AOI for MGB-L1B-EI... on Allen Bradley ControlLogix

Contents

Guard locking according to EN ISO 14119 spring force to lock, power to release (closed-circuit current principle)

Safety function	Guard locking for personnel protection 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, guard locking with guard lock monitoring	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 aforementioned EUCHNER products can be found at www. EUCHNER.com. Simply enter the order number in the search box.

Others

Description	Item
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

Notice: The device can be operated on control systems of the type RSLogix5000 from version 20. (Firmware 20.011).

Software

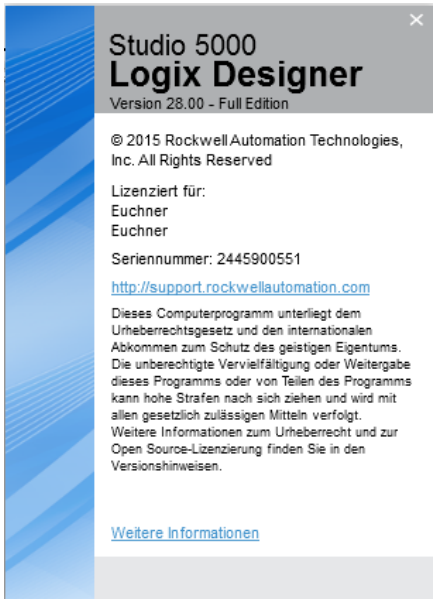

Figure 1

Functional description

General

The MGB-L1B-EI…is guard locking in accordance with EN ISO 14119 according to the closed-circuit current principle. In this example all safety functions are processed via the CIP Safety protocol. The MGB is connected to an Allen Bradley ControlLogix CPU.

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. For the respective MGB selected, only the bits described in the related data sheet are used. For example, on an MGB without connection for an enabling switch, bit FI.EN is always 0.

A description of the individual bits of the data structure is given in the operating instructions.

Important: In the MGB Ethernet/IP all data are only transmitted via CIP Safety in the safety area. This does not mean the data all have a PL or SIL in safety-related terms. Only the data that start with FI or FO are subject to safety-related assessment.

This application is based on the operating instructions for the MGB-L..B-EI- (Ethernet/IP) with data structure type A. The technical details are available in the operating instructions.

Tip: The operating instructions are available at www.EUCHNER.com. Simply enter the order number for the device in the search box.

Mounting

Please ensure the device is mounted correctly as described in the operating instructions.

Installing the EDS file

The EDS file is saved in the MGB and can be downloaded. The EDS file does not contain any information on the operation of the MGB.

Setting up the EUCHNER MGB with Ethernet/IP

Setup via a "Generic Safety Device" is described in application 000223. Use this application before you install the AOI.

Using the EUCHNER AOI

An Add-On-Instruction (AOI) is available from Euchner in the internet at "Service →Downloads→Software". Prior to use, download the file AOI_MGB_Vx.xx.L5X (x.xx stands for the version of the AOI).
On the usage of the new command AOI_MGB, the safe information is separated from the standard information and the identifiers for the individual bits from the related MGB assigned. The command must be used for each MGB that is used in the system.

1. Importing the AOI

Go offline with Studio5000. Right-click the Add-On Instructions folder in the Controller Organizer window to obtain the following screen.

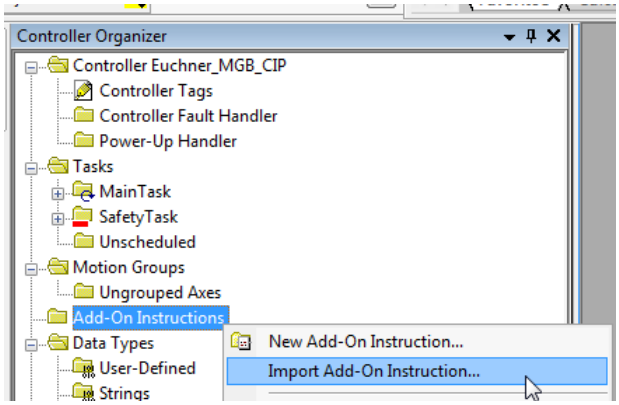

Figure 3

Now import the new AOI from the folder in which you have saved the downloaded file.
Studio5000 now imports all the necessary information and displays it. Please accept using OK.

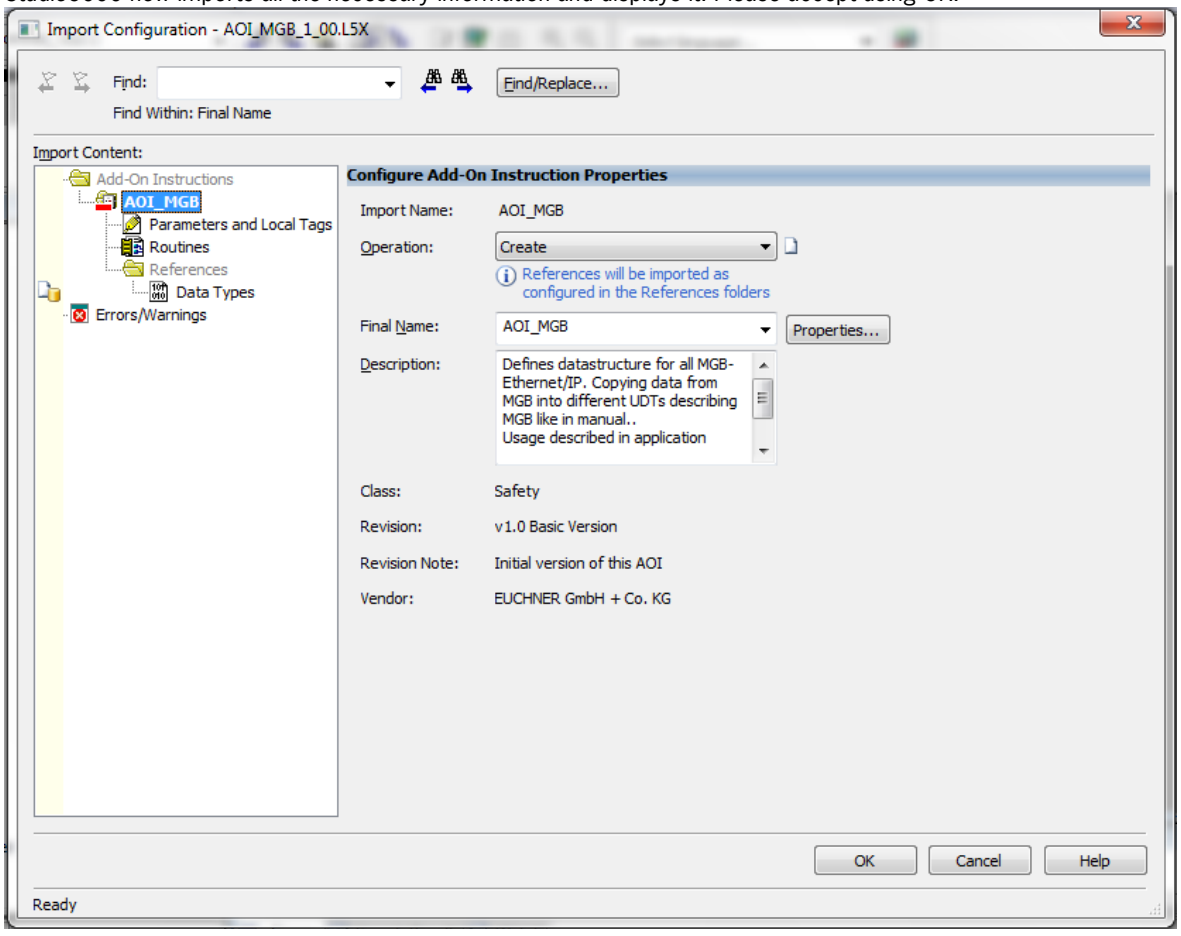

Figure 4

After the import you will see the new AOI_MGB command in the Add-On Instructions folder as well as the new data types for the MGB in the Data Types folder, User-Defined sub-folder

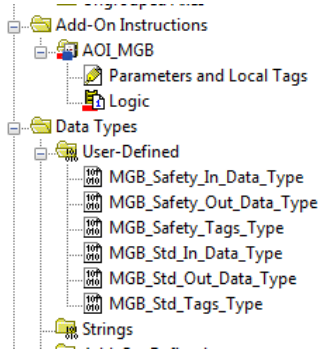

Figure 5

2. Adding the AOI_MGB command in the safety program

Now prepare a new rung on the ladder diagram in the safety task

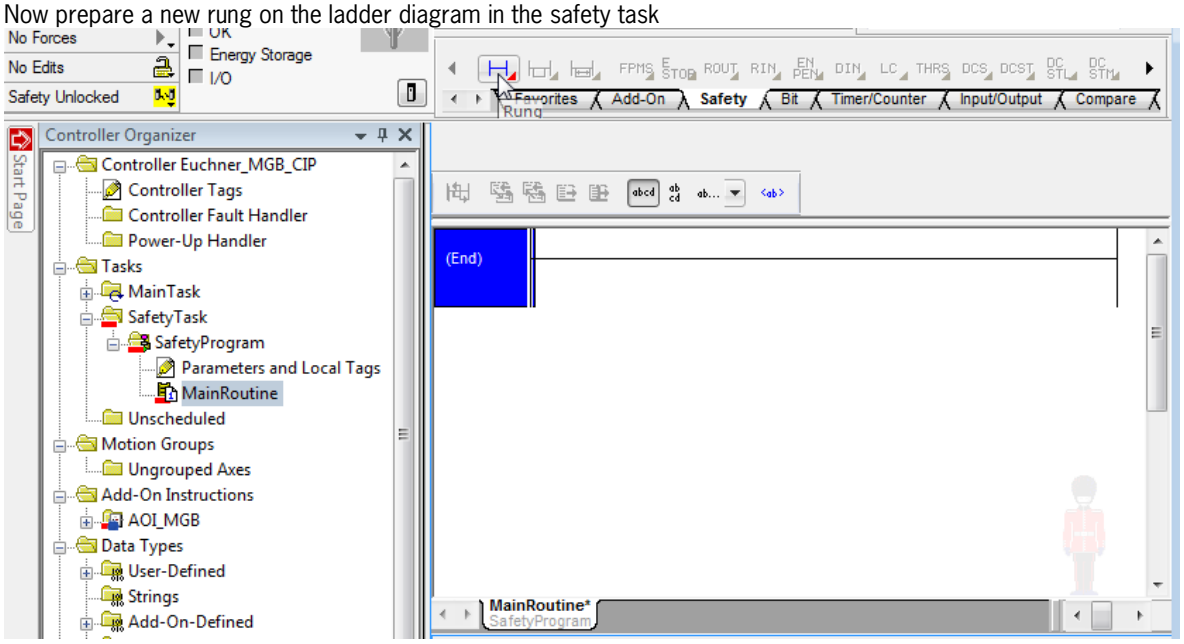

Figure 6

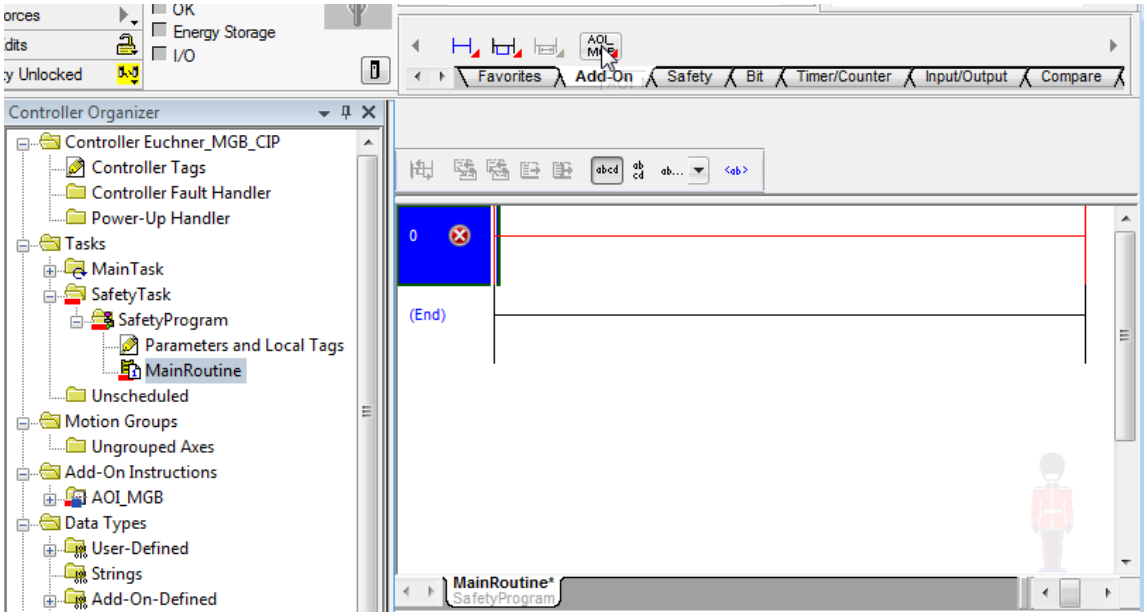

Figure 7

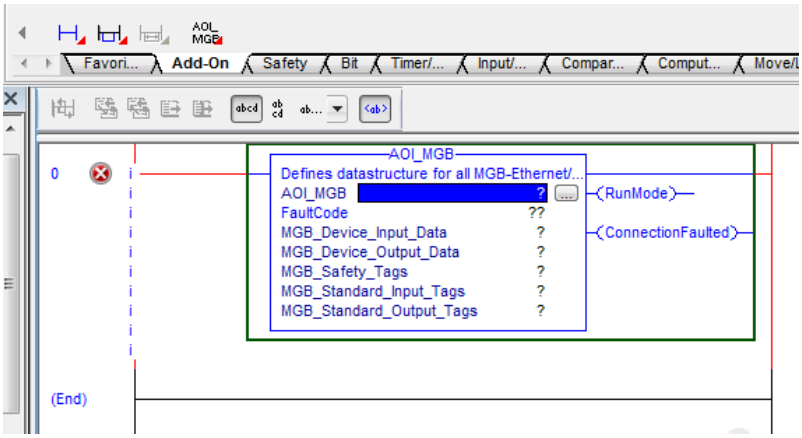

Figure 8

3. *Creating the control tag for the AOI_MGB command*

The tag for the command must be created (for example using right mouse button and "New Tag").

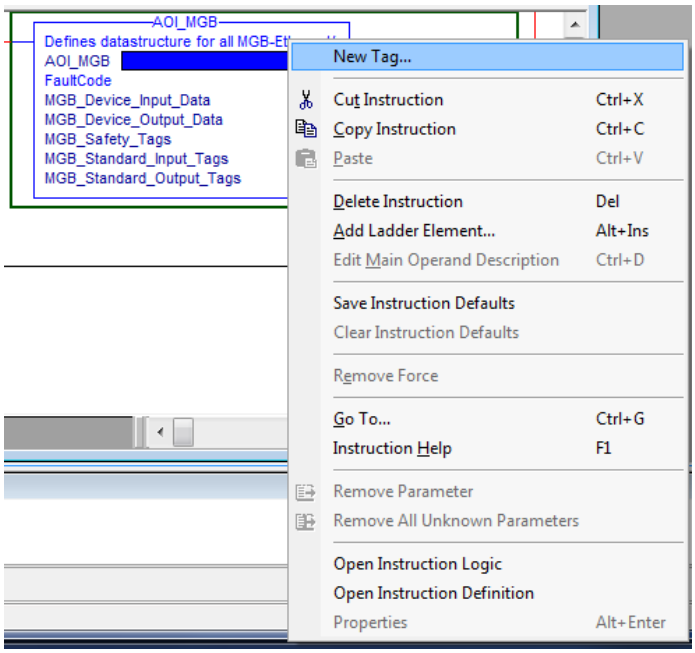

Figure 9

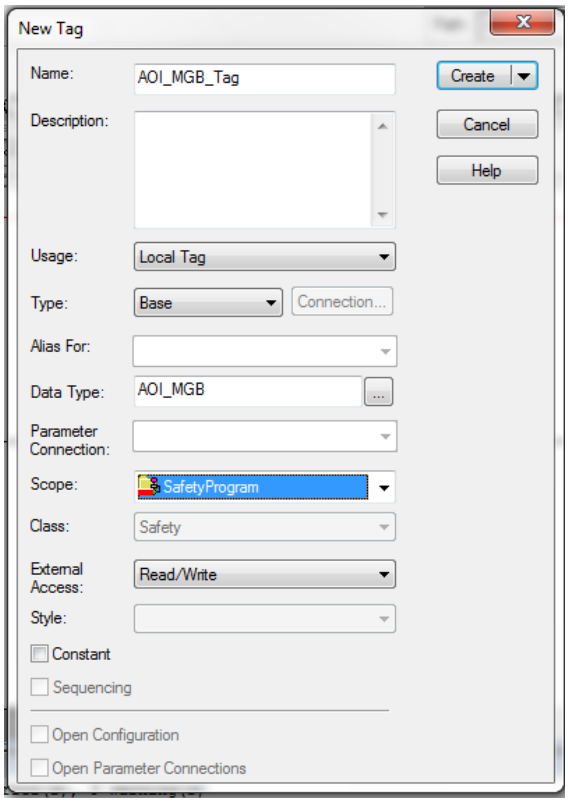

Figure 10

4. Linking the AOI_MGB command to the MGB

Once the tag has been created, the inputs and outputs on the MGB used must be linked in the MGB_Device_Input_Data field and in the MGB_Device_Output_Data field. For this purpose select the identifier for the MGB to which the command is to be linked (here the identifier from the application AP000223.)

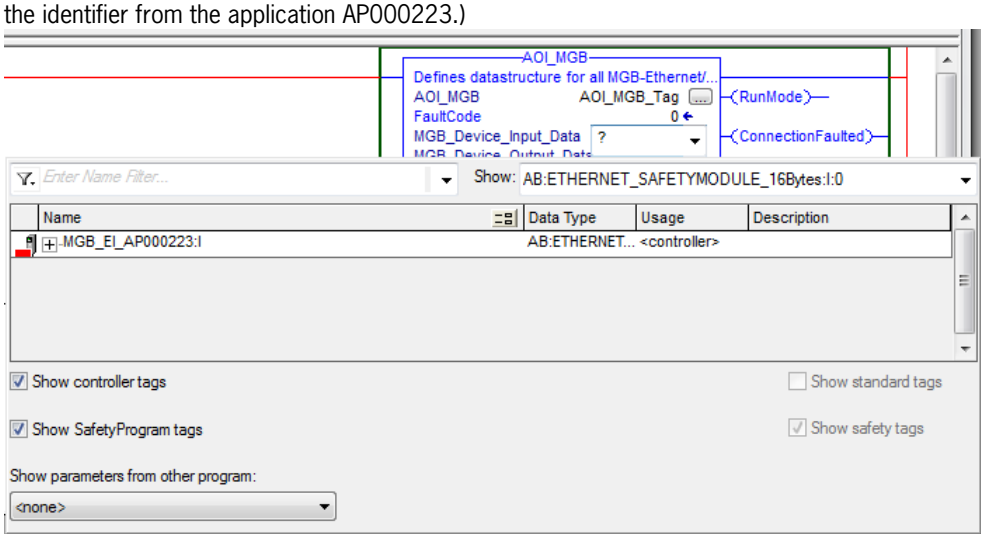

Figure 11

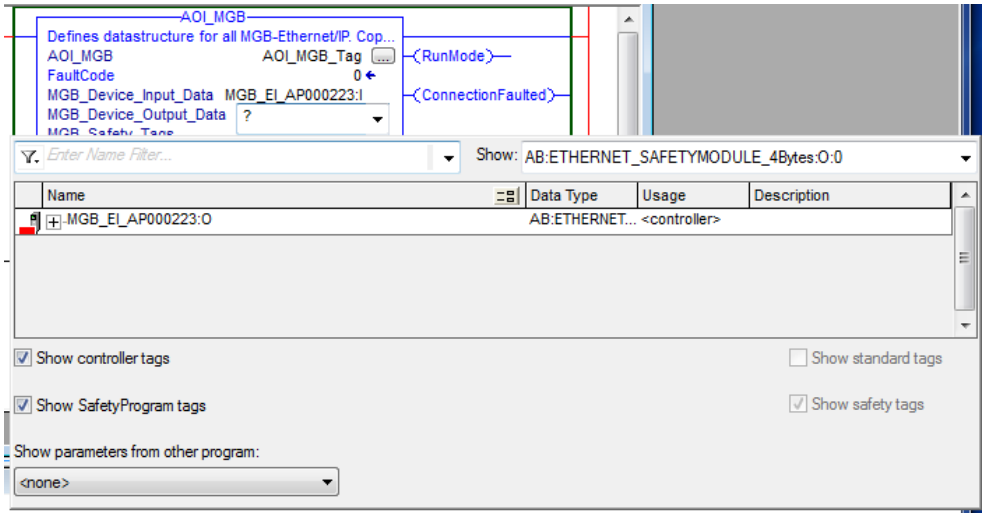

Figure 12

5. *Creating the tags for the safety task*

Create a new tag for the standard program as well as a new tag for the safety program.

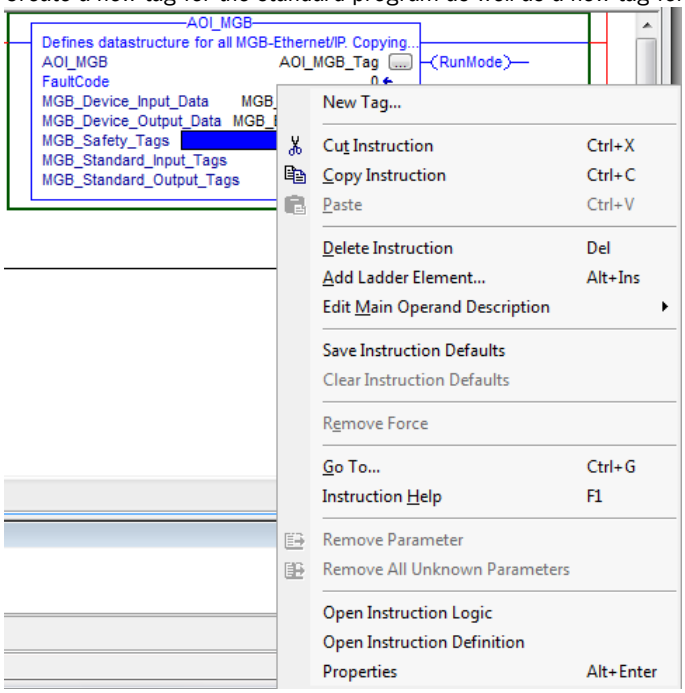

Figure 13

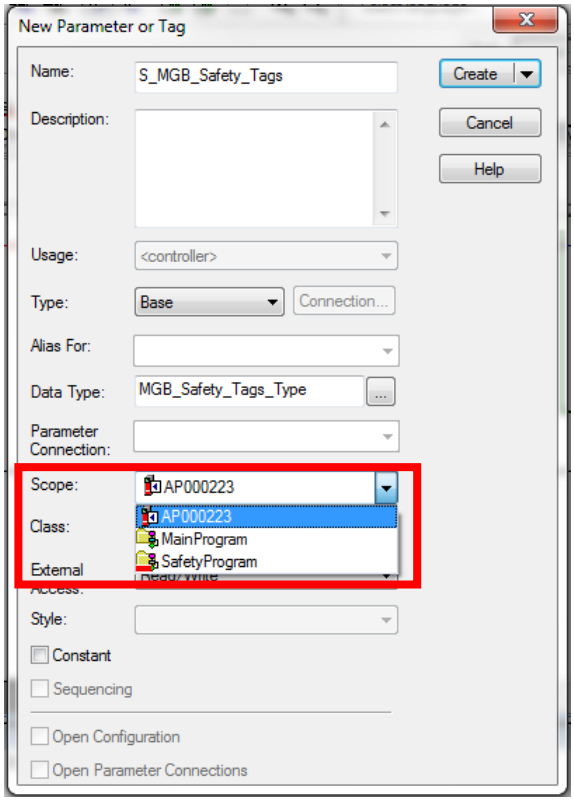

Figure 14

Now create the standard tags for input and output.

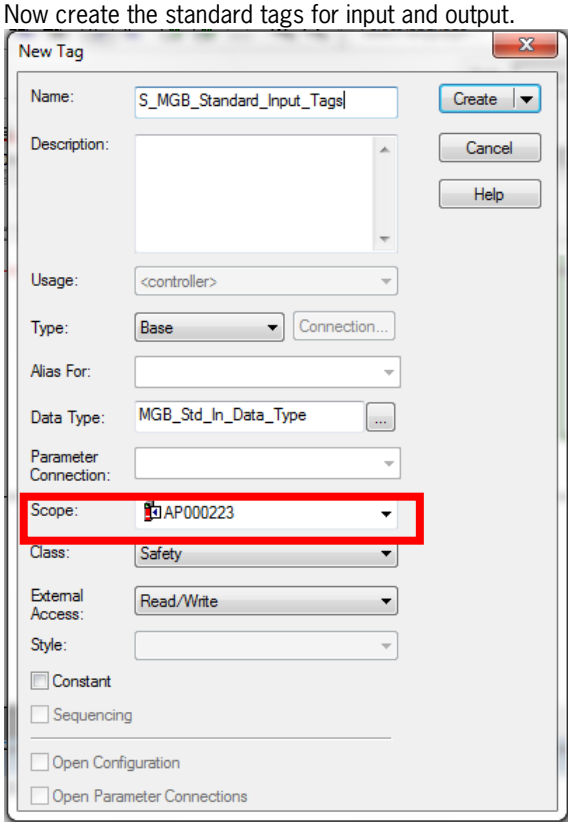

Figure 15

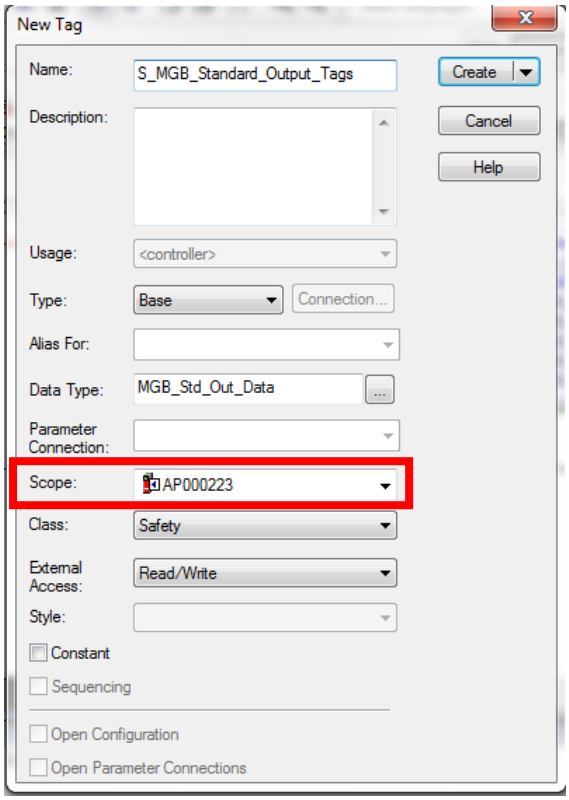

Figure 16

Then check whether the command has been added correctly to the rung. If an error has occurred, please correct it.

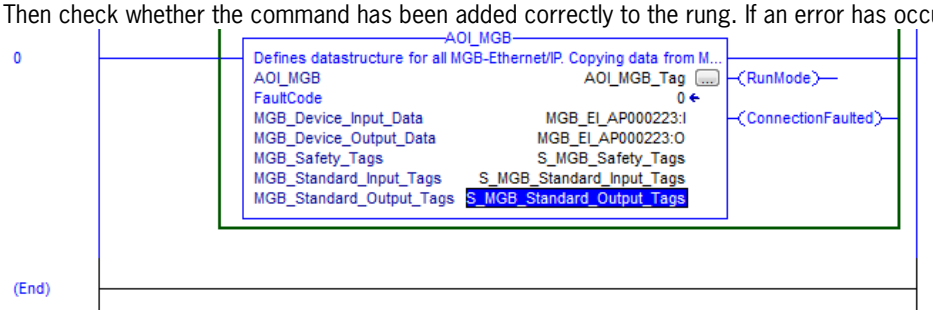

Figure 17

6. *Creating the output tag for the standard task*

In the **global** controller tags create a new standard tag; this tag will contain the output bits that are to be used in the standard task.
ATTENTION: The new variable must be created in the class Standard!

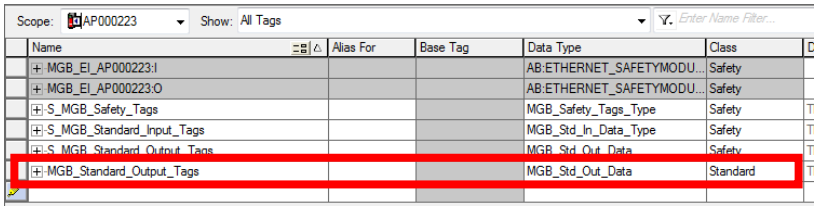

Figure 18

During processing in the safety task, the AOI_MGB command copies the necessary bits from the MGB input area to the variables created earlier. The outputs from the standard task are copied to the MGB structure.
To separate safe bits and standard bits, the standard bits for the outputs still need to be made available on the standard tasks. For this purpose the corresponding part of the safety bits is mapped to the new variable just created. The safe inputs can be read directly from the safe data in the standard task.

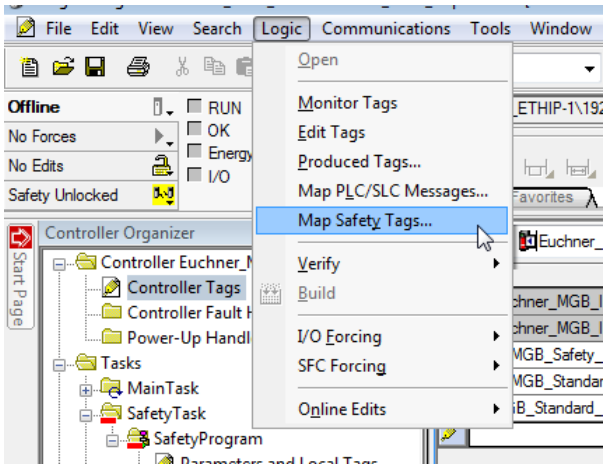

Figure 19

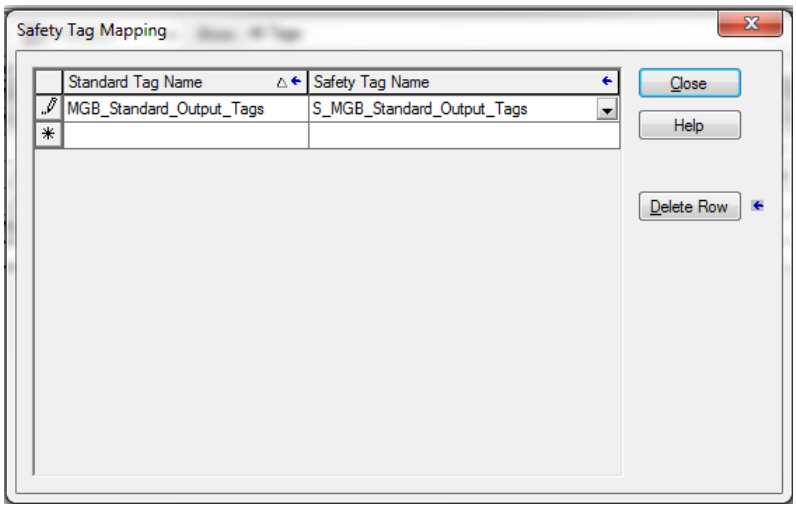

Figure 20

7. Data structures produced due to the AOI

The following bits are now available in the safe task.

S_MGB_Safety_Tags			MGB_Safety_Tags_Type	Safety
S_MGB_Safety_Tags.InputData			MGB_Safety_In_Data_Type	Safety
S_MGB_Safety_Tags.InputData.FI_ES			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_EN			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_MS0			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_MS1			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_MS2			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_D			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_B			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_L			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_SK			BOOL	Safety
S_MGB_Safety_Tags.InputData.FI_UK			BOOL	Safety
S_MGB_Safety_Tags.OutputData			MGB_Safety_Out_Data_Type	Safety
S_MGB_Safety_Tags.OutputData.FO_CL			BOOL	Safety

Figure 21

The following bits are available as read-only data in the standard task.

S_MGB_Standard_Input_Tags			MGB_Std_In_Data_Type	Safety
S_MGB_Standard_Input_Tags.RunMode			BOOL	Safety
S_MGB_Standard_Input_Tags.ConnectionFaulted			BOOL	Safety
S_MGB_Standard_Input_Tags.DiagnosticActive			BOOL	Safety
S_MGB_Standard_Input_Tags.DiagnosticSequen...			SINT	Safety
S_MGB_Standard_Input_Tags.S90_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S91_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S92_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S93_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S94_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S95_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S1_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S2_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S3_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S4_1			BOOL	Safety
S_MGB_Standard_Input_Tags.S90_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S91_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S92_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S93_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S94_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S95_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S1_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S2_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S3_2			BOOL	Safety
S_MGB_Standard_Input_Tags.S4_2			BOOL	Safety
S_MGB_Standard_Input_Tags.D_PF			BOOL	Safety
S_MGB_Standard_Input_Tags.D_ES			BOOL	Safety
S_MGB_Standard_Input_Tags.D_EN			BOOL	Safety
S_MGB_Standard_Input_Tags.D_MS			BOOL	Safety
S_MGB_Standard_Input_Tags.D_OL			BOOL	Safety
S_MGB_Standard_Input_Tags.D_LT			BOOL	Safety
S_MGB_Standard_Input_Tags.FaultCode1			SINT	Safety
S_MGB_Standard_Input_Tags.FaultCode2			SINT	Safety
S_MGB_Standard_Input_Tags.FaultCode			INT	Safety
S_MGB_Standard_Output_Tags			MGB_Std_Out_Data	Safety

Figure 22

The following bits are available as data that can be written in the standard task.

MGB_Standard_Output_Tags			MGB_Std_Out_Data	Standard
MGB_Standard_Output_Tags.H90			BOOL	Standard
MGB_Standard_Output_Tags.H91			BOOL	Standard
MGB_Standard_Output_Tags.H92			BOOL	Standard
MGB_Standard_Output_Tags.H93			BOOL	Standard
MGB_Standard_Output_Tags.H94			BOOL	Standard
MGB_Standard_Output_Tags.H95			BOOL	Standard
MGB_Standard_Output_Tags.H1			BOOL	Standard
MGB_Standard_Output_Tags.H2			BOOL	Standard
MGB_Standard_Output_Tags.H3			BOOL	Standard
MGB_Standard_Output_Tags.H4			BOOL	Standard
MGB_Standard_Output_Tags.Q_G			BOOL	Standard
MGB_Standard_Output_Tags.Q_PF			BOOL	Standard

Figure 23

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.

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