

# AIOT CLOUD CORP. AIC OPC UA Extender User Manual

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# PREFACE

## Disclaimer

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# Acknowledgements

The AIC OPC UA Extender Server is a trademark of AIOT CLOUD CORP. All other product names mentioned herein are registered trademarks of their respective owners.

# **Revision History**

Version	Date	Description	
		1. Support Modbus/TCP protocol	
v1.0	May 2023	2. Support Modbus/RTU protocol	
		3. Support Modbus/ASCII protocol	
v1.1	August 2023	1. Support OPC UA Client protocol	

# CHAPTER 1: Using the AIC OpcUa Extender Server

## **1.1 Introduction**

AIC OpcUa Extender Server is an Open Platform Communications Unified Architecture (OPC UA) server package focused on communicating with systems for data collection. Based on the OPC UA information model, we provide the platform required for information collection and allow users to leverage the serviceoriented architecture of OPC UA to organize their complex data into an OPC UA namespace. With features such as tag subscriptions and real-time updates, AIC OpcUa Extender Server plays a key role as a communication portal that allows OPC UA clients to manipulate HMI or PLC data. AIC OpcUa Extender Server consists of a configurable GUI for parameters and settings as well as an OPC UA server service to act as a hub for gathering data and sending them to OPC UA client applications, enabling a streamlined OPC UA system operation.

Check the operating system requirement before installing the AIC OpcUa Extender Server. The following are the supported operating systems:

- Microsoft Windows 11, Windows 10
- Microsoft Windows Server 2019, 2016



### 1.2 Installing AIC OpcUa Extender Server

1. Double-click the AIC OpcUa Extender Server setup file, then select the language to install and click **<OK**>.



2. The installation wizard will prepare the setup process.

AIC OpcUa Extender Server - In	stallShield Wizard
2	Preparing to Install
	AIC OpcUa Extender Server Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
	Extracting: AIC OpcUa Extender Server.msi
	Cancel



3. Click **<Next>** to proceed, or click **<Cancel>** to quit.



4. Check the **I accept the terms in the license agreement** option, and click **<Next>** to proceed.

License Agreement		4
Please read the following license agree	ement carefully.	
AIOT CLOUD CORP., END-USER LICENSE	AGREEMENT	^
Please carefully read the following terms software, this use of which is licensed by	and conditions before using this AIOT CLOUD CORP., to its cust	product. It contains comers for their use
only as set forth below. If you do not age not use the software. No part of this soft transmitted in any form or by any means CORP	ree to the terms and conditions tware may be reproduced, copie without the prior written permis	of this agreement, do ed, translated or sion of AIOT CLOUD
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5. Enter the user information, than click **<Next>**.

🖟 AIC OpcUa Extender Server - InstallShield Wizard	×
Customer Information Please enter your information.	と
User Name:	_
Organization:	
AIOT CLOUD	
InstallShield	Next > Cancel



**Note:** You can use the Trial Version and enter the serial number later. The entered product key will introduce a respective version of AIC OpcUa Extender Server displayed on the title of the GUI.



\*A warning message will be prompted if the serial number is invalid.



6. Click **<Install>** to continue with the installation.

🛃 AIC OpcUa Extender Server - InstallShield Wizard	×
Ready to Install the Program	
The wizard is ready to begin installation.	
Click Install to begin the installation.	
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.	
and a matrix of	
< <u>B</u> ack <u>Install</u> Cancel	

7. The installation will begin and may take a while.

ฝ AIC Opc	Ua Extender Server - InstallS	hield Wizard	-		×
Installing	AIC OpcUa Extender Serv	er			4.
The prog	ram features you selected are	e being installed.			
1	Please wait while the InstallS Server. This may take sever	Chield Wizard installs al minutes.	AIC OpcUa Extend	ler	
	Status:				
InstaliShield -		< Back	Next >	Cano	el



8. Once completed, click **<Finish>** to exit the installation wizard.





## 1.3 Launching AIC OpcUa Extender Server

Once installed, you should be able to find the program named **AIC OpcUa Extender Server** in the **All Programs** list as shown.



- 1. Click on the icon or **<OpcUa Extender Utility**> to launch the AIC OpcUa Extender Server.
- 2. Enter the password in the respective field, then click **<OK>**.

OpcUa Exte	nder Server Utility Login	×
Password:		
	ОК	Cancel



#### Note:

- 1. Use the default Password: *0000* to log in if you are logging in for the first time.
- 2. Remember to change the password frequently and keep it in a safe place to avoid hacking. Refer to License for setting the password.



\*A warning message will be prompted if an incorrect password is entered.



3. The GUI of AIC OpcUa Extender Server will be displayed on the screen.

Status	Endpoints	s L	Jsers	Industrial Protocols	Historica
Alarm	& Event	Data	abase	Option	License
Opd la Exte	nder Server \	/ersion Infr	ormation		
Edition	Enterpris	-	Empile	Braycom com	<b>t</b> <sub>1</sub>
Euruon.	Litterpris		chi.	@nexcom.com.	
version	: 1.00.51	/1	S/N:	SNUL-####-###KV	VVD
Product det	ails				
Librarie	s:	libxml2 2.	.9.4, opens	sl-1.1.1j Embedded.	
Max Co	nnections:	200			
Max No	des:	2000			
Max His	storical:	20000			
Max, Ev	vent Nodes:	500			
Everineti		Unlimited			



# CHAPTER 2: AIC OPCUA EXTENDER SERVER BASICS

AIC OpcUa Extender Server consists of 9 pages of information and menus for server status and configurable parameters. Simply click on the corresponding tab for further configurations.

Alarm	& Event	Database	Option	License
Status	Endpoints	Users	Industrial Protocols	Historical
UA TCP Configuratio Server Node Co Tag Cor	: opc.tcp://D n Config: Server onfig: NodeC nfig: TagCo	DESKTOP-UHOULB Config.xml Config.xml	H:48010	
Run Opo	:Ua Extender ser OpcUa Extender :	ver automatically server system log	at startup in Windows. gging.	



Item	Name	Description			
4	OpcUa Extender	Move the cursor onto the connection			
1	Server Status	address and right click to copy it.			
		<ul> <li>Server Config: Config the Server using the ServerConfig.xml file</li> <li>Node Config: Config Nodes using the xml file. Click &lt; &gt; to select the node config file, the defalut is NodeConfig.xml</li> <li>Tag Config: Config Tags using csv file. Click &lt; &gt; to select the tag config file, the default is TagConfig.csv.</li> </ul>			
		The Tag CSV definition: - Format: Tag_Name, Display_Name,			
		Directory, Data_Type, Length, Default			
2	Configuration	- Tag_Name: The Tag Name.			
		- Display_Name: The Tag in OpcUa node			
		browser name.			
		- <b>Directory:</b> OpcUa node directory for this			
		- Data_Iype: There are STRING, BOOLEAN,			
		ELONG, INTSZ, DWORD, UNITSZ,			
		- Length: The Tag data length if > 1 means			
		arrav data type.			
		- Default: The default value.			
		In UaExport will in Address Space has Tags folder with tags like below:			
		✓     No Highlight       ✓     Objects       ✓     Objects       ✓     OpcUa Extender Server       ✓     OpcUa Extender Server       ✓     Protocols       ✓     Server       ✓     Tags       ✓     Extra       ✓     Extra       ✓     Types			



Item	Name	Description
		Click < <b>OK</b> > or < <b>Cancel</b> > to hide the interface in the background.
		🎲 OpcUa Extender Server Utility X
		<b>OpcUa Extender Server Utility</b> OpcUa Extender Server Utility is running here.
		EN ^ 현 와 11:34 AM 3/23/2023 <b>티</b>
3	OK/Cancel	To bring the interface back to the screen, click on <b>Show hidden icons</b> ( ) in the taskbar, and click on the icon of OpcUa Extender Server. A message will prompt you to enter the password.
		OpcUa Extender Server Utility           い
		Click <b><apply></apply></b> to make the configured parameters take effect. A message will prompt you with the option to restart the server.
4	Apply	Question × All parameters have been applied. Do you want to restart the OpcUa Extender Server?
5	x	Click on the <b><x< b="">&gt; button to exit AIC OpcUa Extender Server.</x<></b>



### 2.1 Status

The Status page displays brief information about the current server status. When AIC OpcUa Extender Server is launched, the server operation is initially stopped by default. Once AIC OpcUa Extender Server is up and running, the connection addresses for **UA TCP**: will be displayed respectively, allowing client applications to use the addresses to connect to AIC OpcUa Extender Server.

Alarm	& Event	Database	Option	License
Status	Endpoints	Users	Industrial Protocols	Historica
Server Node C	"' Config: Server onfig: NodeC	Config.xml onfig.xml		
Tag Co	nfig: TagCo	nfig.csv		
Run Op	cUa Extender ser	ver automatically	at startup in Windows.	

Item	Name	Description
1	Start	Click <b><start></start></b> to get the server running.
2	Stop	Click <b><stop< b="">&gt; to stop the server operation.</stop<></b>
3	Restart	Click < <b>Restart</b> > to stop and start the server operation. Information! × OpcUa Service has been restarted!



### 2.2 Endpoints

The Endpoints page allows you to configure all affiliated settings of connections between endpoints. You can edit the settings and save them by clicking **<Apply>** at the bottom of the user interface. The settings are applied once the server has been restarted.

Alarn	n & Event	Database	Option	License
Status	Endpoints	Users	Industrial Protocols	Historica
OPC UA In	formation			
Applicatio		od la:Opd laSer	ver	
Application	ITORI, UII.O	pcoa.opcoaser	VCI	
UA TCP A	ddress: opc.t	cp://DESKTOP-U	HOULBH:48010	
2 Port:	480	10		
3 Server	Name: DES	KTOP-UHOULBH		
4 Securit	y Modes: 🔽 N	one	Sign SignEn	crypt
5 Securit	y Policies: 🖂 B	asic256Sha256 (	uatcp-uasc-uabinary)	
	A	es128 Sha256 F	RsaOaep (uatcp-uasc-uabina	arv)
	~ A	es256_5na256_F	ksaPass (uatcp-uasc-uabina	ry)



Item	Name	Description
1	Appliation URI	UA TCP is the default network protocol for the endpoints.
2	Port	Enter a number in the <b>Port</b> field to set the dedicated port for the connection address.
3	Server Name	Enter a name in the <b>Server Name</b> field to set the hostname for the connection address.
4	Security Modes	<ul> <li>Check either of the checkboxes in Security Modes to set the method for authenticating the connection.</li> <li>None: The connection does not require authentication.</li> <li>Sign: The connection requires sign-in information.</li> <li>SignEncrypt: The connection requires and encrypts sign- in information.</li> </ul>
5	Security Policies	<ul> <li>Check either of the checkboxes in Security Policies to set the encryption algorithm used for the connection.</li> <li>Basic128Rsa15: The connection adopts RSA15 as the key wrap algorithm and 128-bit Basic as the message encryption algorithm.</li> <li>Basic256: The connection adopts 256-bit Basic as the message encryption algorithm.</li> <li>Basic256Sha256: The connection uses SHA256 for the signature digest and 256-bit Basic as the message encryption algorithm.</li> </ul>



### 2.3 Users

The Users page displays user authentication settings. Connections to AIC OpcUa Extender Server can be authenticated with username/ password, Windows Logon, or Certification.

Alar	m & Event	Database	Optic	on .	License
Status	Endpoints	03615	Industrial	Protocols	nistorical
Administra	itor				
Name:	root		Password:	Reset	U
Server Us	ers 2				
#	Name	Roles			



Item	Name	Description
1	Reset	Click < <b>Reset</b> > to change the password of the Administrator.
2		Right-click on the table in <b>Server Users</b> to <b>Add</b> a user, <b>Delete</b> one or multiple users, <b>Change Password</b> of a user, and <b>Change Roles</b> of a user.
	Server Users	Note: Press and hold the Shift key and click on the name of the user to select multiple users. Add User Delete User(s) Change Password Change Roles
	Add User	Select Add User in the pop-up window to add a new account. Enter the required information in the respective fields, and select the required Access Right option by selecting the respective checkboxes. Click <b><ok></ok></b> when done.
3	Enable Windows Logon	Check the checkbox on the left of <b>Enable Windows Logon</b> to enable or disable Windows logon, which is a feature that uses username and password of the local windows installation for AIC OpcUa Extender Server connection.



		Check the checkbox on the left of <b>Enable Certification</b> to enable or disable asymmetrical cryptography to authenticate with the self-signed certificate for AIC OpcUa Extender Server connection.
4	Enable Certification	The trusted self-signed public key is stored in the following path: C:\Program Files\NEXCOM\AIC OpcUa Server\pkiuser\trusted\ certs
		The rejected self-signed public key is stored in the following path: C:\Program Files\NEXCOM\AIC OpcUa Server\pkiuser\rejected
		<b>Note:</b> Moving a rejected self-signed public key from the "rejected" location to the "trusted" location results in its status becoming trusted.
5	Anonymous	Check the checkbox on the left of <b>Anonymous</b> to enable or disable aponymous login



### 2.4 Historical

The Historical page displays the **Settings** and **Log Config** of the AIC OpcUa Extender Server Utility. The historical configuration is used to provide historical data for a variable from the AIC OpcUa Extender Server Utility.

Alarn	n & Event	Databa	ise	Option	License
Status	Endpoint	ts Use	rs	Industrial Protocols	Historical
Settings Historica	l Config: His	tDef.cfg			
Queue S	ize: 1	000		Max. Queue Size	: 20000
Default S	Sampling: 6	00	ms	Min. Sampling Ra	te: 500
🗹 Run	Historical fun	ction automatio	cally at se	rvice starting.	
Log Config					
Historica	l Log Folder:	HistLog		_	
Log Polic	y:	Data Update	• ~		
Number	of Records:	2000		Max. Records:	60000



To add Nodeld, Sampling Rate, and Note, click on < . > to bring up the OpcUa Extender Server Historical Editor. Right-click the mouse on the Editor window to enable the shortcut menu, select the item you want to configure, and then click <**Apply**> to activate the settings when you have completed the configuration. For more operations, refer to the next section.

ŧ	NodeId	Sampling Rate (ms)	Note	
ax.	Node Len: 500	Historical Config:	HistDef.cfg	



#### **2.4.1 Historical Editor**

Apart from the method mentioned in the previous section, you can also click on <History Editor> under the AIC OpcUA Extender Server in the Windows Start menu to add Nodeld, Sampling, Rate, and Note.



Right-click the mouse and a shortcut menu will appear on the screen. Click on **<New**> to add Nodeld, Sampling, Rate, and Note here.

NodeI	d	Sampling Ra	Note
	New		
	Edit		
	Cut Copy Paste Delete		
	Open Cor Import Export	ifig. File	
x. No	<mark>Reload</mark> Clean All		Historical Confia: HistDef.cfa
n. Sar	Refresh		5 5



Please input your ite	em information	$\times$
NodeId:		
Sampling Rate:	600	
Note:		
E	OK Cancel	
Warning	×	
I Not	deld or Sampling Rate cannot be empty.	
	ОК	

\*A warning message will appear if the option of Nodeld is empty.



Click **<Apply>** to activate the settings when you are finished.

<b>@</b> (	OpcUa Historical Cor	figuration Editor			×
#	NodeId	Sampling Rate (ms)	Note		
0	NS2INumericl7001	600			
1	NS2INumericl7002	600			
2	NS2INumericl7003	600			
3	NS2INumericl7004	600			
-					
-					
-					
-					
Max	. Node Len: 200	Hi	storical Config: H	listDef.cfg	
Min	. Sampling Rate: 500				
		Apply	Exit		

Information	$\times$
Apply the data to Historical Configuration successful.	
ОК	



To view the detailed configuration file, right-click on **<Open Config. File>**. The data will be listed on a line by line basis in text format.

🔑 OpcUa H	listorical Cor	nfiguration Edito	or X
# NodeId		Sampling Ra	Note
	New Edit Cut Copy Paste Delete		
	Open Co	onfig. File	
	Import Export		
Max. Node Min. Sampl	<b>Reload</b> Clean Al	I	Historical Config: HistDef.cfg
	Refresh		
		Apply	E <u>x</u> it

<b>W</b>	OpcUa Historical C	onfiguration E	ditor		×
# 0	NodeId 1	Sampling Ra 600	Note PLC1		
1	3	500	PLC2 PLC3		
-					
Max	k. Node Len: 500		Historical Conf	ig: HistDef.cfg	
Min	. Sampling Rate: 500	Apply	E <u>x</u> it		



II HistDef.cfg - Notepad		×
File Edit Format View Help		
1,600,PLC1 2,600,PLC2 3,500,PLC3		^

#### Click on **<Import>** if you have an old configuration file.

N	odeId	Sampling Ra	Note
	New		
	Edit		
	Cut		
	Сору		
	Paste		
	Delete		
	Open Confi	g. File	
	Import		
	Export		
	Reload		
ix.	Clean All		Historical Config: HistDef.cfg
n.	Refresh		





### 2.5 Alarm & Event

The Alarm and Event page is for users to browse and setup all the nodes with alarm notification values, including High High, Low Low, High, Low. Please click < . > to open the editor. Alternatively, you may click <**AlarmEvent Editor**> in the Windows Start menu to launch it. For more detailed operation, refer to the next section.

		Users	Industrial Proto	cols Historical
Alarm	& Event	Database	Option	License
Default Limit	t Setting 80.0003		High High Limit:	90.0000
riigir ciniic				
Low Limit:	20.0001		Low Low Limit:	10.0000



#### 2.5.1 AlarmEvent Editor

Apart from the method mentioned in the previous section, you can also click on **AlarmEvent Editor**> under the AIC OpcUA Extender Server in the Windows Start menu to view and edit the OPC UA High High, High, Low Low, Low data.





To add a new NodelD, right-click on the muse to select **New**.

# NodeId		HH Limit	H Limit	L Limt	LL Limt	Note
	New					
	<u>E</u> dit					
	Cut Copy Paste <u>D</u> elete					
	<u>O</u> pen Confi <u>I</u> mport <u>E</u> xport	ig. File				
Max. Node Len:	<u>R</u> eload <u>C</u> lean All		A	larm <u>Eve</u> r	nt Config:	AlmEvtDef.cfg
	Refresh			E <u>x</u> it		

Input the necessary information and then click **<OK>**.

Please input your	item information	$\times$
NodeId:		
High High	90.0000	
High	80.0003	
Low	20.0001	
Low Low	10.0000	
Note:		
	OK Exit	



\*A warning message will appear if the option of Nodeld is empty.



Click **<Apply>** to activate the settings when you are finished.

	NodeId	HH Limit	H Limit	L Limt	LL Limt	Note
)	NS2ID7001	90.00	80.00	20.00	10.00	
1	NS2ID7002	90.00	80.00	20.00	10.00	
2	NS2ID7003	90.00	80.00	20.00	10.00	
3	NS2ID7004	90.00	80.00	20.00	10.00	
lax.	Node Len: 500		Α	larm Even	t Config:	AlmEvtDef.cfg





Right-click on the mouse to select **Open Config. File** to open the HistDef.cfg file, and it can be edited by Notepad.

# NodeId	HH Limit	H Limit	L Limt	LL Limt	Note	
	<u>N</u> ew <u>E</u> dit Cut Copy Paste <u>D</u> elete					
	<u>O</u> pen Config. I	File				
	<u>I</u> mport <u>E</u> xport					
Max. Node Len: 500	<u>R</u> eload <u>C</u> lean All		Ever	t Config:	AlmEvtDef.cfg	[
	Refresh		įt			

III HistDef.cfg - Notepad				_	×
File Edit Format View Help					
					^
					$\checkmark$
	Ln 1, Col 1	100%	Windows (CRLF)	UTF-8	



Right click on the mouse to select **Import** to import the old file.

#	NodeId	HH	l Limit	H Limit	L Limt	LL Limt	Note	
0 NS2ID700 1 NS2ID700 2 NS2ID700 3 NS2ID700	<u>N</u> ew <u>E</u> dit Cut Copy Paste <u>D</u> elete		0 0 0	20.00 20.00 20.00 20.00	10.00 10.00 10.00 10.00			
		Open Config. Fil	e	_				
	· · · · · · ·	<u>I</u> mport						
		<u>E</u> xport						
lax. Node Len:	<u>R</u> eload <u>C</u> lean All		A	larm <u>Eve</u> r	nt Config:	AlmEvtDef.cfg		
		Refresh			Exit			

🙀 Import Alarm & Event Cor	figuration			$\times$
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\blacksquare$ $``$ LAV.	A > OpcUa Server	v ک		م
Organize ▼ New folder			•	?
<ul> <li>This PC</li> <li>3D Objects</li> <li>Desktop</li> <li>Documents</li> <li>Downloads</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> <li>Windows (C:)</li> <li>CD Drive (D:) Wc</li> <li>VirtualLink (E:)</li> </ul>	Name HistLog pkiserver NamEvtDef.cfg HistDef.cfg		Date modified 7/12/2022 11:55 AM 7/11/2022 6:16 PM 7/11/2022 6:16 PM 6/30/2022 5:11 PM 6/30/2022 5:11 PM	
File nam	< Ne: Alarm & Event Config	~	CFG File (*.Cfg) Open Cancel	> > 



### 2.6 Industrial Protocols

The Industrial Protocols page allows you to configure the industrial protocols, read the data directly into our OpcUa Extender Server, the available options are Modbus TPC, Modbus RTU, and Modbus ASCII. Select the protocol according to the device you are accessing. Refer to next section for more detailed operations.

OpcUa Ext. S	Server Utility: Ente	erprise Edition		×
P	rotocols Add/Remove th	e Industrial Proto	col Connections.	
Ala	arm & Event	Database	Option	License
Status	Endpoints	Users	Industrial Protocols	Historical
Protocol	Config:			
#	Prots	Parameters		Slave ID
<				>
			l.	Restore
			OK Cancel	<u>A</u> pply



#### 2.6.1 Modbus TCP

Move the mouse and right-click to select **Add Modbus TCP**.

	0.5	Detabase	On Finn	12
Alai Status	Endpoints	Users	Uption Industrial Protocols	Historica
				_
			Add Modbus TCP	
			Add Wodbus RTU	
			Add Modbus ASCII	
			Add Modbus ASCII Add OPC UA Client	

Fill in the Modbus TCP parameters.

Modbus Tcp Configuration	×
Modbus Parameters	
Type: Modbus TCP	
Zero-Based: SlaveId: 1	
Modbus Addr Ext.: Pooling Timer: 3000 ms	
Modbus Connection:	
Modbus IP: 127 . 0 . 0 . 1 Port: 502	
OpcUa Config	
Modbus Folder: ModbusTcp	
Node Config (csv): ModTcpNode.csv	
OK Cancel	



#### 2.6.2 Modbus RTU

Move the mouse and right-click to select **Add Modbus RTU**.

Status     Endpoints     Users     Industrial Protocols     Histor       Protocol Config:     #     Protocols     Parameters     Slav       #     Protocols     Parameters     Slav       Add Modbus TCP     Add Modbus RTU     Add Modbus ASCII       Add OPC UA Client     Edit       Edit     Delete	А	larm & Event	Database	Option	License
Protocol Config:       #     Protocols     Parameters     Slav       Add Modbus TCP     Add Modbus RTU       Add Modbus ASCII     Add Modbus ASCII       Add OPC UA Client     Edit       Edit     Delete	Status	Endpoints	Users	Industrial Protocols	Historica
Add Modbus TCP       Add Modbus RTU       Add Modbus ASCII       Add OPC UA Client       Edit       Delete	#	Protocols	Parameters		Slave I
Add Modbus TCP      Add Modbus RTU      Add Modbus ASCII      Add OPC UA Client      Edit      Delete	#	Protocols	Parameters		Slave
Add Modbus RTU       Add Modbus ASCII       Add OPC UA Client       Edit       Delete	-			Add Modbus TCP	
Add Modbus ASCII      Add OPC UA Client      Edit      Delete	-			Add Modbus RTU	
Add OPC UA Client     Edit     Delete	1			Add Modbus ASCII	
Edit     Delete					
Delete				Add OPC UA Client	
	<			Add OPC UA Client	>
Delete All store	<			Add OPC UA Client Edit Delete	>
	<			Add OPC UA Client Edit Delete Delete All	store

Fill in the Modbus RTU parameters.

Modbus RTU Configuration	×
Modbus Parameters	
Type: Modbus RTU	
Zero-Based: SlaveId: 1	
Modbus Addr Ext.: Pooling Timer: 200 ms	
Modbus Connection:       COM Port:     COM1       V     Baud Rate:       9600	
Data Bits: 8   Parity: NONE   Stop Bits: 1	
Frame Delay: 10 ms	
OpcUa Config	
Modbus Folder: ModbusRtu, 1	
Node Config (csv): ModbusRtuCfg.csv	


#### 2.6.3 Modbus ASCII

Move the mouse and right-click to select **Add Modbus ASCII**.

A	larm & Event	Database	Option	License
Status	Endpoints	Users	Industrial Protocols	Historica
#	Protocols	Parameters		Slave I
			Add Modbus TCP	
			Add Modbus RTU	
-			Add Modbus ASCII	
			Add OPC UA Client	
<	10- 10-		Edit	>
			Delete	
			Delete All	store

Fill in the Modbus ASCII parameters.

Modbus ASCII Configuration	×
Modbus Parameters	
Type: Modbus ASCII	
Zero-Based: SlaveId: 1	
Modbus Addr Ext.: Pooling Timer: 3000 ms	
Modbus Connection:       COM Port:     COM1       V     Baud Rate:       9600	
Data Bits: 8 V Parity: NONE V Stop Bits: 1 V	-
Frame Delay: 10 ms	
OpcUa Config	
Modbus Folder: ModbusAsc	
Node Config (csv): ModbusAscCfg.csv	



### 2.6.4 OPC UA Client

Move the mouse and right-click to select **Add OPC UA Client**.

Ala	rm & Event	Database	Option	License
Status	Endpoints	Users	Industrial Protocols	Historica
#	Protocols	Parameters		Slave !
			Add Modbus TCP	
			Add Modbus RTU Add Modbus ASCII	
			Add OPC UA Client	
<			Edit	>

Fill in the OPC UA Client parameters.

OPC UA Client Configuration	×
OPC UA Client Parameters	
Type: OPC UA Client	
Endpoint: opc.tcp:// OpcUaServer:48010	
Reconnect Time: 300000 ms Publishing Interval: 2000 ms	
Security Settings	
Auth. Type: Anonymous $\checkmark$	
Security: V Policy: V	
Username: Password:	
Connection Test	
OpcUa Config	
OPC UA Folder: OpcUaDev	
Node Config (csv): OpcUaDevNode.csv	



Once configured, the screen should look like the following.

tatus     Endpoints     Users     Industrial Protocols     His       rotocol Config:     #     Protocols     Parameters     S       01     Modbus TCP     IP: 127.0.0.1:502     1       02     Modbus RTU     ComPort: COM1 (9600-8-N-1)     1       03     Modbus ASCII     ComPort: COM2 (9600-8-N-1)     1	Historica	Industrial Protocols	Users	Endopinte	
#         Protocols         Parameters         S           01         Modbus TCP         IP: 127.0.0.1:502         1           02         Modbus RTU         ComPort: COM1 (9600-8-N-1)         1           03         Modbus ASCII         ComPort: COM2 (9600-8-N-1)         1				Linupoints	Status
#         Protocols         Parameters         S           01         Modbus TCP         IP: 127.0.0.1:502         1           02         Modbus RTU         ComPort: COM1 (9600-8-N-1)         1           03         Modbus ASCII         ComPort: COM2 (9600-8-N-1)         1				onfig:	Protocol C
01         Modbus TCP         IP: 127.0.0.1:502         1           02         Modbus RTU         ComPort: COM1 (9600-8-N-1)         1           03         Modbus ASCII         ComPort: COM2 (9600-8-N-1)         1	Slave		Parameters	Protocols	#
02         Modbus RTU         ComPort: COM1 (9600-8-N-1)         1           03         Modbus ASCII         ComPort: COM2 (9600-8-N-1)         1	1	1:502	IP: 127.0.0.1	Addbus TCP	01
03 Modbus ASCII ComPort: COM2 (9600-8-N-1) 1	1	M1 (9600-8-N-1)	ComPort: CO	1odbus RTU	02
	1	M2 (9600-8-N-1)	ComPort: CO	Addbus ASCII	03
04 OPC UA Client opc.tcp://OpcUa-Server:48010 -		cUa-Server:48010	opc.tcp://Op	OPC UA Client	04
<	>				<



### 2.7 Database

The Database page is designed to store the historical, Alarm & Event data in the database for use by other applications.

Status	Endpoints	Users	Industrial Pro	tocols	Historica
Alarm & E	Event	Database	Option		License
Connection Set	tings				
Database:	None	(Disabled)	$\sim$		
	None	(Disabled)		2200	
Hostname:	MySQ MySO	L 5.x L 8.x	Port	3306	
Username:	Micros	soft SQL Server 20	016		
Password:	Micros	soft SQL Server 20 SQL Database	)19		
Confirm Pass	word:				
Log Config					
Default Scher	ma: OpcU	la Extender_DB	Log Policy:	Data Up	date 🗸 🗸
Default Table	. Histo	rical			



The supported databases are: My SQL 5.x, My SQL 8.x, Microsoft SQL Server 2016, 2017, 2019, and Azure SQL Database.

The first step is to prepare the database, and then input Hostname, Port, Username, and Password for accessing the database.

In Log Config, input the Dafault Schema and Default Table. These files are dependent on your design in database. **Data Update** and **Sampling Rate** are available for the Log Policy.

status	Endpoints	Users	Industrial Protocol	s Historica
Alarm 8	Event	Database	Option	License
Connection Se	ettings			
Database:	None	(Disabled)	$\sim$	
	None	(Disabled)		
Hostname:	MySQ	L 5.x	Port: 3	3306
Username:	Micro	soft SQL Server 20	016	
	Micro	soft SQL Server 20	017	
Password:	Azure	SQL Database	/19	
Confirm Pas	ssword:			
Log Config				
Default Sch	ema: Opcl	Ja Extender_DB	Log Policy: Dat	ta Update 🛛 🗸 🗸



Example 1: Set a historical configuration and save to MySQL Database.

tus Endpoints Users Historical Alarm & Event PubSub Database Li	icense	#	NodeId ns=2:s=Float 0001	Sampling Rate (ms) 1000	Note Float 0001	
C-Hin		1	ns=2;s=Float_0002	1000	Float_0002	
settings		2	ns=2;s=Float_0003	1000	Float_0003	
Historical Config: history of a		3	ns=2;s=Float_0004	1000	Float_0004	
Instance coning. Instally, eng		4	ns=2;s=Float_0005	1000	Float_0005	
Oueue Size: 100 Max Oueue Size: 2	20000	5	ns=2;s=Float_0006	1000	Float_0006	
		6	ns=2;s=Float_0007	1000	Float_0007	
Default 5000 ms Min Campling	500	7	ns=2;s=Float_0008	1000	Float_0008	
Belaur 1000 Ins Imm. Sampling .	500	8	ns=2;s=Float_0009	1000	Float_0009	
		9	ns=2;s=Float_0010	1000	Float_0010	
Kun Historical function automatically at service starting.		10	ns=2;s=Float_0011	1000	Float_0011	
Las Casta		11	ns=2;s=Float_0012	1000	Float_0012	
Log Config		12	ns=2;s=Float_0013	1000	Float_0013	
Historical Log Folder: HistLog		<				
Log Policy: Data Update  Vumber of Records: 1000 Max. Records: 6	50000	Max. I Min. S	Node Len: 500 Sampling Rate: 500	Historical Config:	history.cfg	

Example 1.1: Set your database to **MySQL 5.x** (the example here is using MySQL 5.7.39).

This MySQL 已連線	OpcUa Server Utility: Enterprise Edition X  Database Configure the Database of OpcUa server.
伺服器版本 5.7.39-log 階段作業 2 主機 localhost 埠	Status       Endpoints       Users       Historical       Alarm & Event       PubSub       Database       License         Connection Settings       Database:       None (Disabled)       V
使用者名稱 root 設定位置 C:\Users\alantseng\Documents\Na\	Log Config Default Schema: OpcUa_D8 Log Policy: Data Update Default Table: Historical Init. Database Test Connection
<ul> <li>This MySQL</li> <li>information_schema</li> <li>mysql</li> <li>performance_schema</li> <li>sys</li> </ul>	確定 取満 麥用(A)



Example 1.2: Set login information (Hostname, Username, Port, Password, and confirm it) then click button **<Test Connection>**. Once connected, click **<OK>** to exit.

OpcUa Server Utility: Enter	rprise Edition
Database Configure the	Database of OpcUa server.
Status Endpoints User	rs Historical Alarm & Event PubSub Database License
Connection Settings	
Database:	MySQL 5.x 🗸
Hostname:	localhost Port: 3306
Username:	root
Password:	•••••
Confirm Password:	•••••
Log Config	
Default Schema:	OpcUa_DB Log Policy: Data Update ~
Default Table:	Historical
Init. Database	Test Connection
	確定 取消 套用(A)





Example 1.3: Click button <**Init. Database**> and check the initialization completed message.

A new schema **opcua\_db** and a new table **historical** are shown in the db server of the left panel.

19 6 h	物件 🔝	historical @opcua_db	(This				
Same	📴 開始交易	🖹 文字 🔻 🍸 篩選	排序    🔣 匯入 🔣	匯出			
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SerialNum	ServerTimestamp	SourceTimestamp	Nodeld	NodeBrowseName	NodeValue	LogTimestamp
West's days	) (Nul	l) (Null)	(Null)	(Null)	(Null)	(Null)	(Null)
🗸 📉 This MySQL							
information_schema							
🗧 mysql							
🗸 🥃 opcua_db							
✓ Ⅲ 資料表							
📰 historical							
100 檢視							
> <i>f<sub>x</sub></i> 函式							
> 🕘 事件							
> 💼 查詢							
> 🔝 報表							
> 🖸 備份							
🛢 performance_schema							
S sys							

atus	Endpoints	Users	Historical	Alarm & Eve	nt PubSub	Database	License
D	atabase:	ngs N	/lySQL 5.x		$\sim$		
	Opc para	Ua Data ameters a	base initializa and then rest	ation has been o art the server.	completed. Y	ou can apply	these
-100	Opc para	Ua Datal ameters a	base initializa and then rest	ation has been o art the server.	completed. Y	ou can apply	these 確定
Log	Opc para	ua Datal ameters a	base initializa and then rest	ation has been o art the server.	completed. Y	ou can apply	these 確定 date ~



Example 1.4: Click **<Apply>** and click **<Yes>** to restart the AIC OpcUa Extender Server.

OpcUa Server Utility: Enterp	prise Edition	×
Database Configure the D	Database of OpcUa server.	
Status Endpoints Users	s Historical Alarm & Event PubSub Database License	
Connection Settings		
Database:	MySQL 5.x V	
Hostname:	localhost Port: 3306	
Username:	root	
Password:		
Confirm Password:		
Log Config		
Default Schema:	OpcUa_DB Log Policy: Data Update ~	
Default Table:	Historical	
Init. Database	Test Connection	
	確定 取消 套用(A)	

Question	$\times$
All parameters have been applied. Do you want to restart the OpcUa Server?	
是(Y) 否(N)	



Fxample	15.	The	changed	inform	ation	is	recorded	in	the	table	
слаттріе	: I.J.	me	changeu	IIIIOIIII	auon	12	recordeu	11.1	uie	lable	

物件historical @opcua_db (Th	his 📰 powermeter	r @huayafactory			
📴 開始交易 🛛 🗈 文字 🔻 🍸 篩選 🎜	排序 🖪 匯入 🕄 🛛	[出			
SerialNum A ServerTimestamp	SourceTimestamp	Nodeld	NodeBrowseName	NodeValue	LogTimestamp
1 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0001	Float_0001	0	2022-08-03 09:10:46
2 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0002	Float_0002	0	2022-08-03 09:10:46
3 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0003	Float_0003	0	2022-08-03 09:10:46
4 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0004	Float_0004	0	2022-08-03 09:10:46
5 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0005	Float_0005	0	2022-08-03 09:10:46
6 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0006	Float_0006	0	2022-08-03 09:10:46
7 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0007	Float_0007	0	2022-08-03 09:10:46
8 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0008	Float_0008	0	2022-08-03 09:10:46
9 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0009	Float_0009	0	2022-08-03 09:10:46
10 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0010	Float_0010	0	2022-08-03 09:10:46
11 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0011	Float_0011	0	2022-08-03 09:10:46
12 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0012	Float_0012	0	2022-08-03 09:10:46
13 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0013	Float_0013	0	2022-08-03 09:10:46
14 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0014	Float_0014	0	2022-08-03 09:10:46
15 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0015	Float_0015	0	2022-08-03 09:10:46
16 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0016	Float_0016	0	2022-08-03 09:10:46
17 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0017	Float_0017	0	2022-08-03 09:10:46
18 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0018	Float_0018	0	2022-08-03 09:10:46
19 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0019	Float_0019	0	2022-08-03 09:10:46
20 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0020	Float_0020	0	2022-08-03 09:10:46
21 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0021	Float_0021	0	2022-08-03 09:10:46
22 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0022	Float_0022	0	2022-08-03 09:10:46
23 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0023	Float_0023	0	2022-08-03 09:10:46
24 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0024	Float_0024	0	2022-08-03 09:10:46
25 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0025	Float_0025	0	2022-08-03 09:10:46
26 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0026	Float_0026	0	2022-08-03 09:10:46
27 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0027	Float_0027	0	2022-08-03 09:10:46
28 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0028	Float_0028	0	2022-08-03 09:10:46
29 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0029	Float_0029	0	2022-08-03 09:10:46
30 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0030	Float_0030	0	2022-08-03 09:10:46
31 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0031	Float_0031	0	2022-08-03 09:10:46
32 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0032	Float_0032	0	2022-08-03 09:10:46
33 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0033	Float_0033	0	2022-08-03 09:10:46
34 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0034	Float_0034	0	2022-08-03 09:10:46
35 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0035	Float_0035	0	2022-08-03 09:10:46
36 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0036	Float_0036	0	2022-08-03 09:10:46
37 2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0037	Float_0037	0	2022-08-03 09:10:46
20 2022 00 02 00-10-40	2022 08 02 00-10-40	no-2:Eleat 0029	Floot 0029	0	2022 09 02 00:10:46



	SerialNum 🔺	ServerTimestamp	SourceTimestamp	Nodeld	NodeBrowseName	NodeValue	LogTimestamp
	3945	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0461	Float_0461	4.61e+07	2022-08-03 09:49:19
	3946	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0462	Float_0462	4.62e+07	2022-08-03 09:49:19
	3947	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0463	Float_0463	4.63e+07	2022-08-03 09:49:19
	3948	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0464	Float_0464	4.64e+07	2022-08-03 09:49:19
	3949	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0465	Float_0465	4.65e+07	2022-08-03 09:49:19
	3950	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0466	Float_0466	4.66e+07	2022-08-03 09:49:19
	3951	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0467	Float_0467	4.67e+07	2022-08-03 09:49:19
	3952	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0468	Float_0468	4.68e+07	2022-08-03 09:49:19
	3953	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0469	Float_0469	4.69e+07	2022-08-03 09:49:19
	3954	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0470	Float_0470	4.7e+07	2022-08-03 09:49:19
	3955	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0471	Float_0471	4.71e+07	2022-08-03 09:49:19
	3956	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0472	Float_0472	4.72e+07	2022-08-03 09:49:19
	3957	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0473	Float_0473	4.73e+07	2022-08-03 09:49:19
	3958	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0474	Float_0474	4.74e+07	2022-08-03 09:49:19
	3959	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0475	Float_0475	4.75e+07	2022-08-03 09:49:19
	3960	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0476	Float_0476	4.76e+07	2022-08-03 09:49:19
	3961	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0477	Float_0477	4.77e+07	2022-08-03 09:49:19
	3962	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0478	Float_0478	4.78e+07	2022-08-03 09:49:19
	3963	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0479	Float_0479	4.79e+07	2022-08-03 09:49:19
	3964	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0480	Float_0480	4.8e+07	2022-08-03 09:49:19
	3965	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0481	Float_0481	4.81e+07	2022-08-03 09:49:19
	3966	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0482	Float_0482	4.82e+07	2022-08-03 09:49:19
	3967	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0483	Float_0483	4.83e+07	2022-08-03 09:49:19
	3968	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0484	Float_0484	4.84e+07	2022-08-03 09:49:19
	3969	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0485	Float_0485	4.85e+07	2022-08-03 09:49:19
	3970	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0486	Float_0486	4.86e+07	2022-08-03 09:49:19
	3971	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0487	Float_0487	4.87e+07	2022-08-03 09:49:19
	3972	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0488	Float_0488	4.88e+07	2022-08-03 09:49:19
	3973	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0489	Float_0489	4.89e+07	2022-08-03 09:49:19
	3974	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0490	Float_0490	4.9e+07	2022-08-03 09:49:19
	3975	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0491	Float_0491	4.91e+07	2022-08-03 09:49:19
	3976	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0492	Float_0492	4.92e+07	2022-08-03 09:49:19
	3977	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0493	Float_0493	4.93e+07	2022-08-03 09:49:19
	3978	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0494	Float_0494	4.94e+07	2022-08-03 09:49:19
	3979	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0495	Float_0495	4.95e+07	2022-08-03 09:49:19
	3980	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0496	Float_0496	4.96e+07	2022-08-03 09:49:19
	3981	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0497	Float_0497	4.97e+07	2022-08-03 09:49:19
	3982	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0498	Float_0498	4.98e+07	2022-08-03 09:49:19
	3983	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0499	Float_0499	4.99e+07	2022-08-03 09:49:19
	3984	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0500	Float_0500	5e+07	2022-08-03 09:49:19
	3985	2022-08-03 10:00:22	2022-08-03 10:00:22	ns=2;s=Float_0500	Float_0500	4.13174e+06	2022-08-03 10:00:29
•	3986	2022-08-03 10:03:35	2022-08-03 10:03:35	ns=2;s=Float_0500	Float 0500	1.23457e+08	2022-08-03 10:03:40



Example 2: Set up an Azure SQL database.

Example 2.1: Create a Resource group.

Basics Tags Review + create					
<b>Resource group</b> - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. Learn more $\mathbb{C}^3$					
Project details					
Subscription * ①	BusinessShowFunctionforNexaiot ~				
Resource group * 🛈	RG_for_AzureSQL				
Resource details					
Region * 🕕	(Asia Pacific) Southeast Asia $\checkmark$				

Example 2.2: Click **<Create resources>**.

	\$ <b>\$</b>			×
P Search (Ctrl+/) «	🕂 Create 🛞 Manage view 🗸 📋 Delete resource group 🖒 Refresh 🕁 Export to d	CSV $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$		Open in mobile
(i) Overview	∧ Essentials			
Activity log	Subscription (move) : ForAlanTseng			
Access control (IAM)	Subscription ID : 8f318105-65a4-4e3e-84d1-6c1a1c1c3244	Location : Southeast Asia		
🧳 Tags	Tags (edit) : <u>Click here to add tags</u>			
👃 Resource visualizer				
🗲 Events	Kesources Recommendations			
Settings	Filter for any field Type equals all X Location equals all X + Add f	ilter		
Deployments	Showing 0 to 0 of 0 records. Show hidden types 💿		No grouping ~	E≣ List view ✓
Security	Name 🔿	Type 🕥	Location 1	
Policies				
III Properties				
🔒 Locks				
Cost Management				
S. Cost analysis				
Cost alerts (preview)				
Budgets	No n	esources match your filters		
Advisor recommendations		to changing or clearing your filters.		
Monitoring		eate resources Clear filters		
💡 Insights (preview)		cean more		
III Alerts				
Metrics				



Example 2.3: Select Azure SQL.



Example 2.4: Select **Single database** and click **<Create>**.





Example 2.5: Click **<Create new>** to create a server if there is no one.

Home > Resource groups > RG_for_Az	ureSQL $>$ Marketplace $>$ Select SQL deployment option $>$
Create SQL Database	
<b>i Did you know</b> that new users in Azurr account? <u>Learn more</u>	e can create a free Azure SQL Database and use it for 12 months using Azure free
Project details	
Select the subscription to manage deploye manage all your resources.	ed resources and costs. Use resource groups like folders to organize and
Subscription * ①	×
Resource group * ①	RG_for_AzureSQL     V       Create new
Database details	
Enter required settings for this database, in resources	ncluding picking a logical server and configuring the compute and storage
Database name *	Enter database name
Server * 🕕	Select a server  Create new
Want to use SQL elastic pool? ①	🔿 Yes 💿 No



Example 2.6: Define the server name, user name (admin login), and password.

Microsoft	Server ····	
Server details		
Enter required settings for this server, in subscription and resource group as you	Icluding providing a name and location. This server will be crea r database.	ated in the same
Server name *	opcua-db-server2	~
	.d	latabase.windows.net
Location *	(Asia Pacific) Southeast Asia	~
Select your preferred authentication me	thods for accessing this server. Create a server admin login an	
access your server with SQL authenticat user, group, or application as Azure AD	admin Learn more & , or select both SQL and Azure AD auther	d password to n existing Azure AD ntication.
access your server with SQL authenticat user, group, or application as Azure AD Authentication method	ion, select only Azure AD authentication Learn more & using a admin Learn more & , or select both SQL and Azure AD auther	nd password to n existing Azure AD ntication.
access your server with SQL authenticat user, group, or application as Azure AD Authentication method	<ul> <li>ion, select only Azure AD authentication Learn more &amp; using a admin Learn more &amp; or select both SQL and Azure AD authentication</li> <li>Use SQL authentication</li> <li>Use only Azure Active Directory (Azure AD) authentication</li> </ul>	Id password to n existing Azure AD ntication. ation
access your server with SQL authenticat user, group, or application as Azure AD Authentication method	<ul> <li>ion, select only Azure AD authentication Learn more &amp; using a admin Learn more &amp;, or select both SQL and Azure AD authentication</li> <li>Use SQL authentication</li> <li>Use only Azure Active Directory (Azure AD) authentication</li> <li>Use both SQL and Azure AD authentication</li> </ul>	Id password to n existing Azure AD ntication. ation
access your server with SQL authenticat user, group, or application as Azure AD Authentication method Server admin login *	ion, select only Azure AD authentication Learn more & using a admin Learn more & , or select both SQL and Azure AD authentication ● Use SQL authentication ● Use only Azure Active Directory (Azure AD) authentication ● Use both SQL and Azure AD authentication ● Use both SQL and Azure AD authentication	ad password to n existing Azure AD ntication. ation
access your server with SQL authenticat user, group, or application as Azure AD Authentication method Server admin login * Password *	ion, select only Azure AD authentication Learn more & using a admin Learn more w using a using a select both SQL and Azure AD authentication         Image: SQL authentication       Use SQL authentication         Image: Use SQL authentication       Use only Azure Active Directory (Azure AD) authentication         Image: Use both SQL and Azure AD authentication       Use both SQL and Azure AD authentication         Image: Opcua_admin	at password to n existing Azure AD ntication. ation



Example 2.7: Select **Public endpoint** in the **Networking** tab. Then go to **Review + create** tab to create this database.

Basics Networking Security Additional settings Tags Review + create						
Configure network access and connectivity for your server. The configuration selected below will apply to the selected server 'opcua-db-server2' and all databases it manages. Learn more 🗗						
Network connectivity						
Choose an option for configuring connectivity to your server via public endpoint or private endpoint. Choosing no access creates with defaults and you can configure connection method after server creation. Learn more						
Connectivity method *    No access   No access   Public endpoint   Private endpoint						
Firewall rules						
Setting 'Allow Azure services and resources to access this server' to Yes allows communication the Azure boundary, that may or may not be part of your subscription. Learn more Setting 'Add current client IP address' to Yes will add an entry for your client IP address to the	s from all resources inside server firewall.					
Allow Azure services and resources to No Yes						
Add current client IP address * No Yes						
Connection policy						
Configure how clients communicate with your SQL database server. Learn more						
Connection policy (i) Default - Uses Redirect policy for all client con of Azure and Proxy for all client connections of	nections originating inside originating outside Azure					
Proxy - All connections are proxied via the Az	ure SQL Database gateways					
Redirect - Clients establish connections direct     database	ly to the node hosting the					



Example 2.8: Check the database in your resource group and click it.

Home > Resource groups >					
Resource groups « NEXCOM International Co., Ltd.	RG_for_AzureSQL &				3
+ Create 💿 Manage view 🗸 \cdots		+ Create 🛞 Manage view 🗸 🔋 Delete resource group 🖒 Refresh 🞍 Export to CSV 😤 Ope	<b>n query</b> $\mid \ \emptyset$ Assign tags $\rightarrow$ Move $\sim$		Open in mobile
Filter for any field.	🔘 Overview 🔒				JSON Vit
Name 1	Activity log				
NetworkWatcherRG ***	Access control (IAM)	Subscription ID : 8/218105-6544-4e3e-84d1-6c1a1c1c3244	Location : Southeast Asia		
NetworkWatcherRG ····	📌 Taga	Tags (edit) : Click here to add tags			
NEXAIOT_ANKO ····	🛧 Resource visualizer	Resources Recommendations			
NEXAIOT_VM_For_IAT2000 ····	🗲 Events				
RG_for_AzureSQL ····	Settings	Filter for any field Type equals all X Location equals all X 47 Add filter			
RoviiProject ····	🛆 Deployments	Showing 1 to 2 of 2 records.		No grouping $\checkmark$	≡≡ List view 🗸 🗸
	Security	Name 🗘	Туре ↑↓	Location $\uparrow_{\downarrow}$	
	Poscies	🔲 👼 opcus-db-server2	SQL server	Southeast Asia	
	Properties	Gpcua_DB (opcua-db-server2/Opcua_DB)	SQL database	Southeast Asia	
	💾 Looks				
	Cost Management				

Example 2.9: Click Set server firewall to set a firewall.





Example 2.10: Click on <+ **Add a firewall rule**> to enter the IP address of the AIC Opc Ua Extender Server which allows the server to connect to Azure SQL, and then click <**OK**> to confirm. Once the firewall rule has been created, click <**Save**> to exit.

Firewall rules Allow certain public internet IP addresses to access	: your resource. Learn more <sup>亿</sup>	
+ Add your client IPv4 address (60.251.33.86)	+ Add a firewall rule	
Rule name S	Add a firewall rule	
	Rule name Start IP	End IP
Exceptions	Allow_Client	
Allow Azure services and resources to access		OK Cancel
Firewall rules Allow certain public internet IP addresses to + Add your client IPv4 address (60.251.3	access your resource. Learn more	
Rule name	Start IPv4 address	End IPv4 address
Allow_Client	P22-710	2017-000 C
Exceptions Allow Azure services and resources to a	access this server ①	
Save Discard		



Example 2.11: Click **<Connection Strings>** in the left panel to see the necessary information. Press **<Test Connection>** once you have entered it on the Database page of AIC OpcUa Extender Server.

SQL database	-db-server2/OpcUa_DB)   Connection strings
✓ Search (Ctrl+/) «	
S Overview	ADO.NET JDBC ODBC PHP Go
Activity log	ADO.NET (SQL authentication)
🧳 Tags	Server=tcp opcua-db-server2.database.windows.net 1433 Initial Catalog=OpcUa_D8 Persist Security Info=FalsetUser ID=opcua_admin;Password=(your_password);MultipleActiveResul
Diagnose and solve problems	
Getting started	
Query editor (preview)	
Power Platform	Download ADO.NET driver for SQL server C
Power BI	
Power Apps	
Power Automate	
Settings	
O Compute + storage	
S Connection strings	
Properties	
🔒 Locks	

Alarm & Event	Database	Industrial Protocols Option	License
Connection Settings			
Database:	None (Disabled)	~	
Hostname:	localhost	Port: 330	6 2
Username:			
Password:			
Confirm Password:			
.og Config			
Default Schema:	OpcUa Extender_DB	Log Policy: Data U	Jpdate 🗸 🗸
Default Table:			
Init. Database		Tes	t Connection
	[	OK Cancel	Apply



### 2.8 Option

The Option page provides additional play and launch options that can be enabled during play mode and startup.

Click the **<Set as Default>** button to return to the default options.

The Web Service will provide the Restful API for customers to remotely control the server to START, STOP, RESTART, HTTP\_NODECFG, FILE\_NODECFG.

One option is available:

• Auto launch when logged in to the system.

Status	Endpoints	Users	Industrial Protocols	Historica
Alarm	& Event	Database	Option	License
Web Service	e (for remote co	ntrol command)		
web Service	e (for remote co	nu or command)		
Enable	e Web Service			
Servio	e Port: 10	0600		
Secur	ity Token: 12	2345678	•••	
Autom	natically start wh	nen user logins		
				Cabaa Dafa



pcoa securiys		
Remote IP:	127.0.0.1	
Service Port:	10600	
Service Token:	12345678	
emote Controller - Command:	START ~	
emote Controller - Command: Parameter:	START ~ START STOP	Send



### 2.9 License

The License page displays the **OpcUa Extender Server Version Information** and **Product details**. Also, this page allows you to register the product key.

Status	Endpoints	; L	lsers	Industrial Protocols	Historica
Alarm 8	& Event	Data	abase	Option	License
Edition:	Enterpris	e	Email:	@nexcom.com	.tw
Version:	1.00.317	71	S/N:	SNUL-####-###KV	WB
Product deta	ils				
Libraries	:	libxml2 2.	9.4, opens	sl-1.1.1j Embedded.	
Max Con	nections:	200			
Max Nod	les:	2000			
Max Hist	orical:	20000			
Max. Eve	ent Nodes:	500			
Expiratio	n:	Unlimited			



Item	Name	Description
1	License	Click <license> and enter your software key in the respective fields. Click <ok> when done.</ok></license>
2	Release License	Click it to release the license key on the current device, then you can use the license key in the other device.



### 2.10 About

To see the version number, right-click on the icon 词 in the lowerright corner of Windows Taskbab and click "About".







# CHAPTER 3: ADVANCED FUNCTIONS

### 3.1 Update the Server Certificate

The OpcUa Extender Server Certificate Utility is designed for server certificate management. You can create your own server certificate, load the default value, or select a new server certificate using this utility.

1. Click on **<Server Certificate>** to launch the Server Certificate.



2. The GUI of Server Certificate will be displayed on the screen.

Subject		
Common Name:	OpcUaServer@Nex-3468	
Organization:	NEXCOM	
Organization Unit:	ОТ	
Locality:	New Taipei City	
State:	Taiwan	
Country:	TW	
	(Two letter code e.g. DE, US, TW,)	
Domain:	Nex-3468	
Note: Name of the C	PC UA server application.	



3. To load the default certificate, click on the bottom left corner as indicated below ( ... ) and then click **<Apply>** button.

😧 OpcUa Server Certifica	ate Utility	×
Subject		
Common Name:	OpcUaServer@DESKTOP-UH0ULBH	
Organization:	AIC	
Organization Unit:	ОТ	
Locality:	New Taipei City	
State:	Taiwan	
Country:	TW	
Domain:	(Two letter code e.g. DE, US, TW,) DESKTOP-UH0ULBH	
Load as Default Par	Exit	

4. To load a preferred certificate, click on the bottom right corner as indicated below ( ... ) and then click **<Apply**> button.

Common Name:	OpcUaServer@DESKTOP-UH0ULBH	
Organization:	AIC	
Organization Unit:	ОТ	
Locality:	New Taipei City	
State:	Taiwan	
Country:	TW	
	(Two letter code e.g. DE, US, TW,)	
Domain:	DESKTOP-UH0ULBH	

C



5. Make sure to restart the server once you have pressed the <**Apply**> button.

Common Name:	OpcUaServer@DESKTOP-UH0ULB	н
Information		>
Success in restart the	cleaning up Server Certificate Files. I server again.	Don't forget to
Success in restart the	cleaning up Server Certificate Files. I server again.	Don't forget to



# **CHAPTER 4: TUTORIAL**

## 4.1 Configure the Modbus Data Into OpcUa Extender Server

In this chapter you will be guided how to get the Modbus data into the OpcUa Extender Server. Make sure the information of the Modbus/TCP server and the Modbus/RTU server are prepared before the configuration.

ani I	ModSim32				2_	×
File	Connection	View	Help			
	Connect	t	>	Port 1		
	Disconn	ect	>	Port 2		
				Port 3		
				Port 4		
				Port 5		
				Port 6		
				Port 7		
				Port 8		
				Port 9		
				Modbus/TCP Svr		

1. Use ModSim32 to simulate the Modbus/TCP Server.

ani I	ModSim32					<u>9</u>	×
File	Connection	View	Help				
	Connect	t	>	Port 1			
	Disconn	ect	>	Port 2			
				Port 3			
				Port 4			
				Port 5			
				Port 6			
				Port 7			
				Port 8			
				Port 9			
				Modbus/TCP Svr			
					_		



- 2. Set up the RTU Parameters:
  - Protocol : RTU
  - Baud Rate : 9600
  - Data Bits : 8
  - Stop Bits : 1
  - Parity : NONE

Suggested delay time 4ms for Baud Rate 9600 bps. See reference table on next page.

atii M	lodSim32 —	×
File	Connection View Help	
Se	tup Comm Port 2	 ×
	RTU CASCII      Baud Rate: 9600      Data Bits: 8      Stop Bits: 1      Paritu: NONE	
	Hardware Flow Control Wait for DTR from Master Delay 97 ms after RTS before transmitting first character Wait for CTS from Master Delay 100 ms after last character before releasing RTS	
	OK Cancel	



According to the Modbus RTU standard, the minimum silent period should be 1.75 ms regardless of the baud rate.

Baud rate	Bit rate	Bit time	Character time	3.5 character times
2400	2400 bits/s	417 us	4.6 ms	16 ms
4800	4800 bits/s	208 us	2.3 ms	8.0 ms
9600	9600 bits/s	104 us	1.2 ms	4.0 ms
19200	19200 bits/s	52 us	573 us	2.0 ms
38400	38400 bits/s	26 us	286 us	1.75 ms (1.0 ms)
115200	115200 bits/s	8.7 us	95 us	1.75 ms (0.33 ms)



3. Add 2 files between two Servers :

One is MODBUS Point Type : 03: HOLDING REGISTER

Another is MODBUS Point Type : 04: INPUT REGISTER

- Recommended parameters:
  - Device id : 1
  - Address : 0001
  - Length : 200

atii ModSim32 - ModSim	2	- 🗆 X
File Connection Displ	ay Window Help	
ModSim1		
	Device Id:	1
Address: 0001	MODBUS	Point Type
Length: 200	03: HOLDING F	EGISTER
40001: <00000>	40006: <00000>	40011: <000
40002: <00000>	40007: <00000>	40012: <000
40003: <00000>	40008: <00000>	40013: <000
40005: <00000>	40010: <00000>	40014: <000
S ModSim2		
	Device Id:	1
Address: 0001	MODBUS F	Point Type
	04: INPUT REG	ISTER 🔻
Length: 200		
30001. 200000	30006. 200000	30011.2000
30002: <00000>	30007: <00000>	30012: <000
30003: <00000>	30008: <00000>	30013: <000
30004: <00000>	30009: <00000>	30014: <000
120002. (00000)	30010. (00000)	30015. (000

The Modbus/TCP server or RTU server is ready once the parameters have been filled in.



- 4. Prepare 2 csv files with the following definitions: tags address, type and length.
  - ModRtuNode.csv
  - ModTcpNode.csv
  - csv sample:

/	A	В	С	D	E	F	G	Н	1
1	TagName	DisplayName	Directory	Туре	Trans	Address	Length	Factor	Offset
2	TagString.30001.200	TagString.30001.200	DataType/String	STRING		30001	200		
3	TagString.30001.200.L	TagString.30001.200.L	DataType/String	STRING.L		30001	200		
4	TagString.30001.200.H	TagString.30001.200.H	DataType/String	STRING.H		30001	200		
5	TagString.40001.200	TagString.40001.200	DataType/String	STRING		40001	200		
6	TagString.40001.200.L	TagString.40001.200.L	DataType/String	STRING.L		40001	200		
7	TagString.40001.200.H	TagString.40001.200.H	DataType/String	STRING.H		40001	200		
8	TagBoolean.00001.1	TagBoolean.00001.1	DataType/Boolean	BOOLEAN		1	1		
9	TagBoolean.00001.100	TagBoolean.00001.100	DataType/Boolean	BOOLEAN		1	100		
10	TagBoolean.10001.1	TagBoolean.10001.1	DataType/Boolean	BOOLEAN		10001	1		
11	TagBoolean.10001.100	TagBoolean.10001.100	DataType/Boolean	BOOLEAN		10001	100		
12	TagShort.30001.1	TagShort.30001.1	DataType/Short	INT16		30001	1		
13	TagShort.30001.100	TagShort.30001.100	DataType/Short	INT16		30001	100		
14	TagShort.40001.1	TagShort.40001.1	DataType/Short	INT16		40001	1		
15	TagShort.40001.100	TagShort.40001.100	DataType/Short	INT16		40001	100		
16	TagWord.30001.1	TagWord.30001.1	DataType/Word	UINT16		30001	1		
17	TagWord.30001.100	TagWord.30001.100	DataType/Word	UINT16		30001	100		
18	TagWord.40001.1	TagWord.40001.1	DataType/Word	UINT16		40001	1		
19	TagWord.40001.100	TagWord.40001.100	DataType/Word	UINT16		40001	100		
20	TagLong.30001.1	TagLong.30001.1	DataType/Long	INT32		30001	1		



#### CSV simple:

- Format: Tag\_Name, Display\_Name, Directory, Data\_Type, Transfer, Address, Length, Scaling\_Factor, Scaling\_Offset
- Tag\_Name : The Tag Name.
- Display\_Name : The Tag in OpcUa node browser name.
- Directory: OpcUa node directory for this Tag
- Data\_Type: There are STRING, BOOLEAN, SHORT, INT16, WORD, UINT16, LONG, INT32, DWORD, UINT32, FLOAT, DOUBLE, BCD, LBCD.
- Transfer: There are ABCD, BADC, CDAB and DCBA and only for FLOAT type.
- Address: The Modbus item address
- Length: The Tag data lenght if > 1 means array data type
- Scaling\_Factor and Scaling\_Offset:
  - Scaling factor and offset for read/write operation. For Read, will read data from PLC, then will calc the new\_data = (data \* factor) + offset, then write new\_data to OpcUa Server. For Write, will read data from OpcUa Server, then calc the new\_data = (data offset) / factor, then write new\_data to PLC.
  - for SHORT, INT16, WORD, UINT16, LONG, INT32, DWORD, UINT32, FLOAT, BCD, LBCD
  - Scaled Data Type is FLOAT only



5. Add Modbus TCP and Modbus RTU to the Industrial Protocols tab, then click **<OK**> and restart the AIC OpcUa Extender Server.

OpcUa Extender Server Utility: Professional Edition	×
Protocols	
Modbus Tcp Configuration	×
Modbus Parameters	
Type: Modbus TCP	
Zero-Based: SlaveId: 1	
Modbus Addr Ext.: Pooling Timer: 3000 ms	
Modbus Connection:	
Modbus IP: 127 . 0 . 0 . 1 Port: 502	
OpcUa Config *	- 1
Modbus Folder: ModbusTcp	
Node Config (csv): ModTcpNode.csv	
OK Cancel	
OK Cancel A	Apply

\* This Folder will show on UaExport Protocol folder like the image below.





Modbus RTU Configuration	×
Modbus Parameters	
Type: Modbus RTU	
Zero-Based: SlaveId: 1	
Modbus Addr Ext.: Pooling Timer: 200 ms	
Modbus Connection:	
COM Port: COM1 $\checkmark$ Baud Rate: 9600 $\checkmark$	
Data Bits: 8 V Parity: NONE V Stop Bits: 1	~
Frame Delay: 10 ms	
OpcUa Config	
Modbus Folder: ModbusRtu. 1	
Node Config (csv): ModbusRtuCfg.csv	
01/	
Cancel	

Trees	Madhua ACCII			
Type:	Modbus ASCII			
Zero-Based:		SlaveId:	1	
Modbus Addr Ext.:		Pooling Timer:	3000	ms
Modbus Connection:				
COM Port: COM1	<ul> <li>Baud Ra</li> </ul>	ate: 9600 ~	·	
Data Bits: 8	✓ Parity:	NONE ~	Stop Bits:	1 ~
Frame Delay: 10	ms			
OpcUa Config				
Modbus Folder:	ModbusAsc			
Node Config (csv):	ModbusAscCfg.cs	SV.		



Ala	arm & Event	Database	Option	License
Status	Endpoints	Users	Industrial Protocols	Historica
Protocol	Config:			
#	Prots	Parameters		Slave ID
01	Modbus TCP	IP: 127.0.0.1:50	IP: 127.0.0.1:502	
02	Modbus RTU	ComPort: COM1 (9600-8-N-1)		1
03	Modbus ASCII	ComPort: COM1	(9600-8-N-1)	1
<				>


6. Use **UaExpert** to connect to AIC OpcUa Extender Server, you will see ModbusRtu and ModbusTcp folder in Address Space window and in Data Access View window, the tags definitions in csv file are following:





## 7. Q&A

If you are interested in information about the OpcUa Extender Server product, we recommend that you visit the AIC website. On the AIC website, you can find related information about the product such as product introductions, features, and application cases.

If you require more detailed technical information, you can seek assistance through the AIC Forum. You can post questions or technical issues, receive answers and suggestions from technical experts and other members of the community. This can help you to gain a deeper understanding of the OpcUa Extender Server and use it more effectively.

The AIC Form QRCode is in below:



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