PROFINET IO

SIMATIC MV440 Code Reading System

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Question

How do you configure the SIMATIC MV440 code reading system as PROFINET IO device on the PROFINET IO system of a SIMATIC S7-300?

Answer

Follow the instructions and notes listed in this document for a detailed answer to the above question.

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1 Introduction

The reading device is an optical code reader designed specially for the recognition and evaluation of a wide range of machine-readable codes in industrial production.

The list of readable codes includes all standard matrix codes and barcodes that can be reliably recognized.

The SIMATIC MV440 device family was designed with special focus on the following:

- Robustness
- Reliability
- Simple operability

The principal functions of the code reading device are the reading of codes and the measuring of code quality. Application of the SIMATIC MV440 product family covers practically all sectors of industrial production. Applications range from recognition of immobile parts to recognition of fast-moving parts on a conveyor system.

The SIMATIC MV440 code reading system has the following integrated communication interfaces:

- Ethernet 10/100 Mbit/s for TCP/IP and PROFINET IO
- 1 trigger input and 1 flash output
- MOBY-ASM
- RS232 with TxD and RxD
- 4 parameterizable digital I/Os

The code reading devices are extremely easy to commission and operate. In most cases, parameters are set automatically. If adjustment is necessary, you can set the parameters using the integrated web server via an Internet browser without prior installation of software.

Figure 1-1



2 Configuration in STEP 7

In this example, we incorporate the SIMATIC MV440 HR code reading system as PROFINET IO device in the PROFINET IO system of a SIMATIC S7-300.

A CPU319-3PN/DP is used as PROFINET IO controller.

Figure Figure 2-1 shows the device configuration



All you need for the connection are the software resources and information on the CD supplied with the SIMATIC MV440 code reading system.

Proceed to configure following the instructions below.

Insert station

In the SIMATIC Manager, create a new project and via the menu Insert \rightarrow Station \rightarrow SIMATIC 300 Station insert a new object "SIMATIC 300 Station".



Configure SIMATIC 300 Station

Open the hardware configuration of the SIMATIC 300 station.

In the hardware catalog, under SIMATIC 300 \rightarrow RACK 300, select the rail and drag-and-drop this into the hardware configuration.

Figure 2-3



In the hardware catalog, select the CPU used and drag-and-drop this to slot 2 in the rack. A CPU 319-3PN/DP is used in this example. Figure 2-4



Alternatively, you can use the following CPUs. Table 2-1

CPU	MLFB	Firmware version
CPU 315-2PN/DP	6ES7 315-2EH13-0AB0	V2.5
	6ES7 315-2EH14-0AB0	V3.1
CPU 315F-2PN/DP	6ES7 315-2FH13-0AB0	V2.5
	6ES7 315-2FJ14-0AB0	V3.1
CPU 317-2PN/DP	6ES7 317-2EK13-0AB0	V2.5
	6ES7 317-2EK14-0AB0	V3.1
CPU 317F-2PN/DP	6ES7 317-2FK13-0AB0	V2.5
	6ES7 317-2FK14-0AB0	V3.1
CPU 319F-2PN/DP	6ES7 318-3FL00-0AB0	V2.5

Insert PROFINET IO system

Right-click on the PROFINET interface of the CPU 319-3PN/DP and select the menu item Insert PROFINET IO System. The Properties dialog of the PROFINET interface opens.

Figure 2-5		
(0) UR 1 2 X1 X2 DP X3 PN/0.1		
X3 P7 Poil 1 3	Copy Paste	Ctrl+C Ctrl+V
4 5 6	Replace Object Add Master System Disconnect Master System	
< <u> </u>	Insert PROFINET IO System Disconnect PROFINET IO System PROFINET IO Domain Management PROFINET IO Topology Isochronous Mode	
(0) UR	Specify Module	
Slot Module Order nu	Delete	Del
2 CPU 319-3 PN/DP 6ES7 3 X1 MFVDP	Go To Filter Assigned Modules	,
X2 DP X3 PW/0.1	Monitor/Modify	
X31 Fox 1 3 4	Edit Symbols Object Properties Open Object With	Alt+Return Ctrl+Alt+O
6	Assign Asset ID	
7 8 9	Product Support Information FAQs Find Manual	Ctrl+F2 Ctrl+F7 Ctrl+F6
	Start Device Tool	

In the Properties dialog of the PROFINET interface, click on the "Properties" button.

Figure	2-6
--------	-----

Properties - PN-IO-1	(R0/52.3)	×
General Addresses	PROFINET Synchronization Time-of-Day Synchronization	
Short description:	PN-10	
Device name:	PN-I0-1	
✓ Support device r	eplacement without exchangeable medium	
Interface		
Type:	Ethernet	
Device number:	0	
Address:	192.168.2.21	
Networked:	yes Properties	
Comment:		
	A	
	-	
	21 	
ОК	Cancel Help	

Enter the IP address of the CPU 319-3PN/DP and assign a subnet to the CPU 319-3PN/DP. Click on the "New" button to insert a new subnet.

Confirm the settings with "OK".

Figure 2-7

Beneral Parameters IP address: 192.168.2.21 Subnet mask: 255.255.255.0 C Use router	er
Address: 192	.168.2.21
Subnet:	<u>N</u> ew
Subnet: not networked Ethernet(1)	<u>N</u> ew <u>Properties</u>

Insert SIMATIC MV440 as PROFINET IO device

In the hardware catalog, under PROFINET IO \rightarrow Sensors \rightarrow MV400 \rightarrow MV440, select the code reading system used and drag-and-drop it into the PROFINET IO system of the CPU319-3PN/DP. The SIMATIC MV440 HR code reading system is used in this example.



Install GSD file of the MV400 code reading system

If the code reading system of the SIMATIC MV440 device family is not in the hardware catalog, install the GSD file via the menu Options → Install GSD file... The "Install GSD Files" dialog opens.

'	iguie	2-3							
ł	HW Config - SIMATIC 300								
St	ation	Edit	Insert	PLC	View	Options	Window	Help	
🗅 🚅 🔓 🖩 🗣 🎒 🗎			Custor	mize		Ctrl+Alt+E			
SIMATIC 300 (Configuration)			Specifi Config Symbo Report	y Module j ure Netwo ol Table t System B	irror	Ctrl+Alt+T			
Г	2 X7		CPU 3 MPI/D	8 19-3 P	PN/DF	Edit Ca Updat	atalog Prol e Catalog	file	
	X2 X3 X3 P	7	DP PN-IO-1 Port 1		Install Install	HW Updal GSD File	tes		
	3					Find in	Service 8	Suppor	rt
<u>4</u> 5				Create	e GSD file f	or I-De	vice		

In the "Install GSD Files" dialog, click on the "Browse..." button. Select the directory in which the GSD file of the SIMATIC MV440 code reading system is stored.

Then the GSD file of the SIMATIC MV440 device family is displayed in the "Install GSD Files" dialog.

Select the GSD file and click on the "Install" button.

Upon completion of GSD file installation, click on the "Close" button to close the "Install GSD Files" dialog.

tall GSD Files			_	
stall GSD Files:	fro	om the directory	×	
:\GSD\GSD\PROFINET				Browse
File		Release	Version L	anguages
aSDML-V2.0-Siemens-MV	440-20090126.xml	0172672009 12:00:00 AM	V2.U E	nglish, Lierman, French,
đ				
<u>(</u>				
(
• [Show Log	Select <u>A</u> ll De:	select All	
Install	Show Log	Select <u>A</u> ll Det	select All	

Note The GSD file is in the "VS130-2 Mode" directory on the CD included in the delivery package of the SIMATIC MV440 code reading system.

Define IP address and device name of the SIMATIC MV440 code reading system

In the hardware configuration, double-click on the SIMATIC MV440 code reading system. The Properties dialog of the SIMATIC MV440 code reading system opens.

In the Properties dialog of the SIMATIC MV440 code reading system, you enter the device name of the MV440. The device name "MV440" is used in this example. Click on the "Ethernet..." button.

Figure 2	-11
----------	-----

roperties - M¥440-1			×
General			
Short description:	MV440		
	MV440 HR	×	
Order No. / Firmware:	6GF3440-0GE10	_	
Family:	MV400		
Device name	MV440		
GSD file:	GSDML-V2.0-Siemens-MV440-20090126.xml Change Release Number		
Node in PROFINET I	D System		
De <u>v</u> ice number:	1 PROFINET-IO-System (100)		
IP address:	192.168.2.142 <u>E</u> themet		
Assign [P address	via IO controller		
Connect			
		A	
		-	
1		<u> </u>	
OK		Cancel Help	

Enter the IP address of the SIMATIC MV440 code reading system. Figure 2-12

operties - Ether	net interface MV440		
General Param	eters		
IP address: Sugnet mask:	192.168.2.142 255.255.255.0	Gateway © Do not use router © Use router Address: 192.168.2.14	12
Subnet:	ed		New
E memer ()			Properties
			Dejete
01		Cance	

Define input and output addresses of control byte

Mark the SIMATIC MV440 code reading system and in the slot table double-click on Slot 1 where the input and output addresses of the control byte of the SIMATIC MV440 code reading system are defined. The Properties dialog of the control byte opens.

Figure 2-13								
HW Config - SIMATIC 300								
Station Edit Insert PLC View Options Window Help								
💵 SIMATIC 300 (Configuration) M¥440								
Ethernet(1): PROFINE T-IO-System (100) X1 MPI/DP X2 DP X3 PN-IO-1 X3PT Poil 1 3								
1								
★ ⇒ (1) MV440								
Slot 🚺 Module	Order number	I Address	Q address	Diagnostic address				
0 📑 NV440	66F3440-06E10			8186*				
X1 Interface				8185×				
X1 Fort 1				8184*				
1 🚺 ControlByte		0	0					
2 UserData		256287	256287					

In the Properties dialog of the control byte, you switch to the "Addresses" tab. Enter "2" under Input address and Output address for "Control Byte".



Properties - (ControlByte - (I	R-/51)		2
General Ad	ddresses			
Inputs	2	Process image:		
End.	2			
Outputs - Start:	2	Process image:		
End:	0	OB1 PI		
OK]		Cancel	Help

Save, compile and download hardware configuration

Save and compile the hardware configuration of the CPU 319-3PN/DP. Then download the configuration into the CPU 319-3PN/DP.

Figure 2-15	
🖳 HW Config - SIMATIC 300	
Station Edit Insert PLC View Options Window Help	
D 🗢 🗣 🗣 👰 🖻 🖻 🕍 🎒 🗖 🗖 😤	₩ ?
BU SIMATIC 300 (Configuration) ₩440	
I ▲ 2 N CPU 319-3 PN/DP ×1 MPI/DP ×2 DP ×3 PN+I0-1 ×3 P1 Post 1 3 4 5 5	Download Save and Compile Ethernet(1): PROFINET-ID-System (100)

3 Setup of the SIMATIC MV440 Code Reading System

Assign IP address

Using the Primary Setup Tool, you can identify the MAC address and IP address of the SIMATIC MV440 code reading system in the Industrial Ethernet network.

If you have not yet commissioned the SIMATIC MV440 code reading system, then use the Primary Setup Tool to assign it an IP address. The IP address 192.168.2.142 is assigned to the SIMATIC MV44 code reading system in this example.

Figure 3-1

m 18° AU ΞU	
	Ethernet interface MAC address 00-0E-8C-C4-68-53
57-300 CP : 08-00-06-9C-4A-0B : 192.168.4.152	Assign IP parameters
	IP address 192 . 168 . 2 . 142
SCALANCE W-700 : 00-0E-8C-BF-34-8D : 192.168.1.21	Sugnet mask 255 . 255 . 255 . 0
	✓ Use router 192 . 168 . 2 . 1
	C Receive IP address from <u>D</u> HCP server Identified by
- ? Device name: mv440 - Ind. Ethernet interface	© <u>D</u> iient ID C <u>M</u> AC address C De <u>v</u> ice name
	ClienţID
	Assign Device Names
	Device name: mv440
	Assign Name

Note More information on commissioning the SIMATIC MV440 code reading system is available in the manual. The manual is available for downloading at this link:

http://support.automation.siemens.com/WW/view/en/35126583

Web-Based Management

You set up the SIMATIC MV440 code reading system via the Web-Based Management.

In the web browser, e.g. Internet Explorer, you enter the IP address 192.168.2.142 of the SIMATIC MV440 code reading system to open the Web-Based Management. The home page is displayed (see Figure 3-2). Click on the menu item "Setup" to switch to Setup mode.

<u>File E</u> dit <u>V</u> iew F	<u>a</u> vorites <u>T</u> ools <u>H</u> elp			
😪 🀼 🧕 SIMAT	IC Code Reader		<u>ن</u>	• 🖾 - 🖶 • 🔂 Bage • 🎯 '
SIEMENS	SIMATIC MV440 HR Code reading systems			English
 Home page Setup Live image Live image PDA Browser test 	LEMENS SHAFTC	 Code reader revision level: Firmware version: Profinet IO device name: Network identification: <u>Siemens.com</u> <u>Service & Support</u> 	1 V02.01.00_06 MAC address: IP mode: IP address:	00:0E:8C:C4:68:53 fix 192.168.4.33

In Setup mode, you click on the menu item "Connections".

Select the "Ports" tab and under Ethernet you select the IP mode "PROFINET Mode".

Enter the device name "MV440" under PROFINET IO. The device name must match the device name of the MV440 in hardware configuration (see Figure 2-11).

SIEMENS	SIMATIC MV440 HR	English 🔽
User WEB Password text	Connections Part 1/4: Interfaces	WEB ?
Adjustment	Ports Integration Result & string Digital VO	
▶ Califirate	Ethorpot	BC 222
► Connections		RS-232
▶ Training		Baud rate. 57600 Dps
▶Run		Parity. Odd
▶ Options	Subnet mask.	
► Information	Gateway:	Time limit.
▶ Maintain		ТСР
▶ Stop	Device name: MV440	IP address: 192 . 168 . 0 . 2
▶ Home	Time limit: 500 ms	Port: 8000
	Pulse time: 30 ms	Time limit: 0 sec.
	Swap: S7	
	ASM	Archiving MM
	Baud rate: 115200 V hns	IP address: 192 168 0 10
ф ф		Port: 8765
880		Time limit 10 sec
O POWER		inne innit. 10 set.

Select the "Integration" tab and then select "PROFINET IO" as source for the Trigger under Connection.

Also under Connection, likewise select "PROFINET IO" for String, Result and Control.

SIEMENS	SIMATIC MV440 HR	English 🗾
User WEB Password *** Log on	Connections Part 2/4: Integration	WEB ?
 Adjustment Connections Training Run Options Information Maintain Stop Home Were POWER ETHERNET 	Ports Integration Result & string Digital I/O Connection Trigger Source: PROFINET IO Debouncing: 0 ms Trigger string: String: PROFINET IO Result: PROFINET IO Control: PROFINET IO Diagnostics transfer Transfer images: None Transfer data records: None With transfer monitoring	Instructions: Here, you specify the functions that are linked to the interfaces Info: Not all combinations are permitted. You will find more detailed information in the online help.

In Setup mode, you double-click on the menu item "Run". In Run mode you click on the "Start" button to start evaluation.

SIEMENS	SIMATIC MV440 HR		English 🗾
User WEB Password +++ Log on	Processing mode		<u>WEB</u> ?
 Adjustment Connections Training Run Options Information Maintain Stop Home 	Information: When changing to processing mode, the MV440 requires an adaptation time to adapt itself to the current code. You can avoid this by storing codes in the Trraining' part and selecting them Select code Code number: 1 Start Trigger Info: Code number 1 [1/5] Read: 1 100.000%	300 200 100 0 -100 200 -300 -500 -400 -300 -200 -100 0 100 200 300 400 500 -500 -400 -300 -200 -100 0 100 200 300 400 500	Quality: Overall: -
	NOK: 0 0.000% Match: Off	Result:	
 POWER ETHERNET STATE/SF 	Total counter: 1	Show: All images	

4 S7 Program

The sample program "Example.zip" is located in the "VS130-2 Mode" directory on the CD included in the delivery package of the SIMATIC MV440 code reading system. Dearchive the sample program "Example.zip" in the SIMATIC Manager.

Copy the blocks of the dearchived sample program "Example.zip" into the S7 program of the CPU 319-3PN/DP. Double-click on the block FC1 "FB79_APPLICATION" to open and change it.

Figure 4-1

SIMATIC Manager - [M¥440	D:\Projects\Mv440]		
By File Edit Insert PLC View 🤇	Options Window Help		
🗅 🗃 🕌 🛲 🕹 🛍 🛍	🚵 🔍 🖳 🖕 🐎	- 🟥 💷 🔍 < No Filter	>
⊡- 29 MV440	Object name	Symbolic name	Created in language
E SIMATIC 319	🚵 Systemdaten		
CPU 319-3 PN/DP	🖬 OB1		STL
E S7 program	🖬 0B82	1/0_FLT1	STL
	🖬 0885	OBNL_FLT	STL
E State CP 343-1 Lean	🕀 OB86	RACK_FLT	STL
	OB100	COMPLETE RESTART	STL
	🚰 FB79	VS130-2_CONTROL	STL
	FC1	FB79_APPLICATION	STL
	FC2	CODE_CHANGEOVER	STL
	DB48	USER_DATA	DB
	DB79	VS130_FB79	DB
	2 VAT_79	VAT_79	
	🚰 SFC14	DPRD_DAT	STL
	🚰 SFC15	DPWR_DAT	STL
	🚰 SFC20	BLKMOV	STL
	🚰 SFC21	FILL	STL
	SFC24	TEST_DB	STL
	SFC58	WR_REC	STL
	SFC59	RD_REC	STL
	SFC64	TIME_TCK	STL

In FC1 "FB79_APPLICATION", you call the function block FB79 "VS130-2_CONTROL".

For the input parameters LADDR_CONTROL and LADDR_STATUS, you specify the input and output addresses of the control byte you configured in the hardware configuration (see Figure 2-11). In this example, the following input and output addresses are used for the control byte: 2 (dec) = 2 (hex).

For the input parameters LADDR_SEND and LADDR_RECV, you specify the input and output addresses of the user data you configured in the hardware configuration (see Figure 2-11). In this example, the following input and output addresses are used for the user data: 256 (dec) = 100 (hex).

Figure 4-2

// Call FB79	
CALL "VS130	-2 <u>CONTROL</u> , "VS130_FB79"
LADDR_STEUE	R:=W#16#2 //Addresses from hardware configuration
LADDR_STATU	s:=w#16#2 I/O address control byte 2 (dez) = 2 (hex)
LADDR_SEND	=₩#16#100
LADDR_RECV	= W#16#100
COMMAND	:="VS130_FB79".COMMAND
PARAMI	:=
RESET	:="VS130_FB79".RESET //Reset errors
RECV	:=P#DB48.DBX0.0 BYTE 500 //Area for recieve user data
ACTIVE	:=
DONE	:=
ERROR	:=
ERRCODE	:=
STATE	:=
CODE_OUT	:=
LENGTH	

Comment out the following program code (see Figure 4-4). Save the changes made in FC1 "FB79_APPLICATION".

```
Figure 4-3
```

//***	Evalu	ation	of the	interface signals	
	UN =	e M	2.0 201.1	//WS130-2 error or restart //WS130-2 error	
	U =	e M	2.2 201.2	//This signal starts a machine e.g //Process release	J.

//*** Start of the evaluation

ט // // י	E = 1	10.0 A 2.6	//Start the evaluation //and set the trigger signal
//***	Reset	FB in case of error	
	U U S	M 201.0 "VS130_FB79".ERROR "VS130_FB79".RESET	//Reset FB79-Errors
//***	VS130	Reset	
	U =	M 201.3 A 2.7	//VS130 Reset //VS130 Reset

Download the S7 program into the CPU 319-3PN/DP.

In the S7 program, double-click on the variables table "VAT_79" to open it and set output A2.6=true.

1 IUUIC 4-4

Table	Edit Insert F	LC Variable View Options	Window Help						
-122			× = = ×	? 96					
11	VAT_79 @MV	440\SIMATIC 319\CPU 319	-3 PN/DP\57-Prog	gramm(5) ON					
4	Address	Symbol	Display format	Status value					
1	A 2.6		BOOL	true					
2	DB79.DBX 11	0 "VS130_FB79".RESET	BOOL	false					
3	M 201.0		BOOL	false					
4									
5	//Signals statusbyte								
6	E 2.0		BOOL	true 🚺					
7	E 2.2		BOOL	true					
8	E 2.3		BOOL	false					
9	E 2.5		BOOL	false					
10									
11	//FB-Parameter	//FB-Parameter values							
12	DB79.DBW 32	"VS130_FB79".LENGTH	DEC	10					
13	DB79.DBB 10	"VS130_FB79".PARAM1	DEC	0					
14	DB79.DBB 30	"VS130_FB79".CODE_OUT	DEC	0					
15	DB79.DBW 8	"VS130_FB79".COMMAND	HEX	VV#16#0081					
16									
17	DB79.DBX 22	0 "VS130_FB79".ACTIVE	BOOL	📘 true					
18	DB79.DBX 22	1 "VS130_FB79".DONE	BOOL	true					
19	DB79.DBX 22	2 "VS130_FB79".ERROR	BOOL	false					
20									
21	M 202.0		BOOL	false					
22	M 202.1		BOOL	false					
23	M 202.2		BOOL	false					
24	M 202.4		BOOL	false					

In this example, a QR code is recognized and evaluated by the MV440 code reading system. The data is saved in data block DB48 of the CPU 319-3PN/DP.

Figure 4-5

Kad/Stl/FBD -	@DB48 "l	ISER_DATA" MV440\	SIMATIC 3	19\CPU 319-3 PN/I	DP\\DB48 ONLI					
File Edit Insert PLC Debug View Options Window Help										
X			-							
	Address	Name	Туре	Initial value	Actual value					
	0.0	user_data[0]	CHAR	1.1	'T'					
	1.0	user_data[1]	CHAR	1.1	'h'					
	2.0	user_data[2]	CHAR	1.1	'i'					
	3.0	user_data[3]	CHAR	1.1	's'					
	4.0	user_data[4]	CHAR	1.1	• •					
	5.0	user_data[5]	CHAR	1.1	'i'					
	6.0	user_data[6]	CHAR	1.1	's'					
	7.0	user_data[7]	CHAR	1.1	• •					
	8.0	user_data[8]	CHAR	1.1	'a'					
	9.0	user_data[9]	CHAR	1.1	• •					
	10.0	user_data[10]	CHAR	1.1	't'					
	11.0	user_data[11]	CHAR	• •	'e'					
	12.0	user_data[12]	CHAR	1.1	's'					
	13.0	user_data[13]	CHAR	1.1	't'					
	14.0	user_data[14]	CHAR	1.1	.1.					
	15.0	user_data[15]	CHAR	1.1	. j. i					
	16.0	user_data[16]	CHAR	1.1						

Note

Go to the following link to generate a random barcode for testing:

http://www.tec-it.com/online-demos/tbarcode/barcode-generator.aspx?LANG=en