

## TPS-1

Add TPS-1 into TIA Portal

#### R30AN0228EC0100 Rev. 1.00 Jun 1, 2015

## Introduction

This application note describes how to add TPS-1 device into Siemens TIA Portal.

#### **Target Device**

TPS-1

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#### 1. Software requirement

To add TPS-1 into TIA portal, we need to prepare the software below.

#### 1.1 TIA Portal V13

TIA portal is software developed by Siemens which is mainly used for automation. SIMATIC STEP 7 in the TIA Portal is the software for the configuration, programming, testing, and diagnosis of all SIMATIC controllers. With user-friendly functions, TIA portal ensures significant cost savings for all automation tasks.

#### 1.2 GSD file V2.3 for TPS-1

The GSD file allows for a textual description of some attributes of a PROFINET field device. In the example of this application note, the GSD file template in TPS Development Toolkit V.1.2.4.6 is used.



## 2. Hardware Configuration

Figure 2.1 shows the hardware connection of the example system. The system consists of Siemems Smatic S7-1200 PLC, TPS-1 remote IO target board and Windows 7 PC. All the components in the system are connected by Ethernet cable.



## Figure 2-1 Hardware Configuration

#### 2.1 TPS-1 Target Board

Starter kit SK-TPS-1 can be used as the TPS-1 target board in the example of this application note. The firmware in "TPS-1 Development Toolkit 1.2.4.6" needs to be programed in the target board first. For more detail about firmware download and configuration, please refer the document in "TPS-1 Development Toolkit 1.2.4.6".

#### 2.2 Siemens Smatic S7-1200 PLC

Siemens's PLCs are widely used in factory automation. In the example of this application note, Smatic S7-1200 was used. S7-1200 can provide the basic functions of PLC, which is enough to demonstrate the features of TPS-1 PROFINET remote IO.

#### 2.3 MS Windows 7 PC

TIA portal needs to be installed in MS Windows 7 or above. With TIA portal, the PC can download the software and hardware configuration to Smatic S7-1200 PLC. The exchange data between PLC and PROFINET remote IO can be monitored by the TIA portal software in PC.



#### 3. Add TPS-1 device into TIA Portal

In this chapter, the procedure of adding TPS-1 device will be explained. After completed the procedure below, the TPS-1 device can be added in TIA portal, and the data can be exchanged between S7-1200 PLC and TPS-1 remote IO device.

#### 3.1 Install GSD file

A GSD file (device data file) contains all the DP slave properties. If you want to configure a DP slave that does not appear in the hardware catalog, you must install the GSD file provided by the manufacturer. DP slaves installed via GSD files are displayed in the hardware catalog and can then be selected and configured.

To install GSD file, click Option -> Install general station description file (GSD), see Figure 3-1.

roject Edit View Insert O	nline Options Tools Window Help	
🚰 📑 Save project 📑 🐰	I Settings	Go online 🖉 Go offline 🔥 🖪 📕 💥 🚽 🗌
Project tree	Support packages	orks
Devices	Install general station description file (G	SD) 📑 Topology view 🔓
100	📑 🛃 Show reference text	V 🐫 🖽 🔍 ± 163%
	Global libraries	•

Figure 3-1 Install GSD file

Select the GSD file for TPS-1, see Figure 3-2.

П	istall gener	ral st	ation description i	file				×
	Source path:	: [	D:\MCU_support\TPS-1	\\$7_1200\TPS_	1_Demo\Add_T	PS_demo\Additi	onalFiles\GSD	
	Content of	imp	orted path					
	File			Version	Language	Status		Info
	GSDML-V	2.3-K	W-Software-TPS1-Te	01/18/2014	English	Already installe	ed	Mini evalua
	GSDML-V	′2.3-К	W-Software-TPS1-Te	01/26/2014	English	Already installe	ed	TPS-1 Devic
								_
								_
								_
								_
							Install	Cancel

Figure 3-2 Select GSD file



After installed the GSD file of TPS-1 Template, the device will appear in Hardware catalog. See Figure 3-3.

	Hardware catalog	
	Options	
	✓ Catalog	
		ini ini
	Filter	
After installed the GSD file, the device will	Controllers	
	▶ 🔄 HMI	
appear in Hardware catalog	C systems	
	Drives & starters	
	Image:	
	Detecting & Monitoring	
	Distributed I/O	
	Field devices	
	<ul> <li>Other field devices</li> </ul>	
	PROFINET IO	
	Drives	
	Encoders	
	🕨 🛅 Gateway	
	▼ 1/0	
	🗸 🛄 KW-Software	
	🗸 🧊 TPS-1 Development Toolkit	t
	TPS-1 Template V1.0	>
	TPS-1 Test Device	
	Ident Systems	
	Sensors	
	PROFIBUS DP	

Figure 3-3 Device in Hardware Catalog

#### 3.2 Add TPS-1 Device into Network View

The network view is one of three working areas of the hardware and network editor. You can undertake networking devices with one another

To add TPS-1 device into network view, drag and drop the TPS-1 device from Hardware catalog to Network view (Figure 3-4).

	Project tree	14	Pasteurization_Station >	Devices & networl	ks				-	. # = ×	Hardware c	atalog	e 1 >
	Devices				a Topolo	ogy view	h Network	k view	Devic	e view	Options		
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Devices & networks		1	PLC_1 CPU 1212C	HM connection	<u></u>	5 🔛 🔍 :	100%					lers ens à statters k components ng & Monitoring	HI
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Figure 3-4 Add into Network View



## 3.3 Connect PLC and TPS-1 in Network View

To connect the PLC and TPS-1 device, click the "Not assigned" label of TPS-1 device, and then select IO controller (e.g. PLC\_1). See Figure 3-5.

Pasteurization_Station	works	_ 7 5	iХ
	📱 Topology view 🛛 🛔 Network view 🚺	Y Device view	
Network Connections HMI connection	🔻 🗒 🖳 🔍 ± 100%	- E	•
PLC_1 CPU 1212C	TPS-1 TPS-1 Template Not assigned Select IO controller PLC_1.PROFINET 接口_1		

Figure 3-5 Connect PLC and TPS-1

After selected the PLC, the link will be established in Network view (Figure 3-6).

Pasteurization_Station > Devices & networks		_∎≡×
a a a a a a a a a a a a a a a a a a a	F Topology view 🛛 🏦 Network view 🛛 🏦 Devid	e view
Network Connections HMI connection	🔽 👯 🔛 🔍 ± 100%	
	4 IO system: PLC_1.PROFINET IO-System (100)	<u>^</u>
PLC_1	TPS-1	=
	PLC_1	
PLC_1.PROFINET IO	-Syste	
	- <u>-</u> ,	
		_

Figure 3-6 Network View



×

## TPS-1

#### 3.4 Assign Device Name for TPS-1

In a PROFINET system, device name is used as the identifier of the PROFINET remote IO device. Thus, each PROFINET remote IO device must be assigned with a device name.

To assign a device name to TPS-1 device, right click the TPS-1 chip in Network view and click Assign device name (Figure 3-7).

Pasteurization_Station > Devices & networ	s _ 🖬 🖬 🗙 Ha	ard
	🛃 Topology view 🔒 Network view 🛐 Device view 🛛 Op	otic
Network Connections HMI connection	V 👯 🗄 🍳 ± 100% 🔽 🖂 🖌	
	📮 IO system: PLC_1.PROFINET IO-System (100) \land 😜 🗸	Ca
		-
DIC 1	TDE 1	Filt
CPU 1212C	TPS-1 Template	
	PLC 1	
	Device configuration	
	Change device	
PLC_1.PROFINET	D-Syste Start device tool	
	K Cut Ctrl+)	.x
	E Pasta Ctrl+	NC N
		· •
	X Delete De	el
	Rename F.	.2
	🚽 Go to topology view	
	Compile	•
	Download to device	۲
	Ø Go online Ctrl+	-K
	Go offline Ctrl+1	М
	Ctrl+i	D
	Assign device name	

Figure 3-7 Assign Device Name

After that, all the PROFINET devices in the network will be listed out. Select the corresponding TPS-1 device to assign a device name (Figure 3-8). Assign PROFINET device name.

		Confi	gured PROFINET d	evice				
		PF	OFINET device name:	name: tps-1				
			Type:	TPS-1 Templ	ate V1.0			
		Online	e access					
		Type of the PG/PC interf	ace: 📃 PN/IE		<b>-</b>			
		PG/PC interf	ace: Broadcom	NetLink (TM) Gio	abit Ethernet 🔻 💎 🔯			
8								
		Devic	e filter					
			Only show devices o	f the same type				
		F	Only show devices w	ith bad parame	ter settings			
				ithout names	and a second			
		L	_only show devices w	infournames				
	Erreichbare Teilne	hmer im Netzwerk:						
	IP address	MAC address	Туре	Name	Status			
Flash LED	192.168.0.1	28-63-36-85-70-33	\$7-1200	plc_1	🗸 ок			
	192.168.0.2	74-90-50-00-FC-B7	TPS-1	tps-1	💙 ОК			
					<u> </u>			
				Update	Assign name			
Online status information	2							
Online status mornation	•							
					Close			

Figure 3-8 PROFINET Devices

#### 3.5 Update I/O Image

In order to synchronize the memory of remote IO and PLC, the process image option needs to be set as automatic update. The procedure is shown as below.

Right click **IN/OUT\_1** of TPS-1 in project tree, and click the **Properties** (Figure 3-9).

Devices					
1 O O 1			2	R Network	Conr
- Pasteurization Statio	n		~		
Add new device		ľ	-		
Devices & networ	ks			PLC_1	
▼ PLC 1 [CPU 12120	c			CPU 1212	c 📕
Device configu	ra				- T
Q. Online & diagn	io				
Program block	5				
Technology ob	iects				-
External source	e file:	s			
PLC tags					
PLC data types					
Watch and force	e				
Traces					
Program info					
🕨 📴 Device proxy d	ata		-		
Text lists					
Local modules					
🔻 🛅 Distributed I/O					
🛨 🔛 PROFINET IO	-S				
💌 🛅 TPS-1					
🕎 Devic	e				
😵 Online	e &				
TPS-1					
IN/OU	(	Open			
Common data	V	Tut			Ctrl+X
Documentation s	ñ (	Copy			Ctrl+C
<ul> <li>Languages &amp; res</li> </ul>	ni i	Paste			Ctrl+V
Cood Pood of USP ma		Denan			F2
Card Readenosbine		te man			
Y Details view		Jown	loa	d to device	Cont. M
Details view	2	ao on	une line	2	Ctrl+K
	0	ao on Doline		diagnostics	Ctrl+D
Name			- G	alagnostics	Califo
		rint			Ctrl+P
	<u>-</u>	rint p	ore	new	
	<b>→</b> I	Export	t m	odule labelin	g strips
	Q	Prope	rtie	S	Alt+Enter
			_		

Select I/O address, then modify Organization block in Input addresses and Output address to ---(Automatic update). See Figure 3-10.

N/OUT_1 [Mod	ule]		×
General	IO tags	System constants Texts	
General     Inputs     Module parar     I/O addresses	neters	I/O addresses	*
Hardware ide	ntifier	Start address: 1 End address: 2 Isochronous mode Organization block: (Automatic update) Process image: 自动更新	
		Output addresses Start address: 1 End address: 2 Isochronous mode	
		Organization block: (Automatic update)  Process image: 自动更新  V	*
		OK Cance	

Figure 3-10 I/O Address Setting



#### 3.6 Download Hardware Configuration

After completed the previous steps, the hardware configuration needs to be download to the PLC.

Right click the TPS-1 device in topology view and select **Download to device** -> **Hardware configuration** to download the hardware configuration to PLC (Figure 3-11).

				3	Topology view	di N	etwork view	Device	view		c
🔛 🔍 ± 100%	•					U			4	T	
									^		~
PLC_1 CPU 1212C		TPS-1 TPS-1 Template PLC_1	TPS-1	Device config	uration					6	
				🗶 Cut 💼 Copy 🛍 Paste		Ctrl+X Ctrl+C Ctrl+V					
				Co to petwork	k view	Del F2					
			-	Compile		•			-		
				Download to	device	•	Hardware a	nd software (onl	y char	nges)	
				<ul> <li>Go online</li> <li>Go offline</li> <li>Online &amp; diag</li> <li>Assign device</li> <li>Receive alarn</li> <li>Show force value</li> </ul>	inostics e name ns alues	Ctrl+K Ctrl+M Ctrl+D	Hardware c Software (o Software (a	onfiguration nly changes) I)			
				Cross-referen	ce information Sh	ft+F11					
				🔍 Properties	Alt	+Enter					
				+ Export modul	e labeling strips						
			L								

Figure 3-11 Download Hardware Configuration

#### 3.7 Add Variables of Remote I/O

To view or modify the remote I/O, we can add variable in **PLC tags** in project tree first (Figure 3-12). e.g. Remote\_IO\_I (Address: %IW1)

Remote\_IO\_O (Address: %QW1)

Q: output, I: input W: Word (2Bytes)

Siemens - Pasteurization_S	tatio	n								
iject Edit View Insert Online Options Tools Window Help Po 🕞 Save project 📑 🐰 🗉 🗈 🗶 🏷 🛨 (주 호 🙀 🖥 🖳 🎧 🚇 🖓 🂋 Go online 🖉 Go offline 🏰 🖫 📭 🛠 🖃 💷										
Project tree		Paste	uri	ization_Station → PLC_1	[CPU 1212C AC/DC/RI	/] > PLC tags	▶ 默认	变量表	[37]	
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B 0 0	1	<b>9</b> :	*	🖻 🎌 🗰						
		默	认	变量表						
				Name	Data type	Address	Retain	Visibl	Acces	Comment
Add new device		1	-	Remote_IO_I	Word	%IW1				
🛔 Devices & networks		2	-	Remote_IO_O	Word	%QW1				
▼ 1 PLC_1 [CPU 1212C AC/		3		<add new=""></add>						
Device configuration										
Online & diagnostics										
Program blocks										
Technology objects										
External source files										
🕶 🌄 PLC tags										
li tags 😓 😓										
📑 Add new tag table										
💕 默认变量表 [37]										
The stable of [7]										

Figure 3-12 Variables of Remote I/O



#### 3.8 View and Modify Variables of Remote I/O

The variables can be viewed and modified in **Watch and force tables** in project tree. The change of output variable will reflect in the output of TPS-1 device (Figure 3-13).

Pas	teuriza	ation_Station 🔸 PLC	_1 [CPU 1212	C AC/DC/Rly] 🔸 Watcl	h and force tabl	es 🔸 Watch tab	le_1	- 6	א∎ ג
1	# # IF Lo ダ あ 次 町 m								
	i	Name	Address	Display format	Monitor value	Modify value	1	Comment	
1		"Remote_IO_O"	%QW1	Hex 💌	16#00EA	16#AAAA	A 1		
2		"Remote_IO_I"	%IW1	Hex	16#0000	16#0001			
з			<add new=""></add>						

Figure 3-13 View and Modify Variables



## **Appendix - Glossary**

#### GSD file

- General Station Description file. It is used to describe PROFINET IO field devices.

#### GSDML

- General Station Description Markup Language. It is a XML based language for writing GSD file.

#### PROFINET

- It is a standard for Industrial Ethernet. PROFINET is defined by PROFIBUS and PROFINET International (PI)

#### PLC

- Programmable logic controller. Siemens Simatic S7-1200 was use as example in this document.

#### TPS-1

- Renesas PROFINET IO Device Chip.



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		Descript	ion	
Rev.	Date	Page	Summary	
1.00	Jun. 1 2015		First edition issued	

## General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins

Handle unused pins in accordance with the directions given under Handling of Unused Pins in the manual.

- The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.
- 2. Processing at Power-on

The state of the product is undefined at the moment when power is supplied.

 The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.

In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

- The reserved addresses are provided for the possible future expansion of functions. Do not access
  these addresses; the correct operation of LSI is not guaranteed if they are accessed.
- 4. Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

 When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

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Before changing from one product to another, i.e. to a product with a different part number, confirm that the change will not lead to problems.

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