

TechTip: PLC data exchange with SIEMENS STEP 7 TIA Portal

Contents

1. Use	2
2. SIEMENS STEP 7 TIA Portal	3
2.1. ET200SP	4
2.1.1. Special feature IM155-6PN/3 HF	4
2.2. ET200AL	5
2.3. ET200eco	7
2.4. Passive devices in Ethernet-based networks	8
3. Differences between STEP 7 TIA Portal and STEP 7 Classic	10

1. Use

This TechTip contains additional information on the data exchange with the SIEMENS STEP 7 TIA Portal as a supplement to the TechTip "**TechTip-PLC-data-exchange**".

The data exchange is effected in AutomationML format. You can find further information in the TechTip "**TechTip-PLC-data-exchange**", chapter "AutomationML".

Overview of the different versions of EPLAN Electric P8 and STEP 7 TIA Portal

Version		Remarks	Supported version of the AR APC
EPLAN Electric P8	STEP 7 TIA Portal		
2.7	14SP1	Initial creation of the AML interface	1.0.0
2.7 HF3		Roundtrip engineering optimized	1.0.0
	15	Change in the handling for bus adapters	1.0.0
2.8	15.1	Bus adapters are now replaced as independent PLC cards	1.0.0
2.9	16	AR APC 1.1.0 support, exchange of extension modules, exchange of the BaseUnits for ET200SP	1.1.0

Note:

The "Save GUID during the import" property has to be set for the round-trip engineering up to and including TIA Portal Version 15.1 (can be accessed under TIA Portal in the menu "Extras > Settings" in the "CAx" group).

In addition to the restrictions in AutomationML format, amongst other things, the following points are currently not supported in the AML format:

- Exchange of accessories up to and including TIA Portal Version 15.1. Therefore export your data without accessories (setting can be accessed in the export dialog under "Options > Export accessories")
- With few exceptions HMI devices cannot be exchanged
- Packed addresses (for example at input / output cards with 2-bit data width)
- Symbolic addresses outside the process image.
Here the data exchange via the SDF format can be used.
- Some connection point properties at analog modules (for example signal range)
- Redundant control systems (H-series)

Please refer to the online help system of the TIA Portal under the search term "Restrictions for CAx" for a detailed overview of all restrictions

2. SIEMENS STEP 7 TIA Portal

1. The **PLC type designation** corresponds to the Siemens order number as it is also specified in the hardware catalog of the PLC configuration program.
2. **Racks** are designated in ascending order with numerical values, beginning at "0". The CPU is always plugged at Rack "0".
3. The **Plug designation** is only exchanged at bus ports.
4. The **Start address** always has to be specified at input and output modules. If a module has an inputs and outputs, **Start address 2** is used for the outputs.
5. A PLC connection point (input / output) is exported correctly when
 - a) A valid **PLC address** is specified.
 - b) The **Data type** is filled.
 - c) If the [CPU: Name](#) property is correctly filled at the associated PLC box.
6. The **Station ID** is specified at each module.
7. The **Station type** is entered
 - a) at the module that represents the CPU.
 - b) At each head station if no device description file is specified.
8. The **MasterSystemID** is specified at the bus master and has the following values:
 - a) PROFIBUS: in the range of 1 to 99
 - b) Ethernet-based bus systems: greater than or equal to 100.
9. For the identification of the address use "I" at inputs and "Q" at outputs, so that the identifications do not change during an import.
10. Siemens remembers the **DT**.
11. If both the **PLC type designation** as well as a device description file are specified, the **PLC type designation** is used for the data exchange.
12. The **Channel designation** is a numerical value equal to or greater than 0.
13. The **Function text** is transferred in several languages.

14. A head station is identified by itself being a **rack** that is not placed on any rack and at which either the **Bus coupler / head station** check box or the **CPU** check box is activated (see also TechTipp "**TechTip-PLC-data-exchange**", chapter "Head station").
15. The **PLC card is placed on head station** check box has to be activated for PLC cards that are placed on the head station, are integrated into it and are not adjoined next to the head station.

2.1. ET200SP

1. If the ET200SP station contains a CPU, no separate rack is configured. Instead the CPU itself is the Rack "0". All other fields for rack assignment remain empty.
2. You can find additional information on the PLC data exchange with an ET200SP in the TechTip "**TechTip-Recommendation-for-PLC-items-with-base-and-pluggable-logic**".

2.1.1. Special feature IM155-6PN/3 HF

When using bus adapters in the IM155-6PN/3 HF head station, the following has to be observed: At the second adapter slot one of the two connection points is not used. In this case it is recommend to use a second part variant for the bus adapter (see also TechTipp "**TechTip-PLC-data-exchange**", chapter "Bus adapter"). Each part variant has the exact number of bus ports that are used for the respective slot / module.

2.2. ET200AL

All modules of an ET200AL station are configured on the shared rack (rack 0).

The head station is on slot / module 0, all other PLC cards on slot / modules 2 to 17 and 19 to 34.

Head station as PLC box

ID	Property	Value
20161	Configuration project	Not empty
20408	PLC station ID	Not empty
20409	Station type	ET200AL
20416	PLC type designation	For example 6ES7 157-1AB00-0AB0
20427	Rack	0
20164	Bus coupler / head station	<input checked="" type="checkbox"/>
20521	PLC subdevice 1: Name	ET_Con_1
20533	PLC subdevice 1: Position (slot / module)	1
20607	PLC subdevice 1: PLC type designation	For example 6ES7 157-1AB00-0AB0#BUILTIN
20522	PLC subdevice 2: Name	ET_Con_2
20543	PLC subdevice 2: Position (slot / module)	18
20582	PLC subdevice 2: PLC type designation	For example 6ES7 157-1AB00-0AB0#BUILTIN

A part can be stored at this box.

Bus ports that connect the ET200AL with the network also belong to this head station.

Settings at the bus ports, using Ethernet as an example

20447	Bus interface: Name	X1
20406	Plug designation	P1 R or P2 R
20308	Bus system	Ethernet

Further PLC cards as boxes

ID	Property	Value
20161	Configuration project	Like at the head station
20408	PLC station ID	Like at the head station
20409	Station type	ET200AL
20416	PLC type designation	Not empty
20410	PLC card is placed on rack ID	0
20411	Position (slot / module)	Not empty
20253 [1]	CPU name [1]	Not empty (see CPU-Name)

A part can be stored at this box.

The bus ports that connect the individual modules with each other also belong to the head station and to the individual modules.

Settings at the bus ports for the connection of the ET200AL with each other

First connection point:

20406	Plug designation	X30
20308	Bus system	ET connection
20384	PLC subdevice: Index	1

Second connection point:

20406	Plug designation	X31
20308	Bus system	ET connection
20384	PLC subdevice: Index	2

After a PLC data import the start addresses of the individual PLC cards have to be checked, a value of "-1" for the (new) export is not valid and must be corrected. The start address must either be empty or must have a value greater than / equal to "0".

Affected PLC cards can be determined in the PLC navigator with a filter. To this purpose select the **Start address of PLC card** property as the filter criterion:

Active	Negated	Criterion	Operator	Value
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Start address of PLC card	=	-1

The voltage supply connection points (plug designation: X80 oder X81) that connect the individual racks of the ET200AL to each other are not contained in the exchange file. Therefore configure these as device connection points in EPLAN.

2.3. ET200eco

The following PLC box has to be created for the configuration of an ET200eco station:

Head station as PLC box

ID	Property	Value
20161	Configuration project	Not empty
20408	PLC station ID	Not empty
20409	Station type	ET200eco
20427	Rack	0
20164	Bus coupler / head station	<input checked="" type="checkbox"/>
20521	PLC subdevice 1: Name	8 DIO DC24V/1.3A 8xM12
20533	PLC subdevice 1: Position (slot / module)	1

When using with the specification of the PLC type designation:

20416	PLC type designation	For example 6ES7 147-6BG00-0AB0
20607	PLC subdevice 1: PLC type designation	6ES7 147-6BG00-0AB0#BUILTIN

When using with the specification of the device description file:

20415	Device description: File name	For example GSDML-V2.25-SIEMENS-ET200ECO-20100910.XML
20381	Device description: Index in file	DIM 12
20606	PLC subdevice 1: Device description: Index in file	DAP/DIM 12#BUILTIN

The part is stored at this box.

All other PLC connection points belong to this head station.

Settings at the bus ports

ID	Property	Value
20447	Bus interface: Name	X1 (for all bus ports)
20406	Plug designation	P _x R, for all bus ports, whereby x = 1 ... Number of bus ports

Identify the first bus port as **Bus interface: Main bus port** and enter the relevant bus data here.

If PLC connection points can be either configured as inputs or as outputs, then you use the **PLC connection point, multi-function** function definition at these and set the direction (digital input or digital output) via the logic at the connection point.

2.4. Passive devices in Ethernet-based networks

It is possible to configure passive devices as an "EthernetDevice" so that the port-specific interconnection within an Ethernet-based network is exchanged during the PLC data exchange of passive devices (switches, bus repeaters or similar, see also TechTip "**TechTip-PLC-data-exchange**" Section "Passive devices"). These devices have a specified number of bus connection points that are all configured as "Network / bus cable connection point, general" (also see TechTip "**TechTip-PLC-data-exchange**", chapter "Automatic connections between connected bus ports").

EthernetDevice as head station

ID	Property	Value
20161	Configuration project	Not empty
20408	PLC station ID	Not empty
20427	Rack	0
20411	Position (slot / module)	1
20409	Station type	EthernetDevice
20416	PLC type designation	System:DeviceItem.EthernetDevice. Port _x , whereby x corresponds to the number of bus ports
20164	Bus coupler / head station	<input checked="" type="checkbox"/>

Settings at the bus ports

ID	Property	Value
20447	Bus interface: Name	X1 (for all bus ports)
20406	Plug designation	Px, for all bus ports, whereby x = 1 ... Number of bus ports

Identify the first bus port as **Bus interface: Main bus port** and enter the relevant bus data here.

Passive devices in Ethernet-based networks cannot be assigned to a logical network. Therefore the properties **Logical network: Name** and **MasterSystemID** have to remain empty, and the property **Logical network: Bus port is master** has to be deactivated.

3. Differences between STEP 7 TIA Portal and STEP 7 Classic

The following overview shows which properties are used differently with STEP 7 TIA Portal and STEP 7 Classic during a PLC data exchange.

The data input in EPLAN can be effected:

A = in the parts data

M = in the macro

P = in the project

We recommend entering the data preferably in the parts data and / or in the macros.

Note:

In most cases it is possible to use the same parts database for both the PLC data exchange with STEP 7 TIA Portal as well as with STEP 7 Classic.

The main difference consists of the values for the **Channel designation** (ID 20428). The other properties have additional values for the TIA Portal. PLC cards with these new / additional values can as a rule not be exchanged with STEP 7 Classic since these PLC cards are unknown there and are not supported.

The property **Device description: Index in file** (ID 20381) is not used for the exchange with STEP 7 Classic and is not considered there.

If necessary, you can create part variants in the EPLAN parts management.

PLC connection point:

ID	Property	Usage in		Data input		
		TIA	Classic	A	M	P
20384	PLC subdevice: Index	✓	-	X	X	X
20428	Channel designation*	✓	✓	X	X	X

* Different values in STEP 7 TIA Portal and STEP 7 Classic:

20428 Channel designation	
<i>STEP 7 Classic</i>	<i>Inputs are specified with "Inx", outputs with "Outx", whereby x is a consecutive value equal to or greater than 0.</i>
<i>STEP 7 TIA Portal</i>	<i>(Numerical) value equal to or greater than 0</i>

PLC bus port:

ID	Property	Usage in		Data input		
		TIA	Classic	A	M	P
20448	Bus interface: Main bus port	✓	-	-	X	X
20447	Bus interface: Name	✓	-	X	X	X
20386	Physical network: Bus ID / item number 2	✓	-	-	-	X
20313	Data transfer rate	-	✓	-	X	X
20289	Integrated module	-	✓	-	X	X
20312	Subslot	✓	✓	-	X	X
20308	Bus system *	✓	✓	X	X	X
20446	Subnet mask	✓	-	-	X	X

* Different values in STEP 7 TIA Portal and STEP 7 Classic:

20308 Bus system	
<i>STEP 7 Classic</i>	<i>MPI bus, PROFIBUS, Ethernet or PROFINET</i>
<i>STEP 7 TIA Portal</i>	<i>MPI bus, PROFIBUS, Ethernet, ASi</i>

PLC card:

ID	Property	Usage in		Data input		
		TIA	Classic	A	M	P
20437	PLC card name	✓	-	-	-	X
20164	Bus coupler / head station	✓	-	X	X	X
20381	Device description: Index in file	✓	-	X	X	X
20521ff.	PLC subdevice x: Name	✓	-	X	X	X
20533ff.	PLC subdevice x: Position (slot / module)	✓	-	X	X	X
20454, 20382, 20392ff. 20452ff.	PLC subdevice x: Start address (inputs)	✓	-	-	-	X
20455ff., 20478ff., 20515ff.	PLC subdevice x: Start address (outputs)	✓	-	-	-	X
20607, 20582 ff.	PLC subdevice x: PLC type designation	✓	-	X	X	X
20606, 20593 ff.	PLC subdevice x: Device description: Index in file	✓	-	X	X	X
20417	Object description	-	✓	X	X	X
20432, 20299	Address range (SIEMENS STEP 7 Classic), Address range 2 (SIEMENS STEP 7 Classic)	-	✓	X	X	X
20289	Integrated module	✓	✓	-	X	X
20444	PLC card is placed on head station	✓	-	X	X	X
20312	Subslot	-	✓	-	X	X
20439	Safety address **	✓	-	-	-	X
20409	PLC station type *	✓	✓	X	X	X

* Different values in STEP 7 TIA Portal and STEP 7 Classic:

20409	PLC station type
<i>STEP 7 Classic</i>	<i>S7300, S7400, S7400H, PC_BASED, HMI_BASED</i>
<i>STEP 7 TIA Portal</i>	<i>S7300, S7400, S71200, S71500, ET200AL, PC, ET200ecoPN, ET200SP, ET200ISP, ET200M, ET200S, ET200Pro, ASi, S7mEC, Scalance/X200IRT, among other things</i>

** Exchange as of AML version 1.1.0

Tip:

In the TIA Portal the **Device description: Index in file** property is visible in the "Type Identifier" field of the hardware catalog if it is enabled via the setting "Activate display of the type identifier for devices and modules" (can be accessed in the menu "Extras > Settings" in the group "Hardware configuration > Information on product support").