APPLICATION EXAMPLE

Integration and Usage of the WinCC OA MQTT Explorer and Importer Tool

SIMATIC WinCC Open Architecture

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Mqtt V>5.10.1	Yes	MIT	https://www.npmjs.com/package/mqtt#license

Table 0-1 OSS Packages

Contents

1. Introduction

1.1. Overview

This tool facilitates seamless integration with MQTT brokers, allowing users to subscribe to specific topics and explore available topics within the broker. Users can import the entire broker content for example a full UNS structure or individual topics into their system. Either manually, by clicking on Import, or automatically, the tool dynamically detects and imports new topics as they appear in the broker.

1.2. Components used

This application example has been created with the following hard- and software components:

Component	Number	Article number
WinCC OA 3.20 Server Basis	1	6AV6355-1AA50-0BA0
WinCC OA V3.20, Para Standard	1	6AV6355-1AA50-0CH0
WinCC OA - 1k PowerTags	1	6AV6355-1AA50-0BB0
WinCC OA - Std. Protocol (Connectivity)	1	6AV6355-1AA50-0DN0

Table 1-1 WinCC OA licenses

You can purchase these components from the Siemens Industry Mall.

This application example consists of the following components:

Component	File name	Note
Manual	WinCCOAMqttExplorerAndImporterExample.pdf	This document
Subproject WinCC OA	WinCCOAMqttExplorerAndImporterTool.zip	Subproject for WinCC OA
Example Project WinCC OA	WinCCOAMqttExplorerAndImporterExample.zip	Pre-configured project for testing the example in WinCC OA

Table 1-2 Application Example content

2. Engineering

2.1. Project integration

2.1.1. System requirements

- WinCC OA Version 3.20 P4 or higher installed and valid license (incl. Para)
- Installed WinCC OA JavaScript Manager for Node.js WinCC OA JavaScript Manager for Node.js
- Minimal system requirements for WinCC OA (see WinCC OA Documentation)

2.1.2. Installation WinCC OA

To carry out the installation of WinCC OA, please follow the steps in the WinCC OA documentation.
You can find the documentation under following link: Installation of WinCC OA

2.1.3. Preparation

Unpack the supplied ZIP archive "WinCCOAMqttExplorerAndImporterTool.zip" into the folder where the project is to be created.
The ZIP-archive contains the folder: WinCCOAMqttExplorerAndImporterTool: The MQTT Explorer and Importer subproject

2.1.4. Creating a WinCC OA Project

To create your own project and use it with the MQTT Explorer and Importer tool, the following steps can be performed:

1. Start the WinCC OA Project Administrator and create a new WinCC OA project

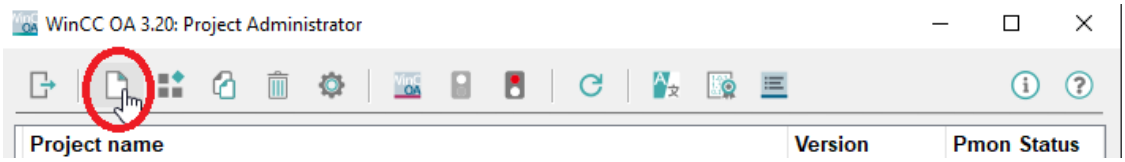

Figure 2-1 Project Administrator

2. Select the option “Legacy Standard project“ and click “Next“

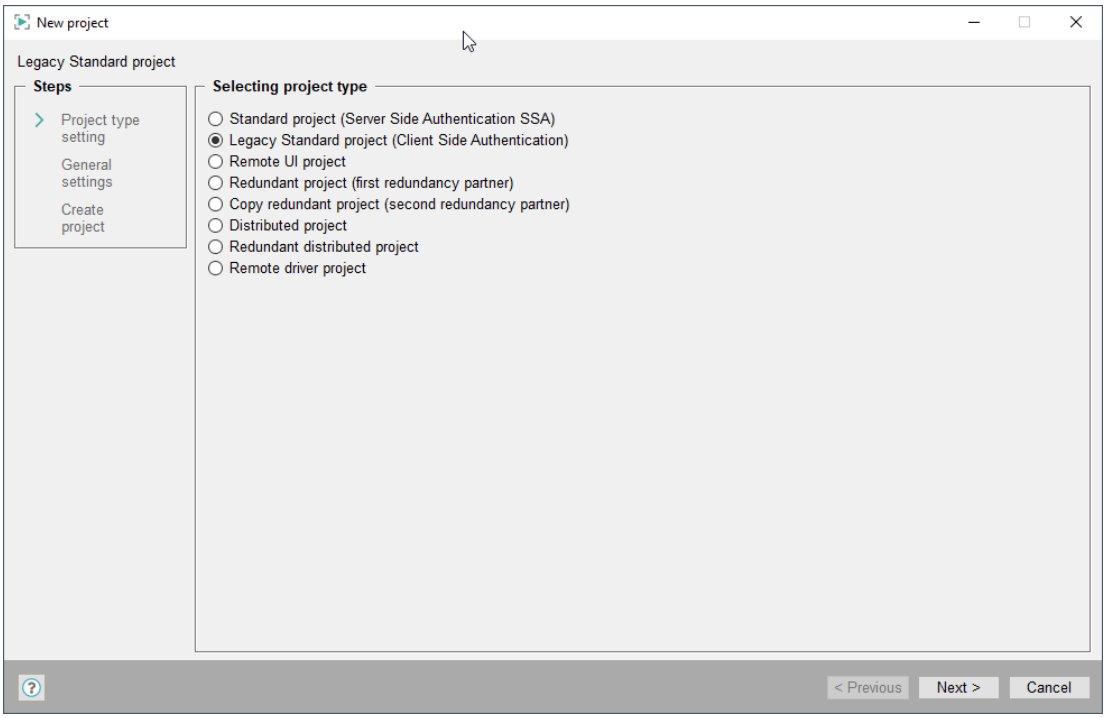

Figure 2-2 Project type selection

3. Enter a project name and select “Englisch – US“ as project language. Define your project path, select “Use SQLite“, and click „Next“.

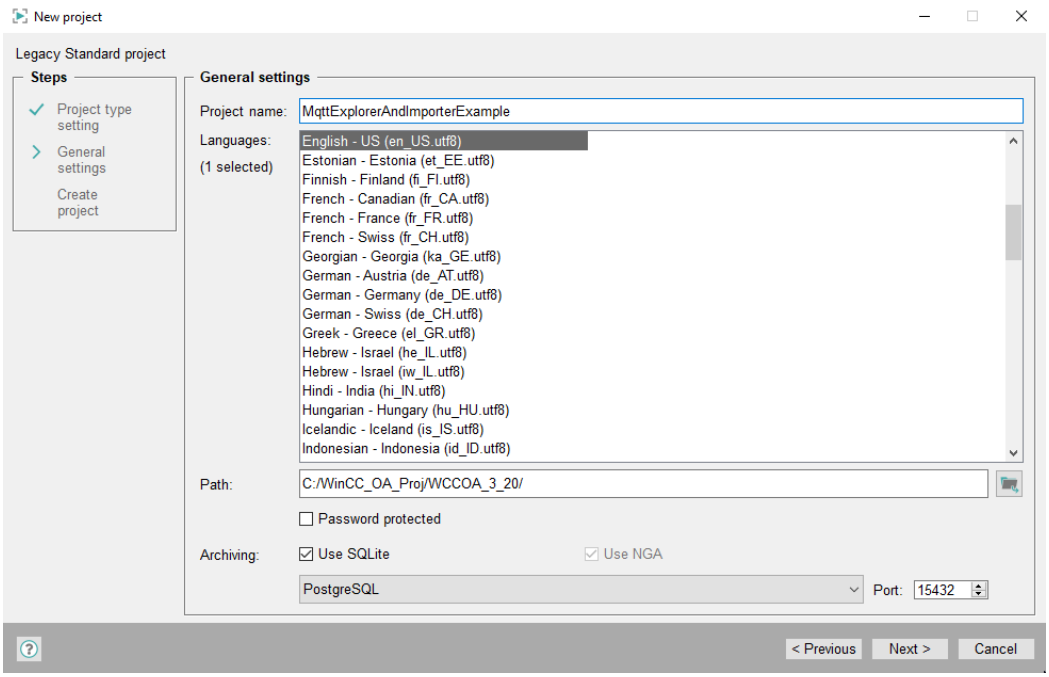

Figure 2-3 General settings

4. Click “OK“ to finish the creation of the new project

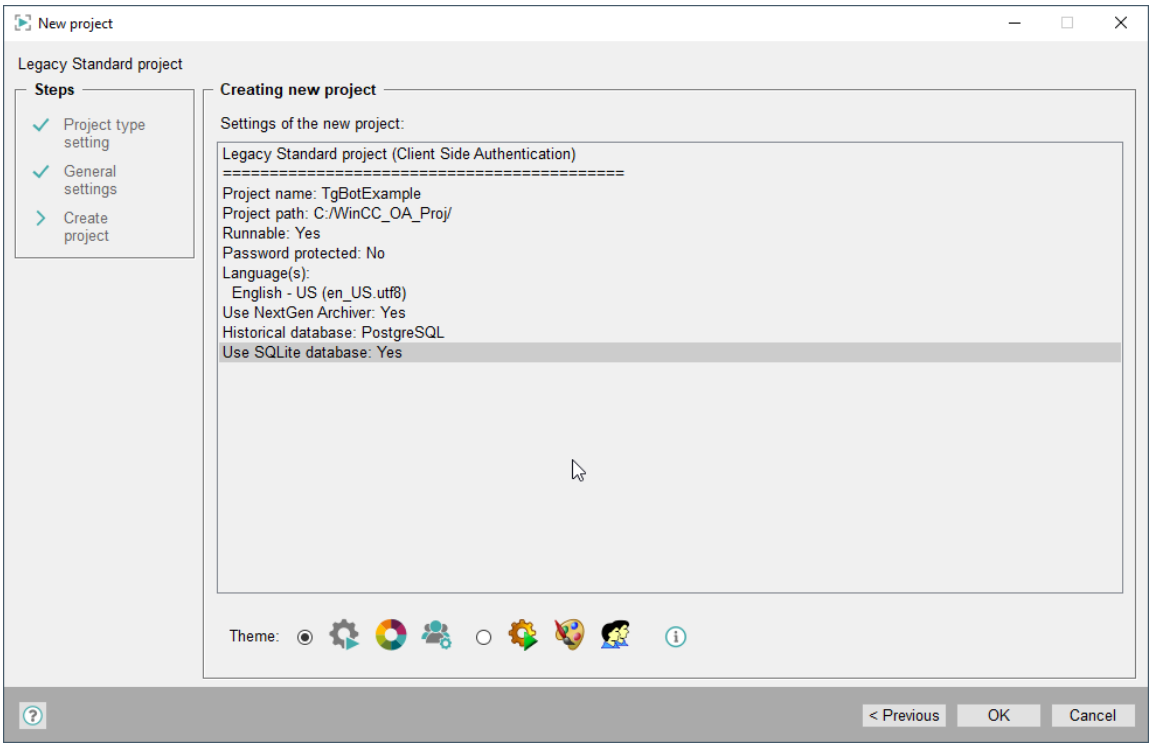

Figure 2-4 Project creation summary

5. After clicking on “OK”, a dialog opens, which allows you to set a password for the “root” user. When “Yes” is selected, another dialog opens, where you can enter the desired password.

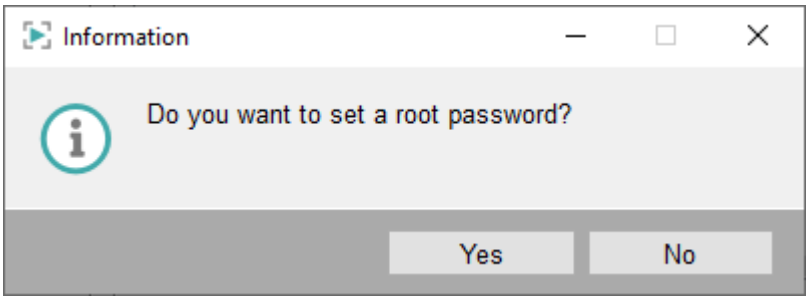

Figure 2-5 Set root user password

6. The WinCC OA “Project Administrator” now shows your newly created project.

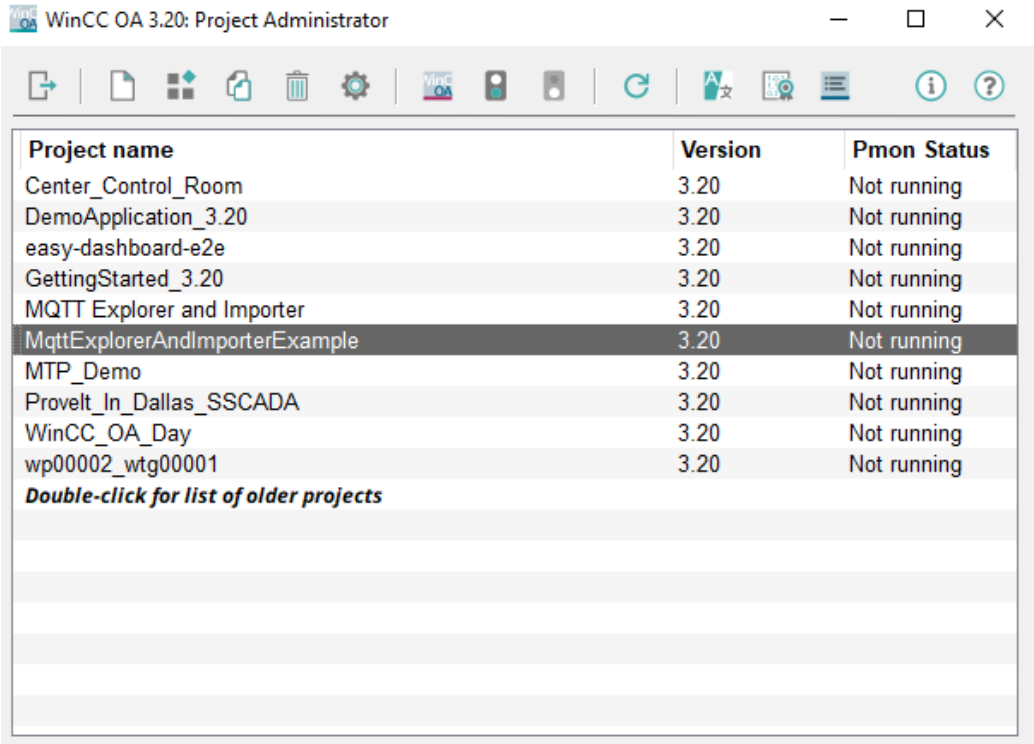

Figure 2-6 Project Administrator with new project

2.1.5. Registration and integration of the MQTT Explorer and Importer as a WinCC OA subproject

1. In the WinCC OA Project Administrator click on  (see Figure 2-6) to register a new project. From the previously created folder in the section 2.1.3, select the folder “MqttExplorerAndImporterTool “, deselect the checkbox “Runnable“, and click on OK.

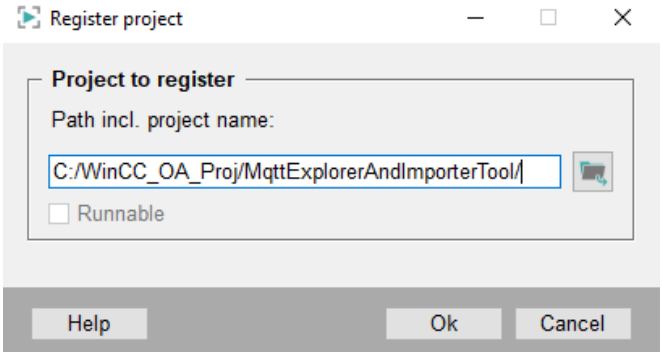

Figure 2-7 Project registration dialog

The subproject is now registered.

Attention: Subprojects (not runnable projects) do not appear in the WinCC OA Project Administrator!

2. To assign the registered subproject to your project, first select your created project in the “Project Administrator” panel, then click in the WinCC OA project administrator on  to open the project properties.

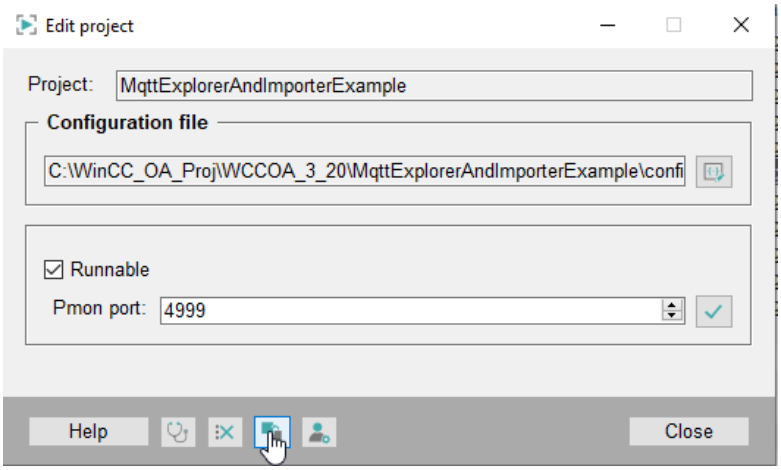

Figure 2-8 Project editing dialog

Now click on  to display the available subprojects.

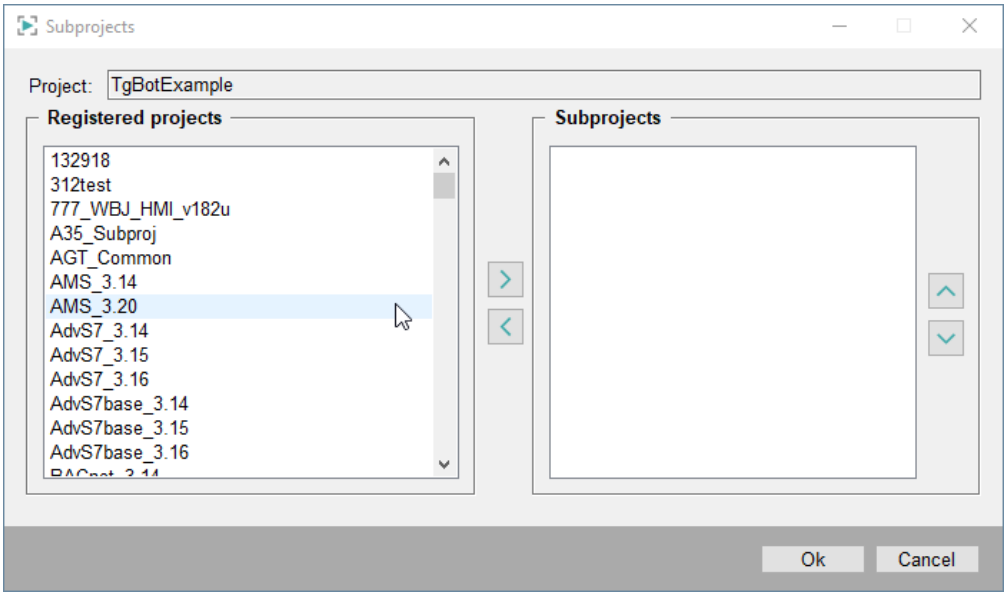

Figure 2-9 Manage subprojects

Select the subproject " MqttExplorerAndImporterTool " then move it by means of  to the right list

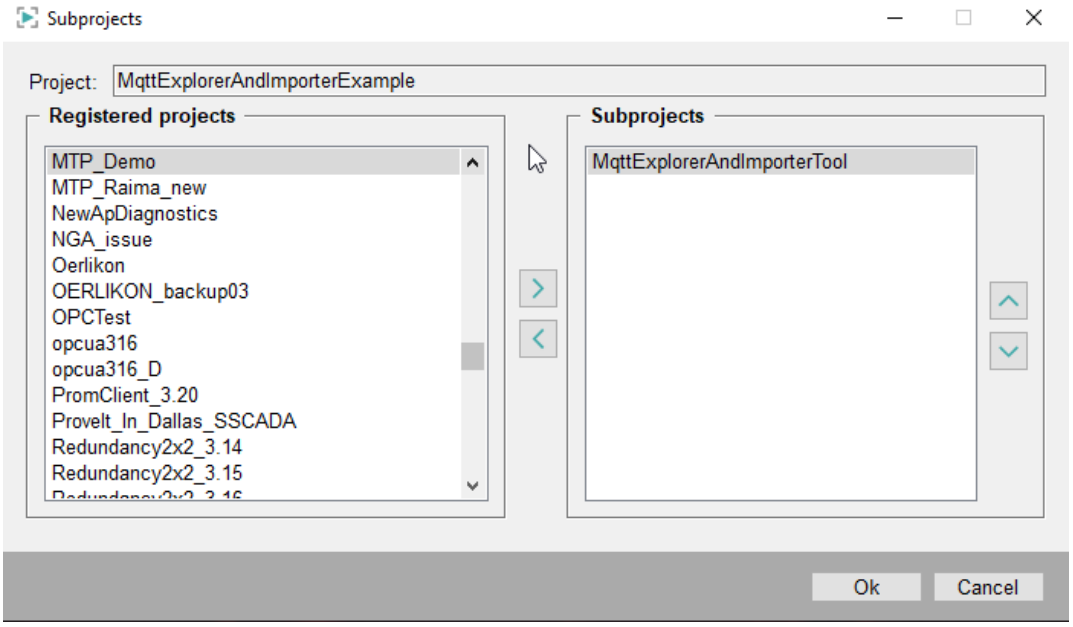

Figure 2-10 Include the subproject into your project

Click "OK" and "Close".

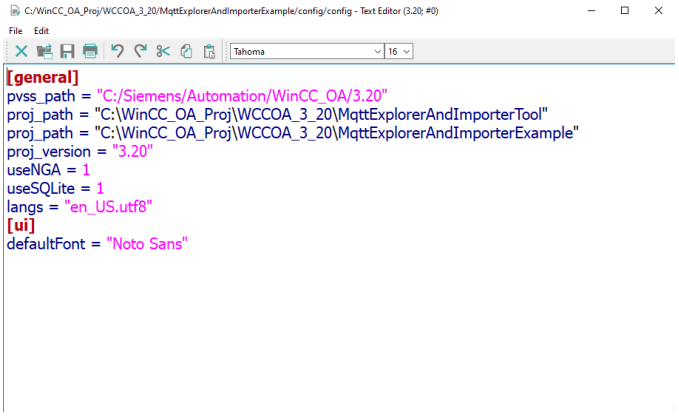

Figure 2-11 Project config file – Order of projects / subprojects

2.1.6. Setting up the MQTT Explorer And Importer Tool

2.1.6.1. Installation of Dependencies

To install all dependencies the PowerShell command “npm install” should be executed in the following path “MqttExplorerAndImporterTool\javascript\mqtt_topic_collector”, the registered subproject from the folder in the section 2.1.3.

2.1.6.2. WinCC OA Configuration

1. Run the project using the start button in the Project Administrator 

   In the GEDI open the “MQTT_Explorer_And_Importer.pnl” panel from the subproject.

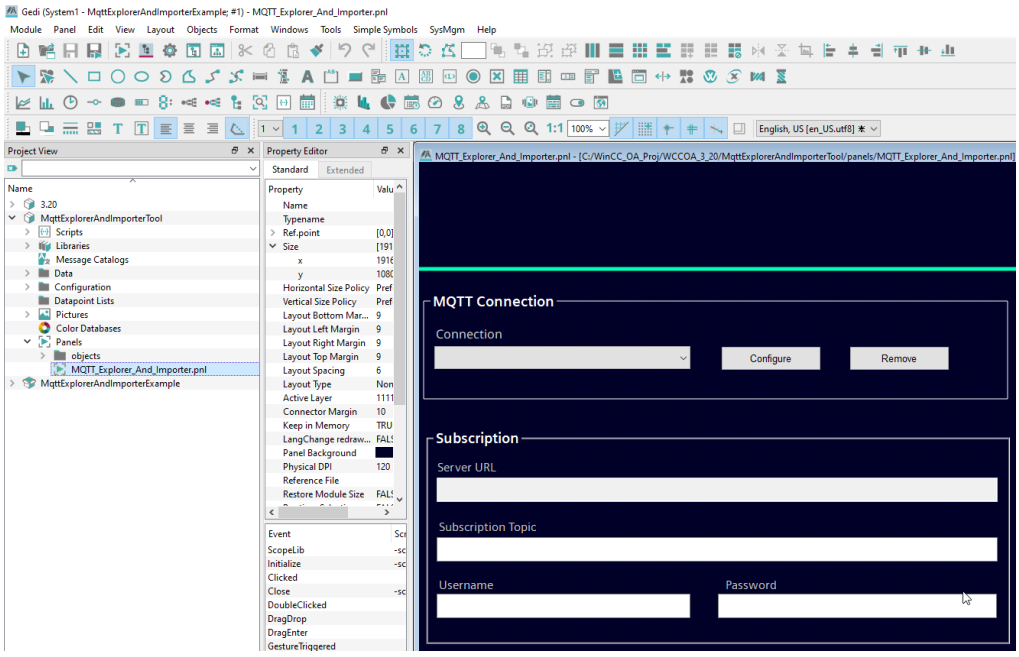

Figure 2-12 GEDI – MQTT_Explorer_And_Importer.pnl

2. After openning the “MQTT_Explorer_And_Importer.pnl”, run it using the following icon in GEDI  (Save and run in QuickTest).

   Note: No need to save the panel in the project when trying to run it.

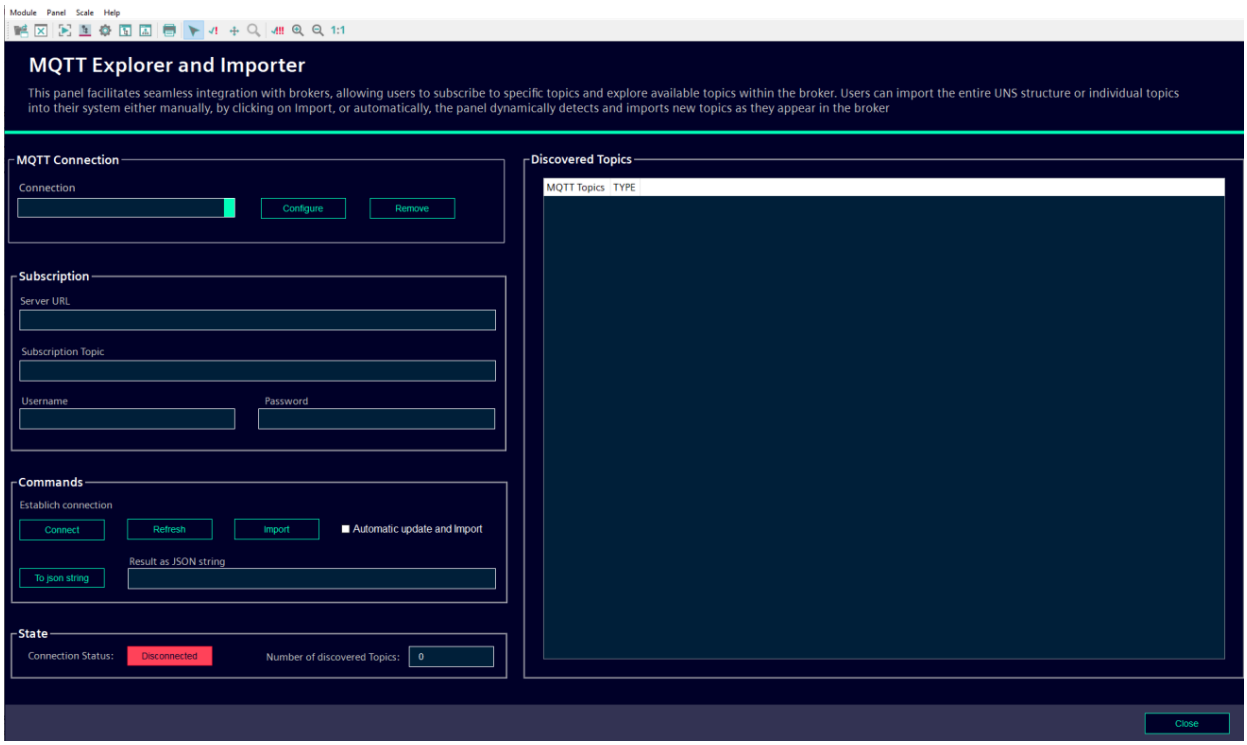

Figure 2-13 Starting “MQTT_Explorer_And_Importer.pnl” Panel

Note: After starting the Panel a DPT (Data Point Type) “MqttBrokerBrowse” and DP (Data Point) “MqttBrokerInformation” will be created automatically to be used with the tool, make sure that the DPT and DP is successfully created in your PARA:

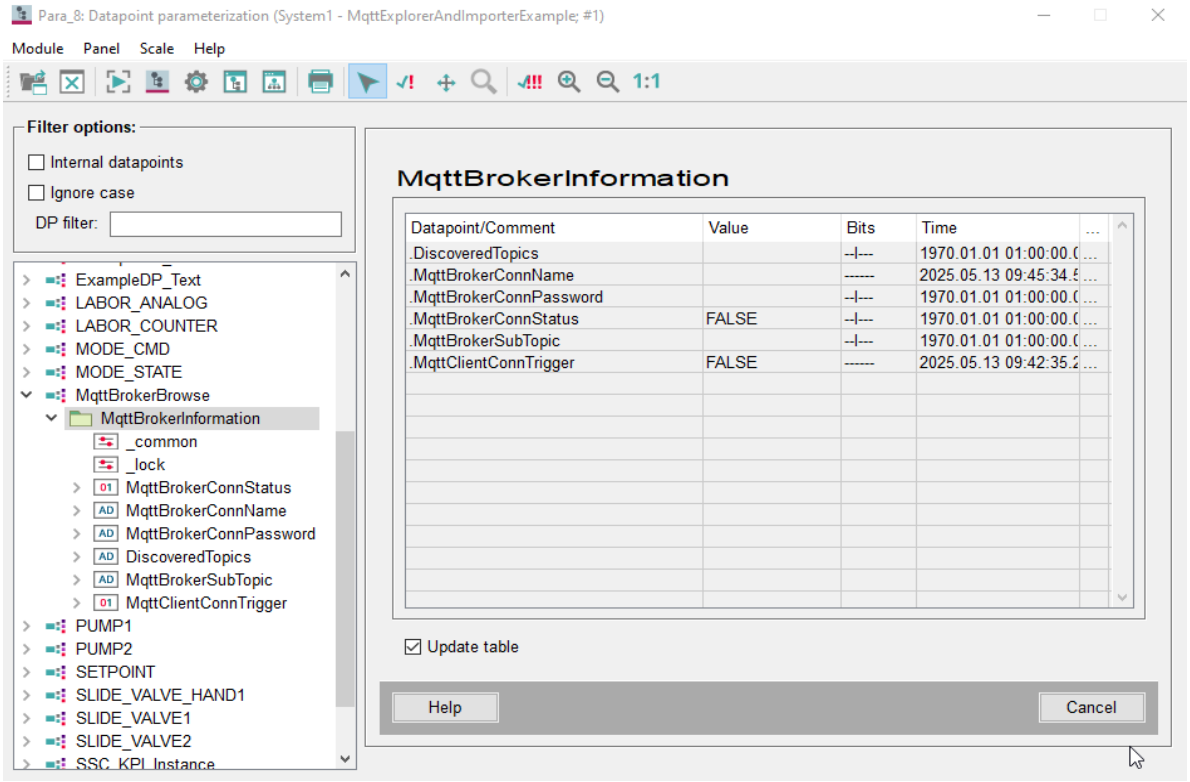

Figure 2-14 Created DPT and DP

3. In the WinCC OA Console:

    a. Add and start a new JavaScript Manager with the options: “mqtt_topic_collector/mqttTopicCollector.js”.

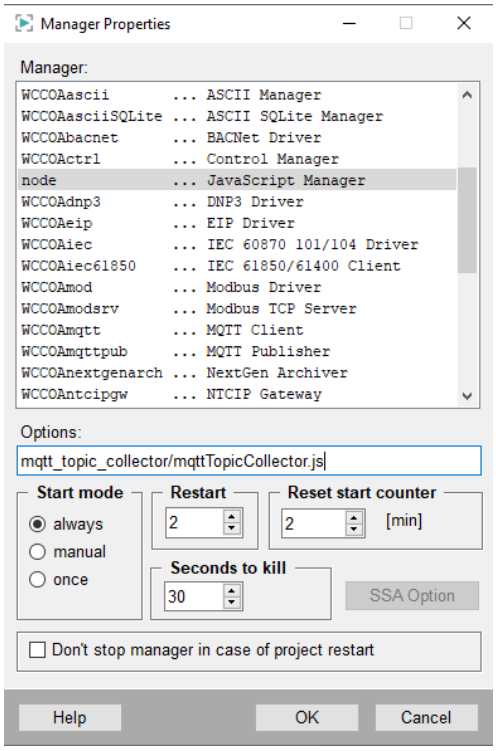

Figure 2-15 Add a new NodeJS Manager

    b. Add and start a new MQTT client and give it a different number than 1, for example -num 2 as Manager option.

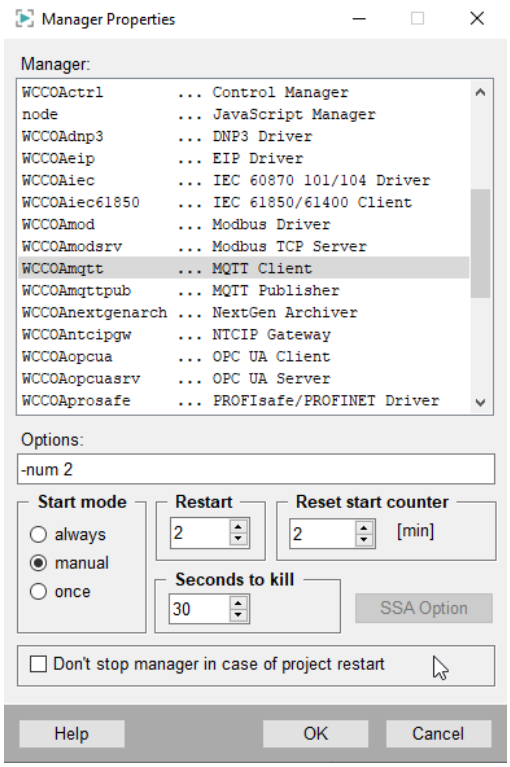

Figure 2-16 Add a new MQTT Client

2.2. Operation

This section provides a step-by-step guide on how to configure and use the “WinCC OA MQTT Explorer and Importer tool”. Explore your broker content, import it manually on demand or automatically dynamic as they appear.

2.2.1. Configuring the MQTT Client Connection

2.2.1.1. Open the Panel

- Start the “MQTT_Explorer_And_Importer.pnl” Panel.
- Click on the "Configure" button in the MQTT Explorer and Importer panel.
- A standard WinCC OA configuration panel will appear.

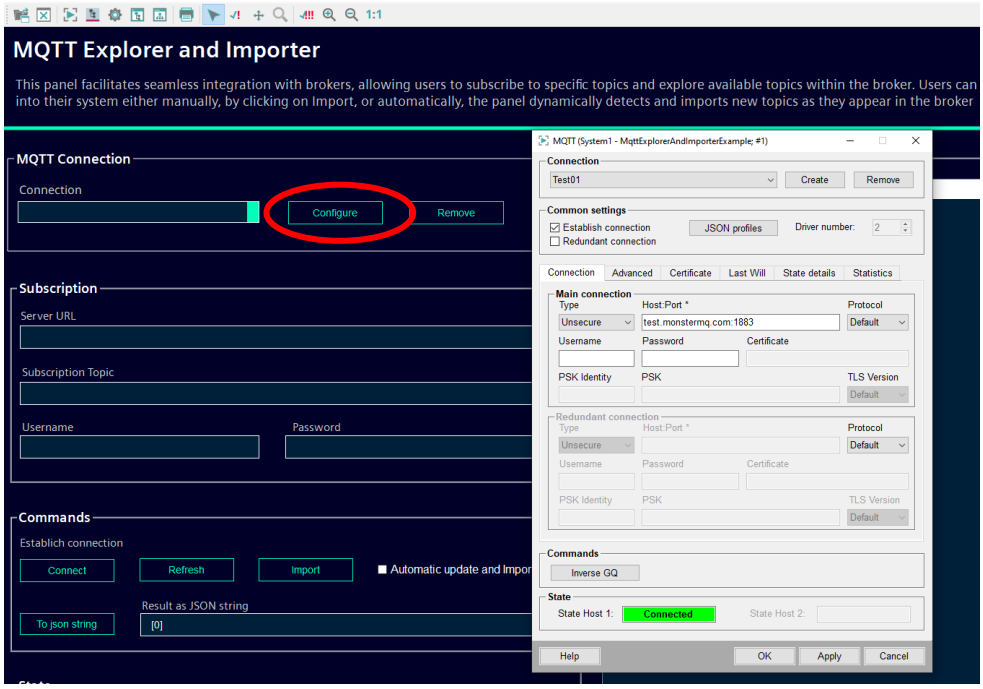

Figure 2-17 MQTT Connection configuration

2.2.1.2. Enter Broker Details

- **Driver number**: Enter the number of the MQTT Driver.
- **URL**: Enter the broker URL.
- **Port**: Enter the port number.
- **Username**: Enter the username (if required).
- **Password**: Enter the password (if required).
- **Establish connection**: enable the check box to establish the connection.

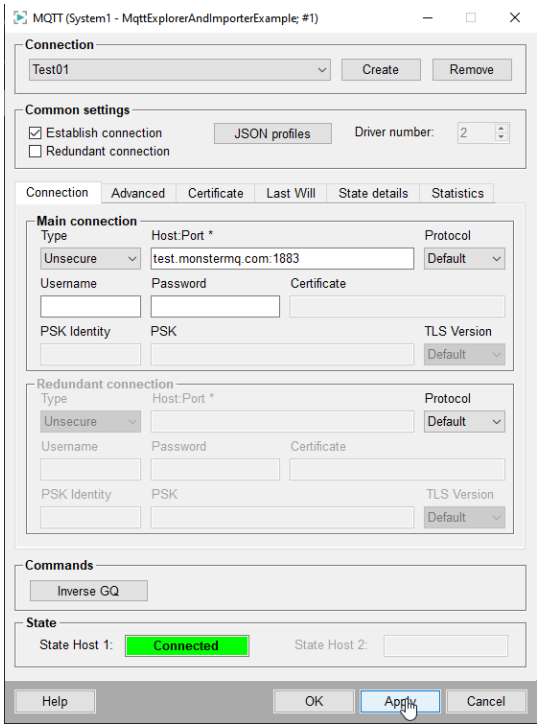

Figure 2-18 MQTT Connection configuration

Note: the MQTT Client connection is needed for the Import of the Broker Topics (UNS structure) for the Config _Address of the DPEs (Data Point Elements).

2.2.1.3. Save and Close

- Click **“Apply”** and **"OK"** to save the configuration and close the panel.

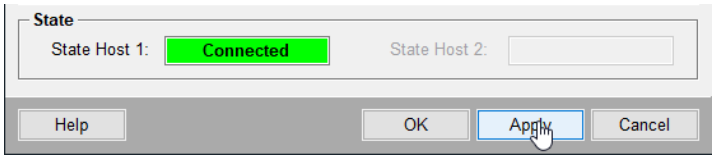

Figure 1-19 MQTT Connection configuration

2.2.2. Subscribing to Topics

2.2.2.1. Enter a Subscription Topic:

- In the "Subscription" section, enter the topic you want to subscribe to.
- To see all topics, enter "#" as a wildcard.

Figure 2-20 MQTT Connection configuration

2.2.2.2. Enter Credentials:

- Enter the **Username** and **Password** (if required).

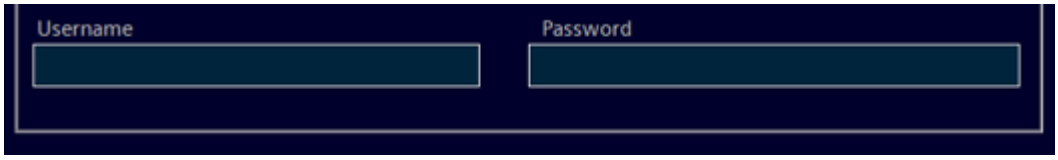

Figure 2-21 Broker subscription

2.2.2.3. Connect the Node.js MQTT Explorer to the Broker

- Click the **Connect** button.
- If the connection is successful, the status will turn green, and display **"Connected"**.
- If the connection fails, the status will be red, and display **"Disconnected"**.

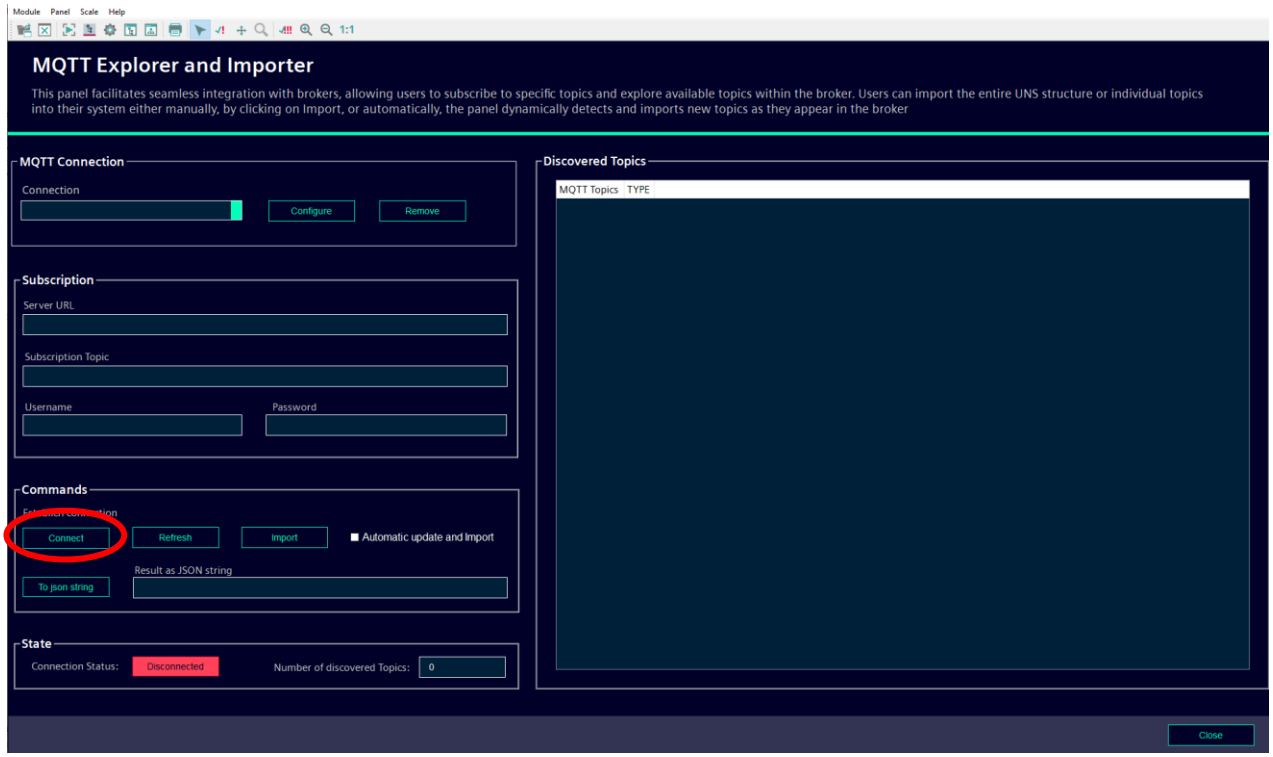

Figure 2-22 Broker subscription

2.2.3. Exploring and Importing Topics

2.2.3.1. Explore Topics:

- Once connected, the topics will be displayed in a tree structure on the right side of the panel.
- The number of discovered topics is updated every second and displayed in the state section, to be able to see the current topics the **Refresh** button should be clicked.
- Click **Refresh** to update the tree with the latest topics.

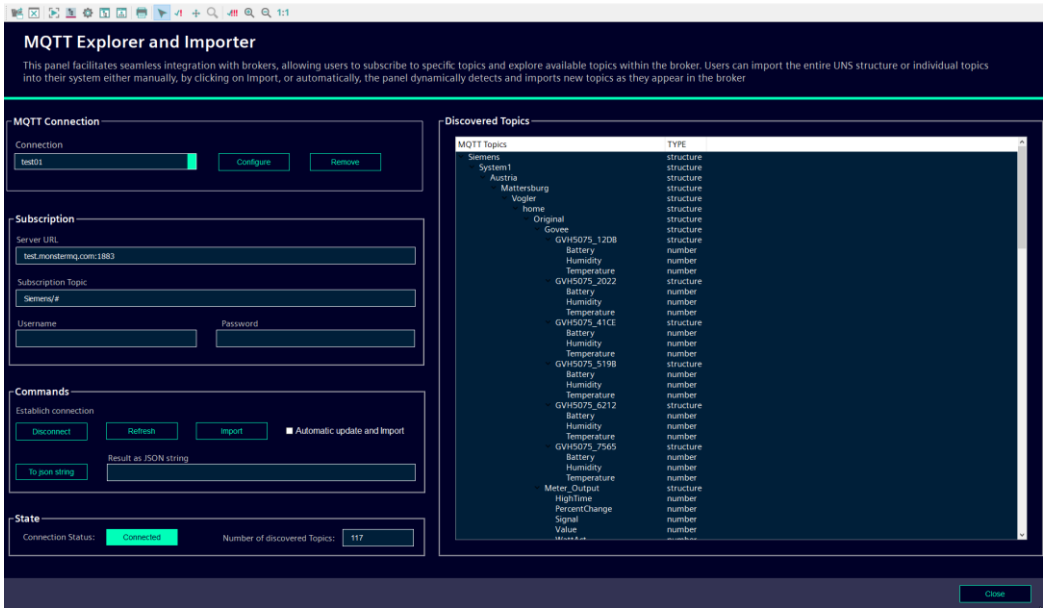

Figure 2-23 Broker Explore

2.2.3.2. Import Topics:

- **Manual Import:** Click the **Import** button to import all visible topics from the tree into WinCC OA.

Figure 2-24 Broker Explore

- **Automatic Import:** Check the **"Automatic update and import"** checkbox to continuously import new topics as they appear on the broker.

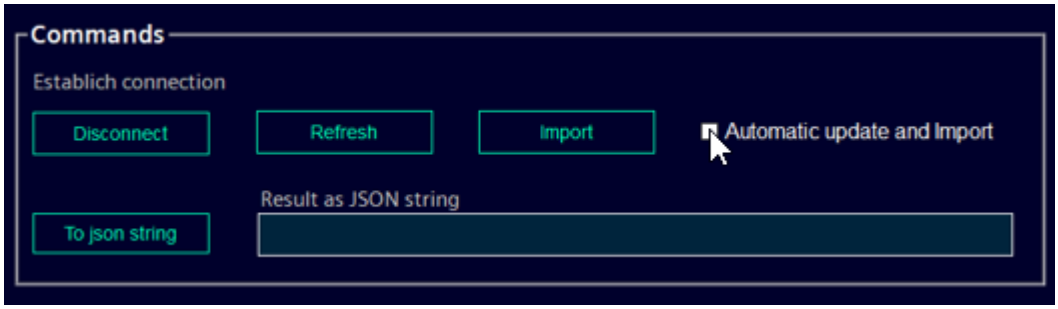

Figure 2-25 Broker Explore

2.2.3.3. Convert to JSON:

- Click **"To JSON String"** to convert the tree structure to a JSON string.

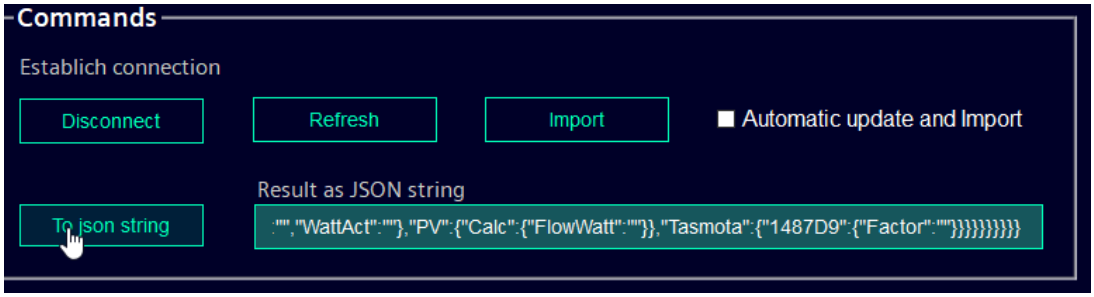

Figure 2-26 Broker Explore

2.2.3.4. Disconnect and Closing the Panel

- Click the **"Disconnect"** button to disconnect from the broker.
- Click the "**Close**" button to close the panel and terminate the current connection to the broker.

2.2.4. Viewing the Import Results in WinCC OA

2.2.4.1. CNS View Panel:

- Open the GEDI and check the CNS view by clicking on the following icon  in the Menu bar on top and check if the structure is imported.
- The imported topics will be displayed in a hierarchical tree structure.

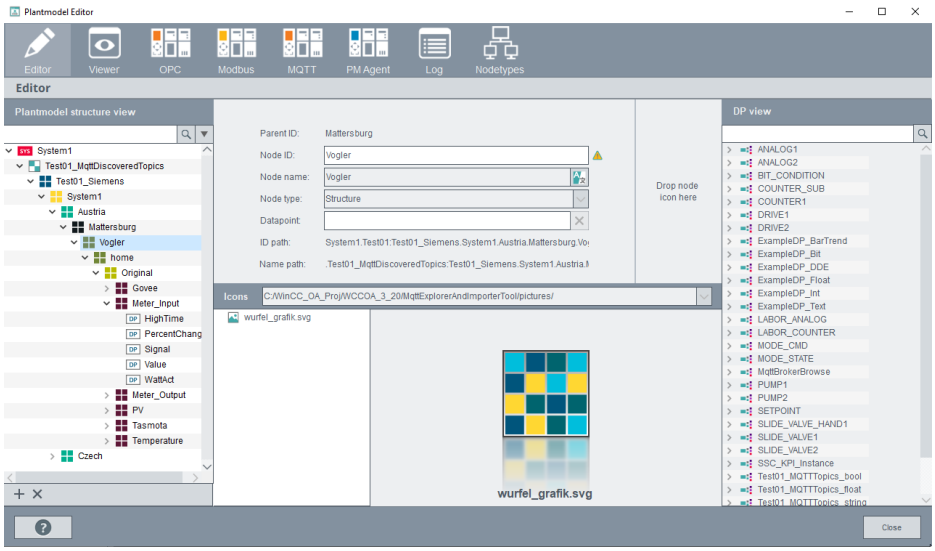

Figure 2-27 CNS view

2.2.4.2. Para Panel:

- Open the Para panel  in WinCC OA to check the data points created.
- Ensure that the data points have a correctly configured _address config.

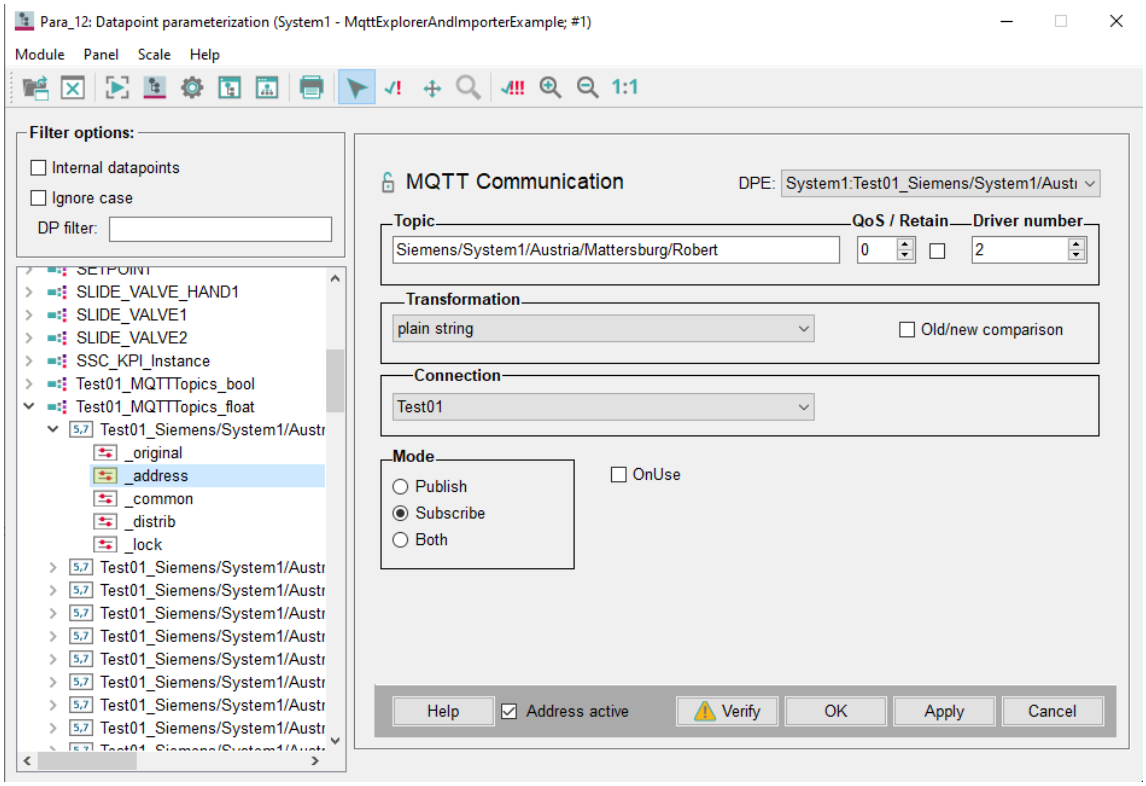

Figure 2-28 PARA _address config

3. Appendix

Important WinCC OA specific abbreviations

Acronym	Long form	Meaning
WinCC OA	Simatic WinCC Open Architecture	A SCADA system for visualizing and operating of processes, production flows, machines and plants in all lines of business. Distributed systems enable any number of stand-alone systems, from 2 to 2048, to be linked via a network. Each subsystem can be configured either as a single-user or multi-user system, redundant or not, in each case.
DPT	Data point type	Object definition (class) of a structured data object as mapping of a real device. Single data points (instances) are derived from the DPT. Therefore, the data point type is a form of template.
DP	Data point	Structured, device-oriented data object as representation of a real device within the control system. A data point contains one or more data point elements (process variables).
DPE	Data point element	Single process information within a device-oriented data point. Each DPE corresponds to a value/state. In addition to the value, there are DPE attributes like time stamp, quality information or origin.
GEDI	Graphic Editor GEDI	Graphic Editor. It is used both for drawing of process images ("panels") as well as for designing of symbols, dialogs, and scripting.
PARA	Configuration Tool	Editor for the creation and configuration of data point types, data points, and data point elements as well as their configs.
ASCII	American Standard Code for Information Interchange	Standardized protocol for storage and transfer of characters/text. In WinCC OA, the acronym also refers to the database import/export manager. It is a module to export and import configurations as ASCII files. Mass configuration can therefore be carried out in a spread sheet program (for example MS Excel), file editor, or in an external database.
D	Driver Manager ("Driver")	Interface for connecting controllers (PLC, DDC, ...) fieldbuses and telecontrol systems. A driver handles the communication via an external protocol and enables the exchange of information with WinCC OA. The processing of data from the “field” to WinCC OA contains event orientation, old/new comparison, transformation, conversion, and smoothing. The protocol of the Driver must be the same as the protocol of the “field” device. Furthermore, the connection (how to reach the device) must be configured in WinCC OA. For exchanging data, a periphery address must be configured on a corresponding DPE.
UNS	Unified Name Space	UNS (Unified Namespace) is a central, real-time data architecture that serves as a single source of truth for all data in an industrial or enterprise environment. It organizes and exposes data from various systems (e.g., PLCs, SCADA, MES, ERP) in a standardized, hierarchical structure, often using MQTT and Sparkplug B.
CNS	Common Name Service CNS	The plantmodel editor can be used for building and modifying data structures such as views and trees based on CNS and use them within projects easily.

CTRL	Control Manager ("Scripting")	Processing unit that allows to process user specific logic / business logic (control scripts). Control possesses an easy to learn syntax (similar to ANSI-C) and is processed by an interpreter (CTRL Manager).

Table 4-1 WinCC OA specific abbreviations

Service and support

WinCC OA Extended Services

Do you have questions about WinCC OA projects, need additional features, or require technical assistance? ETM provides 24/7 access to our complete service and support expertise for WinCC OA.

Our range of services includes the following:

- Extended Services provide tailored support for your evolving needs
- All kind of analysis/troubleshooting for older WinCC OA versions than our current mainline
- Project startup workshop
- Architecture definition
- Project engineering assistance with dedicated contact person
- Special project developments (special requirements, web widgets, gateways, etc.)
- WinCC OA library development assistance
- Project or architecture reviews with report
- Project-specific problem or performance analysis
- Project upgrade (analysis with report, assistance during upgrade, etc.)
- Assistance for complex error reproduction scenarios
- On-site assistance for any tasks related to WinCC OA and their components
- 24/7 on-duty assistance or priority callback for certain time range
- Database support Oracle®, InfluxDB®, PostgreSQL® and MS SQL®
- Raima/HDB to SQLite/NGA migration
- Setup and consulting for WinCC OA Add-ons e.g., APM, AMS, DRS, …
- WinCC OA Security services (as per the WinCC OA Security Guideline, NIS2)
- Tests on unsupported platforms (e.g., unsupported OS)
- Individual Workshops (driver workshop, UI workshop, business logic, etc.)
- Factory Acceptance Test (FAT)/Site Acceptance Test (SAT) assistance
- Creating of prototypes, proof of concepts, demos, etc.
- Project tender analysis and evaluation of projects

  You can find detailed information on our range of services in the service catalog web page:

www.winccoa.com/documentation/WinCCOA/latest/en_US/Support/topics/support_extendedServices.html

SiePortal

The integrated platform for product selection, purchasing and support - and connection of Industry Mall and Online support. The SiePortal home page replaces the previous home pages of the Industry Mall and the Online Support Portal and combines them.

- Products & Services
  In Products & Services, you can find all our offerings as previously available in Mall Catalog.
- Support
  In Support, you can find all information helpful for resolving technical issues with our products.
- mySieportal
  mySiePortal collects all your personal data and processes, from your account to current orders, service requests and more. You can only see the full range of functions here after you have logged in.

You can access SiePortal via this address:

sieportal.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers.
– ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:

siemens.com/SupportRequest

WinCC OA – Training and Certification

To fully leverage the flexibility and openness of WinCC OA, we offer a wide range of training courses, from beginner to expert levels. Our modules cover various topics, with options for individual training. For WinCC OA partners, completing specific courses is required to obtain or maintain partner status, ensuring the highest level of expertise and support.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

www.winccoa.com/support/training.html

Change documentation

Version	Date	Modifications
V1.0	4/2025	First version

Table 4-2 Change Documentation

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