OPC Bridge Installation Guide

Veolia Water Technologies

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Contents

1 Introduction

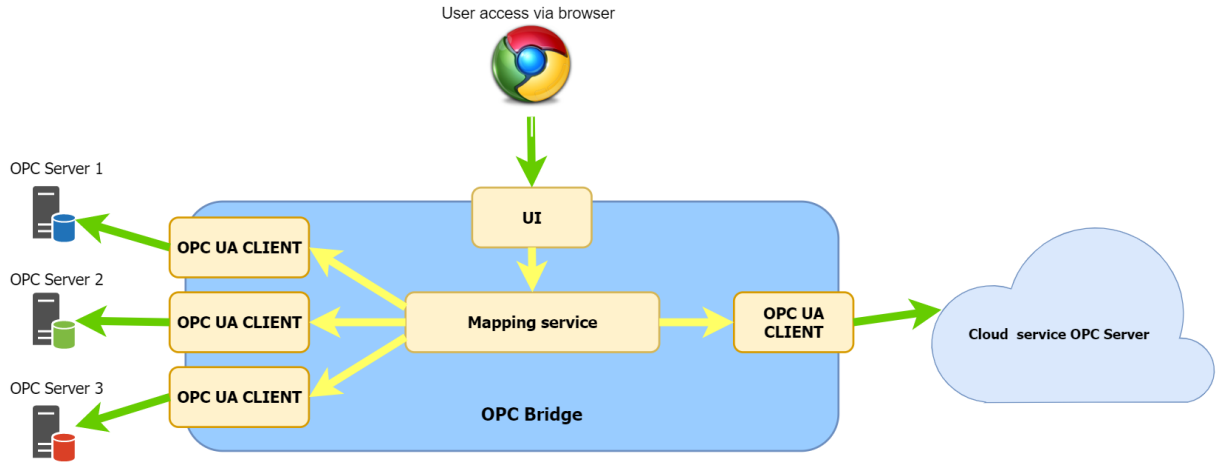
The OPC Bridge is a software component that acts as a mediator/proxy between the Hubgrade cloud service and the local OPC infrastructure at a wastewater treatment plant and/or a sewer network. It facilitates the exchange of data - measurements and calculated set points - between the plant/sewer network and Hubgrade.

This document describes how to install the OPC Bridge, connect it to the local OPC infrastructure and how to setup data transfers between the plant/sewer network and the Hubgrade OPC server

Note: *The screen dumps shown in the following sections might differ from what can be observed from the OPC Bridge user interface. This can be due to differences in the version of the OPC-Bridge or in the number of tanks or lines, different number of sensors or slightly different versions of the feature.*

2 Bridge Functionality

OPC Bridge is a Microsoft Windows application that acts as an intermediate/proxy between an OPC server at a plant and the Hubgrade server. It functions by mapping data items that are located with the two servers and translating the data item ids (tag names) when data items are being exchanged. This is depicted in the figure below.



The OPC Bridge software consists of two parts:

- A Windows service that listens on two or more communication ports. One port that is used for the communication with the Hubgrade server and ports that are used for communication with the plant's own OPC servers.
- A user interface that makes it possible to connect the Windows service with the plant's own OPC servers and with the Hubgrade and for setting-up the data transfers.

2.1 Healthcheck

The OPC Bridge has a built-in healthcheck that automatically restart the service in case of commmunication issues. So after more than 5 Transfer Cycles (default transfer cycles are 2 minutes), where no data is transfered either way, the sevice is restarted. But already from 1st transfer cycle with no data - either way, debug logging is automaticly enabled. the setting of debug logging is maintained across restarts.

2.2 Prerequisites

- We recommend minimum Windows Server 2016 with a minimum of 2 GB of free memory.
- OPC server(s) at the plant that communicates using OPC-UA. The OPC Bridge cannot communicate using OPC DA or OPC XML.
- Port (TCP-52520). This is used for communication with Hubgrade shall be open for TCP on outgoing traffic - either opc.cloud.kruger.dk and opc2.cloud.kruger.dk or the following 4 IP addresses: 79.125.67.56, 79.125.6.6, 34.243.105.104, 46.137.13.19.
- Port HTTPS (TCP-443). This is used by OPC Bridge to update the Hubgrade in case of tag mappings or data errors, should be open for outgoing traffic (optional)
- A recent and up-to-date internet browser (ie. Internet Explorer is not supported)
- (China Only): If you are based in China, you need to open up for outgoing traffic to opc2.plant.watertechnologies.cn or the following IP addresses: 52.80.215.16 and 54.223.163.140.

3 Download and installation

The OPC Bridge installation program can be downloaded from the The download page

3.1 Installation

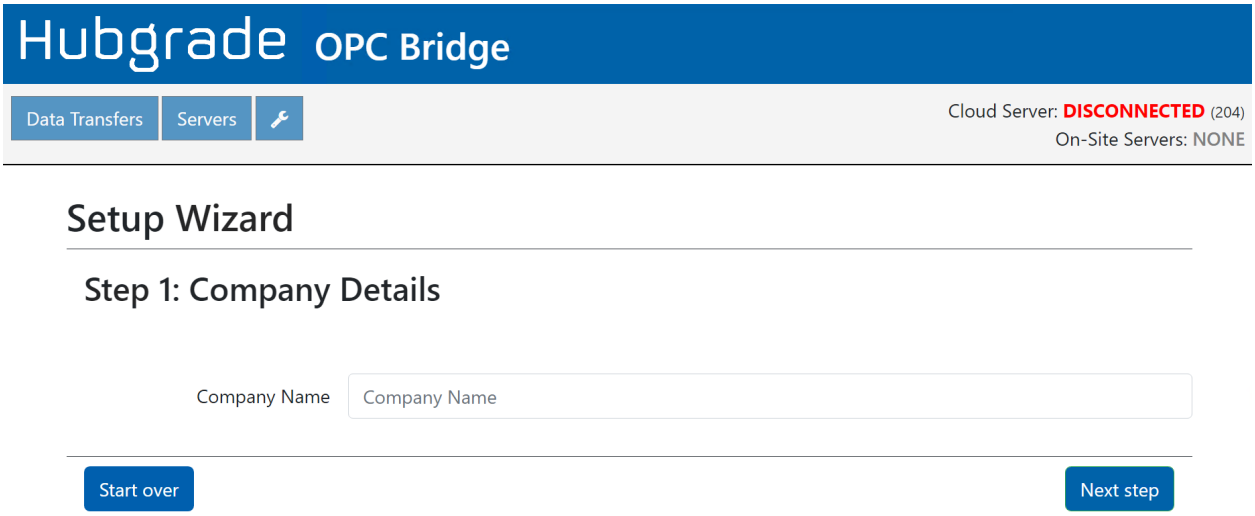
Run the installation program with administrative rights. This can be done by right-clicking on the installation program and selecting the “Run as administrator” option. The installation can take a few minutes to complete. You will get the choice for selecting a path for program files and program data individually during the installation.

If you want to be able to remove the older version later, it is important to use a new path for the program files.

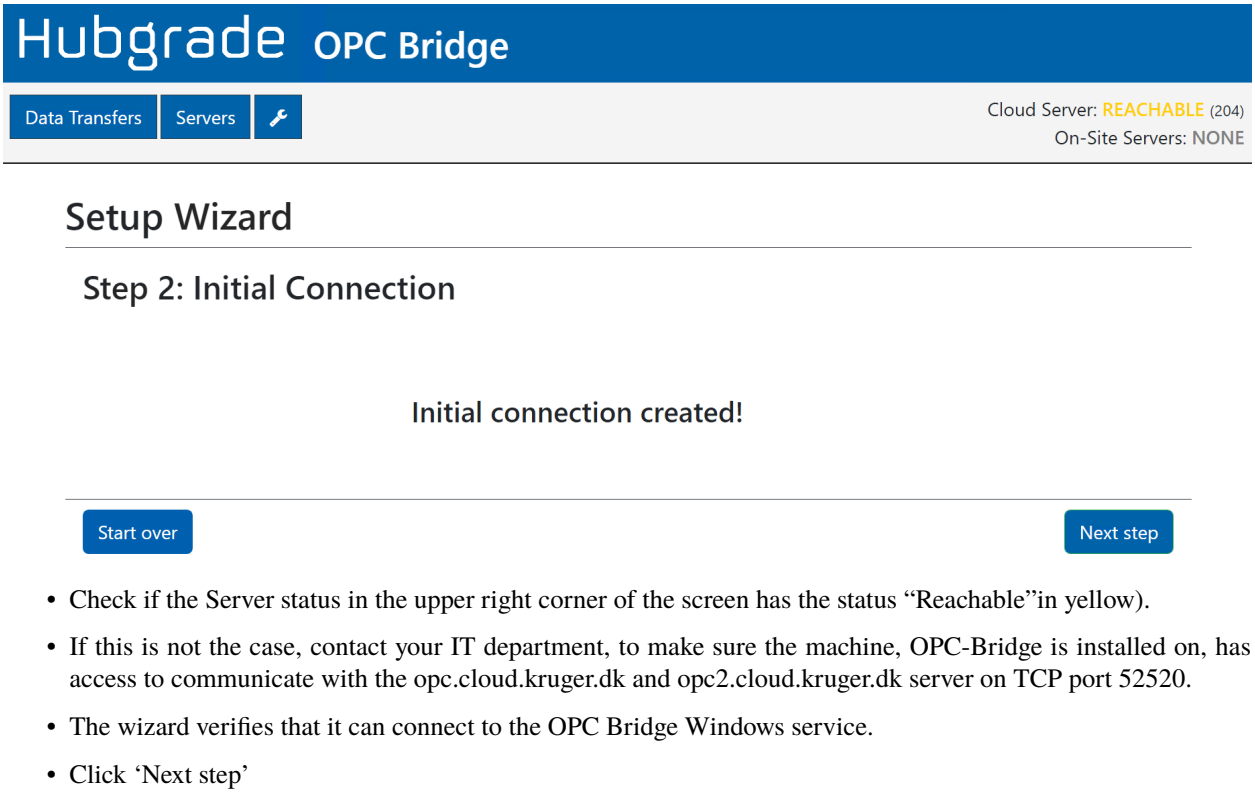
If you want to make a new clean install, and move the config manually later, also in order to ease a fallback situation, we recommend using a new path for program data.

After the installation, use a recent and up-to-date internet browser and browse to http://localhost:8088 or click on the newly created shortcut “opcBridge” on your desktop. This will start a wizard for connecting the OPC Bridge to the Hubgrade. Please follow the steps outlined below.

Step 1 - Company name

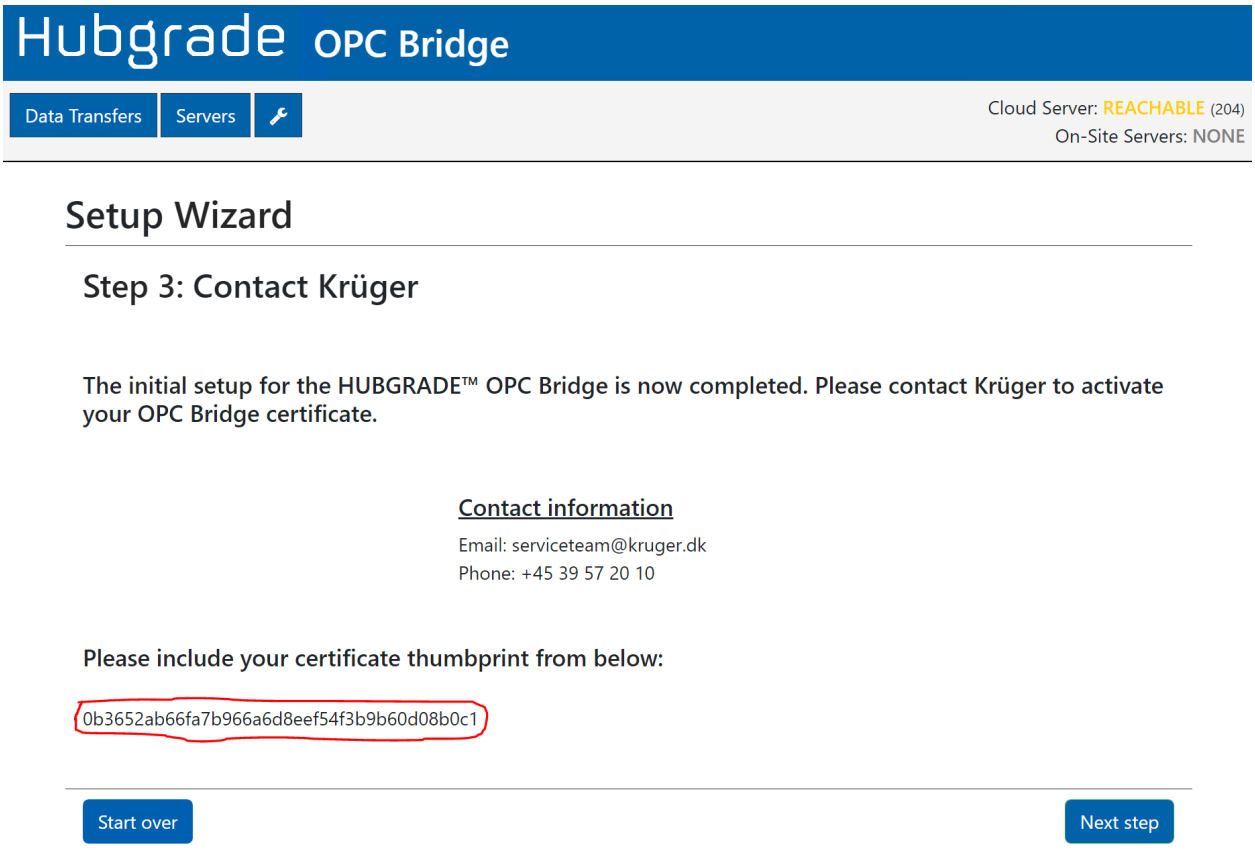


Step 2 - Connectivity



- Check if the Server status in the upper right corner of the screen has the status “Reachable”in yellow).
- If this is not the case, contact your IT department, to make sure the machine, OPC-Bridge is installed on, has access to communicate with the opc.cloud.kruger.dk and opc2.cloud.kruger.dk server on TCP port 52520.
- The wizard verifies that it can connect to the OPC Bridge Windows service.
- Click ‘Next step’

Step 3 - Connectivity and Exchange of certificates



- Copy the certificate thumbprint shown on the screen and mail it along with the company name that was specified on the previous screen to the email address listed on the screen.

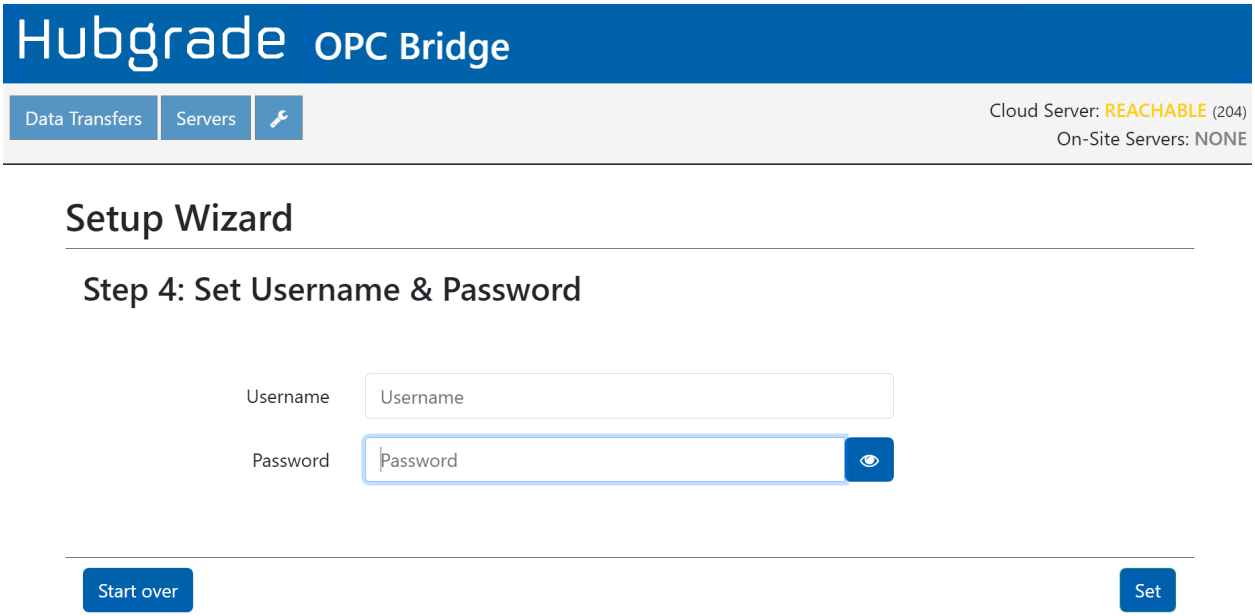
When the Hubgrade service team receives the information, it will create a user account for the designated Hubgrade system administrator. The system administrator will receive an email with a link to a web page for finalizing the creation of the user account. This includes defining a password for the account.

The installation process can now be paused until the link has been received and the user account has been primed with a password.

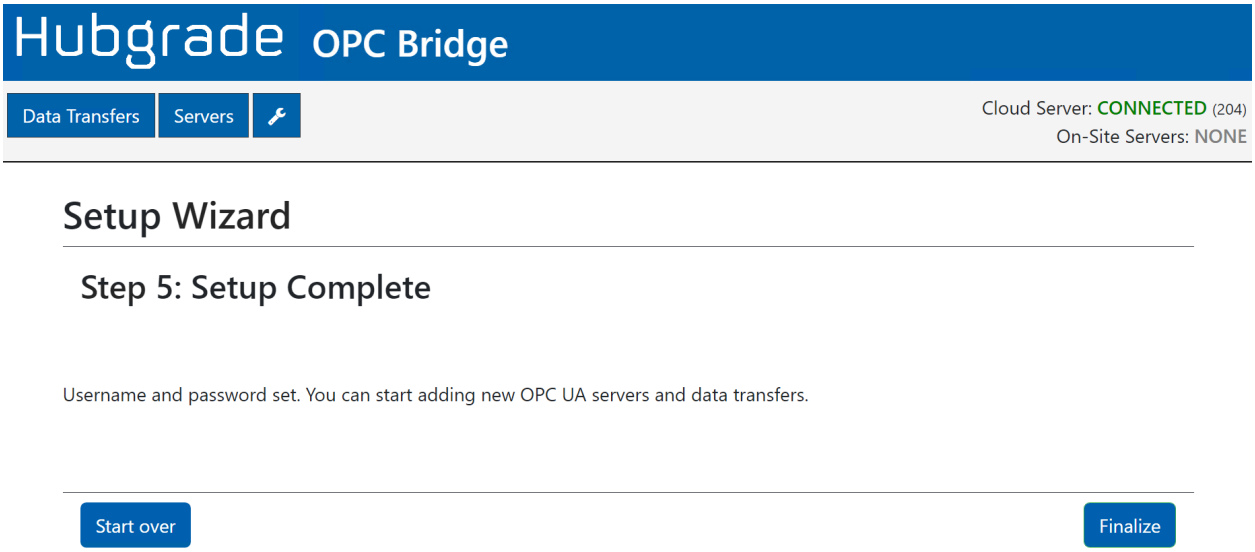
3.2 Setting up the connection to Hubgrade Wastewater Plant Performance

When the email from the Hubgrade service team has been received and when password has been set, the installation can commence with setting up the connection. Password requirements are at least 8 characters, lower and upper case characters and digits.

Browse again to http://localhost:8088 and enter the credentials for the newly created account - username provided by the Hubgrade service team and password set by yourself.



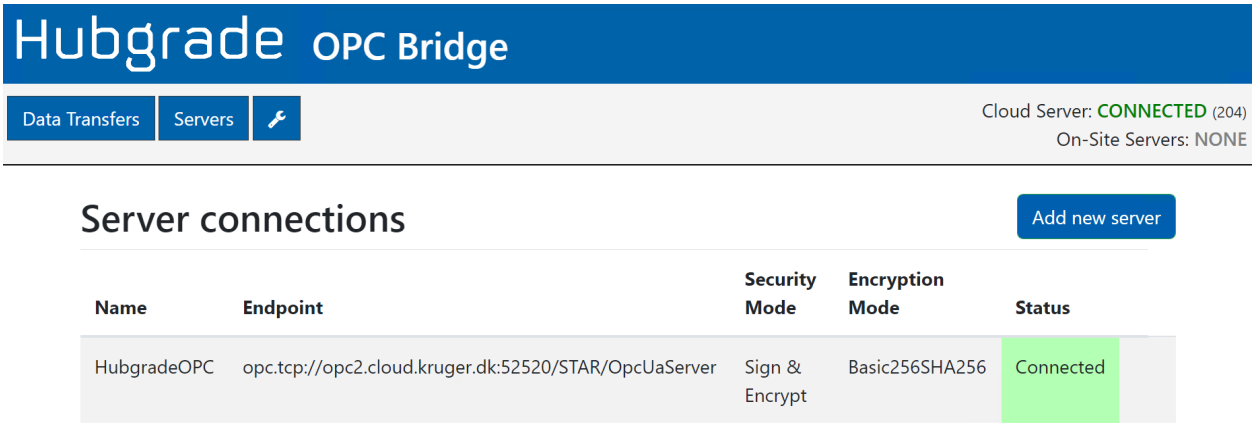
Within a minute you should see that the connection label for Hubgrade located at the upper right corner of the screen - turns green and says CONNECTED and you can click “Finalize”



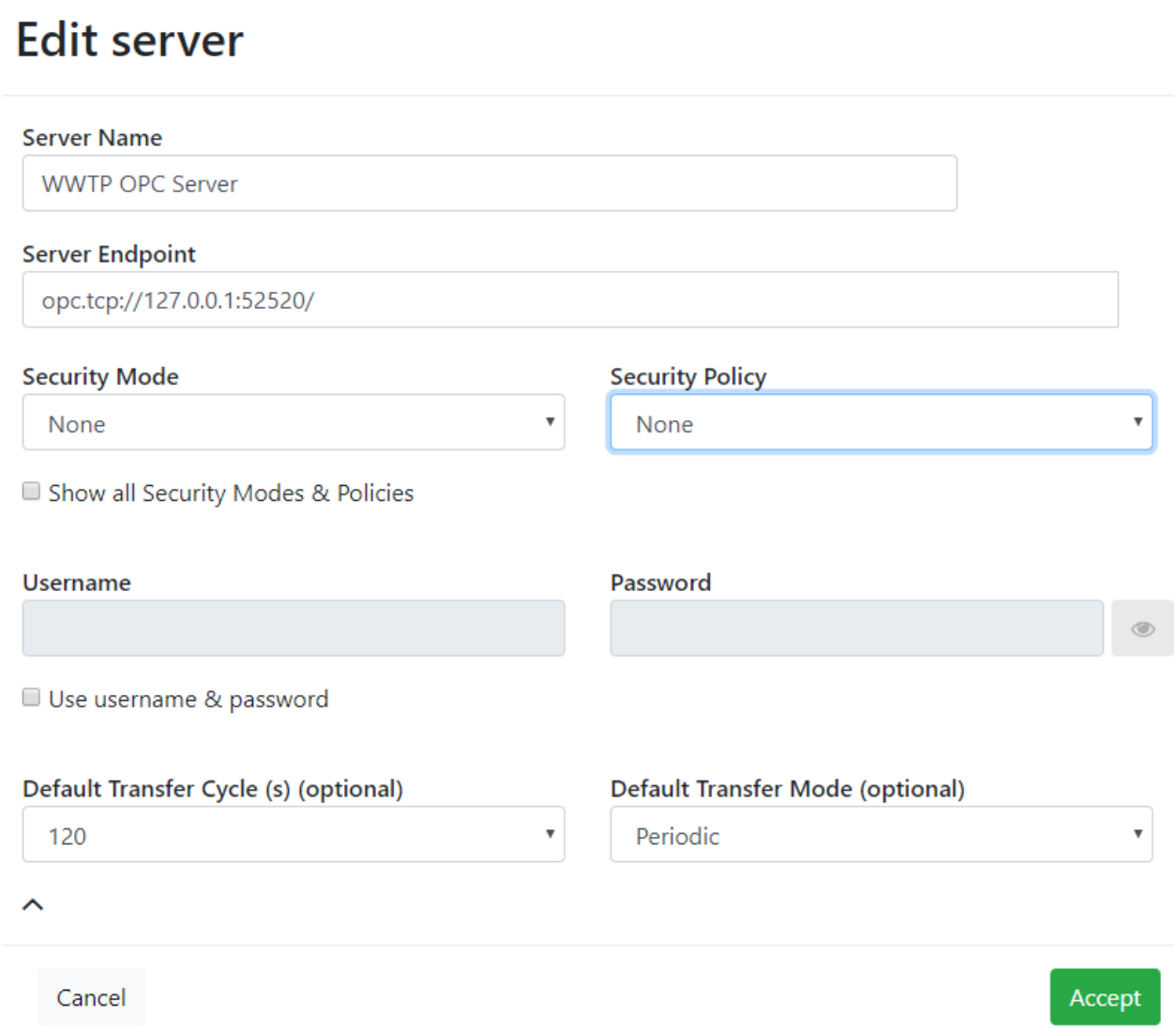
The OPC Bridge is now connected to the Hubgrade Cloud server. The next step is to connect the OPC Bridge to the local OPC server(s).

3.3 Setting-up the connection to local OPC servers

You connect the OPC Bridge to your local OPC server(s) by clicking on the "Servers" tap. This leads to a screen as the one shown in the figure below.



You should see that the connection to the Hubgrade Wastewater Plant Performance server is online - the label in the upper right corner should display CONNECTED. You add your own servers by clicking on the "Add new server" button. This leads to a screen as shown in the figure below.



- Identify the server by giving it a Server Name. You can select any name here, it is just used as an alias for the server endpoint string.
- Enter the Server endpoint for the OPC server that you want to connect to. Please note: At the end of the field, a spinning wheel can be showed immediately after entering the server endpoint, this indicates that the OPC-Bridge is connecting the server to validate the endpoint as well as auto detecting what security mode and security policy is supported. If the OPC Bridge cannot connect to the server, it will display a warning.
- Security Mode can be one of following:
  - None - Connection is not signed and no encryption of data is used.
  - Sign - Connection is signed but data is not encrypted.
  - Sign & Encrypt - Connection is both signed and encrypted.
- Security Policy can be one of:
  - None - Connection does not use encryption.
  - Basic256 - Connection is encrypted.

  - Basic256Sha256 - Connection is encrypted, and data content verified with SHA256.

- Many internal OPC servers run with security “None”. If this is the case with your OPC server, then simply select this from the Security Mode drop-down list and leave the username and password fields blank.
- Select “Default Transfer Cycle”, default should be 120 seconds.
- Select “Default Transfer Mode”, default should be “Periodic”, if you change this to “Subscribe”, your Hubgrade Wastewater Plant Performance Service might not work as intended.
- Then click “Accept”.

The next step is configuring the OPC Bridge by pairing OPC tag names from the local OPC server with the corresponding OPC tag names in Hubgrade.

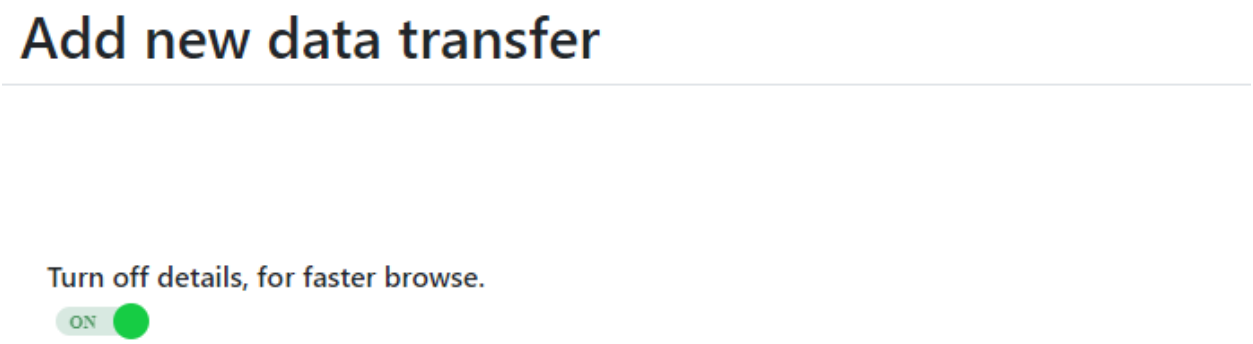
4 Setting-up Data Transfers

The OPC Bridge handles transfer of data between the plant and Hubgrade. This transfer needs to be configured by pairing data elements in the plant's OPC/PLC infrastructure with the corresponding data elements in Hubgrade, e.g. pairing the ammonium measurements from tank 1 on the plant with the "BIOLOGY.LINE 1 TANK 2.NH4" data element in Hubgrade.

The pairing can be performed in manual mode - where the individual data items are paired using the OPC Bridge user interface - or through import of a spreadsheet file where the pairing has been defined.

Turn off details

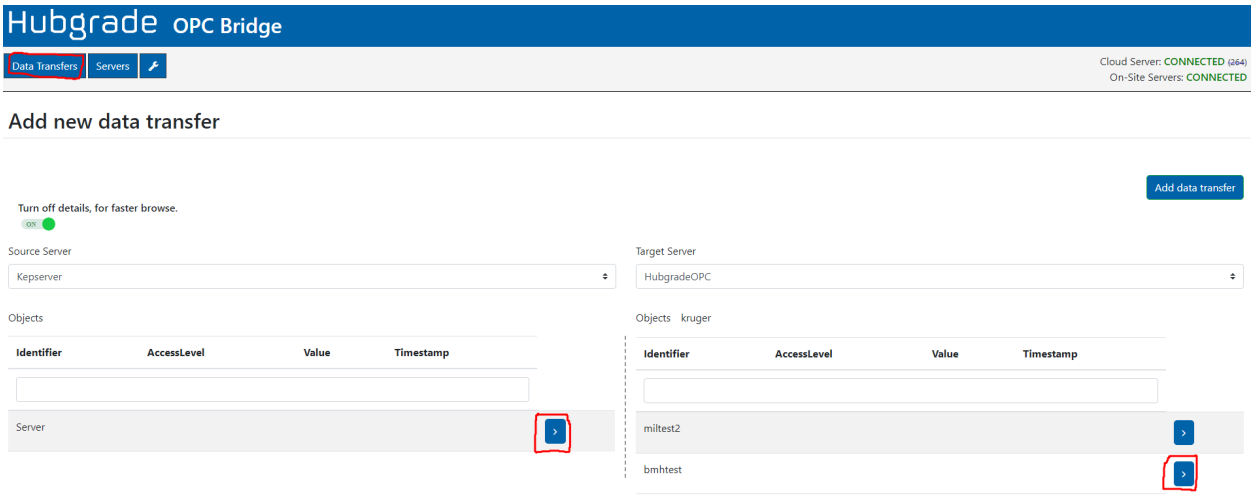
On servers with a large list of tags, the waiting time might be long for the list to come up, as each tag is individually queried, this can be omitted by switching the "Turn off details, for faster browse" switch.



Manual pairing

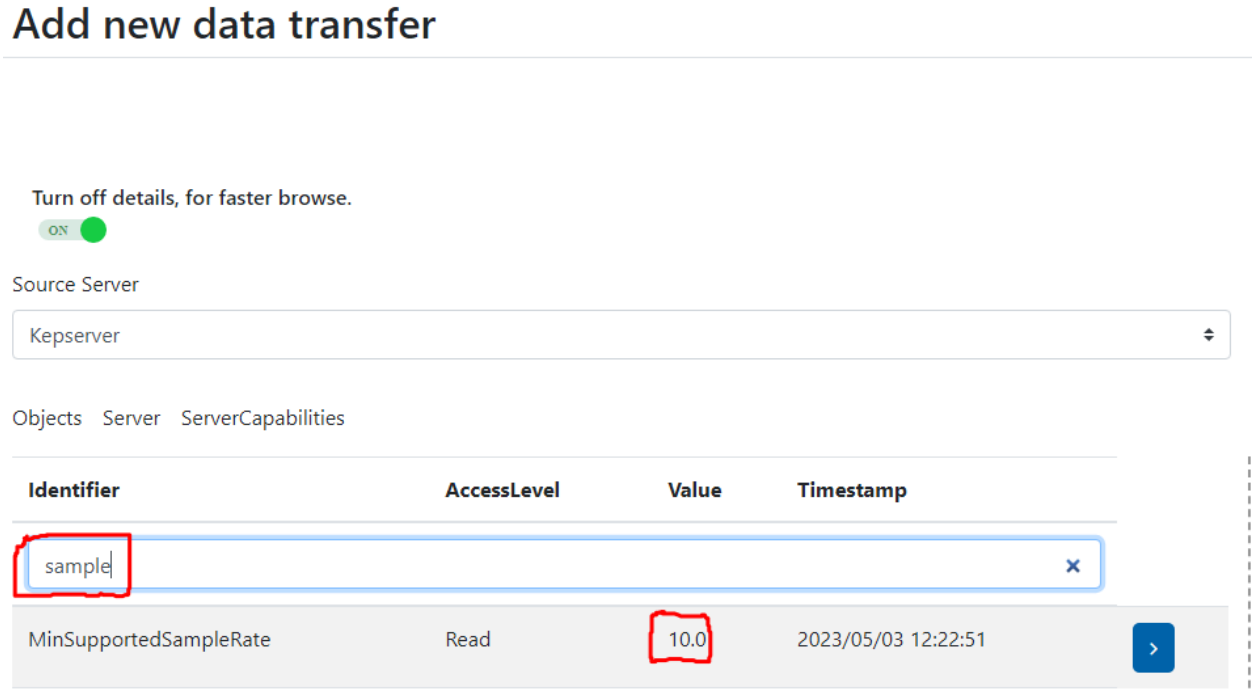
In the OPC bridge you do the pairing from the "Add new data transfer" page. Click the "Data Transfers" button and then the "Add Data Transfers" button. This leads to a page as shown below.

The Data transfers page is split into 2 columns, where one side represents the target server and the other side represents the source server. In the case of entering a new measurement, the source server is the plant server, and the target is the Hubgrade Wastewater Plant Performance server. In the case of a setpoint the target server is the plant server, and



the source is the Hubgrade Wastewater Plant Performance server. If there are more than one internal OPC server at the plant, the one that shall be used shall be selected in the appropriate drop-down list. The OPC Bridge can handle multiple internal OPC servers.

- Select the appropriate target and source servers according to the type of data point you want to transfer (measurement vs. setpoint as described above).
- Specify the source data item by clicking on the ">" link in the left column (indicated with a red circle in the figure above). You can now browse for the data item that shall be mapped.
- You can search for a data item as shown in the figure below.

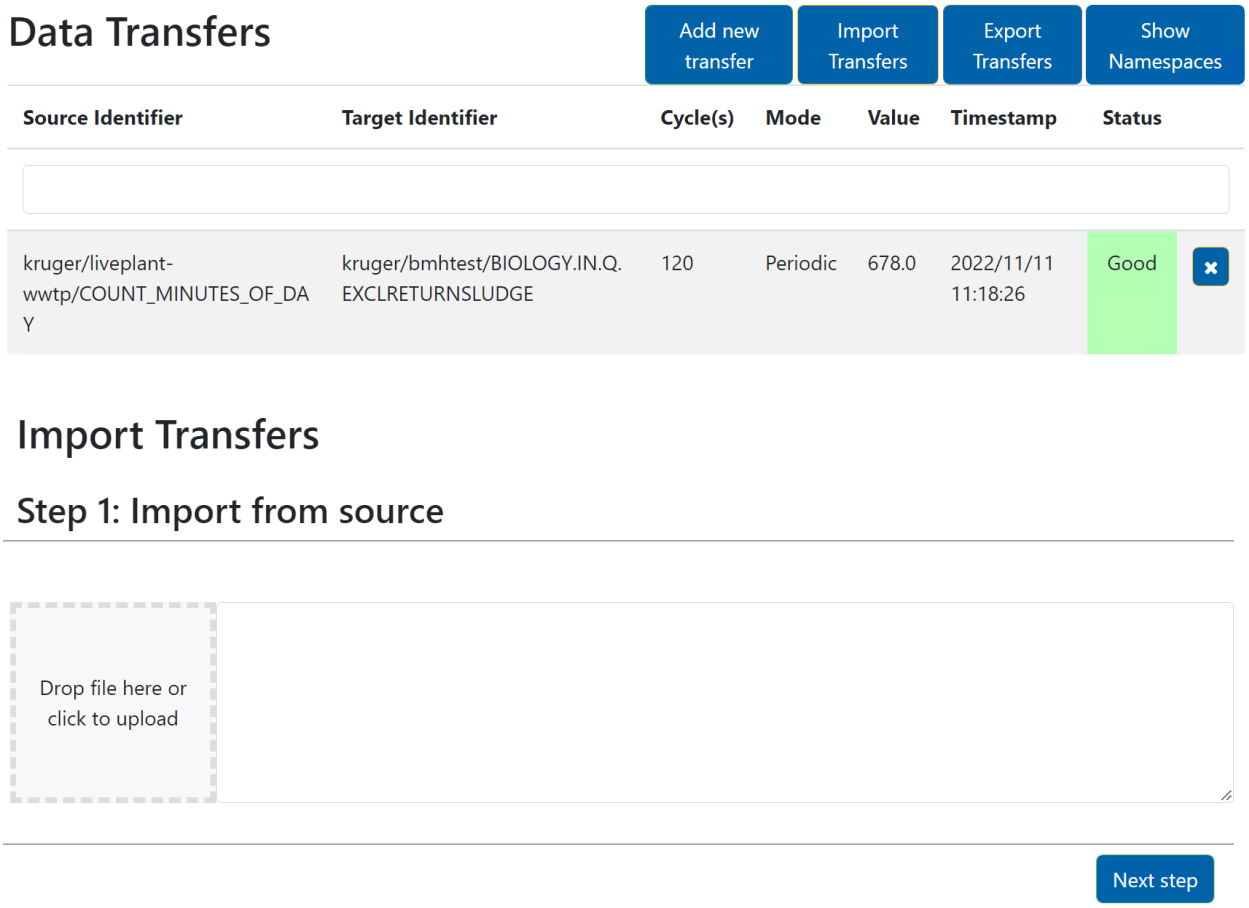


- When you select a data item, you will be able to see the latest value of the data (indicated with a red circle in the figure above).
- Select the data item that shall be paired by clicking it. It will turn yellow when selected.

- Repeat the above steps for the target server in the right column.
- When both the source and target data items have been selected, you pair the two by clicking the green “Add data transfer” button

4.1 Importing and exporting a spreadsheet with pairing definitions

In the OPC bridge, you have the ability to import several data or all points from a CSV file and to export all data points to a CSV file, by clicking on the “Data Transfers” button and then the “Import CSV” / “Export CSV” button. This leads to a page as shown below.



As indicated on the page, you can choose to drag and drop the prepared (See the section “CSV file format”) CSV file on the drop field, or to click on the drop field to get a dialog box, to find and pick the file you want to import.

When the file is read, data from the file will occur on the right side of the page, and the green button “Next step” is lit up and can be clicked, if the imported data seems valid.

Please note: Only one file can be transferred at a time.

An overview on all parsed transfer definitions is now shown, and you have the possibility to remove a definition if needed or requested. When you are happy with the list, click “Next step” to continue.

The importer now needs to know how to deal with any eventually existing transfer definitions.

One of the following options must be selected before clicking on “Next step”.

Import Transfers

Step 2: Parsed transfers

Show Namespaces

Source Identifier	Target Identifier	Cycle(s)	Mode	
kruger/liveplant-wwtp/COUNT_MINUTES_OF_DAY	kruger/bmhtest/BIOLOGY.IN.Q.EXCLRETURNSLUDGE	120	Periodic	✖

Start over

Next step

Import Transfers

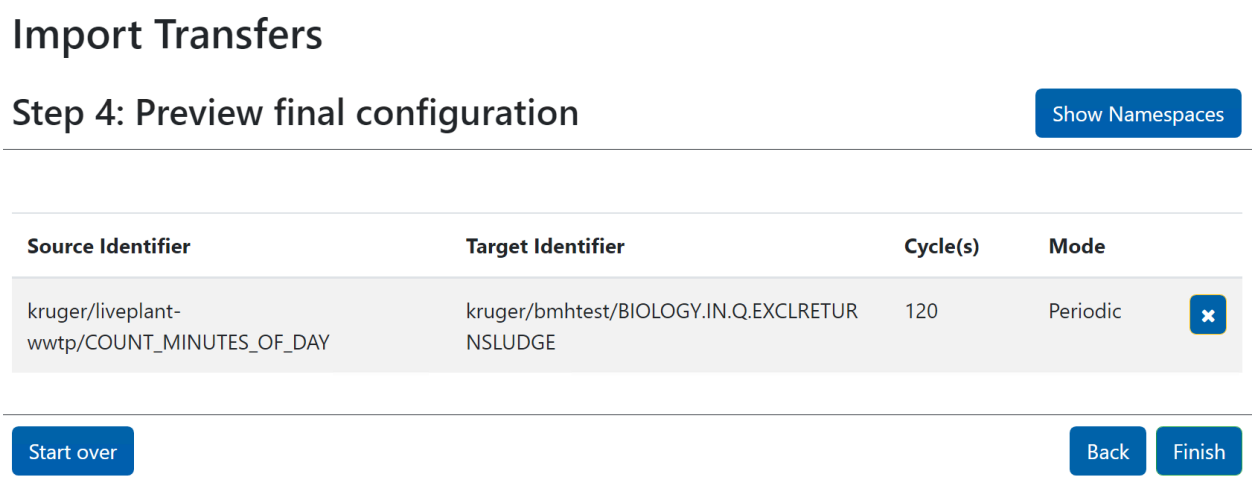
Step 3: Select import mode

- ○ Append, existing transfers will not be over-written
- ◉ Update, existing transfers will be updated and new transfers will be added
- ○ Overwrite transfers for plant 'liveplant-wwtp', all existing transfers for 'liveplant-wwtp' will be dropped

Start over

Next step

- **Append** - Add transfer definitions unless it already exists, in this case do nothing for this specific transfer definition (his option is typically used in case you want to add a few new transfer definitions to your existing configuration).
- **Update** - Add transfer definitions unless it already exists, in this case update the existing transfer definitions (This option is typically used in case you want to change your existing transfer definitions and eventually add a few new transfer definitions).
- **Overwrite** - Remove all existing transfer definitions and add all new transfer definitions.



5 Config options

This page introduse some more advanced config options for the OPC-Bridge, that is rarely used, but still available

5.1 Change port number for web service

Special config option (from opcbridge version 280) The default port for the UI is 8088, if there is already something else running on this port, it is possible to change this by adding a new line in the configuration file, to specify another custom port for this.

guiport=7777

Example:

```
{
"transferDefinitions" : [ ],
"clientDefinitions" : [ ],
"starDefinition" : {
    "id" : "0",
    "name" : null,
    "organization" : null,
    "serverUri" : null,
    "encryptionSecurityMode" : null,
    "username" : "user",
    "password" : "secretPassword",
    "reachable" : null,
    "connected" : false,
    "defaultMode" : null,
    "defaultSamplingInterval" : null,
    "timeout" : 30000,
    "readValues" : false,
    "authenticationType" : 0,
    "certPath" : null,
    "allowSendToServer" : true
},
"guiPort" : 7777
}
```

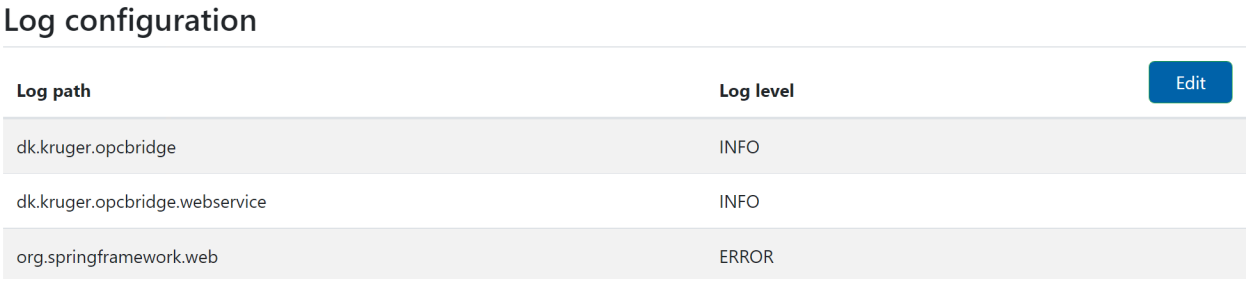
5.2 Limit number of connections on browse

Special config option (from version 111) If the following line in the configfile is added under the specific server definition: “rockwell” = true, then the OPC-Bridge will read one tag at a time instead of in parallel. Browsing large data list will be very slow, and this should only be used, where is is absolutly necessary.

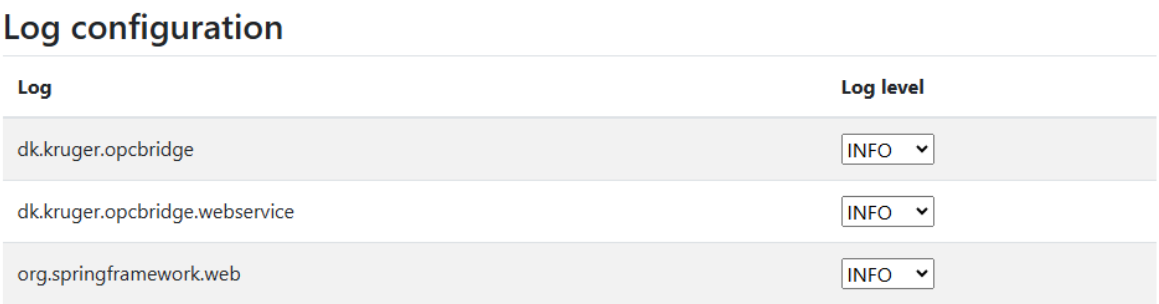
6 Troubleshooting

6.1 Logging

Log files can be found in "%PROGRAMDATA%\KrugerOpcBridge", and will be rotated for every restart of the service. Logging level can be changed by clicking on the wrench, and changing the settings under "Log configuration". When the OPC-Bridge is uninstalled or updated, the logfiles and the config files are not removed.

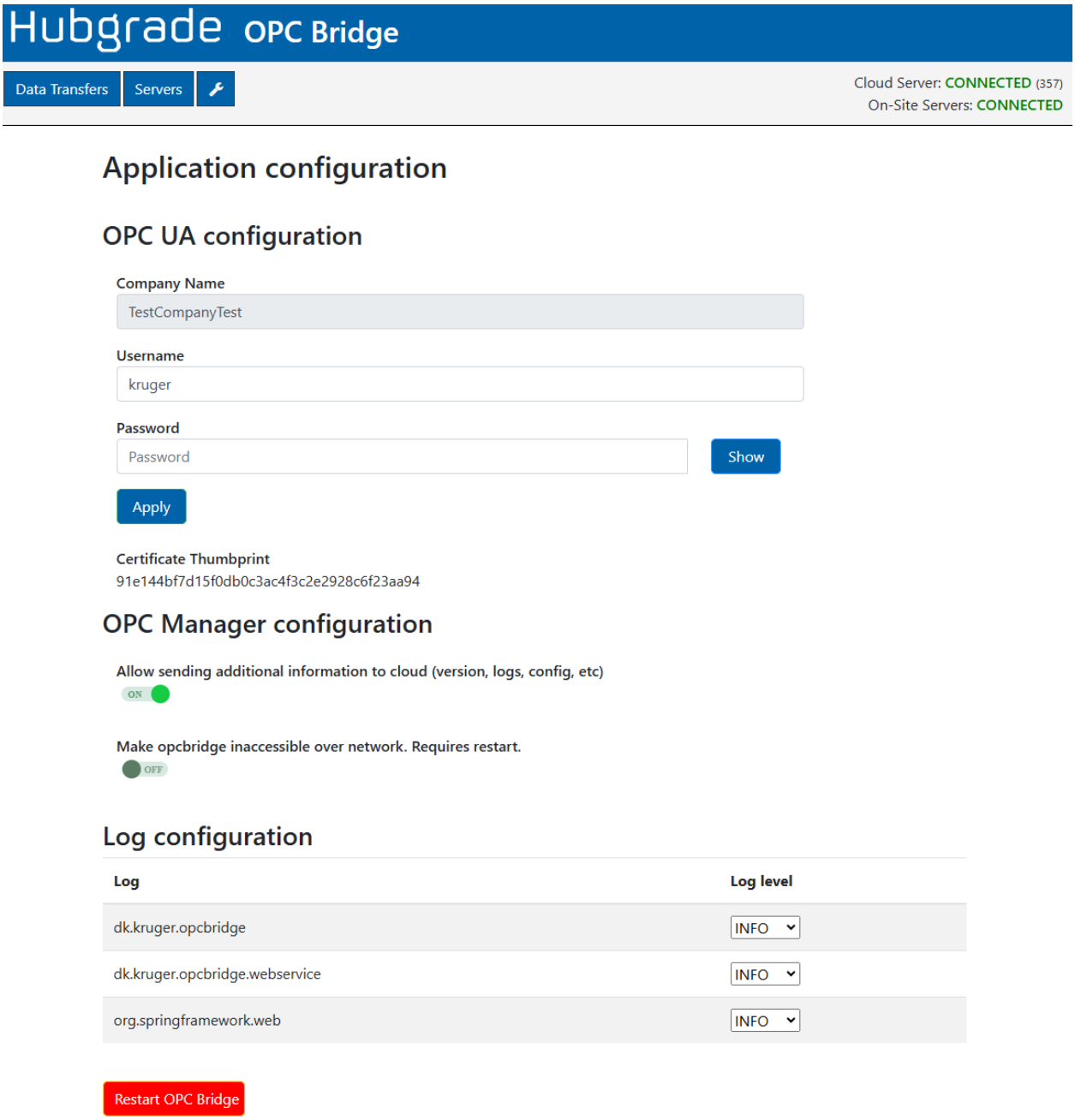


From version 357, it looks like this.



6.2 Restart of OPC-Bridge (from version 357)

To restart the OPC-Bridge from inside the opc-bridge interface, go to the Application configuration. At the bottom of the page, click on the RED "Restart OPC Brigde" button to restart the OPC-Bridge.



6.3 Start/stop of Windows service (any version before 357)

To stop and start the OPC-Bridge, go to the Windows service administration, to stop and start the service. The service name is : KrugerOpcBridgeZZZ, where ZZZ is a number, indicating the version of the OPC-bridge.

6.4 CSV file format

sourceNodeId	targetNodeId	samplingInterval	mode
nsu=http://kruger.dk/STAR/UaNodes;s=kruger/miltest2/COUNT_MINUTES_OF_DAY	nsu=http://kruger.dk/STAR/UaNodes;s=kruger/miltest2/WWTP.OPC-BRIDGE.TESTDATA.NUMINUT	300000	Subscription

File format

The import/export file has a header with the names of each field, followed by a line for each "Data transfer" item.Fields are separated by semicolons.

The header is fixed should look like this:

sourceNodeId;targetNodeId;samplingInterval;mode

Each data transfer line consist om the a field corresponding to the header, and could look like this:

```
"nsu=http://kruger.dk/STAR/UaNodes;s=kruger/miltest2/COUNT_MINUTES_OF_DAY";
"nsu=http://kruger.dk/STAR/UaNodes;s=kruger/miltest2/WWTP.OPC-BRIDGE.TESTDATA.NUMINUT";
↪120000;Periodic"
```

Field description sourceNodeId: The string from where the data is moved from.

targetNodeId: The string to where the data is moved to.

samplingInterval: The time in seconds between the input/output data is moved from/to OPC server. ie. how often the data is transferred.

Mode: The mode used to transfer the data transfer. Possible options are "Periodic" or "Subscription" Periodic: Transfers the data each interval, regardless of any changes of the data. Subscription: Transfers the data each interval, if there is a change in the data value.

If in doubt, use the Periodic option, to force a new data value at each interval.

7 Contact

If you need to contact Veolia Water Tech with technical question or issues on Hubgrade Wastewater Plant Performance or Hubgrade Sewer Performance, you can do so by sending an email to serviceteam@veolia.com. This will create an issue in our ticket management system.