

Configuring WAGO Ethernet with National Instruments LabVIEW via Lookout OPC Server



Application note

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded we would appreciate any information or ideas at any time.

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally trademark or patent protected.



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1 Important comments

To ensure fast installation and start-up of the units described in this manual, we strongly recommend that the following information and explanation is carefully read and adhered to.

1.1 Legal principles

1.1.1 Copyright

This manual is copyrighted, together with all figures and illustrations contained therein. Any use of this manual which infringes the copyright provisions stipulated herein, is not permitted. Reproduction, translation and electronic and photo-technical archiving and amendments require the written consent of WAGO Kontakttechnik GmbH. Non-observance will entail the right of claims for damages.

1.1.2 Personnel qualification

The use of the product detailed in this manual is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH declines all liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Intended use

For each individual application, the components supplied are to work with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kon-takttechnik GmbH.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH.



1.2 Range of validity

This application note is based on the stated hardware and software of the specific manufacturer as well as the correspondent documentation. This application note is therefore only valid for the described installation.

New hardware and software versions may need to be handled differently. Please note the detailed description in the specific manuals.



2 Description

The purpose of this document is to provide step-by-step procedures for configuring National Instruments' LabVIEW for communications with WAGO's Ethernet TCP/IP I/O. The procedures that follow illustrate how to configure National Instruments' Lookout Protocol Drivers OPC Server to handle the Modbus/TCP communication services, and how to attach data made available by the OPC Server to discrete controls and indicators in a sample LabVIEW application.

The procedures in this document have been tested with (but are not limited to) the following hardware/software configuration:

- Intel Pentium III based PC running Windows NT 4.0 Operating System with Service Pack 6
- National Instruments LabVIEW 6i
- National Instruments Lookout Protocol Drivers OPC Server, Version 4.0
- 3 Com Ethernet Network Interface Card
- WAGO 750-342 Ethernet TCP/IP Buscoupler
- WAGO 750-400 2pt. Digital Input Module, 24VDC
- WAGO 750-501 2pt. Digital Output Module, 24VDC
- CAT-5 Crossover Cable for Ethernet Communications

For other details about WAGO I/O please refer to the WAGO Users Manuals.

The User Manuals can be downloaded from the web site www.wago.com



3 Reference Material

3.1 Procedure 1: Configuring the OPC Server

1) Begin by running the OPC Server configurator *Lookout Protocol Drivers OPC Server 4.0.*

	CON NO	.07.07.07.0 7 .7	10101011101010100103030
	10200		
My Computer	Excel		
	01010202020	70700707070 7070 770707070 7070	
言語			
Network.	Microsoft		
Neighborhood	d PowerPoint	ter stanup	
1	10 m	Command Prompt	
	2	C Internet Explorer	
Explorer	Word	Uutlook Express	
1014	-	Windows NT Explorer	
	<u>≓</u> ∐	Administrative Tools (Common)	
MGI	WinZp	🖂, Adobe Acrobat 4.0 🔸	
PhotoSuite 4		🕅 Autodesk Volo View	
1002	<u></u>	CA Registration	
9	272	Citrix ICA Client	
Recycle Bin	Outlook Extraess	HP Laseslet	
		InoculateIT for Windows NT	
		Matrox PowerDesk NT	IPAUL
	Compag Information Center 🔸	MGI PhotoSuite 4	
- 1	New Diffee Descenario	and National Instruments	
	New Office Document	National Instruments IMAD	
	Open Office Document	National Instruments Lab//EU/	
		National Instruments Laborate Protocol Drivers	Lackard Backard Driver ODC Server & 0
- E	Programs •	National Instruments NL409.2	
2 🛆	Des meste	National Instruments Conver Eucloser	
ē 🖵	Encanteris .	A Natural Installents Server Explored	
e 👪	Settings +	Contra retware (common)	
ž 🙃	Fiel +	CE Mare	
2 🏊		Ce vicini	
2 🧶	Help	winzp ·	
ŝ 🚽	Bun	Microsoft Access	
8	Tarr.	Microsoft Excel	
5 6	Shut Down	Microsoft PowerPoint	
		W Microsoft Word	
Start 1	Microsoft Word - NI_AppN	National Instruments LabVIEW 6i	🔇 N 🖄 11:02 AM

Figure 1: Running the OPC Server Configurator.



E Lookout	Protocol	Drivers	OPC Se	rver -	(untitle	ed)			
Fie Object	<u>Options</u>	Alams	Help						
<u>N</u> ew	Cul+N	roup		Pr.	Tag		Descripti	ion	
<u>O</u> pen	Ctrl+O								
Close									
BOVG Court An									
Save As									
Egit									

2) Select **File** -> **New...** from the top menu.

Figure 2: Start a New Configuration.

3) Select **Object** -> **Create...** from the top menu.



Figure 3: Create a new database.



4) Select Modbus as the Object Class and click Ok.



Figure 4: Select Modbus as the Object Class.



5) In the *Create Modbus Secondary* window, select **Modbus Ethernet** for the mode, enter the node's **IP Address**, and give the connection an appropriate name (e.g. **EthernetConnection**). Click **Ok** when finished.

Create Modbus	Secondary			×
Name: Ethernet(Connection	Mode:	Modbus Ethernet	•
- Communication 9	Settings			ОК
IP Address: 10.	5.40.201	Serial port:	COM1 💌	Cancel
Data rate	Parity	Data bits	Stop bits	
O 57600	C Odd	õ s	O 1.5	
O 38400 O 19200	O Even O Mark			Advanced
© 9600 © 4800	O Space	Alarm pri	ority: 8	
C 2400	Phone number	c 🚺		Help
O 1200 O 600	PollRate = [0:01		
O 300	Poll =			
Betry attempts:	4	Receive time	out: 500	
	1.		msecs	

Figure 5: Defining the ethernet connection.

6) Select **Object** -> **Edit Database...** from the top menu.

🚰 Lo	okout Protocol	Drivers OPC S	erver -	(untitled)		
Ele	Diject Options	Alams Help				
Ti	Dreate	Drl+Insert	Pr.	Tag	Description	
	Modily					
	Delete					
	Edit Database					

Figure 6: Edit the database.



7) In the *Edit Object Database* window, select the database created in steps 3 through 5 (**EthernetConnection**), and click **Ok**.

Edit o	bject databa	ase:			×
Ethe	rnetConnection	n			
1					
	Ok		Cance	el	

Figure 7: Select database to edit.



8) Configure the I/O points for the application by entering in the **Member** (I/O Address) and **Description** for each point of I/O. Click **Save** after each Member and Description entry. The following table shows the Members and Descriptions used in this example:

Member	Description
000001	WAGO Node 1 Output 1
000002	WAGO Node 1 Output 2
100001	WAGO Node 1 Input 1
100002	WAGO Node 1 Input 2

EthernetConnection databas	e	×
Configured points:	Native members:	Alarm conditions
	000001-065000 10001-165000 1-9999 300001-365000 30001-39999 400001.1-465000.16	Group: Generate logical alarm Priority:
	logical read-only	
Alias (optional):	Member: 100001	
Description		
WAGO Node 1 Input 1		
0n:	Off:	
Invert logical signal		
Save Delete	Select object Import	Export Quit

Figure 8: Editing the database.



EthernetConnection databas	e	×
Configured points: 000001 000002 100001 100002	Native members: 000001-065000 100001-165000 10001-19999 1-9999 300001-365000 300001-39999 100001 1 405000 10	Alarm conditions Group:
l logical read/write	1400001.1-465000.16	
Alias (optional):	Member: 000002	
Description		
0n:	Off:	
Invert logical signal		
Update Delete	Select object Import	Export Quit

9) Click **Quit** when all Members and Descriptions have been entered.

Figure 9: Completing the database.

10) Select File -> Save As... from the top menu.



Figure 10: Saving the Process File.



11) Type in an appropriate filename (e.g.WAGO_ModbusTCP_Connection), and click Save.

Save Process	s File As	? ×
Save jn: 🔁	kopesrv 💌 🖻 💆	* 🔳
🗀 sinecl2		
File <u>n</u> ame:	WAGO_ModbusTCP_Connection	<u>S</u> ave
Save as <u>t</u> ype:	Process Files(*.lpd)	Cancel
Protect file	from editing with your account name/password	

Figure 11: Saving the Process File (continued).

12) Select **File -> Exit** from the top menu.



Figure 12: Exit the OPC Server Setup Tool.



13) When prompted to make the current process file the startup file, click **Yes**. The application will exit, and the OPC Server configuration will be completed.

Lookout Protocol Drivers OPC Server 🛛 🗙							
?	Make the current process file the startup file?						
	Yes No Cancel						

Figure 13: Make the current process file the startup file.



3.2 **Procedure 2: Writing a client application in LabVIEW.**



1) Begin by running the LabVIEW 6i development software.

Figure 14: Starting LabVIEW.



2) Select New VI.

🔁 LabVIEW	
	New VI 🚽
	Open VI 🛛 🗸
	DAQ Solutions
Quick Tip: To pause the execution of a VI at any subVI, node, or wire, select the	Search Examples
Breakpoint tool from the Tools palette and click the object. Then run the VI.	LabVIEW Tutorial
Next	Exit
Do not show this window when launching	

Figure 15: Starting a New VI.



3) Create an application similar to the sample shown in the following figures. Reference **LabVIEW's** Help menu for assistance with creating this application. Do not be concerned with associating the four onscreen indicators with real world I/O at this time. This operation is described in upcoming steps.

SampleApplication.vi	_ 🗆 ×
File Edit Operate Tools Browse Window Help Image: Second Seco	1
Start/Stop ID Scan Input 1 Input 2 Output 1 Output 2	<u> </u>
▲	▼ // ↓
SampleApplication.vi Diagram	_ 🗆 ×
File Edit Operate I cols Browse Window Help 	1
	. 1
Start/Stop IO Scan TF Output 1 Output 1 TF Input 2 TF	
	, 1
	_
	▶ //.

Figure 16: Sample Application.



4) Now we will attach each onscreen indicator to a real world I/O address. Start by right clicking on the **Input 1** indicator. Select **Data Operations** -> **DataSocket Connection...** from the menus.

	No.		0100101010
My Computer	Microsoft Excel		
.		9070707070707070 70707070707070 707070707	
Network Neighborhood	Microsoft PowerPoint	SampleApplication.vi	
C	10	Ele Edit Operate Iools Browne Window Help	
Internet Explorer	Microsoft Word	Start/Stap ID Scan	
MGI PhotoSuite 4	WinZip	Input 1 Input 2 Output 1 Output 2 Visible Items Find Terminal Change to Indicator	
Recycle Bin	Outlook Express	Description and Tip SampleApplication vi Diagram Ceede Replace	
Acrobat Reader 4.0	Measurement & Automation	File Edit Defail Defail Defail Perintisize to Default Value 	
Autodesk Volo View Express		Stat/Stop ID Scan Input Configuration Config	
Citrix Program Neighborhood			
Microsoft Access			
5/			
😹 Start 🔡	Microsoft Word - NI_	AppN LabVIEW SampleApplication.vi Diag SampleApplication.vi	🔇 N 🖄 11:56 AM

Figure 17: Making a DataSocket Connection.



5) Click on Browse... to locate a DataSocket Connection.

DataSocket Connection	×
Connect To:	
	Browse
Connection Type	
O Publish	🔽 Enabled
Subscribe	Only enabled connections publish and/or
O Publish and Subscribe	subscribe data when VI runs.
	J
Attach Remove	Cancel



6) Select Browse Measurement data... from the menu.

	2000		1101010111	DIGIGIGIGIGI
My Computer				
-	•			
Network Neighborhood	Microsoft PowerPoint	mpleApplication.vi Edit Operate Tools Browse Window Help		
(2)	2	🗘 🕘 🔳 13pt Application Font 🛛 🗸	tor ter Or	
Internet Explorer	Microsoft Word	Start/Stop IC Scan	1 June 2 Detroit Dates 2	-
2		DataSocket Connection		
MGI PhotoSuite 4	WinZip	Connect Ta:		
3	i	Connection Type	Browse Browse Measure	ment deta
Hecycle Bin	Express File	C Publish	Frabled Browse File syste	m
Acrobat Reader 4.0	Measurement & Automation	Subscribe Publish and Subscribe	Only enabled connect	
		Attach	Cancel	
Autodesk Volo View Express		_	nput 2	
1		· · · ·		ALC: THE STORE
Neighborhood				
Microsoft				•
Access	E may	furning and the		
3//				
Start 🔡	Microsoft Word - NI_AppN	LabVIEW SampleAp	plication vi Diagr 💽 SampleApplication vi	SN2 11:59 AM

Figure 19: Browsing for an Item (continued).



7) Expand the directory tree structure as shown, and select item **100001** from the item list. Click **Ok** to continue.

Browse for Item	×
My Computer National Instruments.OPCDemo National Instruments.OPCLookoutDrivers Lookout Protocol Drivers Lookout Protocol Drivers Demo Lookout Protocol Drivers O00001 000002 100001 100002 100001 100002 10001119999	<u>O</u> K <u>C</u> ancel
Browse host:	<u>R</u> efresh
URL: opc://localhost/National Instruments.OPCLookoutDriv	ers/EthernetCo

Figure 20: Browsing for an Item (continued).

8) Click on Attach to complete the operation.

Connect To: opc://localhost/National Instruments OPCLo	okoutDrivers/	Browse
 Connection Type Publish Subscribe Publish and Subscribe 	✓ Enabled Only enabled connect subscribe data when	tions publish and/or VI runs.
Attach Remove	[Cancel

Figure 21: Completing the Attachment.

9) Repeat steps 4 thru 8 to attach **Input 2**, **Output 1**, and **Output 2** to real world I/O addresses. Note that when attaching the Outputs, it is necessary to select **Publish** as the connection type.



10) When completed, the application is ready to run. Click on the *white arrow* icon to run, and click on the *Start/Stop I/O Scan* switch to begin execution. If successful, the onscreen indicators will illuminate as voltage is applied to the inputs and the logic solves true for the outputs.

SampleApplication.vi		_ 🗆 ×
<u>File Edit Operate Tools Browse Window</u>	<u>H</u> elp	
🗘 🐼 🛑 💵 13pt Application Font		1
Run		^
Start/Stop IO Scan		
	Input 1 Input 2 Uutput 1 Uutput 2	
3	• • • • •	
~		
		-

Figure 22: Starting the Sample Application.

					0101010
My Comput	er Microsoft Excel				90100101
-	•		70707070707070707070707070707070707070		5030030030 303030030 3303030030
Network Neighborho	Microsoft od PowerPoint	SampleApplication.vi	ufeden Hele		0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 &
C	*	Lie Fax Theise Toos Biowse	Wuoow Deb		
Internet Explorer	Microsoft Word	Start/Stop IO Scan	hand hand? Ordered Ordered	, Ê	
26	F	*		-	
MGI PhotoSuite	4 WinZip				
0	i	٠ •			
Recycle Bi	n Outlook Express	SampleApplication.vi Diagram	Window Halo		
4-	<u>8</u>				
Acrobat Reader 4.1	Measurement 0 & Automation			Î	
1		Start/Stop IO Scan	Input 1 Output 1		
Autodesk Vi View Expre			Input 2		$\overline{\mathbf{h}}$
			Dutput 2		3.2
Neighborho					
200				-	and the second
Access					
24					the prove
Start	Wicrosoft Word - NI	_AppN LabVIEW	SampleApplication vi Diag SampleApplicatio	on. vi	○N ² 1210 PM

Figure 23: The Running Sample Application.







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