## **PROFIBUS Configuration for Siemens S7-300**

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#### About Moxa

Moxa manufactures one of the world's leading brands of device networking solutions. Products include serial boards, USB-to-serial hubs, media converters, device servers, embedded computers, Ethernet I/O servers, terminal servers, Modbus gateways, industrial switches, and Ethernet-to-fiber converters. Our products are key components of many networking applications, including industrial automation, manufacturing, POS, and medical treatment facilities.

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## **1. Introduction**

This application note describes the configuration of Moxa MGate device as a PROFIBUS DP slave to connect to a Siemens S7-300 PLC as a PROFIBUS DP master. Two bytes input and two bytes output data are configured in this example.

# 2. Applicable products

Product Line	Model Name		
MGate 4000 series	MGate 4101-MB-PBS  MGate 4101I-MB-PBS		
	MGate 4101-MB-PBS-T  MGate 4101I-MB-PBS-T		

# **3. System requirements**

Description	Model / File Name	Version
Siemens S7 PLC	CPU 315-2 PN/DP	3.2.3
	Article Number:	
	6ES7315-2EH14-0AB0	
Siemens PLC programming software	SIMATIC STEP 7	5.5 + SP2
Moxa PROFIBUS DP slave to Modbus serial	MGate 4101-MB-PBS	1.0
gateway		
GSD file for Moxa PROFIBUS DP slave	MPBS0D80.gsd	1.0
Software utility to configure Moxa device	MGate Manager	1.5
Modbus RTU/ASCII slave software	ModSim32	2002

## 4. System overview

In this document, MGate 4101-MB-PBS is used as an example. The system architecture is shown below.

## **PROFIBUS Configuration for Siemens S7-300**



# 5. PLC configuration

### 5.1. Create STEP 7 project

5.1.1. Start SIMATIC Manager and create a new project by selecting "File" menu and then "New" option. The user has to assign a name for this project.

x
Type: Project • FLibrary Browse ancel Help

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5.1.2. Select "Insert" menu and then "Station" option to insert "SIMATIC 300 Station" to the project.



Double click "Hardware" icon, then add a rack to this project by selecting "Insert" menu and then "Insert Object" option.

🍠 SIMATIC Manager - [demo1 C:\Program Files\Sieme						
By File Edit Insert PLC View Options Window						
_ D 🛩   🖁 🐖   X 🖻 🖻 🗖 🎰 🔎 🐾   🌬 🍞 🗄						
demo1     SIMATIC 300 Station						
Image: HW Config - [SIMATIC 300 Station (Configuration) demo1]         Image: Station Edit       Insert       PLC       View       Options       Window       Help         Image: Station Edit       Insert       PLC       View       Options       Window       Help         Image: Station Edit       Insert       PLC       View       Options       Window       Help         Image: Station Edit       Insert       PLC       View       Options       Window       Help         Image: Station Edit       Insert       PLC       View       Options       Window       Help						
Image: Structure of the st						

After above steps are done, the "HW Config" window will show as the following figure.

🖞 HW Config - [SIMATIC 300 Station (Configuration) demo1]
🕅 Station Edit Insert PLC View Options Window Help
다 🔊 알~ 🖩 🐘 (雪) (略) 💼 🏟 🏙 👔 🗊 🖘 😵
⇒(0) UR ^
5
7
(0) UR
Slot Module O Fi M I Q Comment
4
5
6
11

5.1.3. The user has to add the correct CPU module to the STEP 7 project according to his actual hardware model. Here, we use CPU 315-2 PN/DP for example. Select proper CPU module from the menu and drag the icon to the slot.

							(1)			-
								Sigche	enz:	4
								Erofil	le Standard	
								E-	SIMATIC 300	-
								E	🗄 🧰 C7	
								E	🗄 🧰 CP-300	
1							*	E	E- CPU-300	
									CPU 312	
									D CRU 212C	
(0) UR									- CPII 313	
t Module	Order number	Firmware	MPI address	Teddyers	Oaldrare	Comment	1		- CPU 313C	
1 100000	Class hands		1011-000100	1 00001000	20000000	Commission			🗄 🦲 CPU 313C-2 DP	
									🕀 🦲 CPU 313C-2 P#P	
									🕀 🧰 CPU 314	
						X			<ul> <li>EPU 314</li> <li>CPU 314 IFM</li> </ul>	
									<ul> <li>E CPU 314</li> <li>CPU 314 IFM</li> <li>CPU 314 IFM</li> <li>CPU 314C-2 DP</li> </ul>	
							_		CPU 314     CPU 314 IFM     CPU 314 IFM     CPU 314C-2 DP     CPU 314C-2 PMDP	
							_		CPU 314     CPU 314     CPU 314 IFM     CPU 314 IFM     CPU 314C-2 DP     CPU 314C-2 PM     CPU 314C-2 PM     CPU 314C-2 PM	
Image:									CPU 314     CPU 314 IFM     CPU 314C-2 DP     CPU 314C-2 DP     CPU 314C-2 PM     CPU 314C-2 PP     CPU 314C-2 PP     CPU 314C-2 PP	
						×			CPU 314     CPU 314     CPU 314 IPM     CPU 314 C-2 DP     CPU 314C-2 PMDP     CPU 314C-2 PMDP     CPU 314C-2 PP     CPU 315     CPU 315	
Image:						×			CPU 314     CPU 314 IPM     CPU 314 C2 PP     CPU 314C-2 PP     CPU 315-2 PP     CPU 315-2 PP     CPU 315-2 PP	

🖳 HW Config - [SIMATIC 300 Sta	ation (Configuration) dem	o1]				
🕅 Station Edit Insert PLC	View Options Window	Help				
] D 🗲 🔓 🖷 🖳 🎒   🛅	e    🟜 🎪   🚯 📼   器	<b>N?</b>				
1         ^           2         I CPU 315-2 PN/DP(1)           X1         MP/DP           X2         PN-FO           X2 PI R         Poxt 1           X2 P2 R         Poxt 2           3         Y						
( ) UR						
Slot Module	Order number	Firmware	MPI address	I address		
2 CPU 315-2 PN/DP(1)	6ES7 315-2EH14-0AB0	¥3.2	2			
XI MPI/DP			2	2047*		
X2				2046*		
AZZ Port 1				2045*		
X2A Port 2 2044*						

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#### 5.2. Create PROFIBUS network

5.2.1. Double click "MPI/DP" block to configure PROFIBUS DP module.

🖳 HW Config - [SIMATIC 300 Station (Configurat	tion) demo1]
Insert PLC View Options	s Window Help
D 🚅 🔓 🖳 🖏   🎒 🛍   🏙 🎰   🌘	D 🗖 🔡 💦
(0) UR     1     2     CPU315-2 PN/DP(1)     X1     MPI/DP     X2     PV-10     X2 PI     Pott 1     X2 P2     Pott 2     3	PROFIBUS DP master module
•	III
SIMATIC 300 Station Slot Designation D UR	

#### Set the interface type as PROFIBUS

Properties - MPI/DP - (R0/S2.1)	_ XX
General Addresses Operating Mode Configuration Clock	
Short Description: MPI/DP	
	*
	-
Name: MPI/DP	—  I
_ Interface	
Type: PROFIBUS	
Address: 2	
Networked: No Properties	
Comment:	
	*
	-
OK Cancel H	íelp

The user should assign the address for PROFIBUS master module here and click "New" button to create a new subnet.

Properties - PROFIBUS interface	MPI/DP (R0/S2.1)
General Parameters	
Address:	If a subnet is selected, the next available address is suggested.
Subnet:	
not networked	New
	Properties
	Delete
	CancelHelp

5.2.2. Select the proper transmission rate for this subnet. The profile should be configured as "DP". Click "OK" after these modifications are done.

Properties - New subnet PRC	FIBUS	×
General Network Settings		1
Highest PROFIBUS Address:	126 Thange	Options
Transmission Rate:	45 45 (31 25) Kbps 93.75 Kbps 187 5 Kbps 500 Kbps 1 5 Mbps 3 Mbps	
Profile:	DF Standard Universal (DP/FMS) User-Defined	Bus Parameters
OK		Cancel Help

Switch to "Operating Mode" tab and set the mode as "DP master".

Properti	ies - MPI/DP	- (R0/S2.1)		_
Genera	d   Addresses	Operating Mode Configuration   Clo	k	
c	No DP			
•	DP master			
C	DP slave			
	🔲 Test, com	missioning, routing		
	Master:	Station Module Rack (R) / slot (S) Receptacle for interface module		
	Diagnostic ad	dress:		
	Address for "	slot" 2:		
	К		Cancel	Help

The user will see the result as the following figures. It means that the PROFIBUS network is created successfully.

Properties - MPI/DP - (R0/S2.1)		×
General Addresses Operating Mode Configuration Clock		
Short Description: MPI/DP		
		*
		-
Name: MPI/DP		
Interface		
Type: PROFIBUS		
Address: 2		
Networked: Yes Properties		
Comment:		
		~
		-
OK	Cancel	Help

HW Config - [SIMATIC 300 Sta	ation (Configuration) dem	o1] Help		
		<b>₩</b> ?		
		PROFIBUS(1	): DP master system	m (1)
(0) UR				
Slot Module	Order number	Firmware	MPI address	I address
2 CPU 315-2 PN/DP(1)	6ES7 315-2EH14-0AB0	¥3.2		
XI MPI/DP				2047*
X2 PN-10				2046*
XGI PORTI Y21 But 2				2042*
2012				2077

### 5.3. Install the GSD file

For engineering and configuring purpose, user has to install device's GSD file to the configuration tool - SIMATIC Manager.

Double click "Hardware" button.

SIMATIC Manager - [demo1 -	- C:\Program Fi	les\Siemens\Step7\s7proj\demo1] Window Help	
		<sup>₽</sup> <u>□</u> :- :::: ::::   < No Filter >	•
App demo1     SIMATIC 300 Station     CPU315-2 PM/DP(1)     Gr S7 Program(1)     Gr S0urces     Gr Blocks	<mark>BÜ</mark> Hardware	CPU315-2 PN/DP(1)	

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Select "Options -> Install GSD File".						
💐 HW Config - [SIMATIC 300 Station (C	🙀 HW Config - [SIMATIC 300 Station (Configuration) demo1]					
🛄 Station Edit Insert PLC View	Options Window Help					
] D 🚅 ≌~ 🖩 🖳  ∰  (∰  18 🖻    🕯	Customize	Ctrl+Alt+E				
(0) UR     (1     (2)	Specify Module Configure Network Symbol Table Report System Error Edit Catalog Profile Update Catalog	Ctrl+Alt+T				
	Install GSD File					
	Find in Service & Support					
•	Create GSD file for I-Device					
(0) UR Slot Module O Fi	M I Q Comment					

Select the GSD file for Moxa PROFIBUS slave module and click "Install" button.

Install GSD Files		×
Install GSD Files:	from the directory	
E.\moxa		Browse
File Release Version	Languages	
MPBSUD80.gst	Default	
Moxa Profibus Slave		
Install Show Log	Select All Deselect All	
Close		Help

If the GSD file is installed successfully then the user can find "Moxa Profibus Slave" from the hardware catalog list.

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#### 5.4. Configure PROFIBUS interface

5.4.1. Drag and drop "Moxa Profibus Slave" device from the catalog to "DP master system".



Select "Moxa Profibus Slave" icon and right click the mouse to select "Object Properties". The PROFIBUS address of Moxa device can be configured here. Please be noted that this value should be identical to the value of address rotary switch on Moxa's PROFIBUS slave.

Order number: Family: DP slave type: Designation:	Gateway Moxa Profibus Slave	GSD file (type file): MPBS0D80.GSD
Addresses Diagnostic address	: 2043	Node/Master System PROFIBUS 1 DP master system (1)
SYNC/FREEZE C	apabilities	
V SYNC	FREEZE	🔽 Watchdog

Address:	-	
Transmission rate: 1.5 Mb		
Subnet:		New
PROFIBUS(1)	1.5 Mbps	Properties
		Tiopernes
		Detete

5.4.2. Configure the desired I/O modules for data exchange with the PROFIBUS master. The user can freely to choose proper combination of I/O modules according to his real application. In this example, 2 bytes input and 2 bytes output are chosen.

Drag "Input: 2 Bytes" module from the module list of Moxa Profibus Slave to slot 1 and "Output: 2 Bytes" to slot 2. Please save these changes after all configurations are done.



5.4.3. The user has to download the new configuration to the CPU 315-2 PN/DP after all settings are configured properly. Before that, please make sure the Ethernet connection between the PC and the CPU 315-2 PN/DP has already built. The user can modify the IP address of the CPU 315-2 PN/DP by double clicking the "PN-IO" block.

Orszell         JAthener         Properties         Ethernet interface PIAO (RO/S2)           Dorde enroling         P37-00         Properties         Ethernet interface PIAO (RO/S2)           Dorde enroling         P37-00         Orszell         Orszell         Orszell           Dorde enroling         P37-00         Orszell         Orszell         Orszell           Dorde enroling         P37-00         Orszell         Orszell         Orszell           Dorde enroling         P38-00         Orszell         Orszell         Orszell           Dorde enroling         Padatemak         P32-00         Orszell         Orszell           Dorde enroling         Orszell         Orszell         Orszell         Orszell           Dorie         Dorde enrolinterinterface	Carbon Ex         Carbon Ex         PEOFIBER(1)         PEOFIDE(1)         PEOFIDE(1)	<u>0</u>
Image: Second	General   Addresses   PROFINET   Synchronization   Time-of- Short description: PN-IO Device name:   PN-IO	Dey Synchronitetion
7 UK	Bit         Motion           1         Interfeee           1         Interfeee           1         Interfeee           2         Interfeee           3         Interfeee           3         Interfeee           3         Interfeee           1	Grand Permitten If a minor is wheth, If a minor is

Click "Download to Module" button to download the configuration to the CPU 315-2 PN/DP.

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# **PROFIBUS Configuration for Siemens S7-300**

💼 HW Config - [SIMATIC 300 Station (Configuration) demo1]					
Station Edit Insert PLC View Options Window H	elp				
] D 😅 🐎 🖩 🐘 (종)   🎭 💼 🚺 🎰 🌘 📼   🎇   🏘	•				
Image: Second	Select Node Addre Over which station a PM/DP(1)? Rack: Slot:	ss Idress is the programming de 0 == 2 == 6 Local	vice connected to th	ie module CPU315	5-2
	Enter connection to	C Can be reached by mean target station:	is of gateway	Chatian anna	Madu
	IP address	MAC address	CDU 215 2	Station name	CRU21
	192.108.0.1	00-02-00-F0-F7-F0	CPU 515-2	SIMATIC SU	CPUSI
	A consible Mades				· · ·
·	(	III Vie	//		•
(0) UR	OK		0	Cancel	Help

Select Node Addres	s			x
Over which station ad PN/DP(1)?	dress is the programming dev	vice connected to t	he module CPU31.	5-2
Rack:				
Slot:	2 *			
Target Station:	💿 Local			
	C Can be reached by mean	us of gateway		
Enter connection to	target station:			
IP address	MAC address	Module type	Station name	Modul
192.168.0.1	00-0E-8C-F6-F7-F8	CPU 315-2	SIMATIC 30	CPU31
•	III			۰.
Accessible Nodes				
192.168.0.1	00-0E-8C-F6-F7-F8	CPU 315-2P	SIMATIC 30	CPU315
•	III			F.
	Upda	te		
ОК		0	Cancel	Help

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## 6. Moxa's PROFIBUS device configuration

#### 6.1. Assign a PROFIBUS address

Before communication, the user has to assign an address to Moxa's PROFIBUS slave. This address should be in accordance with the value which is configured in the STEP 7 project. The user can assign an address 0 to 99 by using the rotary switch. If the desired address is over 99, please configure it via MGate Manager.



#### 6.2. Device configuration with MGate Manager

6.2.1. For configuration purpose, the user has to connect the COM port of PC to the MGate 4101-MB-PBS.



6.2.2. Start MGate Manager and search for the device.



Search   Broadcast Search  Specify IP Search  O . 0 . 0 . 0	
Products Search     Specify IP Search	
© Specify IP Search 0 · 0 · 0 · 0	
Connect through COM Port     COM1	
OK Cancel	
Search Configuration Load Monitor Log ProCOM Mapping	Import

6.2.3. Select the target device and click the configuration button to configure it.

	Name	Model	MAC Address	IP/COM	Status	Firmware Version
	MG4101_10003	MGate 4101I-MB-PBS	N/A	COM1		Ver. 1. 1 Build 11112119
De	avice Identification	Device Fur	rion			
Ē						
	Search	Con	figuration	Monitor	ProCOM Ma	Import
	Locate	Loa	d Default	Diagnose	Upgrade Firm	ware Export
				-		
_		_				
	1					

6.2.4. Select "PROFIBUS" tab. The user does not need to change the PROFIBUS settings since the address is set via the rotary switch.



6.2.5. Select "IO Mapping" tab. Please add proper I/O modules with the same size and sequence as we did in previous STEP 7 project. Here, for example, is 2 bytes input and 2 bytes output.



After clicking "OK" button, the MGate 4101-MB-PBS will reboot with new configuration. The "P2 Status (PROFIBUS)" LED will be in steady green which indicates the device is in data exchange mode.

# 7. Verification

## 7.1. Create Modbus commands

The user can verify his PROFIBUS communication works correctly or not by creating Modbus commands for testing.

Start MGate Manager and select "IO Mapping" tab to add two Modbus commands as the following figure. The MGate 4101-MB-PBS will read a register (2 bytes) from Modbus slave by using the first command and write a register (2 bytes) to Modbus slave by using the second command. With these two commands, the I/O data can be exchanged between PROFIBUS and Modbus networks.

D	Enable	Slave ID	Function	Address	Length	Internal Address	Poll Interval	Swap
:01>	Cyclic	1	3	0	1	0	1000	None
:02>	Cyclic	1	6	0	1	40000	1000	None
	US Slave (Inp	ut/Ouput:2/	2 bytes)			Down		
ROFIB D	US Slave (Inp I/O Module	ut/Ouput:2/	2 bytes) Configuration	n ID	Internal A	Address		
ROFIB D 01]	US Slave (Inp I/O Module Input:2 byte	ut/Ouput:2/	2 bytes) Configuration 0x11	n ID	Internal A	Address		

### 7.2. Modify and monitor I/O data

7.2.1. Set the hardware switch on the CPU 315-2 PN/DP to "Run" mode. The CPU 315-2 PN/DP starts to exchange I/O data with Moxa's PROFIBUS slave interface.



The initial value of I/O data at Modbus slave side is 0x0000.

📰 ModSim32 - [ModSim2]		
File Connection Dis	splay Window Help	_ & ×
Address: 0001 Length: 1 40001: <0000H>	Device Id: 1 MODBUS Point Type 03: HOLDING REGISTER	•

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7.2.2. Select the slot of output I/O module and "Monitor/Modify" option.



Change the output value from 0x0000 to 0x1234 and then check the "Modify" option to trigger this modification to take effect.

<b>.</b>	Monitor/Modify - 16DO - (R-/S2)									
Onl	Online via assigned CPU services									
Pat	Path: demo1\SIMATIC 300 Station\CPU315-2 PN/DP(1)									
	^	Address	Symbol		Display format	Status value	Modify value			
1		PQB 0			HEX	<b>64</b> (	B#16#12			
2		PQB 1			HEX	<b>64</b>	B#16#34			
×	Row Not Effective     Undate Force Symbol with F5									
	un c   M   M   M	conditionall onitor odify Trigger	y	Run immed 667 Status Modif	liately Value y Value	Enable Perph	eral Outputs			
	Cl	038					Help	>		

7.2.3. The new output I/O data has been successfully written from CPU 315-2 PN/DP to the Modbus slave via the MGate 4101-MB-PBS.

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🗱 ModSim32 - [ModSim	2]	
📁 File Connection	Display Window Help	_ 8 ×
Address: 0001 Length: 1	Device Id: 1 MODBUS Point Type 03: HOLDING REGISTER	•
40001: <1234H>		

Meanwhile, the input I/O data is read from the Modbus slave to the input I/O module of CPU 315-2 PN/DP via the MGate 4101-MB-PBS. The new value 0x1234 will be seen in the "Monitor/Modify" window of SIMATIC Manager.



Monitor/Mo	odify - 16DI - (R-/S1)			<b>X</b>
Online via assigne	d CPU services			
Path: demo	o1\SIMATIC 300 Station	CPU315-2 PN/	DP(1)	
Adduess	Symbol	Display format	Status value	Modify value
1 PB 0		HEX	B#16#12	
2 PIB 1		HEX	B#16#34	
🗙 Row Not E	ffective Update	Force Symbol w	ith F5	
– Run conditional	lv — Run immed	liately —		
✓ Monitor	60, Status	: Value	🔲 Enable Periph	eral Outputs
🔲 Modify	Modif	y Volue	J. 10 Dimler	
S. Trigger	Modil	,	1. no pushay	
			4	
Close				Help