

Connecting MGB-L1B-PN... to Siemens S7 315F (TIA Portal V13)



Contents

Guard locking acc. to EN ISO 14119 actuated by spring force applied – power-ON released (closed-circuit current	Ċ
principle)	2
Components/modules used	2
EUCHNER	2
Others	2
Software	2
Functional description	3
General	3
Data structure	3
Notice	3
Mounting	4
Installing the GSDML file	4
Hardware configuration	9
Creating the safety program	14
Example of depassivation	14
Explanation:	16
Sources	17
Important note – please observe carefully!	18
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Guard locking acc. to EN ISO 14119 actuated by spring force applied – power-ON released (closed-circuit current principle)

Safety function Guard locking acc. 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 PROFINET inter-	117102 / MGB-L1HB-PNC-R-117102	117098 / MGB-L1B-PNC-R-117098
face, guard locking with guard lock moni- toring	117103 / MGB-L1HB-PNC-L-117103	117099 / MGB-L1B-PNC-L-117099

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	ltem	
SIMATIC S7 CPU315F-2 PN/DP	6ES7315-2FH13-0AB0	
SIMATIC SM326 DO 8x24V/2A PM	6ES7326-2BF40-0AB0	
8-port switch	-	
Desktop PC	-	

Software

	Totally Integrated Automation PORTAL
Installed software	
Totally Integrated Automation Portal	
Version V13 SP1 Update 8	
Version V13 SP1 Update 8	
Options	
✓ WinCC Basic	
Version V13 SP1 Update 8	





Functional description

General

The MGB-L1B-PN... 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 PROFIsafe protocol. The MGB is connected to a Siemens 315F-2 PN/DP CPU.

PROFINET	Eingangsbereich / Inpu	it range:	Bit	7	6	5	4	3	2	1	0	
		Slot 1	Byte 0	-	-	S95	-		S92	-	S90	
	WIGD-D	5101 7	Byte 1	-	-		-	<u></u>	-		-	
	Emergency stop	Slot 2	Byte 0	-	-		-	-	-	-	S93	
	MGB-L	Slot 3	Byte 0	ÜK	SK	-	-		Z	R	Т	
Datenbytes (Datenblöcke für	Diagnostics	Slot 4	Byte 0	L	-	-	-	-	E	E	Е	
nicht sichere	Ausgangsbereich / Out	tput range:	Bit	7	6	5	4	3	2	1	0	
T UNK (KON)	MGB-B	Slot 1	Byte 0	-	-	H95	-	-	H92	n-1	H90	
Data bytes (data blocks for	Emergency stop	Slot 2	Byte 0	-	-	-	-	8	-	-	H93	
unsafe functions)	MGB-L	Slot 3	Byte 0	-	-	-	-	-		-	S	
	Diagnostics	Slot 4	Byte 0		-	-	-	-	-	Reset	Q	
PROFIsafe	Eingangsbereich / Inpu	it range:	Bit	7	6	5	4	3	2	1	0	
			Byte 0	-	-	-	Z	R	Т	-	S93	
Detection	SAFETY	Slot 5	Byte 1	-	-	-	-		-	ŪΚ	SK	
(Datenblöcke für sichere Funktion)						Isafe inte d within P	m genutz rofisafe (t (Steuer control b	byte, CRO yte, CRC	C usw.) etc.)		
olonere i unicieny	Ausgangsbereich / Out	tput range:	Bit	7	6	5	4	3	2	1	0	
data bytes (data blocks for		-	Byte 0	-	-	-	-	1. -	-	-	S	
safe functions)	SAFETY	Slot 5	Byte 1	2	-	-	-	-	-	-	-	
			Byte 2-5			PROFIsafe intern genutzt (Statusbyte, CRC usw.) Used within Profisafe (status byte, CRC etc.)						
	ŪK = T and R and Z SK = T and R L = Lebensdauer / Life	Z = Zuha R = Riege T = Türste	ltung / guard Istellung / bo ellung / door	locking off position position		E = Gerāte Q = Quittie S = Zuhatte	diagnose / rung / Ackr emagnet / C	Device dia low ledgen Juard locki	gnosis 1ent 1g solenoid			

Figure 2

Data structure

Input range, slot 1 - 4: Standard

Input range, slot 5: Safe

Output range, slot 1 - 4: Standard

Output range, slot 5: Safe

Information about the output range: Refer to the operating instructions for information about activation of guard locking.

Notice

This application is based on the MGB-PN operating instructions. Please refer to the operating instructions for the technical details. Pay attention to activation of guard locking when using an MGB-L2..-PN (guard locking according to EN ISO 14119 in accordance with the open-circuit current principle).

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. Also ensure that the handle module is NOT in the operating distance during configuration.

Installing the GSDML file

The latest MGB PROFINET GSDML file and the associated BMP image file (to depict the MGB in the configuration software) are available in the Service/Downloads/Software/GSD-data/MGB area at http://www.euchner.com.

Please proceed as follows to install the GSD file in TIA Portal V13:



Figure 3

Click "Options" and select "Manage general station description files (GSD)."



Ordner suchen	x
🔺 🍌 GSD-Dateien	-
PROFIBUS	
A 📙 PROFINET	
Þ 🍌 EKS	
🔺 🍌 MGB-PN	-
GSDML-V2.3-Euchner-MGB_110026-20160429	
D 🍌 MSC	-
OK Abbreche	ni

Select the folder where you saved the GSMDL file and click "OK."



Manage genera	al station description files			×								
Source path:	Source path: dmin\Documents\Automatisierung\MGB-PN_Applikation_12-2016\AdditionalFiles\GSD											
Content of imported path												
File		Version	Language									
GSDML-V2.3	-Euchner-MGB_110026-20160429.xml	V2.3	English, German, French, Italian, Spanish									
<				>								
			Delete Install Canc	el								

Select the GSDML file suitable for the MGB from the list and click "Install."





Enter the corresponding order no. of the bus and guard locking module in the search box for the hardware catalog. The appropriate device will be displayed there. Check the information area to determine the GSDML file version. If an older GSDML file has already been installed, you can select the required GSDML file. Drag the selected MGB into your PROFINET network.



			📑 Topol	ogy view	A Netwo
Network Connections	HMI connection	Ŧ		1 🔍 ±	
PLC_1 CPU 315F-2 PN/		euch 1170 Select IO con PLC_1.PROFI	ntroller NET-Schnitts	telle_1	

Now assign the appropriate IO controller to the MGB by clicking "Not assigned" and then selecting the IO controller.



Hardware configuration

Open the MGB device view. Double-clicking the displayed MGB will show the general settings of the MGB in the bottom window. You can make the corresponding settings there, e.g. assigning the IP address and the diagnostic addresses. The device name and the input and output addresses can be changed in the device overview.

12-2016	Distributed I/O	PROFINET IO-S	ystem (100): Pl	N/IE_1 ▶ 0	euchn	ermgb	_ ⊫∎×
		Topol	ogy view 🚠	Network	view	Dev	vice view
🔐 euchnermgb 💌 🛄		evice overview					
	+ Assign device nam	e			t	I address	Q address
20	Assign a PROFINET de	vice name manually f	or an IO device he	ere. The IO		2043*	
zernus	device must be insert	ed and connected on	line with the IO sy	stem. In the	(1	2042*	
auch	PROFINET device nam	e to the IO device.	, you assign a con	nigureu		01	0
•						2	1
	Assigning address	es and names to PRO	FINET devices			3	2
	Trangene devi					4	3
		Standard P	ROFIsate 16 Bool	0 5	5	510	510
•							
	•						
	~						
< Ⅲ > 100% ▼	🔍 [<	III				>

Figure 8

Click the "assign device name" icon marked in red here.



ssign PROFINET device	name.				_			>
		Configured PRO	FINET dev	ice				
		PROFINET devie	ce name:	euchnermgb			-	
		Dev	vice type:	117098-MGB-L1B-PNC-R				
		Online access						
		Type of the PG/PC	interface:	PN/IE			•	
		PG/PC	interface:	Broadcom NetLink (T	M) G	Gigabit Ethernet	- 🖲 🖸	
d,		Device filter						
2		🛃 Only show	devices of th	ne same type				
		Only show	devices with	bad parameter settings				
		Only show	devices with	iout names				
	Accessible devi	ces in the network:	Device			Canada		
	IP address	MAC address	Device	PROFINET device name		Status No device nam	a accioned	_
	192.168.0.1	00-0E-8C-8A-65-DF	\$7-300	plc_1	4	Device name i	s different	
Flash LED								
	<			1111				>
					Jpda	ate list	Assign name	
Online status information: Search completed	: . 2 of 2 devices we	ere found.						
<			1111					>
							Close	

Select the suitable device name and the corresponding available devices, and then click "Assign name." The device name in this application is

"euchnermgb" (factory setting from GSD file). Please note that the device name in the device overview must match the assigned device name.

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				🛃 Topolog	y view	da N	etwork vie	w []	Device view
euchnermgb			Devi	ce overview					
		^	앝.	Module	Rack	Slot	I address	Q address	Туре
N		=		 euchnermgb 	0	0	2043*		117098-MGB
ornig		1		Interface	0	0 X1	2042*		euchnermgb
active				Standard Bus-Modul_1	0	1	01	0	Bus module st
e.				Standard Not-Halt-Modul_1	0	2	2	1	Emergency swi.
				Standard Zuhaltemodul_1	0	3	3	2	Locking modul
				Standard Diagnose-Modul_1	0	4	4	3	Diagnostic mo
	and the second			Standard PROFIsafe 16 Bool	0	5	510	510	PROFIsafe 16 B
			8						1
	0.00								
		•							
		1							
4 IIII 1 100%					100		_		

Figure 10

The PROFIsafe assembly is located in slot 5. Go to the general properties there. They are displayed in the bottom window.

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Standard PR	OFIsafe 16 B	lool EA	_1 [Module]			Roper	ties	1 Info	Diagnostics	1 1 6
General	IO tags	Sys	tem constants	Texts						
 General 	M	1	PROFIsafe							
Catalog i	nformation									
PROFIsafe				F	SIL: SIL3			-		
Inputs				E CRC Len	th: 3-Byte-CRC				17 C	
I/O addresse	es			E Block						
				F_DIOCI	_10. 0					
				F_Par_Vers	on: 1					
				F_Source_	dd: 1					
		•		F_Dest_	dd: 135					
			F_Par_CRC_	WithoutAddres	es: 🚺 Value ran	ge: [11022].	×]		
		-			🛃 Manual as	ssignment of F-r	nonitor	ing time		
				F_WD_T	me: 600		ms	j		
				F_Par_	RC: 33803					
					F-I/O DB m	nanual number a	assignr	nent		
				F-I/O DB-num	er: 513					
				F-I/O DB-na	ne: F00005_Star	ndardPROFIsafe*	16BoolE			

Figure 11

Enter the same PROFIsafe address you set on the DIP switch (Figure 12) on the MGB-PN in the "F_Dest_Add" field. Refer to the operating instructions for information about setting the PROFIsafe address on the MGB.

OFF

NO

0EE

Binary coding of the DIP switches for PROFIsafe address (factory setting: 135)

> default address: 128 + 4 + 2 + 1 = 135

Figure 12

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Project tree	MGB-PN_Applikation_12-	2016 → PLC_1 [CPU 315F-2 PN/DP] → Safety Administration 🛛 🗕 🖬 🗮 🗙
Devices		
🖻 O O 🗐	a	
 MGB-PN_Applikation_12-2016 Add new device Devices & networks Device configuration Online & diagnostics Safety Administration Program blocks Technology objects External source files PLC tags PLC tags PLC tags Online backups Online backups Device proxy data Program info PLC alarms Tech lists 	General F-runtime group F-Ablaufgruppe 1 [RTG1] F-blocks Protection Settings	Offline safety program protection Password for modifying safety program: Password: Login Change F-CPU access protection The password for downloading to the F-CPU is set in the inspector window of the F-CPU in the "Properties" tab. Go to the "Protection" area of the F-CPU

Figure 13

Go to "Safety Administration" and open the "Protection" item. Set up a password there. If the F-CPU must be protected by a password as well, please note the "F-CPU access protection" item.

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Creating the safety program

The F sequence group, the FB and the associated DB are generated automatically in TIA Portal V13. As soon as the program is compiled, a safety program consistency check is performed.

Example of depassivation

PROFINET	Eingangsbereich / Input	range:	Bit	7	6	5	4	3	2	1	0
	MGB-B	Slot 1	Byte 0	-	-	S95	-	-	S92	-	(S90)
	Emergency stop	Slot 2	Byte 1 Byte 0	-	-	-	-	-	-	-	- S93
	MGB-L	Slot 3	Byte 0	ÜK	SK	-	-	-	z	R	T
Datenbytes	Diagnostics	Slot 4	Byte 0	L	-	-	-	-	E	E	E
(Datenblöcke für nicht sichere	Ausgangsbereich / Outp	Ausgangsbereich / Output range:		7	6	5	4	3	2	1	0
Funktion	MGB-B	Slot 1	Byte 0	-	-	H95	-	-	H92	-	H90
Data bytes (data blocks for	Emergency stop	Slot 2	Byte 0	-	-	-	-	-	-	-	H93
unsafe functions)	MGB-L	Slot 3	Byte 0	-	-	0	-	-	-	-	S
	Diagnostics	Slot 4	Byte 0	-	-	-	-		-	Reset	Q
PROFIsafe	Eingangsbereich / Input	range:	Bit	7	6	5	4	3	2	1	0
			Byte 0	-	-	-	Z	R	Т	-	S93
Datenhytes	SAFETY	Slot 5	Byte 1	-	-	-	-	-	-	ÜΚ	SK
(Datenblöcke für sichere Funktion)			Byte 2-5		PROF Use	PROFIsafe intern genutzt (Steuerbyte, CRC usw.) Used within Profisafe (control byte, CRC etc.)					
	Ausgangsbereich / Outp	Ausgangsbereich / Output range:			6	5	4	3	2	1	0
data bytes (data blocks for			Byte 0	-	-	-	-	-	- 1	-	S
safe functions)	SAFETY	Slot 5	Byte 1	-	-	-	-	-	-	-	-
			Byte 2-5		PROFIsafe intern genutzt (Statusbyte, CRC usw.) Used within Profisafe (status byte, CRC etc.)						
	ŪK = T and R and Z SK = T and R L = Lebensdauer / Life	Z = Zuha R = Riege T = Türst	ltung / guaro stellung / b ellung / door	l locking olt position position		E = Gerāte Q = Quittie S = Zuhalt	diagnose / rung / Ackr emagnet / Q	Device diag now ledgern Guard lockin	gnosis ent Ig solenoid		

Figure 14

Below is an example of how depassivation of the MGB-PN can be performed. The MGB-PN is to be depassivated intentionally using a button on MGB-PN. Refer to the table for the corresponding input address assigned to the button (e.g. S90 = 10.0). Please consider the input and output ranges you assigned to the MGB-PN in the HW configuration.

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likation_12-2016 + PLC_	1 [CPU 315F-2 PN/DP] ▶ Program blocks ▶ Main_Safety_RTG1 [FB1]	_∎∎×
📩 🕁 👻 🔹 🖿 🗖	🔚 💬 🕮 ± 🖴 💓 修 😘 🥙 📾 🕫 🦆 🐂 🚱 🖤 🔢	
Main_Safety_RTG1		
8 >=1 [??] − I −ol	·····································	
▼ Block title:		^
Comment		
Network 1: 1=ACKNOW	LEDGEMENT FOR REINTEGRATION	
Comment		
%40.0 "Tag_1" %DB513.DBX2.2 "F00005_ StandardPROFIsaf e16BoolE".ACK_ REQ *	& %DB513.DBX0.2 "F00005_ StandardPROFIsaf e16BoolE".ACK_ REI =	

Figure 15

The designation of the modules named here can vary, because they are generated automatically. Create the link shown in Figure 15 in FB1. The "ACKNOWLEDGEMENT REQUEST" bit from DB513 (Figure 16) set when the MGB-PN is passivated. User acknowledgment using an MGB-PN button must be performed in this example. If the "ACKNOWLEDGEMENT REQUEST" bit and bit I0.0 are set, the "ACKNOWLEDGEMENT FOR REINTEGRATION" bit is set and the MGB-PN is re-integrated.

Click "Compile." This automatically performs a safety program consistency check. Then load the safety program into your PLC by clicking "Load into Device." The MGB-PN can now be depassivated at any time by pressing the button. Teach the handle module as described in the operating instructions.

	. PN	I/DF	P] 🕨 Program block	s → System blocks →	STEP 7	Safety ▶ F-IO	data blocks	▶ F00005	_Standard	PROFIsafe16BoolE [DB513] 🗕 📙 I	١X
141											4
	FU	Ni	me	Data type	Offset	Start value	Retain	Visible in	Setpoint	Comment	
1		•	Input								~
2			PASS_ON	Bool	0.0	false		~		1=ACTIVATE PASSIVATION	=
З			ACK_NEC	Bool	0.1	TRUE		V		1=ACKNOWLEDGEMENTNECESSARY	
4	1		ACK_REI	Bool	0.2	false				1=ACKNOWLEDGEMENT FOR REINTEGRATION	1
5	-		IPAR_EN	Bool	0.3	false		 Image: A set of the set of the		1=ENABLE I-PARAMETER ASSIGNMENT	
6	-	•	Output								
7	1		PASS_OUT	Bool	2.0	TRUE		~		1=PASSIVATION OUTPUT	
8	1		QBAD	Bool	2.1	TRUE				1=FAIL-SAFE VALUES ARE OUTPUT	
9	-		ACK_REQ	Bool	2.2	false				1=ACKNOWLEDGEMENT REQUEST	
10	0 🕣		IPAR_OK	Bool	2.3	false				1=NEW I-PARAMETER VALUES ASSIGNED	~
	<	:									>

Figure 16 (DB513)

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There must be at least one MGB call in the safe program section to prevent the device from being passivated. Bit I6.1 (ÜK) from the PROFIsafe area of the MGB is then used. Bit ÜK is set when the following conditions are met: door closed/bolt tongue inserted into the locking module/guard locking active.



Figure 17

One output of the Siemens output card is connected with bit I6.1 (ÜK) in this example.

Exm	anations
F X DI	ananon
	anacioni

ACK_REI (IN 0.2) (BOOL)	User acknowledgment on manual reintegration	<pre>"ACK_REI = 0->1" (positive edge): Reintegration takes place after a positive edge. Comment: User acknowledgment is possible only</pre>		
		after the fault causing passivation has been remedied. User acknowledgment is always required for an "F communication error," inde-		
		of ACK_NEC.		
ACK_REQ (OUT 2.2)	The user can only read this variable in the P periphery data module.	"ACK_REQ = 1":		
(BOOL)		The fault leading to passivation has been remedied.		
		User acknowledgment for manual reinte- gration (ACK_REI) is now possible.		
		Cause for passivation:		
		"F communication error," "assembly er- ror," "channel error"		
		Comment:		
		Once the fault leading to passivation has been remedied and the F system has recognized this, the F system sets "ACK_REQ = 1."		
		After user acknowledgment, the F operat- ing system sets "ACK_REQ = 0."		



Sources

Elaboration of S7 Distributed Safety project presentation at Technikerschule Hannover SIMATIC Safety Integrated "Passivation and Reintegration of F-I/O considering as example the ET 200S."

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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 has the obligation to assess the safety technology him/herself. 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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