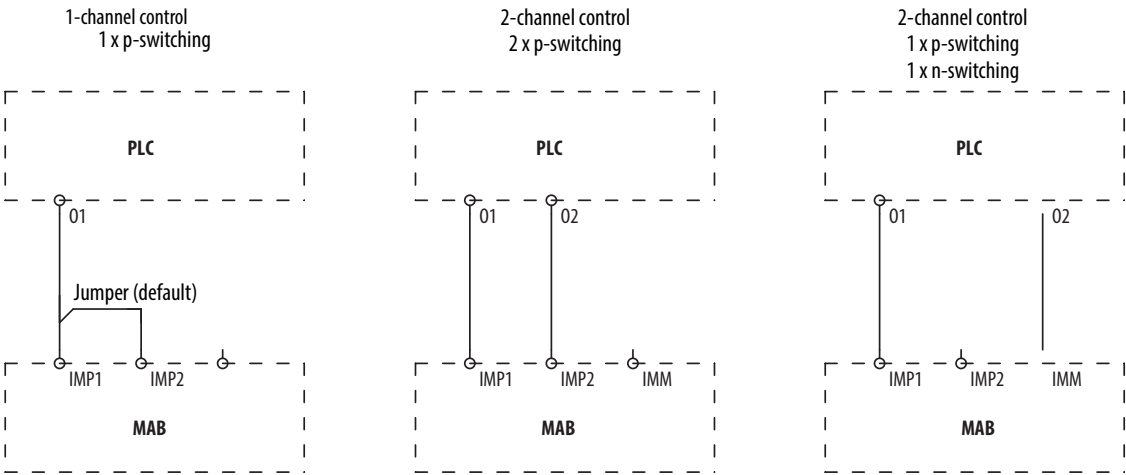
 Status indicator flashes

x Any state

Operation with Control Systems

Do not use a control system with pulsing or switch off the pulsing function in your control system. The control system must tolerate these pulses, which may have a duration of up to 1 ms when the device is configured for series operation or 300 µs when the device is configured for standalone operation.

Connection of Guard Locking Control

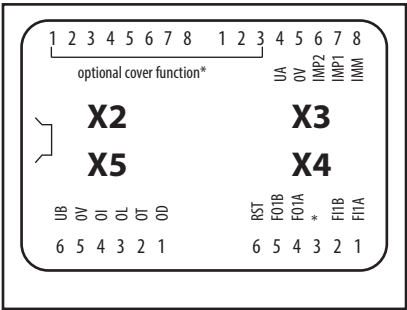


With two-channel control, the jumper between IMP1 and IMP2 must be removed. Connection as shown above.

Dual-Channel Solenoid Control

Hardware Rev B provides the possibility of a dual lock command. Rev B models have three possibilities for solenoid control of the 442G-MAB:

- a. 1-channel IMP1 (+24VDC) with jumper
- b. 2-channel IMP1 (+24VDC) and IMP2 (+24VDC)
- c. 2-channel IMP1 (+24VDC) and IMM (0V)



Signal	Terminal	Name (Rev A)	Name (Rev B)
Lock Command A	x3.7	IMP	IMP1
Lock Command B	x3.6	n/a	IMP2
Alternate Lock Command B	X3.8	n/a	IMM

The factory-default setting for Rev B models is for single-channel control (a jumper installed in the base of the lock module connects IMP1 and IMP2).

IMPORTANT The jumper between IMP1 and IMP2 must be removed for dual-channel control.

The multifunctional access box lock modules ending in –C04 (E-stop with three push buttons) require the following rework if dual lock solenoid control is desired:

- The yellow/black wire inside the MAB needs to be moved from terminal x2.8 (H4 – illumination of push button S4) to x3.6 (IMP2).
- Remember to remove the jumper between IMP1 and IMP2.

IMPORTANT If illumination of push button S4 is an absolute requirement, another signal (for example, one of the diagnostic signals OT, OI, or OL) could be given up instead. In that case, simply move the wire for the unrequired signal to terminal x3.6 for IMP2.

Proving Basic Lock Function With Active Guard Lock Monitoring

1. Switch on operating voltage.

The State status indicator flashes (5 Hz) as the device performs a self-test (up to 8 seconds). When the self-test is complete, the State status indicator flashes at regular intervals.

2. Close all safety guards and insert the bolt tongue into the locking module. For Power to Lock versions, activate guard locking.
 - The safety outputs FO1A/FO1B are ON
 - 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. To start the machine, use the control system.
 - 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 two through four for each safety guard.

With Inactive Guard Lock Monitoring

1. Switch on operating voltage.

The State status indicator flashes (5 Hz) as the device performs a self-test (up to 8 seconds). When the self-test is complete, the State status indicator flashes at regular intervals.

2. Close all safety guards and insert the bolt tongue into the locking module. As soon as the bolt tongue is inserted in the locking module, the safety outputs FO1A/FO1B are ON (independent of whether the guard door is locked or unlocked).
 - The machine must not start automatically.
 - The State status indicator is ON. The lock status indicator is ON for a long time with a short interruption (guard door unlocked) or is ON continuously (guard door locked).
3. To start the machine, use the control system.
4. Open the guard door (for Power to Release versions, use the control system to unlock the guard door).
 - The machine must switch off and it must not be possible to start it as long as the safety guard is open.

Repeat steps two through four for each safety guard.

Change Device Configuration (using DIP switches)

The Access Box can be configured using DIP switches. The following settings are possible:

- Changing system operation (standalone or series operation)
- Deactivating guard lock monitoring
- Deactivating release monitoring

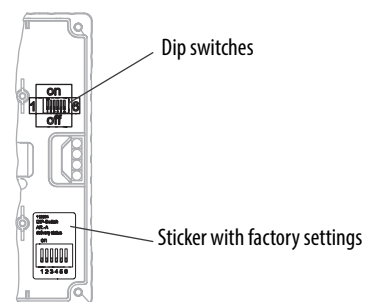
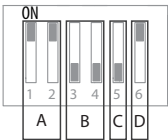


Figure 1 - Location of the Switches

Function of the Switches



Factory settings are shown.

Detail	Switch	Function ¹
A	1+2	On: Device is configured for standalone operation (factory setting) Off: Device is configured for series operation
B	3+4	On: Guard lock monitoring is deactivated Off: Guard lock monitoring is activated (factory setting)
C	5	On: DIP switch configuration enabled Off: DIP switch configuration inhibited (factory setting)
D	6	On: Release monitoring is activated (factory setting) Off: Release monitoring is deactivated

Changing System Operation
(configuring device for standalone or series operation)

IMPORTANT The terminal assignment also changes on changing the configuration (see Table 1 - Terminal assignment on page 17).

- 1. Switch off power supply.
- 2. Set DIP switches 1, 2 and 5 as shown.

Switching from series to standalone operation	Switching from standalone to series operation

- 3. Switch on the power supply for at least five seconds.
 - The change is confirmed by the illumination of the Power status indicator. All other status indicators are off.
- 4. Switch off power supply.
- 5. Set DIP switch five to OFF.
 - The next time the device is started, the new setting will be activated.

Activating/Deactivating Guard Lock Monitoring



WARNING: If guard lock monitoring is inactive, the position of the guard locking does not influence the safety outputs. The safety guard can be opened immediately. This setting is not allowed to be used in applications in which, for example, there is hazard due to overrunning machinery movement.

1. Switch off power supply.
2. Set DIP switches three, four, and five as shown.

Deactivating guard lock monitoring	Activating guard lock monitoring

3. Switch on the power supply for at least five seconds.
 - The change is confirmed by the illumination of the Power status indicator. All other status indicators are off.
4. Switch off power supply and set DIP switch five to OFF.
5. Set DIP switch five to OFF.
 - The next time the device is started, the new setting will be activated.

Activating/Deactivating Release Monitoring

IMPORTANT Release monitoring can be activated only if guard lock monitoring is also active.

IMPORTANT When release monitoring is active, the system enters into a latching fault when the escape release or manual release is actuated. See *System status table, signal sequence incorrect* status (DIA red, lock flashes one time).

1. Switch off power supply.
2. Set DIP switches five and six as shown.

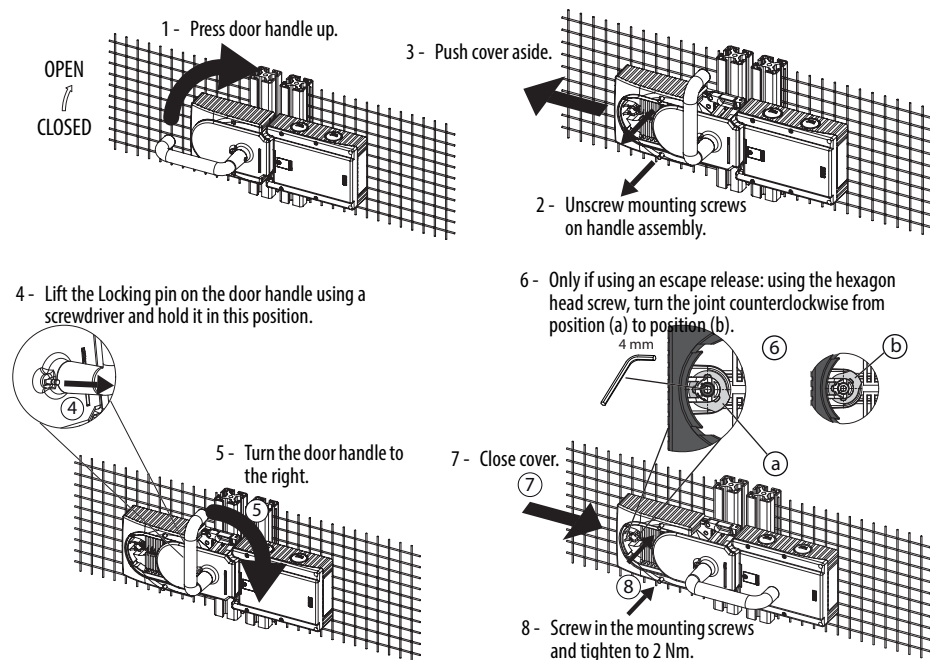
De-activate release monitoring	Activate release monitoring

3. Switch on the power supply for at least five seconds.
 - The change is confirmed by the illumination of the Power status indicator. All other status indicators are off.
4. Switch off the power supply.
5. Set DIP switch five to OFF.
 - The next time the device is started, the new setting will be activated.

Change Actuation Direction of Handle Assembly

IMPORTANT It is only possible to perform this change when the bolt is not extended and an escape release is not yet mounted.

If for some reason a right-hand assembly needs to be mounted on a left-hinged guard door or a left-hand assembly needs to be mounted on a right-hinged guard door, the actuating direction of the door handle must be changed. The example that is shown is for changing from right- to left-hand operation (see [Figure 2](#)).



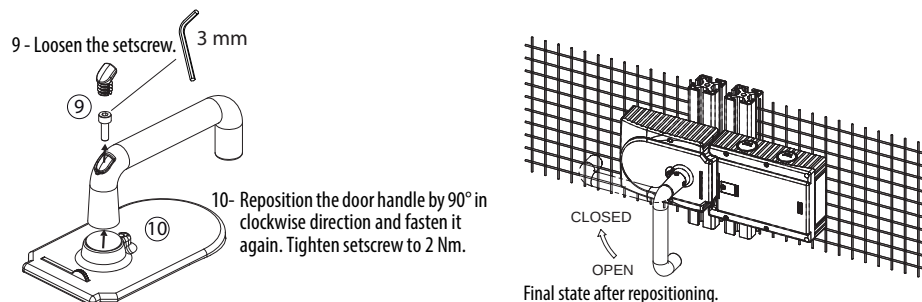


Figure 2 - Change Actuation Direction

Fault Reset

1. Open the guard door.
2. Switch off the operating voltage at the locking module for a minimum of three seconds or apply 24V to the input RST for a minimum of three seconds. Alternatively, during the system set-up with the lock module lid removed, the device can be reset using the internal reset button in the base of the lock module.

IMPORTANT The State status indicator flashes quickly (approximately 5 Hz). A self-test is performed during this time (up to eight seconds). The status indicator then cyclically flashes three times.

3. Close the guard door and switch on the guard locking.

Close safety guard and switch guard locking on. The system is in normal mode again.

Auxiliary/Manual Release

The manual release is provided to allow for unlocking the guard door in the event of unforeseen or uncommon circumstances.

With release monitoring active (default factory setting), the system enters into a latching fault when the escape release is actuated. To reset the device, turn the power off for at least three seconds or apply 24V to the input RST for a minimum of three seconds.

IMPORTANT The guard door must be in the open position to clear a latching fault.

IMPORTANT The system might not enter into a latching fault if the mechanical release is actuated slowly.

IMPORTANT The mechanical release is not a safety function.
The machine manufacturer must select and use a suitable release according to the risk assessment.
The correct function must be checked at regular intervals.



ATTENTION: The locking screw must be screwed back in and sealed after assembly and after use of the manual release (for example, with sealing lacquer). Tightening torque is 0.5 Nm.

1. Undo locking screw.
2. Lift locking arm using a screwdriver and actuate the guard door handle.

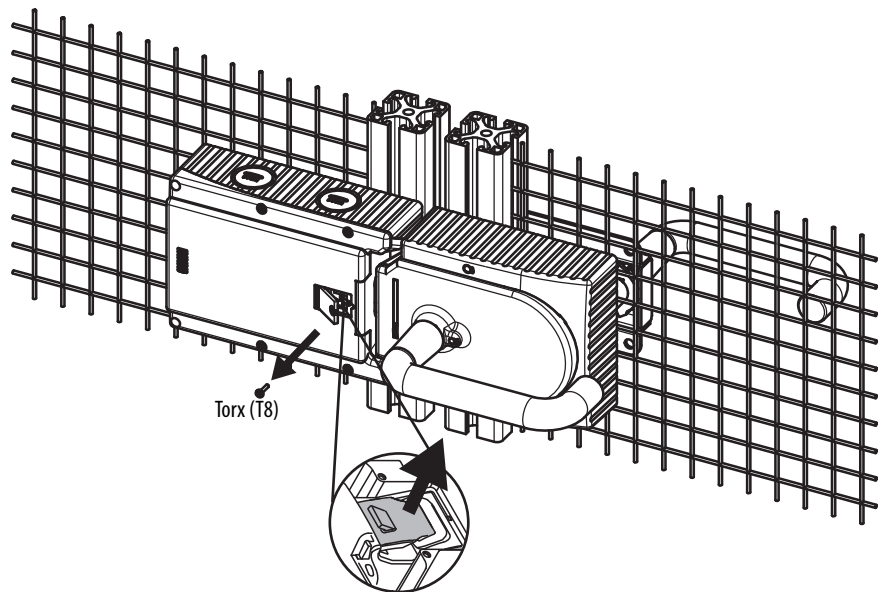


Figure 3 - Auxiliary/Manual Release

Emergency Release

Permits opening of a locked safety guard from outside the danger area without tools.



ATTENTION:

- It must be possible to operate the emergency unlocking manually from outside the protected area without tools.
- Emergency unlocking must possess a marking indicating that it may be used only in an emergency.
- The actuator must not be under tensile stress during manual release.
- The unlocking function meets all other requirements from EN ISO 14119.
- Emergency unlocking meets the requirements of Category B according to EN ISO 13849-1:2008.
- Check the release function every time after mounting.

To actuate the emergency release, press the rotary knob down and turn it clockwise by 90° until the snap-in bolt latches in the hole of the flange. When the emergency release is in the latched position, guard locking is released.

To reset the emergency release, push the snap-in bolt inward using a small screwdriver or similar tool and simultaneously turn the rotary knob counterclockwise into the unlatched position. The emergency unlocking can be sealed in the unlatched position using the seal kit provided.

IMPORTANT The safety outputs are switched off when the emergency unlocking is actuated. Use the safety outputs to generate a stop command.

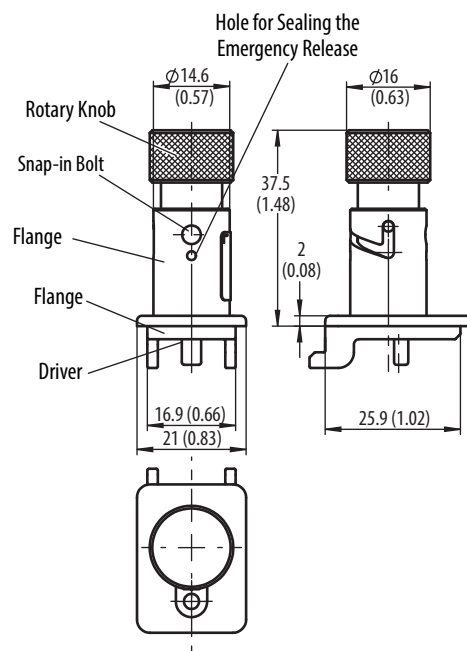


Figure 4 - Emergency Release

Mounting

The cover of the mechanical release has to be removed before mounting the emergency release.

1. Remove the lock module cover (seven screws)
2. Open the manual release cover
3. Pull the manual release cover forcefully at an angle of 45° until it unlatches
4. Remove the manual release cover downwards
5. Re-attach the lock module cover (six screws)
6. Lubricate the driver of the emergency release all around
7. Insert the emergency release
8. Secure the emergency release with the enclosed screw
9. Check the function of the emergency release

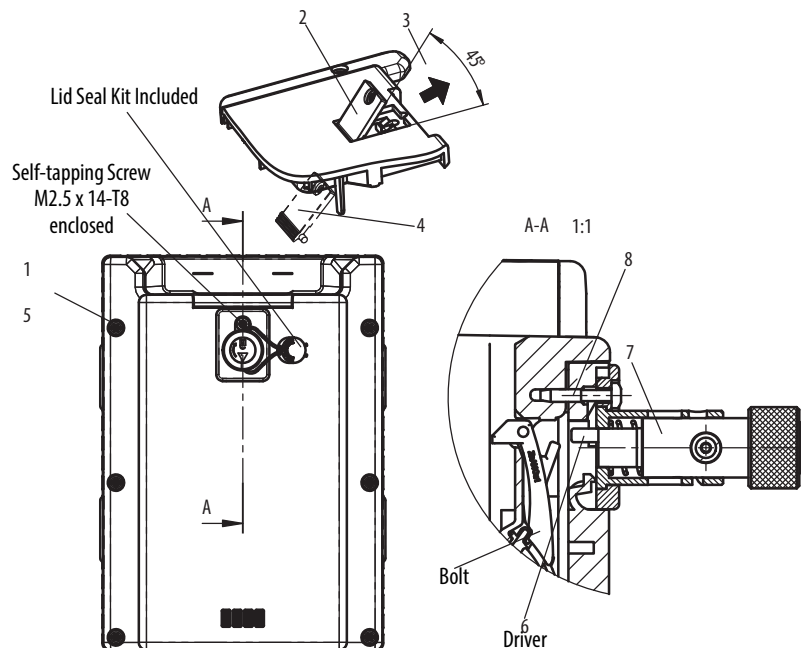


Figure 5 - Mounting Emergency Release



ATTENTION: The mechanical lifetime of the emergency release is limited to 20,000 actuations. Then the bolt of the locking module does not allow further emergency releases. To make this function available again, the whole locking module has to be exchanged.

Bolt Locking Mechanism

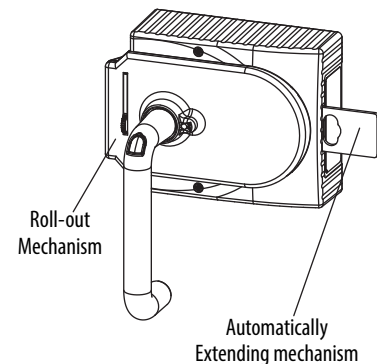
The Access Box has two mechanisms for locking the bolt actuator to prevent locking the guard and restarting the machine while an operator is inside the safeguarded area.

One of the bolt locking mechanisms automatically extends when the handle is in the OPEN position. The other mechanism is manually extended (see Figure 18). To pivot out, press the grooved part (only possible with the handle in the OPEN position and the bolt retracted).

IMPORTANT With the manual bolt locking mechanism rolled out, the bolt cannot be extended.

Note: The minimum padlock diameter is 2 mm (0.08 in.) and the maximum diameter is 10 mm (0.39 in.) You can fit a maximum of three locks in an 8 mm (0.31 in.) diameter.

Figure 6 - Bolt Locking Mechanisms



Series Operation

A maximum of ten devices can be connected in series.

Resetting in Switch Chains

IMPORTANT If you use the reset input (RST) for resetting devices that are connected in series, all devices in the chain must be reset simultaneously. Resetting individual switches results in faults.

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:

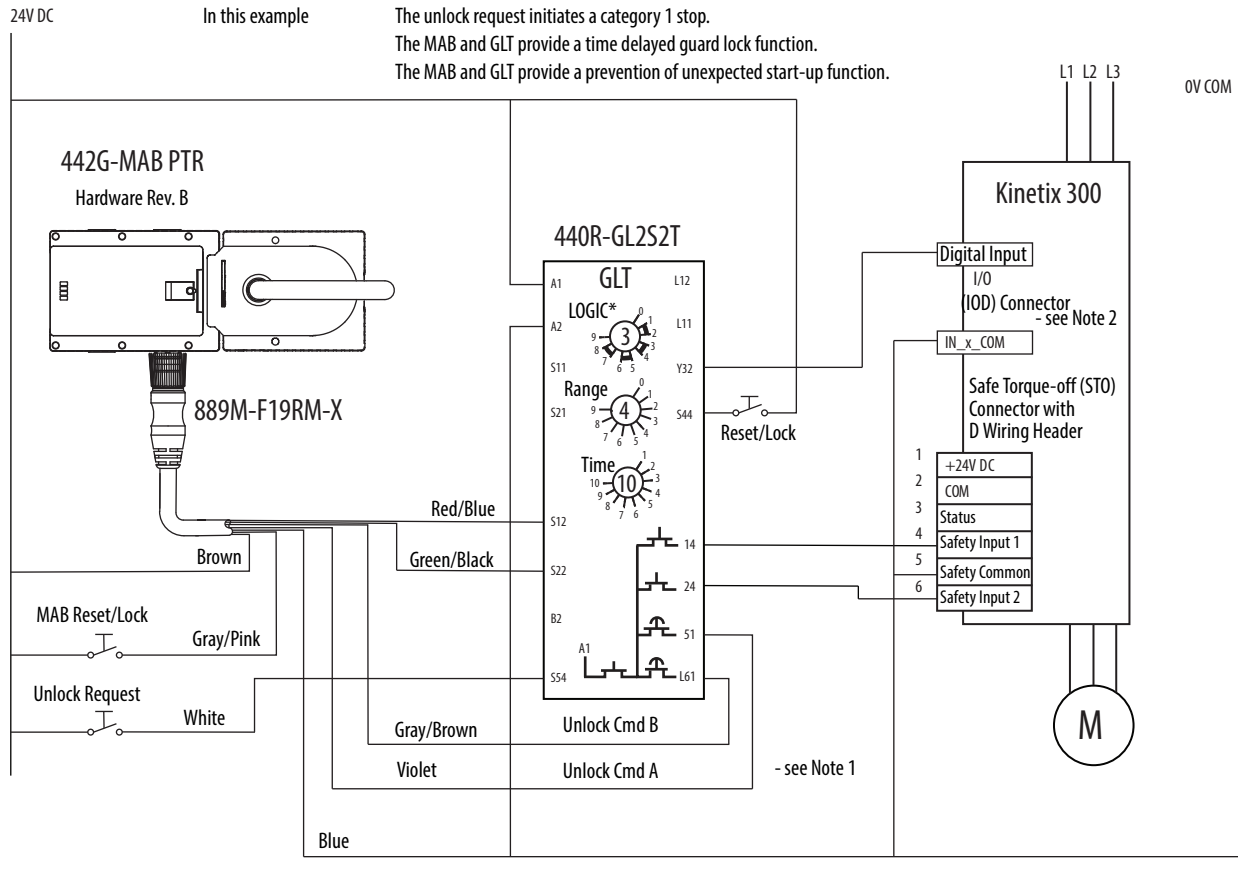
- Set-up work
- The installation or replacement of a Access Box module
- An extended period without any use
- A fault condition
- Any change to the DIP switch setting



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

Wiring Examples

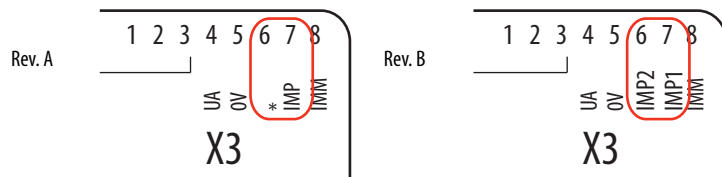
Cat 1 Stop with Kinetix® 300 and GLT Time Delay Safety Relay



Note 1: When using a Hardware Rev. A MAB, connect the violet wire to terminal S1 of the GLT. The gray/brown wire must remain unconnected.

Note 2: The digital input configured for Abort Index in MotionView software, must be active-high when the safety function is requested. Digital input common (IN_x_COM) must be used in this signal activation/de-activation transition.

Note that the terminal designations for X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



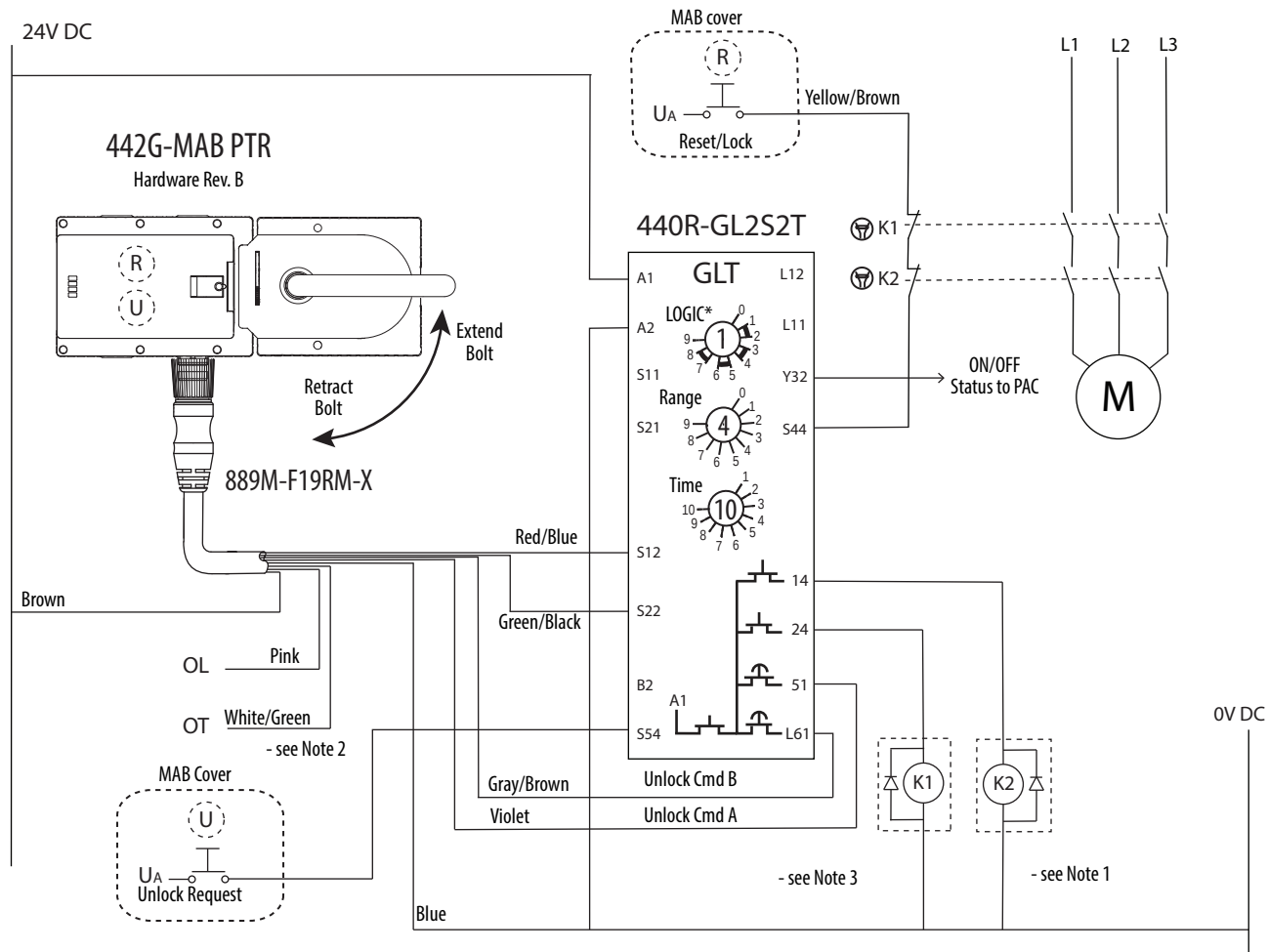
Cat 0 Stop with GLT Time Delay Safety Relay

In this example

The unlock request initiates a category 0 stop function.

The MAB and GLT provide a time delayed guard lock function.

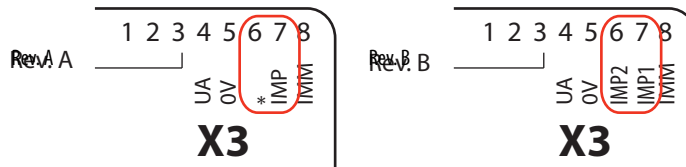
The MAB and GLT provide a prevention of unexpected start-up function.



Note 1: K1 and K2 = 100S-C09EJ14BC:
EJ contactors have integral transient suppression. External transient suppression may be required when non-"EJ" contactors are used.

Note 2: U_A : Connected to 24V internally in MAB
OL: True when the door is closed, the bolt is extended and locked.
OT: True when the door is closed and the bolt is extended, locked or not.

Note 3: When using a Hardware Rev. A MAB, connect the violet wire to terminal 51 of the GLT. The gray/brown wire must remain unconnected.
Note that the terminal designations of X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



Cat 1 Stop with PowerFlex® 525 and GLT Time Delay Safety Relay

24V DC

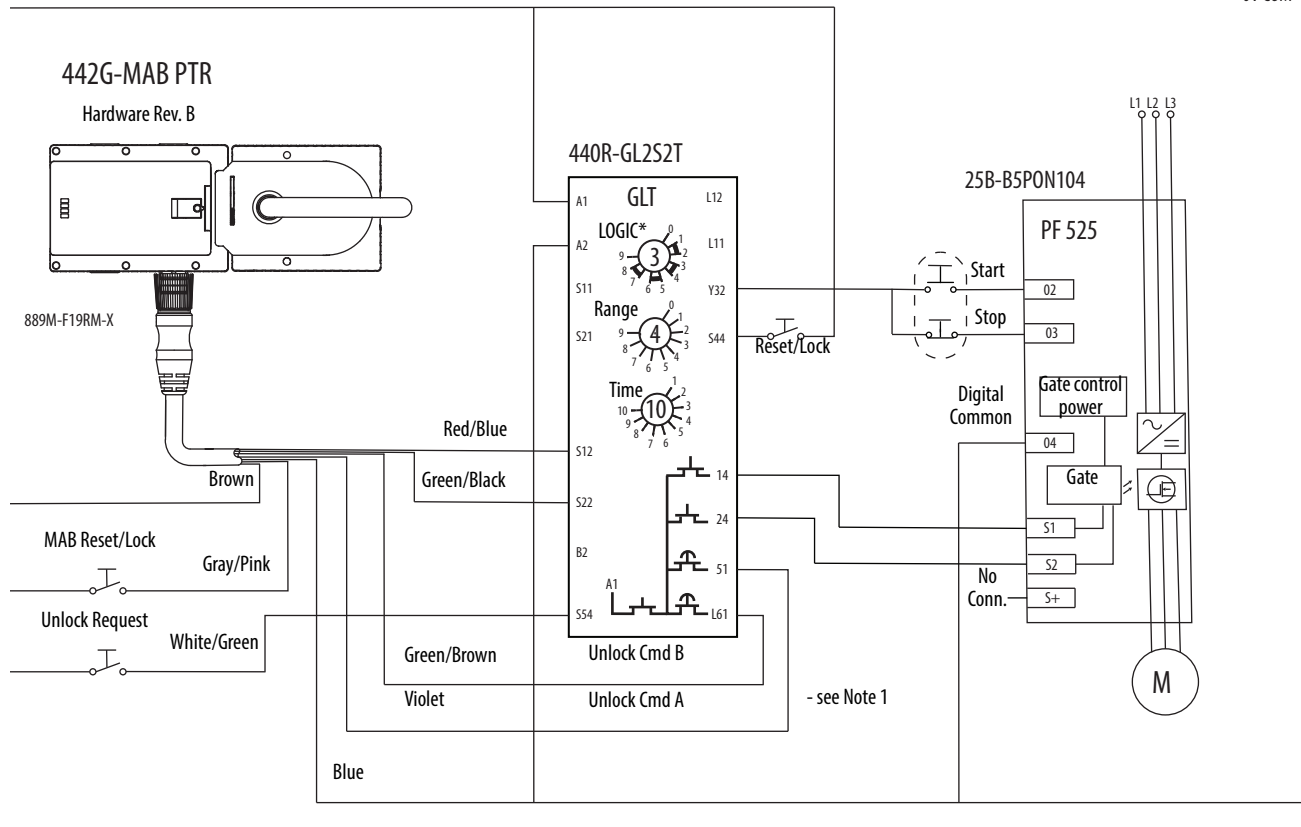
In this example

The unlock request initiates a category 1 stop.

The MAB and GLT provide a time delayed guard lock function.

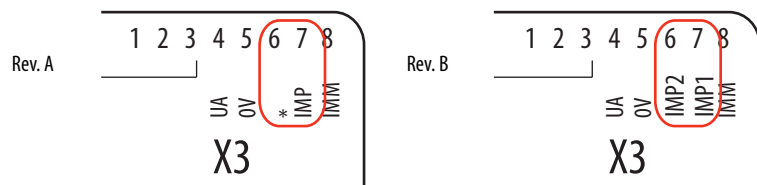
The MAB and GLT provide a prevention of unexpected start-up function.

0V COM



Note 1: When using a Hardware Rev. A MAB, connect the violet wire to terminal S1 of the GLT. The gray/brown wire must remain unconnected.

Note that the terminal designations for X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



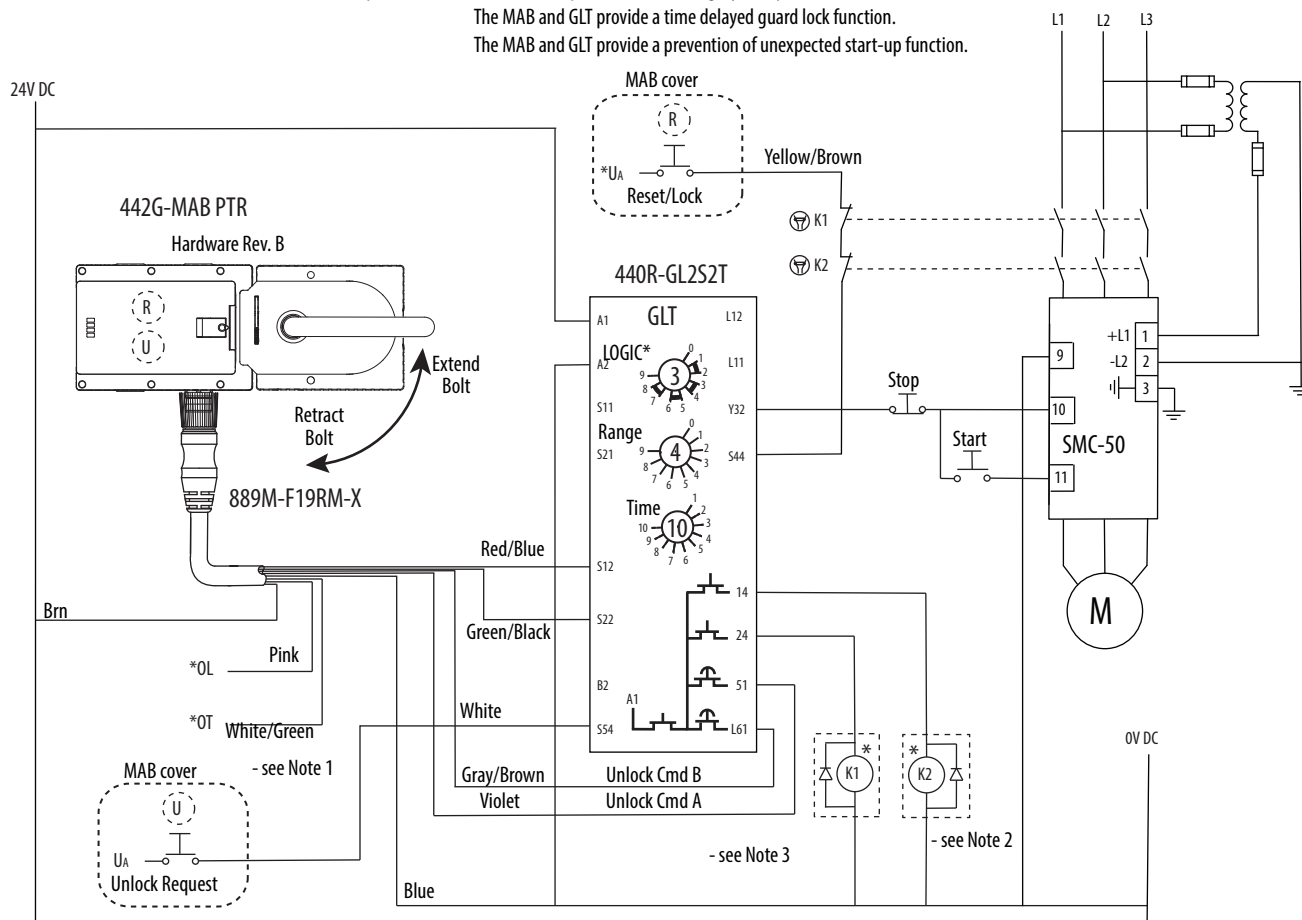
Cat 1 Stop with SMC™-50 and GLT Time Delay Safety Relay

In this example

The unlock request initiates a category 1 stop.

The MAB and GLT provide a time delayed guard lock function.

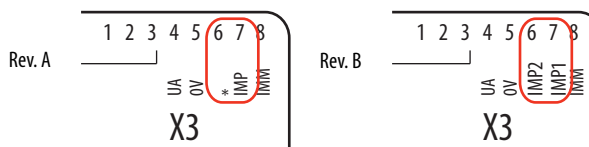
The MAB and GLT provide a prevention of unexpected start-up function.



Note 1: K1 and K2 = 100S-C09EJ14BC:
EJ contactors have integral transient suppression.
External transient suppression may be required when non-"EJ" contactors are used.

Note 2: U_A: Connected to 24V internally in MAB
OL: True when the door is closed, the bolt is extended and locked.
OT: True when the door is closed and the bolt is extended, locked or not.

Note 3: When using a Hardware Rev. A MAB, connect the violet wire to terminal 51 of the GLT. The gray/brown wire must remain unconnected.
Note that the terminal designations of X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.

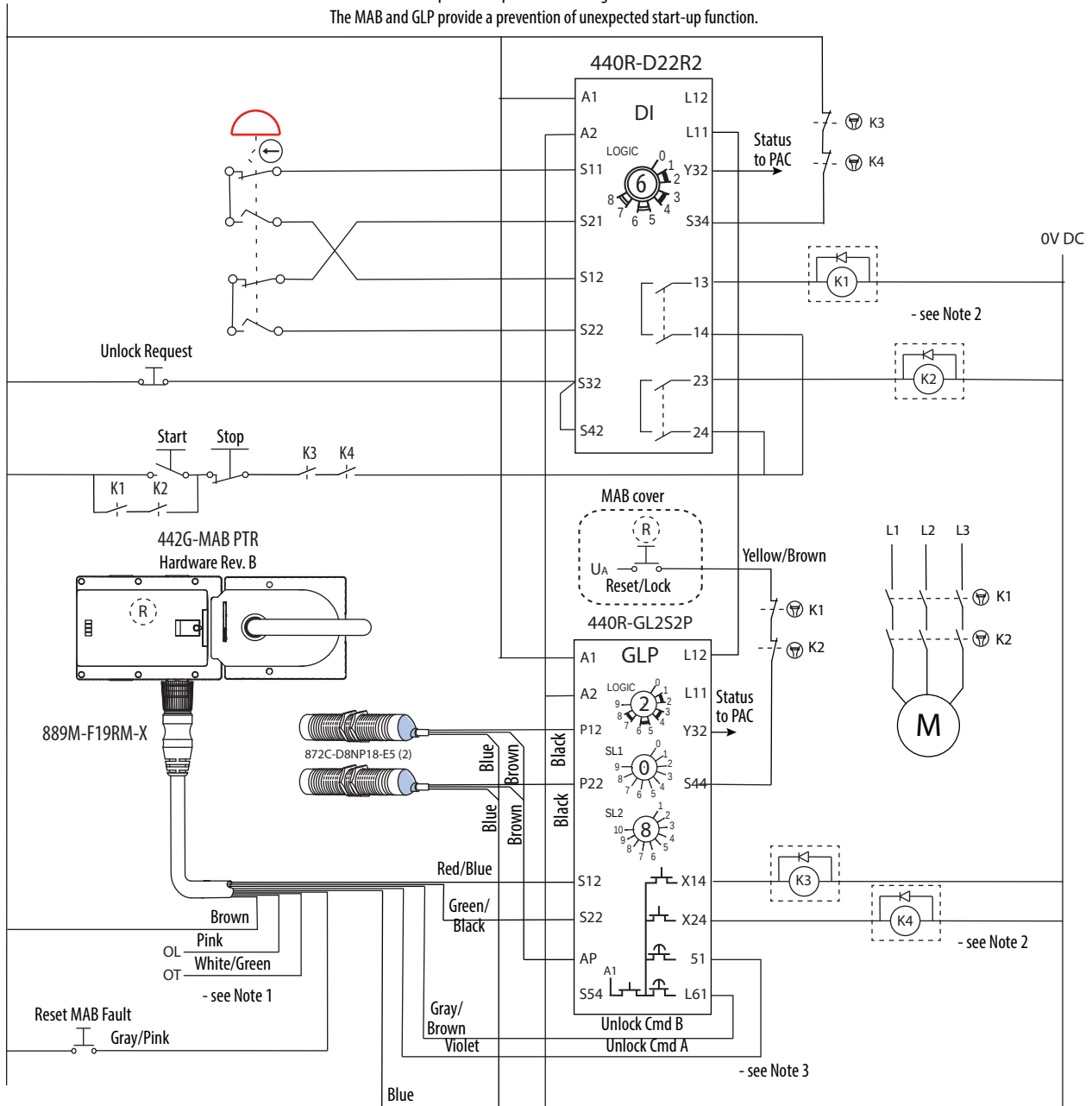


Cat 0 Stop with Speed Monitored Guard Lock Function with GSR-DI and GLP Safety Relay

In this example

The E-stop initiates a category 0 stop function.
The unlock request initiates a category 0 stop function.
The MAB and GLP provide a speed monitored guard lock function.
The MAB and GLP provide a prevention of unexpected start-up function.

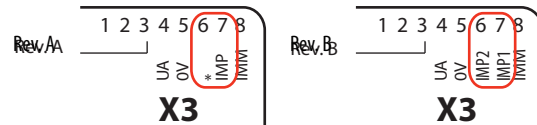
24V DC, Class 2



Note 1: U_A : Connected to 24V internally in MAB
OL: True when the door is closed, the bolt is extended and locked.
OT: True when the door is closed and the bolt is extended, locked or not.

Note 2: K1 and K2 = 100S-C09EJ14BC - EJ contactors have integral transient suppression. External transient suppression may be required when non-"EJ" contactors are used.
K3 and K4 = 700-HPSXZ24 DPDT Safety relays with 700-ADL12 suppression - red status indicator modules.

Note 3: When using a Hardware Rev. A MAB, connect the violet wire to terminal 51 of the GLP. The gray/brown wire must remain unconnected.
Note that the terminal designations of X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



Cat 0 Stop with Speed Monitored Guard Lock Function with GSR-SI and GLP Safety Relay

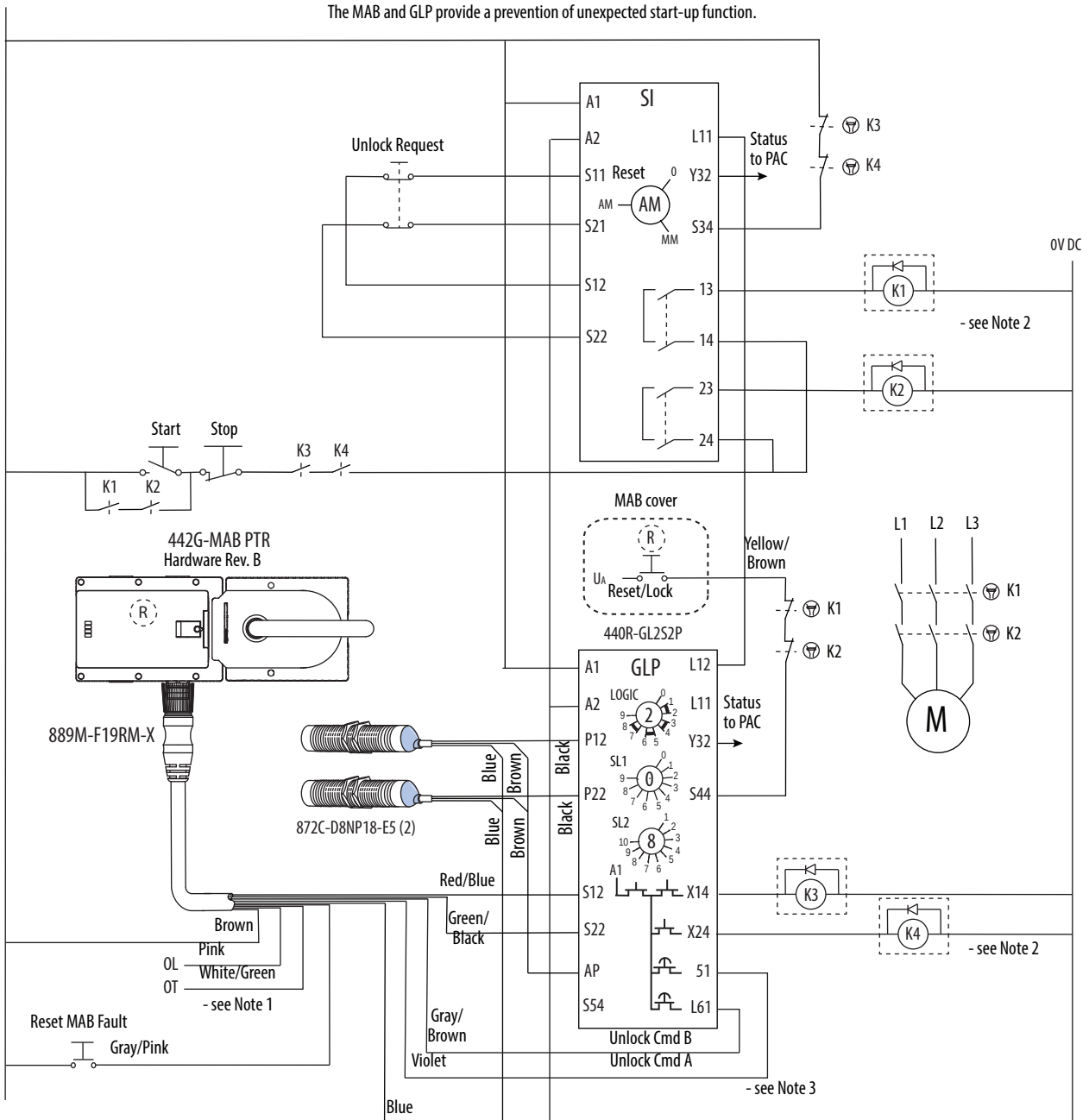
24V DC, Class 2

In this example

The unlock request initiates a category 0 stop function.

The GLP and MAB provide a speed monitored guard lock function.

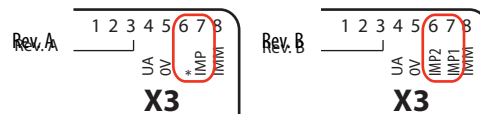
The MAB and GLP provide a prevention of unexpected start-up function.



Note 1: U_A : Connected to 24V internally in MAB
 OL: True when the door is closed, the bolt is extended and locked.
 OT: True when the door is closed and the bolt is extended, locked or not.

Note 2: K1 and K2 = 100S-C09EJ14BC - EJ contactors have integral transient suppression. External transient suppression may be required when non-"EJ" contactors are used.
 K3 and K4 = 700-HPSXZ24 DPDT Safety relays with 700-ADL12 suppression - red status indicator modules.

Note 3: When using a Hardware Rev. A MAB, connect the violet wire to terminal 51 of the GLP. The gray/brown wire must remain unconnected.
 Note that the terminal designations of X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



Cat 1 Stop with Speed Monitored Guard Lock Function with PowerFlex 525, GSR-SI, and GLP Safety Relay

In this example

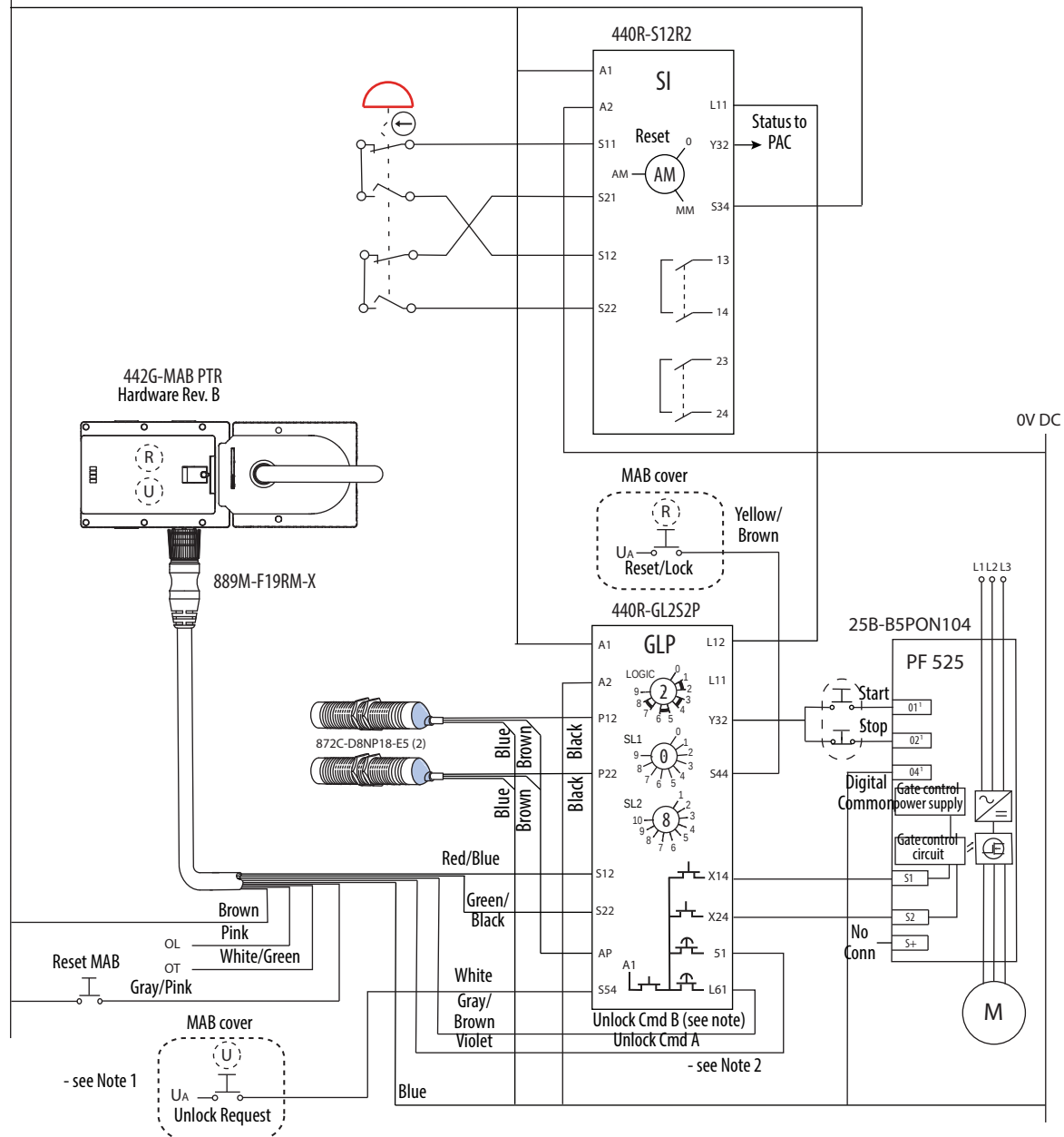
24V DC, Class 2

The E-stop initiates a category 1 stop function.

The unlock request provides a category 1 stop function.

The MAB and GLP provide a speed monitored guard lock function.

The MAB and GLP provide a prevention of unexpected start-up function.



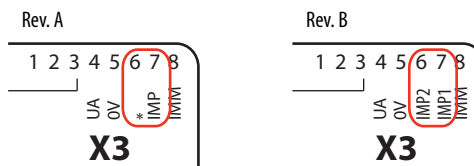
Note 1: **U** : Connected to 24V internally in MAB

OL: True when the door is closed, the bolt is extended and locked.

OT: True when the door is closed and the bolt is extended, locked or not.

Note 2: When using a Hardware Rev. A MAB, connect the violet wire to terminal 51 of the GLT. The gray/brown wire must remain unconnected.

Note that the terminal designations of X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



Cat 1 Stop with Speed Monitored Guard Lock Function with SMC-50 and GLP Safety Relay

In this example

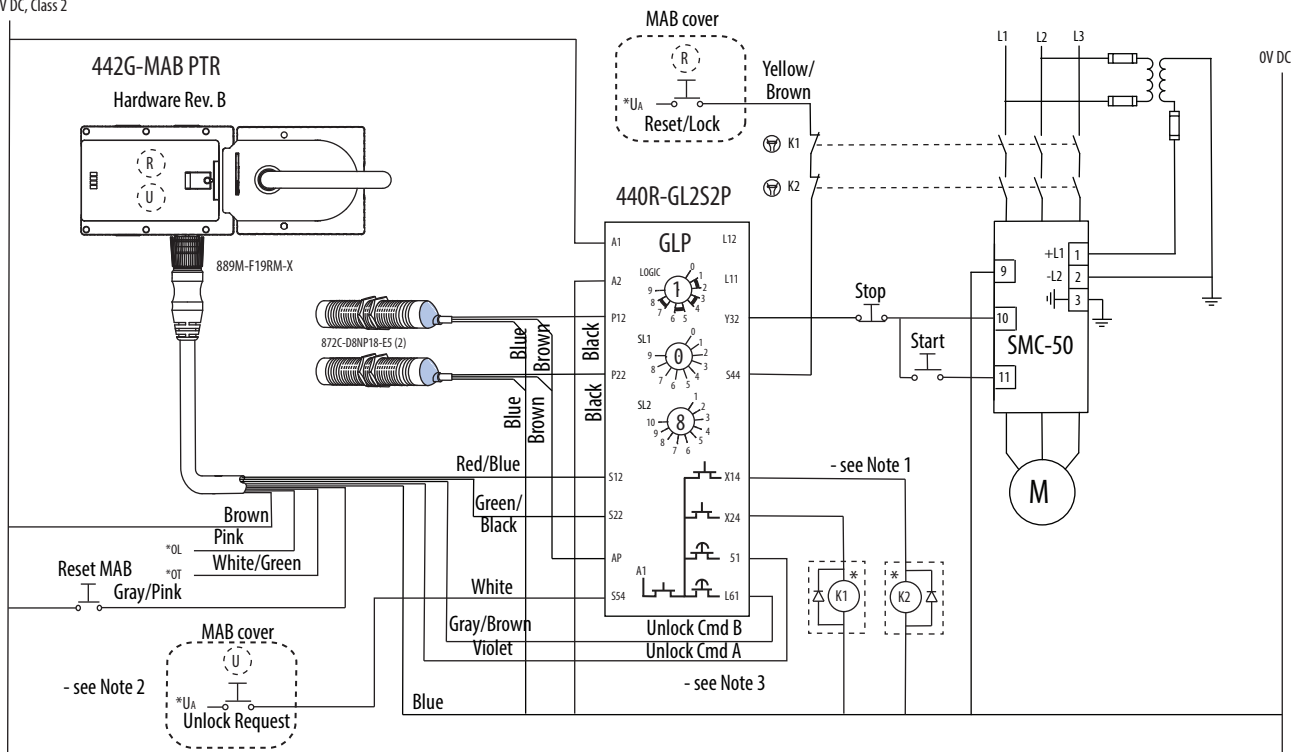
The E-stop initiates a category 1 stop function.

The unlock request provides a category 1 stop function.

The MAB and GLP provide a speed monitored guard lock function.

The MAB and GLP provide a prevention of unexpected start-up function.

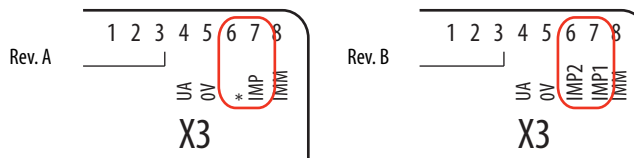
24V DC, Class 2



Note 1: K1 and K2 - 100S-C09EJ14BC:
EJ contactors have integral transient suppression.
External transient suppressions may be required
when non-"EJ" contactors are used.

Note 2: UA: Connected to 24V internally in MAB
OL: True when the door is closed, the bolt is extended and locked.
OT: True when the door is closed and the bolt is extended, locked or not.

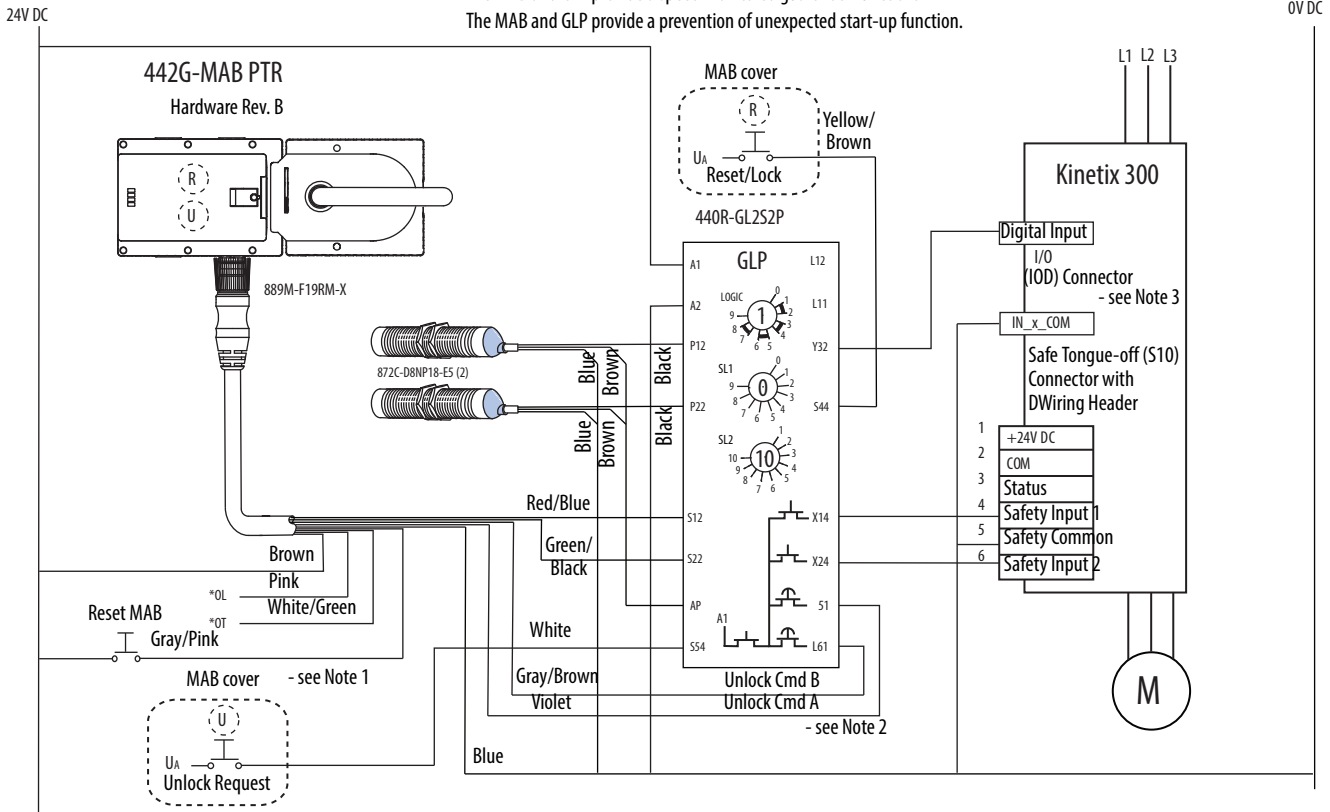
Note 3: When using a Hardware Rev. A MAB, connect the violet wire to terminal S1 of the GLT. The gray/brown wire must remain unconnected.
Note that the terminal designations of X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



Cat 1 Stop with Speed Monitored Guard Lock Function with Kinetix 300 and GLP Safety Relay

In this example

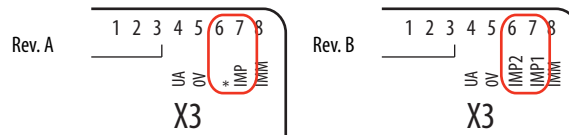
The E-stop initiates a category 1 stop function.
The unlock request provides a category 1 stop function.
The MAB and GLP provide a speed monitored guard lock function.
The MAB and GLP provide a prevention of unexpected start-up function.



Note 1: UA: Connected to 24V internally in MAB
OL: True when the door is closed, the bolt is extended and locked.
OT: True when the door is closed and the bolt is extended, locked or not.

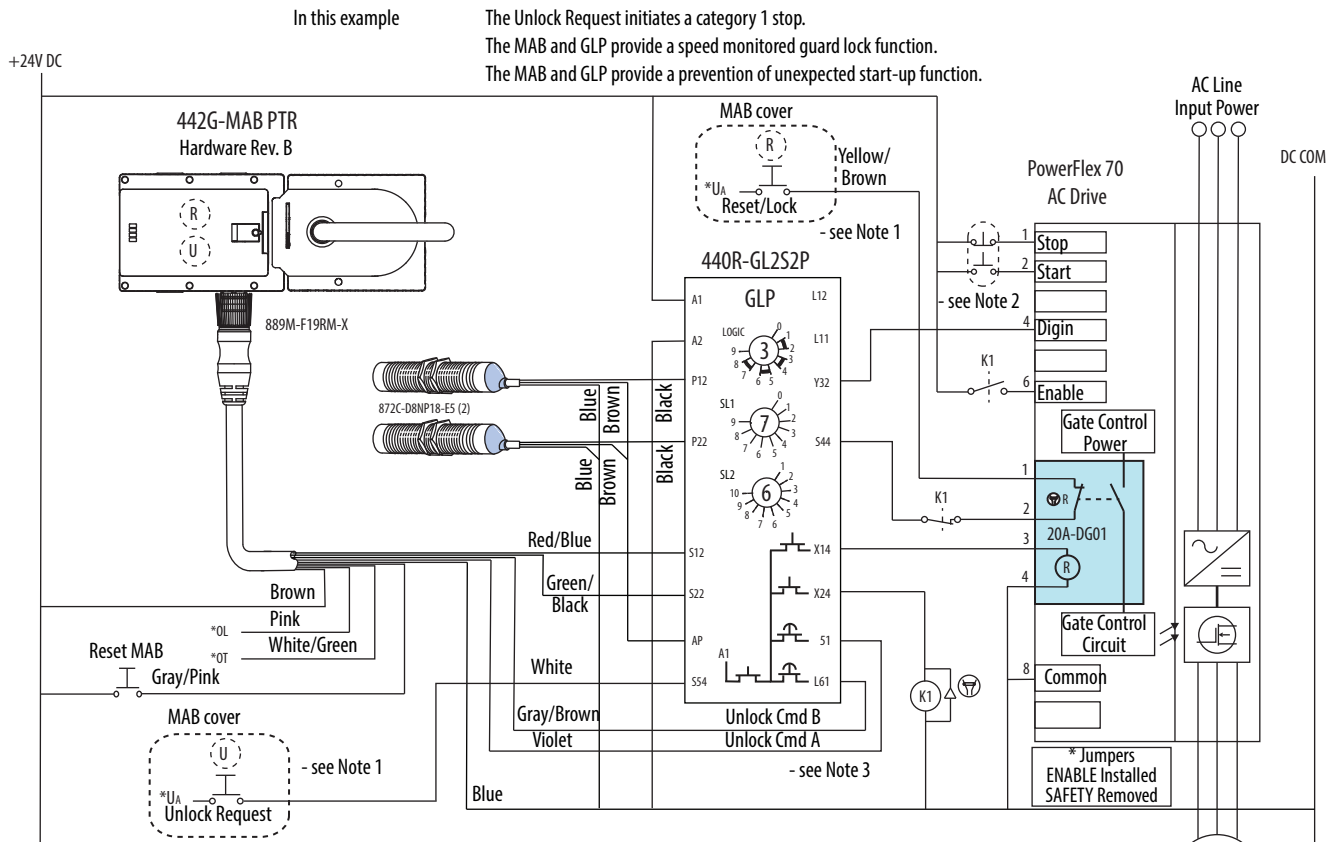
Note 2: When using a Hardware Rev. A MAB, connect the violet wire to terminal 51 of the GLP. The gray/brown wire must remain unconnected.

Note that the terminal designations of terminals X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



Note 3: The digital input, configured for abort index in MotionView software, must be active-high when the safety function is requested. Digital input common (IN_x_COM) must be used in this signal activation/de-activation transition.

Cat 1 Stop with Speed Monitored Guard Lock Function with PowerFlex 70 and GLP Safety Relay

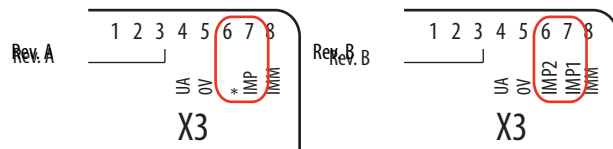


Note 1: U_A: Connected to 24V internally in MAB
OL: True when the door is closed, the bolt is extended and locked.
OT: True when the door is closed and the bolt is extended, locked or not.

Note 2: Configured for three-wire control (external supply)
Digin 4 is configured for speed sel 1, preset speed 1 (5.0 Hz)
Important: The drive enabled digital input is a solid-state circuit.
Pulse tested outputs should not be used with PF 70 digital inputs

Note 3: K1 2 = 700-HPS2Z24 with 700-HN123 terminal socket and 700-ADL1R surge suppressor with red status indicator.

Note 4: When using a Hardware Rev. A MAB, connect the violet wire to terminal 51 of the GLP. The gray/brown wire must remain unconnected.
Note that the terminal designations of X3.6 and X3.7 are different on Hardware Rev. A and Hardware Rev. B MAB.



Specifications

Safety Ratings		Operating Characteristics (continued)	
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 only)	Protection Type	Short circuit and reverse polarity protected, cross-fault detection
Safety Classification	Type 4 interlocking device with guard locking and high-coded RFID actuators according to ISO 14119	Current Consumption I_{UB} (no load on any outputs)	80 mA
Functional Safety Data	PFHd: 2.47×10^{-8} ; PLe, Cat. 4 (according to ISO 13849-1). Mission time: 20 years. B10d for E-stop: 1.0×10^5 cycles	With energized guard locking solenoid and unloaded outputs OI, OL, OT, and OD	350 mA
Certifications	cULus (UL 508) and CE Marked for all applicable EU directives	Push button (no load, per status indicator)	5 mA
Outputs		External Fuse	See Electrical Connection on page 23
Safety Outputs (F01A/F01B)	Semiconductor outputs, PNP	Response Time (On)	570 ms
Output Current, maximum (each)	200 mA	Response Time (Off)	350 ms first switch, 5 ms each additional switch
Output voltage U_{F01A} / U_{F01B}^1 @ 50 mA switching current	ON: $U_B - 2V \dots U_B$, OFF: $0 \dots 1V$ DC	Risk Time (per IEC 60947-5-3)	350 ms
Monitoring Outputs		Discrepancy Time	10 ms (maximum)
Monitoring Outputs (OD, OT, OL, OI)	P-switching and short circuit-proof	Start-up Time (availability)	0.5 s configured for standalone operation 8 s configured for series operation
Output Voltage	$U_A - 2V \dots U_A$	Maximum Length of Switch Chain	10 MAB devices
Maximum Load (each)	50 mA, maximum	Utilization Category (IEC 60947-5-2)	DC-13 24V 200 mA
Push Button Controls and Indicators		Insulation Voltage U_i (IEC 60947-1)	30V
Operating Voltage	$5 \dots 24V$ DC	Impulse Withstand Voltage U_{imp}	1.5 kV
Operating Current	$1 \dots 100$ mA	Pollution Degree (IEC 60947-1)	3
Breaking Capacity, maximum	250 mW	Manual Release	Built in (ISO 14119)
Power Supply status indicator	24V DC	Mechanical Life	1,000,000 operations
Operating Characteristics		Environmental	
Torque Settings, maximum	1 Nm lock module cover screws (6x) 0.5 Nm manual release locking screw 2 Nm handle set screw (handle and escape release)	Ambient Temperature [C (F)] at $U_B = DC$ 24V	$-20 \dots +55^\circ (-4 \dots +131^\circ)$
Locking Force F_{max}	2600 N	Storage Temperature [C (F)]	$-20 \dots +65^\circ (-4 \dots +149^\circ)$
Holding Force F_{zh} (ISO 14119)	2000 N	Enclosure Rating	IP65
Maximum Impact Energy Withstand	300 J	Operating Humidity	$5 \dots 80\%$ relative
Locking Bolt Alignment Tolerance	Horizontal: ± 4 mm (0.16 in.); Vertical: ± 5 mm (0.2 in.)	Vibration/Shock	IEC 60068-2-27 30 g (1.06 oz), 11 ms/IEC 60068-2-6 10...55 Hz
Physical Characteristics			
Operating Voltage U_B	Class 2 PELV 24V DC +10/-15% required	Weight	Lock module with cover 750 g (26.45 oz), handle assembly 1000 g (35.27 oz), Escape release 500 g (17.64 oz))
Auxiliary Power U_A	Class 2 PELV 24V DC +10/-15% required	Materials	Glass fiber reinforced plastic, nickel-plated die-cast zinc, anodized aluminum handle, stainless steel hardware

Dimensions [mm (in.)]

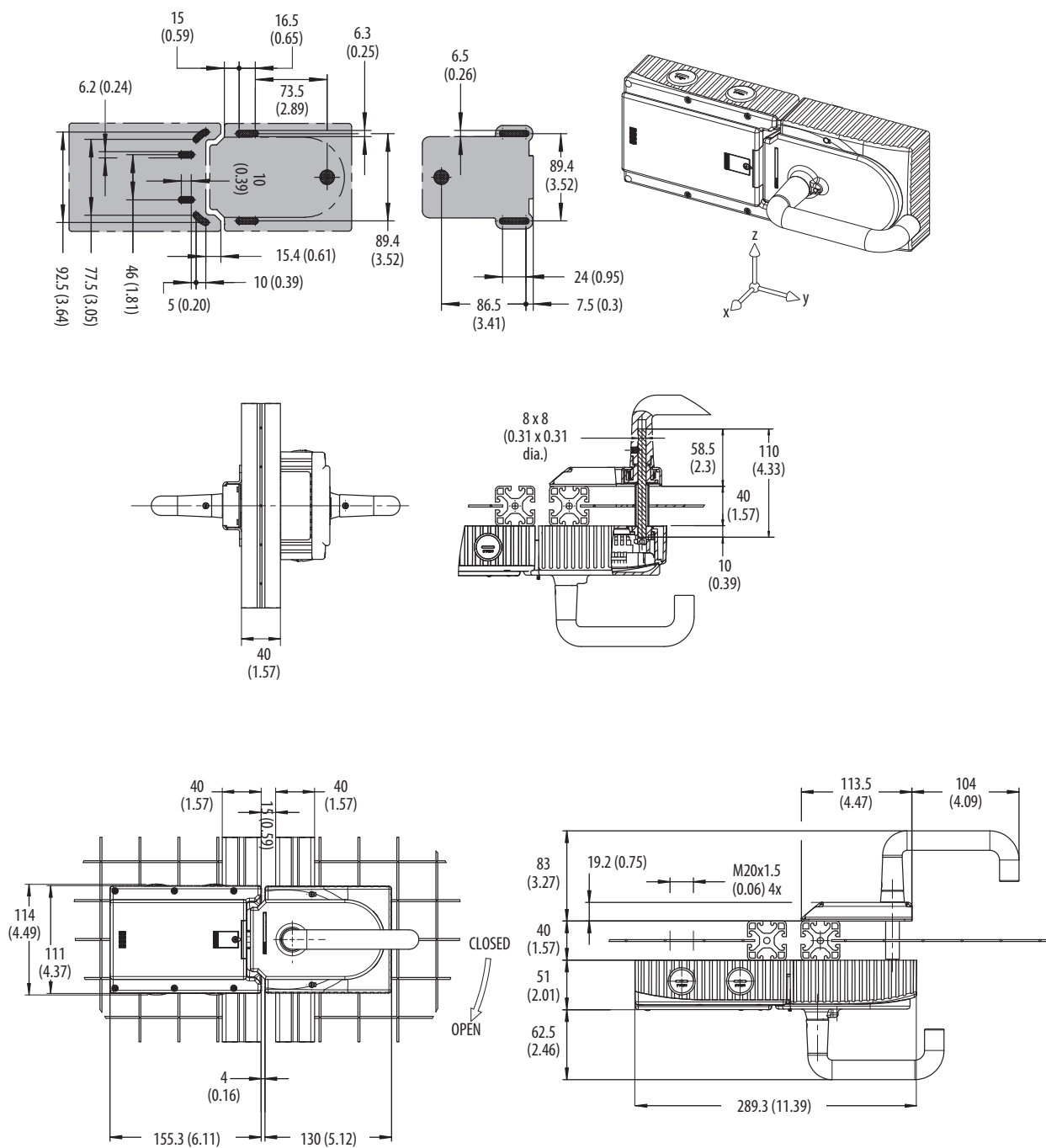


Figure 1 - Dimensions for MAB Mounted without Optional Mounting Plates

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 should be selected. The device should be covered during paint work.

Catalog Numbers

Handle Assembly (one required per system)

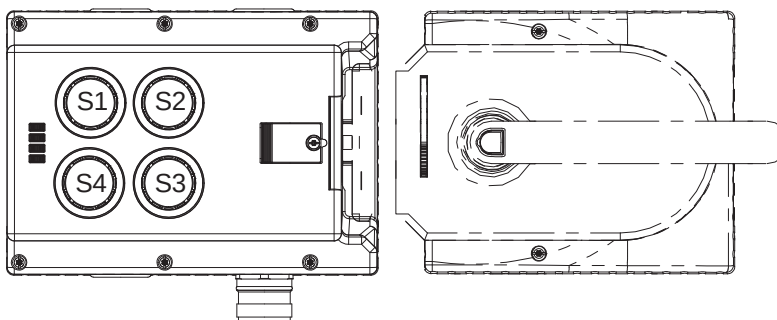


Figure 2 - Right Handle (for use on guard doors that are hinged on the right or slide from the right)

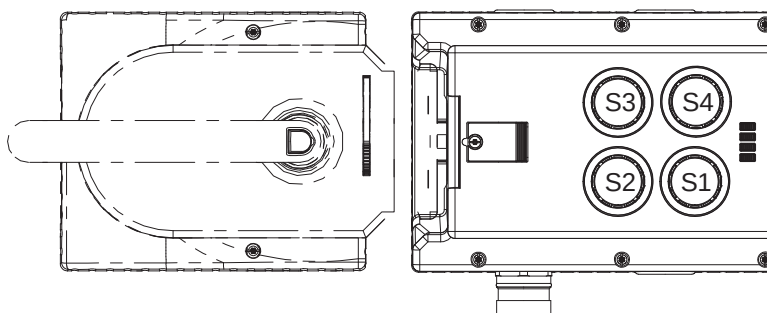


Figure 3 - Left handle (for use on guard doors that are hinged on the left or slide from the left)

Machine Layout	Cat. No.
Right-hand Guard Door (Figure 2)	442G-MABH-R
Left-hand Guard Door (Figure 3)	442G-MABH-L

Lock Module (one required per system)

Lock Type	Machine Layout	Cat. No.	
		Cable Entry (M20)	Connector (19-pin M23)
PTL	Right-hand Guard Door (Figure 2)	442G-MABL-UT-*	442G-MABL-URM-*
	Left-hand Guard Door (Figure 3)		442G-MABL-ULM-*
PTR	Right-hand Guard Door (Figure 2)	442G-MABR-UT-*	442G-MABR-URM-*
	Left-hand Guard Door (Figure 3)		442G-MABR-ULM-*

Replace * with Code:	Cover Controls and Indicators
C00	Blank Cover (No controls or indicators)
C01	One illuminated push button (S2)
C02	Two illuminated push buttons (S2,S3)

C03	E-stop (S1) and two illuminated push buttons (S2,S3)
C04	E-stop (S1) and three illuminated push buttons (S2, S3, S4)
C05	E-stop (S1)

IMPORTANT See [Figure 2](#) (right-hand guard door assembly) and [Figure 3](#) (left-hand guard door assembly) for the positions of the controls. Covers with push buttons are supplied with a colored lens kit, including one blue, green, red, and yellow, and two white.

Escape Release (optional)

Cat. No. 442G-MABE1

(The standard shaft (115 mm (4.53 in.)) is optimized for use on 40 mm and 45 mm profiles. An extended shaft (250 mm (9.85 in.)) is available (see Chapter 3, [Installation and Wiring on page 15](#) for instructions about mounting on smaller or larger profiles.

Accessories

Description	Cat. No.
Mounting Plate, Handle Assembly	442G-MABAMPH ¹
Mounting Plate, lock Module	442G-MABAMPL ²
Mounting Plate, Escape Release	442G-MABAMPE
Extended Shaft (250 mm (9.58 in.)) for Escape Release	442G-MABASHFT
Emergency Release Knob	442G-MABAKNOB

¹ Use only if the lock module is also mounted to a plate.

² Use only if the handle module is also mounted to a plate.

Mating Cordset

Description	Cat. No.
19-pin M23 cordset	889M-F19RM- ³

³ Add 2, 5, or 10 for cable length in meters.

Replacement Parts

Description	Cat. No.
Replacement Handle for Handle Assembly	442G-MABADH
Replacement Indicator Lens Covers	442G-MABALENS ⁴
Lock Module Replacement Cover, no controls	442G-MAB-C00
Lock Module Replacement Cover, one push button	442G-MAB-C01
Lock Module Replacement Cover, two push buttons	442G-MAB-C02
Lock Module Replacement Cover, E-stop, two push buttons	442G-MAB-C03
Lock Module Replacement Cover, E-stop, three push buttons	442G-MAB-C04
Lock Module Replacement Cover, E-stop	442GL-MAB-C05

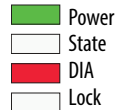
⁴ Includes one blue, green, red and yellow, and two white.

Notes:

Troubleshooting and Assistance

Status/Diagnostic LED Indicators During Troubleshooting

DIA LED Illuminated and State LED Not Illuminated



Fault: Internal fault.

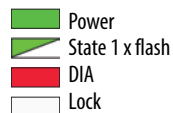
Possible causes:

- Data error
- Locking arm is blocked
- Internal component fault

Remedy:

1. Check whether the locking arm is blocked (possibly by the bolt of the handle assembly).
2. Switch off the voltage at all devices or press the reset button (if present) that controls ALL integrated reset inputs in the series connection.
3. Close the door.
4. Switch the voltage on again or release the reset button.
5. Wait until the State LED flashes at regular intervals.
The 442G-MAB is now ready for operation again.

DIA LED Illuminated and State LED Flashes One Time



Fault: Fault during handle configuration or invalid DIP switch position.

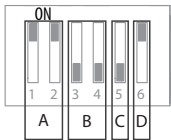
Possible causes:

- Invalid DIP switch position

Remedy:

1. Check the DIP switch setting. Configuration must be repeated if the setting is incorrect. Follow the instructions in “Changing Device Configuration” on [page 34](#).

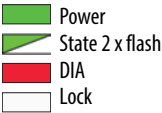
Function of the switches



Factory settings are shown.

Detail	Switch	Function ¹
A	1+2	On: Device is configured for standalone operation (factory setting) Off: Device is configured for series operation
B	3+4	On: Guard lock monitoring is deactivated Off: Guard lock monitoring is activated (factory setting)
C	5	On: DIP switch configuration enabled Off: DIP switch configuration inhibited (factory setting)
D	6	On: Release monitoring is activated (factory setting) Off: Release monitoring is deactivated

DIA LED Illuminated and State LED Flashes Two Times (standalone operation only)



Fault: Input error.

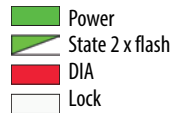
Possible causes:

- 24V DC missing at safety inputs FI1A and/or FI1B
- A safe control system with clocking outputs is connected to safety inputs FI1A and/or FI1B.

Remedy:

1. Check the wiring and correct it if necessary or switch to standalone mode.
2. Switch off the voltage or press the reset button (if present) that controls the integrated reset input.
3. Close the door(s).
4. Switch the voltage on again or release the reset button.
5. Wait until the State LED flashes at regular intervals.
The Access Box is now ready for operation again.

DIA LED Illuminated and State LED Flashes Two Times (series connection only)



Fault: Input error

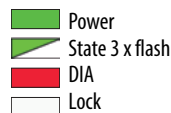
Possible causes:

- 24V DC missing at safety inputs FI1A and/or FI1B of the first Access Box.
- FI1A is connected with FO1B or FI1B is connected with FO1A.
- Conventional safety components (switching contacts) are connected to FI1A and/or FI1B.
- A safe control system with clocking outputs is connected.
- All connections are correct, but there is no common potential for the series-connected devices (several power supply units for one chain).
- An upstream unit is set as a standalone device.

Remedy:

1. Check the wiring and correct it or switch off the clock pulses or check the upstream devices for incorrect DIP switch configuration.
2. Switch off the voltage at all devices
or
press the reset button (if present) that controls ALL integrated reset inputs in the series connection
3. Close the door(s).
4. Switch the voltage on again
or
release the reset button
5. Wait until the State LED flashes at regular intervals.
The Access Box is now ready for operation again.

DIA LED Illuminated and State LED Flashes Three Times



Fault: Handle assembly read error (e.g. error in code/code not readable).

Possible causes:

- EMC interference, e.g. caused by clocked cables near the Access Box.
- Hardware fault in the handle assembly

- Different potentials at the fence and door, which causes compensating currents that could lead to this error message.

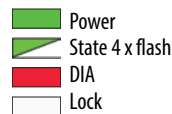
Remedy (in case of EMC interference or potential differences):

1. Check the area of use regarding increased EMC radiation or lack of grounding connections of the protective enclosure.
2. Switch off the voltage at all devices
or
press the reset button (if present) that controls ALL integrated reset inputs in the series connection.
3. Switch the voltage on again
or
release the reset button.
4. Wait until the State LED flashes at regular intervals.
The Access Box is now ready for operation again.

Remedy (in case of hardware fault in the handle assembly):

Replace the handle assembly and repeat the instructions for the handle configuration (see [Handle Configuration on page 15](#)). Tip: Close the guard door and activate guard locking to avoid interruptions during the handle configuration.

DIA LED Illuminated and State LED Flashes Four Times



Fault: Output fault.

Possible causes:

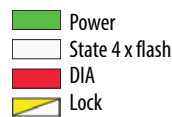
- The connected control system and the Access Box does not have a common reference potential (common ground).
- A ground loop is produced by bridges having been installed both on the Access Box and in the control cabinet.
- The internal output circuit is damaged.
- 24V DC or 0V is present at one of the two safety outputs during the switch-on process.
- A safe control system with clocking outputs is connected.

Remedy:

1. Check the wiring and correct it.

2. Switch off the voltage at all devices
or
press the reset button (if present) that controls ALL integrated reset inputs in the series connection.
3. Switch the voltage on again
or
release the reset button.
4. Wait until the State LED flashes at regular intervals.
5. The Access Boxes are now ready for operation again if no fault occurred in the internal output connection.

DIA LED Illuminated and Lock LED Flashes One Time



Fault: Signal sequence incorrect

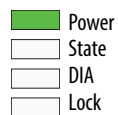
Possible causes:

- Bolt actuator broken.
- EMC interference.
- Hardware fault in the handle assembly
- Different potentials between fence and door.
- With active release monitoring, escape release or manual release was activated.

Remedy:

1. Open all safety doors on which the LED Lock is flashing (regardless of the number of flashing pulses) so that no passage is possible.
2. Switch off the voltage at all devices or press the reset button (if present) that controls the integrated reset inputs.
3. Switch the voltage on again or release the reset button.
4. Wait until the State indicator flashes at regular intervals.
5. Close the safety doors. If there is no internal fault, the Access Boxes are now ready for operation again.

DIA LED Not Illuminated and State LED Not Illuminated or Does Not Flash



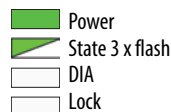
Possible causes:

- Handle configuration is complete.
- DIP switch five still set to “ON” (system configuration (series or standalone operation not fully completed)).

Remedy:

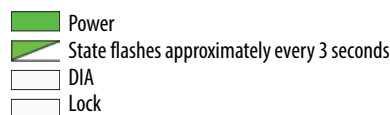
- When the handle configuration is complete, the operating voltage must then be switched off at the locking module for at least three seconds to activate the new code of the handle assembly in the locking module. As an alternative, 24V can be applied to the input RST for at least three seconds.
- Complete the device configuration (see [Change Device Configuration \(using DIP switches\) on page 34](#)) process (set DIP switch five to “OFF”). Restart the Access Box.

DIA LED Not Illuminated and State LED Flashes Three Times



The device indicates that it is ready to learn a new handle assembly. This state will continue for three minutes after power-up with the door open.

DIA LED Not Illuminated and State LED Flashes Approximately Every Three Seconds



The device displays normal operation with the door open. If this display also occurs with the door close, the handle module has already been taught in and is being blocked on this Access Box.

Remedy:

Repeat handle configuration with a new handle assembly (see [Handle Configuration on page 15](#)).

TIP Close the door and activate guard locking to avoid interruptions during configuration.

Close the door and activate guard locking to avoid interruptions during configuration.

Individual Flickering Input LED on the Evaluation Unit

Even when the Access Box is switched off, it emits a pulse sequence at output FO1A to verify the functional capability of the output circuit at all times. So, a faintly flickering LED can be seen on an input of an evaluation unit even though the evaluation unit does not switch on or signal any fault.

Notes:

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

Documentation Feedback

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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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