

Application Note

for

Connecting a S7-1500

to the

S7A Driver V8

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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

To open the CPU properties, select and right-click the CPU from the project tree view and select **Properties...** from the context menu.



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.

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

- 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.
 - 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:

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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 .

- In the Device view now the rail with all configured moduls is displayed. You can be read off the slot number at the top of the CPU module.
- 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

- To open the device configuration, expand the channel node and select the respective device item.
- Enter the IP address of the S7-1500 CPU in the Dest. IP Addr. field.
- Select the type S7-1500 from the PLC Type drop down list.
- 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 adresses.

C:\Program Files\Proficy\Proficy iFIX\DEFAULT.57A - Configurator										
Eile Edit View Display Mode Options Help										
S7A ⊕	Device Name: PLC1 Description:	Enable 🔽								
	Device Parameters	Backup Device								
	Src. IP Address: 192.0/2.214.79	Src. IP Address:								
PLC1_DB100	TCP Port: 102	TCP Port: 102								
	Rack / Slot: 0 / 1	Rack / Slot: 0 / 2								
日子。 日子。 伊丁、 PPI_NetLink 日子。 の PP_ の PP」 PCIFX 日子。 の PROFINET	PLC Type: S7 1500	S7-400H Autom. connect to master CPU Autom. switch back to master CPU								
		Autom. switch back to primary								
	Reply Timeout: 04	Reply Timeout: 04								
	Retries: 3	Retries: 3								
	Delay Time: 10	Delay Time: 10								
	Symbol List Data Monitor									
+5	•🗊 🛛 🗙									
For Help, press F1		1.								

		E	Block Definition in TIA Po	ortal (Example Block DB10	I/O Address definition in iFIX		
	DB	10	0		Block Properties		
Name Data type				Data type	Offset	Block type	I/O Address
1	1 🕣 👻 Static		Static			DI, DO, DR, DA	
2	-		Bit_Var_1	Bool	0.0 3		PLC1:DB100.DBX0.0
3	-00		Bit_Var_2	Bool 2	0.1		PLC1:DB100.DBX0.1
4	-00		Bit_Var_3	Bool	0.2		PLC1:DB100.DBX0.2
5	-		Bit_Array_1	Array[07] of Bool	2.0 4		PLC1:DB100.DBX2.0
6	-		USInt_Var_1	USInt 5	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	-00		Char_Var_1	Char	7.0		PLC1:DB100.DBB7
10	-		UInt_Var_1	UInt 7	8.0		PLC1:DB100.DBW8U
11	-		Sint_Var_2	SInt	10.0		PLC1:DB100.DBW10
12	-00		Word_Var_1	Word 8	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	DWor. 9	22.0		PLC1:DB100.DBD22
16	-		Real_Var_1	Real	26.0		PLC1:DB100.DBF26

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 referes 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 stucture						
Data Block *	Digital: DB <number>.DBX<byte offset="">.<bit number=""></bit></byte></number>						
	Analog: DB <number>.DB<type qualifier=""><byte offset="">[U]</byte></type></number>						
Flags	Digital: M <type qualifier=""><byte offset="">[.<bit number="">]</bit></byte></type>						
	nalog: M <type qualifier=""><byte offset="">[U]</byte></type>						
Inputs	Digital: I <type qualifier=""><byte offset="">[.<bit number="">]</bit></byte></type>						
	Analog: I <type qualifier=""><byte offset="">[U]</byte></type>						
Outputs	Digital: Q <type qualifier=""><byte offset="">[.<bit number="">]</bit></byte></type>						
	Analog: Q <type qualifier=""><byte offset="">[U]</byte></type>						

*) 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 defined. For memory area "DB" (Data block) the type qualifier must 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	10.5
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 " \mathbf{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