EUCHNER

Application

Integration of MSC-CE-PN in TIA Portal V13/V14/V15

EN

From V1.3.0

Contents

1. About this document

1.1. Version

Version	Date	Change/addition	Chapter
01-08/18	31.07.2018	Prepared	All

1.2. Scope

The purpose of this document is the integration and configuration of the expansion device MSC-CE-PN-121315 in SIEMENS TIA Portal version V13, version V14 and version V15.

1.3. Target group

Design engineers and installation planners for safety devices on machines, as well as setup and servicing staff possessing special expertise in handling safety components as well as expertise in the installation, setup, programming and diagnostics of programmable logic controllers (PLC) and bus systems.

1.4. Supplementary documents

The overall documentation for this application consists of the following documents:

Document title (document number)	Contents	
Operating Instructions MSC (2121331)	Modular safety integrated controller MSC - installation and use	www
Operating Instructions Fieldbus Modules (2121341)	Technical data sheet on the fieldbus modules MSC	www
Communication Connector (2121344)	Assembly instructions for expansion connector	www
Technical Sheet Bus Modules (2121346)	Technical data sheet on MSC fieldbus module	www
Possibly enclosed data sheets	Item-specific information about deviations or additions	
Safety Information and Maintenance (2121335)	Information sheet with important safety information	

1.5. Notice

This application is based on the operating instructions for the MSC and the operating instructions for the fieldbus modules MSC. Please refer to the operating instructions for the technical details and other information.

EN

2. Components/modules used

2.1. EUCHNER

Description	Order number / item number
Base unit safe small control system MSC	121289 / MSC-CB-AC-FI8FO2-121289
Expansion device MSC	121315 / MSC-CE-PN-121315
Expansion connector MSC	121308 / AC-PL-B-121308

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.

2.2. Others

Description	Order number / item number
SIMATIC S7-1215 FC DC/DC/DC	6ES7 215-1AF40-0XB0

2.3. Software

Description	Version
EUCHNER Safety Designer	Version V1.5.3
BUS Configurator	Version V3.6.4
Totally Integrated Automation Portal	Version V14 SP1 update 6
STEP 7 Professional	Version V14 SP1 update 6
STEP 7 Safety	Version V14 SP1 update 6

3. Functional description

The MSC is a freely programmable, safe small control system. Using the expansion device MSC-CE-PN the system status as well as the status and diagnostic elements for all inputs and outputs that are configured in the MSC system can be transmitted to a control system with PROFINET support. In addition, the expansion device makes it possible to read in eight individual fieldbus inputs that can be used by the control system.

4. Layout of the protocol data packet

The input structure comprises a single byte that represents 8 fieldbus inputs

The output structure comprises:

- One status byte
- A variable number of bytes for the status of the inputs
- One byte that represents the copy of the fieldbus inputs
- A variable number of bytes for the status of the sensors
- A variable number of bytes for the status of the safe outputs OSSD
- A byte that represents I/O indices for fieldbus diagnostics
- Two bytes that represent the diagnostics on the MSC system

NOTE!

You will find the detailed description of the protocol data packet in the operating instructions for the fieldbus modules.

5. Configuration in EUCHNER Safety Designer

5.1. Description

The OSSD outputs are active if the input (Interlock) and the fieldbus input are ON (=TRUE). The status of the AND operator is transmitted to the control system via the fieldbus output.

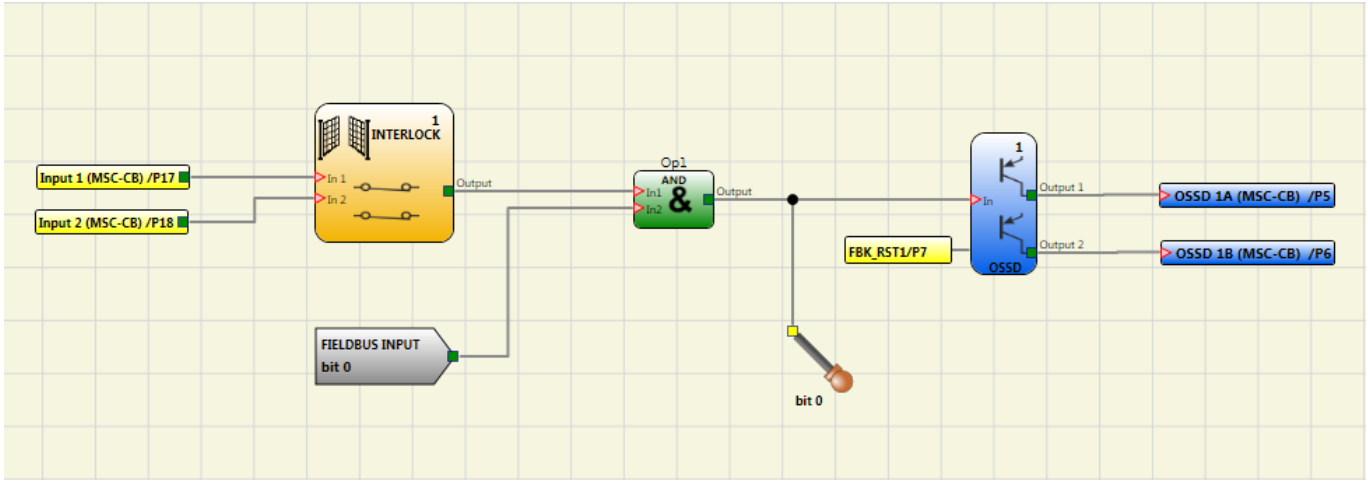

Figure 1: Safety Designer project

5.2. Transferring the Safety Designer project

Establish a connection to the MSC-CB and transfer the project configuration to the base unit MSC-CB. The project can only be transferred if the validation is valid.

5.3. Creating project report

The number of inputs and outputs used can be found in the project report from EUCHNER Safety Designer. This information is required later to select the GSD file used.

Create the project report using the *Print report* *icon*

EUCHNER

```
Input
Input 1 Byte 00 -> FIELDBUS INPUT

Output
Output 1 Byte 00 -> MSC-Module Status
Output 1 Byte 01 -> MSC-CB Input
Output 1 Byte 02 -> FIELDBUS INPUT feedback
Output 1 Byte 03 -> FieldBus Probe (00÷07)
Output 1 Byte 04 -> FieldBus Probe (08÷15)
Output 1 Byte 05 -> OSSD (00÷07)
Output 1 Byte 06 -> I/O indices for Fieldbus diagnostic
Output 1 Byte 07 -> Input diagnostic/OSSD diagnostic

Fieldbus Input byte description
Bit 0: FIELDBUS INPUT0

Fieldbus Output bytes description
Byte 00 - MSC-Module Status
Bit 0: MSC-Module on line
Bit 1: Diagnostic present

Byte 01 - MSC-CB Input (If Input visualization active)
Bit 0: Function Block 1 Interlock MSC-CB

Byte 02 - FIELDBUS INPUT feedback (If feedback visualization active)

Byte 03 - FieldBus Probe (00÷07) (If Probe visualization active)
Bit 0: FieldBus Probe 0

Byte 05 - OSSD (00÷07) (If Output visualization active)
Bit 0: OUTPUT1

I/O indices for Fieldbus diagnostic

1: Function Block 1 (Interlock MSC-CB)
192: OUTPUT1 (MSC-CB)
```

Figure 2: Extract from project report

EN

6. Configuration of BUS Configurator

1. Connect the configuration PC to the expansion device MSC-CE-PN
2. Open BUS Configurator and select the *I/O Select* tab. Select the check boxes for all fieldbus inputs and outputs (Figure 3).
3. Write the configuration to the memory in the MSC-CE-PN using *WRITE*
4. Check the status of the outputs on the MSC using the MONITOR function (Figure 4)

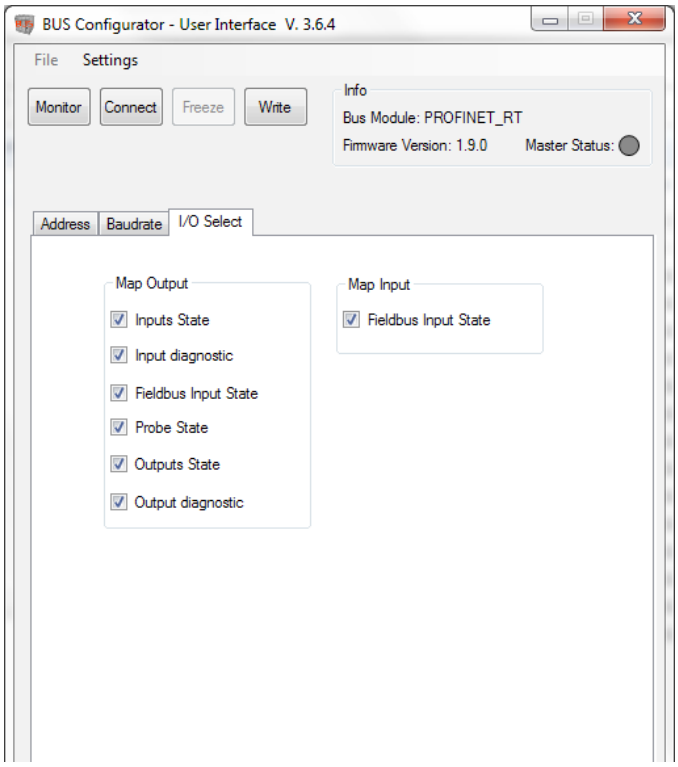

Figure 3: I/O Select, BUS Configurator

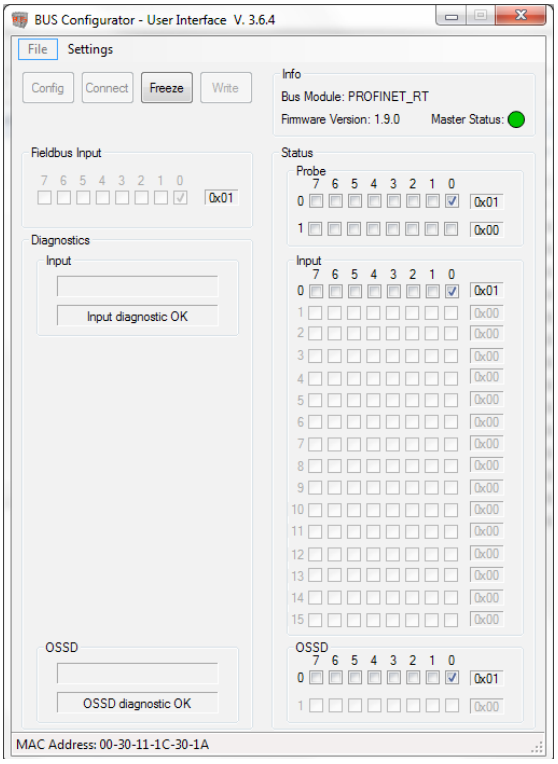

Figure 4: Monitoring, BUS Configurator

7. Installing the GSD file

The selection of the GSD file is dependent on the number and type of the MSC modules installed.

Refer to the project report from EUCHNER Safety Designer for the number of input and output bytes required for the exchange of process data.

Example from the project report:

Input		
Input 1	Byte 0	Fieldbus input
Output		
Output 1	Byte 0	MSC module status
Output 1	Byte 1	MSC-CB input
Output 1	Byte 2	Fieldbus input feedback
Output 1	Byte 3	Fieldbus output (0-7)
Output 1	Byte 4	Fieldbus output (8-15)
Output 1	Byte 5	OSSD (0-7)
Output 1	Byte 6	I/O indices for fieldbus diagnostics
Output 1	Byte 7	Diagnostic inputs/diagnostics OSSD

GSDML-V2.33-Profinet-PNET_1+XX-20180227.xml

Total output bytes: 08

Table 1: Input/output bytes from project report

The GSD file used for the example has the following name:

- GSDML-V2.33-Profinet-PNET_1+08-20180227.xml

NOTE!

You will find the GSD files in the download area at www.euchner.com. Always use the latest GSD file.

EN

Please proceed as follows to install the GSD file in TIA Portal V13/V14/V15:

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

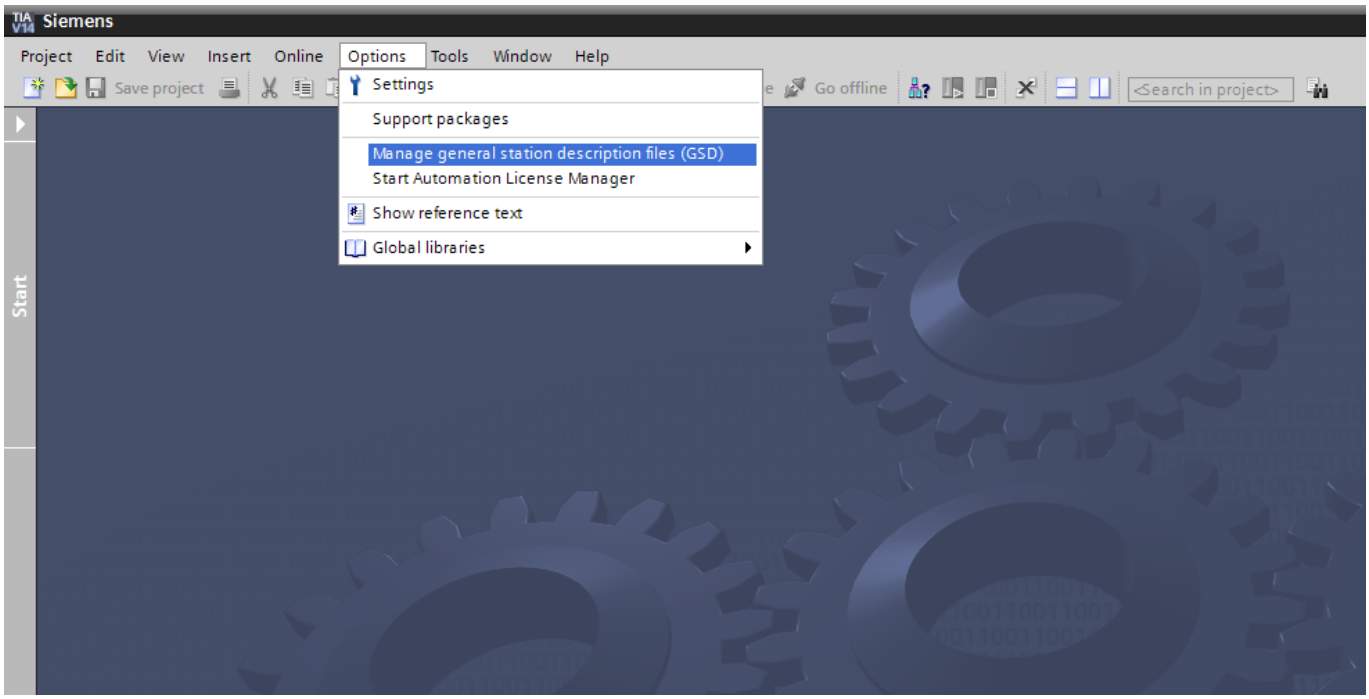

Figure 5: GSD file selection

2. Select the appropriate path with the GSD files, select the corresponding file and install it.

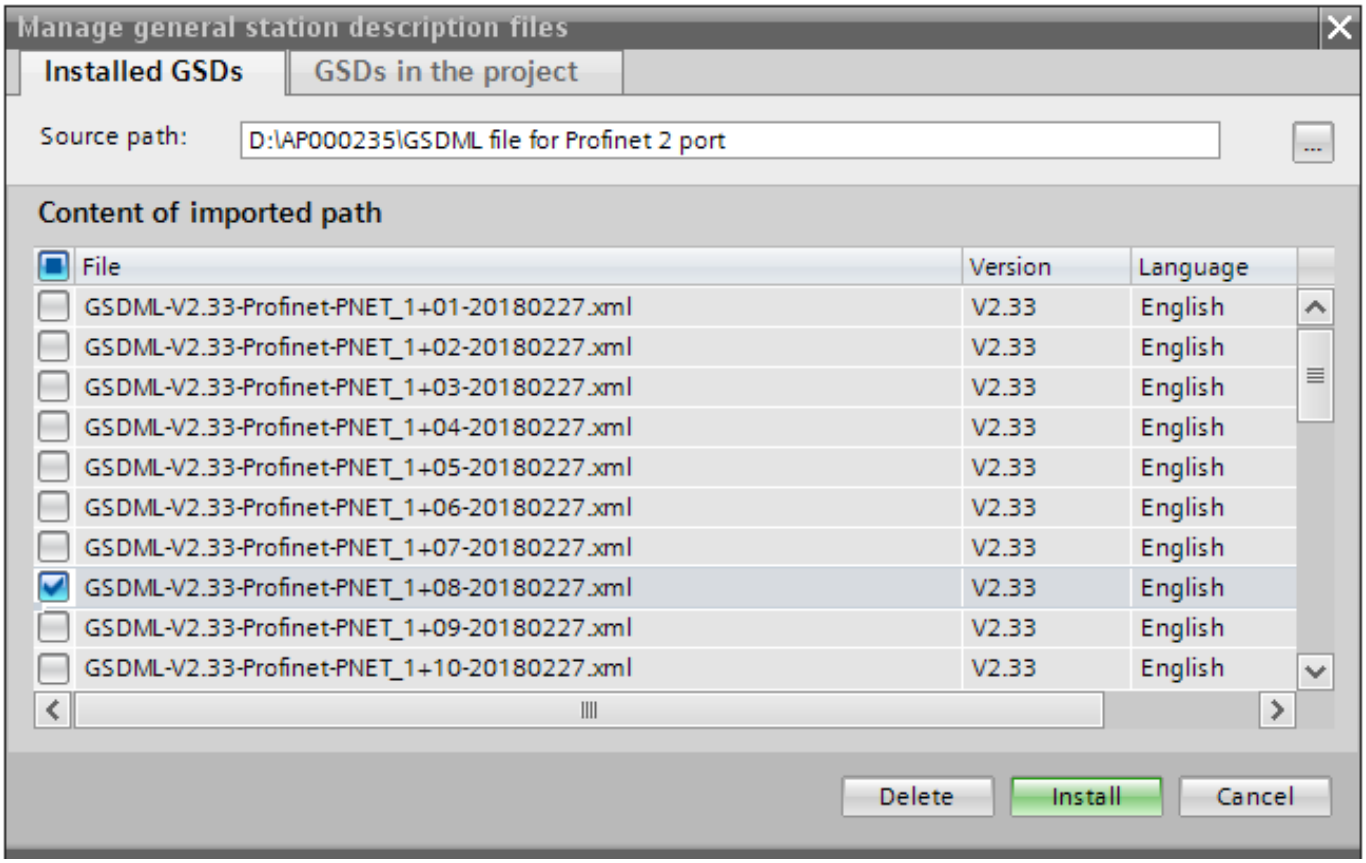

Figure 6: GSD data installation

8. Configuring the expansion device MSC-CE-PN

Select the expansion device ABCC40-PIR from the hardware catalog (Figure 7) and add it to the network view using drag & drop. Then assign the CPU. For this purpose, click *Not assigned* and select the corresponding IO controller (Figure 8).

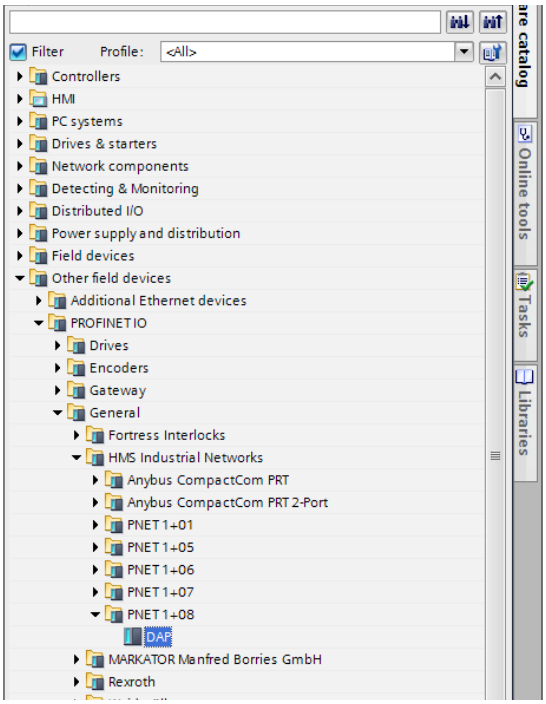

Figure 7: Hardware catalog, TIA Portal

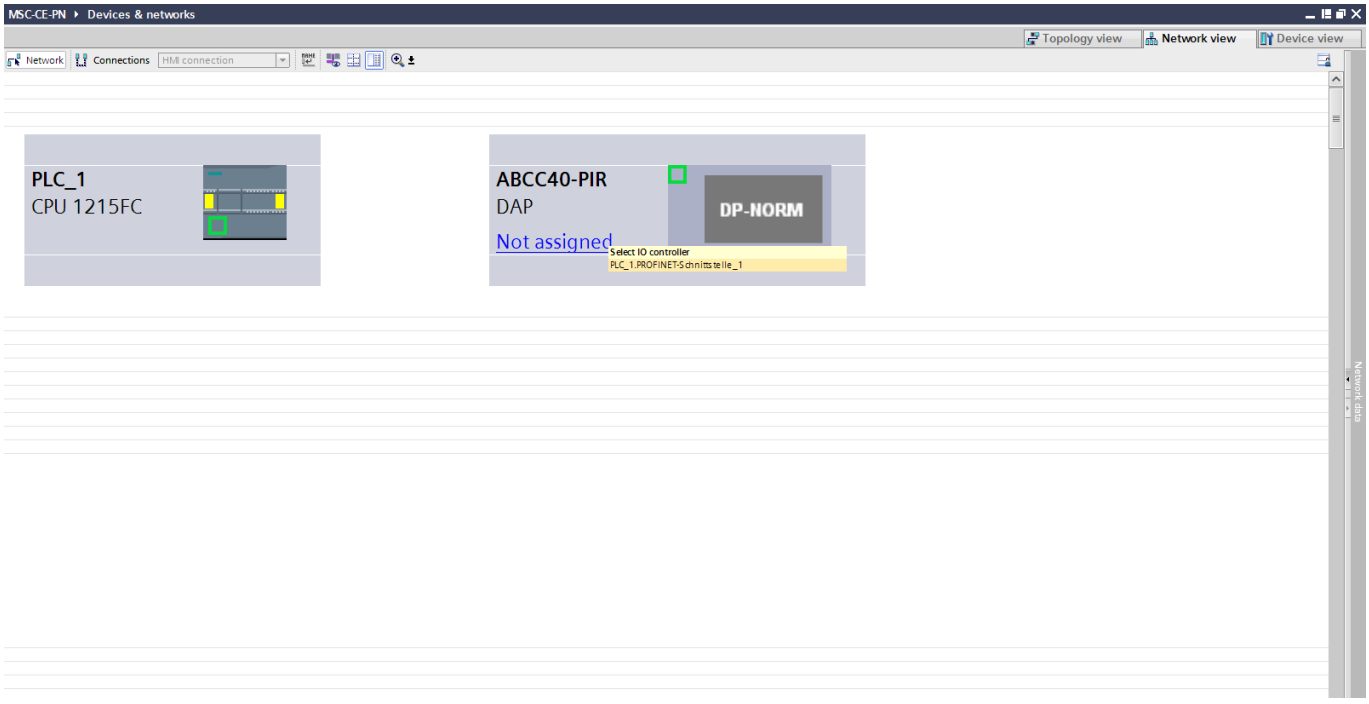

Figure 8: Network view for the MBM

EN

The following PROFINET parameters must be set:

- Device name (factory setting from GSD file): [*abcc40-pir*].
- IP address: optionally fixed or dynamic

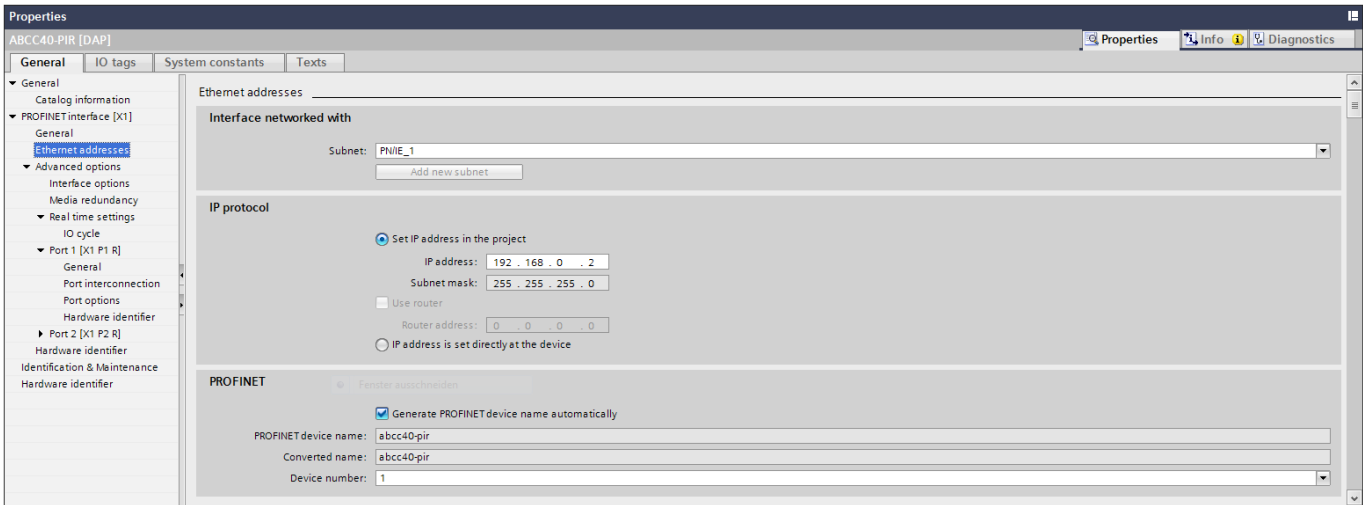

Figure 9: PROFINET parameters

- Real time settings, IO cycle
  Recommendation:
  Update time: Calculate update time automatically
  Watchdog time: Accepted update cycles without IO data: 3

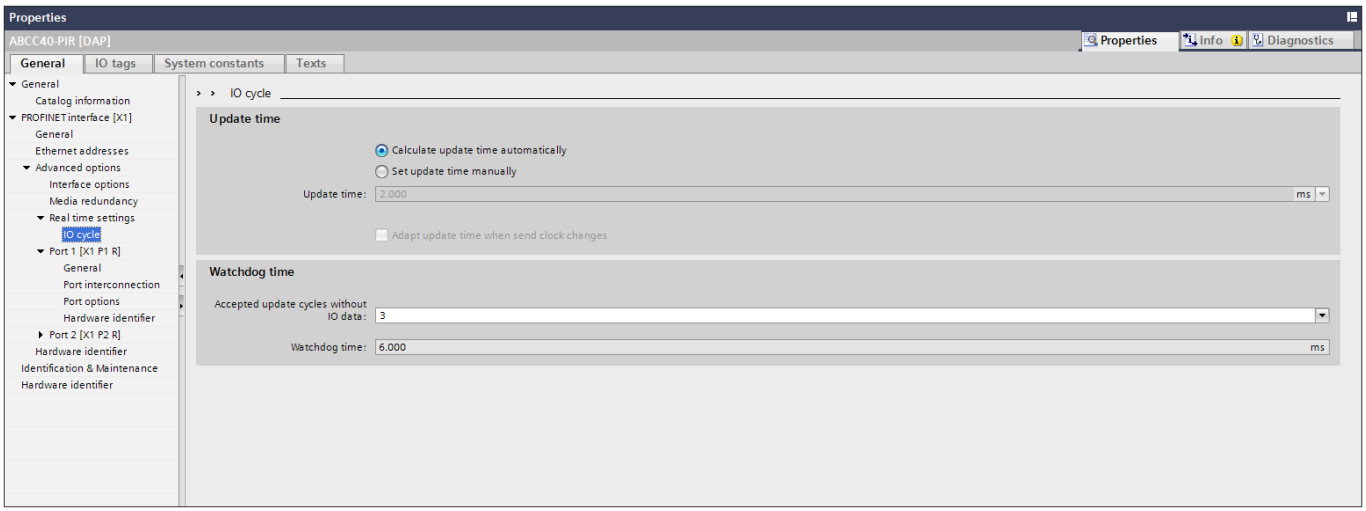

Figure 10: PROFINET real time settings

9. Configuring the input and output data

Open the expansion device in the device view and, in the hardware catalog select the output module "Data to fieldbus" and drag it to slot 1 using drag & drop. Then add the input module "Data from fieldbus" to slot 2 using drag & drop.

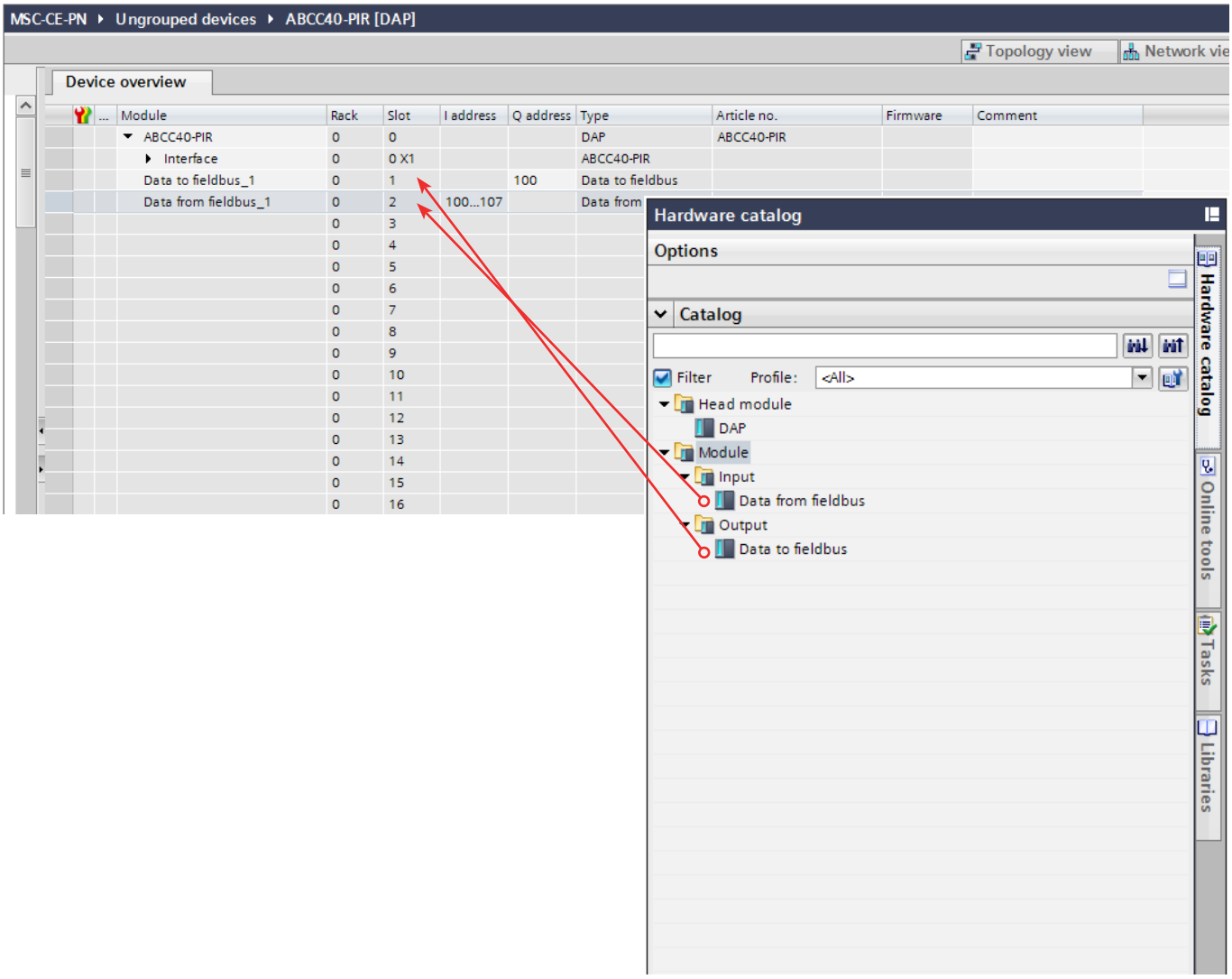

Figure 11: Adding input/output modules

NOTE!

- The output data "Data to fieldbus" must always be placed in slot 1 before the input data "Data from fieldbus" are added.
- The input and output addresses are assigned by TIA Portal, these addresses can be changed manually to the required address range.

EN

10. Assigning PROFINET device names to the MSC-CE-PN

1. Open the device view and select the expansion device. Use *Assign device name*.

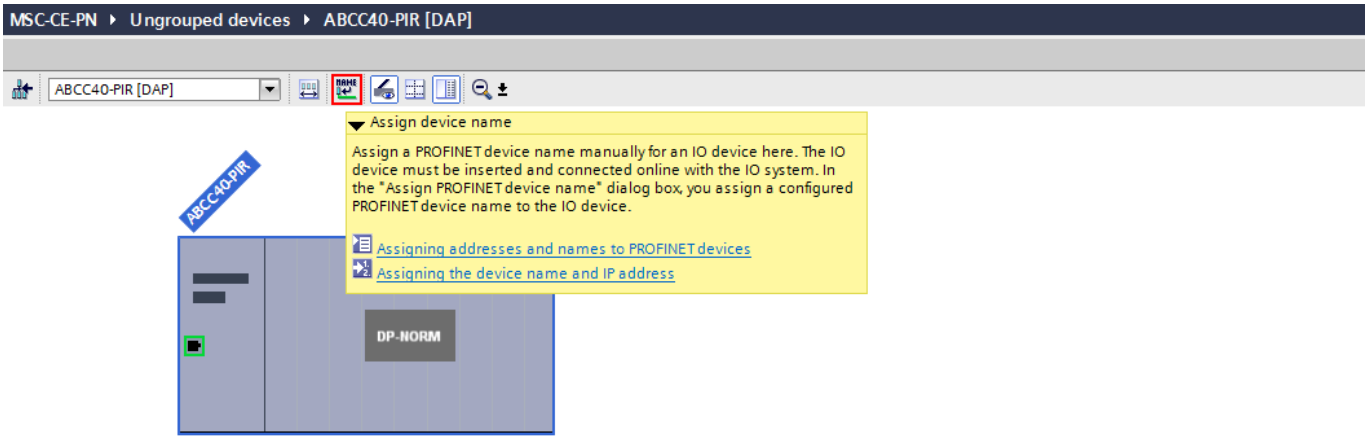

Figure 12: Device view

2. Use *Update list* to display all devices of the same type. Compare the MAC address on the type label with the MAC address of subscriber available in the network and assign the PROFINET name to the MAC address using *Assign name*.

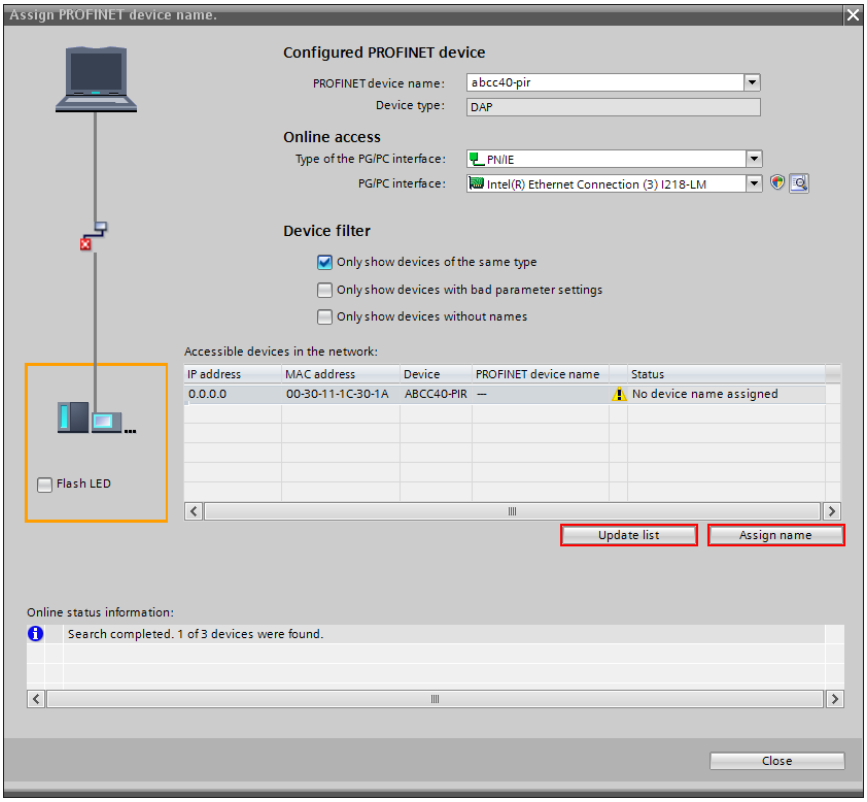

Figure 13: Assigning device name

TIP: As an alternative to the MAC address comparison, you can see from the *Flash LED* whether you have selected the correct subscriber.

11. Controlling the fieldbus output

In this example, the fieldbus output on the MSC-CE-PN is controlled by an input on the S7-1215 Compact. The fieldbus output sends the enable for the OSSD output on the base unit MSC-CB.

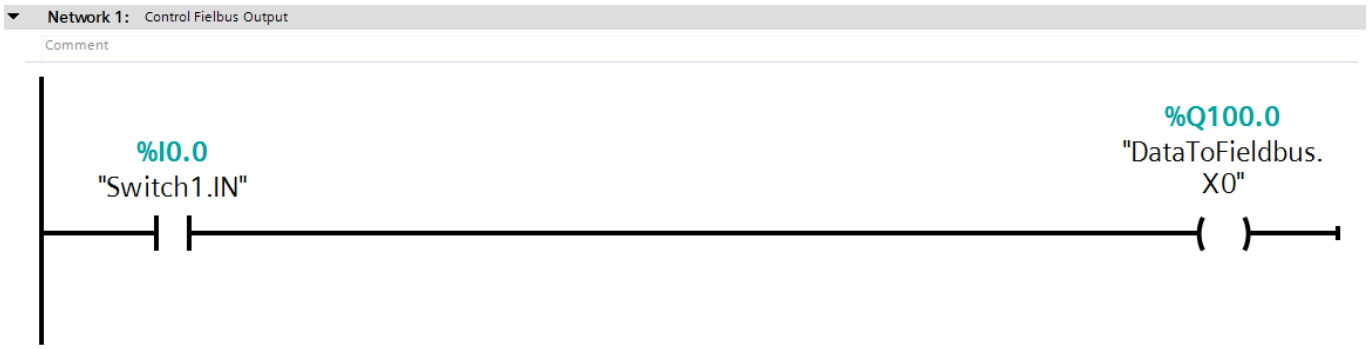

Figure 14: Controlling fieldbus output

11.1. Monitoring view in Safety Designer

Establish a connection to the MSC-CB and use Monitor to view the I/O real time status.

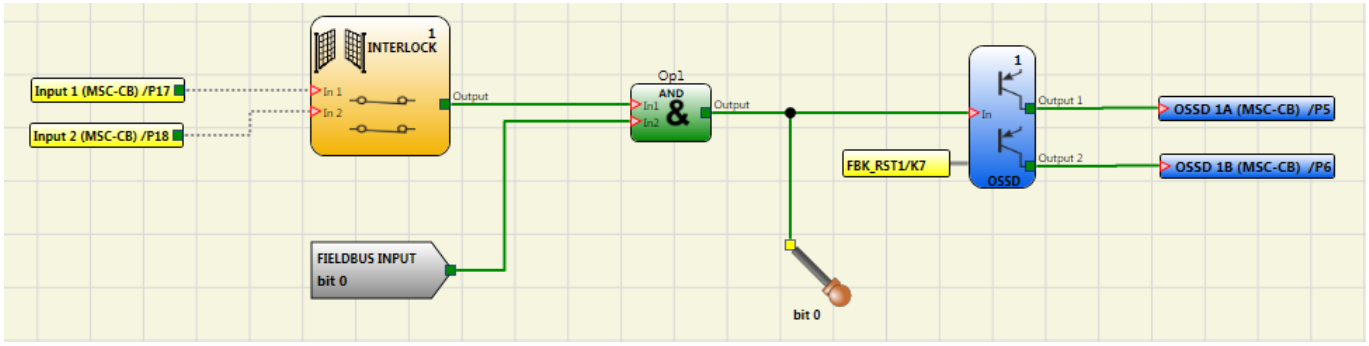

Figure 15: I/O real time status

11.2. Monitoring view, TIA Portal

Establish a connection to the control system Go online and start the I/O monitoring mode in TIA Portal using Monitor On/Off.

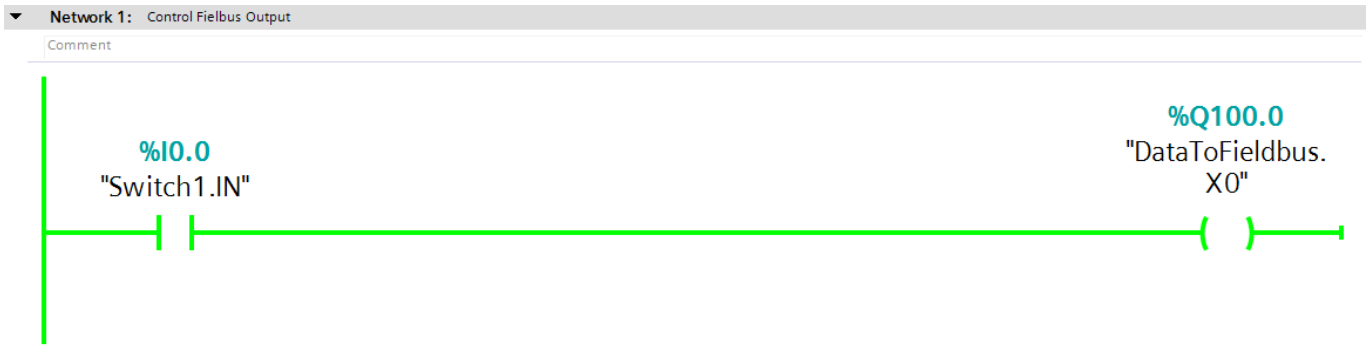

Figure 16: TIA Portal I/O real time status

EN

12. 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 example provided 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 danger zone and the software within the safety evaluation must also be considered, for example.

The applications provided 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.

According to the Machinery Directive 2006/42/EC, the design engineer of a machine or installation has the obligation to perform a risk assessment and take measures to reduce the risk. While doing this, the engineer must comply with the applicable national and international safety 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 an 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.

In particular in relation to a fault exclusion, it must be noted that a fault can only be excluded by the machine's or installation's design engineer and this action requires justification. A 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.

Euchner GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen, Germany
info@euchner.de
www.euchner.com

Edition:
AP000235-01-08/18
Title:
Application MSC
Integration of MSC-CE-PN in TIA Portal V13/V14/V15