

# AQwire

Communication tester

Instruction manual

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## Disclaimer

Please read these instructions carefully before using the equipment or taking any other actions with respect to the equipment. Only trained and qualified persons are allowed to perform installation, operation, service or maintenance of the equipment. Such qualified persons have the responsibility to take all appropriate measures, including e.g. use of authentication, encryption, anti-virus programs, safe switching programs etc. necessary to ensure a safe and secure environment and usability of the equipment. The warranty granted to the equipment remains in force only provided that the instructions contained in this document have been strictly complied with.

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## 1. Revision notes

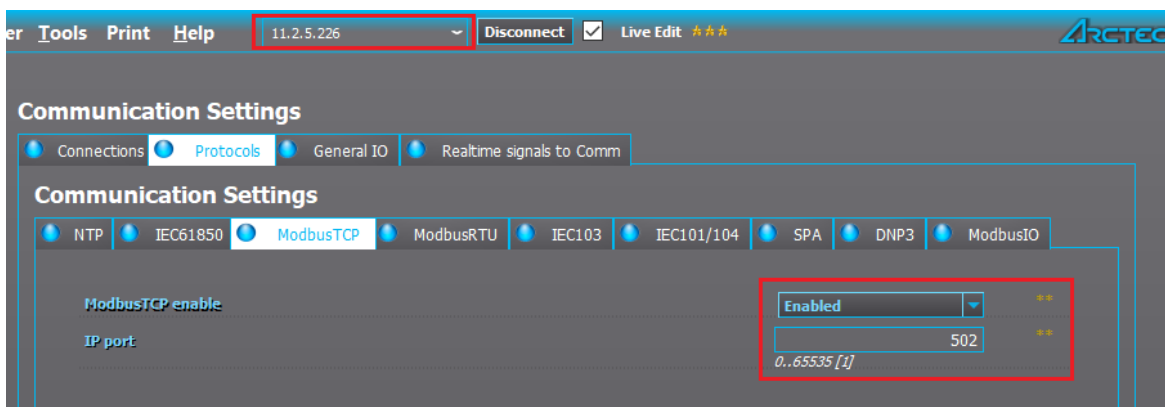
Revision	1.00
Date	14.6.2019
Changes	- First manual version.

## 2. Introduction

AQwire is a free software developed by Arcteq Relays. AQwire is used for testing communication protocol connections such as Modbus TCP, Modbus RTU, SPA, IEC104, IEC101, IEC61850 and DNP3 TCP. The software is designed for testing communication of Arcteq AQ-200 series IEDs but can be used for testing other manufacturer connections to some extent.

Before using this manual it is advised to have basic understanding of how to use AQtivate setting tool. AQtivate setting tool is used for configuring Arcteq AQ-200 series IEDs. If you are new to the setting tool the software manual is downloadable at [www.arcteq.fi/downloads](http://www.arcteq.fi/downloads).

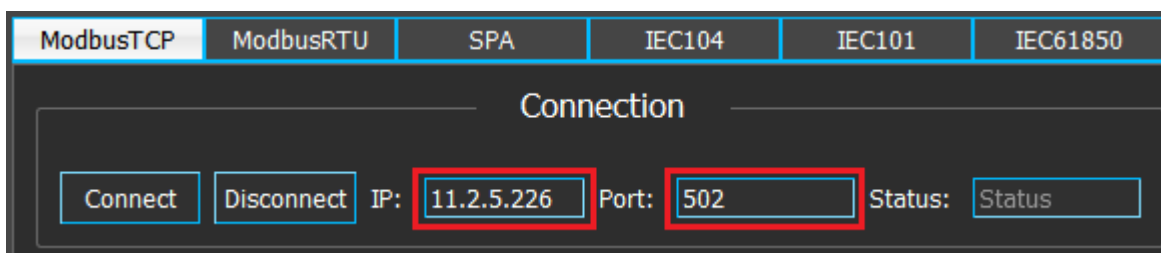
### 3. Modbus TCP



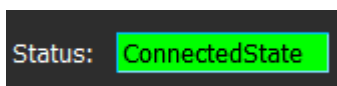
To use Modbus TCP enable it at *Communication* → *Protocols* → *Modbus TCP*. Set the IP address of the unit back ethernet port at *Communication* → *Connections*. In this example IP address is set to 11.2.5.226 and IP port is set to 502.

#### Connection

Launch AQwire and choose tab *Modbus TCP*. To *IP* and *Port* fields set previously mentioned values and click connect.

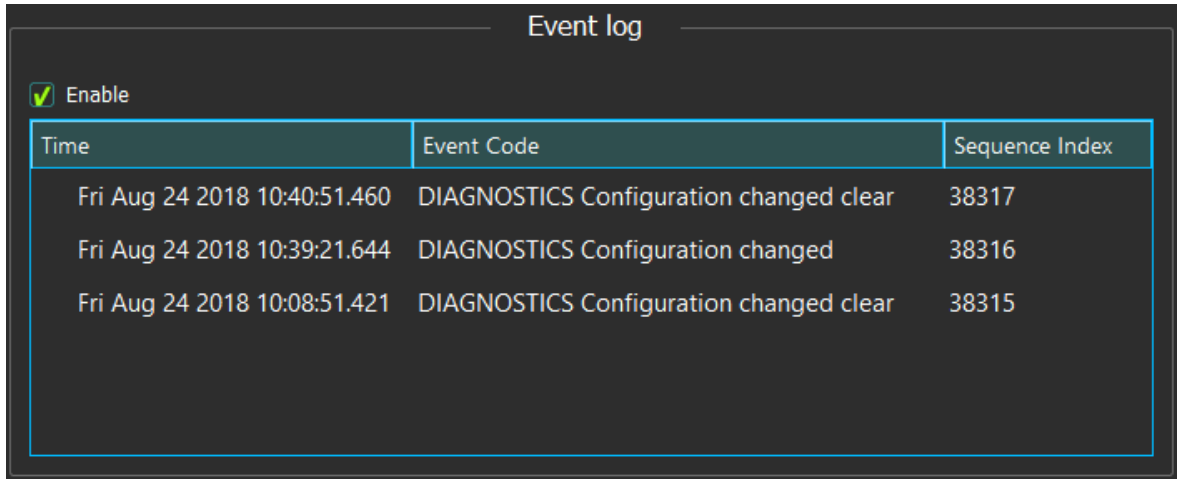


If connection was established successfully *Status* field will turn green.



#### Event log

When connection is established, *Enable* checkbox is automatically checked and requests for events will be sent once every second. Any new events will be displayed in this view.



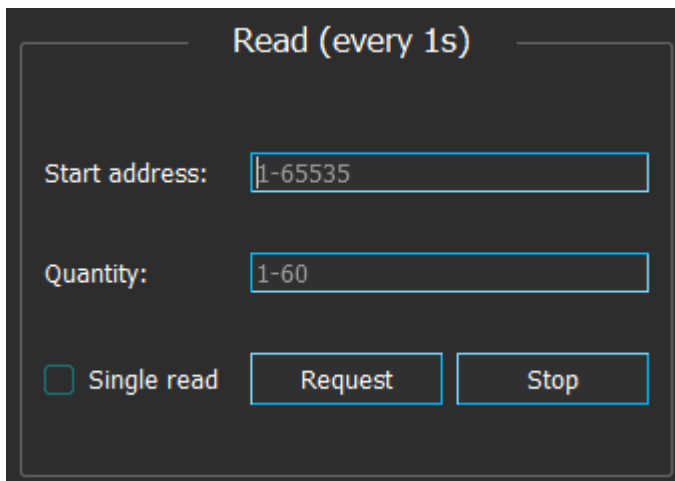
The screenshot shows a window titled "Event log" with a checked "Enable" checkbox. Below it is a table with three columns: "Time", "Event Code", and "Sequence Index". The table contains three rows of event data.

Time	Event Code	Sequence Index
Fri Aug 24 2018 10:40:51.460	DIAGNOSTICS Configuration changed clear	38317
Fri Aug 24 2018 10:39:21.644	DIAGNOSTICS Configuration changed	38316
Fri Aug 24 2018 10:08:51.421	DIAGNOSTICS Configuration changed clear	38315

The checkbox can be unchecked at any time if new events are not needed but it is recommended to leave it checked to keep the connection alive. Too long idle time will disconnect the connection automatically.

## Read

Registers can be read by using the read box.



The screenshot shows a window titled "Read (every 1s)". It contains two input fields: "Start address:" with the value "1-65535" and "Quantity:" with the value "1-60". Below these fields is a checkbox labeled "Single read" which is currently unchecked. To the right of the checkbox are two buttons: "Request" and "Stop".

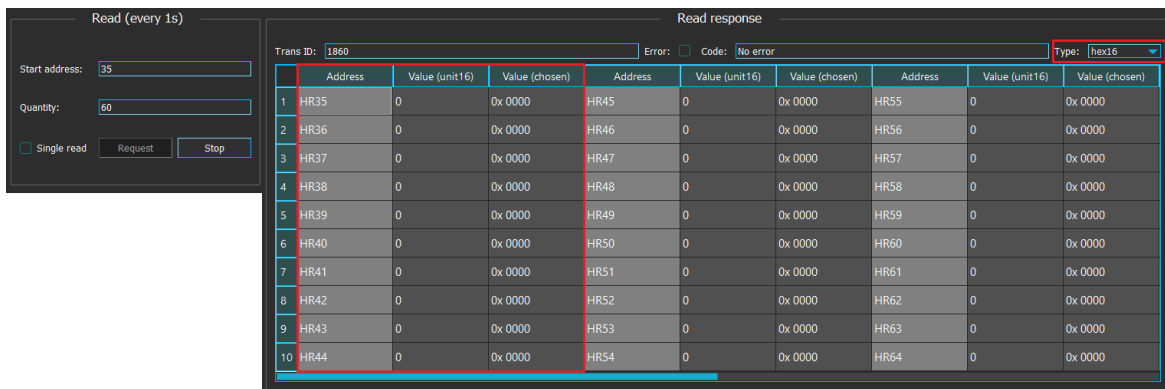
After filling the starting address and the number of addresses to be read (max.60) user can click *Request* button which will result in a request to be sent once every second. *Stop* button pauses the requests.

Requests can also be sent one at a time by enabling *Single read*.

## Response

*Read response* displays responses from the unit on requests.





The registers are displayed in three columns.

- First column is the address
- Second column is the value of that address (integer value)
- Third column is the value of that address converted to the type chosen in *Type* dropdown box

*Type* dropdown box has following options available:

- uint16
- uint32
- hex16
- hex32
- float32

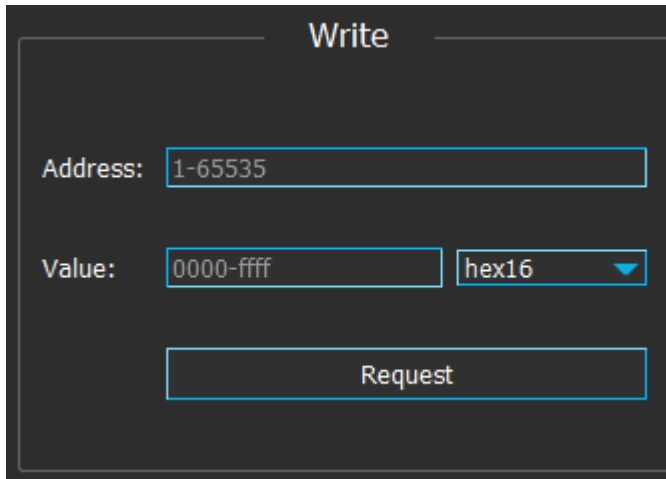
*Error* and *Code* fields are used for indicating errors. In case of any error *Error* checkbox is checked and the *Code* field will display the exception code. Explanation of exception codes are listed in the table below.

Table. 3. - 1. Main modbus exception codes

Code	Text	Details
1	Illegal Function	Function code received in the query is not recognized or allowed by slave
2	Illegal Data Address	Data address of some or all the required entities are not allowed or do not exist in slave
3	Illegal Data Value	Value is not accepted by slave
4	Slave Device Failure	Unrecoverable error occurred while slave was attempting to perform requested action
5	Acknowledge	Slave has accepted request and is processing it, but a long duration of time is required. This response is returned to prevent a timeout error from occurring in the master. Master can next issue a Poll Program Complete message to determine whether processing is completed
6	Slave Device Busy	Slave is engaged in processing a long-duration command. Master should retry later
7	Negative Acknowledge	Slave cannot perform the programming functions. Master should request diagnostic or error information from slave
8	Memory Parity Error	Slave detected a parity error in memory. Master can retry the request, but service may be required on the slave device
10	Gateway Path Unavailable	Specialized for Modbus gateways. Indicates a misconfigured gateway
11	Gateway Target Device Failed to Respond	Specialized for Modbus gateways. Sent when slave fails to respond

## Write

If a register is writable user can use the *Write* box to write values to one or two addresses.



Similarly to *Response* box *Write* box also has type dropdown box with slightly different descriptions.

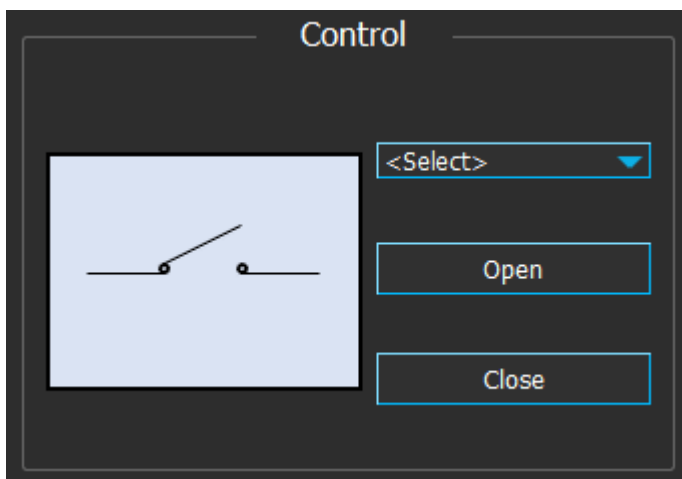
In short:

- To write to one address only choose type *hex16* or *uint32* (depending on if the value is hexadecimal or integer).
- To write to two addresses type the first address in the *Address* field and choose the type *hex32* or *uint32* or *float* (value type hexadecimal, integer or *decimal*).

To see the change of the register(s), use continuous read requests on the same register(s) when writing. The changes (if there are any) will be visible in the response box.

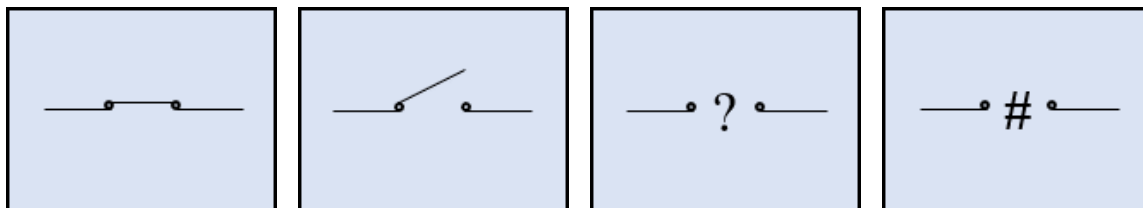
## Control

Objects (circuit breakers) are controlled with *Control* box.



By default when control object hasn't been chosen, display picture will be at disconnected state. When an object is chosen from the dropdown list, objects state will be read once every second and the display picture will change accordingly.

The object can be in four states: Connected, Disconnected, Intermediate and Bad.

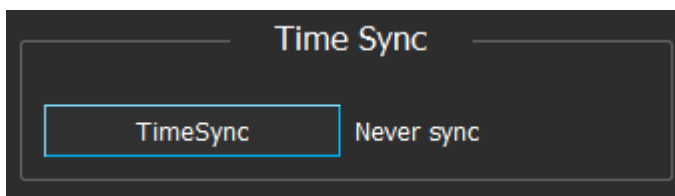


*Open and Close buttons are used to control the objects. Objects can be controlled only when Local/Remote (L/R) switch is at Remote state.*



The Local/Remote switch at Local mode

### Time synchronization

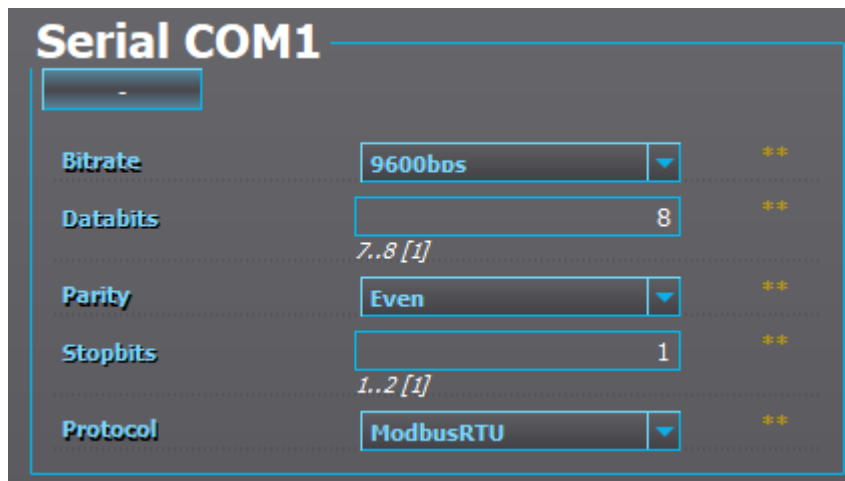
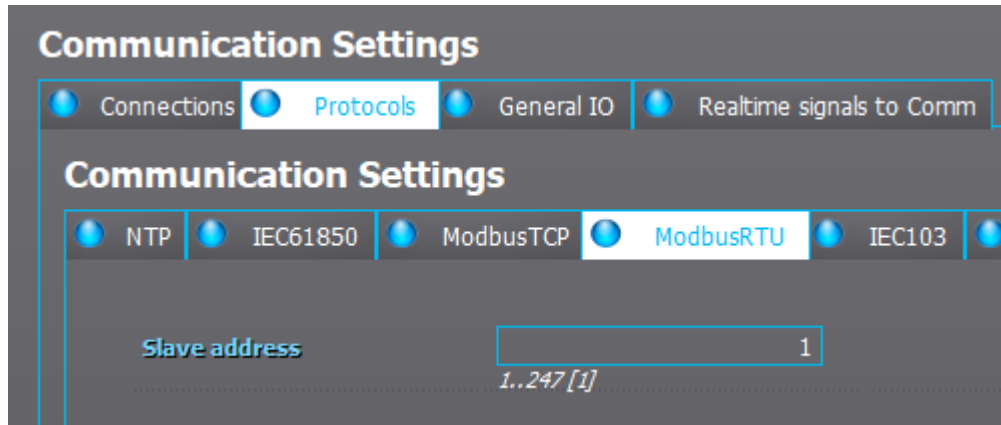


Time of the unit can be synced by using *Time sync* box. When it is clicked, time sync request is sent. Note that sync command is given only once.

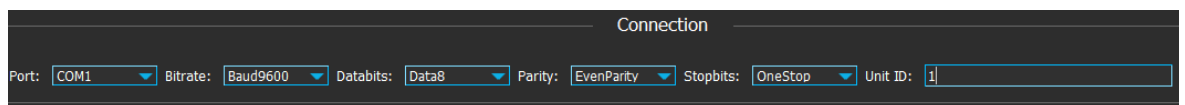
## 4. Modbus RTU

This protocol is nearly identical to Modbus TCP. Therefore instructions here only include aspects that are different.

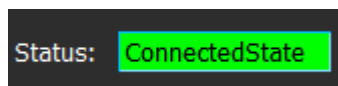
Set desired unit slave address at *Communication* → *Protocols* → *Modbus RTU*. Enable Modbus RTU at *Communication* → *Connections* → *Serial COM1*.



Launch AQwire and choose *Modbus RTU* tab. Set *Port*, *Baudrate* etc. settings accordingly. *Unit ID* is equivalent to *Slave address* setting in the unit.



Click *Connect* to establish a connection. If connection was successful the *Status* box will turn green.



**NOTE:** *Status* field in serial connections are used to indicate the connection of the computer and the USB-cable. If there is a disconnection elsewhere (like at the adapter or at the unit side). There will be another field for *Response time out* notice, but *Status* field will remain at *ConnectedState*.

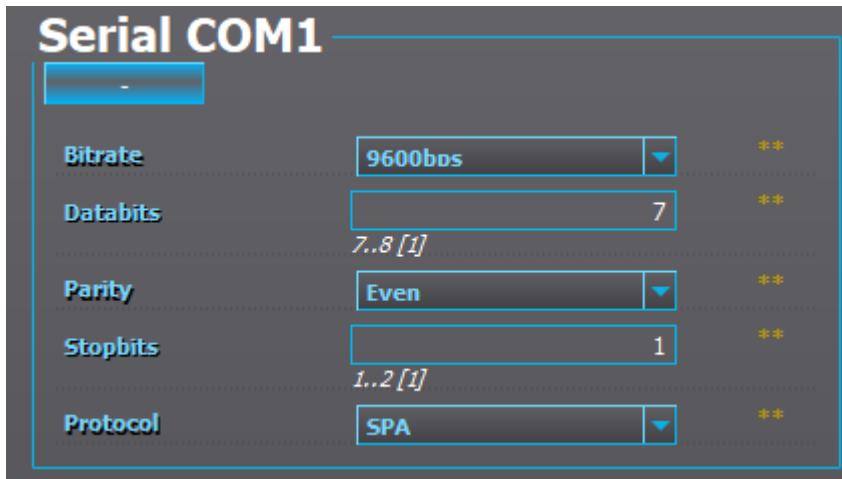
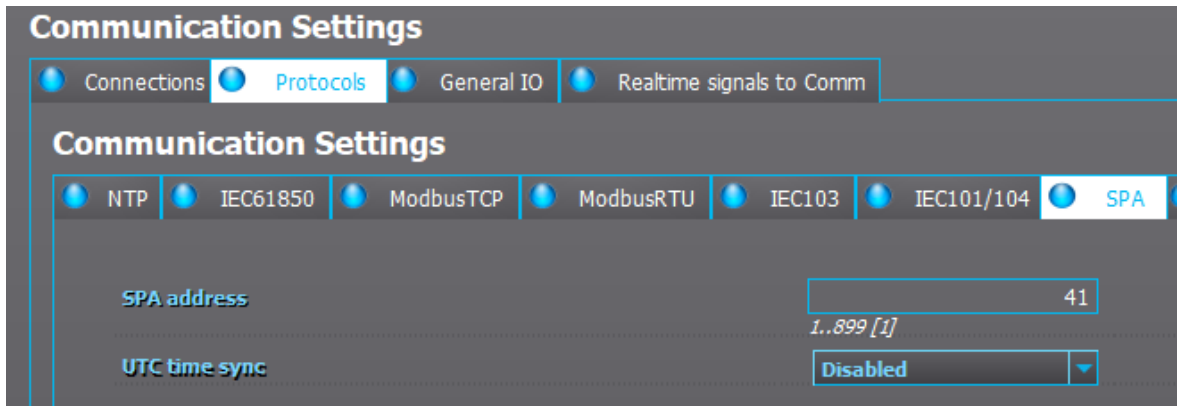
**Response timeout.**

**NOTE:** In this protocol the unit will not disconnect the connection while idling. To send and receive the needed information faster, consider turning off the continuous requests when not needed, such as:

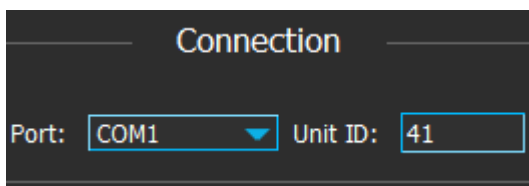
- Read request (each 1s), turn off by clicking *Stop* button.
- Event request (each 1s), turn off by unchecking *Enable* checkbox.
- Object state request (each 1s), turn off by selecting the <select> option at the dropdown list.

## 5. SPA

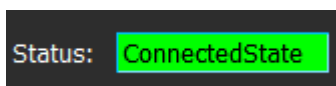
Set SPA slave address at *Communication* → *Protocols* → *SPA*. Activate SPA protocol at *Communication* → *Connections*.



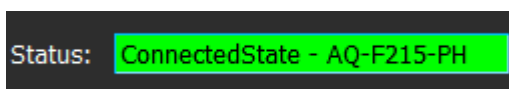
Launch AQwire and choose *SPA* tab. Input the same settings as is set in the unit. *Unit ID* field is equivalent to *Slave address* set in the unit.



Click *Connect*. If connection was established *Status* will turn green.



On connection established, a request for the unit's identification will be sent. If there is a response, the name of the unit will also be shown on the field



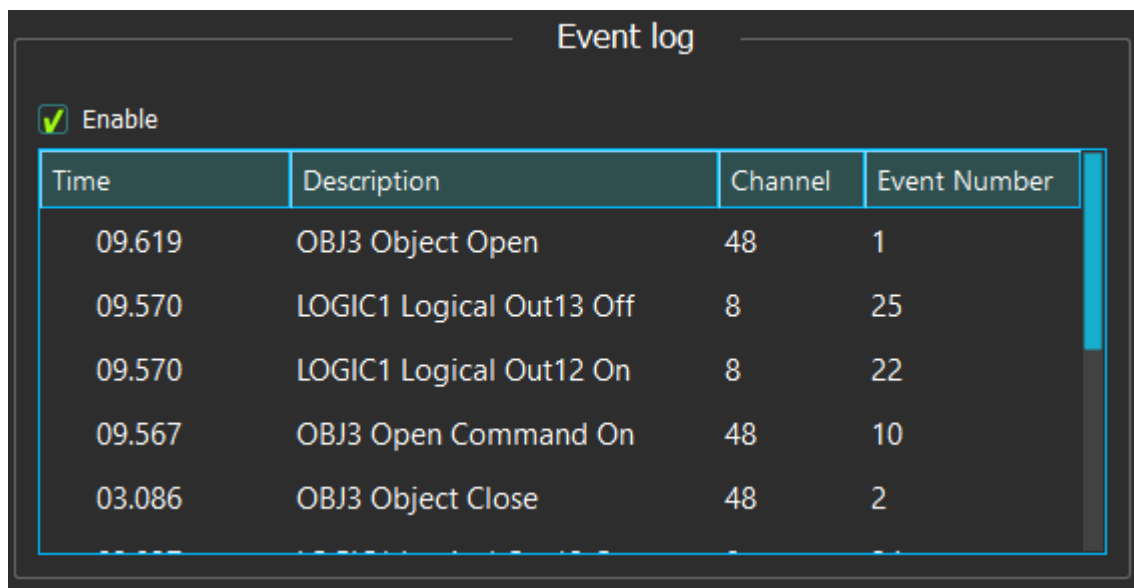
**NOTE:** *Status* field in serial connections are used to indicate the connection of the computer and the USB-cable. If there is a disconnection elsewhere (like at the adapter or at the unit side). There will be another field for *Response time out* notice, but *Status* field will remain at *ConnectedState*.

**NOTE:** In this protocol the unit will not disconnect the connection while idling. To send and receive the needed information faster, consider turning off the continuous requests when not needed, such as:

- Read request (each 1s), turn off by clicking *Stop* button.
- Event request (each 1s), turn off by unchecking *Enable* checkbox.
- Object state request (each 1s), turn off by selecting the <select> option at the dropdown list.

## Events

When connection to a unit is established *Enable* checkbox in the event box will be automatically checked and the requests for events will be sent once every second. Any incoming events (if there are any) will be displayed at *Event log*.

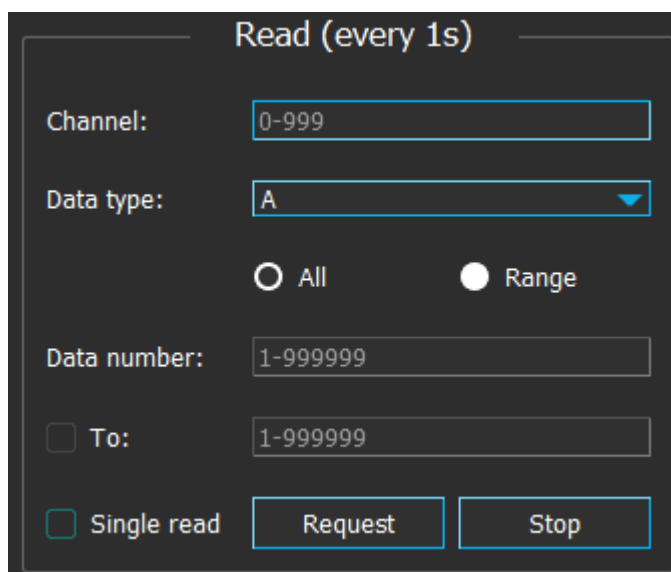


The screenshot shows the 'Event log' window with an 'Enable' checkbox checked. Below it is a table with the following data:

Time	Description	Channel	Event Number
09.619	OBJ3 Object Open	48	1
09.570	LOGIC1 Logical Out13 Off	8	25
09.570	LOGIC1 Logical Out12 On	8	22
09.567	OBJ3 Open Command On	48	10
03.086	OBJ3 Object Close	48	2

The checkbox can be unchecked at any time if the events are not needed anymore.

## Read

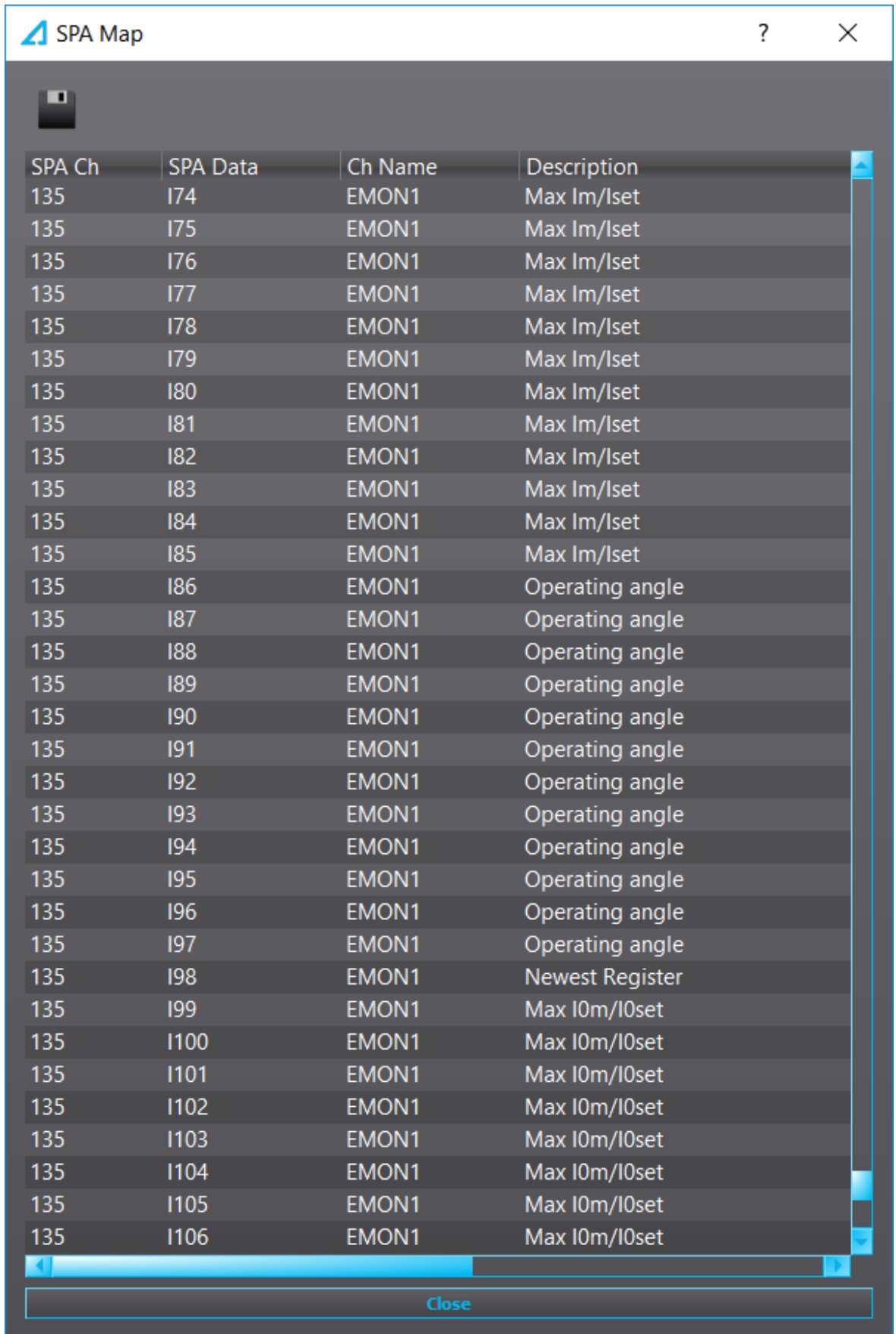


The screenshot shows the 'Read (every 1s)' configuration window with the following settings:

- Channel: 0-999
- Data type: A
- Radio buttons: All (unselected), Range (selected)
- Data number: 1-999999
- To: 1-999999
- Single read:  (unchecked)
- Buttons: Request, Stop

To read data *Channel* and *Data type* fields must be filled according to *SPA map* (found at Tools → Communication → *SPA map*). For each channel and data type pair user can choose to read all data, a range of data or just one.

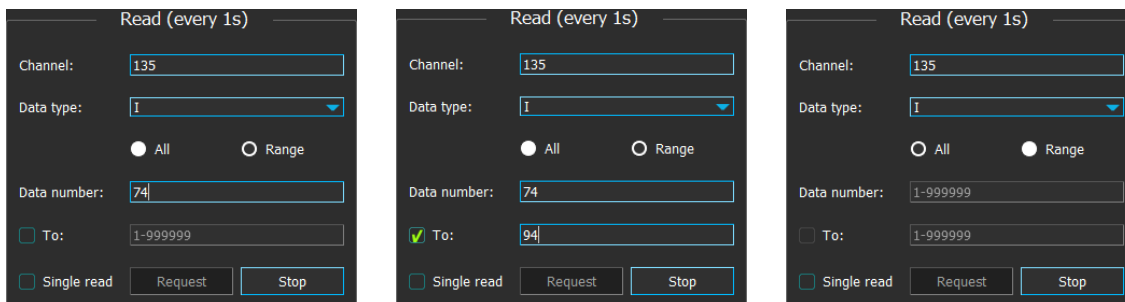
For example in channel 135, data type I, following data is available.



SPA Ch	SPA Data	Ch Name	Description
135	I74	EMON1	Max Im/Iset
135	I75	EMON1	Max Im/Iset
135	I76	EMON1	Max Im/Iset
135	I77	EMON1	Max Im/Iset
135	I78	EMON1	Max Im/Iset
135	I79	EMON1	Max Im/Iset
135	I80	EMON1	Max Im/Iset
135	I81	EMON1	Max Im/Iset
135	I82	EMON1	Max Im/Iset
135	I83	EMON1	Max Im/Iset
135	I84	EMON1	Max Im/Iset
135	I85	EMON1	Max Im/Iset
135	I86	EMON1	Operating angle
135	I87	EMON1	Operating angle
135	I88	EMON1	Operating angle
135	I89	EMON1	Operating angle
135	I90	EMON1	Operating angle
135	I91	EMON1	Operating angle
135	I92	EMON1	Operating angle
135	I93	EMON1	Operating angle
135	I94	EMON1	Operating angle
135	I95	EMON1	Operating angle
135	I96	EMON1	Operating angle
135	I97	EMON1	Operating angle
135	I98	EMON1	Newest Register
135	I99	EMON1	Max I0m/I0set
135	I100	EMON1	Max I0m/I0set
135	I101	EMON1	Max I0m/I0set
135	I102	EMON1	Max I0m/I0set
135	I103	EMON1	Max I0m/I0set
135	I104	EMON1	Max I0m/I0set
135	I105	EMON1	Max I0m/I0set
135	I106	EMON1	Max I0m/I0set

These are the settings for three types of read:

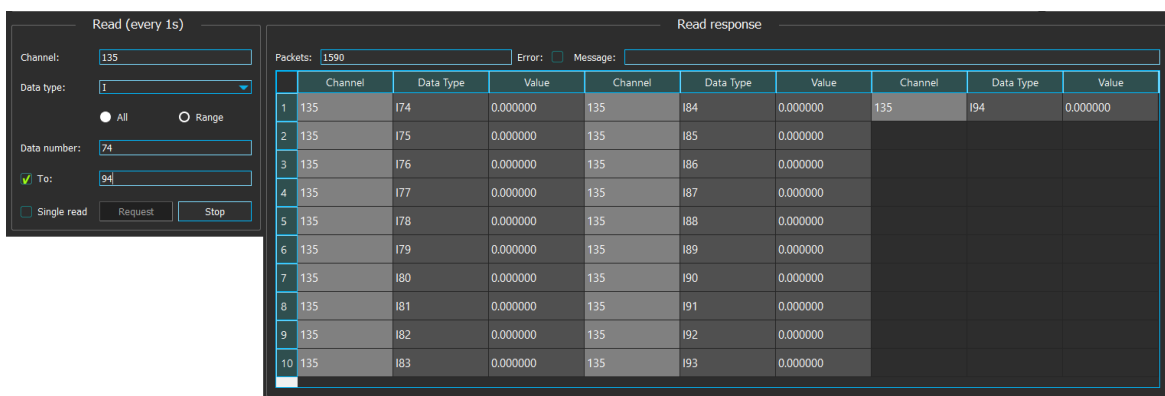




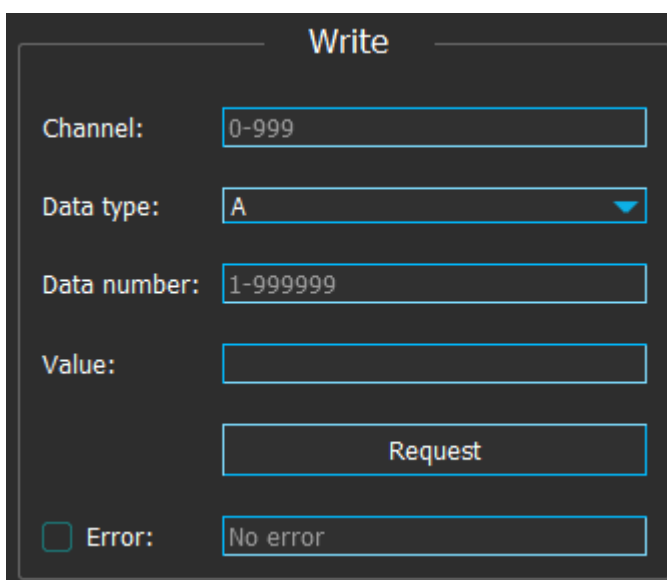
**NOTE:** When all data is read, there is a possibility that the amount of data needed to be sent exceeds the length of a packet. In that case the unit will not respond with any data but an error message.

## Response

The responses from the unit for the read requests will be displayed in the response box.



## Write



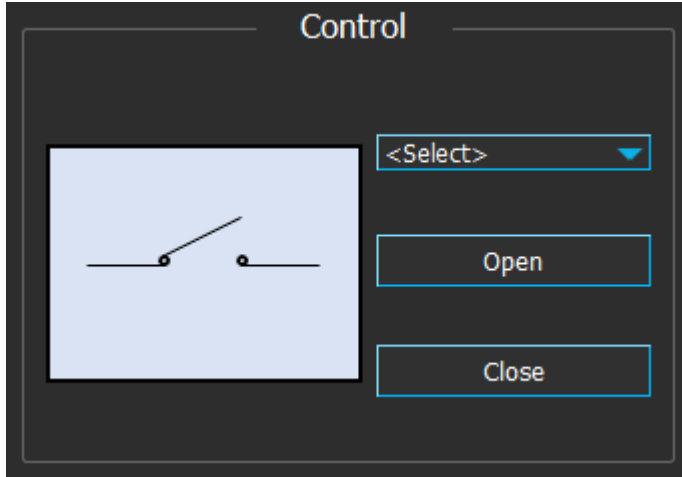
Write box is used for writing values to channels of *write* type.

*Channel*, *Data type* and *Data number* must be filled in accordance with SPA map (*Tools* → *Communication* → *SPA map*).

If register status changes need to be seen continuous read requests on the same register should be used as write command is given. Any possible changes will be displayed in the *Response* box.

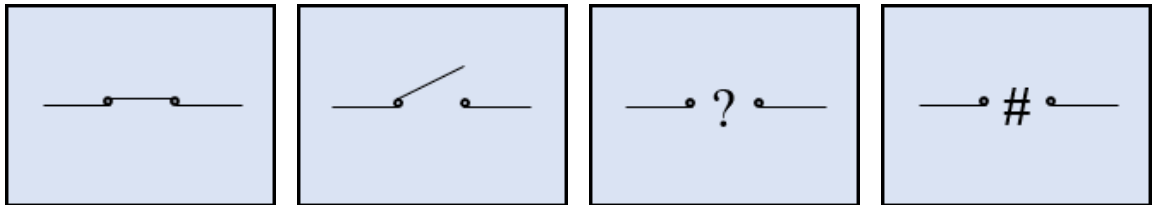
## Control

Objects (circuit breakers) are controlled with *Control* box.



By default when control object hasn't been chosen, display picture will be at disconnected state. When an object is chosen from the dropdown list, objects state will be read once every second and the display picture will change accordingly.

The object can be in four states: Connected, Disconnected, Intermediate and Bad.

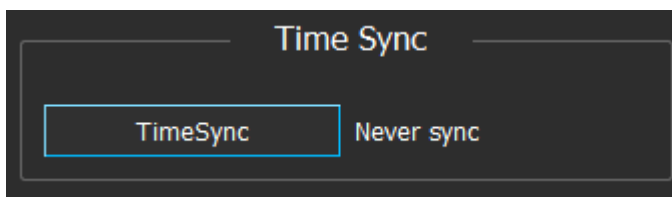


*Open* and *Close* buttons are used to control the objects. Objects can be controlled only when *Local/Remote (L/R)* switch is at *Remote* state.



The Local/Remote switch at Local mode

## Time synchronization



Time of the unit can be synced by using *Time sync* box. When it is clicked, time sync request is sent. Note that sync command is given only once.

## Errors

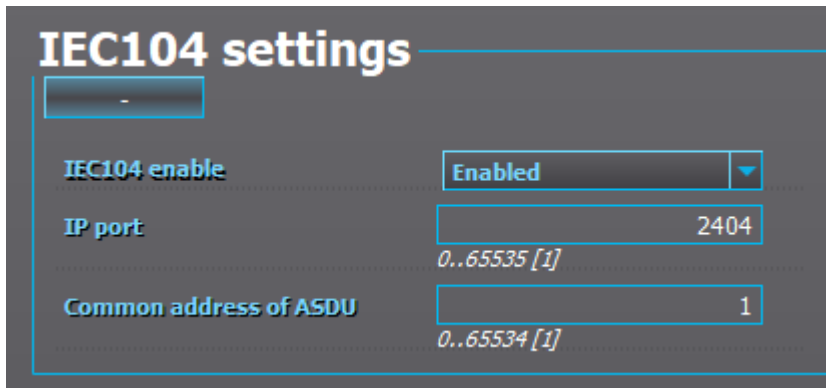
When reading responses *Error* checkbox is checked whenever there is an error. In these cases *Message* will briefly describe the issue.

When writing values an error may occur in situations like data being invalid or not writable. In such event *Error* checkbox will be checked and error code will be displayed in the field next to it.

Table. 5. - 2. Error codes in SPA communication

Code	Description
0	Error in checksum or parity
1	Slave busy (The slave may reply with this kind of a type N message to a master's message of type R when a long reply message should be formed and the slave is currently busy with another task.)
2	Overflow of slave input buffer
3	Message from master too complicated for the slave (The slave may reply with this kind of a type N message when its communications program is intentionally simplified. Possible methods of simplification are, for instance, writing the communications program of the slave to recognize only such write messages which comprise only a single channel number and a single data item number)
4	Reserved for use in higher levels of the communication network
5	Syntax error (Incorrect or unrecognized message type, unrecognized data type, error in channel number or data item numbers, syntax error in data part of message.)
6	Slave does not contain all data requested in the message (The slave does not, for instance, include all addressed channels or data items, or some data addressed by a number is not available.)
7	Addressed data is impossible to write or read (due to a permanent or temporary blockade) A type N message with error code 7 can be issued as a reply to an data write message if the addressed information cannot be assigned a new value or is nonexistent. A type N message with error code 7 can be issued as a reply to an data read message if the addressed data is existing and can (in general) be assigned a new value but it cannot be read.
8	Data in write message not validated
9	Undefined negative acknowledgment (e.g., internal error in communications program)

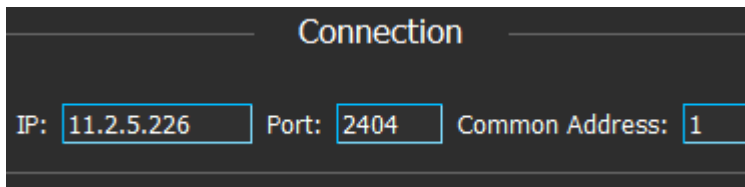
## 6. IEC104



To use IEC104 enable it at *Communication* → *Protocols* → *IEC101/104* and set *IP port* and *Common address of ASDU*.

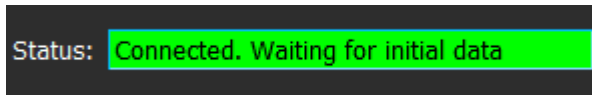
### Connection

Launch AQwire and choose *IEC104* tab. Input the same settings as is configured in the unit.

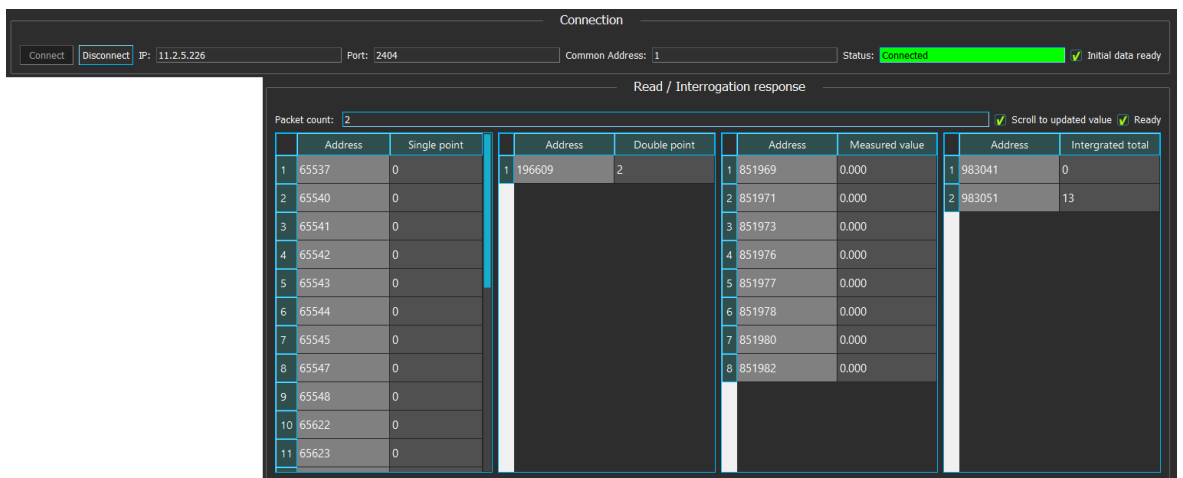


**NOTE:** When enabling IEC104 it takes approximately 30 seconds for the communication to start.

Click *Connect* to start connection. If connection was established successfully *Status* should turn green.



After approximately 15 seconds *Initial data ready* checkbox should be checked. If it is not disconnect and connect again.



## Response

Read / Interrogation response

Packet count: 2  Scroll to updated value  Ready

Address	Single point	Address	Double point	Address	Measured value	Address	Intergrated total
1 65537	0	1 196609	2	1 851969	0.000	1 983041	0
2 65540	0			2 851971	0.000	2 983051	13
3 65541	0			3 851973	0.000		
4 65542	0			4 851976	0.000		
5 65543	0			5 851977	0.000		
6 65544	0			6 851978	0.000		
7 65545	0			7 851980	0.000		
8 65547	0			8 851982	0.000		
9 65548	0						
10 65622	0						
11 65623	0						

Read / Interrogation response box will show data from

- General interrogation commands \*
- Counter interrogation commands \*
- Read commands
- Spontaneous events (if the address is there on the response box)

\* Just the addresses that have general interrogation (GI) activated (set to 1) at *Tools* → *Communication* → *IEC101/104*.

Single points:

IOA	GI	GI_Group	Description
65537	1	0	Local/Remote switch
65538	0	0	DI1

*Scroll to updated value* checkbox is checked by default. Unchecking will stop the tool from values being scrolled away as they are updated.

*Ready* checkbox indicates if the data in the response box has been updated to the latest request.

## Read

*Read* command box is used for sending read commands for any address that contains a value of type single point, double point or measured value.

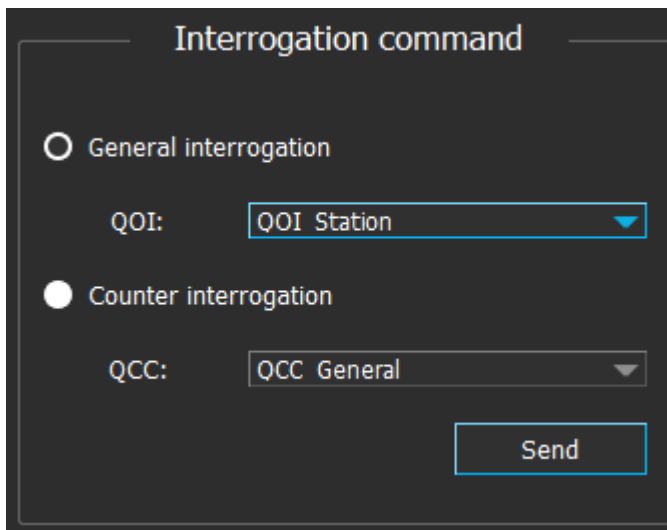
### Read command

IOA:

The response will be displayed in the response box:

- If the address has been there in the response box, it will be highlighted for 3 seconds.
- If it has not been there, the column used to contain it will be erased to place it in.

## Interrogation



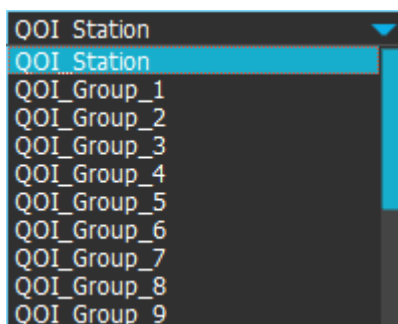
There are two types of interrogation:

- *General interrogation*: Receives values of type *Single point* and/or *Double point* and/or *Measured value*.
- *Counter interrogation*: Receives values of type *Integrated totals*.

The response will be displayed in the response box:

- If the addresses have been there in the response box, they will be highlighted for 3 seconds.
- If they have not been there, the column used to contain them will be erased to place them in.

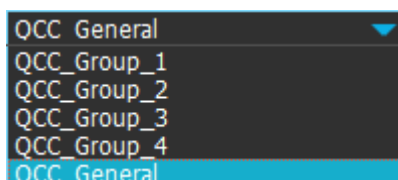
When sending *general interrogation commands* user must choose *Qualifier of Interrogation* command (QOI)



The option *QOI Station* is the same to one of the two commands sent when getting initial data.

The other options are groups indexed from 1 to 16. If the user has set the group of the data in the IEC104 map (*Tools* → *Communication* → *IEC104 map*) send an interrogation command for that group will return that specific data.

When sending counter interrogation commands *Qualifier of Counter interrogation Command* (QCC) must be chosen from the list.



The option *QCC\_General* is the same to one of the two commands sent when receiving initial data.

The other options are groups indexed from 1 to 4. If group has been set for the data in units IEC104 map, sending a counter interrogation command for that group will return that specific data.

## Single command

To send single commands, simply choose an address from the dropdown list and a value (1 or 0), then click *Send* on the *Single command* box.

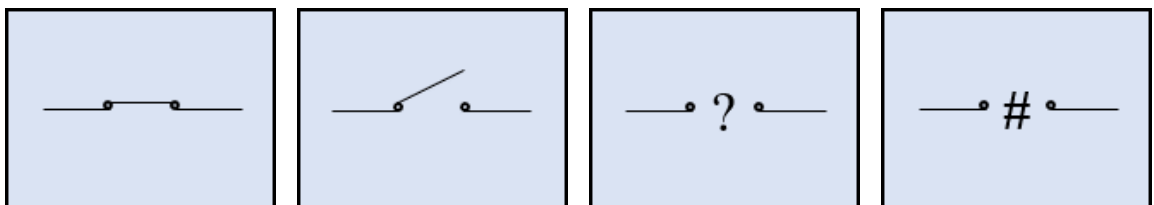
Depending on the settings the behaviour of the program should be one or more of the following:

- If the changed address is present on the response box, it will be highlighted.
- If the event for the changed address is not filtered out, an event will show up in the event box.
- If none of the above conditioned applied, nothing happens.

## Double command

By default when control object hasn't been chosen display picture will be at disconnected state. When an object is chosen from the dropdown box the objects state will be read and the display picture will change accordingly.

There are four states an object can be in: *Connected*, *Disconnected*, *Intermediate* and *Bad*.



The *Open* and *Close* buttons are used for controlling the objects but they can only be used when *Local/Remote (L/R)* switch on the device is set to Remote state.

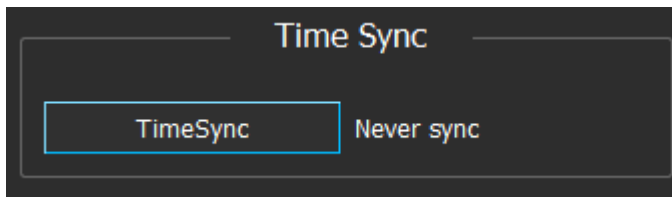


### The Local/Remote switch at Local mode

At the bottom of the window is a field displaying the status of Local/Remote switch. It has four states

Local / remote status	Default state when the program starts
Unknown local/remote state (try read IOA 65537)	Unknown mode because the address 65537 has not been read at any time since connected. The buttons are disabled.
Toggle local/remote switch to enable buttons	Local mode. The buttons are disabled
Remote mode. Select object to control	Remote mode. The buttons are enabled according to the state of the selected object

### Time synchronization



Time of the unit can be synced by using *Time sync* box. When it is clicked, time sync request is sent. Note that sync command is given only once.



## 7. IEC101

This protocol is nearly identical to IEC104. Therefore only the differences are documented here.

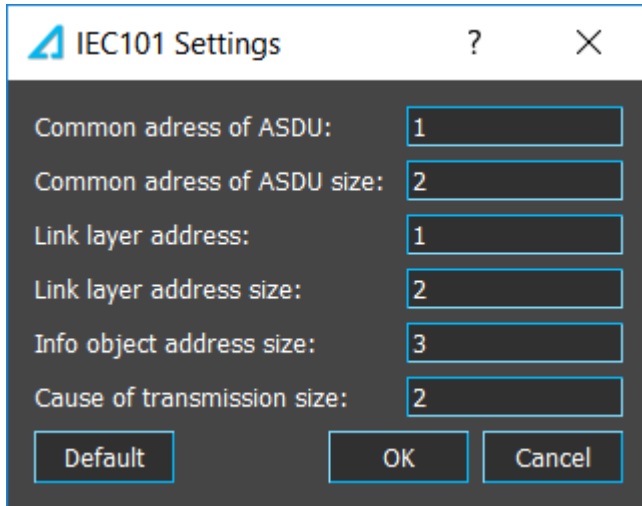
To take IEC101 into use enable it at *Communication* → *Connections* and configure it at *Communication* → *Protocols* → *IEC101/104*.

Setting	Value	Range
Common address of ASDU	1	0..65534 [1]
Common address of ASDU size	2	1..2 [1]
Link layer address	1	0..65534 [1]
Link layer address size	2	1..2 [1]
Information object address size	3	2..3 [1]
Cause of transmission size	2	1..2 [1]

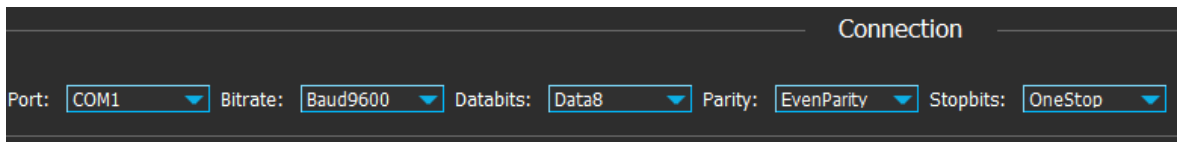
Setting	Value	Range
Bitrate	9600bps	
Databits	8	7..8 [1]
Parity	Even	
Stopbits	1	1..2 [1]
Protocol	IEC101	

### Connection

Launch AQwire and choose tab *IEC101*. Connection is done by clicking *Settings* and setting up the *Common address of ASDU* and other settings.

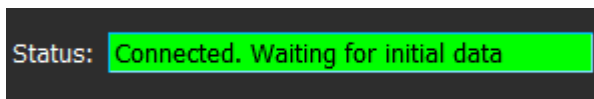


Also serial connection settings should be first configured to *Connection* box.

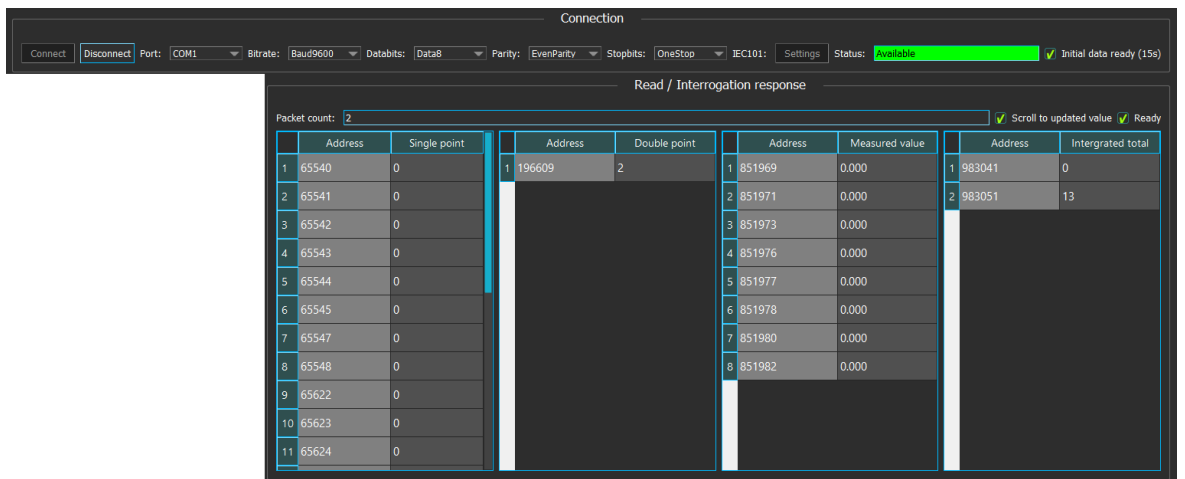


**NOTE:** It will take approximately 30 seconds after enabling the protocol until it is fully in use. If connection fails try again after a moment.

*Connect* connects to device. If connection was established *Status* field will turn green.



In approximately 15 seconds the *Initial data ready* checkbox should be checked. If not disconnect and connect again.

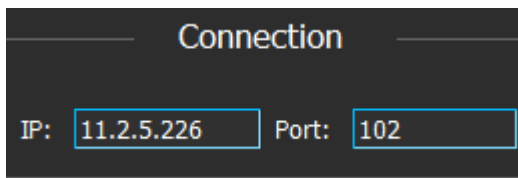


## 8. IEC61850

Setting up IEC61850 in an AQ-200 series IED is described in detail in AQtivate Instruction manual.

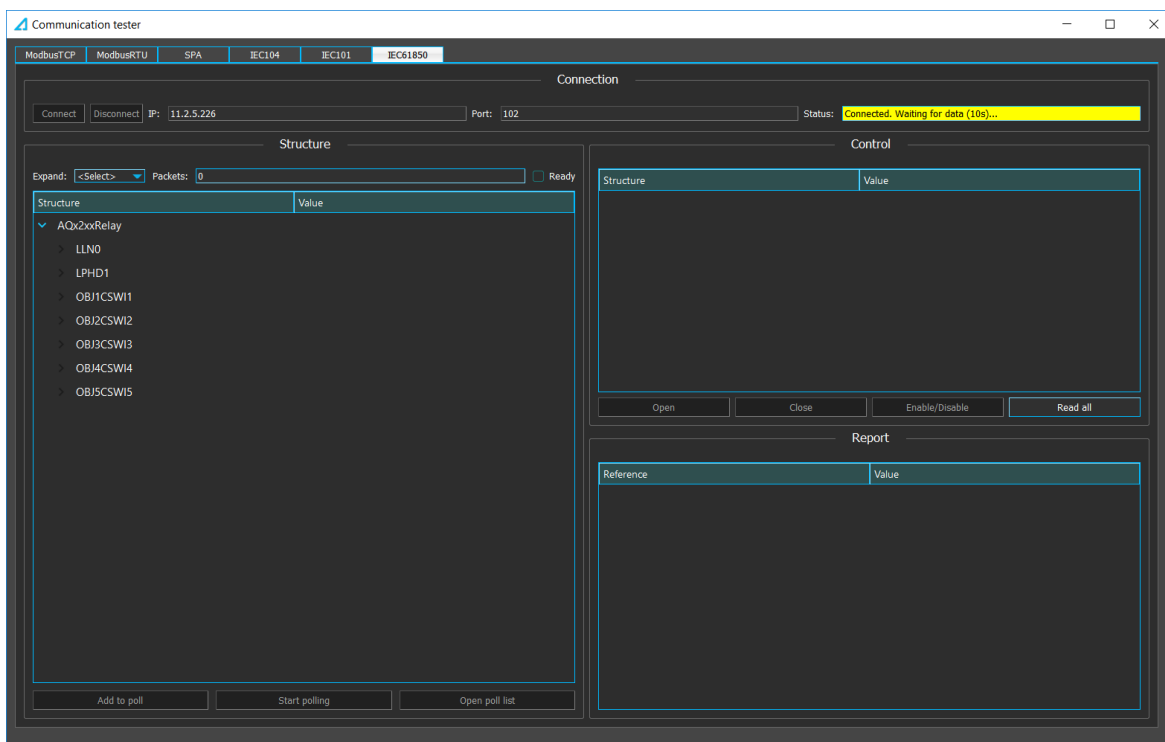
### Connection

Launch AQwire and open *IEC61850* tab and set same IP address and port as is used in the unit.

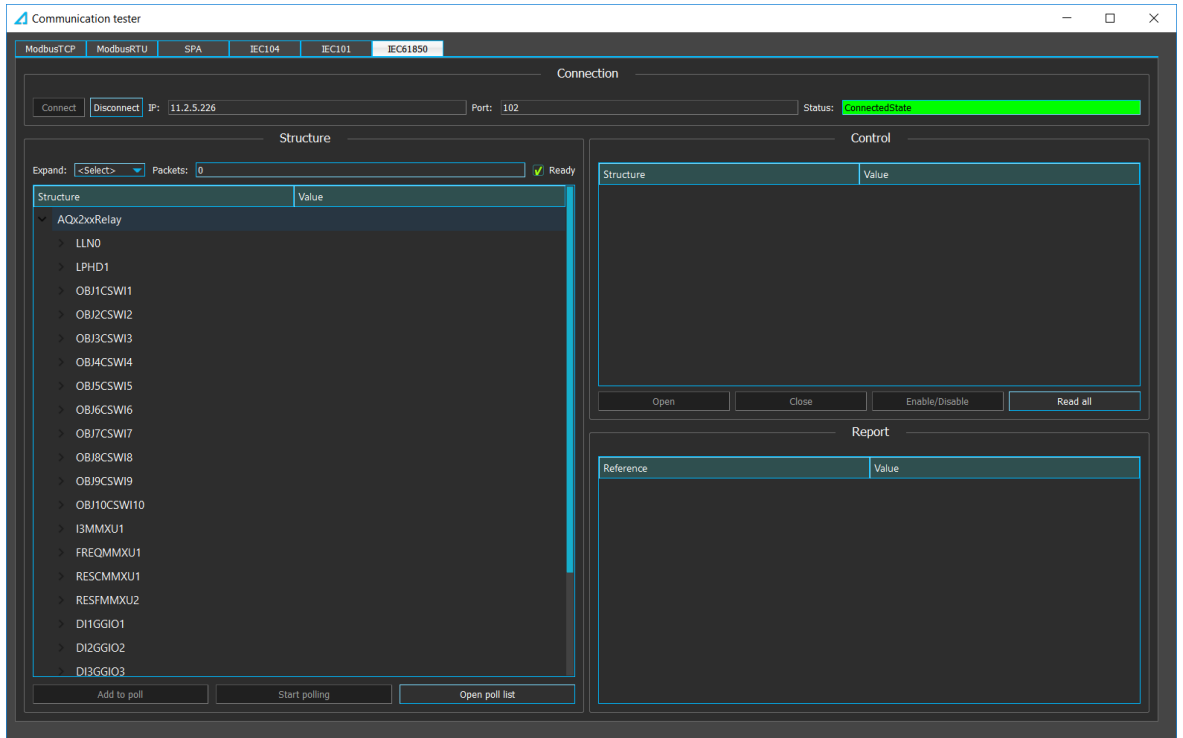


**NOTE:** When IEC61850 is enabled in the unit it takes approximately one minute before it is fully in use. If connection is disconnected immediately try connecting again after a moment.

After clicking *Connect* connection should be established and program starts requesting the data tree from the unit.

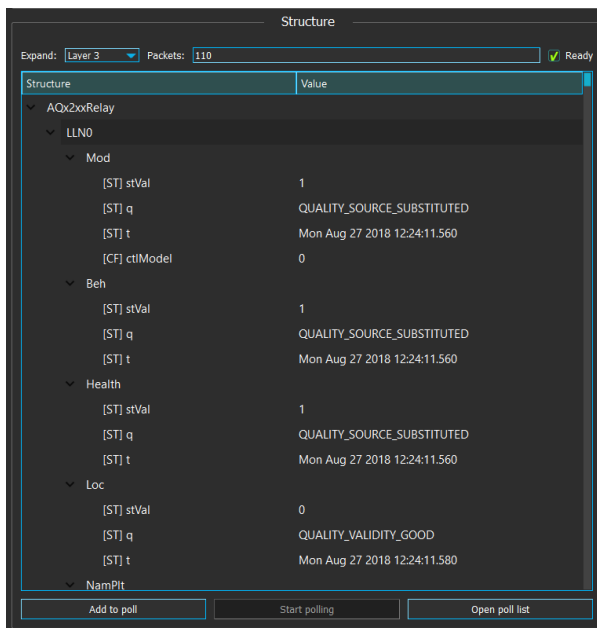


The process takes approximately 10 seconds after which *Status* field turns green.



## Structure

*Structure* box holds the all of the data sent from the relay at the beginning.



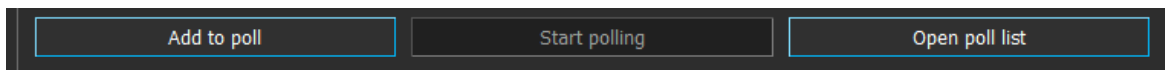
*Expand* dropdown list is used for expanding the tree to chosen level.

*Packets* field is used as a counter of number of messages received from the unit since connected.

*Ready* checkbox indicates if there are still incoming messages.

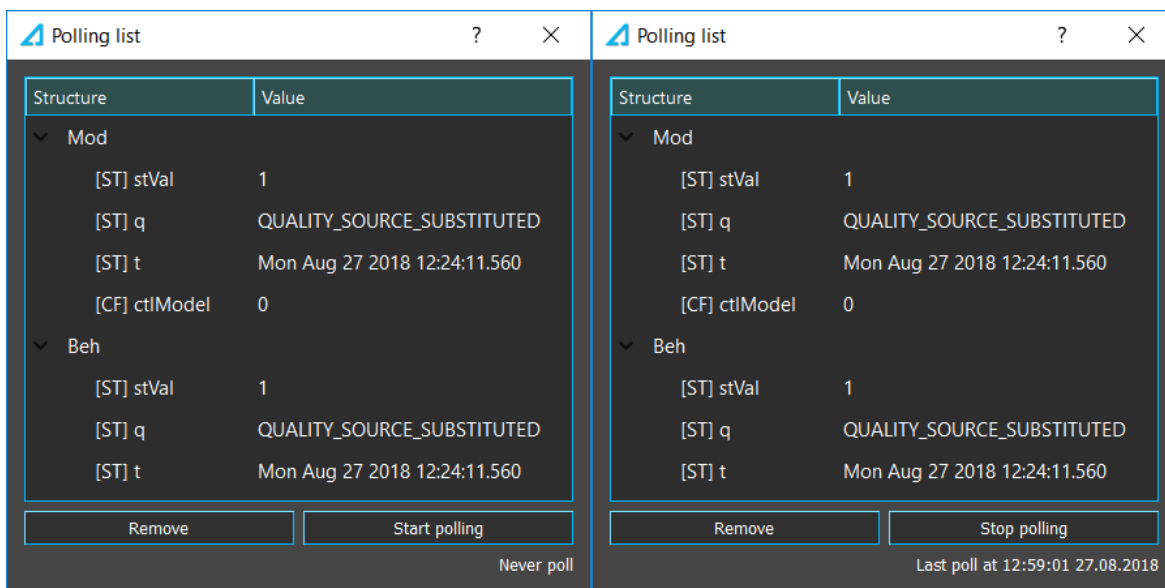
## Polling

At the bottom of the Structure box there are three buttons used for polling the chosen data:

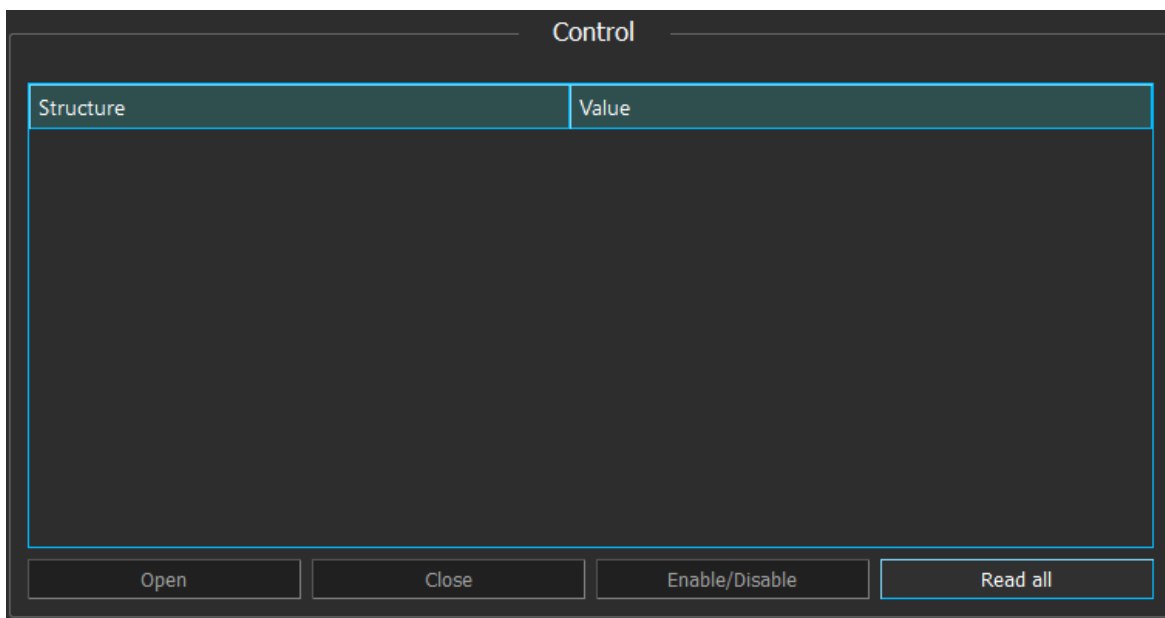


- *Add to poll* (*/Remove from poll*) button is used for adding or removing the selected item with all its sub-items to/from the polling list. Only available if an item is selected.
- *Start polling* (*/Stop polling*) button is usable only when there are items in the polling list.
- *Open poll list* button is used for opening the list of items added to be polled.

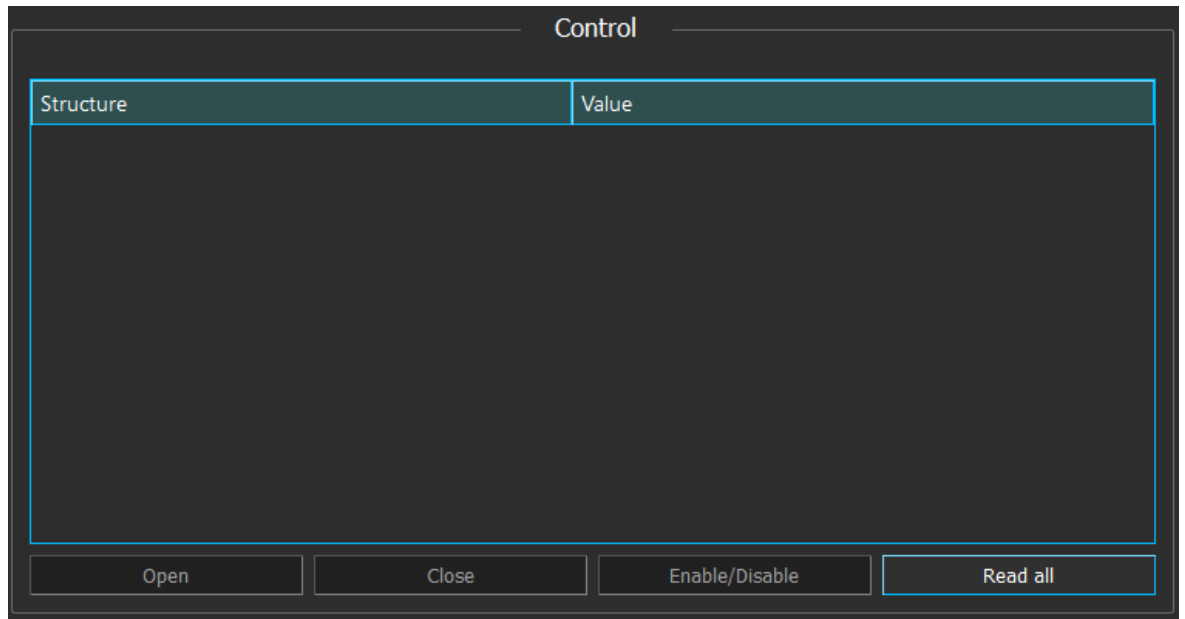
In the dialog showing the poll list, there are similar buttons. *Last poll* is displayed at the bottom of this window.



## Control

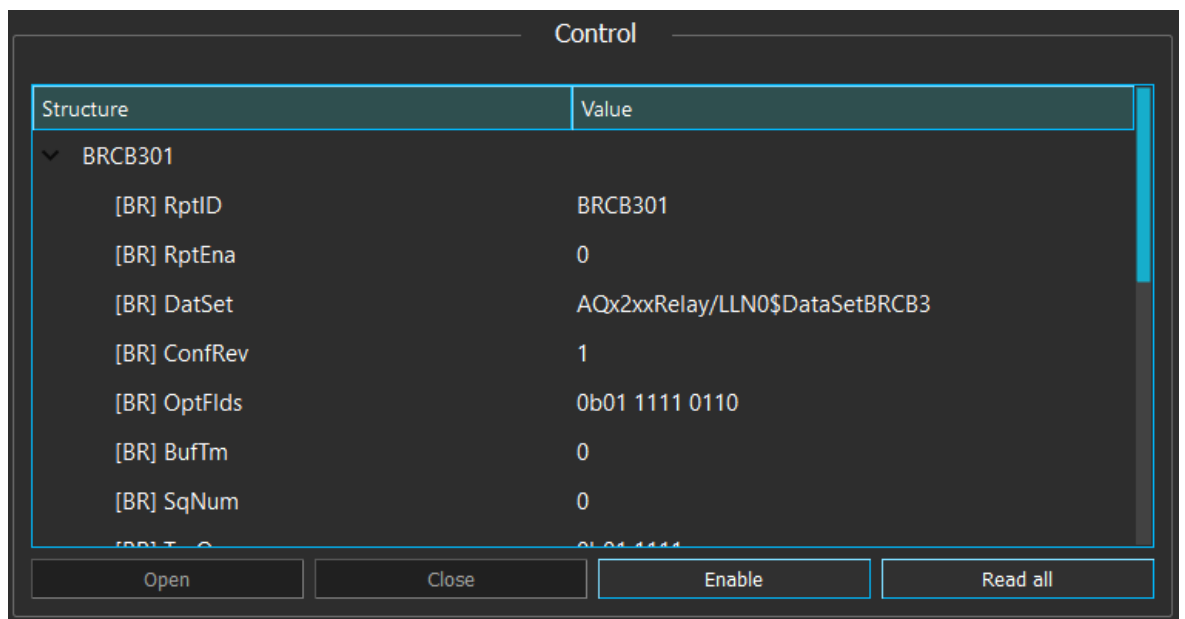


*Control* box has similar data fields with *Structure* box. When an item in the *Structure* box is selected the same item will be automatically displayed at the *Control* box.



*Read all* button will read all data in the *Control* box.

*Enable/Disable* button is enabled only when an item starting with URCB (Unbuffered report control block) or BRCB (Buffered control block) is selected.



*Open* and *Close* buttons are available when an item starting with *OBJ* or *[CO] Oper* is selected.

Structure	Value
▼ [CO] Oper	
[CO] ctIVal	0
> [CO] origin	
[CO] ctINum	1
[CO] T	Tue Aug 28 2018 14:12:54.003
[CO] Test	0
[CO] Check	0b11

Open      Close      Disable      Read all

Objects can only be controlled if *Local/Remote (L/R)* switch on the device is at *Remote* state.



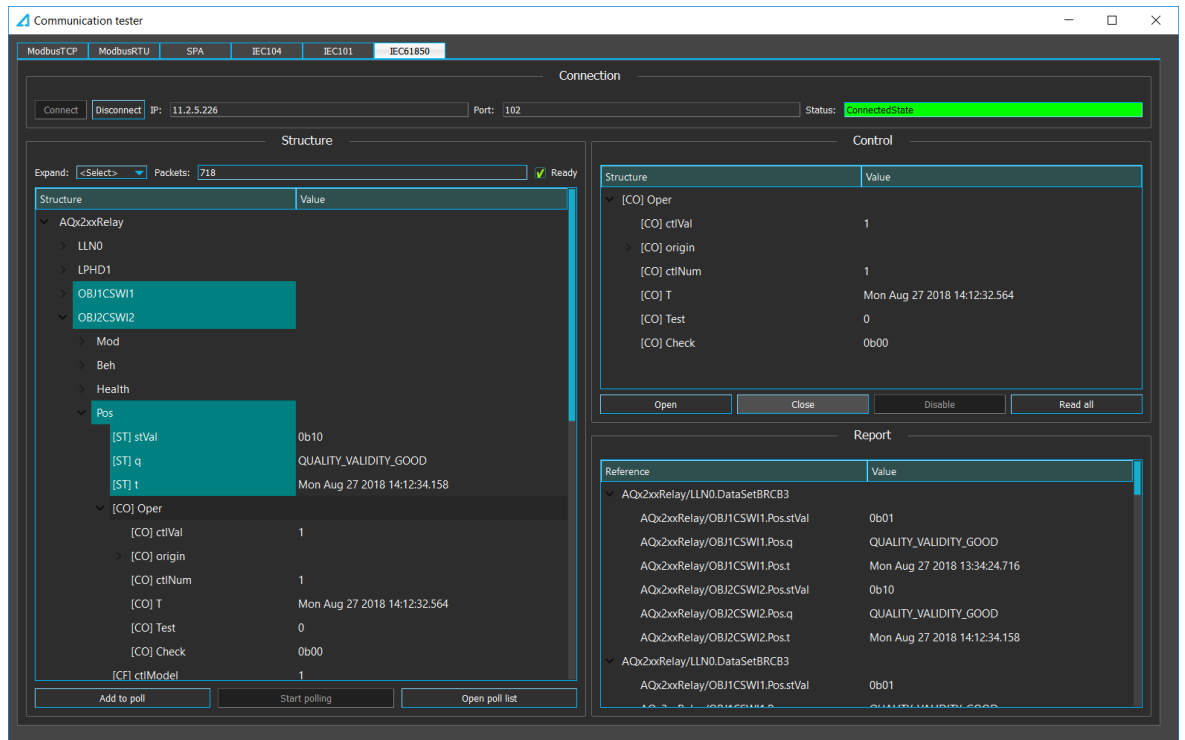
The Local/Remote switch at Local mode

## Report

When an item starting with *URCB* (Unbuffered report control block) or *BRCB* (Buffered report control block) is enabled. All the items under its dataset item (named *DatasetURCB* or *DatasetBRCB*) will be reported from the unit on changed.

The reports will be displayed on the report box.

The values received from the reports will also be updated in all the data fields (structure box, control box and poll list). In the structure box the references of that data and its parents are also highlighted.





## 9. DNP3 TCP

DNP TCP enable	Enabled
IP port	20000 0..65535 [1]
Slave address	1 1..65519 [1]
Master address	2 1..65535 [1]
Link layer timeout	0 ms 0..60000 [1]
Link layer retries	1 1..20 [1]
Diagnostic error counter	0 0..4294967295 [1]
Diagnostic Transmitted messages	2286 0..4294967295 [1]
Diagnostic Received messages	2292 0..4294967295 [1]

Enable DNP3 protocol at *Communication* → *Protocols* → *DPN3 TCP* and set IP port and other settings required. Detailed instructions on how to configure *DNP3 Map* (*Tools* → *Communication* → *DNP3*) are found in AQtivate Instruction manual.

### Connection

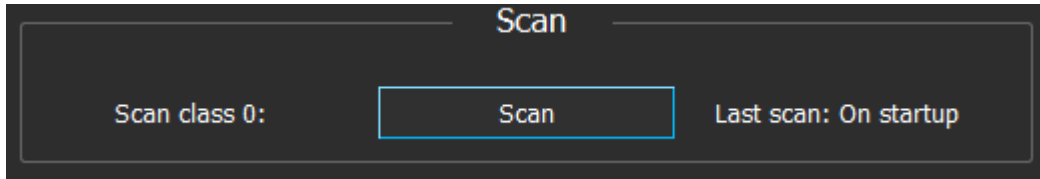
Launch AQwire and choose tab *DNP3TCP* and use the same settings as in the unit you are connecting to. Once settings are inserted click *Connect*.

When the connection is established *Status* field will turn green.

### Polling

On connection the client will send ALL CLASS poll to receive all entities. After this client will send a CLASS-1-2-3 (EVENT CLASSES) poll once every second.

CLASS 0 poll is only sent at the beginning. The first CLASS 0 poll if more are needed it can be done by using *Scan* box.



## Response

Whenever data is coming from the outstation (as a response to a poll), it will be displayed in the response box.

Packet count:   Scroll to updated value

	Index	BINARY	Time
1	0	1	0
2	1	0	0
3	2	0	0
4	3	0	0
5	4	0	0
6	5	0	0
7	6	0	0
8	7	0	0

	Index	DOUBLE BIT	Time
1	0	OFF	0
2	1	OFF	0
3	2	ON	0
4	3	ON	0
5	4	OFF	0

	Index	ANALOG	Time
1	0	0	0
2	1	0	0
3	2	0	0
4	3	0	0
5	4	0	0
6	5	0	0
7	6	0	0
8	7	0	0

	Index	COUNTER	Time
--	-------	---------	------

If the data comes as a response to a CLASS 0 poll, the time column will be 0. However, if it is a response to an EVENT CLASSES poll, there will be a valid time in the column.

The data in the response box is always updated once every second (with each poll). When there is a change in any line the packet counter will be incremented, the table will automatically scroll to that line, and the line itself will be highlighted for 2.5 seconds.

11	10	0	0
12	11	0	Wed Dec 12 10:07:18 2018
13	12	0	0

Auto-scroll function can be turned off by using the check box at the top right corner.

## Time synchronization

Timesync is done passively. The outstation should be sending a sync request after an interval and the client will respond with a timestamp.

## Event

Whenever there is data coming from the outstation (as response to EVENT CLASS poll), the event will be listed in the event box. The data in the response box is also updated with the latest changes.

Type	Index	Value	Timestamp
DOUBLE BIT	1	ON	10:16:55
BINARY	11	0	10:16:53
BINARY	11	1	10:16:41

## Control

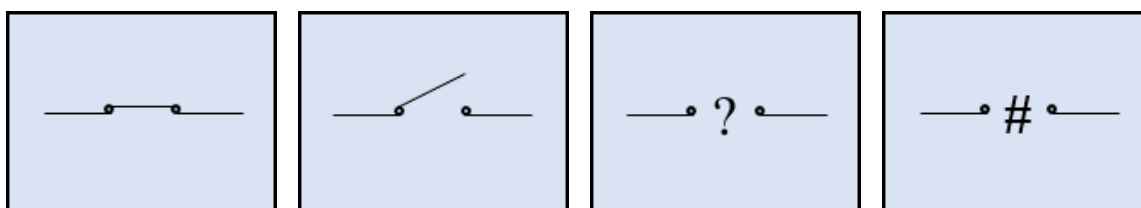
**Control**

Object indexes:

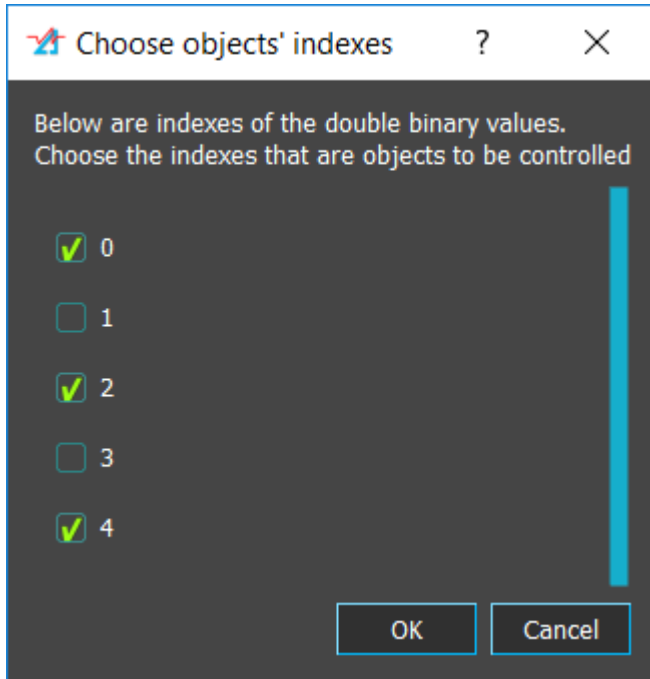
Control index:

Status

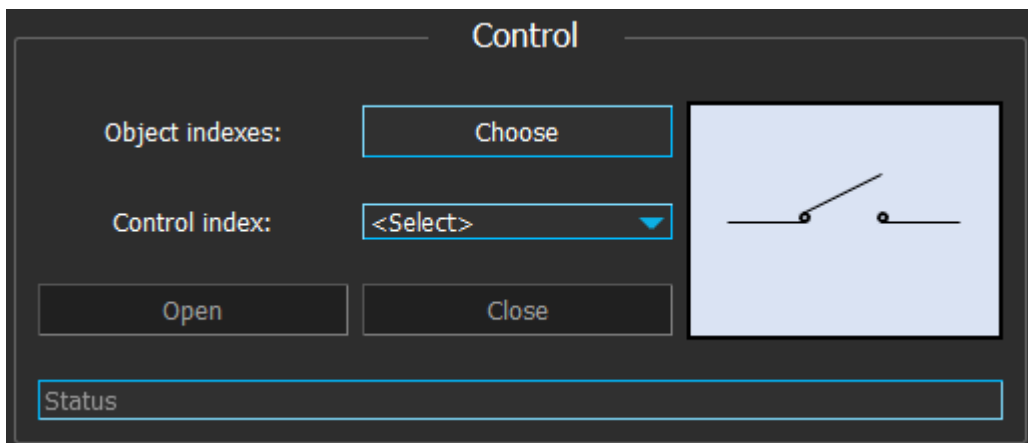
The objects can be controlled using the *Control* box. By default when no object has been chosen the display will be at disconnected state like above. There are four states an object can be in: *Connected*, *Disconnected*, *Intermediate* and *Bad*.



Since there is no fixed DOUBLE BIT address for the object in DNP protocol the indexes of objects must be chosen by using *Choose*.



After indexes are chosen it can then be selected from the dropdown to control.



*Open* and *Close* buttons are used to control the objects but the objects can be controlled only when *Local/Remote* switch is set to *Remote*.



### The Local/Remote switch at Local mode

When an object is selected the displayed picture will be updated with the objects' status. One of the *Open* and *Close* buttons will be enabled.

At the bottom of AQwire window there is a field that displays the status of latest operation. It has three different states:

Status	Default state when AQwire launches
State: SUCCESS - Status: SUCCESS	Last operation succeeded

State: SELECT_FAIL - Status: LOCAL	Last operation failed due to local state of the unit.
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## 10. Contact and reference information

### Manufacturer

Arcteq Relays Ltd.

### Visiting and postal address

Wolffintie 36 F 12

65200 Vaasa, Finland

### Contacts

Phone:	+358 10 3221 370
Fax:	+358 10 3221 389
URL:	url: <a href="http://www.arcteq.fi">www.arcteq.fi</a>
email sales:	sales@arcteq.fi
Technical support site:	<a href="https://arcteq.fi/support-landing/">https://arcteq.fi/support-landing/</a>
Technical support:	+358 10 3221 388 (EET 8:00 – 16:00)