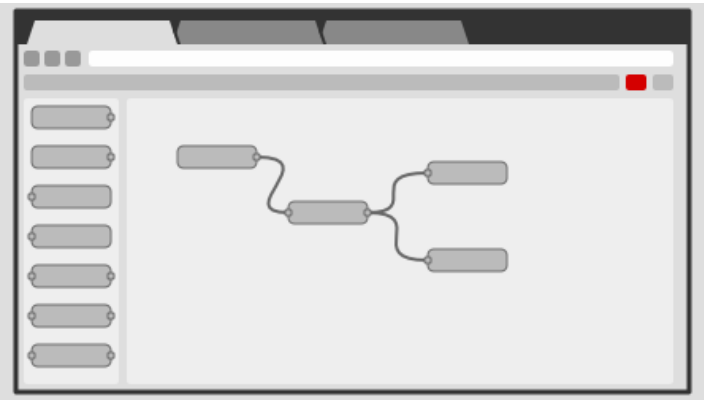
2.6 Installation of MySQL

To download MySQL, go to the link https://dev.mysql.com/downloads/installer/ and click on Windows (x86, 32-bit), MSI Installer v8.X.XX (mysql-installer-communicty-8.x.xx.x.msi). Then, click on "No thanks, just start my download". Double click on the installer to start the installation. Following the following steps for the installation.

1. Select "Developer Default" and click next.
2. During check requirements, click Next and click "Yes" for "One or more product requirements have not been satisfied".
3. During "Installation", click on "Execute". And then click "Next".
4. In the "Product Configuration", click "Next". Config Type: Development Computer, Tick: TCIP/IP, Open Windows Firewall ports for network access. Then, click "Next".
5. In the "Authentication Method", select "Use Strong Password Encryption for Authentication (Recommended). Then, click "Next".
6. In the "Accounts and Roles", set MySQL Root Password: "password". Repeat Password: "password".
7. In the "Windows Service", keep the default settings and click "Next".
8. In the "Apply Configuration", click on "Execute". Then, click "Finish".
9. In the "Product Configuration", click on "Next".
10. In the "MySQL Router Configuration", keep the default settings and click "Finish".
11. In the "Product Configuration", click on "Next".
12. In the "Connect To Server", enter User name: root, Password: password. Then, click "Check" and click "Next".
13. In the "Apply Configuration", click on "Execute". Then, click "Finish".
14. In the "Product Configuration", click on "Next".
15. Finally, in the "Installation Complete", keep the default settings and click "Finish".

2.7 Node-RED

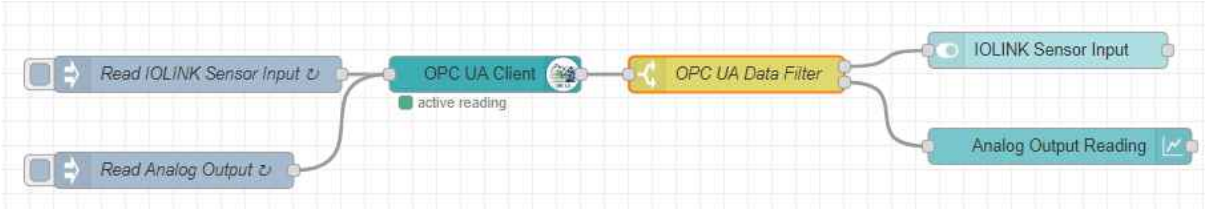
Node-RED is a powerful tool for building Internet of Things (IoT) applications with a focus on simplifying the 'wiring together' of code blocks to carry out tasks. It uses a visual programming approach that allows developers to connect predefined code blocks, known as 'nodes', together to perform a task. The connected nodes, usually a combination of input nodes, processing nodes and output nodes, when wired together, make up a 'flows'.



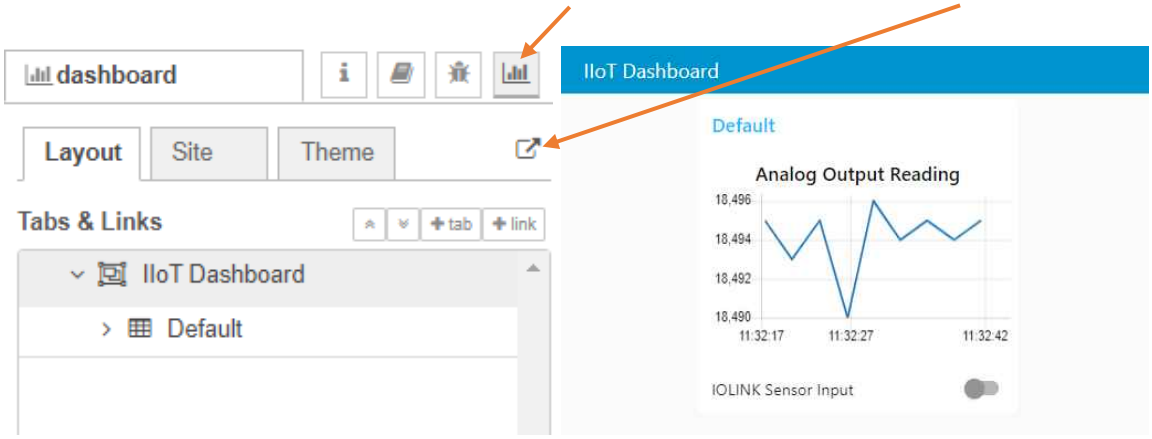
Node-RED browser-based flow editor

3.7 Building a GUI-Dashboard

In Node-RED, you can build an interactive GUI-Dashboard using Dashboard nodes (such as switch, char, etc.). You can add switch node → IOLINK Sensor Input and chart node → AO1 for visualization as show below.



To view the IIoT dashboard, you can click on "dashboard" icon and click on shortcut button.

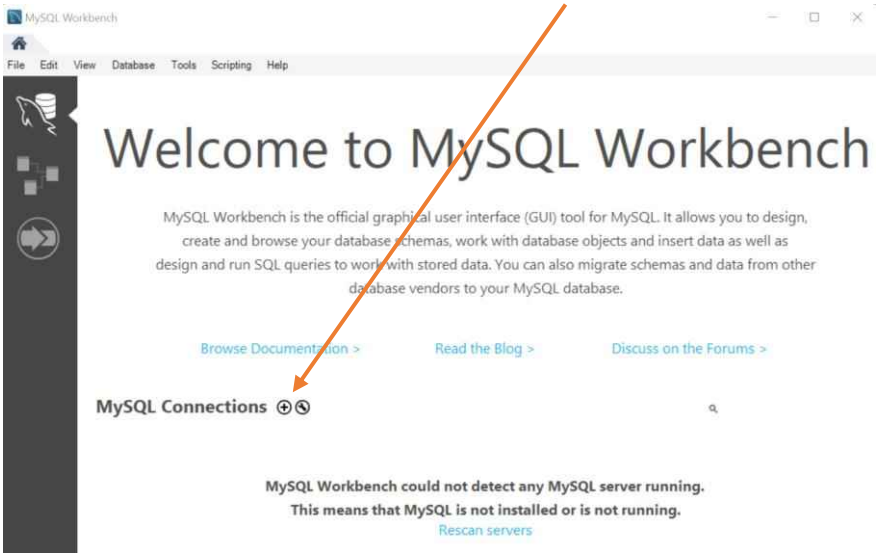


Self-exploration – Adding New PLC Data and Beautifying the Dashboard

As part of your self-exploration, you may add additional PLC data from TwinCAT3 XAE and decorate dashboard in your suitable preference (color and layout).

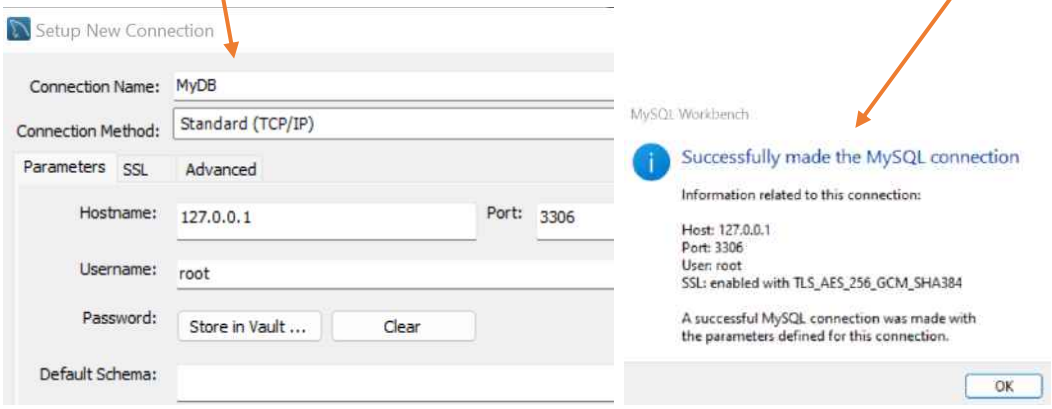
3.8 MySQL Workbench

Now, you can launch the MySQL Workbench. Click on (+) to add the connection.

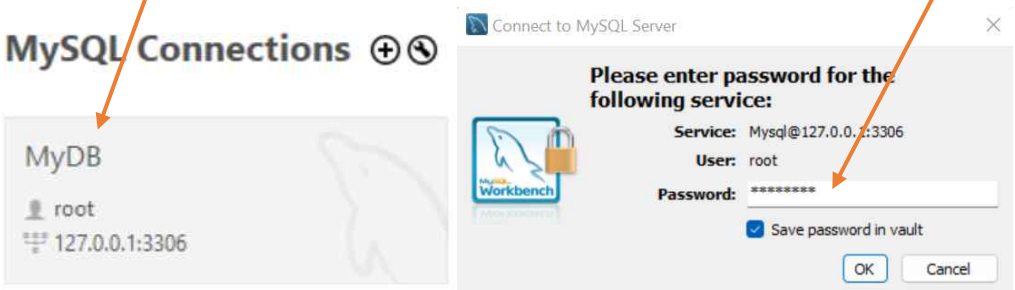


MySQL Workbench Main Menu

Next, enter the information below.
Connection Name: **MyDB**, Hostname: **127.0.0.1**, Username: **root**, Password: **password**
Then, click on **"Test Connection"**. Once, the testing is done successfully, you will see the successful connection message. Then, click "OK".

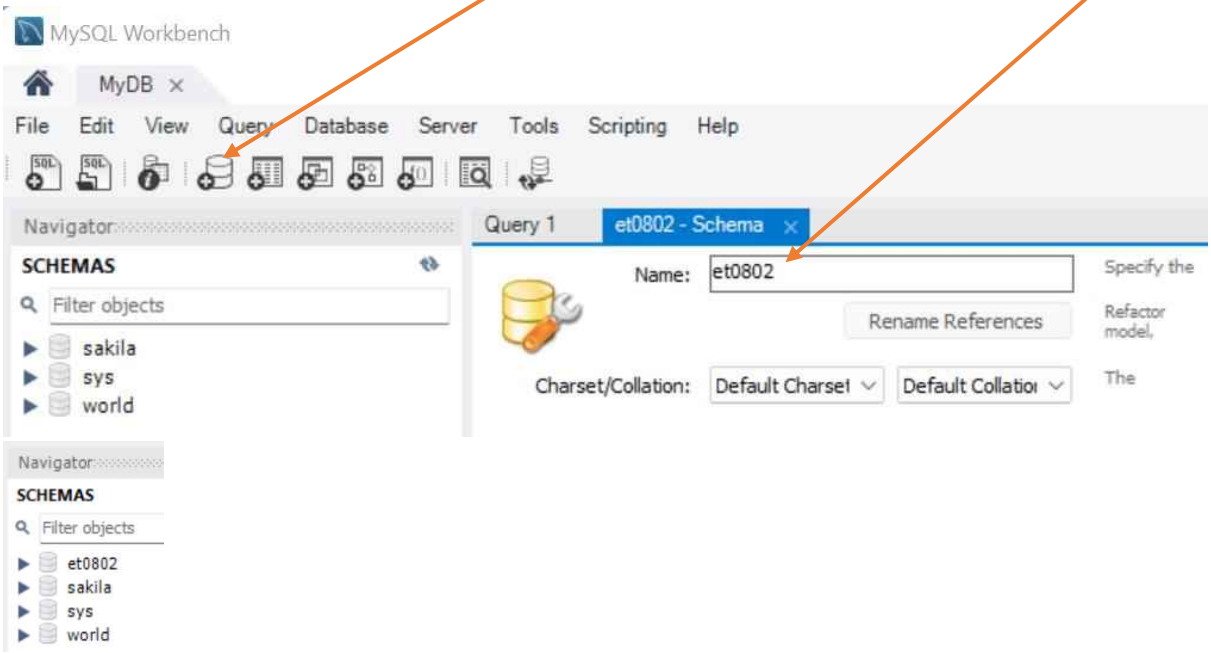


Finally, click on "MyDB" connection to enter into the MySQL server. Enter the password if it is prompted.



3.8.1 Adding a new database

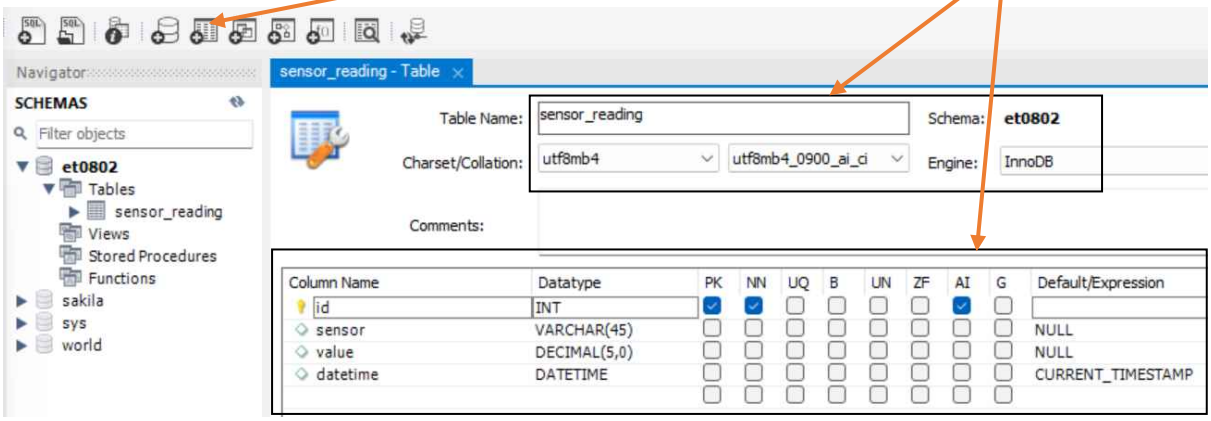
To create a database (schema), click on "Database" icon and enter the Database name as "et0802". Then, click "Apply" and click "Apply" again. And, click on "Finish" button.



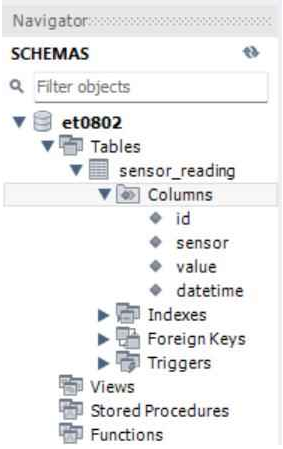
"et0802" database is created. Right click on "et0802" and select "Set as Default Schema".

3.8.2 Create a new table into a database

After setting the default schema, click on “Create new table button” and enter the following information shown in the picture below.



Then, click “Apply” and click “Apply” again. And, click on “Finish” button.



And now, “sensor_reading” table is created.

3.8.3 Sending sensor data into a database

Now, open Node-RED program and add the “function” node into workspace as shown below. And add a wire as shown.