

THE MEASURABLE DIFFERENCE.



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OXYGEN OPC UA

Starting with OXYGEN 8.1, DEWETRON highaccuracy measurement systems natively support the OPC UA standard. This allows for flexible network integration in two primary modes:

- OPC UA Server:
Publishing high accuracy measurement data to the network.
- OPC UA Client:
Receiving data from external devices and thirdparty systems.

This training material explains how to set up an OPC UA server and client.

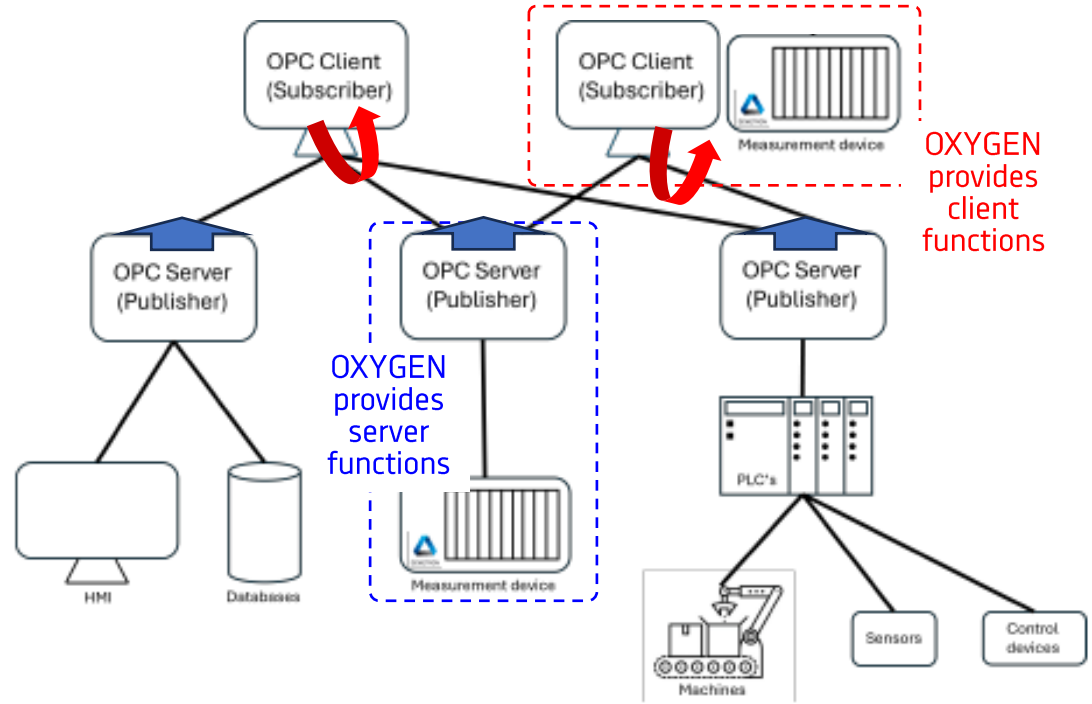


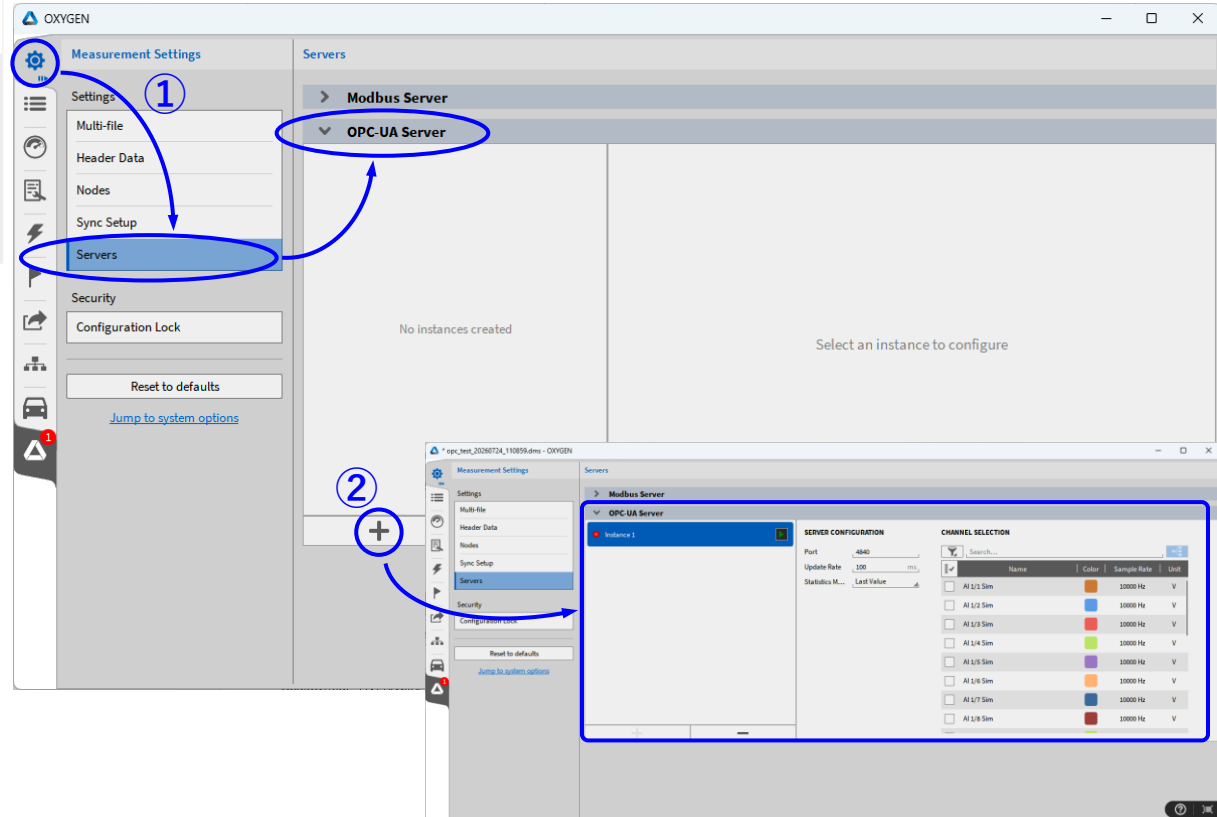
Fig. 3.1: OPC UA schematic

OXYGEN – Setup the OPC UA Server(1/4)



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- 1 Navigate to *Measurement Settings > Servers* and select *OPC UA server*.
- 2 Click + to create a new OPC UA Server instance(click – to delete the instance). The OPC server configuration screen will be displayed. The configuration method will be explained on the following pages.



OXYGEN – Setup the OPC UA Server(2/4)



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③ Configure the OPC UA Server parameters.

- **Port:** Set the communication port (default: 4840). Adjust this to meet your IT or firewall requirements.
- **Update Rate (Global Limit):** Defines the maximum frequency for data processing to manage system load and bandwidth. Make sure that the following parameters are limited to this value or less.
 - Sampling Interval*: [-> Detail slide](#)
 - Publishing Interval*: [-> Detail slide](#)
- **Statistic Mode:** Determines how data is processed for high-frequency channels within the publishing interval:
 - Last Value: Returns the most recent value (default).
 - Minimum / Maximum: Returns the lowest or highest value.
 - Average: Returns the arithmetic mean.
 - RMS: Returns the Root Mean Square value.

SERVER CONFIGURATION ③

Port: 4840

Update Rate: 100 ms

Statistics Mode: Last Value

CHANNEL SELECTION

Search...

☒	Name	Color	Sample Rate	Unit
☐	AI 1/1 Sim	Orange	10000 Hz	V
☐	AI 1/2 Sim	Blue	10000 Hz	V
☐	AI 1/3 Sim	Red	10000 Hz	V
☐	AI 1/4 Sim	Green	10000 Hz	V
☐	AI 1/5 Sim	Purple	10000 Hz	V
☐	AI 1/6 Sim	Yellow	10000 Hz	V
☐	AI 1/7 Sim	Dark Blue	10000 Hz	V
☐	AI 1/8 Sim	Brown	10000 Hz	V

* Attention

Shorter intervals enable faster monitoring, while longer intervals minimize the measurement device's CPU load.

OXYGEN – Setup the OPC UA Server(3/4)



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- ④ Channel Selection: Enable or disable specific measurement channels. Only selected channels are visible in the OPC UA server's address space.

For every channel activated on the OXYGEN OPC UA Server, the following parameters are available to the OPC UA Client:

- *Samplerate*: The actual acquisition rate of the channel within OXYGEN (independent of the OPC UA publishing or sampling intervals).
- *Usable*: the channel status in OXYGEN: 1 (Active) or 0 (Inactive/Deactivated).
- *ScaleFactor*: The scaling factor applied to the channel in OXYGEN.
- *ScaleOffset*: The scaling offset applied to the channel in OXYGEN.
- *Measurement*: The actual measurement value of the channel.

SERVER CONFIGURATION

Port: 4840

Update Rate: 100 ms

Statistics Mode: Last Value

CHANNEL SELECTION ④

Filter: Analog Search...

	Name	Color	Sample Rate	Unit
☒	AI 1/1 Sim	Orange	10000 Hz	V
☐	AI 1/2 Sim	Blue	10000 Hz	V
☐	AI 1/3 Sim	Red	10000 Hz	V
☒	AI 1/4 Sim	Green	10000 Hz	V
☐	AI 1/5 Sim	Purple	10000 Hz	V
☐	AI 1/6 Sim	Orange	10000 Hz	V
☐	AI 1/7 Sim	Dark Blue	10000 Hz	V
☐	AI 1/8 Sim	Dark Red	10000 Hz	V

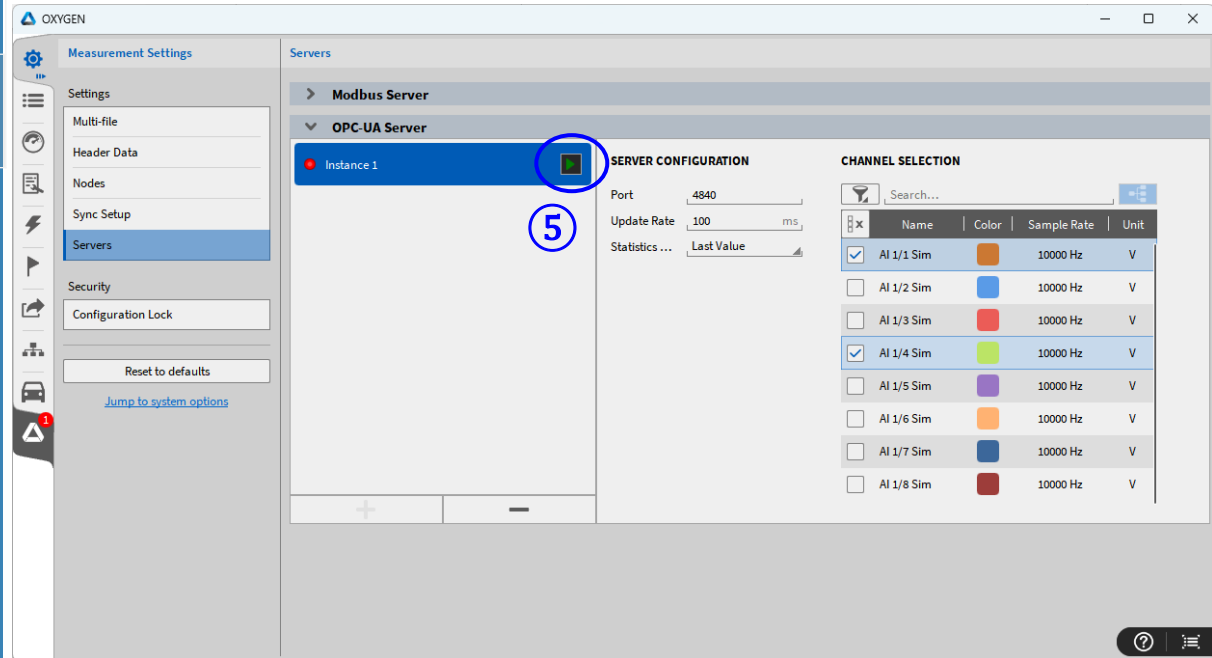
OXYGEN – Setup the OPC UA Server(4/4)



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- ⑤ Click the Play button to start the server.
The status icon will change “▶” to “◻”.

The setup of the OPC UA server is now complete.



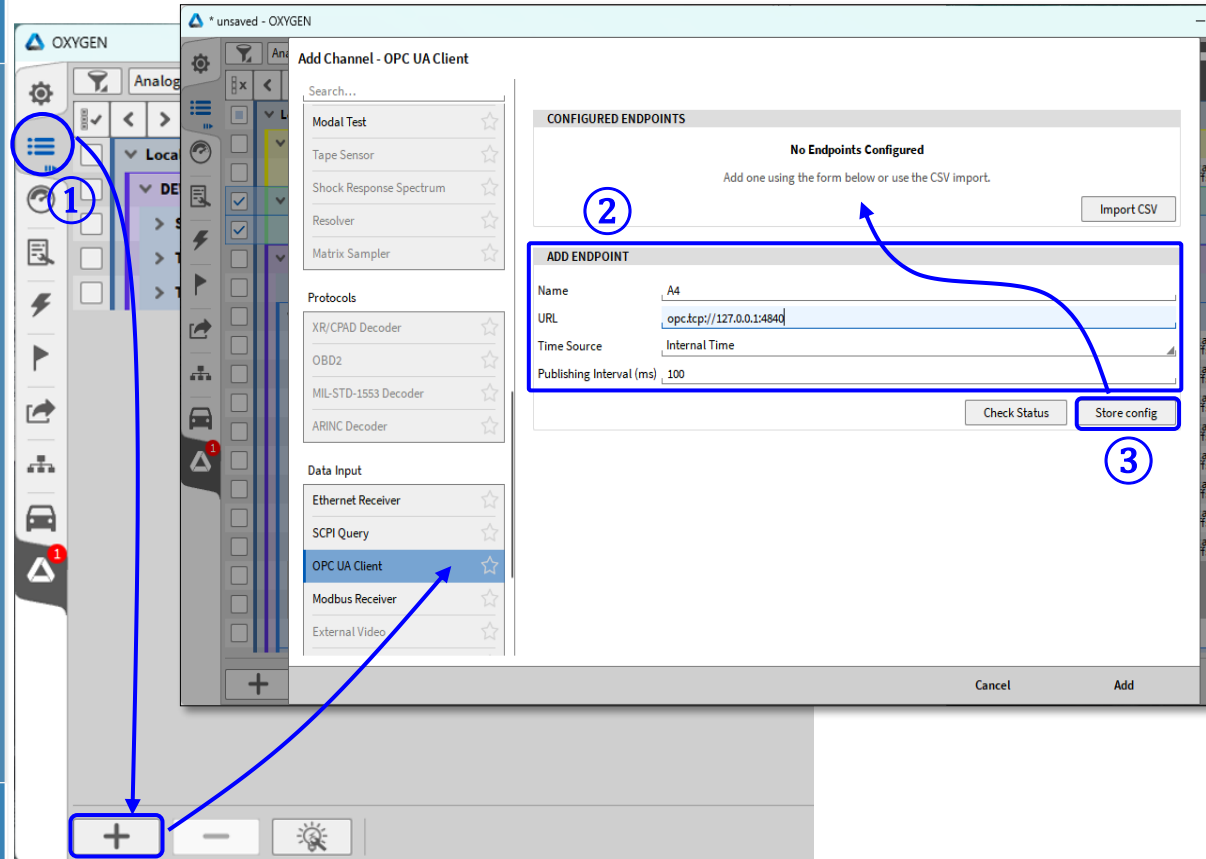
OXYGEN – Setup the OPC UA Client(1/5)



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- 1 Open the OXYGEN channel list, click the + button, and select *OPC UA Client* from the *Data Input* section.
- 2 When adding a new Endpoint, enter the following parameters from the *Add Endpoint*. If you have already registered the Endpoint, please proceed to 4.
 - Name: Enter a unique identifier for the OPC UA Server.
 - URL: Enter the OPC UA Server address and port number(e.g., `opc.tcp://127.0.0.1:4840`).
 - Time Source: Define how data is timestamped:
 - * *Internal Time*: Uses the local OXYGEN time upon data reception.
 - * *Reported Time*: Uses the OPC UA Server's timestamp. Ensure the OPC UA Server is synchronized and provides timestamps in UTC to avoid data inconsistency.
 - Publishing Interval: Set the cycle rate in [ms] for data subscriptions. The minimum/maximum limits are defined by the connected OPC UA Server.
- 3 Clicking the *Store Config* button will add new entry in the configured Endpoint list.

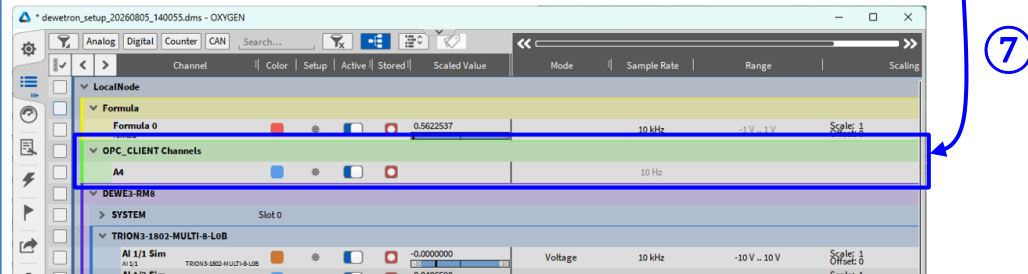
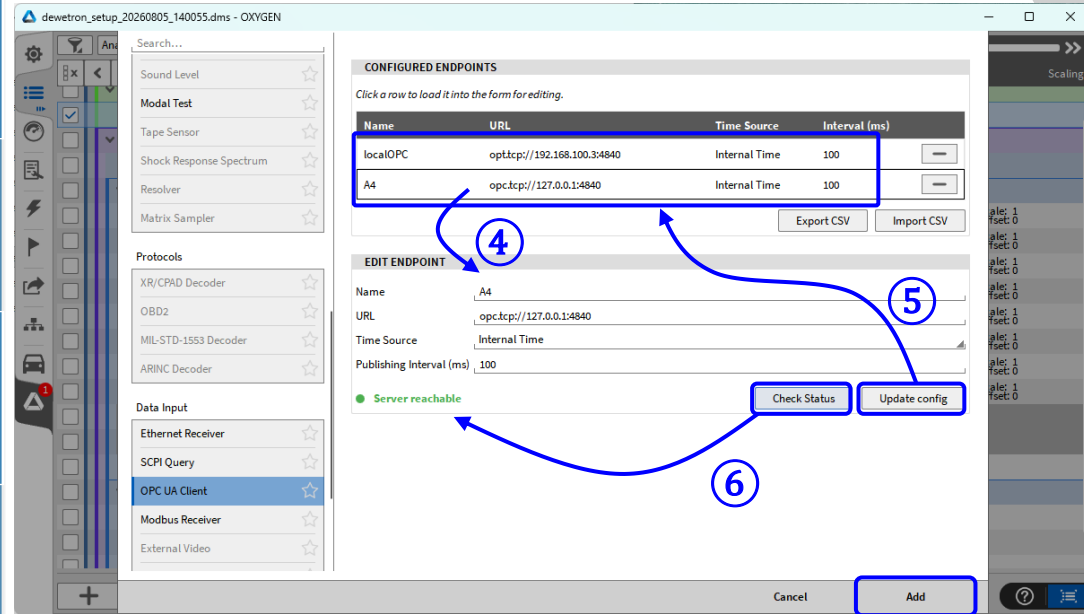


OXYGEN – Setup the OPC UA Client(2/5)



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- ④ Select Endpoint:
If there are already registered Endpoints, you can select from the *Configured Endpoints*.
- ⑤ The configuration of the selected endpoint are displayed in *Edit Endpoint*. Clicking the *Update Config* button will reflect the changes in the registered list.
- ⑥ Click *Check Status* to verify connection. The system will display “Server reachable”(green) or “Server not reachable”(red).
- ⑦ Click *Add* to finalize. The OPC UA Client will appear as a new section in the OXYGEN channel list.



OXYGEN – Setup the OPC UA Client(3/5)



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① Click the gear icon to modify an existing OPC UA Client.

② Check the connection status. The client provides realtime status feedback for troubleshooting

- Server not reachable
- Not connected
- Connected

③ Security settings follow the standard OPC UA protocol. The client automatically queries the server for available endpoints and security policies.

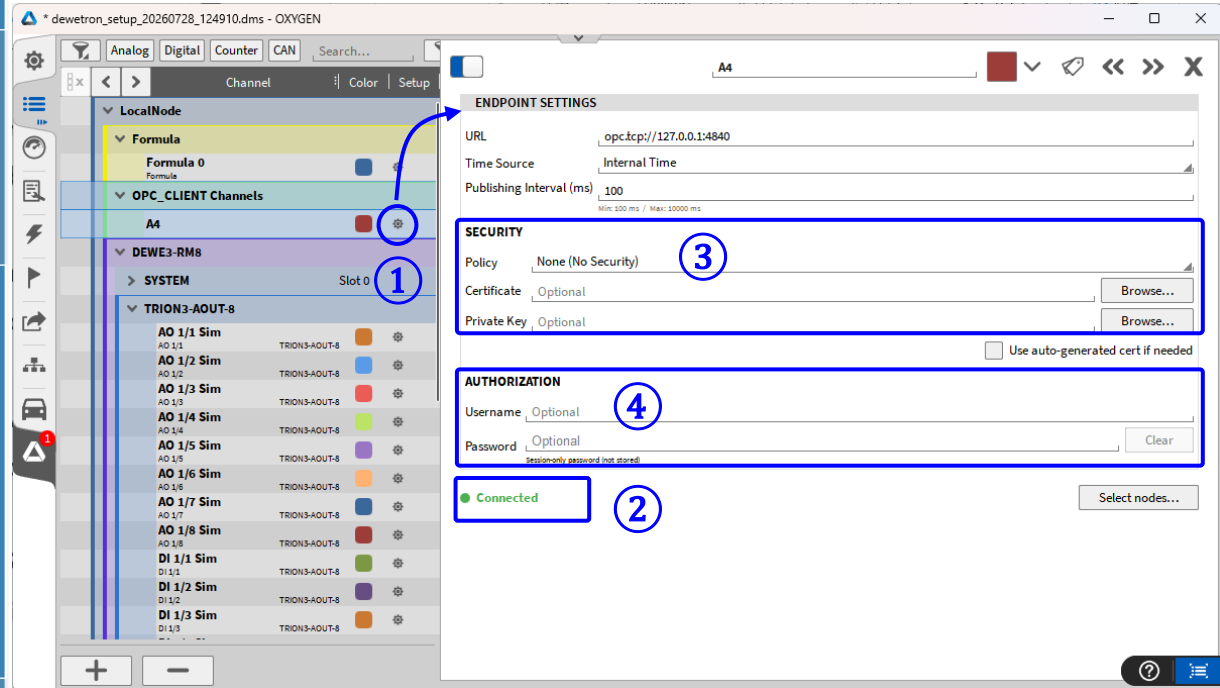
Certificate Handling:

- **Automatic Generation:** Simplifies setup; recommended for most scenarios.
- **Manual Provisioning:** Used for environments with strict security or PKI requirements. Manual certificates must be explicitly enabled.

④ Authentication

Two authentication modes are available:

- Anonymous: No credentials required.
- Username/Password*: Required if the server restricts access.

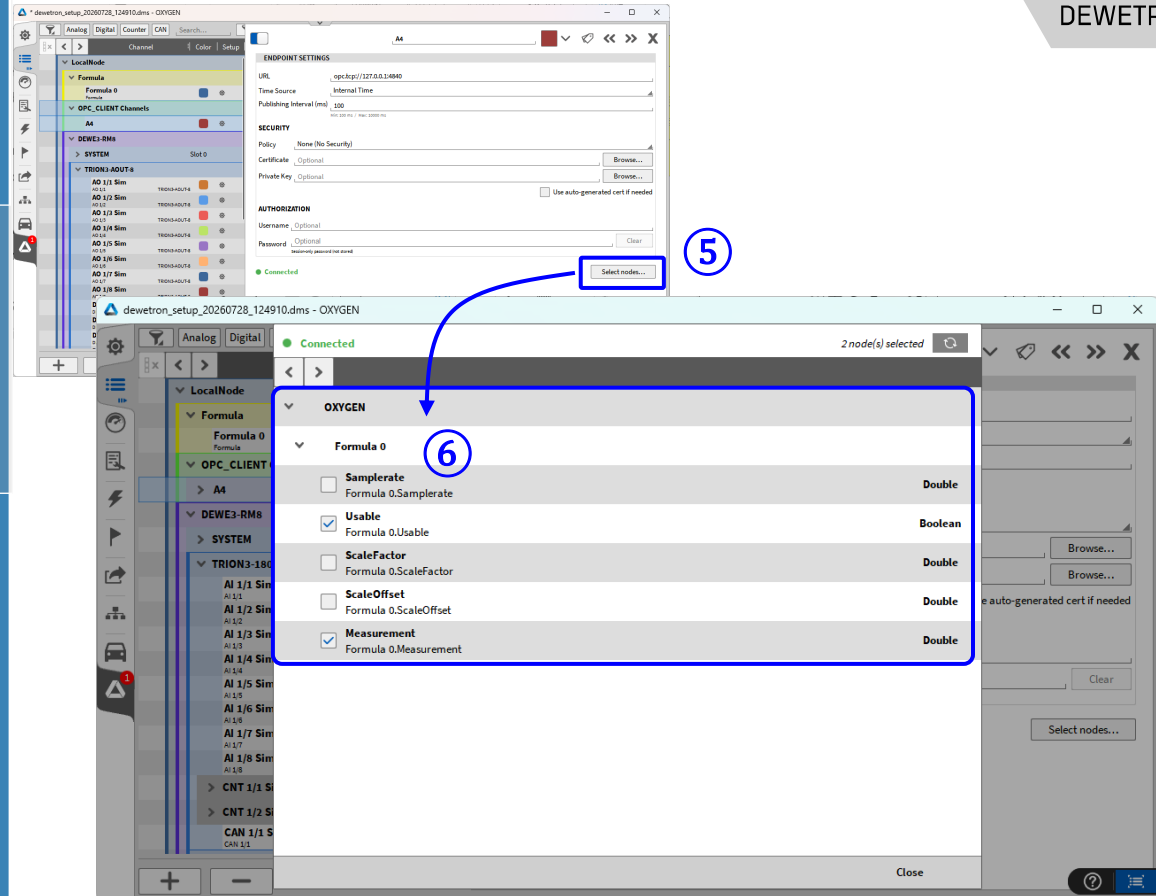


* For security reasons, passwords are not stored. They must be re-entered after restarting the applications.

OXYGEN – Setup the OPC UA Client(4/5)

⑤ After configuring the server, click *Select Nodes* to choose the channels for subscription. Data acquisition is managed via the standard OPC UA subscription mechanism.

⑥ Node Selection: All available nodes are displayed in a tree view. The structure and available objects depend on the specific OPC UA Server implementation. For details on parameters provided by an OXYGEN OPC UA Server, refer to the Setup the OPC UA Server in this material.



OXYGEN – Setup the OPC UA Client(5/5)



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- 1 Once a node is selected, channels appear in the OXYGEN channel list under the respective *OPC_CLIENT Channels* section.
- 2 Click each gear icon of a channel to edit its configuration.
- 3 Following parameters can be configured in *Properties*.
 - *Sampling Interval [ms]*: Defines how often the server samples the data. Example: A Sampling Interval of 20 ms combined with a Publishing Interval of 100 ms means the server sends a packet every 100 ms containing 5 sampled values for that channel.
- 4 Following parameters can be configured in *Sensor scaling*.
 - *Scaling type*: Individual scaling can be applied to each channel in the scaling section.

OXYGEN – OPC UA: Points to Note and Considerations



- **Buffering and Update Behavior**

The client utilizes buffering (queueing) for monitored items to prevent data loss during temporary communication delays or highspeed updates. Data is recorded whenever a value or its timestamp changes. This ensures consistent timeseries recording even if the measurement value remains constant.

- **General Usage Notes**

To ensure reliable operation, consider the following:

- **Server Implementation:** The client requires a standard-compliant OPC UA service implementation on the server side
- **Stable Identifiers:** Use stable node identifiers to ensure consistent automatic reconnection.
- **Security:** Align security policies with your specific network deployment requirements.
- **Time Sync:** Verify OPC UA Server time synchronization when using “Reported Time” (OPC UA Server timestamps). When using OPC UA Client-side (“Internal Time”) timestamps, note that data may be delivered in batches (depending on OPC UA queue size and publishing interval). As a result, multiple values may share very similar or identical client timestamps, even if they were sampled at different times on the server. Ensure both server and client system clocks are correctly synchronized. It is recommended not to use manually adjusted or unsynchronized system time, as this may result in incorrect or misleading timestamps, especially when working with the reported time of the OPC UA Server.

- **Performance Considerations**

The OXYGEN OPC UA Client is verified for high-performance scenarios, including millisecond-level sampling. However, actual performance is influenced by:

- Server processing capabilities and system load.
- Network bandwidth and latency.
- The ratio between sampling and publishing intervals.

Recommendation: Always balance sampling and publishing intervals to match your hardware and network infrastructure.