TechTip: PLC data exchange

Contents

1. Use

The multiple entry of data is avoided through the data exchange. This reduces the work load across departments and avoids typing errors. The configuration is accelerated overall and the planning quality is improved.

For the fundamental description of a property please refer to the current EPLAN help:

- Terminals, Cables, Plugs, and PLC Information > PLC > Basics
- EPLAN Properties: Overview

Further notes and specifications for individual properties can also be found in the **TechTip: Overview of the PLC properties.**

With Version 2.7 of EPLAN Electric P8 numerous new check runs which help you in configuring the data exchange were implemented in the PLC field.

2. Exchanged data

1. Hardware data
   Rack structure with part information.

2. Symbol table (assignment list, table of variables or similar)
   Contains the assignment of the symbolic address to a hardware address.

3. Network structure logical view (association of the devices to networks), not the exact cabling.

The data exchange is based on a file that can be exchanged simply between the EPLAN designer and the PLC programmer. Data that an editing program does not find in the exchange file because the other editing program does not know them, are supplemented during importing. EPLAN supplements the further required data from the parts management.

PLC configuration programs and EPLAN are based on different points of view.
EPLAN configures electrical engineering hardware details such as voltage supply, etc.
PLC configuration programs have a logical view for the software programming.

Through the different views of the programs and the current developments on the hardware and software sector, the data exchange cannot always cover all the requirements. The applies for example to passive items in the bus bundle and used field bus systems.

3. Recommended workflow in EPLAN

3.1. Physical rack layout

Begin with the rack layout on a single-line schematic page.
Use single-line PLC boxes as main functions.

Advantages:

1. The hardware data of the used devices is planned through the rack layout. All the main functions exist in the single-line representation. When this representation is copied, the parts entered there are copied as well.

2. Individual functions (I/O connection points, power supply, bus ports, etc.) can be placed via drag & drop from the PLC navigator.

3. The rack layout can be exchanged with PLC configuration programs.

The following properties must be filled at PLC cards that represent modules and / or racks:

ID	Property
20427	**Rack** at a rack
20410	**PLC card is placed on rack ID** at modules on a rack
20411	**Position (slot / module)** at modules on a rack. As a rule this field remains empty at racks or head stations.

EPLAN assumes that devices on the same rack are connected by means of a "backplane". This is not configured separately.

Tip:

Use the "edit in table" function to achieve effective editing of the specifications. Special schemes are available here.

3.1.1. Head station

A **head station** is identified by being a rack and either has the **Bus coupler / head station** check box, is not placed on a rack, or the **CPU** check box is activated.

PLC cards which are directly placed on the head station or are integrated into it, are identified by the check box **PLC card is placed on head station**. For the corresponding position on the head station, the **Position (slot / module)** property is used.

For PLC cards that are adjoined next to the head station the **PLC card is placed on head station** check box remains deactivated. For the corresponding position next to the head station, the **Position (slot / module)** property is used.

The **PLC card is placed on head station** property is used during PLC data exchange in AML format.

3.1.2. Extension racks

Extension racks have to be connected with the main rack via bus ports. Enter the configuration project that belongs to the PLC box, use the "Local-Bus: Extension" bus system at the bus port. Further properties are not required in the AML format. Activate the **Do not check bus ID** check box at the bus port to suppress the error checking 004037.

3.1.3. Passive devices

Passive devices as well as devices that should not or cannot be exchanged with the PLC configuration program can be used for the configuration of the bus topology.

1. Terminals, pins: To do so activate the **Net-connecting** check box on the **Symbol / function data** tab.

4. Passive switches, bus repeaters, and similar units:

    a) When using a PLC box: The **PLC structure data** tab remains completely empty, no PLC-specific properties are required.

    b) When using a black box: The settings for bus capable devices are not required and remain empty. Details on the individual properties can also be found in the **TechTip: Overview of the PLC properties,** Chapter "Settings at bus-capable devices".

    c) Bus ports are configured as "Network / Bus cable connection points, switch connection point". Since these bus ports are treated as busbar connection points, no specifications are required on the **Bus data** tab.

    The network structure is exported in the AML format, the topology view ("port to port switching") is incomplete, however.

3.2. I/O interconnection

Place the I/O connection points with the associated sensors / actuators on multi-line schematic pages.

Use bitwise representation (meaning one macro per channel) with functional grouping of the devices.

Advantages:

1. Once macros have been created they can be used repeatedly for similar machine functions.
2. I/O connection points or channels can be placed via drag & drop from the PLC navigator or assigned.
3. You can check the assignment in the PLC navigator or on a PLC overview page.

3.2.1. Safety controllers

PLC cards that can check multiple connection points each for sameness or difference are often used for safety controllers. At such safety-relevant components PLC configuration-programs often treat multiple connection points as one channel. Since only one channel may be active in EPLAN, identify further connection points of the channel with the property **Deactivated I/O connection point**. This way these connection points are not filled with ambiguous data for the PLC configuration program during the PLC data exchange.

To allow the post-addressing of these connection points in EPLAN, enter the same value in the **Channel designation** field for each of the combined connection points.

3.3. Network structure

Connect the single-line bus ports of the modules via autoconnecting. Bus ports are by default net-connecting and signal-transmitting.

Advantages:

1. The network structure can be documented clearly by connecting the single-line bus ports.

2. The network structure can be exchanged with PLC configuration programs. The logical view (association of the devices to networks), is always exchanged. The export / import of the exact cabling depends on the bus system and the exchange format used.

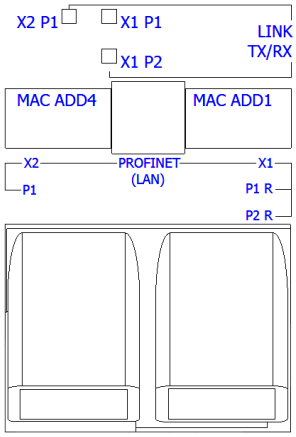
The following properties have to be filled at the bus ports:

ID	Property
20406	**Plug designation**
20308	**Bus system**
20311	**Physical network: Bus ID / item number**
20413	**Physical network: Name**
20414	**Logical network: Name**
20447	**Bus interface: Name** at Ethernet-based bus systems

For the bus ports the **Plug designation** is identifying together with the **Bus interface: Name** property.

In Ethernet-based bus systems, associated bus ports are combined to a bus interface via the bus interface name. You can recognize this by the respective specifications in the manual or through labels on the PLC card.

Example for the Siemens module 6ES7516-3AN01-0AB0:



This PLC card has three bus ports for Ethernet-based bus systems:

Connection point	**Plug designation**	**Bus interface: Name**
1	P1 R	X1
2	P2 R	X1
3	P1	X2

In the process the connection points 1 and 2 form a bus interface, connection point 3 forms a second bus interface.

EPLAN treats the following bus systems equivalently during exporting / importing, because they have the same hardware topology (Ethernet-based bus systems):

- CC-Link IE
- CC-Link IE Control
- CC-Link IE Field
- CC-Link IE Field Basic
- EtherCAT
- Ethernet
- EtherNet/IP
- Modbus TCP
- Powerlink
- PROFINET
- SERCOS III
- VARAN

3.3.1. Automatic connections between associated bus ports

The following network / bus cable connection points are considered as belonging together and are automatically connected to each other through an internal connection if they have the same DT and to the same bus system:

1. *Input* and *output*
   Enter data only at the *input*.

2. *General* network / bus cable connection points with the same *bus interface name*
   Only in Ethernet-based bus systems (see chapter "Network structure").
   Enter data only at the main bus port of the bus interface.

The check run 004040 can be used to find contradictory data.

It is mandatory that the following properties be filled at the PLC bus port:

ID	Property
20161	**Configuration project**
20006	**DT**
20406	**Plug designation**
20308	**Bus system**
20447	**Bus interface: Name** at Ethernet-based bus systems

The check run 004040 outputs a message if one of the following properties is different:

ID	Property
20413	**Physical network: Name**
20414	**Logical network: Name**
20310	**Logical network: Bus port is master**
20311	**Physical network: Bus ID / item number**
20386	**Physical network: Bus ID / item number 2**
20309	**DNS/PROFINET device name**
20313	**Data transfer rate**
20289	**Integrated module**
20334	**MasterSystemID**
20312	**Subslot**

ID	Property
20186	Marked for deletion
20446	Subnet mask

A check is carried out if the property to be checked is not empty at the second bus port.

If the property to be checked is empty at the first bus port and is filled at the second bus port, a message is also output.

4. Export from EPLAN

Before the export from EPLAN:

1. Check the project by means of the check runs from the 004 range. EPLAN makes schemes available to you here that you use or adjust according to you requirements.

2. Delete the data not required at the auxiliary function (**Project > Organize > Compress > Settings > Remove project data > Remove PLC structure data at PLC auxiliary functions**).

4.1. Hardware data

1. The EPLAN export references a **configuration project** that is specified at all the associated PLC boxes and bus ports.

2. Bus ports are represented single-line.

3. A device is identified with the **CPU** property (check box is activated).
   The complete CPU name in the form `[Configuration project].[Station ID].[CPU identifier]` must be unique project-wide.

4. The device identification is effected by means of

   a) the **PLC type designation** property or

   b) a device description file (e.g. GSD / GSDML / EDS file, property **Device description: File name** property) and the **Object description** or

   c) a device description file (e.g. GSD / GSDML / EDS file, property **Device description: File name** property) and the **Device description: Index in the file** at the data exchange in AML format.

The **PLC type designation** as a rule corresponds to the order number in the hardware catalog of the respective PLC configuration program. The exact spelling is important.

Every PLC card can only have **one** device identification. A combination of several parts by entering several PLC type designations, device description files or indexes is not supported.

PLC connection points of the following categories are not exchanged:

- General
- 2 connection points
- Power supply
- Card power supply.

4.2. Assignment list

A PLC connection point (input / output) existing in a assignment list (symbol table) is exported if the following conditions are fulfilled:

1. Only PLC connection points with the following function definitions are exchanged:
   a. PLC connection point, DI
   b. PLC connection point, DO
   c. PLC connection point, AI
   d. PLC connection point, AO
   e. PLC connection point, multi-function with the type of signal
      - Digital input
      - Digital output
      - Analog input
      - Analog output

   (Exception: PLC standard exchange format, all PLC connection points are exchanged here)

2. A PLC connection point, multi-function is treated with its logic like the corresponding I/O connection. For example
   PLC connection point, multi-function, type of signal digital input corresponds to *PLC connection point, DI*

3. A CPU exists in a configuration project.

4. The **symbolic address** is specified. The symbolic address must be unique within a CPU.

5. The **Data type** (Boolean, byte, etc.) is specified.

6. The associated PLC box is assigned to a CPU by specifying the CPU: Name property. The correct and complete specification of the CPU name at the PLC box is required so that the assignment list (designation in the AML format: "TagTable") can be completely exported.

5. Import in EPLAN

During importing EPLAN supplements item data such as inputs / outputs from the parts data.

1. The device identification is effected by means of

   a) the **PLC type designation** property or

   b) a GSD / GSDML / EDS file (**Device description: File name** property) and the **Object description** or

   c) a GSD / GSDML / EDS file (**Device description: File name** property) and the **Index in file** at the data exchange in AML format.

2. If items with placeholder characters (such as "*" and "?") are found in the PLC type designation in the parts database during an import into EPLAN, the first suitable part is used (PLC configuration programs do not always differentiate between parts that are equivalent electrotechnically).

3. If multiple parts with the same **PLC type designation** are found during the import in EPLAN, the first of those parts with the matching **Object description** (in as far as this import file is available) is assigned. If no part has a matching object description, the first found part is assigned.

4. If no appropriate part is found, a simple PLC box is created.

In these cases messages are output so that the imported devices can be checked subsequently.

Device and PLC connection points that are available in the project but not in the import file, have the **Marked for deletion** property assigned during import. These objects can be filtered in the PLC navigator and subsequently be edited. Deactivate this property after the check or editing.

6. Preparation of parts data

In the parts management the appropriate properties have to be filled or the check boxes activated:

ID	Property
22105	PLC type designation
22038	Object description
22037	Device description: File name
22283	Device description: Index in file
22269	Station type
22019	Bus coupler / head station
22020	CPU
22052	Power supply
22053	Bus distribution device

The following function templates are defined:

1. Each PLC device has a PLC box.

2. Each connection point of the PLC device is defined as a function template.

3. The **channel designation** is filled at inputs and outputs.
   Because of the possible combination of connection points, we recommend entering the **Channel designation** for safety controllers not at the parts but in the project.

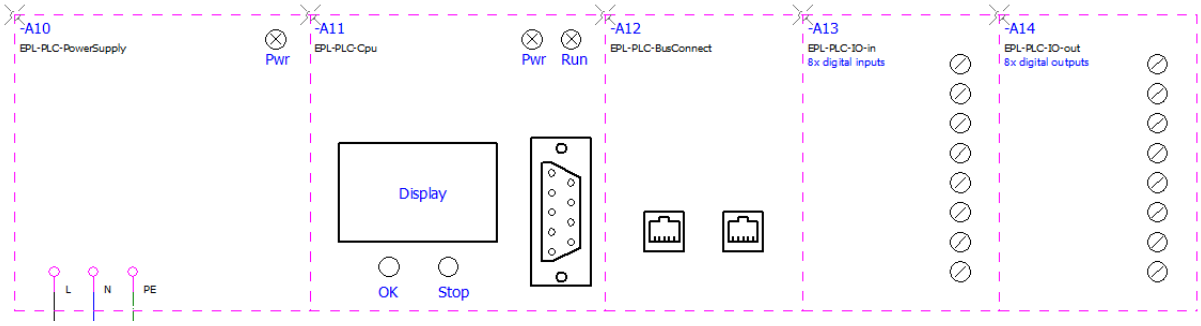
4. A bus port (port / plug) only has **one** function definition.
   The following applies at the function definition of the bus port:

ID	Property	Value
20406	Plug designation	Is filled
20447	Bus interface: Name	Has to be filled for Ethernet-based bus systems
20308	Bus system	Is filled
21000	Connection point designation	Is empty
21007	Connection point description	Is empty

7. Recommendation EPLAN macros

EPLAN recommends prepared macros for standardization:

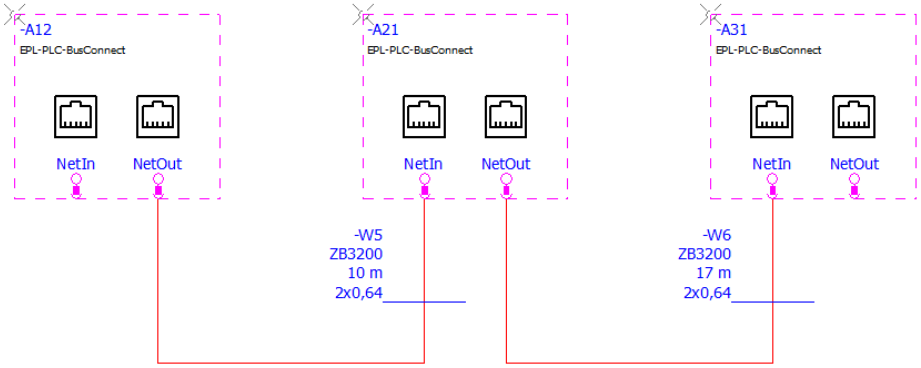
1. Physical mapping of the rack structure.
   Representation type "single-line", main function



2. Overview of complete I/O card as graphical control of the channel assignment.
   Representation type "Overview"

3. Channel-wise mapping of the I/O for functionally oriented schematics.
   Representation type "Multi-line"
   (can also be dragged-and-dropped from symbols.)

4. Bus ports for mapping the network structure.
   Representation type "Single-line"
   (Separate compact representation or summary with 1.)



5. Voltage supply (power supply).
   Representation type "Multi-line"
   (Separate compact representation or summary with 1.)

Additional information on the creation of macros can be found in the **TechTip-PLC-Procedure-at-unknown-PLC-cards**.

8. AutomationML

Details of the individual properties are available in the **TechTip PLC overview of the properties.**

Free symbolic addresses (which are not assigned to any PLC connection point) can be exported and imported in AutomationML format via the PLC data exchange. After the import of an AutomationML file, the free symbolic addresses existing there are available in EPLAN.

In the following sections you find special features on different devices.

8.1. PC station

1. The PC is a separate station and is configured as Rack "0". All other fields of the rack assignment remain empty.

2. The **Bus coupler / head station** check box is to be activated.

8.2. Switches

1. The switch is an own station and is configured as **Rack** "0". All other fields of the rack assignment remain empty.

2. The **Bus coupler / head station** check box is to be activated.

3. Bus ports:

    a) A bus port has the function definition "Network / bus cable connection point, input". All the required interface data are entered here (among other things **Physical network: Bus ID / item number**, **Bus interface: Main bus port**)

    b) All the other bus ports have the function definition "Network / bus cable connection point, output". Here the specifications **Physical network: Name**, **Logical network: Name** and **Physical network: Bus ID / item number** can, among other things, be empty.

Example "SCALANCE X200IRT" of SIEMENS

PLC box:

ID	Property	Value
20416	PLC type designation	6GK5 204-0BA00-2BA3
20409	PLC station type	Scalance/X200IRT

Bus ports:

20447	**Bus interface: Name**	`X1` (for all bus ports)
20406	**Plug designation**	`Px R`, for all bus ports, whereby x=1...n

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

8.3. Bus adapter

Stations of the ET200SP type or similar or of a SCALANCE router require bus adapters (media modules) to which the network connections are connected.

These bus adapters are not configured as accessories but as PLC boxes with the associated bus ports.

PLC box:

ID	Property	Value
20161	**Configuration project**	Not empty
20416	**PLC type designation**	e.g. `6ES7 193-6AR00-0AA0`
20410	**PLC card is placed on rack ID**	Like head station
20411	**Position (slot / module)**	Not empty
20444	**PLC card is placed on head station**	☑

8.4. Subdevices

A PLC card can consist of several integrated modules (subdevices) that each have separate Address ranges and start addresses. Each subdevice is defined by corresponding properties. Up to twelve subdevices can be specified (in the text below x designates the number of the subdevice 1…12).

Subdevices do not have their own **PLC type designation** or specifications on a device description file and are exported when they have at least one start address.

Note:

If a PLC card has no subdevices (meaning that it only consists of one module), definitions for these can be omitted. The value "0" or "1" is entered (both values have the same meaning) at the **PLC subdevice: Index** property at the associated PLC connection points.

Further information on the definition of subdevices is available from your PLC manufacturer.

9. SIEMENS STEP 7 TIA Portal and STEP 7 Classic

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.

Currently the following points are not supported in the AML format or in the CAx format defined by SIEMENS:

- 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)

9.1. STEP 7 TIA Portal

The data exchange is effected in AutomationML format, see Chapter "AutomationML".

Note:

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

In addition to the restrictions in Chapter 9, amongst other things, the following points are currently not supported in the AML format:

- Exchange of accessories. 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

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

1. For the identification of the address use "I" at inputs and "Q" at outputs, so that the identifications do not change during an import.

2. Siemens remembers the **DT**.

3. 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.

4. The **Channel designation** is a numerical value equal to or greater than 0.

5. The **Function text** is transferred in several languages.

6. 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 Section "4.2.1 Head station").

7. 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.

9.1.1. 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. Additional information about the bus data exchange with an ET200SP is available in the **TechTip: Recommendation for PLC items with base and pluggable logic**.

9.1.2. ET200AL

The following PLC boxes have to be created for the configuration of an ET200AL station:

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	☑

A part can be stored at this box.

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

An additional (virtual) rack has to be created for the individual PLC cards on which the additional cards are then aligned:

Rack as PLC box

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	`System:Rack.ET200AL/Extension`
20427	Rack	`1`

No part is stored at this box.

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	`1`

ID	Property	Value
20411	Position (slot / module)	Not empty
20253 [1]	CPU name [1]	Not empty (see CPU name)

A part can be stored at this box.

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
☑	☐	Start address of PLC card	=	-1

Bus ports that connect individual racks of the ET200AL to each other are not contained in the exchange file. Therefore configure these as device connection points in EPLAN.

9.1.3. Passive devices in Ethernet-based networks

It is possible to configure passive devices as an "EthernetDevice" so that the "port-to-port interconnection" within an Ethernet-based network is exchanged during the bus data exchange of passive devices (switches, bus repeaters or similar devices, see also Section "4.2.3 Passive devices"). These devices have a specified number of port connection points that are all configured as "Network / bus cable connection point, general" (also see Section "4.3.1 Automatic connection 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.Portx`, whereby x corresponds to the number of ports
20164	Bus coupler / head station	☑

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 ports

9.2. STEP 7 Classic

1. As of STEP 7 V5.6 Siemens remembers the **DT** which can then also be changed.
2. If both **PLC type designation** as well as a device description file are specified, the device description file together with the **Object description** is used for the data exchange.
3. At the **Channel designation** inputs are specified with "Inx", outputs with "Outx", whereby x is a consecutive value equal to or greater than 0.
4. The **Symbolic address** may have a maximum length of 24 characters. Quotation marks (") are not permitted.
5. The **Object description** always begins with "IM" at IM modules.
6. The **Address range (SIEMENS STEP 7 Classic)** has to be specified at input and output modules. If a module has inputs and outputs, **Address range 2 (SIEMENS STEP 7 Classic)** is used for the outputs.
7. At PROFINET slaves the **Bus address** corresponds to the device number.

Networks / topology information:

The bus structure / network structure is replaced.

However, no information that describes at which plug / port the network is connected is contained in the SIEMENS STEP 7 Classic CAx format ("port to port interconnection").

9.3. 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 bus 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
STEP 7 Classic	*Inputs are specified with "Inx", outputs with "Outx", whereby x is a consecutive* value equal to or greater than 0.
STEP 7 TIA Portal	*(Numerical) value equal to or greater than 0*

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
STEP 7 Classic	*MPI bus, PROFIBUS, Ethernet or PROFINET*
STEP 7 TIA Portal	*MPI bus, PROFIBUS, Ethernet, ASi*

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

ID	Property	Usage in		Data input		
		TIA	Classic	A	M	P
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
20409	PLC station type *	✓	✓	x	x	x

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

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

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").

10. SIEMENS TIA Selection Tool

The data exchange is effected in AutomationML format, see also Chapter "AutomationML".

The BaseUnits of an ET200 can also be exchanged as accessories with the TIA Selection Tool, see also **TechTip: Recommendation for PLC items with base and pluggable logic.**

BaseUnits are considered under the following conditions during the PLC bus data exchange:

1. The data exchange is performed in the TIA Selection tool with the target system "ECAD".

2. The BaseUnits are stored in the EPLAN parts management with a PLC type designation.

For the export from EPLAN Electric P8, the accessories must be specified as an additional part number at the electronics module. During an import in EPLAN Electric P8 the accessories are entered as an additional part number at the electronics module.

Restrictions in the TIA Selection Tool during import:

- Symbolic addresses and function texts are not imported.

11. Rockwell Automation Studio 5000 and Studio 5000 Architect 20/21

1. 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.
2. **PLC type designation** is called "Catalog number" at Rockwell.
3. The **Function text** (is called "Comment" for Rockwell) is transferred in multiple languages.
4. The **Symbolic address** may not contain any blank.
5. The **CPU** property must be activated at the controller.
6. Rockwell remembers the DT.
7. If a project has to support both exchange formats, the properties **Rack** and **PLC card name** must be filled identically.

11.1. Rockwell Automation Studio 5000

The data exchange is effected in AutomationML format, see also Chapter "AutomationML".

Note:

The new **TechTip: PLC data exchange with Automation Studio 5000 of Rockwell** is available for the upgrade from Studio 5000 Architect 20/21 to the new AML format used in Automation Studio 5000.

11.2. Rockwell Studio 5000 Architect 20/21

While the structure of the modules is defined in standard cases via the properties **Rack ID** and **Module is placed on rack ID**, the **PLC card name** property must be used for the Rockwell format instead of the **Rack ID** property.

11.2.1. The following device families are supported

- ControlLogix (1756)
- CompactLogix (1768/1769)
- Point IO (1734)
- Flex (1794/97)

1. The tag name is transferred (**Symbolic address**), **Data type**, **Channel designation**.

2. A **rack** (rack / chassis or DIN rail / rail) must always be configured.

3. The **PLC card name** property contains the name of the device in RsLogix.

4. EPLAN generates a unique Rockwell-conform GUID during exporting that is saved in the **PLC object ID** property.

5. SubModules / Built-In Modules (for example 1769-L23x) are mapped via the **Plug designation**.

11.2.2. The following connections are exchanged

- ControlNet
- DeviceNet
- Ethernet
- Compact Logix Expansion

- Only generic switches are supported (no Stratix switches). - The exchange only takes Base Tags into consideration. Alias tags are not supported. - The hardware address is not transferred.

11.2.3. ControlLogix

The position of PLC cards on a rack is managed by the **Position (slot / module)** property. Counting direction is from left to right.

11.2.4. CompactLogix / Point IO / Flex

1. EndCaps are included in transferring.

2. When the rack is selected, a power supplyunit (PowerSupply) must always be specified as well.

3. The method of counting of the position of the PLC cards on the rack is no longer only from left to right, but can be effected in both directions.

4. The size of the rack must be specified by means of the properties **Number of positions in the rack** and **Number of positions in the rack (left)**.

5. The actual sequence of the devices on the rack is specified by means of the **Sort code (for position in rack)** property.

11.2.4.1. CompactLogix 1768

a) PowerSupply and Controller are not included in the count of the number of positions.

b) Devices are located on the right and left of the controller.

c) PowerSupply and devices / cards of the 1768 family are configured to the left of the controller.

d) Devices / cards of the 1769 family are configured to the right of the controller.

11.2.4.2. CompactLogix 1769-L3x

a) Only the PowerSupply is not included in the count of the number of positions

b) Devices are located to the left and right of the PowerSupply.

11.2.4.3. CompactLogix 1769-L23x

a) The **Number of positions in the track (left)** property does not have to be set.

b) The embedded input / output modules are identified via the **Plug designation**.

11.2.4.4. Flex 1794/97

a) Basic modules 1794-TBX are not taken into consideration during the data exchange

b) The **Number of positions in the track (left)** property does not have to be set.

c) The **Position (slot / module)** property is not set at PowerSupply and Controller. To the right of this counting begins at "0".

d) Flex Daughter Cards on the controller are managed in EPLAN by making the controller a rack and configuring the Daughter Cards as PLC cards on this rack.

12. Schneider-Electric Unity Pro XLS

1. A PLC connection point (input / output) is only exported if the following property is filled:

ID	Property
20407	**Channel designation**
20405	**Data type**

2. The **Station type** contains the specification of the PLC card type and is to be specified at each device.

3. At the "drop" station type the type of the drop is specified in the **Object description**.

4. Identify the power supply modules (activate the **Power supply** check box).

5. Power supply modules are always plugged into Slot / module "-1".

6. Counting of the slots / modules begins at "0" for the control families Premium or M340 and at "1" for the Quantum.

7. **Racks** are specified with their topological addresses in the form "\<Bus position>.<Node number>\<Rack position>".

8. Exchanging of the bus systems depends on the used control family:

   a) M340: Import of CANOpen
   b) Premium: Import and export of Fipio
   c) Quantum: Import and export of RIO or DIO bus

Currently some of the connection point properties at analog modules are not supported in the format defined by Schneider Electric.

13. Beckhoff TwinCAT3 and TwinCAT2

1. The **PLC type designation** as a rule consists of a two-digit character combination and a four-digit numerical combination.

2. The **Symbolic address** complies with IEC 61131 and may not contain special characters such as umlauts or double underlines.

13.1. TwinCAT3

The data exchange is effected in AutomationML format, see also Chapter "AutomationML".

Note:

The **TechTip: PLC data exchange with TwinCAT3 from Beckhoff** is available for the upgrade from TwinCAT2 to the new AML format used in TwinCAT3.

1. If both **PLC type designation** as well as a device description file are specified, the **PLC type designation** is used for the data exchange.

2. The **Channel designation** is a numerical value equal to or greater than 0.

3. The **Function text** is transferred in several languages.

4. Each stations begins with a bus coupler or a CPU. The associated check boxes (**CPU** or **Bus coupler / head station**) have to be activated here. The **Rack** property has to be filled with the value 0.

5. Each station has exactly one rack.

6. The bus ports of the backplane are not drawn exactly. The following PLC cards are assigned to the CPU or the bus coupler, the **PLC card is placed on rack ID** property has be filled with the value 0.

7. For EtherCAT the bus port network / bus cable connection point, general is used. The **Logical network: Bus port is master** check box must be activated at the bus port at which the bundle begins.

13.2. TwinCAT2

1. Bus couplers with downstream connected PLC cards (C-bus / EtherCAT) are considered as a module, meaning that the bus coupler is defined as a **rack**. The bus ports of the backplane are not drawn, but rather the downstream PLC cards are assigned to the bus coupler with the **PLC card is placed on rack ID** property. The bus system and the bus address are specified at the PLC box.

2. At industrial PC solutions (with card) the card is drawn as a PLC box and identified as a **CPU**. The bus data are assigned to the bus ports on the card.

3. The following bus ports are used on the card at a C-bus:

    a) IN = Network / Bus cable-connection point, end
    b) OUT = Network / bus cable connection point, source
    c) At OUT the **Logical network: Bus port is master** check box has to be activated.

4. At Embedded PC (CX) the PLC box is identified as a CPU. Here the type for the interface of the subsequent bus ports is specified at the PLC type designation (for example ETHERCATPROT). Afterwards any PLC cards (for example bus couplers) can follow on the internal bus. Therefore the bus coupler to the subsequent bus ports has to be identified as **Bus coupler / head station**. In addition the bus system at the PLC box is specified here ("EtherCAT" or "Other bus systems" for C bus).

5. The following bus ports are used for EtherCAT:

    a) Network / bus cable connection point, general
    b) Network / bus cable connection point, input
    c) Network / bus cable connection point, output
    d) The **Logical network: Bus port is master** check box must be activated at the CPU (the bus begins here).

6. TwinCAT2 always expects a CPU and a bus coupler in the export file.

7. Necessary port descriptions at bus ports in EtherCAT systems are stored in the **Channel designation** property.

13.2.1. CPU with integrated bus coupler

When using CPUs with integrated bus coupler configure two PLC boxes (main functions) with an own device tag each (not nested, even if it is actually one device) in EPLAN.

CPU as PLC box

ID	Property	Value
20416	PLC type designation	ETHERCATPROT
20161	Configuration project	Not empty
20427	Rack	1
20411	Position (slot / module)	0
20167	CPU	☑
20253 [1]	CPU name [1]	I/O - configuration

A part can be stored at this box.

Bus coupler as PLC box

ID	Property	Value
20416	PLC type designation	EK1100
20161	Configuration project	Like at the CPU
20410	PLC card is placed on rack ID	1
20411	Position (slot / module)	0
20164	Bus coupler / head station	☑
20253 [1]	CPU name [1]	I/O - configuration
20289	Integrated module	☑
20311	Physical network: Bus ID / item number	Not empty
20308	Bus system	EtherCAT

No part is stored at this box.

After the import in EPLAN

There is no rack structure in an export file of TwinCAT2.
The CPU is not specified exactly, but is generally defined as `ETHERCATPROT`.
EPLAN can therefore not recognize whether a bus coupler is an independent device or is integrated into the CPU.

The imported bus structures have to be manually supplemented / corrected in EPLAN:

At the CPU

ID	Property	Value
20427	**Rack**	1
20411	**Position (slot / module)**	0

Select the used CPU on the **Parts** tab.

At the bus coupler

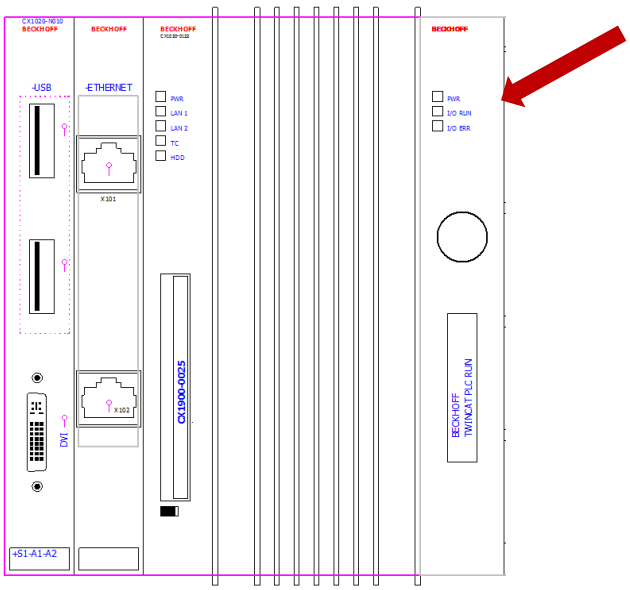
ID	Property	Value
20410	**PLC card is placed on rack ID**	1
20411	**Position (slot / module)**	0
20164	**Bus coupler / head station**	☑
20289	**Integrated module**	☑

Delete the part on the **Parts** tab.

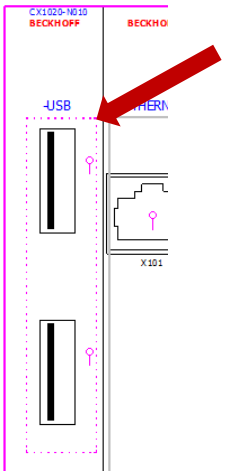
13.2.2. USB bus

TwinCAT2 expects either a Control Panel (for example CPX8XX) or a bus coupler (for example BK9500) at the USB bus port.

1. Configure the PLC box for the CPU in EPLAN.

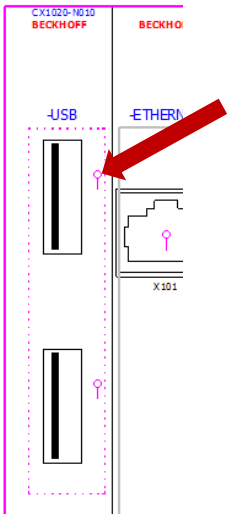


2. Create a separate PLC box with the following properties in the CPU:



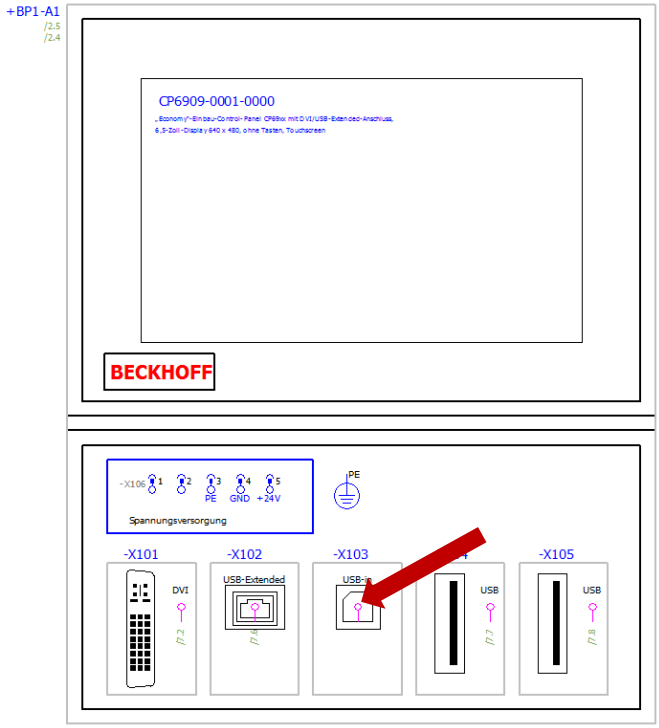
ID	Property	Value
20416	PLC type designation	USB
20161	Configuration project	Not empty
20427	Rack	Like at the CPU
20411	Position (slot / module)	0
20253 [1]	CPU name [1]	I/O - configuration

3. Configure the USB connection point at the CPU with the following properties in EPLAN



ID	Property	Value
20026	Function definition	Network / bus cable connection point, source
20021	Representation type	Single-line
20161	Configuration project	Like at the CPU
20413	Physical network: Name	Not empty
20414	Logical network: Name	Not empty
20310	Logical network: Bus port is master	☑
20308	Bus system	USB

4. Configure the USB connection point at the bus node (for example panel) with the following properties in EPLAN:



ID	Property	Value
20026	Function definition	Network / bus cable connection point, input
20021	Representation type	Single-line
20161	Configuration project	Like at the CPU
20413	Physical network: Name	Like at the master
20414	Logical network: Name	Like at the master
20310	Logical network: Bus port is master	☐
20308	Bus system	USB

After the import in EPLAN

The imported bus structures have to be manually supplemented / corrected in EPLAN:

At the PLC box for the USB connection point

ID	Property	Value
20427	**Rack**	Like at the CPU
20411	**Position (slot / module)**	0

Establish the single-line bus connections graphically (in as far they do not already exist). In the process you are supported by the following check runs in finding missing connections:

- Check run 004050
- Check run 004051

13.3. Differences between TwinCAT3 and TwinCAT2

The following properties that were used with TwinCAT2 are not used anymore for the PLC data exchange with TwinCAT3:

At PLC boxes:

ID	Property
20308	**Bus system**
20311	**Physical network: Bus ID / item number**

At bus ports:

ID	Property
20428	**Channel designation**