

Connection of MGB-L1B-EI... to Allen Bradley ControlLogix



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Guard locking spring applied – power on released according to EN ISO 14119 (closed-circuit current principle)

Safety function

Guard locking according to EN ISO 14119

Reliability figures according to EN ISO 13849 Category 4, PL e

Components/modules used

EUCHNER

Description	Order no./ item designation Set	Order no./ item designation Evaluation unit
Safety system MGB with Ethernet/IP interface, Interlocking device with guard locking	126636 / MGB-L1HB-EIA-R-126636 126638 / MGB-L1HB-EIA-L-126638	126635 / MGB-L1B-EIA-R-126635 126637 / MGB-L1B-EIA-L-126637

Tip: More information and downloads about the above mentioned EUCHNER products can be found at www.EUCHNER.de. Simply enter the order number into the search field.

Other

Description	Items
Allen Bradley ControlLogix 4 Slots Chassis	Mat No PN-240518
Allen Bradley Logix 5576S Automation Controller 8M/4M	Mat No PN-98688
Allen Bradley Logix L7SP SIL3 PLe Safety Partner	Mat No PN-98690
Allen Bradley 2-PORT CLX HI-CAP ENET/IP MODULE – TP	Mat No. 184724

Hint: The device can be used with controls type RSLogix5000 from Version 20. (Firmware 20.011).

Software



Figure 1

Functional description

General

MGB-L1B-EI... is an interlocking device with integrated guard locking according to EN ISO 14119 working with closed-circuit current principle. In this example all safety functions are handled with CIP-safety protocol. The MGB is connected to a CPU from Allen Bradley ControlLogix.

Inputs	Bit							
	7	6	5	4	3	2	1	0
Byte 0 = Connection Header	-	-	-	-	-	Diagnostic Active	Connection Faulted	RunMode
Byte 1 = Connection Header	DiagnosticSequenceCount							
Byte 2 = Connection Header	-	-	-	-	-	-	-	-
Byte 3 = Connection Header	-	-	-	-	-	-	-	-
Byte 4 = Failsafe Inputs 0	FI.MS2	FI.MS1	FI.MS0	-	-	-	FI.EN	FI.ES
Byte 5 = Failsafe Inputs 1	FI.UK	FI.SK	-	-	-	FI.L	FI.B	FI.D
Byte 6 = Inputs 0	-	-	S92.2	S92.1	S91.2	S91.1	S90.2	S90.1
Byte 7 = Inputs 1	-	-	S95.2	S95.1	S94.2	S94.1	S93.2	S93.1
Byte 8 = Inputs 2	S4.2	S4.1	S3.2	S3.1	S2.2	S2.1	S1.2	S1.1
Byte 9 = Diagnostics	D.LT	-	D.OL	D.MS	D.EN	D.ES	D.PF	-
Bytes 10,11	FaultCode							

Outputs	Bit							
	7	6	5	4	3	2	1	0
Byte 0 = Failsafe Outputs 0	-	-	-	-	-	-	-	FO.L
Byte 1 = Outputs 0	-	-	H95	H94	H93	H92	H91	H90
Byte 2 = Outputs 1	-	-	-	-	H4	H3	H2	H1
Byte 3 = Control X6 and Ack	Q.FP	Q.G	-	-	-	-	-	-

Figure 2

Data structure

Figure 2 shows the general data structure. Only those bits are used which are described in the corresponding data sheet of the respective MGB. E.g. an MGB without connector for an enabling device will never set bit FI.EN, which is reserved for the use of enabling devices. This bit will always be 0.

Descriptions of all bits are to be found in the operation manual.

Important: With MGB-EI all data are sent exclusively as safe data with CIP-Safety. This does not mean that all bits are fulfilling any requirement for SIL or PL. Only those bits starting with FO or FI are safety relevant.

This application is based on the operation manual of MGB-L..B-EI... (Ethernet/IP) with data structure A. For technical details please refer to the according operation manual.

Tip: More information and downloads about the above mentioned EUCHNER products can be found at www.EUCHNER.de. Simply enter the order number into the search field.

Mounting

Please obtain correct mounting as described in the operation manual.

Integrating to Ethernet/IP and CIP-Safety

Important: Parameters „Request Packet Interval“ and „Connection Reaction Time Limit“ are relevant and influence the reaction time of the safety function. Increasing reaction time possibly may lead to a loss of a safety function, and should always be considered.

Hint: The following screenshots are made with software Studio5000 Version 24.0. Maybe presentation with RSLogix5000 or other versions of Studio5000 could vary from this.

Tip: The complete project AP000223.ACD is available for download on the homepage of EUCHNER under „Service →Downloads→Software“. You can copy the MGB from this project. Afterwards it can be pasted into a new project or a n existing project. Thus only name and IP-address have to be adjusted accordingly. All parameters are set correctly.

Please follow the steps below for integrating the MGB-system:

1. Define network (Gateway)

If the MGB is connected with a different subnet than the control a gateway address in MGB must be set. A description how to set a gateway address is to be found in application AP000228.

2. Assign IP-Address

Use service routine BOOTP/DHCP-Server. Observe setting of DIP-switches at MGB! See chapter 11. of the operation manual „Controls and Indicators “.

Adjust the DHCP Server so that the MGB is assigned a valid IP-Address or put MGB to a fixed IP-address in the same network of the control. The MAC-Address of the MGB can be found on the side of the MGB.

3. Create new project in RSLogix5000 and add “new module” to I/O Configuration-Path.

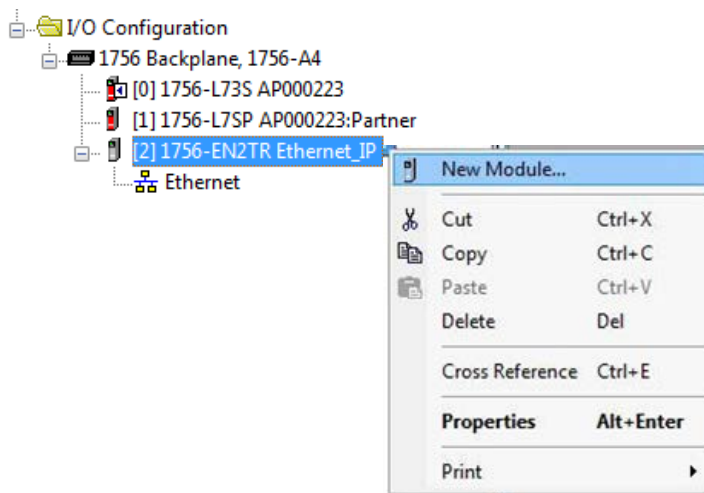


Figure 3

Open dialogue window for inserting of a new module.

3. Choose “Generic EtherNet/IP Safety Module”

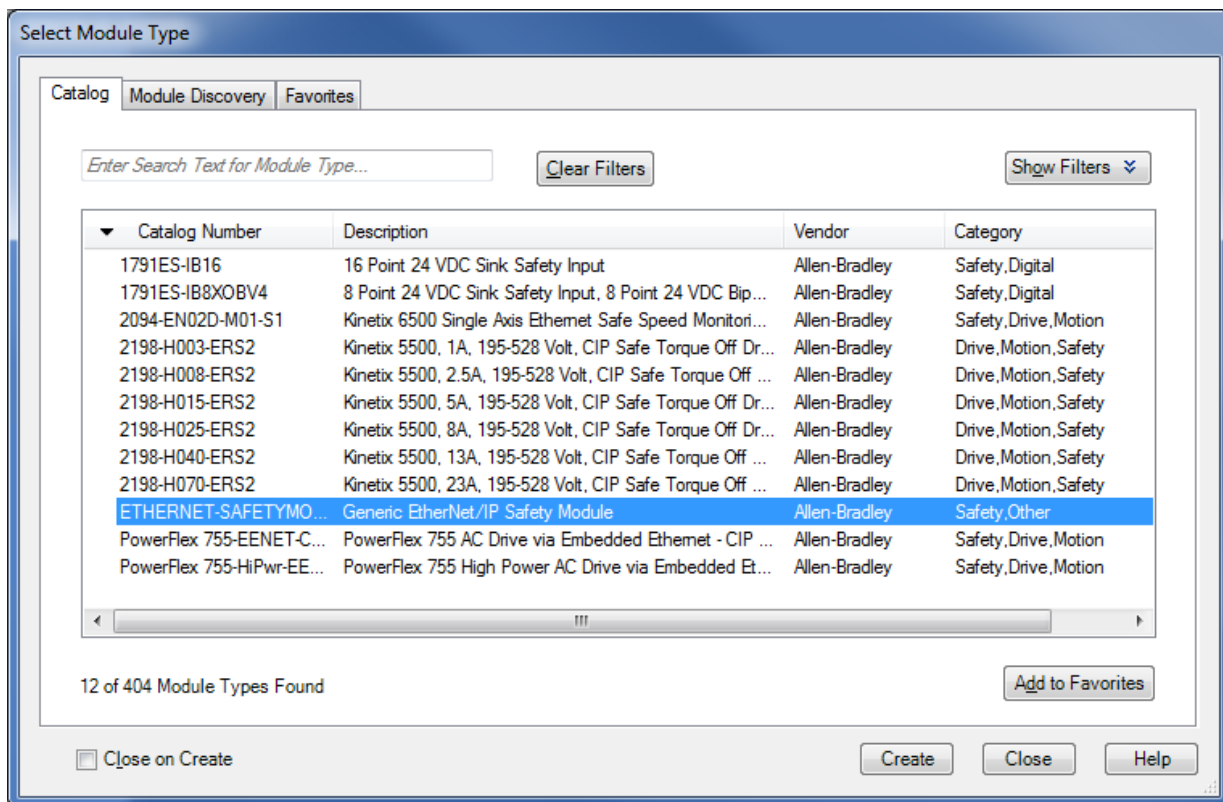


Figure 4

Create Generic Ethernet/IP Safety Module as new subscriber at Ethernet.

4. Adjusting parameters for MGB

General:

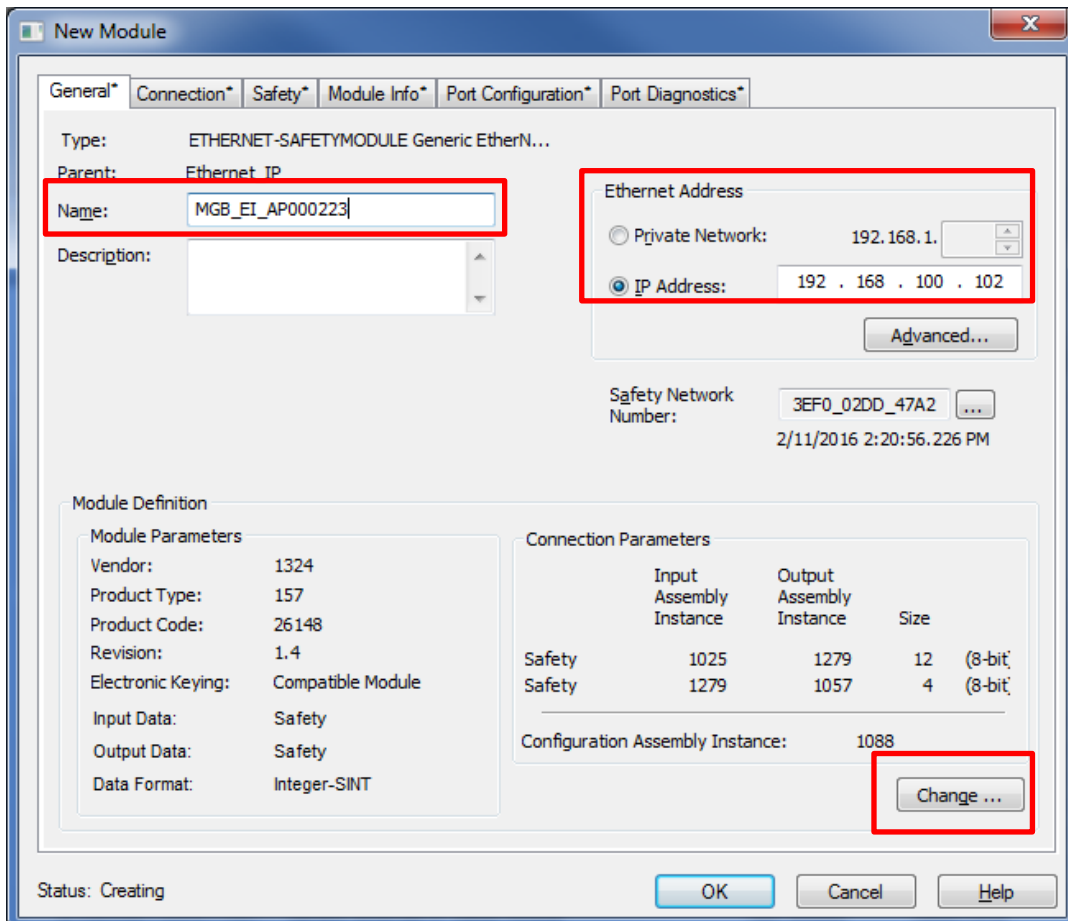


Figure 5

- Give a valid name to MGB.
- Give the same IP-address of step 1 to the MGB.
- Change module definition according to the following steps.

4 a) Module Definition: Module

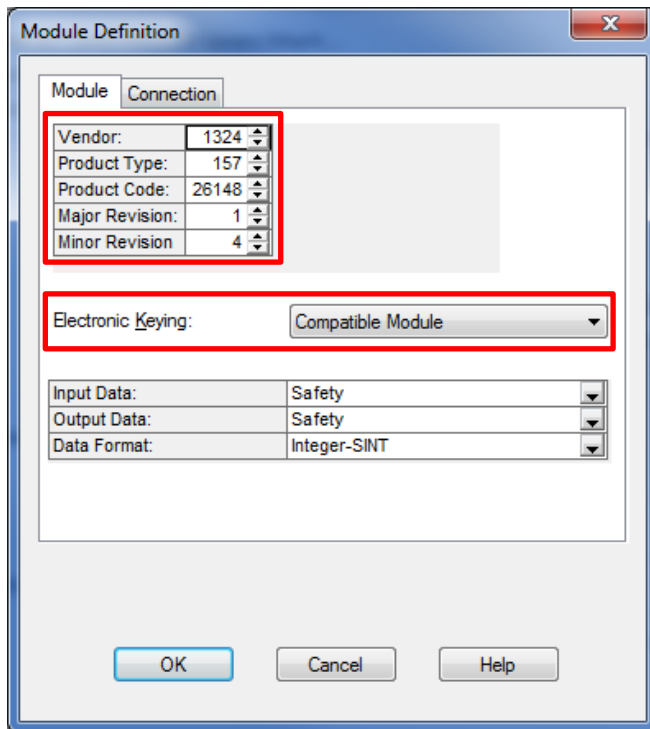


Figure 6

Vendor:	1324	EUCHNER GmbH + Co. KG
Product Type:	157	Guard Locking w. Access Control
Product Code:	See Type label	
Major Revision:	See Type label	First figure of version no.
Minor Revision:	See Type label	Last figure of version no.
Electronic Keying:	Compatible Mode	If needed also Exact Match can be chosen

Tip: These parameters can be found with RSLinx in properties of MGB.

4 b) Module Definition: Connection

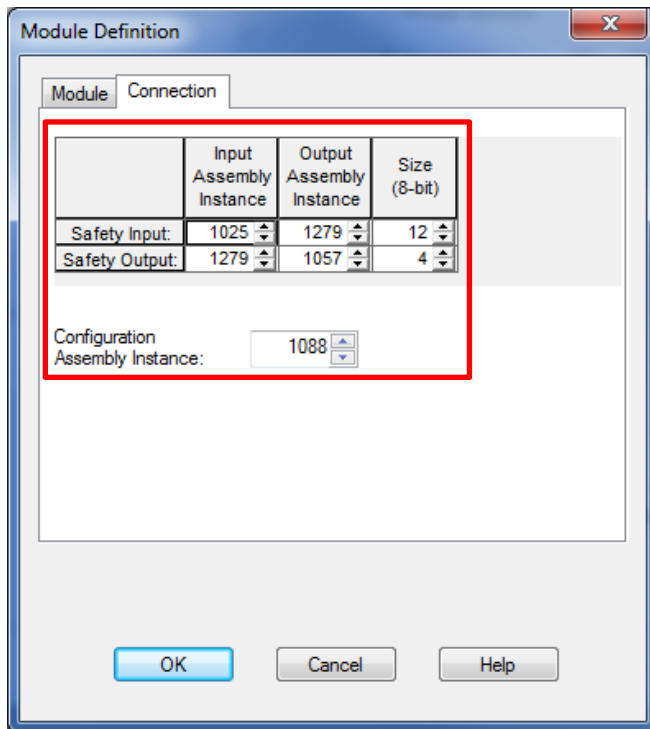


Figure 7

Input Assembly Instance	Safety Input	1025
	Safety Output	1279
Output Assembly Instance	Safety Input	1279
	Safety Output	1057
Size (8-Bit)	Safety Input	12
	Safety Output	4
Configuration Assembly Instance		1088

Safety:

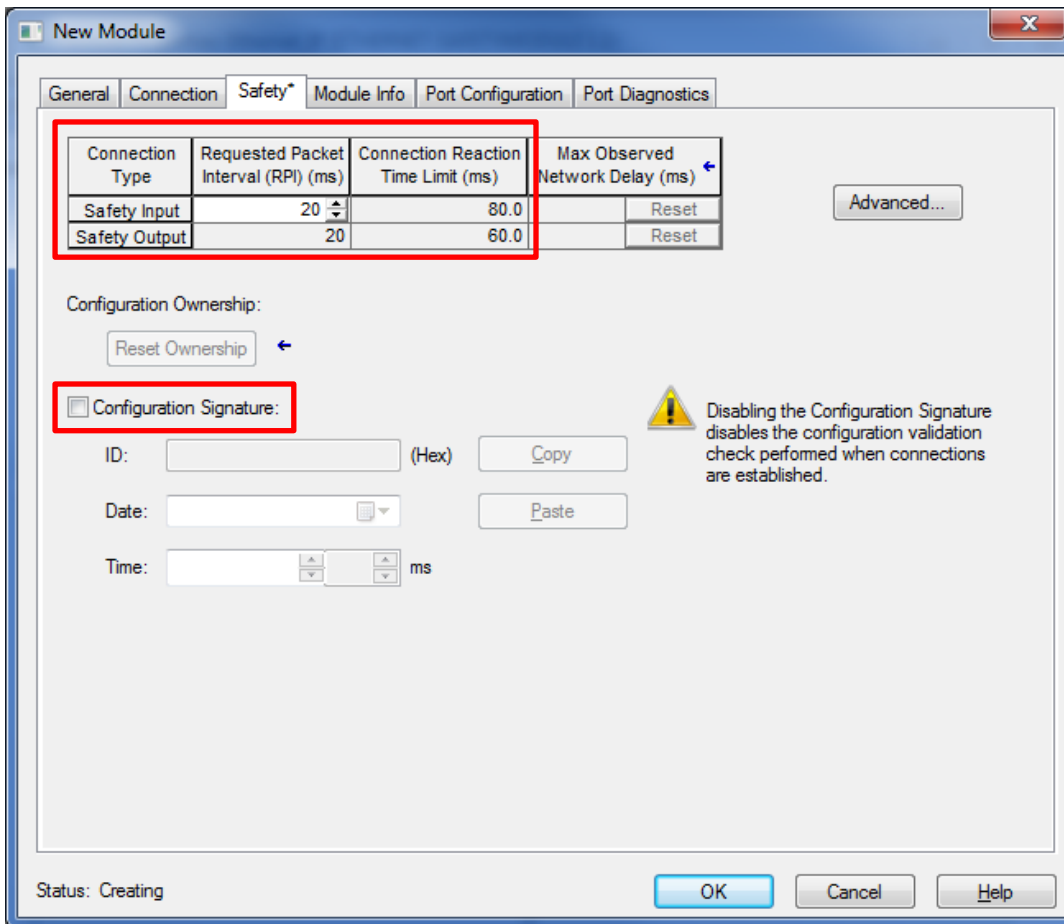


Figure 8

Requested Packet Interval (RPI) (ms)	Safety Input	20
	Safety Output	20
Connection Reaction Time Limit (ms)	Safety Input	80.0
	Safety Output	60.0

Disable configuration signature (MGB does not contain configuration data)

5. Programming of MGB

With an automatically created controller tag with the same name as the MGB access to the data of the MGB is realized.

[-] MGB_EI_AP000223:I	{ ... }	{ ... }		AB:ETHERNET_...	Safety
[-] MGB_EI_AP000223:I.RunMode	1		Decimal	BOOL	Safety
[-] MGB_EI_AP000223:I.ConnectionFa...	0		Decimal	BOOL	Safety
[-] MGB_EI_AP000223:I.Data	{ ... }	{ ... }	Decimal	SINT[12]	Safety
[+] MGB_EI_AP000223:I.Data[0]	1		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[1]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[2]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[3]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[4]	1		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[5]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[6]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[7]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[8]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[9]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[10]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:I.Data[11]	0		Decimal	SINT	Safety
[-] MGB_EI_AP000223:O	{ ... }	{ ... }		AB:ETHERNET_...	Safety
[-] MGB_EI_AP000223:O.Data	{ ... }	{ ... }	Decimal	SINT[4]	Safety
[+] MGB_EI_AP000223:O.Data[0]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:O.Data[1]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:O.Data[2]	0		Decimal	SINT	Safety
[+] MGB_EI_AP000223:O.Data[3]	0		Decimal	SINT	Safety

Figure 9

Program of the safe inputs and outputs within a safety program is now possible.

Tip: In application AP000224 is a description of an AOI, which can be downloading from the internet. With this AOI naming like in the operation manual is assigned to all input and output-bits for an easier access. Additionally standard outputs will be available in the standard task.

6. Download of configuration and programs

Switch online to the controller and download the complete project to the controller.

7. Setting of Safety Network Number

Open properties of MGB again.

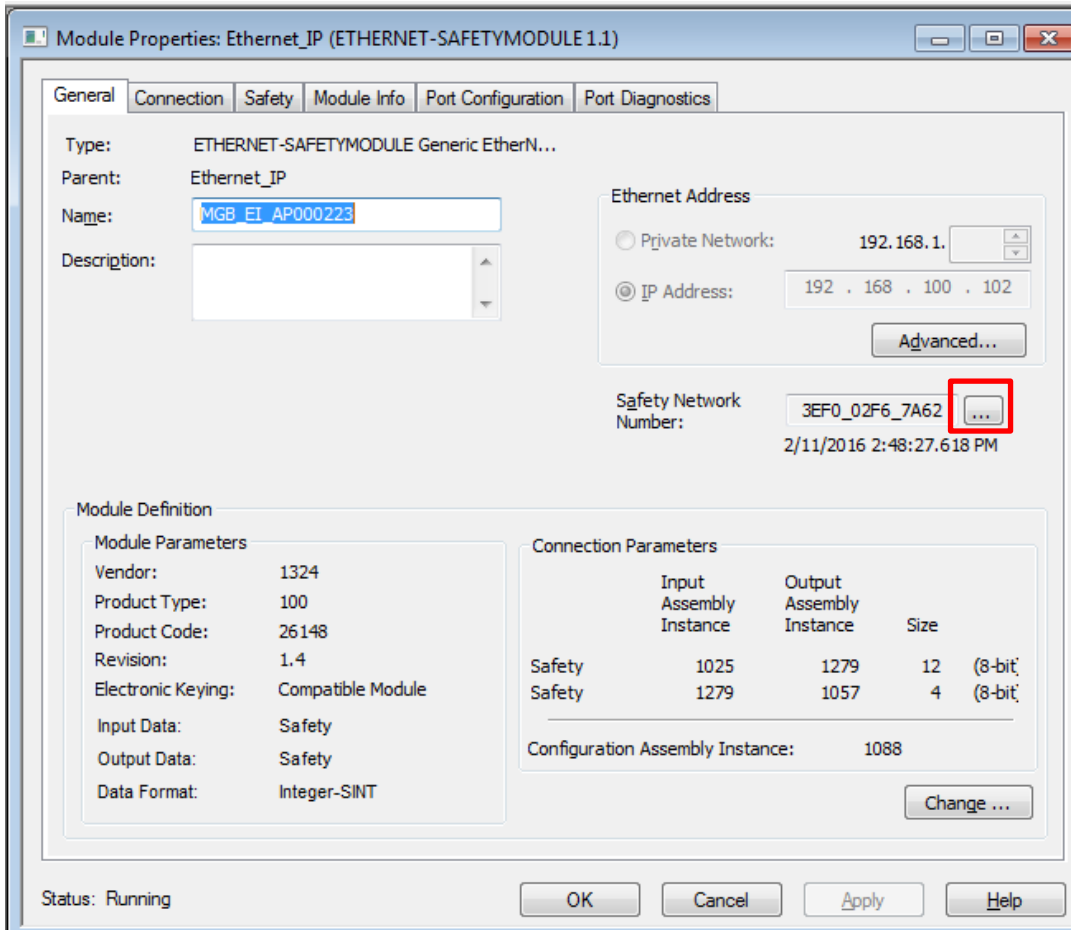


Figure 10

Set Safety Network Number.

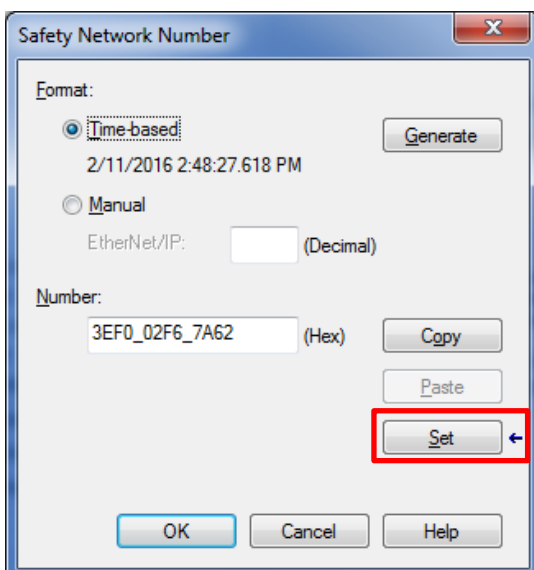


Figure 11

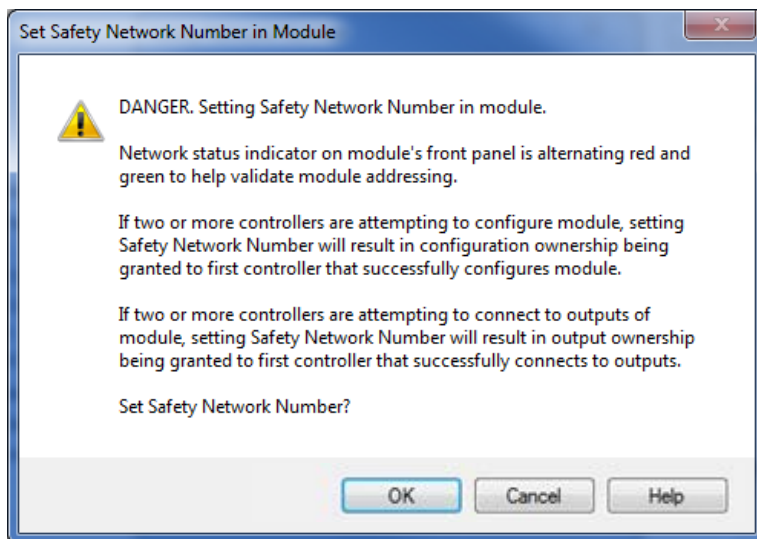


Figure 12

With this step the control takes ownership of the MGB.

If there are some problems in setting of Safety Network Number follow this:

- Check whether all parameters are set correctly
- Sometimes “Electronic Keying” in figure 6 have to be set to “Exact Match” instead of “Compatible Module”
- If the MGB has already been used possibly a Safety Network Number is already stored in MGB. Then a reset like described in the following has to be made.

Resetting of MGB

If the setting of the Safety Network Number does not work properly or if the MGB indicates an error on LED MOD, try resetting the MGB.

1. Inhibit Connection

Before resetting of ownership all connections to MGB have to be inhibited. For this purpose mark the checkbox “Inhibit Connection”. Send these changes by using the button “Apply”.

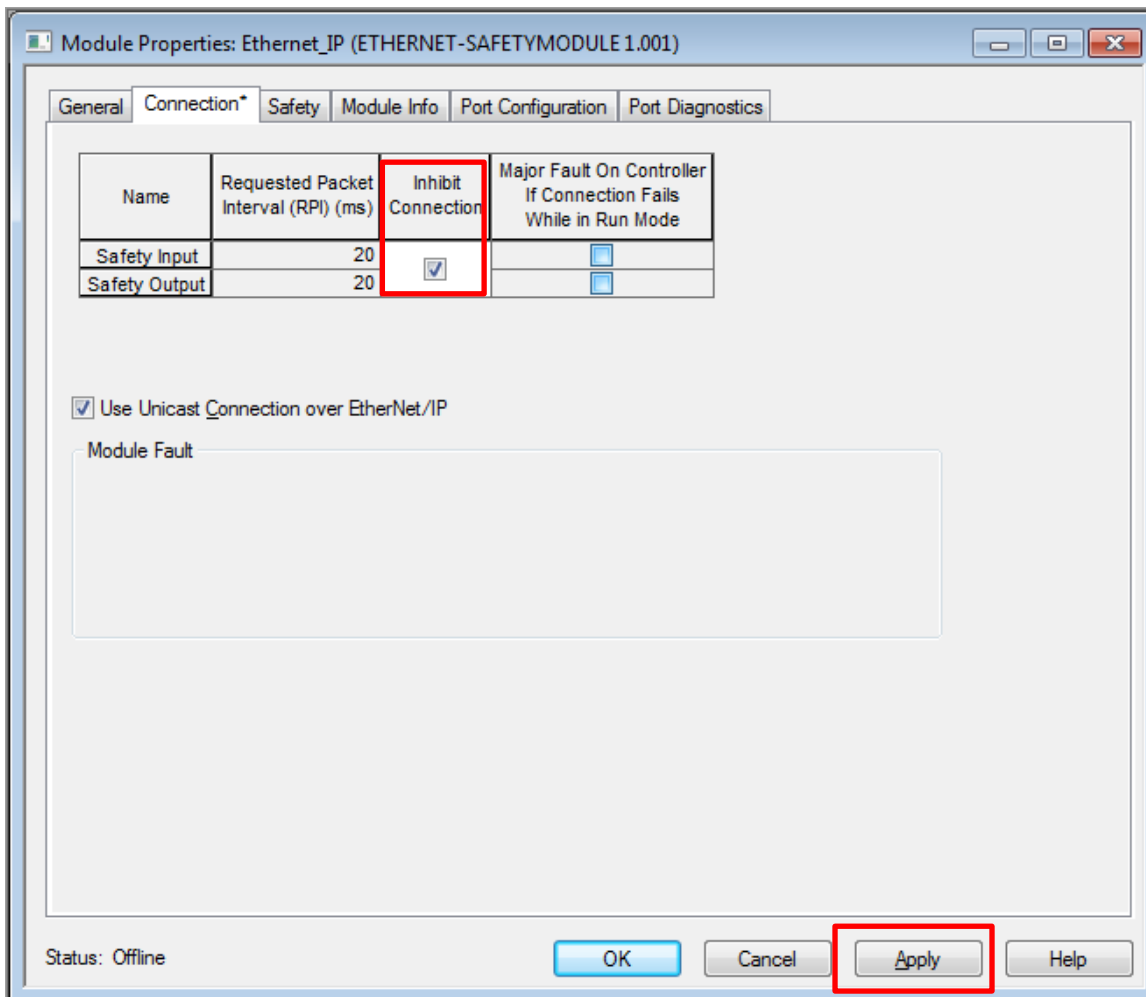


Figure 13

Confirm the next window with “Yes”.

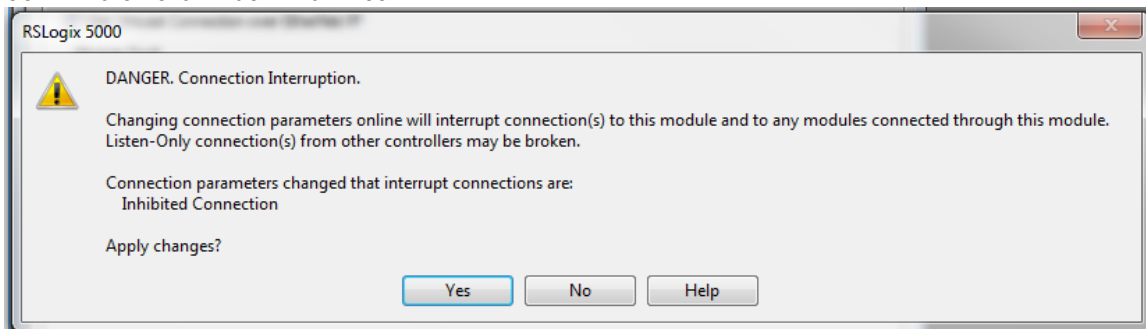


Figure 14

2. Reset Ownership of MGB

Click to „Reset Ownership” button in the tab “Safety” of the MGB Properties Window.

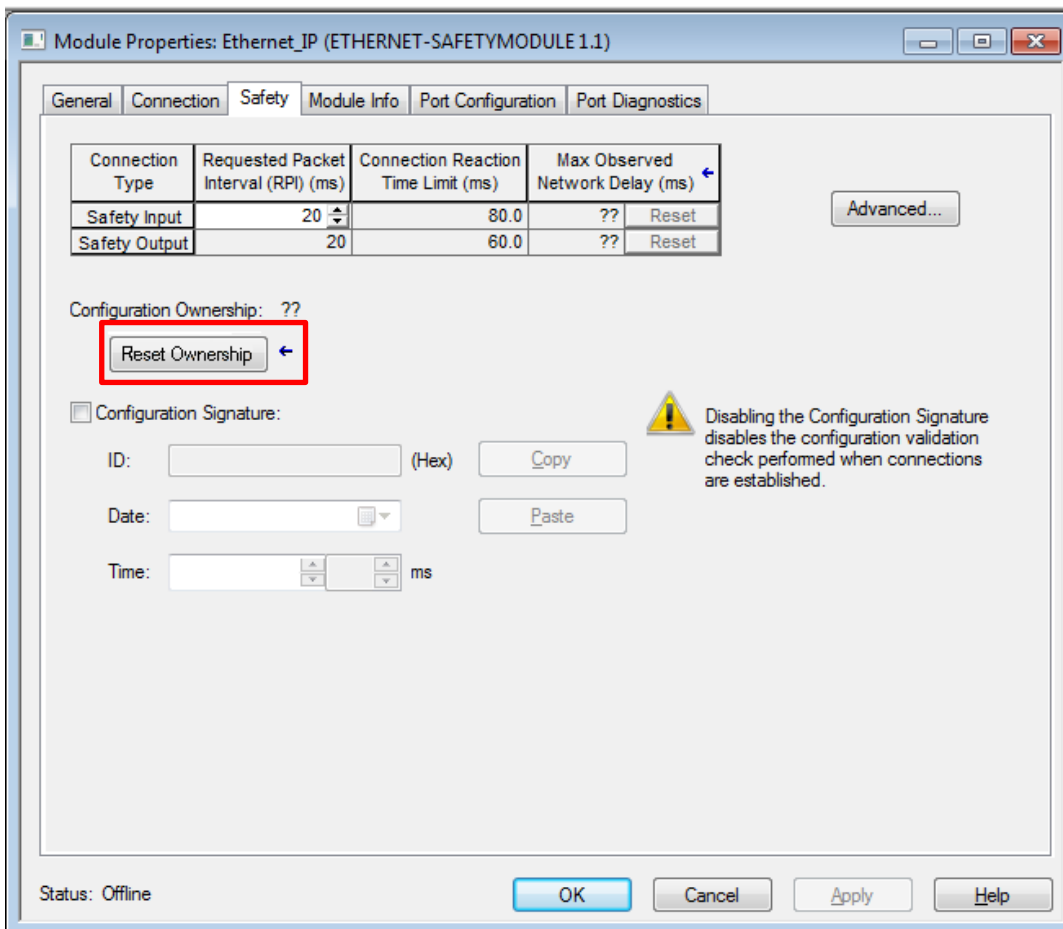


Figure 15

Confirm the next window with “Yes”.

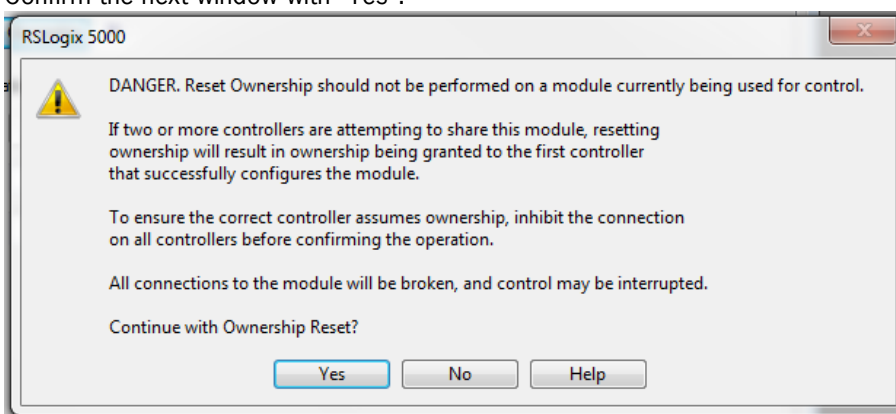


Figure 16

The Reset procedure will last several seconds.

3. Re-establish of connection

Release now the checkbox "Inhibit Connection" in tab "Connection". Afterwards apply changes by clicking to "Apply".

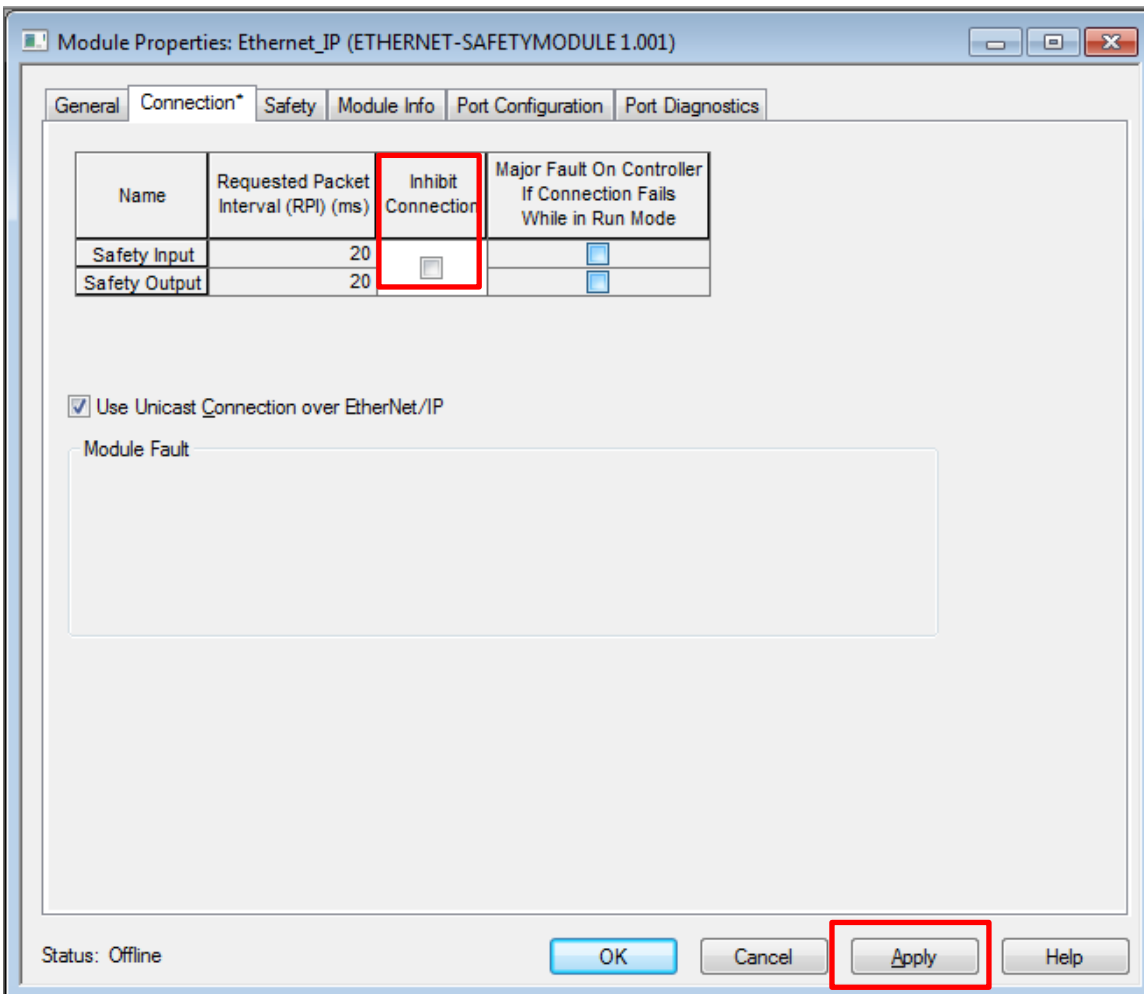


Figure 17

Confirm the next window with "Yes".

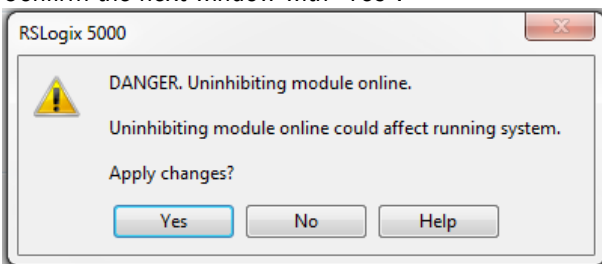


Figure 18

Important note – please observe carefully!

This document is intended for a design engineer who possesses the requisite knowledge in safety engineering and knows the applicable standards, e.g. through training for qualification as a safety engineer. Only with the appropriate qualification is it possible to integrate the introduced example into a complete safety chain.

The example represents only part of a complete safety chain and does not fulfill any safety function on its own. In order to fulfill a safety function, the energy switch-off function for the hazard location and the software within the safety evaluation must also be considered, for example.

The introduced applications are only examples for solving certain safety tasks for protecting safety doors. The examples cannot be comprehensive due to the application-dependent and individual protection goals within a machine/installation.

If questions concerning this example remain open, please contact us directly.

In accordance with Machinery Directive 2006/42/EC, the design engineer of a machine or installation is obligated to perform a risk assessment and take measures to reduce the risk. When doing this, the engineer must comply with the applicable national and international standards. Standards generally represent the current state of the art. Therefore, the design engineer should continuously inform himself about changes in the standards and adapt his considerations to them. Relevant standards include EN ISO 13849 and EN 62061. This application must be regarded only as assistance for the considerations about safety measures.

The design engineer of a machine/installation is obligated to assess the safety technology itself. The examples must not be used for assessment, because only a small excerpt of a complete safety function was considered in terms of safety engineering here.

In order to be able to use the safety switch applications correctly on safety doors, it is indispensable to observe the standards EN ISO 13849-1, EN ISO 14119 and all relevant C-standards for the respective machine type. Under no circumstances does this document replace the engineer's own risk assessment, and it cannot serve as the basis for a fault assessment.

Particularly in case of fault exclusion, it must be noted that this can be performed only by the design engineer of a machine or installation and requires a reason. General fault exclusion is not possible. More information about fault exclusion can be found in EN ISO 13849-2.

Changes to products or within assemblies from third-party suppliers used in this example can lead to the function no longer being ensured or the safety assessment having to be adapted. In any event, the information in the operating instructions on the part of EUCHNER, as well as on the part of third-party suppliers, must be used as the basis before this application is integrated into an overall safety function. If contradictions should arise between the operating instructions and this document, please contact us directly.

Use of brand names and company names

All brand names and company names stated are the property of the related manufacturer. They are used only for the clear identification of compatible peripheral devices and operating environments in relation to our products.