



Application Note

for

Connecting a S7-1500

to the

S7A Driver V8

Date: 02.01.2020

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1. Introduction

1.1 Purpose of this document

This document describes the special settings in the Siemens TIA-Port V12 to connect a S7-1500 to the S7A driver

1.2 Target group

This document is for iFIX-Application developers, who intend to configurate the connection between the S7A driver and a S7-1500 controller.

1.3 Definitions and Akronyms

1.3.1 Akronyms

TIA - Totally Integrated Automation

1.4 Typografical conventions

Italic is used for the dialog-, directory-, host- and domain-names as well as for options

Blue text color is used for the titel of dialog windows and property pages.

Orange text color is used for marking buttons, checkboxes and menu items

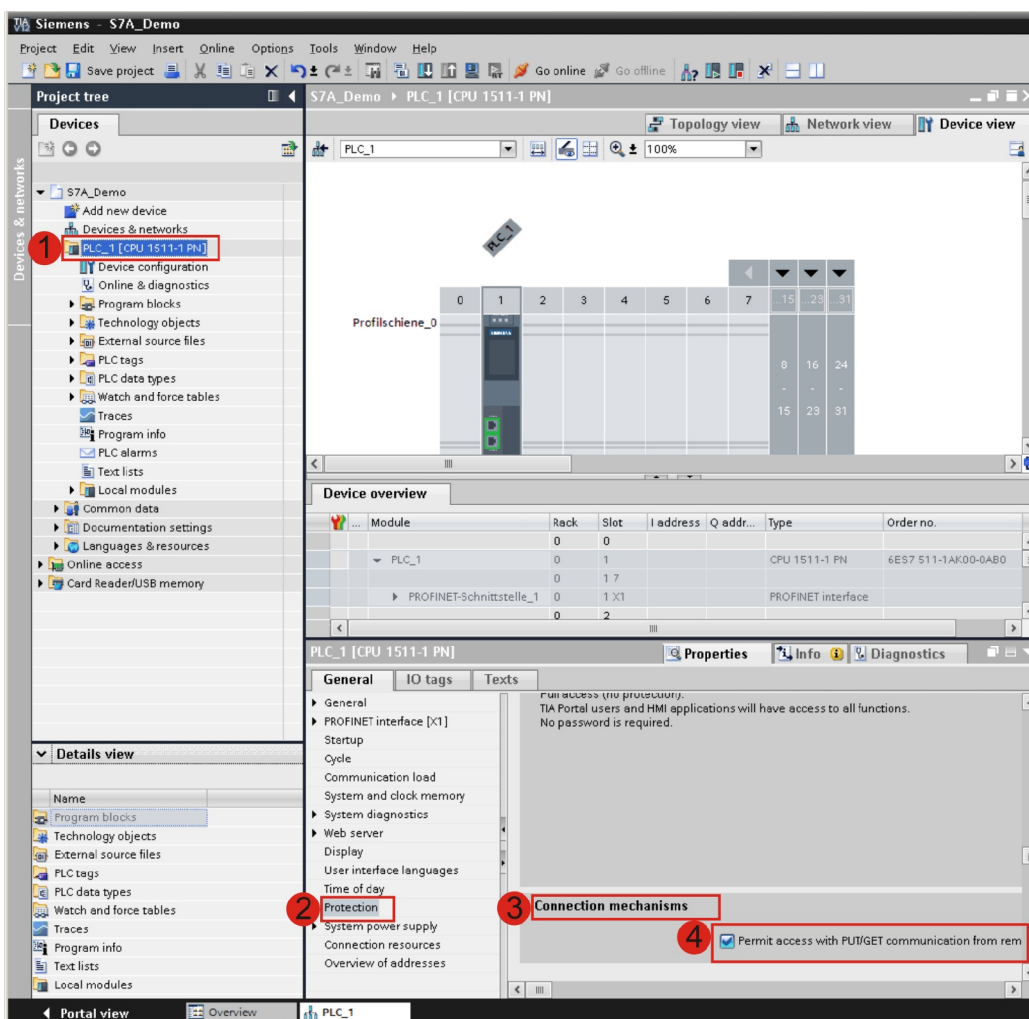
Green text color is used for names of in-/output fields, lists and list columns.

2. Settings within the TIA Portal

There are generally two special settings to be done in the TIA Portal for the S7A Driver to access the data blocks of the S7-1500. The first setting considers the S7-1500 CPU, the second the data blocks to which the driver should have access to. Furthermore, the slot of the S7-1500 CPU is to be determined with the device configuration of the TIA Portal.

2.1 Removing the Limitations of the Communications Services

The standard limitation of the communications services has to be removed for the CPU. Only then the S7A driver or other clients are able to communicate to the S7-1500 over a pre-defined (not explicitly projected) connection. This setting is a little bit „hidden“ in the CPU-properties. The following screen shot shows how to find and change it:

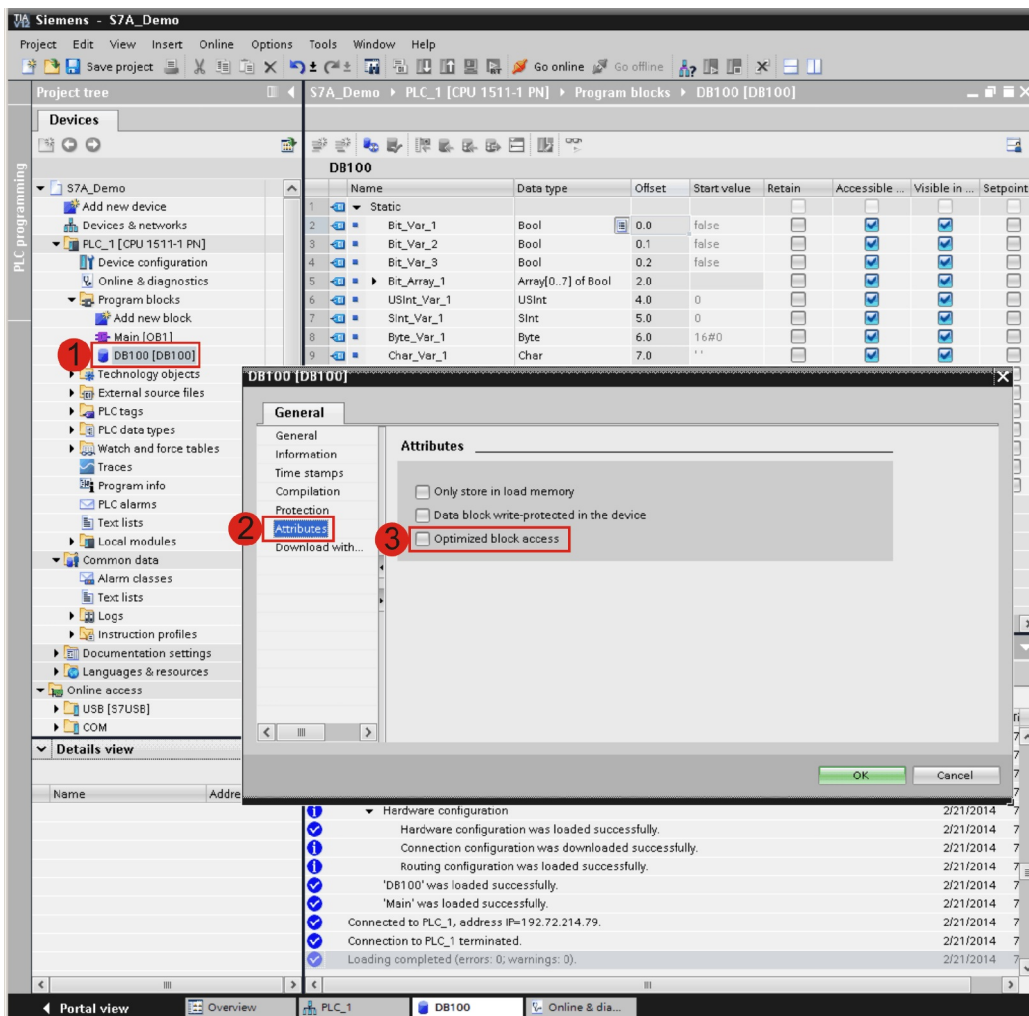


Picture 1: Connection mechanism setting of the S7-1500 CPU

- 1 To open the CPU properties, select and right-click the CPU from the project tree view and select **Properties...** from the context menu.
- 2 Select the item **Protection** from the **General** list.
- 3 Scroll down the right window until the field **Connection mechanism** and the check box **Permit access with PUT/GET communication from remote Partner (PLC, HMI, OPC...)** appears.
- 4 If this option is not set already, (checkbox is not checked), set it now.

2.2 Setting the Data Block

By default the data blocks in the S7-1500 CPU are accessible only via variable names. However, the S7A driver in version 7.50 to 7.52 is not yet able to access data blocks via symbolic names but only via the physical byte offset as known from the S7300-400. To allow this physical access, the data block has to be set to standard access mode. This is done in the data block properties. The following screen shot shows where to find the settings and how to set them:

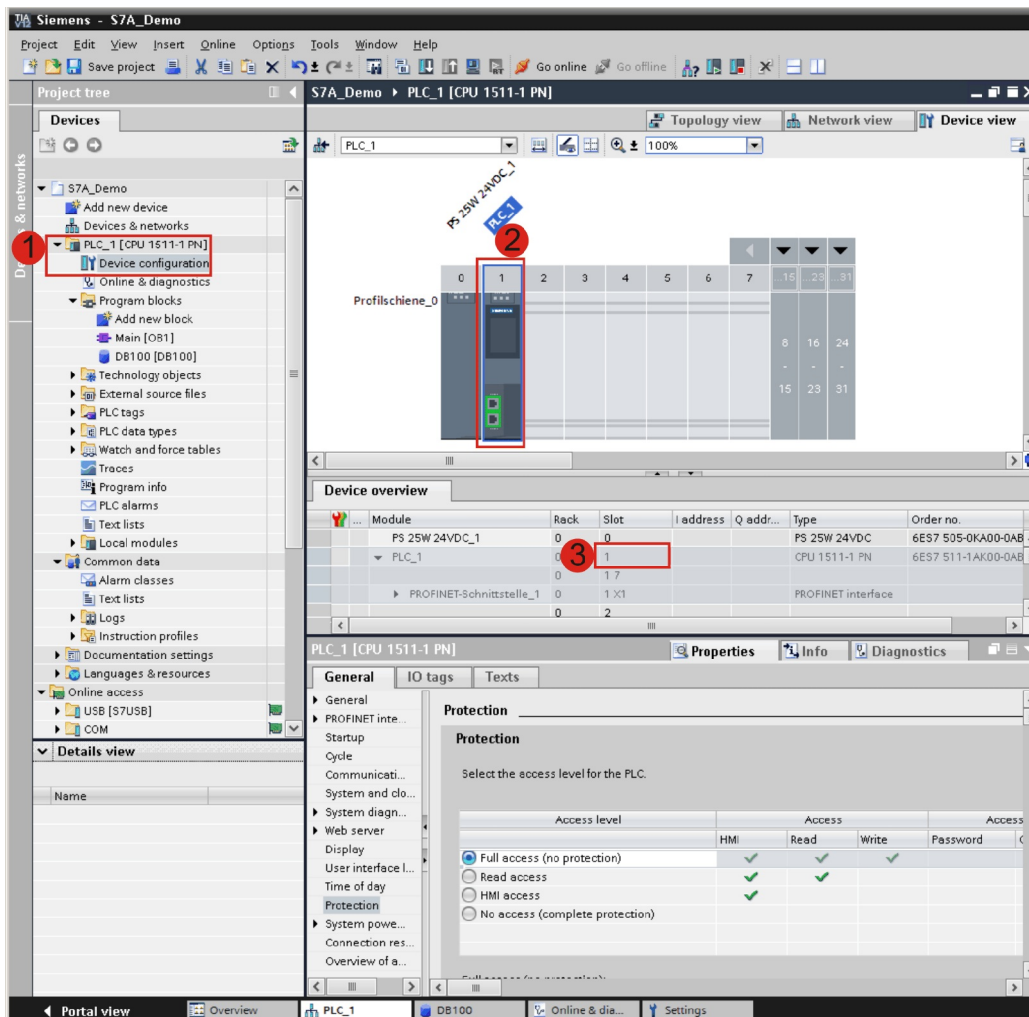


Picture 2: Setting the attributes of a data block

- 1 To open the data block properties, select and right-click the data block from the project tree view and select **Properties...** from the context menu.
- 2 Select item **Attributes** from the **General** list.
- 3 If the option **Optimized block access** is active (checkbox is checked) disable it (uncheck checkbox).

2.3 Determine the slot number of the S7-1500 CPU

For a successful connection between the S7A driver and the S7-1500 CPU it is absolutely necessary to configure the correct slot number of the S7-1500 CPU in the S7A driver device. If the S7A driver does not have the right slot number of the S7-1500 CPU no connection is possible. The slot number is a S7A device parameter and must be entered into the field **Slot** of the device parameter dialog in the S7A Power Tool. The following screen shot shows how to determine the S7-1500-CPU's slot number:

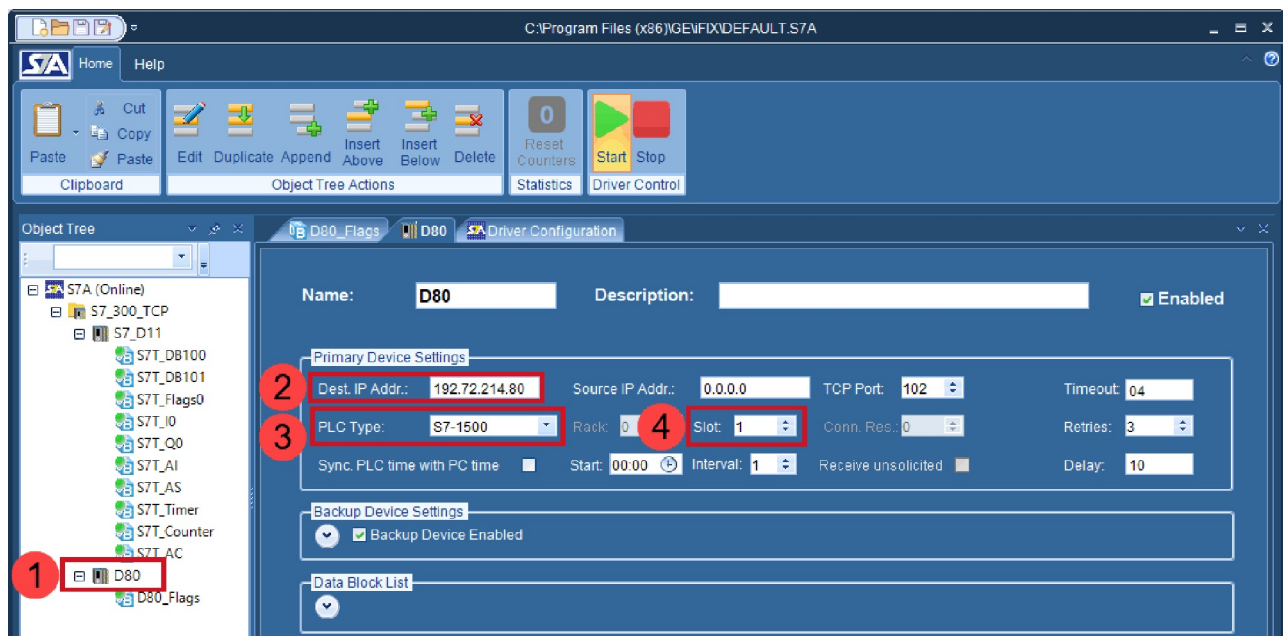


Picture 3: Determine the CPU's slot number

- 1 To open the device configuration from the project tree view, expand the CPU node and select the item **Device configuration**.
- 2 In the **Device view** now the rail with all configured modules is displayed. You can be read off the slot number at the top of the CPU module.
- 3 Furthermore you can find the slot number in the **Device overview** in the column "Slot" of the topmost row of the CPU module.

3. Setting the Slot Number in the S7A Device Configuration

The CPU's slot number determined in the TIA device configurator is to be entered into the S7A device configuration. The following screen shot of the S7A V8 Power Tool shows a S7A device configuration for a S7-1500 device:

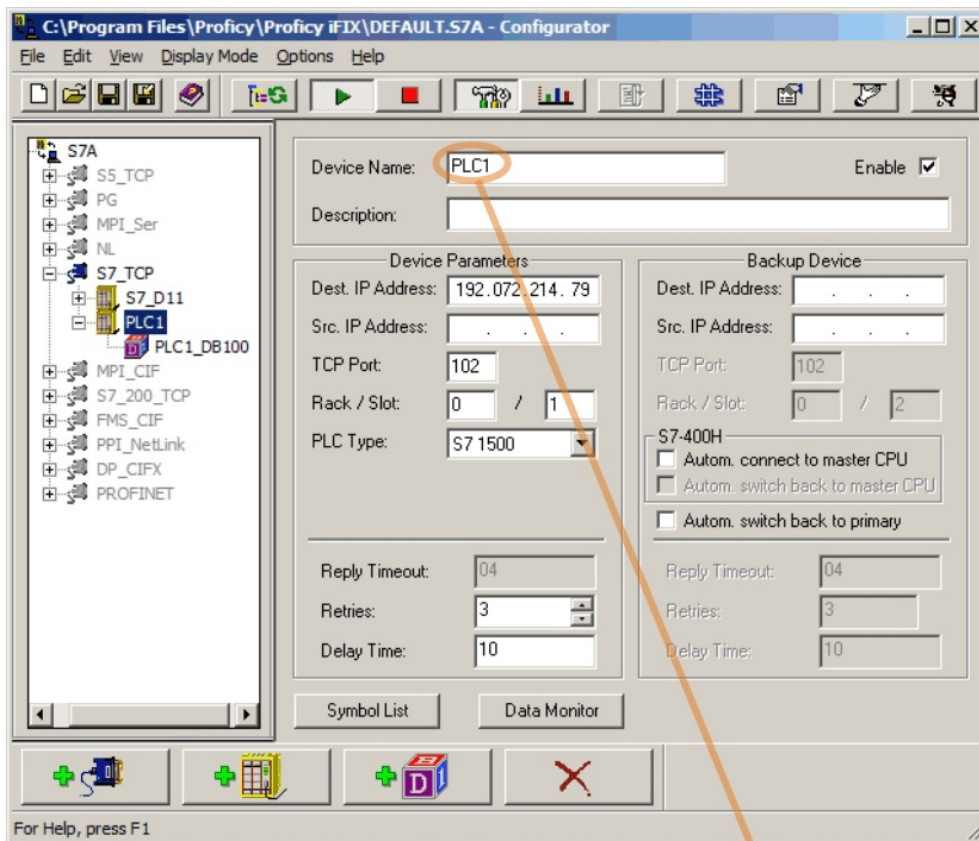


Picture 4: Slot number in S7A Device Configuration

- 1 To open the device configuration, expand the channel node and select the respective device item.
- 2 Enter the IP address of the S7-1500 CPU in the **Dest. IP Addr.** field.
- 3 Select the type S7-1500 from the **PLC Type** drop down list.
- 4 Enter the previously determined S7-1500 CPU's slot number in the **Slot** field.

4. Address mapping between TIA DB addresses and S7A I/O addresses

The following picture shows on how a iFIX I/O address is build from the S7A driver device name and the TIA data types and offset addresses.



| Block Definition in TIA Portal (Example Block DB100) | | | | I/O Address definition in iFIX | |
|--|-------------|---------------------|--------|--------------------------------|-------------------|
| DB100 | | | | Block Properties | |
| | Name | Data type | Offset | Block type | I/O Address |
| 1 | Static | | | DI, DO, DR, DA | 1 |
| 2 | Bit_Var_1 | Bool | 0.0 | | PLC1:DB100.DBX0.0 |
| 3 | Bit_Var_2 | Bool | 0.1 | | PLC1:DB100.DBX0.1 |
| 4 | Bit_Var_3 | Bool | 0.2 | | PLC1:DB100.DBX0.2 |
| 5 | Bit_Array_1 | Array[0..7] of Bool | 2.0 | | PLC1:DB100.DBX2.0 |
| 6 | USInt_Var_1 | USInt | 4.0 | AI, AO, AR, AA | PLC1:DB100.DBB4U |
| 7 | SInt_Var_1 | SInt | 5.0 | | PLC1:DB100.DBB5 |
| 8 | Byte_Var_1 | Byte | 6.0 | | PLC1:DB100.DBB6U |
| 9 | Char_Var_1 | Char | 7.0 | | PLC1:DB100.DBB7 |
| 10 | UInt_Var_1 | UInt | 8.0 | | PLC1:DB100.DBW8U |
| 11 | SInt_Var_2 | SInt | 10.0 | | PLC1:DB100.DBW10 |
| 12 | Word_Var_1 | Word | 12.0 | | PLC1:DB100.DBW12 |
| 13 | UDInt_Var_1 | UDInt | 14.0 | | PLC1:DB100.DBD14U |
| 14 | DInt_Var_1 | DInt | 18.0 | | PLC1:DB100.DBD18 |
| 15 | DWord_Var_1 | DWord | 22.0 | | PLC1:DB100.DBD22 |
| 16 | Real_Var_1 | Real | 26.0 | | PLC1:DB100.DBD26 |

3.1 Device name portion of the I/O address

The left part of the iFIX I/O address is the S7A device name **1** , which refers to a specific PLC. The colon is used as separator between the left part (device name) and the right part which specifies the address within the PLC.

3.2 The address portion of the I/O address

The right part of the iFIX I/O address (after the device name and the colon separator) specifies the physical address within the PLC's memory area. For a S7-1500 the following memory areas can be read/written by the S7A driver:

| Memory Area | Address structure |
|--------------|--|
| Data Block * | Digital: DB<number>.DBX<byte offset>.<bit number> |
| | Analog: DB<number>.DB<type qualifier><byte offset>[U] |
| Flags | Digital: M<type qualifier><byte offset>[.<bit number>] |
| | Analog: M<type qualifier><byte offset>[U] |
| Inputs | Digital: I<type qualifier><byte offset>[.<bit number>] |
| | Analog: I<type qualifier><byte offset>[U] |
| Outputs | Digital: Q<type qualifier><byte offset>[.<bit number>] |
| | Analog: Q<type qualifier><byte offset>[U] |

*) Data block is accessible when optimized block access is disabled!

3.3 Bit address format

A bit address consists of a memory area byte offset and a bit number separated by a dot. For memory area "M" (Flags), "I" (Inputs) and "Q" (Outputs) no type qualifier must be defined. For memory area "DB" (Data block) the type qualifier must be set to "X" .

The following table shows examples of bit addresses for the different memory areas of a S7-1500

| Memory area | Example address |
|-------------|-----------------|
| Data Block | DB100.DBX0.0 |
| Flags | M10.1 |
| Inputs | I0.5 |
| Outputs | Q 1.0 |

3.4 Analog address format

An analog address consists of an alphanumeric type qualifier, a numeric byte index and the optional qualifier "U" which specifies an unsigned value.

The following table shows examples of analog addresses for the different memory areas of a S7-1500

| Memory area | Example address | Description | Range |
|-------------|-----------------|--|--------------------------------|
| Data Block | DB100.DBB0 | Signed 8 Bit value at byte index 0 | -128 ...+127 |
| | DB100.DBB1U | Unsigned 8 Bit value at byte index 1 | 0 ... +255 |
| | DB100.DBW2 | Signed 16 Bit value starting at byte index 2 | -32768 ...+32767 |
| | DB100.DBW4U | Unsigned 16 Bit value starting at byte index 4 | 0 ... +65535 |
| | DB100.DBD6 | Signed 32 Bit value starting at byte index 6 | -2147483648 ... +2147483647 |
| | DB100.DBD10U | Unsigned 32 Bit value starting at byte index 10 | 0 ... +4294967295 |
| | DB100.DBF26 | 32 Bit Floating Point (Real) value starting at byte index 26 | |
| Flags | MB10 | Signed 8 bit value at flag index 10 | -128 ...+127 |
| Inputs | IW 2 | Signed 16 bit value starting at input byte 2 | -32768 ...+32767 |
| Outputs | QD1 | Signed 32 Bit value starting at output byte 1 | -2147483648 ... +2147483647 |