

## Application Note #1217: **Siemens S7-1200 and S7-1500 Ethernet**

### Introduction

This document applies to:

- Siemens S7-1200 and S7-1500 series controllers.
- GP-Pro EX SIMATIC S7 Ethernet Driver 1.14.08 and later.

This is an addendum to the Pro-face PLC/Device connection manual “SIMATIC S7 Ethernet Driver”. The sections in this guide supplement the corresponding section in the GP-Pro EX Device/PLC connection manual. Refer to both documents to configure both the SIMATIC controller and the GP-Pro EX project.

## 1 System Configuration

The system configuration in the case when the External Device of Siemens AG and the Display are connected is shown.

Series	CPU	Link I/F	SIO Type	Setting Example
SIMATIC S7-1200 Series	CPU1211C CPU1212C CPU1214C	PROFINET interface on CPU*4	Ethernet (TCP) (OP Communication)	Setting Example 4
SIMATIC S7-1500 Series	CPU1511-1 PN CPU1513-1 PN CPU1515-2 PN CPU1516-3 PN/DP CPU1518-4 PN/DP CPU1516F-3 PN/DP CPU1518F-4 PN/DP	PROFINET interface on CPU	Ethernet (TCP) (OP Communication)	Setting Example 6

\*4 The PROFINET interface in the CPU only supports OP Communication. FETCH/WRITE cannot be used.

### 3.4 Setting Example 4

- **External Device Settings**
  - **Configuring the PLC**

In the Siemens device configuration software, Step 7 Basic or TIA Portal, the only communications setup required is to establish the PLC Ethernet address and subnet mask. Select the PROFINET interface on the CPU. Set up the IP address and subnet mask.

The Siemens “Devices & Networks” configuration step is not required.

**Important:** At least one accessible data block with an integer element is required for GP-Pro EX communications, even if it is not used in the project for anything but the system area. See the section “Supported Device Addresses” below.

## ○ Mapping Data Blocks for GP-Pro EX Access

Data blocks must be mapped for GP-Pro EX projects to access them. Data blocks are “optimized” by default in S7-1200 and S7-1500 series projects. It will be necessary to uncheck the “optimized” property of each data block that will be accessed by the GP-Pro EX project. This change will “map” the data block elements; assigning offsets for GP-Pro EX access.

### ▪ Step 7 version 10 – version 12

In Siemens Step7 v10 create the Program Blocks with the “Symbolic access only” property unchecked. If you have Step7 version 11 or 12 create the Program Blocks with “Standard – compatible with S7-300/400” selected. For examples refer to the illustrations below.

Step 7 version 10

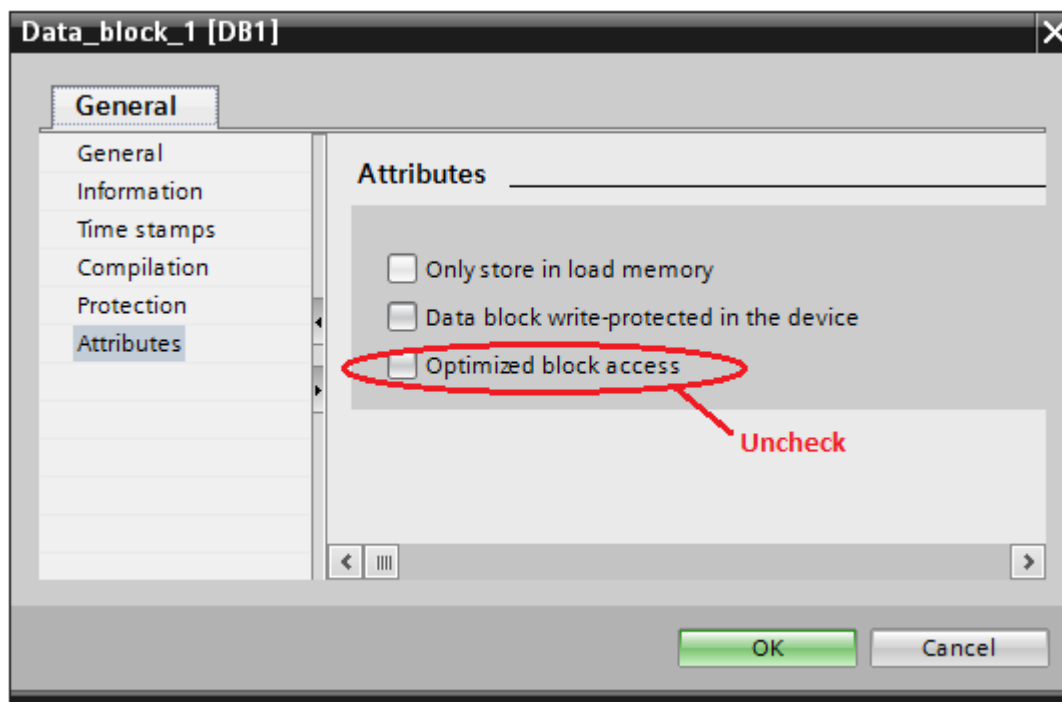
The screenshot shows the 'Add new block' dialog for Step 7 version 10. The 'Name' field is 'Block'. The 'Type' is 'Global DB'. The 'Language' is 'DB'. The 'Number' is '2'. The 'Block access' section has 'Manual' selected, and the 'Symbolic access only' checkbox is unchecked and circled in red with a red arrow pointing to it labeled 'Uncheck'. The 'Description' text states: 'Data blocks (DBs) are data areas in the program that contain user data. Select one of the following types: - A global data block - An instance data block'. The 'Data block (DB)' icon is highlighted in the left sidebar. The 'Further information' section at the bottom has 'Add new and open' checked.

Step 7 version 11 and 12:

The screenshot shows the 'Add new block' dialog for Step 7 version 11 and 12. The 'Name' field is 'Block'. The 'Type' is 'Global DB'. The 'Language' is 'DB'. The 'Number' is '5'. The 'Block access' section has 'Standard - compatible with S7-300/400' selected and circled in red with a red arrow pointing to it labeled 'Select'. The 'Description' text states: 'Data blocks (DBs) are data areas in the program that contain user data. Select one of the following types: - A global data block - An instance data block'. The 'Data block (DB)' icon is highlighted in the left sidebar. The 'Additional information' section at the bottom has 'Add new and open' checked.

### ▪ Step 7 version 13 and Later

In Siemens Step7 v13 and later create a Data Block. Then in the project tree, right-click the data block and select [Properties]. In the [General] tab, select [Attributes]. Clear the [Optimized block access] check box, and click [OK]. Clear the check boxes of all data blocks that will be accessed by the GP-Pro EX project.

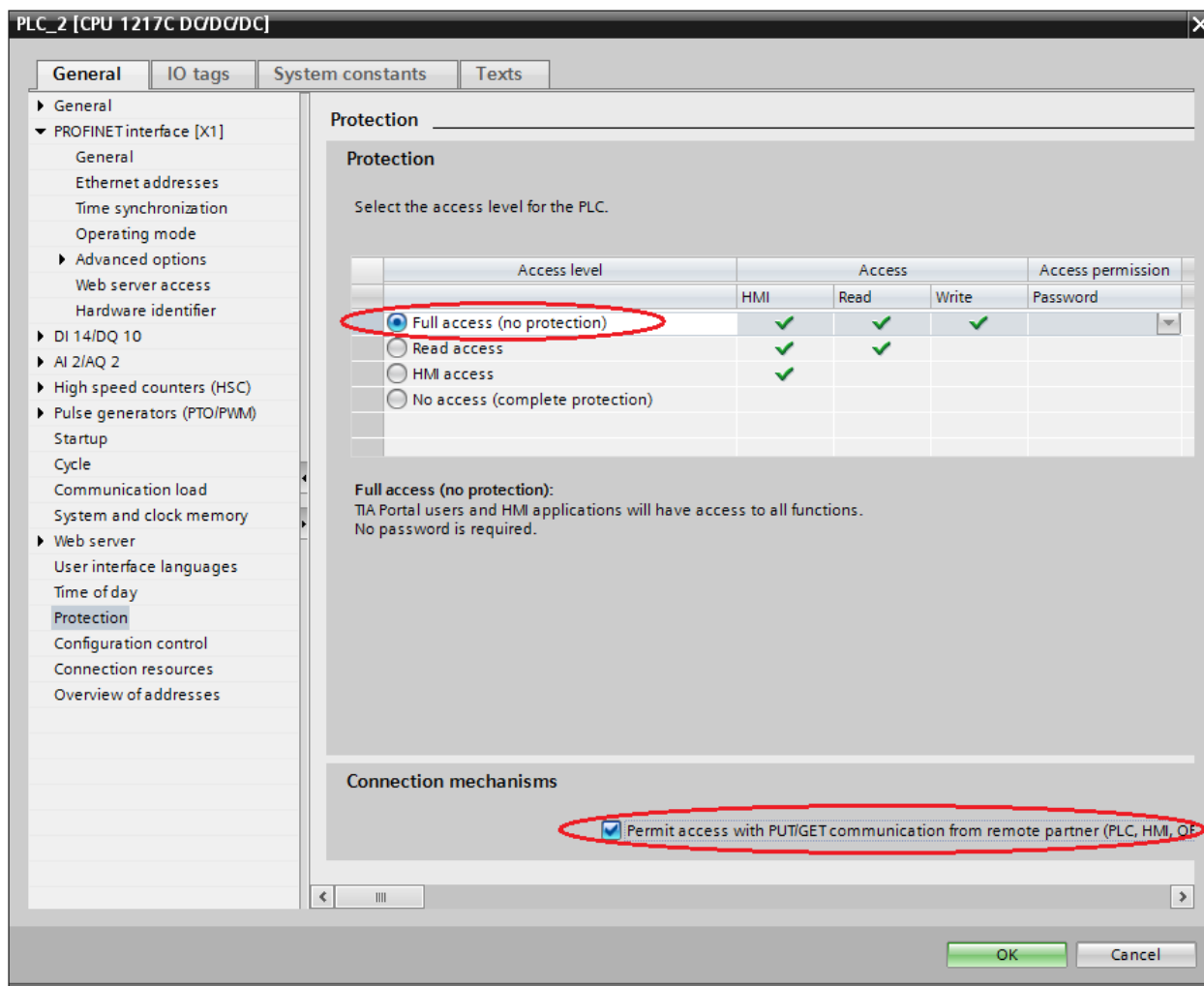


An offset column should appear in the data block as shown below. If it does not appear select the “Optimized block access” check box and then repeat the step above clearing that same check box to correct the problem.

The screenshot shows a table titled 'Data\_block\_1' with the following columns: Name, Data type, Offset, Start value, Retain, Accessible f..., Visible in ..., and Comment. The table contains several rows of data, including 'GP\_SysStartAddress', 'GP\_WatchdogWriteAd...', 'IntegerVal', and 'Ctr\_ACC'. A red arrow points to the 'Offset' column header with the text 'Offset column should appear in data block'.

	Name	Data type	Offset	Start value	Retain	Accessible f...	Visible in ...	Comment
1	<DB> Static							
2	<DB> GP_SysStartAddress	Int	...	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
3	<DB> GP_WatchdogWriteAd...	Int	...	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4	<DB> IntegerVal	Int	...	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
5	<DB> Ctr_ACC	Int	...	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
6	<Add new>							

In the project tree, select [Device configuration]. In the [General] tab, select [Protection]. Choose “full access”. Scroll to the bottom of the dialog box to the section “Connection mechanisms”. Select the [Permit access with PUT/GET communication from remote partner] check box, and click [OK]. (Some PLCs do not have this feature. In that case skip this step)



Set the data block, and then compile the project. When you compile the project, an offset is mapped to each element in the data block as shown below.

**Data\_block\_1**

	Name	Data type	Offset	Start value	Retain	Accessible f...	Visible in ...	Comment
1	Static							
2	GP_SysStartAddress	Int	0.0	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
3	GP_WatchdogWriteAd...	Int	2.0	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4	IntegerVal	Int	4.0	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
5	Ctr_ACC	Int	6.0	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
6	<Add new>							

Compiling assigns offset addresses


Save and load the PLC project.






## 5.3 Supported Device Addresses

To establish communications with the PLC requires defining a minimum of one “mapped” (S7-300/400 compatible) Data Block in the PLC. The Data Block should include one or more variables defined as data type “Int” and reserved for GP-Pro EX use. One or more of these variables is then assigned in the GP-Pro EX “System Area” > “System Area Start Address”.

**Tip:** A system start address is required even if the system area is NOT used. Please refer to the GP-Pro EX Reference Manual for information about the System Area.

The range of supported device address is shown in the table below. Please note that the actually supported range of the devices varies depending on the configuration of the S7-1200/1500 series PLC. Please check the actual range of your PLC.

 This address can be specified as system data area.

Device	Bit Address		Word Address		32 bits	Remarks
	English	German	English	German		
Data Block (OP Communication)	DB00001.DBX00000.0 - DB59999.DBX65533.7		DB00001.DBW00000 - DB59999.DBW65532			 *1 *A
Input	I00000.0 - I32767.7	E00000.0 - E32767.7	IW00000 - IW32766	EW00000 - EW32766		
Output	Q00000.0 - Q32767.7	A00000.0 - A32767.7	QW00000 - QW32766	AW00000 - AW32766		
Marker	M00000.0 - M16383.7		MW00000 - MW16382			

\*1 When you write the bit address, the Display reads the word address corresponding to that of the External Device first. Change only the target bit address among the word data once read, and write the word data to the External Device.

Note that the correct data may not be written if you change the word address value in the ladder program while the Display reads the data of the External Device and writes it to the External Device.

**Tip:** An Ethernet crossover cable, switch, or hub is required to connect a Pro-face display to the Siemens PLC.

For more information on Pro-face and our full line of HMI, Operator Interface and Industrial PC products please visit our web site at [www.profaceamerica.com](http://www.profaceamerica.com).

For technical support email: [support@profaceamerica.com](mailto:support@profaceamerica.com) or call: 800.289.9266.