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2

# S7-200 SMART OPC Communication with SCADA

S7 - 200 SMART / Version 2.3 / WinCC 7.4

https://w3.siemens.co.in/automation/in/en/automationsystems/industrial-automation/s7-200-smart-plc/pages/default.aspx





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# **Table of contents**

Warra	anty and	liability	. 2
1	Introduc	tion	. 4
	1.1 1.2	Overview Components used	
2	Enginee	ring	. 5
	2.1	Hardware setup	. 5
3	Enginee	ring	. 6
	3.1 3.2 3.3	Description of interface Project integration Operation	. 6
4	Appendi	x	22
	4.1 4.2 4.3 4.4	Service and support Support Links and literature Change documentation	23 23

# 1 Introduction

## 1.1 Overview

The controller consists of S7-200 Smart PLC including the Ethernet communication port. Via Ethernet (TP: Twisted-Pair) the controller is connected to the PC (Personal Computer). OPC Server, which provides the data. The PC ACCESS is shipped with S7-200 Smart. OPC Server, displays the data from the OPC Server.

## 1.2 Components used

This application example has been created with the following hardware and software components:

Table 1	-1
---------	----

Component	Number	Article number	Note
CPU ST20	0	6ES7-288-1ST20-0AA0	
CPU ST30	0	6ES7-288-1ST30-0AA0	
CPU ST40	4	6ES7-288-1ST40-0AA0	
CPU ST60	0	6ES7-288-1ST60-0AA0	
S7 MICROWIN SMART V2.4	1	6ES7 288-SW01-0AA0	
WinCC 7.4	1		
S7-200 PC Access SMART V2.3	1		

This application example consists of the following components:

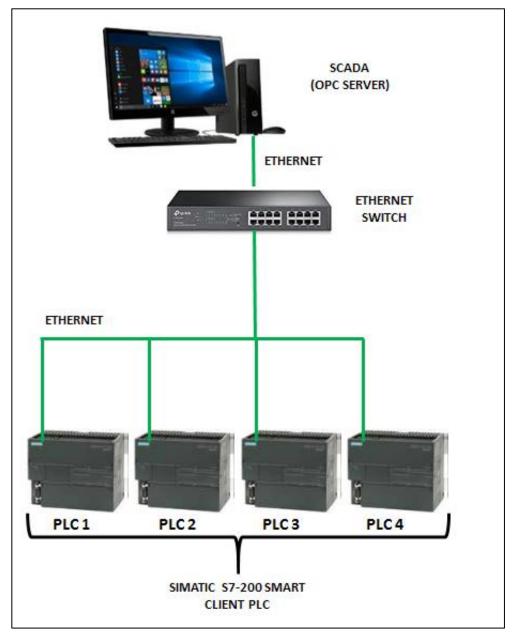
Table 1-2

Component	File name	Note

# 2 Engineering

## 2.1 Hardware setup:

The figure below shows a schematic overview of the most important components of the solution:



# 3 Engineering

## 3.1 Description of interface

There is no driver for communication with the S7-200 SMART CPU in WinCC, so communication via Ethernet between WinCC and the S7-200 SMART CPU can only be done via OPC. As the Sever side of the OPC, the S7-200 SMART CPU only needs to set the IP address. The PC is used as the client side of the OPC to establish a PC Station with the S7-200 SMART.OPC Server under WinCC Explorer software to communicate with the S7-200 SMART. After the PC Station is set up, the implementation steps in WinCC are as follows:

## 3.2 **Project integration**

# 1. Establish all the Tags to be used in WinCC Explorer in PC ACCESS software.

First create all the Tags to be used in the PC ACCESS as mention below. The following settings have to be made in the software configuration to open S7-200 PC Access SMART S7-200 PC access smart that allows you to monitor all configured PLCs data.

- 1. Double click on icon of S7-200 PC Access SMART.
- 2. After clicking icon, a window will appear in which you have to click on project tree.
- 3. In project tree, right click on MWSMART (TCP/IP) and select New PLC.

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Cut Cut+X Copy Cut+C Paste Cut+V New PLC- Network Interface Card.	🕼 Project		Name /	Address	Data Type	Access	Comment								
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- 4. The Communication Interface window will open, and then click on Find CPUs.
- 5. Select the IP address of CPU for communication then click on "OK".
- 6. Repeat the step 4 to step 6 for another PLC with different IP address.
- 7. Renaming of PLC can be done by right click on New PLC and select Rename option.
- 8. You can also change IP Address by Right click on New PLC, click on properties.
- 9. Then communications window will appear, click on find CPU.
- 10. As you select find CPU, it will show connected CPU to the PC.
- 11. Then click on "OK".

🗄 🛱 Project	Name / Address	Data Type Access	Comment		
MWSMART(TCP/IP)     MewPLC					
		ommunications		×	
		Communication Interface			
		Intel(R) Dual Band Wireless-A	C 3165.TCPIP.1	<ul> <li>Click the "Edit" button to change the IP data and station name of the selected CPU. Click the "Flash Lights" button to continuously flash</li> </ul>	
		Found CPUs Added CPUs		CPU LEDs to visually locate a connected CPU.	
				MAC Address	
				Flash Lights	
				IP Address	
				Edit	
				Subnet Mask Local TSAP	
Test Client tem ID / Data Type Value	Time Sta., Cu			02.01	Status
tem ID / Data Type Value	Time Sta   Cu			Default Gateway Remote TSAP	
				02.01	
				Station Name (ASCII characters a-z, 0-9, - and .)	
				1	
			1		
		Find CPUs Add CPU.	Edit CPU Delete CPU		
				OK Cancel	

12. In project tree, right click on New PLC then select New  $\rightarrow$  Item.

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	Rename								
	Properties								
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o ID / Doto T									
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nu pata i	ype Value	Time Sta	. Quality						
Unit Detta 1	ype Value	Time Sta	. Quality						
	ype Value	Time Sta	. Quality						
unio para i	ype Value	Time Sta.	. Quality						
in in providence	ype Value	Time Sta	. Quality						

7

13. Item properties window will be open.

File Edit View Status Tools Help								
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Project     MWSMART(TCP/IP)     NewPLC	Name 🗠		Data Type	Access	Comment			
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MempLC	NewItem (1)		BYTE	RW				
	🗢 NewItem (2)	V80	BYTE	R₩				
			-					
			Item Proper	ties		×	1 <b>.</b>	
			- Symbolic N	ame:				
			Name:	I	Newltem (2)			
	1				fw/SMART.NewPLC.NewItem	(7)		
Test Client			ID:	Te .	WSMART.NewFLL.Newtern	(2)		Status: Off
Item ID 🕗 Dat	ta Type 🛛 🛛 Va	ue Time	St. Memory Lo					
			Address:	P	VB0	Read/Write 💌		
			Data Typ	e: E	BYTE 💌			
			- Engineerin	a Units				
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			Low:		0.0000000			
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						<b>v</b>		
						OK Cancel		
							_	

- 14. In Item Properties, change Symbolic Name (Name) and Memory Location (Address) and select Data Type accordingly then click on OK.
- 15. Repeat the step13 to step15 for New Item (New Tag).
- To monitor the added items Click on MWSMART (TCP/IP) then Click on' Add Current Items to Test Client" icon in tool bar the click on save file then Test Client Status.
- 17. If PLC is properly connected to PC then in Test client window, check the communication result it will show good quality otherwise it show bad quality.

	PC Access St	MART								
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- PLC2	PLC3									
PLC3	PLC4									
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MWSMART.PLC1.TAG1		1 00	Good	-						
MWSMART.PLC1.TAG3			Good	_						
MWSMART.PLC1.TAG4	DINT	+0000	Good							
MWSMART,PLC1,TAG5	REAL	0.00000000	Good							
MWSMART.PLC1.TAG6		00000000	Good							
MWSMART.PLC2.TAG1			Good							
MWSMART.PLC2.TAG2			Good							
MWSMART.PLC2.TAG4	DINT REAL	+0000 0.0000000	Good Good							
		00000000	Good							
MWSMART PLC3 TAG		0	Good							
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MWSMART.PLC3.TAG4	DINT	+0000	Good							
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			Good Good							
MWSMART.PLC4.TAG3										
MWSMART,PLC4,TAG4	DINT	+0000	Good							
MWSMART,PLC4,TAG5			Good							
	DWORD	00000000	Good							
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Ready										NUM

- 18. If the communication quality is "bad", the communication is unsuccessful and you need to check if the software configuration and hardware connection are correct.
- 19. Minimize the S7-200 PC Access SMART window.

## Note:

The tag need to be display in scada need to configure in PC Access. OPC Communication supports all data types.

## 2. Opening of New Project & Adding a new driver in WinCC Explorer.

Double click on "WinCC Explorer". Open a new project in the WinCC software, right-click on "Tag Management" and select "Open" in the shortcut menu. In the "WinCC Configuration Studio" window that opens, right-click "Tag Management" and select "Add New Driver" in the shortcut menu to add the " **OPC** " driver. Figure 1. Shown.

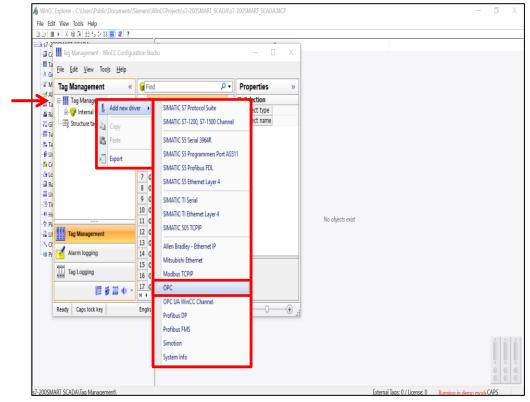


Figure 1. Adding a new drive "OPC"

## 3. Searching and adding tags defined in PC ACCESS in WinCC

First right click on "OPC Groups" and click on "System parameters" in the shortcut menu. In the pop-up "OPC Item Manager" window extend Local and select "S7200SMART.OPCServer" and click on the "Browse Server" button. In the "Filtering criteria" window that pops up, select "Next" to search. As shown in Figure 2.

📌 OPC Item Manager	
File View Options Help -         Microsoft Terminal Servit         Microsoft Windows Netw         Web Client Network         WoRKGROUP         V( <local>         S7200SMART.OPCS         S7200SMART.OPCS         S700CPC.SimaticNET.DP         OPC.SimaticNET.DP         OPC.SimaticNET.1         OPC.SimaticNET.PD         OPC.SimaticNET.PD         OPC.SimaticNET.PD         OPC.SimaticNET.PD         OPC.SimaticNET.PD         OPC.SimaticNET.PD         OPC.SimaticNET.PD         OPC.SimaticNET.PD         OPC.SimaticNET.PD         Access Authorization         COPC.SimaticNET.PD         Access Authorization         COPC.SimaticNET.PD         Access Authorization         COPC.SimaticNET.PD         COPC.SimaticNET.PD         COPC.SimaticNET.PD         COPC.SimaticNET.PD         COPC.SimaticNET.PD         Coper.SimaticNET.PD         Coper.SimaticNET.PD         Coper.SimaticNET.PD         Coper.SimaticNET.PD         Coper.SimaticNET.PD         Coper.SimaticNET.PD         Coper.SimaticNET.PD         Coper.SimaticNET.PD         Cop</local>	Computer OPC Web server Browse Server Exit

Figure 2. Select browse server

### 4. Create a new connection and add the required Tags

Select the desired Tag in the Tag list, click the "Add Item" button to add the required Tag, and you will automatically be asked to create a new connection and add the Tag to the connection, as shown in Figure 3 & 4. If you need to add more than one Tag, repeat the steps as described above.

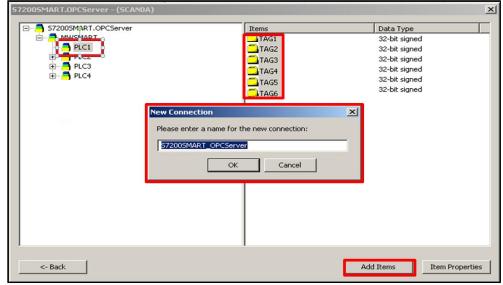


Figure 3. Establishing a new connection

S	72005MART.0PCServer - (SCA	i0A)			x
	S72005MART.OPCServer       MWSMART       PLC1       PLC2       PLC3       PLC5       PLC6       PLC7       PLC8	Items		Data Type 32-bit signe 32-bit signe 32-bit signe 32-bit signe 32-bit signe	
	<- Back		Add	Items	Item Properties

Figure 4. Adding Tags

Figure 3 & 4 Adding Tags and establishing the new connection. Once the Tags have been successfully added, the OPC connections and Tags that have been added are displayed in the tag management in WinCC, as shown in Figure5. Shown.Right click on S7200SMART\_OPC Server, then select New Group. Rename New Group as per PLCs named in S7-200 PC Access SMART software. Once you rename, click on S7200SMART\_OPC Server go to column number 6 (Group) then tagwise select PLC.

ag Management «	🤪 Tags [ PLC	2]						Find	P
III Tag Management	Name	Data type	Length	Format adaptation	Connection	Group	Address	Linear scaling	AS value
🗉 😚 Internal tags	1 TAG11	Binary Tag	1		S7200SMART	PLC2	"MWSMART.PLC2.TAG1", "", 3	13	
OPC     OPC Groups (OPCHN Unit 1	2 TAG12	Unsigned 8-bit value	1	ByteToUnsignedByte	S7200SMART	PLC2	"MWSMART.PLC2.TAG2", "", 3	10	
R P ST200SMART OPCServe	3 TAG13	Text tag 8-bit character set	8		S7200SMART	PLC2	"MWSMART.PLC2.TAG3", "", 3		
A DUCT	4 TAG14	Unsigned 32-bit value	4	DwordToUnsignedDword	S7200SMART	PLC2	"MWSMART.PLC2.TAG4", "", 3	13	
- S PLC2	5 TAG15	Floating-point number 32-bit IEEE 754	4	FloatToFloat	S7200SMART	PLC2	"MWSMART.PLC2.TAG5", "", 3	10	
- B PLC4	6 TAG16	Unsigned 32-bit value	4	DwordToUnsignedDword	S7200SMART	PLC2	"MWSMART.PLC2.TAG6", "", 3	B	
	8								
	9								
	10		1						
🐺 Structure tags	11								
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	24								
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Tag Management	26								
Alarm logging	27								
Tag Logging	28								
	29 30								

After tagwise select PLC minimize the Tag Managment window.

Figure 5. Successfully added Tags from PC ACCESS

## 5. WINCC creates & monitors the screen

In WinCC Explorer open Graphics Designer. WINCC creates the screen and monitors the New screen in the Tag WINCC, adds the "input/output field", and selects the OPC Tag for it, as shown in Figure 6. Goto WINCC Explorer to Activate WINCC to test SCADA and S7-200 SMART OPC communication. To create new screen go to Graphics Designer, accordingly give tags and delay as shown in figure 6.

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- Effects			ear on New Input			Yes		Q		
			ear on Invalid Input			No		8		
		H	idden Input			No		Q		
L										

Figure 6. I/O Field , their tag and time delay

### 6. Script Design

In WinCC Explorer window, in project tree, right click on global script. In global script, select Open VBS Editor then in the pop-up Global Script VBS Window will appear then select Actions right click on Action  $\rightarrow$  New  $\rightarrow$  Action(Alt + F3) (which is in workplace). Start writing script. You have to save Script file according to project path.

MinCC Explorer - C:\Users\Public\Documents\Siemens	WinCCProjects\s7-200SMA	RT_SCADA\s7-200SMART_SCAI	)A.mcp		- 0 ×
File Edit View Tools Help					
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B s7-200SMART_SCADA	Name	Туре	Last Change		
- Computer	C-Editor	.71-	5/6/2019 3:10:35 PM		
-III Tag Management	VBS-Editor		5/6/2019 3:10:36 PM		
A Graphics Designer	VD3-Editor		5/0/2019 5:10:50 PM		
The Menus and toolbars					
-Sa Alarm Logging					
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Redundancy					
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s7-200SMART_SCADA\Global Script\	,			1 object(s) selected	Running in demo mode CAPS

Note: Script file will be save by .bac extension.



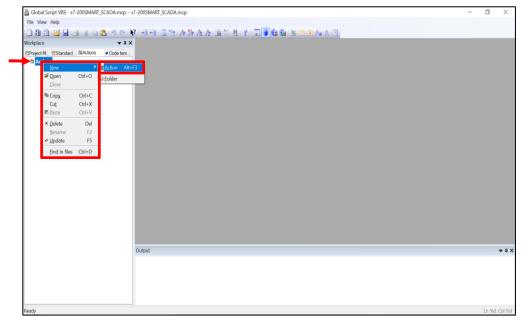


Figure 8. Script file generation

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### Figure 9. Script window

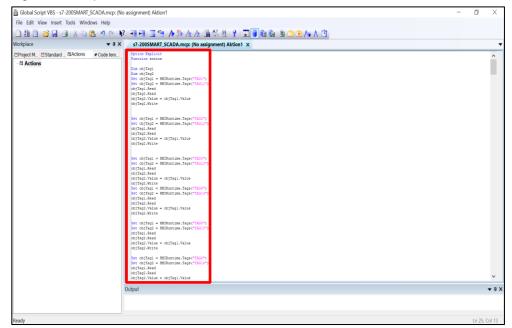


Figure 10. Script

7. Script File: **Option Explicit** Function action Dim objTag1 Dim objTag2 Set objTag1 = HMIRuntime.Tags("TAG1") Set objTag2 = HMIRuntime.Tags("TAG11") obiTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag1.Write objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG2") Set objTag2 = HMIRuntime.Tags("TAG12") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag1.Write objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG3") Set objTag2 = HMIRuntime.Tags("TAG13") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag1.Write objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG4") Set objTag2 = HMIRuntime.Tags("TAG14") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag1.Write objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG5") Set objTag2 = HMIRuntime.Tags("TAG15") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag1.Write objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG6") Set objTag2 = HMIRuntime.Tags("TAG16") objTag1.Read obiTag2.Read objTag2.Value = objTag1.Value objTaq1.Write objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG1") Set objTag2 = HMIRuntime.Tags("TAG21") objTag1.Read objTag2.Read

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objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG2") Set objTag2 = HMIRuntime.Tags("TAG22") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG3") Set objTag2 = HMIRuntime.Tags("TAG23") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG4") Set objTag2 = HMIRuntime.Tags("TAG24") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG5") Set objTag2 = HMIRuntime.Tags("TAG25") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG6") Set objTag2 = HMIRuntime.Tags("TAG26") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG1") Set objTag2 = HMIRuntime.Tags("TAG31") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG2") Set objTag2 = HMIRuntime.Tags("TAG32") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG3") Set objTag2 = HMIRuntime.Tags("TAG33") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write

Set objTag1 = HMIRuntime.Tags("TAG4") Set objTag2 = HMIRuntime.Tags("TAG34") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG5") Set objTag2 = HMIRuntime.Tags("TAG35") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG6") Set objTag2 = HMIRuntime.Tags("TAG36") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG31") Set objTag2 = HMIRuntime.Tags("TAG151") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG32") Set objTag2 = HMIRuntime.Tags("TAG152") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG33") Set objTag2 = HMIRuntime.Tags("TAG153") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG34") Set objTag2 = HMIRuntime.Tags("TAG154") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write Set objTag1 = HMIRuntime.Tags("TAG35") Set objTag2 = HMIRuntime.Tags("TAG155") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write

Set objTag1 = HMIRuntime.Tags("TAG36") Set objTag2 = HMIRuntime.Tags("TAG156") objTag1.Read objTag2.Read objTag2.Value = objTag1.Value objTag2.Write

End Function

# 3.3 Operation

	Communication Of S7-200 Smart With SCADA						
MASTER RECV	MASTE		.C 2	PLC 3		PLC 4	
1	1		1	1		1	
1	1		1	1		1	
abcdefgh	abcdefg	jh abc	defgh	abcdefgh		abcdefgh	
111.000	111.00	0 111	1.000	111.000		111.000	
222.000	222.00	0 222	2.000	222.000		222.000	
333.000	333.00	0 333	3.000	333.000		333.000	

**Result:** Communication result of WinCC Explorer and PC Access.



- OPC SCADA 4 plc - S7-20	0 PC Access	MART			-
File Edit View Status		avience -			
El 🕼 🖬   A 🕫 🕼 /	Name	/ Address		Access Comment	
<ul> <li>□ ♥ WYSMART(PCP)</li> <li>□ ♥ IC1</li> <li>□ ♥ IC2</li> <li>□ ♥ IC2</li> <li>□ ♥ IC3</li> <li>□ ♥ IC4</li> </ul>	7) 9 PLC1 9 PLC2 9 PLC3 9 PLC4				
Test Client					
Item ID /	Data Type	Value	Quality		_
MWSMART.PLC1.TAG1	BOOL	1	Good	,	
MWSMART.PLC1.TAG2	BYTE	01	Good		
MWSMART.PLC1.TAG3	STRING		Good	-	
MWSMART.PLC1.TAG4	DINT		Good		
MWSMART.PLC1.TAG5	REAL	222.0000	Good		
	DWORD		Good		
MWSMART.PLC2.TAG1	BOOL	1	Good		
MWSMART.PLC2.TAG2	BYTE	01	Good		
	STRING	abcdefgh	Good		
MWSMART.PLC2.TAG4	DINT	+0111	Good		
MWSMART.PLC2.TAG5	REAL	222.0000	Good		
MWSMART.PLC2.TAG6	DWORD	00000333	Good		
MWSMART.PLC3.TAG1	BOOL	1	Good		
	BYTE	01	Good		
MWSMART.PLC3.TAG3	STRING	abcdefgh	Good		
MWSMART.PLC3.TAG4	DINT	+0111	Good		
MWSMART.PLC3.TAG5	REAL	222.0000	Good		
	DWORD		Good		
MWSMART.PLC4.TAG1	BOOL		Good		
	BYTE		Good		
	STRING		Good		
MWSMART.PLC4.TAG4	DINT	+0111	Good		
MWSMART.PLC4.TAG5	REAL	222.0000	Good		
MWSMART.PLC4.TAG6	DWORD	00000333	Good		

Figure2. Data transfer in PC Access.

# 4 Appendix

## 4.1 Service and support

### **Industry Online Support**

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks: <u>support.industry.siemens.com</u>

### **Technical Support**

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form: www.siemens.com/industry/supportrequest

### SITRAIN – Training for Industry

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page: www.siemens.com/sitrain

### Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

support.industry.siemens.com/cs/sc

#### Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone:

support.industry.siemens.com/cs/ww/en/sc/2067

# 4.2 Support

Siemens Ltd DI FA AS Thane Belapur Road Thane 400601, India

Application Center SUP FA Email: rginslpresales-fa.in@siemens.com

## 4.3 Links and literature

Table 4-1

No.	Торіс
\1\	Siemens Industry Online Support
	https://support.industry.siemens.com
\2\	Link to this entry page of this application example
	https://support.industry.siemens.com/cs/ww/en/view/Entry ID
\3\	

# 4.4 Change documentation

Table 4-2

Version	Date	Modifications
V1.0	MM/YYYY	First version