Micro Motion[®] Model 5700 Transmitters

PROFINET Siemens PLC Integration Guide





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Contents

1 Before you begin

Topics covered in this chapter:

- About this document
- Related documentation

1.1 About this document

This document provides information about how to integrate a Micro Motion Model 5700 Ethernet transmitter communicating with a Siemens Simatic S7-400 PLC using a Simatic Manager project.

The information in this document assumes that users understand:

- Transmitter programming concepts and procedures
- All corporate, local government, and national government safety standards and requirements that guard against data loss, equipment failure, injuries, or death

1.2 Related documentation

You can find all product documentation via the Micro Motion product documentation DVD shipped with the product or at *www.micromotion.com*.

Торіс	Document
Transmitter installation	Micro Motion Model 5700 Transmitters Ethernet Installation Manual
Hazardous area installation	See the approval documentation shipped with the transmitter, or download the appropriate documentation from the Micro Motion web site at <u>www.micromotion.com</u> .
Transmitter configuration and use	Micro Motion Model 5700 Transmitters Ethernet Configuration and Use Manual
Product Data Sheet	Micro Motion Model 5700 Product Data Sheet (PDS)
Modbus configuration	Modbus Interface Tool (MIT) — available at www.micromotion.com

Table 1-1: Additional documentation and resources

Before you begin

Model 5700 transmitters in Ethernet 2 networks

Topics covered in this chapter:

- Star topology •
- Ring topology •
- Daisy-chain topology •

You can install the Model 5700 transmitter in star, ring, or daisy-chain networks using industrial-rated shielded Ethernet cables.

- Make sure that each cable is no longer than 100 meters.
- Connect the Model 5700 transmitter to the host system via a LAN (Local Area • Network) and not a WAN (Wide Area Network).
- Follow all network security best practices.

2.1 **Star topology**

Model 5700 transmitters can be installed in a star network.



External Ethernet switch С.

А.

В.

2.2 Ring topology

Model 5700 transmitters can be installed in a ring network.





2.3 Daisy-chain topology

Model 5700 transmitters can be installed in a daisy-chain network.



3 Establish cyclic data

Topics covered in this chapter:

- Install the GSDXML file
- Create a PROFINET network
- Configure Ethernet IP address and device name
- Verify communications
- Troubleshooting the PROFINET integration

3.1 Install the GSDXML file

1. Download the GSDXML file using one of the following methods:

Option	Description
Use a USB memory drive	a. Insert a USB memory drive into the Model 5700 Ethernet service port. The service port connection is located under the transmitter cap.
	 b. From the transmitter display, choose Menu > USB Options > Transmitter > USB Drive > Download Support Files > GSD file. c. Follow the menu to copy the GSDXML file to the USB memory drive. d. Copy the zip file from the USB memory drive to the PC where SIMATIC Manager is installed. e. Unzip the file to a chosen location.
Download the file	a. Download the GSDXML file from the Micro Motion Model 5700 Ethernet product website.b. Unzip the file to a chosen location.

- 2. To install the Model 5700 PROFINET GSDXML file into your GSD file catalog using the HW config in SIMATIC Manager:
 - a. Choose Options > Install GSD File.

Example:

	*****	Specify Module	COTTACTE
10) UA2	PS 407 10A	Configure Network. Symbol Table Report System Error	Ctrl+Alt+T
x2 X1	DP MPI/DP	Edit Catalog Profile Update Catalog	
4 5 6	CP 443-5 Basic CP 443-5 Ext CP 443-1	Install HW Updates Install GSD File	
X1 X1 P1 R X1 P2 R	Port 1 Port 2	Find in Service & Support	
7 8 9	DI32xDC 24V D032xDC24V/0.5A		_

- b. Select Install.
- c. Choose Update Catalog.

all GSD Files:	from the directory		-	
Documents and Settings\	Administrator\Desktop\Profinet	GSD		Browse
le	Coriols-20151007-125700.xml	Release 10/07/201512:57	Version	Languages
DML-V2.31-Micro Motion			00 PM V2.31	English
5DML-V2.31-Micro Motion			JULEM V2.31	English
SDML-V2.31-Micro Motion			00 PM (V2,31	English
SDML-V2.31-Micro Motion			JUIFM (V23)	English
SDML-V2.31-Micro Motion				English
SDML-V2.31+Migro Micro			JU FM (V2.3)	English

3.2 Create a PROFINET network

- 1. Configure the primary protocol as PROFINET in the Model 5700 device:
 - a. From the transmitter display, choose Device Tools > Configuration > Network Settings.

- b. Select Profinet.
- 2. From SIMATIC Manager, choose File > 'New Project' Wizard.
- 3. Follow the wizard to select the CPU for your PLC.

Example: CPU 400

- 4. In the Component View, click on the CPU.
- 5. Double-click Connections.

A graphical representation of the network is displayed.

6. Double-click the CPU icon.

The HW Config screen is displayed.

7. Double-click the interface, then click Properties.

Example:

(0) UR2		Properties - Siemens (R0/S6.1)	
1	PS 407 10A	General Addresses PROFINET Synchronization Media Re	edundancy
3 X2	CPU 412-2 DP	Short description: PN-IO	
X7 4	MPI/DP CP 443-5 Basic	Device name: Siemens	
5 6	CP 443-5 Ext		Properties - Ethernet interface PN-IO (R0/S6.1)
X1 X1 P1 R	Siemens Port 1	Support device replacement without exchangeable medium	General Parameters
X1 P2 R 7	Port 2 DI32xDC 24V	Interface	Set MAC address / use ISD protocol
9	D032xDC24V/0.5A	I ype: Ethernet Device number: 0	MAC address:
		Address: 192.168.0.168	IP protocol is being used Gateway Gateway
		Networked: Yes Properties	IP address: 192.168.0.168 © Do not use router Subnet mask: 255.255.255.0
		Comment:	Address:
		1	Subnet:
			Profinet New
		<u></u>	Properties
			OK Cancel Help
			OK Cancel Help

The network settings of the S7 400 PLC Ethernet interface are configured.

8. Right-click on the Ethernet interface, and select Insert PROFINET IO System. Example:

1	PS 407 10A		
3	CPU 412-2 DP		
X2	DP		
XI	MPI/DP		
4	CP 443-5 Basic		
5	CP 443-5 Ext		
6	CP 443-1		
X1	Siemens	Canal	Orly
XTPTR	Port 1	Copy	Contect
X1 P2 R	Port 2	Pasce	CON+V
7	D132xDC 24V	Insert Multi-Controller Device	
8	D032xDC24V/0.5A	Replace Object	
3		Add Master System	
		Disconnect Master System	
		Master System Isochronous Mode	0
		Insert PROFINET IO System	
		Disconnect PROFINET IO System	
		PROFINET IO Domain Manageme	nt
		PROFINET IO Topology	
		PROFINET IO Multi-Controller De	vices
		PROFINET IO Isochronous mode	
		Specify Module	
		Delete	Del
		Go To	
		Filter Assigned Modules	
		Monitor/Modify	

The Ethernet network is created.

9. Double-click on the PROFINET network you just created.

The Properties menu is displayed.

10. Enter the name of the network.

mple:		
Prof	net: pn (100) (1) mmi570((1) mmi570(
General Update Time		
Short designation:	PROFINET IO System	
Name:	pn	
	Use name in ID device / controller	
IO system no.:	100 💌	
Subnet:	Profinet	
	Properties	
Comment:		
	×	
ОК		Cancel Help

11. (Optional) To use the network name in the IO device and in the controller, check Use the name in IO device/controller.

12. Drag and drop the device called Standard from the GSD file catalog to the Model 5700 Ethernet network.

The Model 5700 Ethernet network is located at PROFINET IO > Additional Field Devices > Sensors > Coriolis > 5700 Coriolis Meter.



- 13. Double-click on the device to enter the configuration menu.
- 14. Enter the Device name.

Note

The Device name must:

- Follow all DNS conventions
- Cannot start with a number
- Cannot contain uppercase alpha characters
- 15. Make the appropriate IP address configuration of the device, and press Ok.

You can use the Ethernet button if required.

If the Use name in IO device/controller checkbox is checked in the network properties, then Device name will have the following format: *device_name.network_name*.

Option	Description
Device name when the Use	Properties - mmi5700
name in IO device/controller	General Identification
checkbox is unchecked	Short description: 5700CoriolisMeter
	5700 Coriolis Meter, for PNIO controller with PDev
	Order no./ firmware: 00210 / Z1.0
	Device name. Immovio
	GSD file: GSDML-V2.31-Micro Motion-Coriolis-20151007-125700.xml
	Change Release Number
	Node in PROFINET IO system
	Device number: 1 v pn (100)
	IP address: 192.168.0.1 Ethernet
	Assign IP address via IO controller
	Comment:
	×
	OK Cancel Help
Device name when the Use	Properties - mmi5700.pn
name in IO device/controller	General Identification
checkbox is checked	Short description: 5700CoriolisMeter
	5700 Coriolis Meter, for PNIO controller with PDev
	Dedecare / firmunation 00210 / 721 0
	Family: Coriolis
	Device name: mmi5700 . pn
	GSD file: GSDML-V2.31-Micro Motion-Coriolis-20151007-125700.xml
	Change Release Number
	Node in PROFINET IO system
	Device number: 1 pn (100)
	IP address: 192.168.0.1
	Assign IP address via IO controller
	Comment
	Commerk.

- 16. Click on the Model 5700 Ethernet icon to display the HW configuration in the lower screen.
- 17. From the HW Catalog, drag the input and output slots to one of the following locations:
 - PROFINET IO > Additional Field Devices > Sensors > Coriolis > 5700 Coriolis Meter > Standard > Input Modules - Slot 1
 - PROFINET IO > Additional Field Devices > Sensors > Coriolis > 5700 Coriolis Meter > Standard > Output Modules – Slot 2

Example:

If Empty is selected, delete the slot by right-clicking on the slot, and selecting Delete. For a description of the Input and Output slots, see *Appendix A*.

Example: In this example, Small Configurable Data has been added to Slot 1.



- 18. Press Save and Compile.
- 19. Press Download to Module to download the configuration into the CPU module.

Note

The modules configured and downloaded in the HW Config are set in the transmitter. You do not need to set the Input or Output modules on the transmitter first. You can configure the variables in the input data sets using the web server or ProLink III.

F	
🙀 HW Config - [SIMATIC 400(1) (Configuration) Proiect_f	inal]
🙀 Station Edit Insert PLC View Options Window Help	
D 😅 🖫 🖉 🐘 🎒 🗈 🛍 🏙 🏨 🚯 🗖 💥 🕺	•
0) UR2 1 PS 407 10A	
3 CPU 412-2 DP X2 DP X1 MP/DP 4 X CP 443-5 Basic 5 X CP 443-5 Ext 6 X CP 443-1 X1 Siements X1 Siements X1 P2 R Port 2 7 D132xDC 24V/ 8 D032xDC24V/0.5A 9	Download Station: SIMATIC 400(1) Module: [0/3/0] CPU 412-2 DP Cancel

The configuration is downloaded into the CPU module. The PLC should show a red LED bus fault.

3.3 Configure Ethernet IP address and device name

Use this procedure to configure the Ethernet IP address and device name for the Model 5700 Ethernet device.

1. Choose PLC > Ethernet > Edit Ethernet Node.

Example:



2. To configure the programming machine (PG) to PC interface, choose Options > Set PG/PC Interface...

Example:

0 📽 🔐 🖶 👗 🗞 🛍	1	Customize	Ctrl+Alt+E	· 7 28 8 5 5 (1 12				
- Acyclic_test_results	0	Access Protection	,	in language Size in the work me	Туре	Version (Header)	Name (Header)	Unlinked	Author
SIMATIC 400(1)	1	Change Log	,	-	508	-	-	-	-
B m S7 Program(1)	0	Text Libraries	,	52	Organization Block	0.1		-	
Sources	2	Language for Display Devices		130	Function	0.1			
Blocks	e.	Manage Multilegual Texts		38	Data Block	0.1		-	
and a second	C	manage matomigate reco	100	40	Data Block	0.1		-	
	C	Rewire		64	Instance data block	0.1		-	SIMATI
	9	Run-Time Properties		62	Instance data block	0.1		-	SIMAT
	13			-	Vanable Lable	0.1	00000	-	C
	2	Compare Blocks			System runction block	1.0	HUNEL	-	CIMATI
	5	Reference Data	,	-	System runction block	1.0	WHITEL	-	2009411
		Define Global Data							
		Configure Network							
		Simulate Modules							
		Configure Process Diagnostics							
		CAx Data							
	Г	Set DG/DC Interface							

3. Press Browse to find the Model 5700 Ethernet device on the network.

Тір

If you cannot find the Model 5700 device, turn off your firewall. Firewalls sometimes prevent SIMATIC Manager from browsing network devices.

Ethemet node		Nodes accessible online
MAC address:		Baswepe
Set IP configuration		
Use IP parameters		
10 addams		_ Gateway
IF duaress.		Do not use router
Subnet mask:		C Use router
		Address
C Obtain IP address	from a DHCP server	
Identified by		
C Diret 10	C MAC eddess	C Device name
Client ID:		
Alage IP Configu	ation	
Assign device name		
Device name:	1	AssignNarian
Reset to factory settin	gi	
		Report

4. Select the device from the list and press Ok.

Example:

5101	IP address	MAC address	Douise type	Name	Subnet mask
Stop	192.168.0.168	00-18-18-0F-0A-0F	57-400 CP	siemens	
ast search	/				
//					
Flash MAC	address: 00-1E-	F2-00-00-14			

- 5. Fill in the appropriate network settings and press Assign IP Configuration.
- 6. Fill in the device name and press Assign Name.

Make sure the IP configuration and device name are the same as what you configured in *Section 3.2*.

		Nodes accessible online
IAC address:	00-1E-F2-00-00-14	Browse
et IP configuration		
 Use IP paramete 	1\$	
IP address:	192.168.0.1	Gateway © Do not use router
Subnet mask:	255.255.255.0	C Use router Address: 192.168.0.1
Obtain IR addres	e from a DHCP canvar	
Identified by	S HOIL & DITCH SELVER	
Client ID	C MAC address	C Device name
Client ID:		
Assign IP Config	uration	
ssign device name	X.	
Device name:	mmi5700	Assign Name
leset to factory setti	nas	
		Reset

7. Press Browse again to make sure the changes were applied to the device.

Start	! IP address	MAC address	Device type	Name	Subnet mask
	192.168.0.1	00-1E-F2-00-00-14	Coriolis	mmi5700	
Stop	192.168.0.168	00-18-18-0F-DA-0F	S7-400 CP	siemens	
t search					
lash N	AAC address: 00	-1E-F2-00-00-14			

Example:

8. Choose PLC > Ethernet > Verify Device Name to verify the device name was properly assigned.

🖳 HW Config - [SIMATI	C 400(1) (Configuration)	Proiect_final]		
DI Station Edit Insert	PLC View Options Window H	lelp	1	
	Upload	Ctrl+L		
(0) UR2	Download Module Identification. Upload Module Identification to F	 PG		
3 CPU 4	Faulty Modules			
X2 X1 MPI/D, 4 H CP 443	Module Information Operating Mode	Ctrl+D Ctrl+I		
5 2 CP 443 6 2 CP 444	Clear/Reset Set Time of Day Monitor/Modify		Profinet: Pl	ROFINET-IO-System (100)
XI PIR Port 1 XI P2R Port 2	Update Firmware			► (1) mmi570(
7 DI32xD 8 D032x1	Save Device Name to Memory C	ard		
9	Ethernet	•	Edit Ethernet Node	
	PROFIBUS	•	Verify Device Name Assign Device Name	
L L	Save Service Data		1	
Verify Device National Available Devices: Device name St mmi5700	me tatus IP address MAI 192.168.0.1 00-1	C address IE-F2-00-00-1	Device type 4 Coriolis	Assign Name
Show only missir	ng and incorrectly configur	ed devices		
Close				Help

3.4 Verify communications

1. Verify that the PLC shows no faults (red lights).

The most likely error will be a Bus Fault (BF LED is red), which means either the Device Name, the IP address, the Input Slot, or the Output Slot between the PLC and the Model 5700 Ethernet transmitter does not match.

- 2. To verify you are receiving data:
 - a. In the HW Config, click the Model 5700 Ethernet icon.
 - b. Right-click on the Input Slot and press Monitor/Modify.
 - c. Click the I/O Display box and the Monitor box to see the process variables updating.

th:	F	emerso	n\SIMATIC 40	0(1)\CPU 412-5 H PN	I/DP		
17	Ad	dress	Symbol	Display format	Status value	Modify value	T
T	PIB	0		HEX	B#16#41		1
1	PIB	1		HEX	B#16#A0		16
1	PIB	2		HEX	B#16#00		1
1	PIB	3		HEX	B#16#00		14
1	PIB	4		HEX	B#16#40		
1	PIB	5		HEX	B#16#00		1
1	PIB	6		HEX	B#16#00		1
1	PIB	7		HEX	B#16#00		
1	PIB	8		HEX	B#16#3F		
	PIB	9		HEX	B#16#80		1
	PIB	10		HEX	B#16#00		1
1	-			11FW			-
iun F M	Row N condit lonitor lodify	lot Effe	Ru	Update Force Symbol n immediately Status Value	Enable Peri	pheral Outputs	
3	Trig	ger		modily value	V I/O Display		

3. If the transmitter is still not communicating, from the transmitter display, choose Menu > Configuration > Ethernet settings > Primary Protocol > Profinet to verify that PROFINET is the configured primary protocol on the Model 5700 Ethernet transmitter.

3.5 Troubleshooting the PROFINET integration

3.5.1 Cannot download PROFINET into the PLC controller

Use the following procedure if you cannot download the PROFINET program into the PLC controller.

- 1. Choose PLC > Ethernet > Edit Ethernet Node.
- 2. Select Browse.

A list of network devices with MAC IDs is displayed.

3. Select the PROFINET controller and press OK.



Establish cyclic data

4 Configuring Siemens PLC read/write operation

1. To insert the data blocks:

You will use the data blocks to configure the request and response parameters on the Siemens PLC.

a. From the SIMATIC Manager screen, select Insert > S7 Block > Data Block.

Example: [Acyclic_test_results -- D/5788 Ethemet Testing\@VT round #\Acyclic_] File Edit Insert PLC View Op findow Help Ra 🕞 🔠 💼 😰 🔍 No Filter> . y 12 = 15 = 10 k/ 0 📽 😫 Station Subnet Symbolic name Created in language Size in the work me... Type Program SDB CYCL EXC LAD 180 0 0.1 ST Software Organizator Data Block Data Block Instance da DB Request 1 Organization Block 45 43 64 62 08 08 08 08 S7 Block M7 Suffe 2 Function Block 3 Function Symbol Table STL STL 4 Data Block 1.0 TextLibrary 5 Data Type External S 6 Variable Table

b. From the Properties screen, enter the values as shown in the following example and select OK.

Example:

Properties - Data Block			100	×
General - Part 1 General	Part 2 Calls Attri	butes		
Name and type:	DB2	Shared DB	-	-
Symbolic Name:	DB_Request			
Symbol Comment:				
Created in Language:	DB			
Project path:				
Storage location of project:	D:\MODBUS TCP\P	rofinet v0.35\e	merso_1	
	Code		Interface	
Date created:	02/04/2016 04:52:16	PM		
Last modified:	02/04/2016 04:52:16	PM	02/04/2016 04:52:10	6 PM
Comment:				<u>~</u>
	J			-
ОК			Cancel	Help

The first of two data blocks is created.

c. From the Properties screen, enter the values as shown in the following example and select OK.

roperties - Data Block		and concerning		
General - Part 1 Genera	I - Part 2 Calls At	tributes		
Name and type:	DB3	Shared DB	-	Ŧ
Symbolic Name:	DB_Response			
Symbol Comment:				
Created in Language:	DB]		
Project path:				
Storage location of project:	D:\MODBUS TCP	Profinet v0.35\e	merso_1	
	Code		Interface	
Date created:	02/04/2016 04:53:	10 PM		
Last modified:	02/04/2016 04:53:	10 PM	02/04/2016 04:53:10 PM	1
Comment:				*
				-
ок			Cancel	Help

The second of two data blocks is created.

- 2. To copy the SFB52 and SFB53 data blocks to your project:
 - a. From the SIMATIC Manager screen, select File > Open and select the Library tab.
 - b. Select Standard Library and press OK.

Example:

Name	Storage path	
😪 Redundant IO CGP V40	C:\Program Files\Siemens\Step7\S7libs\red_io_1	
Redundant ID CGP V52	C:\Program Files\Siemens\Step7\S7libs\red_io52	
Redundant IO MGP V32	C:\Program Files\Siemens\Step7\S7libs\red_io_0	
SIMATIC NET CP	C:\Program Files\Siemens\Step7\S7libs\simation	
Comparino_ner_or	The second se	
Standard Library stdlibs (V2)	C.VProgram Files/Siemens/Step7/S7libs/stdlib30 C:VProgram Files/Siemens/Step7/S7libs/stdlibs	
Standard Library stdlibs (V2)	C.VProgram Files/Siemens/Step7VS7lbs/atdlb30 C:VProgram Files/Siemens/Step7VS7lbs/atdlbs	
Standard Library stdlibs (V2)	C.VFrogram Files/Siemens/Step7/S7lbs/stdlb30 C:\Program Files/Siemens/Step7\S7lbs/stdlbs	
Standerd Library stdilos (V2)	C.VProgram Files/Siemens/Step7/S7lbs/stdlb30 C:VProgram Files/Siemens/Step7/S7lbs/stdlbs	
Standard Library ♦ stdlibs (V2) Selected	C.VPtogram Files/Siemens/Step7/S7lbs/stdlb30 C:VPtogram Files/Siemens/Step7/S7lbs/stdlbs	
Standard Library stdlibs (V2) Selected ser projects:	C.VProgram Files/Siemens/Step7/S7lbs/stdlb30 C:VProgram Files/Siemens/Step7/S7lbs/stdlbs	
Standard Library Stalibs (V2) Selected per projects: 1	C-VPtogram Files/Siemens/Step7/S7lbs/atdlb30 C:VProgram Files/Siemens/Step7/S7lbs/atdlbs	
Standard Library Stalibs (V2) Selected ser projects: ample projects:	C.VPtogram Files/Siemens/Step7/S7lbs/stdlb30 C:VProgram Files/Siemens/Step7/S7lbs/stdlbs	

The pre-defined library opens.

- c. From the Standard Library tree view, select System Function Blocks > Blocks.
- d. From the right panel, select SFB52 and SFB53, and select Copy.

1.1.4.17 (2010)	ê 9 % 1	1- 12 🟦 💼 📢 🕅	iller > 💌	9 38 5 5	🔟 🐶		
Standard Library	Object name	Symbolic name	Created in language	Size in the work me	Type	Version (Header)	Name (Header)
Communication Blocks	SFB43	PULSEGEN	SIL		System function block	1.0	PULSEGEN
E IEC Function Blocks	SFB44	ANALOG	STL		System function block	1.0	ANALOG
Mincellaneous Blocks	SFB46	DIGITAL	SIL		System function block	1.0	DIGITAL
e 📺 Organization Blocks	SFB47	COUNT	SIL		System function block	1.0	COUNT
PID Control Blocks	SFB48	FREQUENC	STL		System function block	1.0	FREQUENC
E PROPienergy Blocks	SFB49	PULSE	STL		System function block	1.0	PULSE
E E Solar Develop Blocks	ag (59862	RDREC	STL		Some fraction block	1.0	RDREC
Go Electo	ga 57853	WRREC	21L Oper	Object	Ctrl+Alt+O		
and ILV/ America Blocks	\$\$ SPB54	RALRM	STL		ek.	1.0	RALRM
The tree constant paces	SFB60	SEND_PTP	STL Cut	_	Ctrl+X gk	1.0	SEND_PTP
	SFB61	RCV_PTP	STL Copy	(Ctrl+C ek	1.0	RCV_PTP
	55 SFB62	RES_RCVB	STL Daste	_	CHILLY RK	1.0	RES_RCVB
	SFB63	SEND_RK	STL		ek.	1.0	SEND_RK
	SFB64	FETCH_RK	STL Delet	e	Del ek	1.0	FETCH_RK
	SFB65	SERVE_RK	STL		ek.	1.0	SERVE_RK
	1 SFB73	RCVRBC	STL Insert	New Object	* ež	1.0	RCVREC
	SFB74	PRVREC	STL		ek	1.0	FRVREC
	1 SFB75	SALRM	STL Comp	pare Blocks	ek	1.0	SALRM
	1 SFB81	RD_DPAR	STL Drint		, ek	1.0	RD_DPAR
	SFB104	IP_CONF	STL		sk.	1.0	IP_CONF
	SPC0	SET CLK	STL Sarci	al Object Properties		1.0	SET CLE

SFB52 and SFB53 are copied to your Projects folder under CPU > S7 Program > Blocks.

- 3. To add the SFB52 and SFB53 DB instances:
 - a. To create the data blocks, choose Insert > S7 Block > Data Block.
 - b. Enter the values as shown in the following example and select OK.

Example:

General - Part 1 Genera	I - Part 2 Calls Attributes		
Name and type:	DB52 Instance	DB SFB52	-
Symbolic Name:	SFB52_Instance	1	
Symbol Comment:			
Created in Language:	DB		
Project path:			
Storage location of project:	D:\MODBUS TCP\Profinet v0	.35\emerso_1	_
	Code	Interface	
Date created:	02/04/2016 05:07:40 PM		
Last modified:	02/04/2016 05:07:40 PM	02/04/2016 05:07:40 PM	
Comment:			*

The first of the two data block DB instances is added.

c. Enter the values as shown in the following example and select OK.

ieneral - Part 1 Genera	I - Part 2 Calls Attribu	tes	
Name and type:	DB53	stance DB 🗾 SFI	853 💌
Symbolic Name:	SFB53_Instance		
Symbol Comment:			
Created in Language:	DB		
Project path:			
Storage location of project:	D:\MODBUS TCP\Prof	inet v0.35\emerso_1	
	Code	Interface	
Date created:	02/04/2016 05:08:38 P	м	
Last modified:	02/04/2016 05:08:38 P	M 02/04/2016 0)5:08:38 PM
Comment:			~

The second of the two data block DB instances is added. The SIMATIC Manager displays the entries.

Object name	Symbolic name	Created in language	Size in the work me	Туре	Version (Header)
🖄 System data				SDB	4
🖬 0B1	CYCL_EXC	LAD	180	Organization Block	0.1 🌈
DB2	DB_Request	DB	46	Data Block	0.1 🍾
🖬 DB3	DB_response	DB	48	Data Block	0.1 🧹
DB52	SFB52_Instance	DB	64	Instance data block	0.1 🔨
🖬 DB53	SFB53_Instance	DB	62	Instance data block	0.1
VAT_1	VAT_1			Variable Table	0.1
🚰 SFB52	RDREC	STL		System function block	1.0
🚰 SFB53	WRREC	STL		System function block	1.0
	and the second s	and the second s		and and a	

4. To configure the DB2 Request data block, double-click DB2 Request and enter the values as shown in the following example.

Example:

-	CF DB2 "DB_Request" WorkAcyclic_test_results\SIMATIC 400(1)\CPU 412-5 H PN/DP\\DB2					
	Address	N	ame	Туре	Initial value	Comment
	0.0	Γ		STRUCT		
I	+0.0	Γ	Word2	WORD	W#16#0	
I	+2.0		Word3	WORD	W#16#0	
l	+4.0]	Word4	WORD	W#16#0	
I	+6.0		Word5	WORD	W#16#0	
1	=8.0	Г		END STRUCT		

5. To configure the DB3 Response data block, double-click DB3 Response and enter the values as shown in the following example.

Example:

DB3 "DB_Response" Proiect_final\SIMATIC 400(1)\CPU 412-2 DP\\DB3					
Address		Name	Туре	Initial value	Comment
	0.0		STRUCT		
	+0.0	ReadWordl	REAL	0.00000e+000	
	+4.0	ReadWord2	REAL	0.00000e+000	
	+8.0	ReadWord3	REAL	0.00000e+000	
	=12.0		END_STRUCT		

6. To program acyclic read:

a. Double-click OB1.

Object name	Symbolic name	Created in language	Size in the work me	Туре	Version (Header)	<
🎒 System data		1		SDB		
🕞 0B1	CYCL_EXC	LAD	174	Organization Block	0.1	<
🖬 DB2	DB_Request	DB	46	Data Block	0.1	5
🕩 DB53	SFB53_Instance	DB	62	Instance data block	0.1	2
VAT_1	VAT_1			Variable Table	0.1	3
SFB52	RDREC	STL		System function block	1.0	-
SFB53	WRREC	STL		System function block	1.0	1

b. Choose Insert > Network.

File Edit 1	nsert PLC Debug View Object	Options Wir	ldow Help Pana 66^ !≪ ≫!	□□□ Ёі≧≧ + +++-0 @ ५ -
	Block Template	+		Contents Of: 'Environment\Inter
DEN	Declaration Line	Alt+Ins	terface	Name
Bit logi	Network	Ctrl+R	- TEMP	
⊕ Compa ⊕ Conver ⊕ Conver	Network Comment Symbol	Ctrl+J	"Main Progra	m Sweep (Cycle)"
⊕	Program Elements LAD Language Elements	Ctrl+G ▶	nt:	
Integer fu Integer fu Integer fu Integer fu Integer fu Integer fu Integer fu	nction point fct. control			DB53 "SFB53_ Instance"

c. To configure the input and output parameters, from SFB blocks, drag SFB52 to Network.

	DH52 "SFB52_ Instance"	39
	SFB52 Read a Process Data Record "PDRKC"	
EN	ENO	-
MO.Z-REQ	VALID	-10.4
WELGELFF4-ID	BUSY	-116.3
247 - IND	DC ERROR	-10.5
4 - ML 82	STATUS	-MD18
PEDES. DEXO. 0	LEN	-11622

Parame- ter	Description
REQ	 The Read request is sent to the Model 5700 using bit memory M8.2. You have the following options: 1 (true) starts the read request. You must end the request. 0 (false) ends the request. Reset Bit logic is used to reset M8.2.
VALID	Bit memory M8.4 indicates whether a new data record was received and valid.
BUSY	Bit memory M8.3 indicates whether the read process has terminated or not.
ERROR	Bit memory M8.5 indicates whether an error has occurred while processing the function.
STATUS	The double-word bit memory MD18 contains an error code. For error de- scriptions, see <i>Help on system functions / function blocks</i> .
ID	Displays the PN-IO diagnostic address (for example, "8180" = 1FF4 hex). This address is used for PROFINET acyclic read/write to the Model 5700E station to perform pre-defined diagnoses.
INDEX	Displays the data record number (247 – starting Modbus register for mass flow). For the Model 5700, the starting address is 1.
MLEN	The maximum length in bytes of data record information to be fetched.
RECORD	The destination area for the read data record. For DB3 in this example, the starting address is 0 and the address length is two bytes.

d. Read the acyclic parameters displayed in the Actual value field.

Example:



7. To program acyclic write, choose S7 Program > Blocks and double-click OB1.

The OB1 block is a Program Cycle Organization Block. The S7 CPU operating system executes OB1 periodically. When OB1 has been executed, the operating system restarts it. Cyclic execution of OB1 is started after the start-up has been completed.

- a. To edit the program, select OB1.
- b. Choose Insert > Network.
- c. From SFB blocks, drag SFB53 to Network and and configure the input and output as shown in the following example.



8. To create a variable table:

Use the variable table to modify and monitor the connected PLC variables and memory content.

- a. From the SIMATIC Manager screen, choose Insert > S7 Block > Variable Table.
- b. Enter the values as shown in the following examples and save your changes.

Ex	ample:				
Ľ	VAT_ACYCLIC	C @Proiect_final\SIM	ATIC 400(1)\CPU	412-2 DP\\$7 Pr	ogram(1) ONLINE
	Address	Symbol	Display format	Status value	Modify value
1	M 1.0		BOOL	true	true
2	DB2.DBW 0	"DB_Request".Word1	HEX	VV#16#005B	VV#16#005B
3					
4					
5					

The write request is sent to the Model 5700 using bit memory M1.0.

- c. To start the read request, enter 1 (true) in the Modify value field, right-click, and press Modify.
- d. To end the request, enter 0 (false) in the Modify value field, right-click, and press Modify.
- 9. To download a project to PLC:

a. From the SIMATIC Manager screen, select the Download to Module icon.

The configuration is downloaded to your CPU.

b. After the project downloads, open the vat table and make the corresponding M 1.0, 8.2 bits high for read and read/write.

The read request is sent to the Model 5700 using bit memory M8.2. The write request is sent to the Model 5700 using bit memory M1.0.

c. Go online to read and write acyclic data into the Model 5700 device module.

Appendix A Input and output slots

Topics covered in this appendix:

- Input slots
- Output slots

A.1 Input slots

Empty

Use the Empty Input slot when no input data is required. Typically for a Model 5700 Ethernet mass flow meter, the Empty Input slot is unused because this meter is a measuring device.

Table A-1: Common input data

Assembly Dword			
index	Name		Data type
0	Mass Flow		REAL
1	Temperature		REAL
2	Density	REAL	
3	Drive Gain	REAL	
4	Totalizer 1 (default = Mass	REAL	
5	Inventory 1 (default = Mas	REAL	
6	Status		DWORD
	Severity Counter/Heartbeat (bits	 Bit #0 = Immediate Failure Bit #1 = Last Measure Value Failure Bit #2 = Function Check Bit #3 = Out of Specification Bit #4 = Maintenance Required The PLC will display the coun- 	
	16-32)	ter/heartbeat as a signed INT, therefore the counter can be negative.	

Assembly Dword index	Name		Data type
7	Alert detail	 Bit #0 = Electronics Failure Bit #1 = Sensor Failed Bit #2 = Configuration Error Bit #3 = Core Low Power Bit #4 = Security Breach Bit #5 = Sensor-Transmitter 	DWORD
	Communications error	 Bit #6 = Tube Not Full Bit #7 = Extreme Primary Purpose Variable Bit #8 = Reserved Bit #9 = Flowmeter Initializ- ing Bit #10 = Function Check in Progress Bit #11 = Sensor Being Si- mulated Bit #12 = Output Fixed Bit #13 = Drive Over Range Bit #14 = Process Aberra- tion Bit #15 = Discrete Event X Active Bit #16 = Output Saturated Bit #17 = Function Check Failed Bit #18 = Data Loss Possible 	
8	Echo Output Data Discrete	Actions	DWORD

Table A-1: Common input data (continued)

Table A-2:Liquid volume flow

Assembly Dword index	Name	Data type
0-8	Mass Flow	See Table A-1
9	Volume Flow	REAL
10	Totalizer 2 (default = Volume Total)	REAL
11	Inventory 2 (default = Volume Inventory)	REAL

Table A-3:	Gas vo	lume flow

Assembly Dword index	Name	Data type
0-8	Mass Flow	See Table A-1
9	Gas Volume Flow	REAL
10	Totalizer 4 (default = Gas Volume Total)	REAL
11	Inventory 4 (default = Gas Volume Inventory)	REAL

Table A-4: API Referral

Assembly Dword		
index	Name	Data type
0-8	Mass Flow	See Table A-1
9	Volume Flow	REAL
10	Totalizer 2 (default = Volume Total)	REAL
11	Inventory 2 (default = Volume Inventory)	REAL
12	Corrected Density	REAL
13	Corrected Vol Flow	REAL
14	Totalizer 3 (default = Corrected Vol Total)	REAL
15	Inventory 3 (default = Corrected Vol Inv)	REAL
16	Avg Density	REAL
17	Avg Temperature	REAL
18	CTL	REAL

Table A-5: Concentration Measurement

Assembly Dword index	Name	Data type
0-8	Mass Flow	See Table A-1
9	Volume Flow	REAL
10	Totalizer 2 (default = Volume Total)	REAL
11	Inventory 2 (default = Volume Inventory)	REAL
12	Density at Reference	REAL
13	Std Vol Flow Rate	REAL
14	Totalizer 5 (default = Std Vol Total)	REAL
15	Inventory 5 (default = Std Vol Inv)	REAL

Assembly Dword index	Name	Data type
16	Net Mass Flow Rate	REAL
17	Totalizer 6 (default = Net Mass Total)	REAL
18	Inventory 6 (default = Net Mass Inv)	REAL
19	Net Vol Flow Rate	REAL
20	Totalizer 7 (default = Net Vol Flow Total)	REAL
21	Inventory 7 (default = Net Vol Flow Inv)	REAL
22	Concentration	REAL
23	Density - Fixed SG Units	REAL
24	Density - Fixed Baume Units	REAL

Table A-5: Concentration Measurement (continued)

Table A-6: Batcher

Assembly Dword index	Name	Data type
0-8	Mass Flow	See Table A-2
9–11	Liquid Volume	
12	Batch Total	REAL
13	Overshoot Compensation Value (Reg 1457)	REAL
14	Batch Fill Time	REAL
15	 Fill status and diagnostics Bit #0 - Primary Fill in progress (reg 2495 bit 0) Bit #1 - Primary AOC training (reg 2495 bit 9) Bit #2 = Primary Valve (reg 2495 bit 5 Bit #3 = Undefined Bit #4 = Undefined Bit #5 = Undefined Bit #6 - Fill Start Not Okay (reg 2496 bit 0) Bit #7 - AOC Flow Rate Too High (reg 2496 bit 1) Bit #8 - Maximum Fill Time Exceeded (reg 2496 bit 2) Bit #9 - Slug Flow (reg 2496 bit 3) Bit #10 - Tube Not Full (reg 2496 bit 4) Bit #11 - Drive Overrange (reg 2496 bit 5) Bit #12 - Critical Sensor Failure (reg 2496 bit 6) Bit #13 - Critical Transmitter Failure (reg 2496 bit 7) Bit #14 - Density Out of Limits (reg 2496 bit 8) Bit #15 - Temperature Out of Limits (reg 2496 bit 9) Bit #16 - Bit #31 for future expansion 	DWORD

Table A-7:	Small in	put confic	urable	data set

Assembly Dword index	Name	Data type
0-8	Mass Flow	See Table A-1
9–16	8 configurable slots	REAL *8

Table A-8: Medium input configurable data set

Assembly Dword index	Name	Data type
0-8	Mass Flow	See Table A-1
9–24	16 configurable slots	REAL *16

Table A-9: Large input configurable data set

Assembly Dword index	Name	Data type
0-8	Mass Flow	See Table A-1
9–40	32 configurable slots	REAL *32

Table A-10: Advanced Phase Measurement (APM) – liquid

Assembly Dword		
index	Name	Data type
0-8	Mass Flow	See Table A-1
9	Volume Flow	REAL
10	Totalizer 2 (default = Volume Total)	REAL
11	Inventory 2 = (default = Volume Inventory)	REAL
12	Gas Void Fraction	REAL
13	Contract Total 1	REAL
14	Contract Total 2	REAL
15	Contract Total 3	REAL
16	Contract Total 4	REAL
17	Net Oil Flow @ Line	REAL
18	Net Water Flow @ Line	REAL
19	Watercut @ Line	REAL

Assembly Dword index	Name	Data type
20	Net Oil Total @ Line	REAL
21	Net Water Total @ Line	REAL
22	Density Oil @ Line	REAL
23	Net Oil Flow @ Ref	REAL
24	Net Water Flow @ Ref	REAL
25	Watercut @ Ref	REAL
26	Net Oil Total @ Ref	REAL
27	Net Water Total @ Ref	REAL

Table A-10: Advanced Phase Measurement (APM) – liquid (continued)

Table A-11: Advanced Phase Measurement (APM) – gas volume

Assembly Dword		
index	Name	Data type
0-8	Mass Flow	See Table A-1
9	Gas Volume Flow	REAL
10	Totalizer 4 (default = Gas Volume Total)	REAL
11	Inventory 4 (default = Gas Volume Inventory)	REAL
12	Contract Total 1	REAL
13	Contract Total 2	REAL
14	Contract Total 3	REAL
15	Contract Total 4	REAL
16	Total time mist detected	DWORD
17	 APM Status Bit #0 – TMR Algorithm Active (reg 433 bit 12)⁽¹⁾ Bit #1 – Bit #15 currently not defined Bit #16 – Bit #31 for future expansion 	DWORD

(1) Do not include the parenthesis in the label

A.2 Output slots

Empty

Use the Empty Input slot when no output data is required. No output data is a typical application and is the default.

Assembly Dword		
index	Name	Data type
0	 Bit #0 – Start Sensor Zero (trigger start with a 1, no abort) Bit #1 – Reset All Process Totals (same as setting bits 2-8)v Bit #2 – Reset Totalizer 1 (Mass Total by default) Bit #3 – Reset Totalizer 2 (Volume Total by default) Bit #4 – Reset Totalizer 3 (PM Ref Vol Total by default) Bit #5 – Reset Totalizer 4 (GSV Total by default) Bit #6 – Reset Totalizer 5 (CM Ref Vol Total by default) Bit #7 – Reset Totalizer 6 (CM Net Mass Total by default) Bit #8 – Reset Totalizer 7 (CM Net Vol Total by default) Bit #9 – Start All Totals (trigger start with a 1) Bit #10 – Stop All Totals (trigger stop with a 1) If both start and stop =1, then totals are stopped Bit #11 – Start Smart Meter Verification (Continue Measuring Mode only) Trigger start with a 1, no abort Bit #12 – Reset all Inventory Totals 	DWORD

 Table A-12:
 Common output data — Discrete actions only

Table A-13: External process data

Assembly Dword index	Name	Data type
0	Common output data (instance 150 data)	See Table A-12
1	External Pressure	REAL
2	External Temperature	REAL

Table A-14: Batcher

Assembly Dword index	Name	Data type
0	Common output data (instance 150 data)	See Table A-12
1	Batch Target	REAL

Assembly Dword		
index	Name	Data type
2	 Batcher Control – Discrete Actions Bit #0 – Reserved Bit #1 – Start Fill Bit #2 – End Fill Bit #2 – Pause Fill Bit #4 – Resume Fill Bit #5 – Reserved Bit #6 – Start Training Bit #7 – Save AOC Calibration 	DWORD
	 Bit #8 – Bit #31 for future expansion 	
3	Maximum Batch Time (Reg 1305)	REAL

Table A-14: Batcher (continued)

Table A-15: Batcher and external process data

Assembly Dword		
index	Name	Data type
0–2	External process data (instance 151 data)	See Table A-12
3	Batch Target	REAL
4	 Batcher Control – Discrete Actions Bit #0 – Reserved Bit #1 – Start Fill Bit #2 – End Fill Bit #2 – Pause Fill Bit #4 – Resume Fill Bit #5 – Reserved (for Clean in Place) Bit #6 – Start Training Bit #7 – Save AOC Calibration Bit #8 – Bit #31 for future expansion 	DWORD
5	Maximum Batch Time (Reg 1305)	REAL

Table A-16: Output configurable data

Assembly Dword index	Name	Data type
0	Common output data (instance 150 data)	See Table A-12
1	Configurable Slot 1 (Register)	REAL
2	Configurable Slot 2 (Register)	REAL
3	Configurable Slot 3 (Register)	REAL

Assembly Dword		
index	Name	Data type
4	Configurable Slot 4 (Register)	REAL
5	Configurable Slot 5 (Register)	WORD
6	Configurable Slot 6 (Register)	WORD
7	Configurable Slot 7 (Register)	WORD
8	Configurable Slot 8 (Register)	WORD
9	Configurable Slot 9 (Coil)	BOOL
10	Configurable Slot 10 (Coil)	BOOL
11	Configurable Slot 11 (Coil)	BOOL
12	Configurable Slot 12 (Coil)	BOOL

Table A-16: Output configurable data (continued)

Table A-17: Advanced Phase Measurement (APM)

Assembly Dword		
index	Name	Data type
0	Common output data (instance 150 data)	See Table A-12
1	External Pressure	REAL
2	External Temperature	REAL
3	External Water Cut	REAL

Input and output slots

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