

Instruction booklet

IEC 61850 configuration for AQtivate 300



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Version: 1.02 EN

Revision	1.00
Date	12.02.2015
Changes	N/A
Revision	1.01
Date	22.01.2021
Changes	The "GOOSE publisher" chapter updated.
Revision	1.02
Date	21.02.2023
Changes	 The visuals updated. Content rewritten to be easier to read and understand. The "Introduction" chapter updated. Added a few images throughout the document for clarification.

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1 INTRODUCTION

This guide will show you the basic steps for configuring IEC 61850 communication in AQ 300 series devices. This document is applicable to all models in the AQ 300 product family.

You need the AQtivate 300 software to set up the IEC 61850 configuration. This software is freely available at our website: <u>www.arcteq.fi/documents-and-software</u> \rightarrow "Software" \rightarrow "Installation files". Please note that downloading the AQtivate 300 installer requires registration but that is also free of charge.

Some relay functions require you to connect to it online via the relay's web server interface. Most web browsers work with the software, such as Mozilla Firefox, Google Chrome, and Opera.

As noted, this instruction booklet is only for the IEC 61850 communication configuration. For more detailed instructions on the AQtivate 300 configuration and setting tool, please see the AQtivate 300 instruction manual. This is also available on our website: www.arcteq.fi/documents-and-software \rightarrow "Software" \rightarrow "Instruction manuals".

2 WEB SERVER

The AQ 300 series relays have a web server interface which can be accessed via a web browser. Open your browser and enter the relay's IP address into the browser's URL address bar (see the image below).

	Relays IP address				
← → C	10.2.5.248				
		·		 	 -

2.1 Downloading CID files

You can download CID files (file extension .cid) by following the path Advanced \rightarrow Status/log and then clicking the "Get .CID file" button in the *Communication files* pane (see the image below).

TIME TO THE L	web access lo	web error log
 Communication log files SPORT	comm. log Serial comm. lo	g IEC61850 log
Warnings and Encore		
warnings and criters		
Report		
Build and download system state report	Get report	
Communication files		
Download 15061950 files		0.1.100.01
Download IEC60870 5-101/102/10/ file	Get Clo nie	Get ALD THE
Download Medbus information file	Cet Medice Ele	Set me in text format
Download DNP3 configuration file	Cert DND2 Etc. Drimit	C110002 01- (
Download SPA configuration file	Cet Din's the (ntml)	Cet CRA Fie (CSV)
Download SPA configuration file	Get SPA file (html)	Get SPA file (csv)

2.2 Enabling IEC 61850

Before IEC 61850 communication can function in an AQ 300 series relay, you must first enable it with the relay's web server interface. However, this is the only step that is required to get IEC 61850 started in the device: after this you can set up the IP address information and connect to the device with an IEC 61850 client.

You can enable IEC 61850 in the interface's **System settings** and by clicking the checkbox for "IEC61850 enabled" under the column titled "New value" in the *Ethernet comm.* pane (see the image below).

				Setting
em settings	tapand all	Collapse all	(+) 5)	stem parameters
	[+] Station bus settings			
	[-] Ethernet comm.			
	[-] Ethernet comm.			
	[-] Ethernet comm.	Device value	New value	
ndu k protectionilood estation ed	[-] Ethernet comm.	Device value	New value	
ndy k protectionHood entation ed Set settings	[-] Ethernet comm. }	Device value × 5 sec	New value 5 sec	•
ands rk protectionilood matation cod Set settings	EC61850 enebled GOOSE repeat rate IEC0104 enebled	Device value 2 5 sec	New value S sec	•
nds k protectionHood ed Set settings	[-] Ethernet comm. SEC61850 enabled GOOSE repeat rate SEC104 enabled Modbus TCP enabled	Device value 5 sec	New value S sec	•

3 AQTIVATE 300 SOFTWARE

You can get a configuration file from an AQ 300 series device by opening the AQtivate 300 software and by pressing the "Upload" icon in the main toolbar (see the image below). This opens a new dialog window called *Select device* that lists all the connected devices the software finds in the network. However, in some cases your computer can have trouble finding relays in the network. If this happens, you can insert the device's IP address manually by writing the IP in the text field and clicking the "Add IP" button.

		AQtiva	te 300			
Edit Project View	Language Help					
🛎 🔳 🔀 🗣 🗸		🖸 = 🔒 = 🐼		C ⁴		Produced for Arct
i -	1	Select de	vice			×
Select a device from th	e list.					
.▲ IP	Substation	Device	Platform	Firmware	Func. level	RDSP rev
CI 0 10.2.5.248	Arcteg	AQ T352	AQ-300	2.8.13	2	1359
<						>
Refresh			Ad	d IP		
					OK	Cancel
	1				@ 20	03-2014 SoftReal Ltr

We advise you to always log into using the password-protected Master view operating mode. This allows you to change configurations as you like. When you start the software, click the "Change View Mode" icon in the main toolbar. In the dialog window that opens, choose Master view as the preferred operating mode, enter the password in its reserved text field, and press "OK" (see the image on the following page).

Hardware configuration	Fur change View Mode	
Software configuration Functions Functions Filter Visible FBs Parameters Parameters	First Choose the desired view mode: Mc Dome View: basic functionality Based View: extended functionality Cost Based View: full functionality Cost Based View: full functionality Cost Based View: full functionality Cost Based View: system management Password (lowercase letters are converted to capitals): 	

3.1 Communication configurator

IEC 61850 configuration can be opened by clicking the "Communication Configurator" icon (see the image below).

Ϋ́π	AQtivate 300 - AQ_G357A.epc	- 🗆 🗙
File Edit Project View Language H	elp 🗇 v 🏂 🗝 🐼 🚺 🔂 🖬 🖼 🖽	Produced for Arcteg
AQ_G357A Hardware configuration Software configuration	AQ 300 Device Configuration	urator
⊳ · IEC61850 ⊳ · System	File Name: File ID: AQ_G357A	

Select the "IEC 61850" tab in the opening dialog window to access further communication settings (see the image below).

2	Communication configurator	 = ×
IEC 61850	IEC 60870-5-101/104 IEC 60870-5-103 DNP3	
IEC 6	1850 communication settings	

3.1.1 Adding a device name

You relay must have a unique name. Open the Communication Configurator, open the "IEC 61850" tab in the dialog window, and click on the "IED TEMPLATE" in the topic tree panel on the left-hand side of the dialog window. Next, replace the default name "TEMPLATE" with your selected relay name (see the image below). Please note that the name must be unique within the subnet!



3.1.2 Adding a dataset

To create a new dataset, you can use an existing dataset as a basis by copying the dataset. As an example, let's imagine we want to use the dataset "DO PhyHealth" from the report control block "LPHD1" as the basis for a new dataset that is meant for the report control block "LN0" (see the image below). Find the "DO PhyHealth" dataset in the topic tree, click its name with the right mouse button, and click the "Copy" menu item from the temporary menu that appears. Alternatively, you can click the dataset's name with the left mouse button to highlight it and then use the established Windows shortcut command **Ctrl + C** to copy it.

<u>í</u>				Communication co
IEC 61850	IEC 60870-5-101/104 IEC	C 60870-5-103	DNP3	
IEC 6	1850 communic	ation setti	ngs	
4 🔠 C:\	Users WikoMuotio (Desktop V	AQ_G357A.epc	^	Property
⊿ -IED	TEMPLATE			Name
1				Description
				Type ID
	4 - 🔽 🕒 LPHD1			CDC
	▷ -DO PhyNam			
	4 DO PhyHenith	Com	_	01.0
	DA st\	Сору		Ctri+C
	DA q	Create new		Ctrl+A
	DA t	Move		Ctrl+M
	D - 🔽 🕒 F3PIOC	Delete		Del
	▷ - 🔽 😕 F3PIOC ▷ - 🖓 😐 F3PTOC	Import GOO	SE as in	puts

Next, find "LNO" in the topic tree, click its name with the right mouse button, and click the "Create new dataset" menu item from the temporary menu that appears (see the image below). Alternatively, you can click the name with the left mouse button to highlight it and then use the shortcut command **Ctrl + A** to create a new dataset.



After this, you can rename the dataset and start adding other objects into it. You can add objects to a dataset by clicking the dataset you want to add objects into, and then drag-and-dropping the needed objects from the topic tree panel into the dataset's view area in the bottom-right corner of the dialog window (see the image below).



3.1.3 Adding a report control block

Next, the new dataset must be linked to a report control block. To continue with the example from before, drag the new dataset into the report control block "LN0" (see the image below).



This establishes the link and now you can rename it; here it has been renamed as "RCB". Finally, you need to make a choice whether or not the report control block is buffered or not by setting its value to "True" or "False", respectively (see the image below).

▲ - C:\Users\NikoMuotio\Desktop\AQ_G35 ∧	Property	Value
▲ IED TEMPLATE	Name	rcbTest
	Description	
	Report ID	rcbTest
Test	Dataset	Test
Meas	Trigger dchg	False
lo Operate	Trigger qchg	False
Start	Trigger dupd	False
	Trigger period	False
rcb_Meas	Buffered	False

Please note that unbuffered control blocks report only when there is a subscription from the client, whereas the server collects, buffers, and reports buffered control block information even if there is no subscription from the client!

3.2 GOOSE publisher

Making a GOOSE control block with a linked dataset for publishing follows the same steps as making a new dataset and linking it to a report control block. There are two main differences to pay attention to: items must be added to the dataset on the data attribute level, and the dataset name must include the word "GOOSE". To avoid any unnecessary mishaps, the instructions below offer detailed steps for making a GOOSE publisher.

Firstly, copy the first signal on the data attribute level (see the image below). The data attribute level is signified by the green letter "DA" before the item's name.

A V 🐨 F3PIOC1	^	Property		Value
⊳ •DO Mod		Name		gener
⊳-DO Ben		Description		
>-DO NamPlt		Basic type		BOOL
⊿ ··DO Op		Data type		
DA general		Value		
DA phs	Сору		Ctrl+	C
DA phs	Create n	ew	Ctrl+	A
····DA q	Move		Ctrl+N	N
DA t	Delete		D	el
	Import G	OOSE as inputs		

Secondly, create a new dataset by clicking "LN0" with the right mouse button and click on the menu item "Create new dataset" (see the image below).



Thirdly, rename the new dataset. Remember to include "GOOSE" somewhere in the name, such as in this example where the new name is "GOOSE_test" (see the image below).

IEC 61850 communication se	ettings
	Property Name Description

Fourthly, drag-and-drop the newly named dataset into the report control block "LN0" (see the image below).

IEC 61850 communication se	ettings
C:\Users\WikoMuotio\Desktop\AQ_G357. ∧	Property Name Description

Fifthly, the software pops up a new dialogue window wanting to know whether to create a new, non-GOOSE dataset with the copied object. Deny this request with "No" (see the image below).

Confirm			×
?	Create new datas	et with the copied	object?
	Yes	No	

Sixthly, the software pops up another new dialogue window. This time the program wants to know whether to create a new GOOSE control block with the dataset. Accept this request with "Yes" (see the image below).



Seventhly, give the GOOSE publisher a name. In the example image below, the selected name is "gcbGOOSE_test".



Eighthly, and finally, the control block's property "APPID (hex)" requires a value. This value must be a unique number, written in hexadecimal (see the image below).

gcbGOOSE_test	^	Property	Value
⊳ DO Mod		Name	gcbGOOSE_test
 ▷ -DO Beh ▷ -DO Health ▷ -DO NamPlt ▷ -DO LEDRs ▷ -I▼ III LPHD1 ⊿ -I▼ III F3PIOC1 		Description	
		Goose ID	gcbGOOSE_test
		Dataset	GOOSE_test
		Destination MAC addr.	01-0C-CD-01-00-00
		APPID (hex)	204_

3.3 GOOSE subscriber

Before you can configure the GOOSE subscriber, you have to import a CID file from a device with a GOOSE publisher. You can do this by clicking the device level of the topic tree panel with the right mouse button. The device level is titled "IED [device name]". Then, click the "Import GOOSE as inputs..." option in the menu that appears (see the image below).



When the importation has been completed successfully, you receive the following confirmation pop-up window (see the image below). Click "OK"; you can now close the Communication Configurator dialog window and continue in the AQtivate 300 setting tool.



Please note that the subscribed data must be linked in the relay configuration. Find "IEC61850" in the topic tree panel on the left side of the setting tool window and open its sublevels with the small triangle in front of its name. Open the "External GOOSE References" sublevel to view its data (see the image below).



Next, double-click on the data that you wish to link. This opens a new dialog window, titled *ExtRef properties*. In this window you can select the destination for the data linkage. The GOOSE function block has eight (8) one-bit GOOSE inputs available, and here you can determine which data is linked to which function block input (see the image below).

idInst Relay prefix	
prefix	
InClass LLN0	
hinst	
doName Loc	
daName stVal	
intAddr	
GOOSE receiver	-
GSE Control Reference Go thits Govar01 Gor	
Config Rev. Go 1bit8_GoVar03_GoR	Eğ 🐃
APPID Go 1bit8_GoVar04_GoR Go 1bit8_GoVar05_GoR	-8
Go 1bit8_GoVar06_GoR MAC Address Go 1bit8_GoVar07_GoR	-8
GoID GO	<u> </u>
Dataset Reference Relay/LLN0\$DataSetG0	DOSE1

Afterwards, you can use the outputs of this function block in relay configuration. Below you can see the image of the GOOSE subscriber function block as it is represented in the logic editor in AQtivate 300.

Go1bit8	
stVal01	•
Valid01	
stVal02	
Valid02	•
stVal03	
Valid03	
stVal04	•
Valid04	•
stVal05	
Valid05	
stVal06	
Valid06	
stvalu/	
ctVal08	
Valid08	
16	

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4 REFERENCE INFORMATION

Manufacturer information

Arcteq Relays Ltd. Finland

Visiting and postal address:

Kvartsikatu 2 A 1 65300 Vaasa, Finland

Contacts:

Telephone (general and commercial issues): +358 10 3221 370 (office hours GMT +2) Website: <u>www.arcteq.fi</u> Email (sales): <u>sales@arcteq.fi</u> Technical support: <u>https://support.arcteq.fi</u>

Arcteq support line: +358 10 3221 388 (EET 9:00 - 17:00)