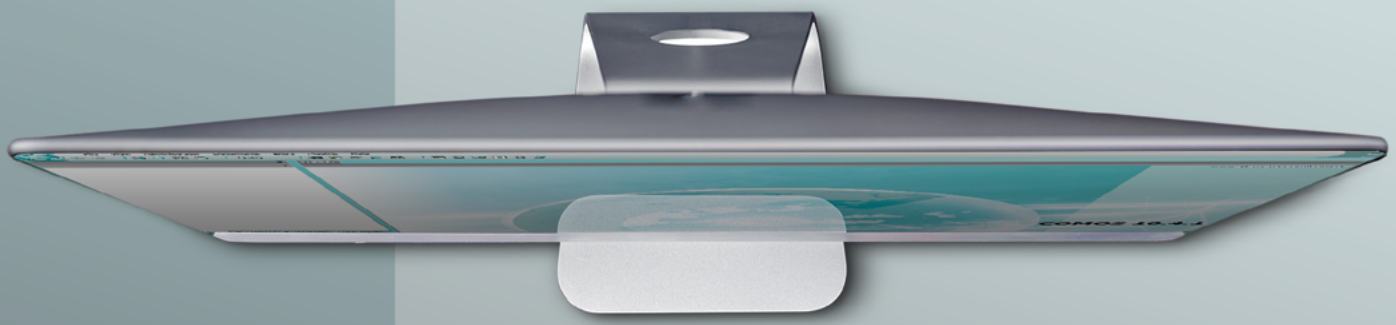
UNDERSTANDING COMOS WORKFLOW



01. Introduction

Hi, my name is Lucy and I have been working with **COMOS** software for more than 10 years. It is a platform that can significantly increase the productivity, quality and flexibility of engineers and technicians on projects of process industries. **COMOS** allows users to manage the entire life cycle of large process plants in an integrated way, from process design to plant operation, through different knowledge areas.

Since demand for digitalization increased and new technologies have come along, more companies have been looking for solutions such as **COMOS**, and the demand for professionals who have this type of knowledge has increased. However, training professionals with this qualification doesn't follow the growing demand of the market. Therefore, I hope that this material can foment **COMOS** knowledge and help new users training.

I was part of several national and international projects where I could help companies and users to use **COMOS** in the right way, so that they could take greater benefit from the platform.

As a tool that aims to be flexible and customizable, **COMOS** may seem difficult and complex, especially when it is used to manage large plants.

It is not my intention to discuss here about all functionalities available in **COMOS** and their possibilities of use. Otherwise, this document would become huge, and it would go beyond the scope proposed.

COMOS, as a large software, provides several tools that allow users to solve the same problem using different solutions. The question that remains is: how to find the best solution in **COMOS** for each problem? To do that, the first step is to understand the workflow within the platform.

Therefore, to help you in this first experience, I have prepared a step-by-step document that will guide you through some of the most used features on the platform, in a logical, easy and uncomplicated way; illustrating the features through text and screenshots.

The objective here is to bring the reader an initial experience with the platform, showing the workflow within COMOS in a simple way.

ON THE NEXT PAGES YOU WILL LEARN:

- What is COMOS;
- To open the project database;
- To create and open a working layer of a project;
- To navigate between equipment and documents;
- To create and update equipment;
- To open documents;
- To update equipment in batch using query;
- To release a working layer.

2. What is COMOS?

COMOS, an acronym for **COM**ponent **O**bject **S**erver, is a software developed and provided by **Siemens**. It allows the management throughout the entire life cycle of process plants in an integrated way (**Figure 1**), from basic design to plant operation. Its first version was launched on the market by **Innotec GmbH**, the Company that created the software and was responsible for commercialization before being purchased by **Siemens**.

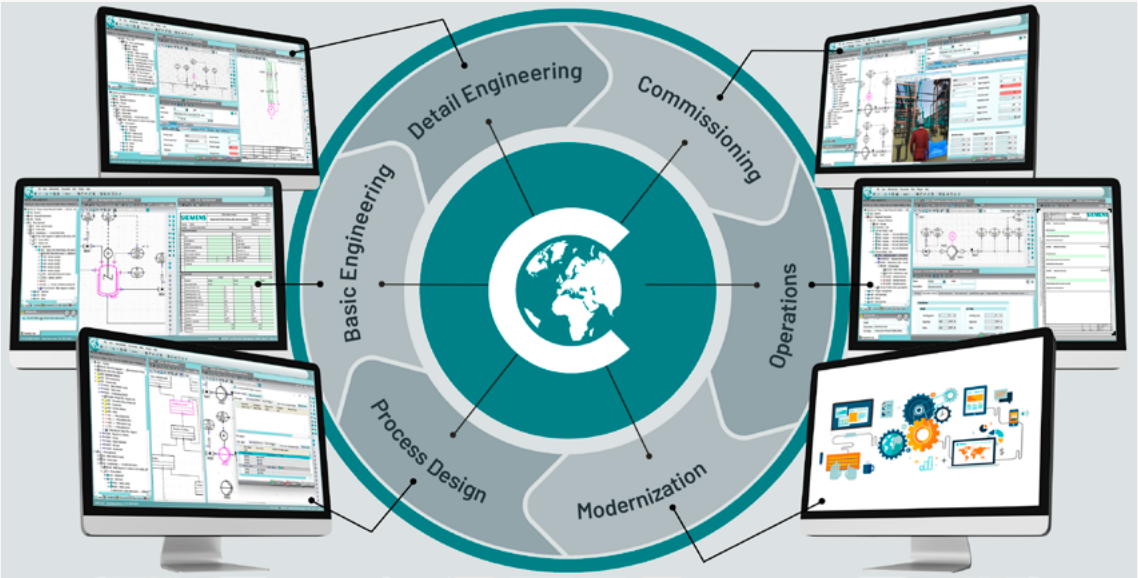


Figure 1 - COMOS platform (Siemens document: "COMOS – Making data work". Available on: <https://new.siemens.com/br/pt/produtos/software/industria/comos/portfolio.html>).

COMOS offers a single, consistent and integrated database solution; keeping all data up-to-date and available, so that technicians, engineers and operators can access data from all project phases whenever needed.

Changes made to a specific equipment, document or query; are updated in a single database in **COMOS**, and data are made available immediately to the entire application.

COMOS was developed using the object orientation concept, allowing the modeling of equipment like the real world, bringing a vision from the real plant process to the platform.

The standard **COMOS** platform is flexible and highly customizable, allowing configuration and customization to meet the specific needs of each industry.

The explanations on how the **COMOS** platform works will become clearer as the reader follows the step-by-step guide prepared to illustrate the workflow in **COMOS**.

3 . Step-by-step

The routine of a **COMOS** user varies according to the function performed by the professional. However, we can expect that the workflow always includes: create, read, update and/or delete information in the project.

As it is a platform developed with the concept of object orientation, the equipment and documents, inside **COMOS**, are represented by objects. Thus, create, read, update, and delete of information, will always be done in an object within the project.

The following step-by-step was created considering common daily activities of a **COMOS** user, going through the functionalities that I consider essential to understand the workflow. Although the workflow in **COMOS** is not unique, the user will be able to understand it in a conceptual way if he follows the step-by-step that I created, and he will not have difficulties to follow other possible workflows demanded in the daily routine of a real project.

STEP 1 Starting COMOS

At first, we need to start **COMOS** platform. To do this, double-click the **COMOS** icon (**Figure 2**) shown on your desktop or start it from the Windows start menu.

Figura 2 - Comos icon

The initial system screen will appear as shown in **Figure 3**. Note that the main screen can be divided into 6 distinct areas:

I. Menu Bar;
II. Icon Bar;
III. Object Structure;
IV. Detail Area;
V. Working Area;
VI. Status Bar.

Figure 3 - COMOS main screen opened

STEP 2 Opening the Project Database

Before opening a project, we need to open the project database. To do this, click the cylinder-shaped icon (**Figure 4**), located on the icon bar, to start the process of opening the database.

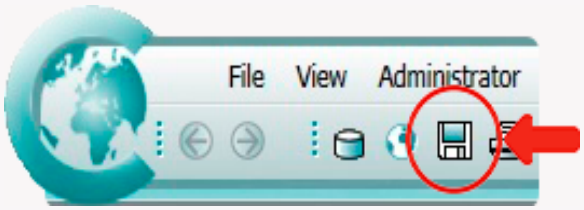


Figure 4 – Icon to open the project database

When you click the icon, the window (shown in **Figure 5**) will be displayed to select the project database.

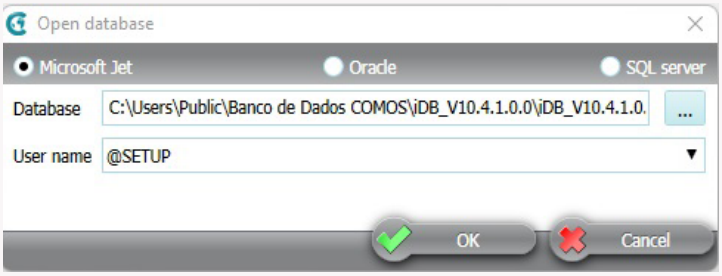


Figure 5 – Open database window

COMOS supports three types of relational databases: **Microsoft Jet**, **Oracle** and **SQL Server**.

Siemens provides a standard database file (**StandardDB**) in **Microsoft Jet** format containing the data structure and modeled objects to allow user to start on the platform. This standard structure can be customized according to the user's needs.

To follow our workflow, I will use **StandardDB**, because it is a simple database type that stores data in a file. We could follow the same step-by-step using **Oracle** or **SQL Server**, however, we would have to create and configure servers. If one of these databases have the instances already created in the place you access **COMOS**, you can use them, but I suggest you use StandarDB to access the example project that will be shown in this document.

Perform the following actions, in the Open database window, to open **StandardDB** (**Figure 6**):

- Select the **Microsoft Jet** option at the top of the window;
- Click on the button beside the Database field, a pop-up will appear allowing you to select database file;
- Find and select the **iDB_V10.4.1.0.0** file in **<. mdb>** format (if the **iDB_V10.4.1.0.0** folder is compressed, the folder must be unzipped before starting the database opening procedure);
- Click the **Open** button;
- Select the default user **@SETUP** in the User name field;
- Click the **Ok** button.

NOTE:

THE USER @SETUP IS A DEFAULT COMOS USER WITH AN ADMINISTRATOR PROFILE. IF COMOS YOU USE IS MAINTAINED BY AN ADMINISTRATOR PROFESSIONAL, HE/SHE HAS PROBABLY ALREADY DISABLED THIS USER.

NOTE:

THE NAME OF THE DATABASE FILE MAY BE DIFFERENT DEPENDING ON THE FILE VERSION.

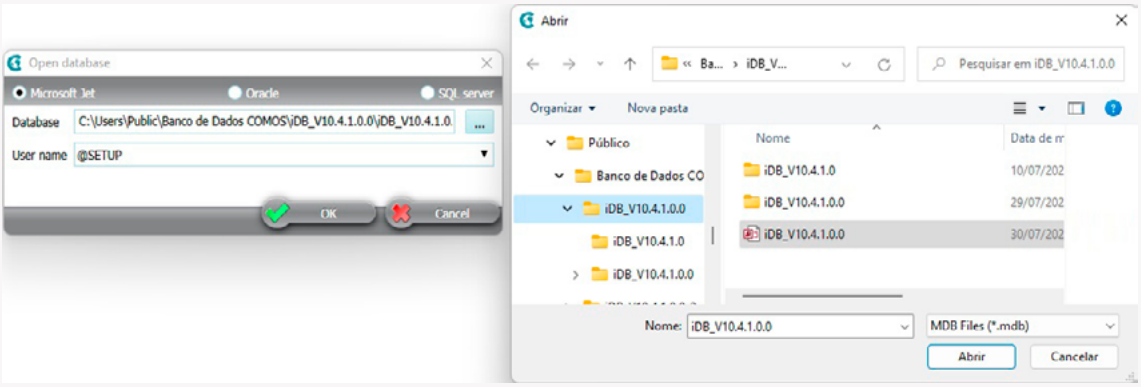


Figure 6 – Selecting the standard database file

Database will be opened by clicking the **Ok** button in the **Open database** window.

STEP 3 Opening the Project List

Click the globe-shaped icon located on the icon bar to start the process of opening a project (**Figure 7**).

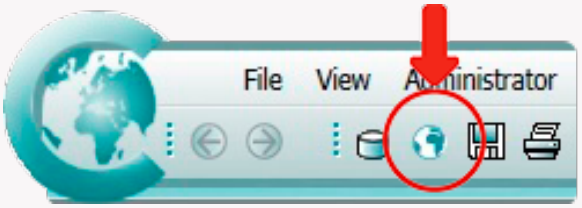


Figure 7 - Opening the Project List

When you click on the icon, the project screen will appear.

Select the **Engineering** option at the top of the window and the list of engineering projects will be shown (**Figure 8**).

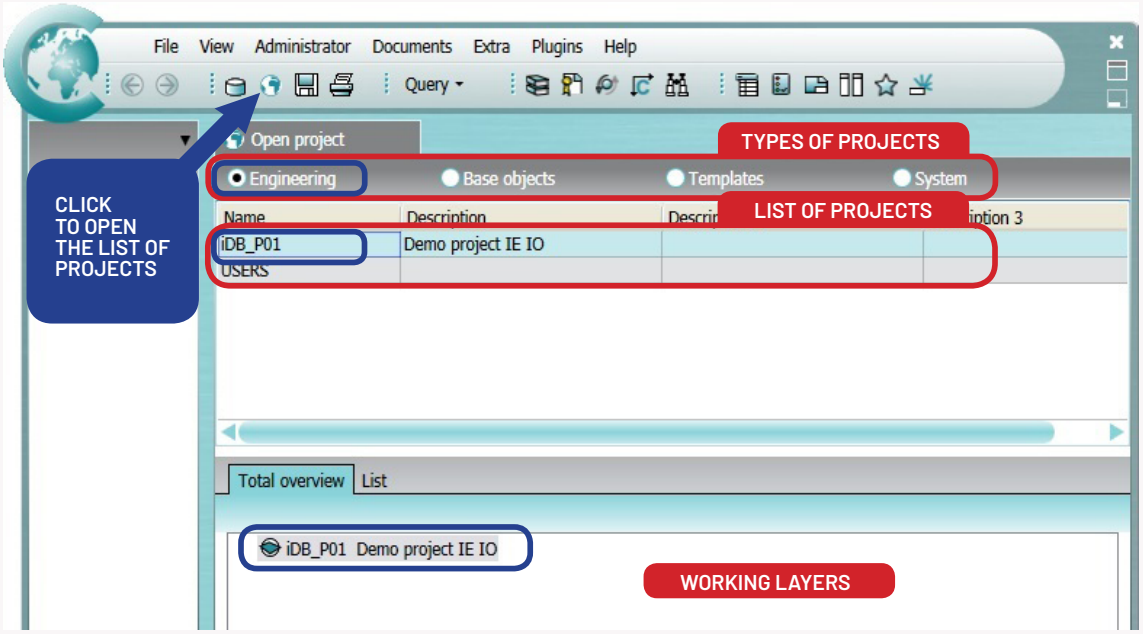


Figure 8 - Project List

In this version, **StandardDB** provides the **iDB_P01** engineering project as a demonstration.

At this point, we could create a project, however, **COMOS** users normally work on existing projects, so we will use **iDB_P01** to continue our workflow.

STEP 4 Opening a Working Layer

To open the project, use mouse left button to double click on the project in the list. However, it is not advisable to update information directly in the project, since mistakes can happen, and some mistakes can ruin months of work. Also, the project can be updated by multiple users simultaneously. For this reason, **COMOS** works with the concept of working layer, which greatly helps in the task of managing changes in the project and managing multiple users editing the project simultaneously.

The layers management can be done by the user himself, or, depending on the complexity of the project, a more experienced user may be designated to manage the layers and releases.

The release tool allows user to update the upper layer according to the current layer.

Working layers are organized below the project, and each layer can contain multiple sub-layers. Each layer contains all the information from the upper layers and project, and can be changed without impacting the upper layers. When the user responsible for layer management realize that it is time to update the upper layer, he performs the release.

iDB_P01 project does not have any layers created yet, as shown in **Figure 8**. There is only the main layer, which is the project itself.

Therefore, we will create a layer that will be used to store the changes suggested in this guide (**Figure 9**).

Right-click on the main layer and select the option: **New|Working layer**.

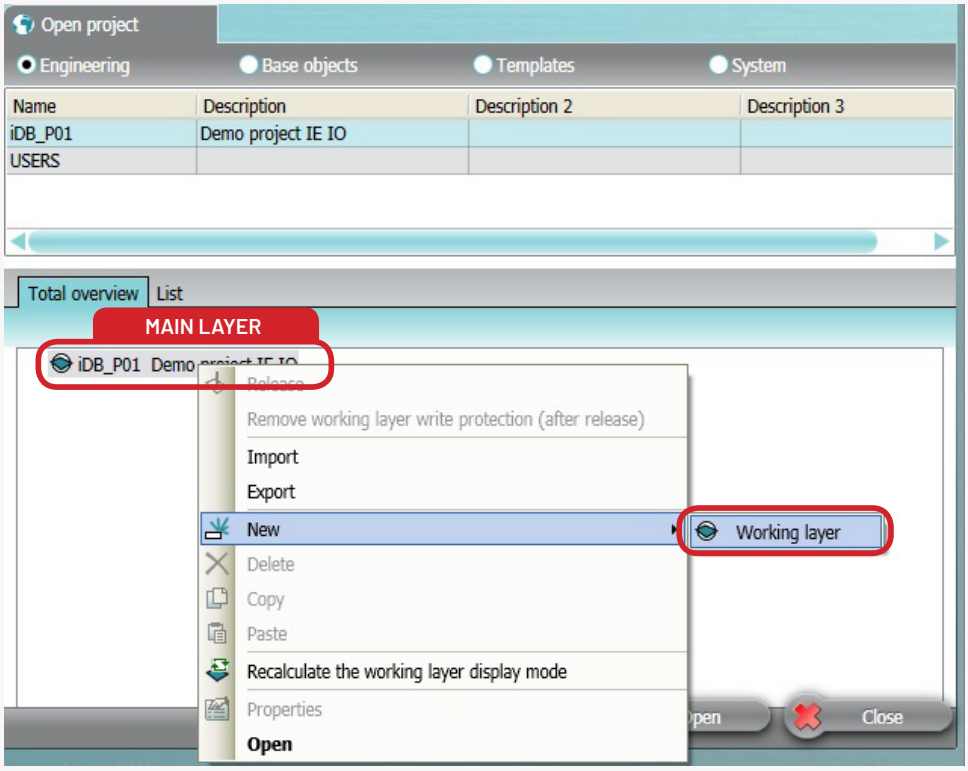


Figure 9 - Creating a Working layer

A window will appear asking to fill name and description of the layer. Fill in the **Name** and **Description** fields as shown in **Figure 10** and click **Ok**.

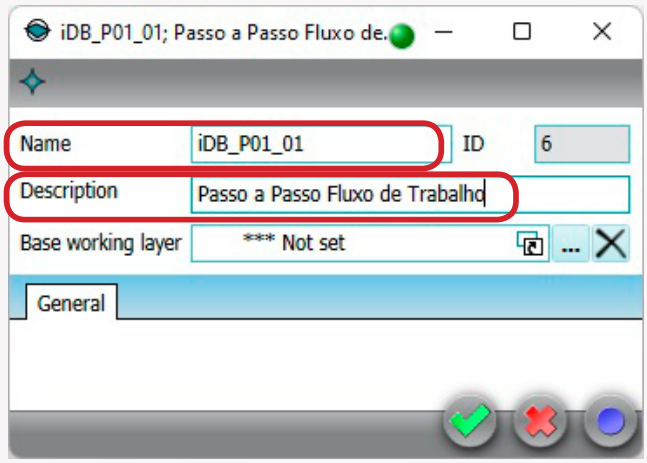


Figure 10 - Name and description of the new layer

Use mouse left button to double click on the new layer to open it.

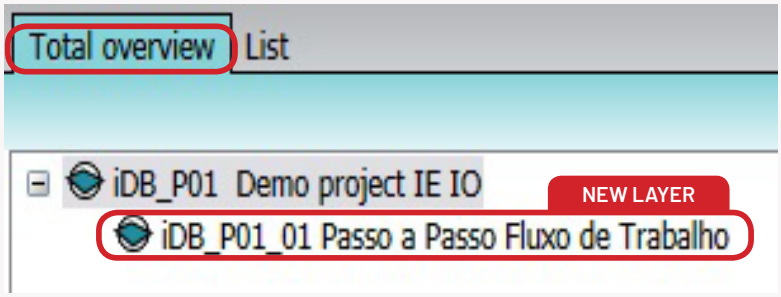


FigurE 11 - Created layer

When the new layer is opened, the object structure of the project (**Figure 12**) will be displayed on the left side in the **main window**.

The object structure is organized into five tabs: **Units**, **Locations**, **Documents**, **Base objects**, and **FA**.

Select the **Units** tab to display the object structure containing the equipment and documents of the process plant.

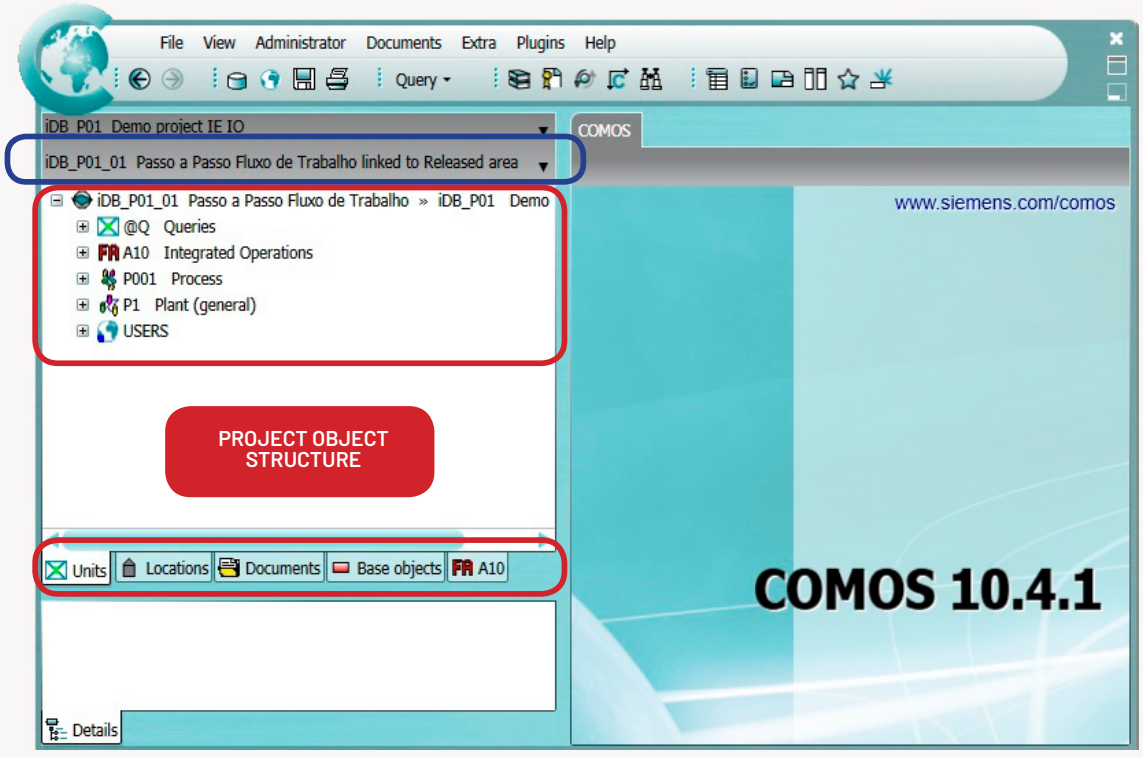


Figure 12 - Project Object Structure

STEP 5 Setting Project Window

In order to simplify navigation, close the **Details** tab.

Right-click on the blank area and select the **Navigator settings option** (**Figure 13**).

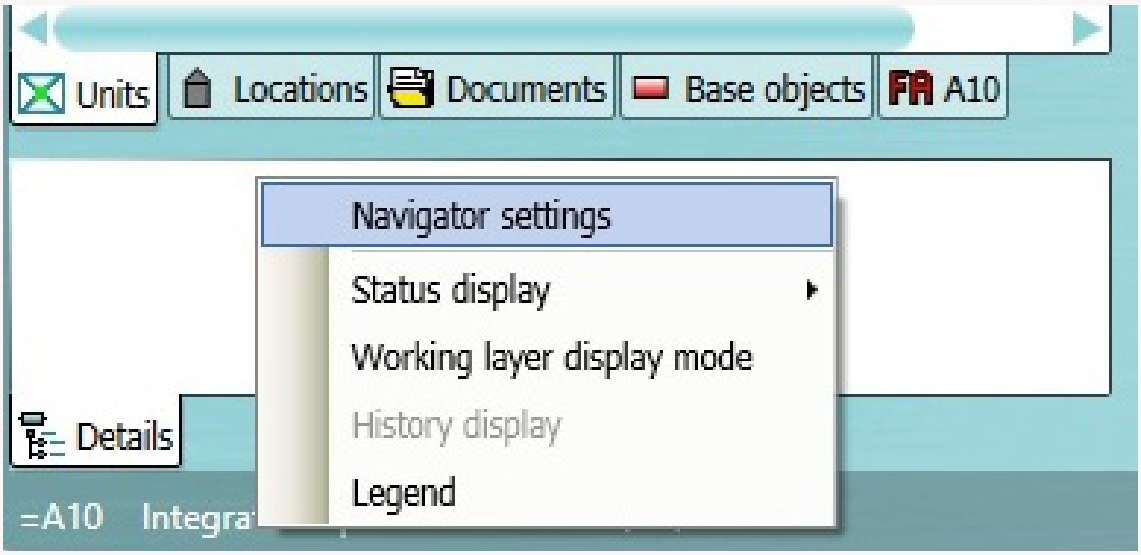


Figure 13 - Opening Navigator settings

Disable the **Detail** option and click **Ok** (**Figure 14**).

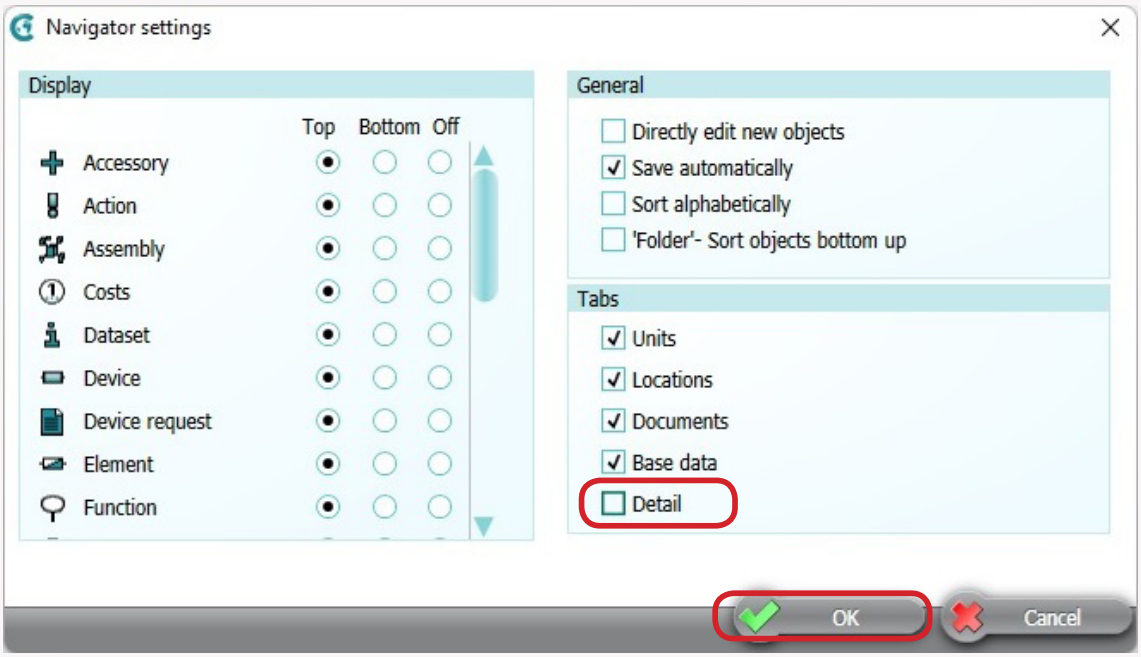


Figure 14 - Navigator settings window

In this guide, we will focus our activities, related to the **Units** tab, on **unit H3** of **plant P1** (**Figure 15**).

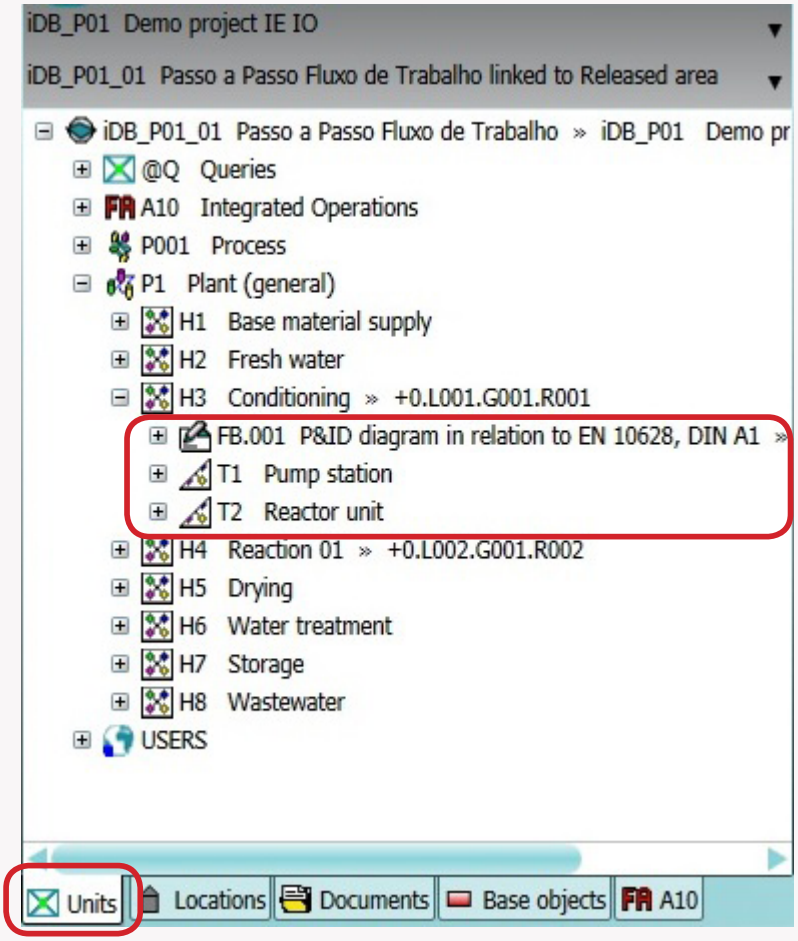


Figure 15 - Unit H3 of plant P1

STEP 6 Opening a Process Diagram

In the following steps, we will update an equipment that will impact the **P&ID FB.001** in unit **H3**. So, first, the diagram needs to be opened.

Follow the instructions below to open **P&ID FB.001** (**Figure 16**):

- Select the Units tab, where you will find the process plant objects representing the equipment and documents;
- Select the P&ID FB.001 diagram, located on the Units tab within the structure iDB_P01_01|P1|H3;
- Double click on the process diagram to open it. The diagram will be displayed in the working area, beside the object structure;
- Use the mouse scroll to zoom in and find pump P001;
- Click once using the mouse left button on the pump to select it.

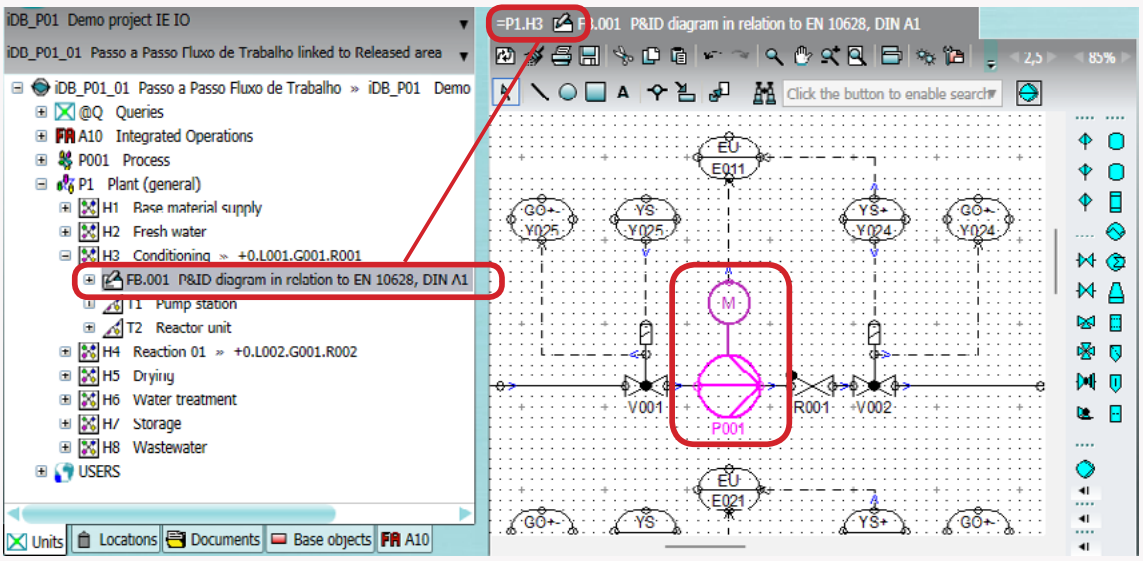


Figure 16 - P&ID FB.001

STEP 7 Navigating from Process Diagram to a Pump in the Object Structure

Right-click on pump **P001** and select the option: **Navigate|Object**, as shown in **Figure 17**.

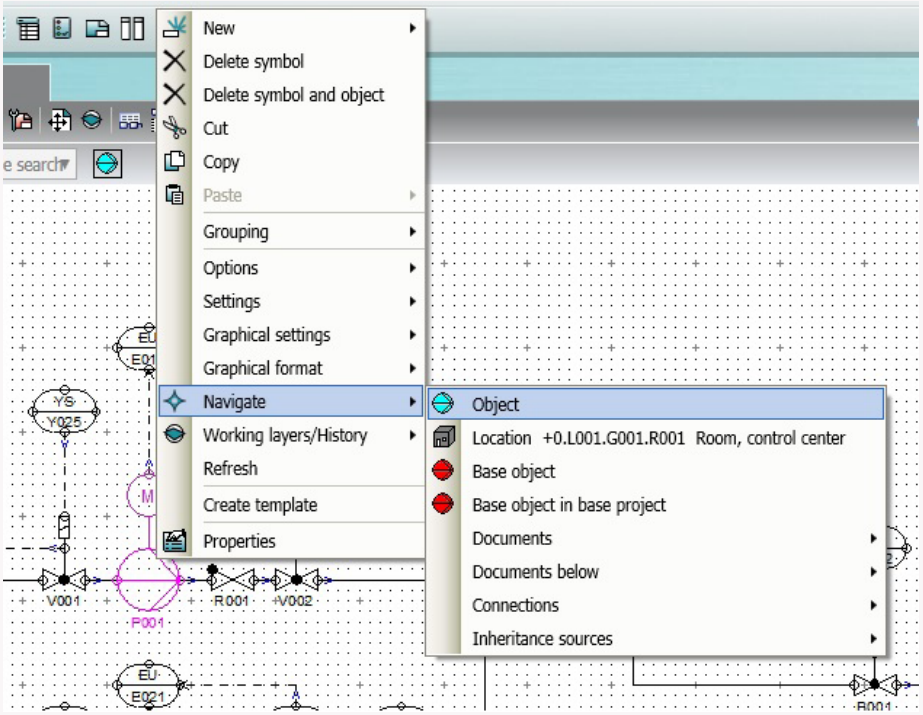


Figure 17 - Navigating to Pump P001

Selecting option **Object**, the system takes you directly to the pump object **P001**, located in the structure within the subunit **T1** (**Figure 18**).

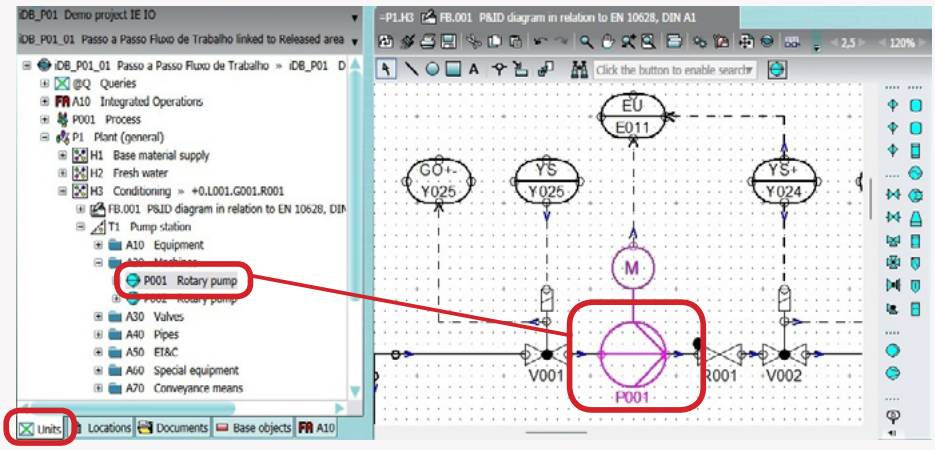


Figure 18 - Pump P001 in the Units tab

STEP 8 Editing Pump Properties

When you find the pump in the object structure, double-click on the object using mouse left button to open the pump properties, where all data available for this object can be seen (**Figure 20**).

Select the **Process data** tab, fill in the **Ambient temp.** field and click **Ok**; as shown in **Figure 19**. The pump update will be confirmed.

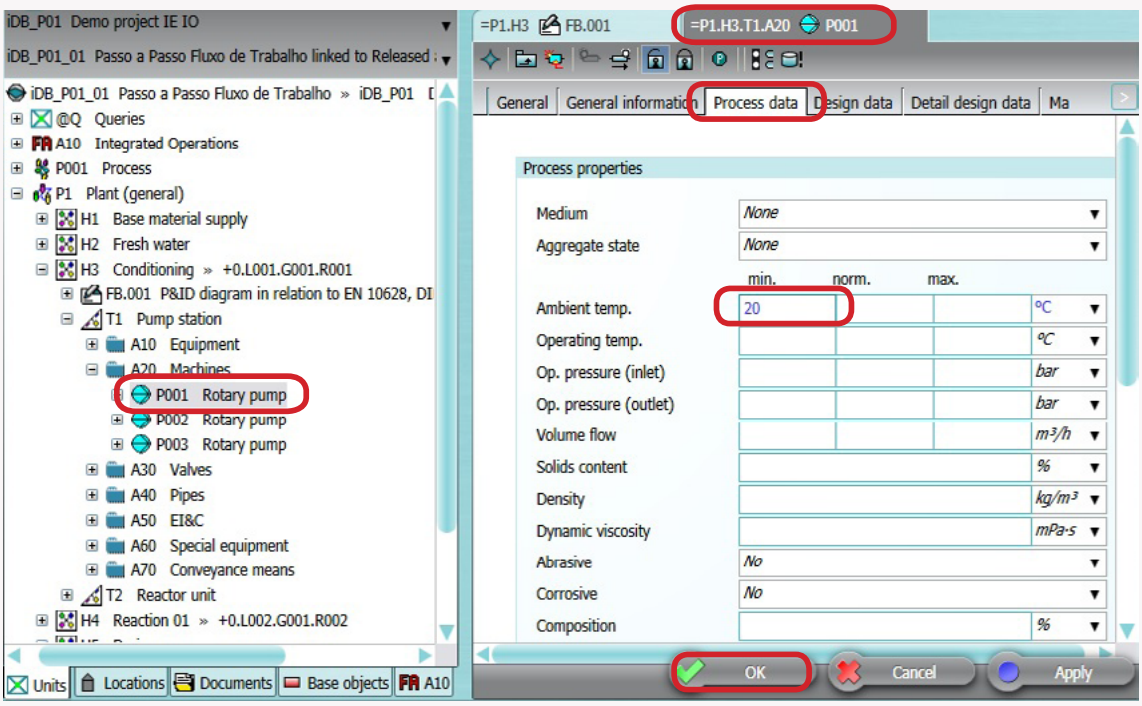


Figura 19 - Properties of pump P001

STEP 9 Opening a Data Sheet

The equipment data sheet is found below the pump in the object structure. And equipment datasheet can be opened the same way, by using the mouse left button to double-clicking on the document.

By dragging the open tabs holding mouse left button and moving it to the working area center, you will be able to see simultaneously the P&ID opened, the pump properties and the pump data sheet; as shown in **Figure 20**. Note that the value of **20ºC** filled in the pump properties already appears in the data sheet.

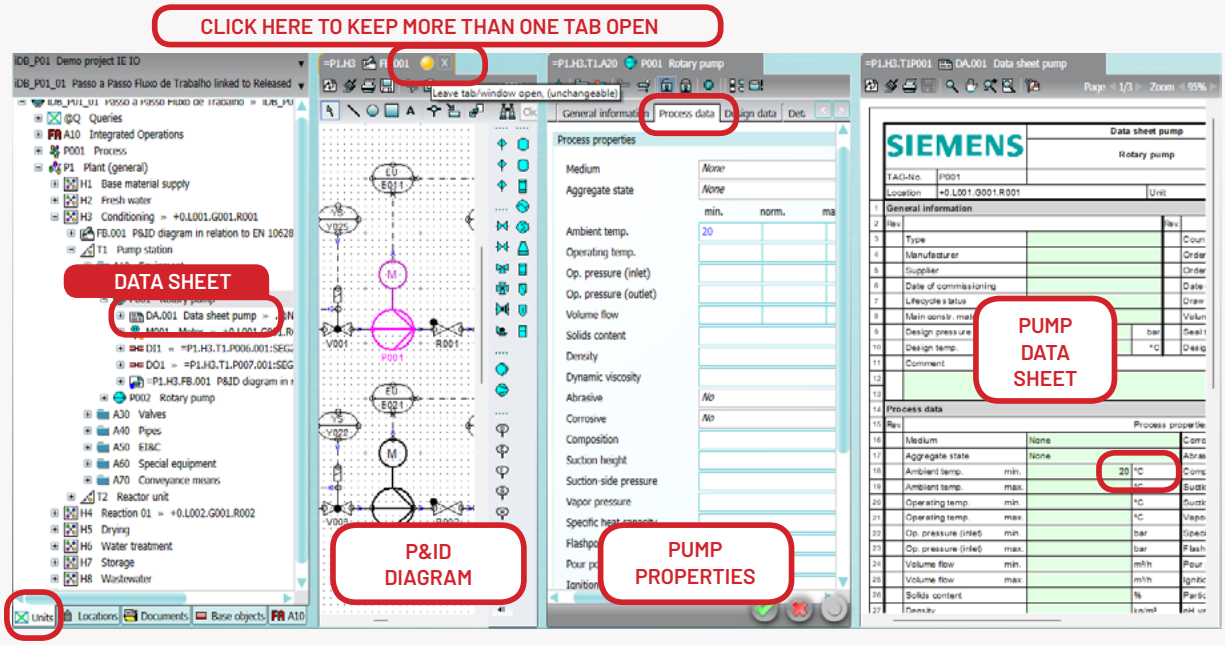


Figure 20 – P&ID, pump properties and pump data sheet

STEP 10 Saving Project Updates

Pump data can be edited directly in the data sheet, in the P&ID or via object properties.

Then simply click on the floppy disk icon located on the icon bar to save all changes (**Figure 21**).

You have to update data in just one place, because **COMOS** is designed with a single database. The platform will take care of displaying the updated information everywhere in the system.

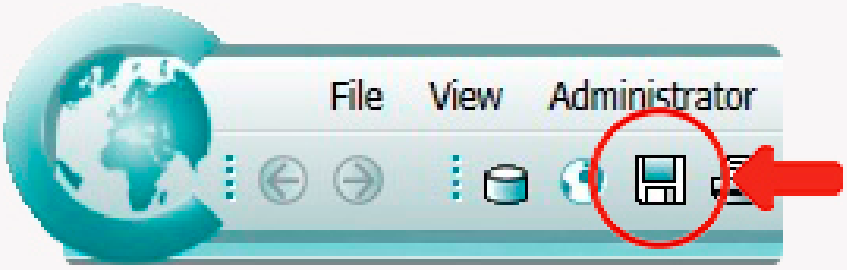
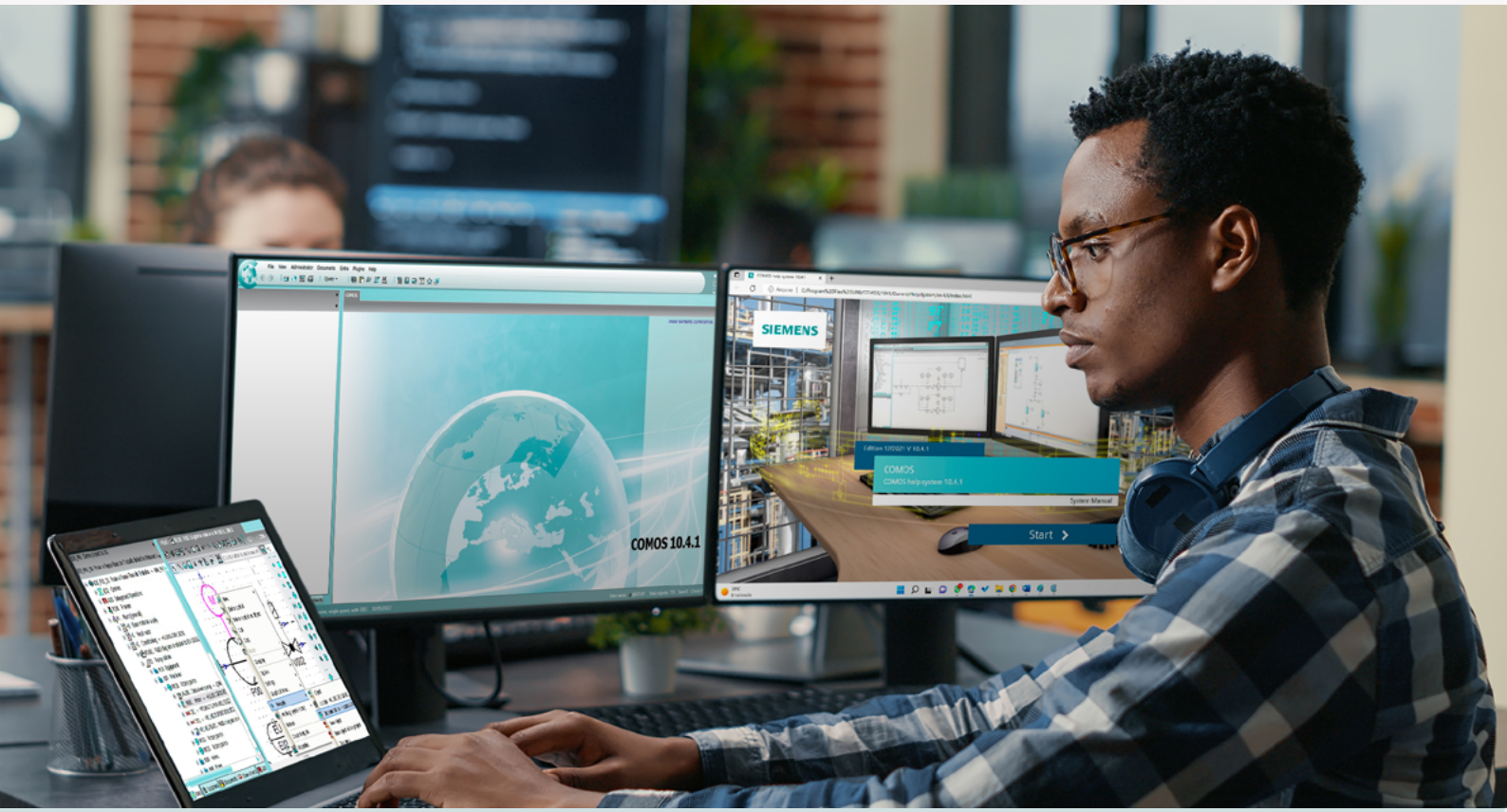


Figure 21 - Icon for saving changes



STEP 11 Creating a New Pump

Now, we will create a pump (**P003**) within the **T1** subunit, and then we will insert it into the **P&ID**. To do so, perform the following actions:

- In the **Units** tab, right-click on the folder **A20**, located under subunit **T1**;
- Select the option: **New** | **A10** | **A20** (**Figure 22**);
- Next, notice that the pump was created in the structure below pump **P002** (**Figure 23**).

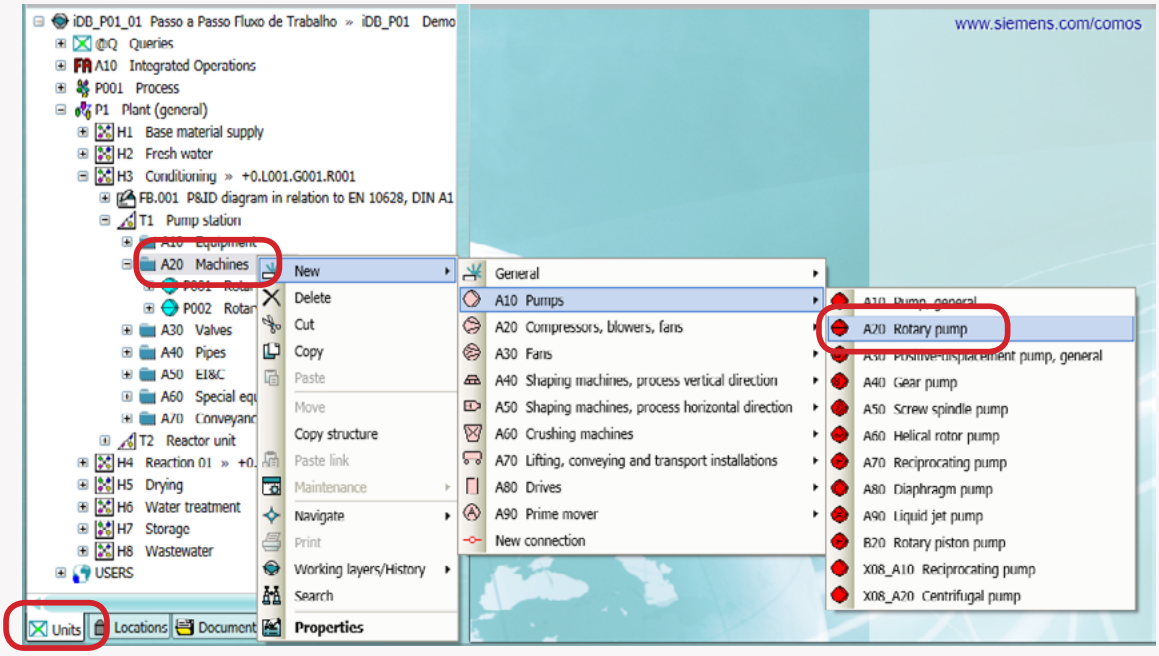


Figure 22 - Creating pump P003

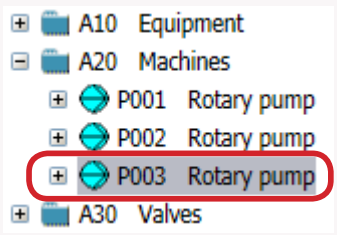


Figure 23 - Pump P003 created

STEP 12 Including the New Pump in the P&ID

We can easily include pump P003 in the P&ID:

- Open P&ID FB.001 again;
- Drag the P003 pump into the drawing (drag and drop). To do this, click on the pump with the mouse left button and keep it pressed down;
- Then drag the pump onto the open diagram. Notice that when you bring the mouse cursor to the diagram keeping the left button pressed down, the pump symbol appears in the document;
- Take the mouse cursor to the place where you want to draw the pump in the P&ID and release the mouse left button. Notice that the pump will be drawn in the diagram (**Figure 24**);
- Click Save.

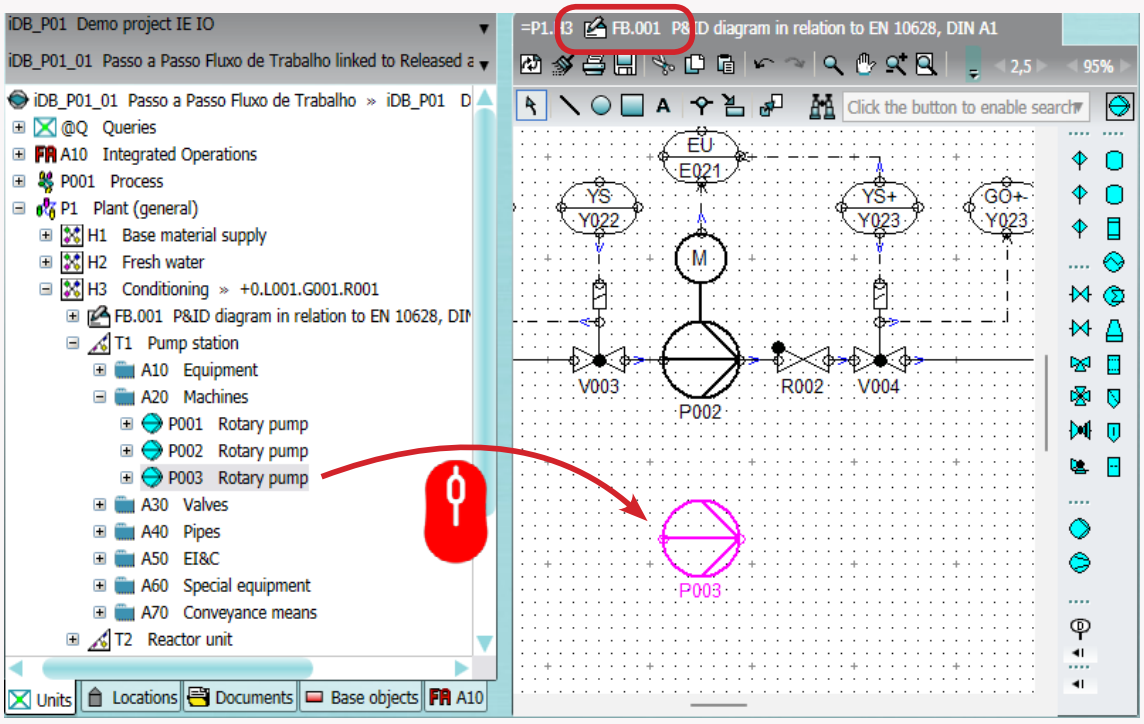


Figure 24 - Dragging pump P003 into the P&ID

STEP 13 Navigating to the Automation Structure from an Instrument Symbol

You can navigate to several points in the system related to the selected object in the tree or in the diagram.

If you need to check some information in the automation structure related to some instrument drawn in the **FB.001** diagram, it is not necessary to look for it by opening structure by structure, just navigate from the symbol of the instrument drawn in the P&ID.

For example, right-click on the instrument **E011** and select **Navigate|Location** (**Figure 25**).

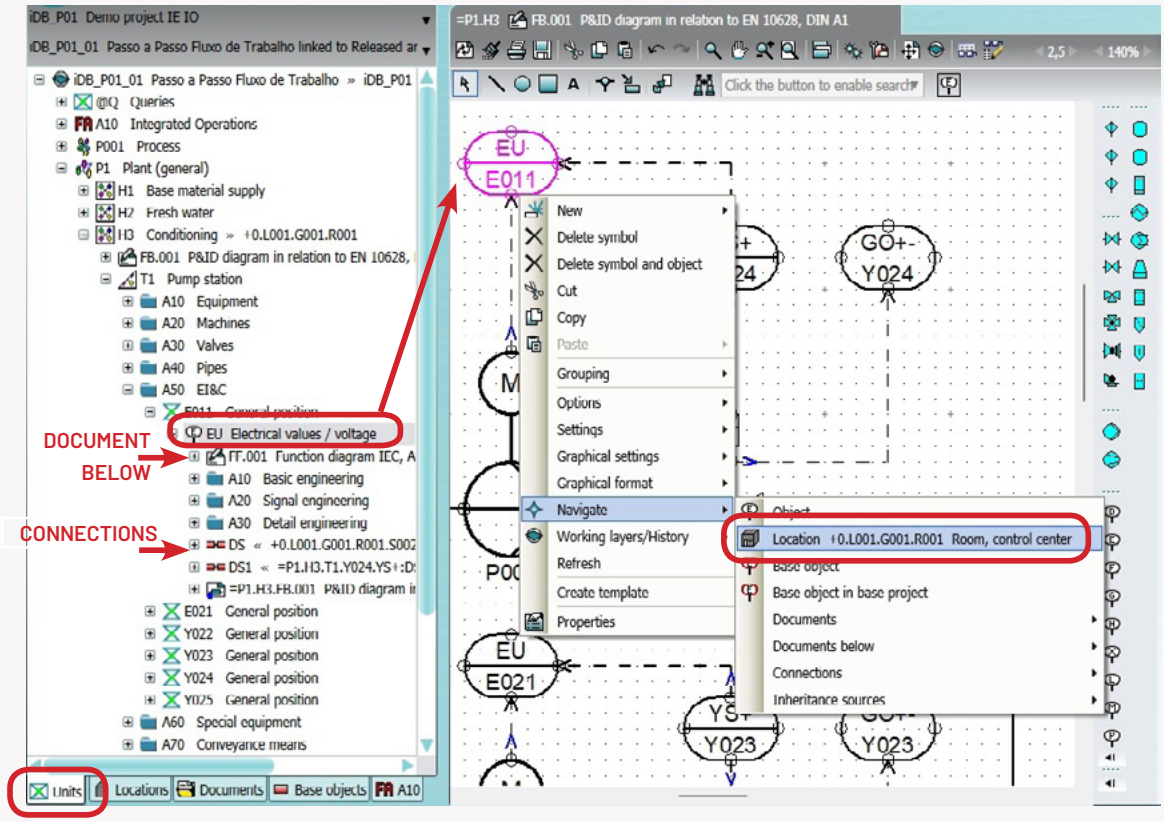


Figure 25 - Navigating to the automation structure from instrument E011

When selecting the Location option, from instrument **E011**, the system takes us to the automation equipment structure in the Locations tab (**Figure 26)**.

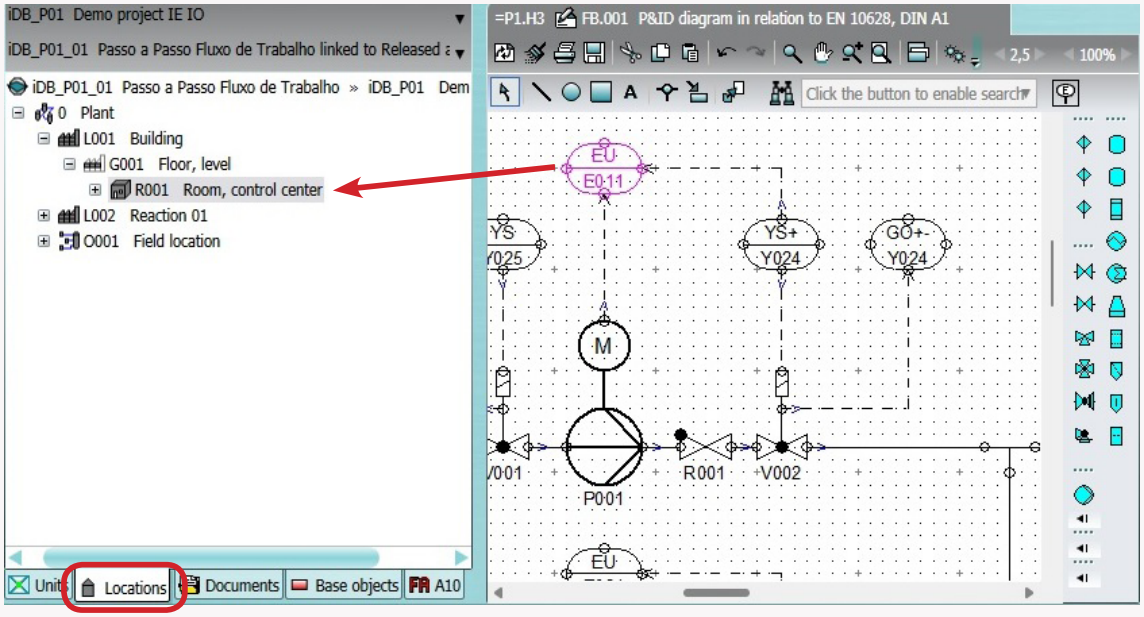


Figure 26 - Structure of objects related to instrument E011 in the Locations tab

In addition to Locations, notice in **Figure 25** that there are 8 navigation options:

- **OBJECT:** takes you to the object that represents the instrument in the structure, still in the **Units** tab.
- **LOCATION:** takes you to the object structure of the automation equipment in the **Locations** tab.
- **BASE OBJECT:** takes to the instrument modeled object in the current project (**iDB_P01**), located in the **Base objects** tab of the project.
- **BASE OBJECT IN BASE PROJECT:** takes to the instrument modeled object in the general project of modeled objects, outside the current engineering project.
- **DOCUMENTS:** lists the documents that the instrument is drawn, so that the user can navigate to the instrument's symbology in each of the drawings.

- **DOCUMENTS BELOW:** lists the existing documents below the instrument in the tree, so that the user can navigate to each of these documents.
- **CONNECTIONS:** lists the connectors available for the instrument, so that the user can navigate to each of these connectors.
- **INHERITANCE SOURCES:** lists the objects in higher hierarchies, from which the instrument receives information by inheritance, according to the **object orientation** concept**.**

STEP 14 Navigating to the Electrical Structure

Now, we will update an electrical information in the driving motor of pump **P001**. To do this, we will navigate directly to the electric motor inside the panel on the **Locations** tab, in the same way we did for the instrument **E011** (**Figure 27** and **Figure 28**).

In this case, a new navigation option appears, the Implementation, which is a type of link created during project design between the object that represents the motor in the P&ID and the object that represents the motor in the electrical diagrams.

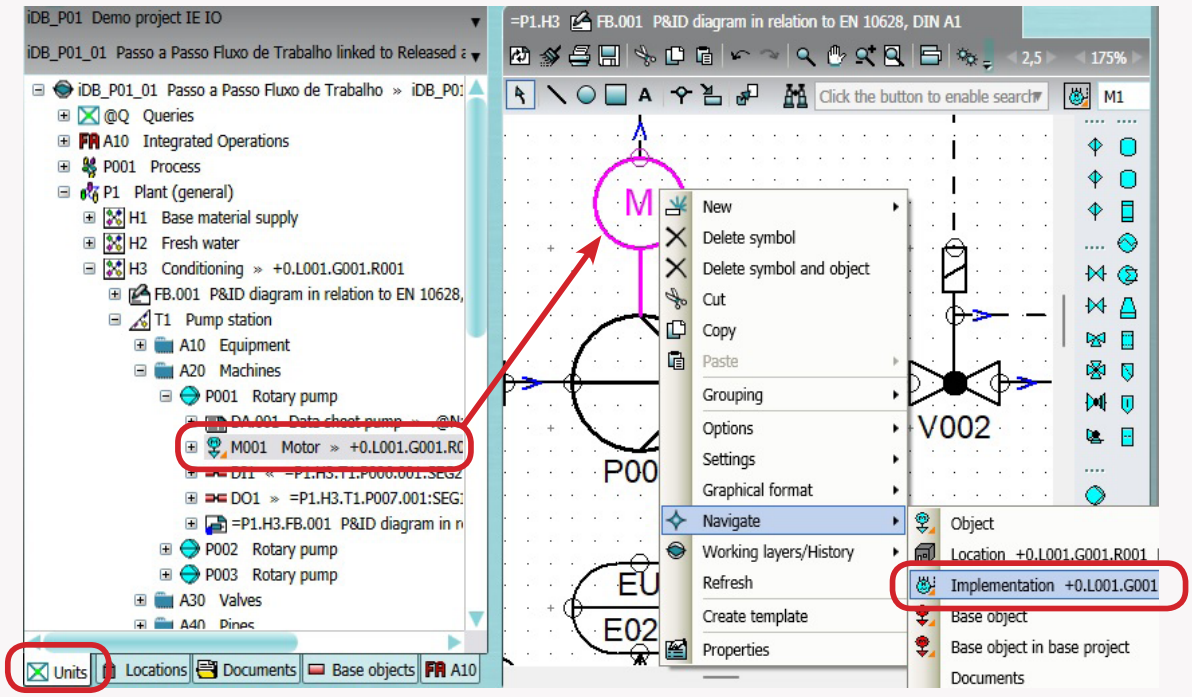


Figure 27 - Navigating to Pump Driver Motor M001 in the Locations Tab

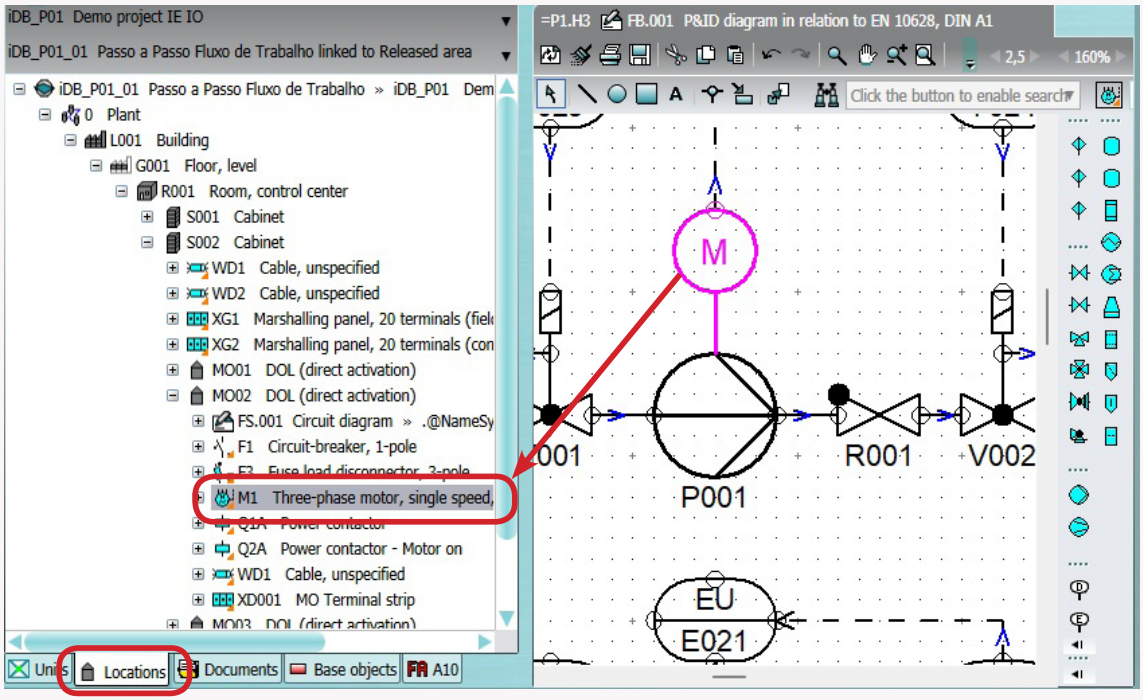


Figure 28 – Object representing the driving motor of pump P001 in the Locations tab

- Open the electric motor properties;
- Fill in the **Power factor** field on the **Technical data** tab as shown in **Figure 29**;
- Click **Ok**.

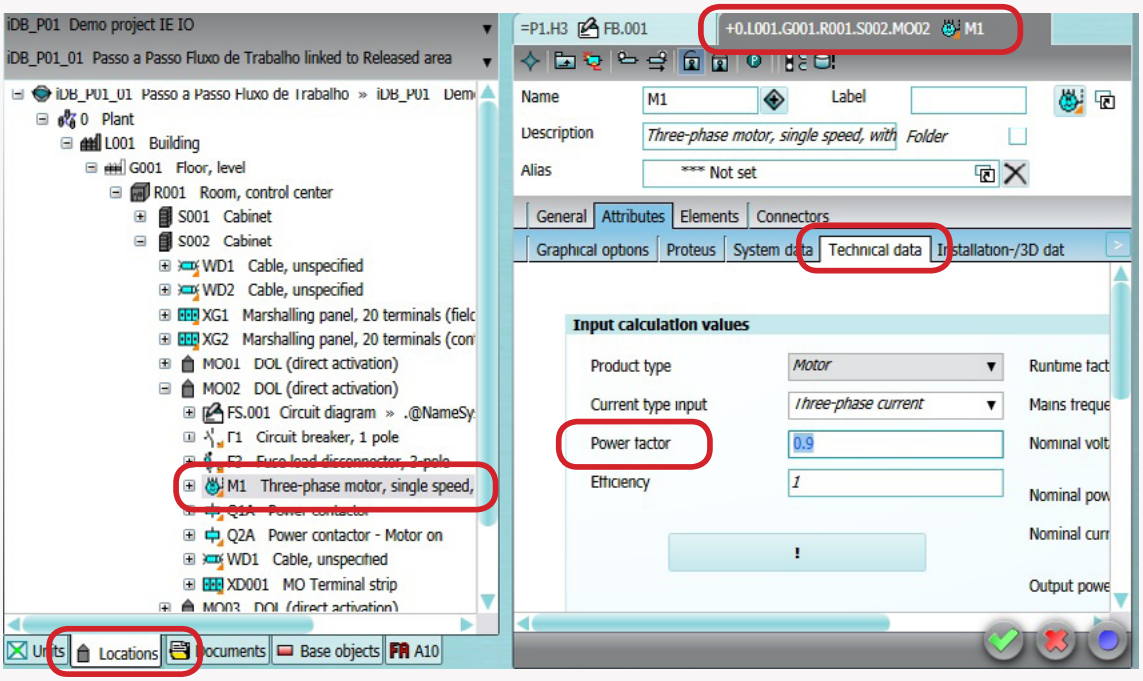


Figure 29 – Properties of the electric motor M1

STEP 15 Opening the Electrical Circuit Diagram

Open diagram **FS.001**, just above the motor in the structure, to see the circuit diagram where motor **M1** is drawn (**Figure 30**).

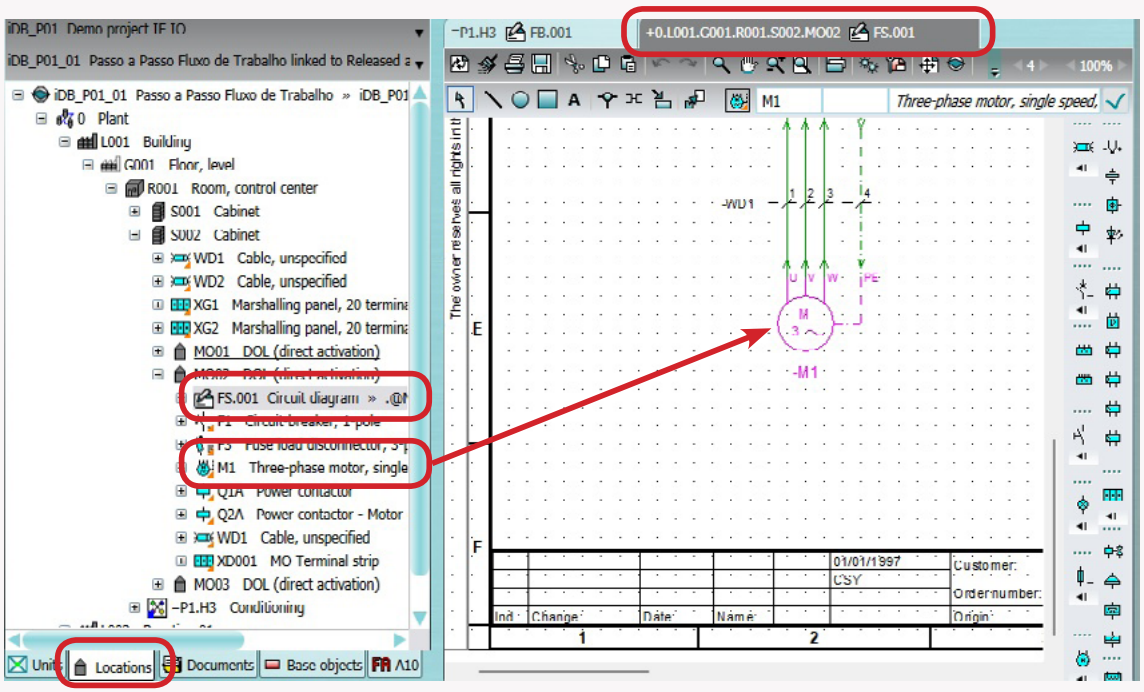


Figure 30 - Electrical circuit diagram where motor M1 is drawn

STEP 16 Navigating to the Circuit Diagram in the Documents Tab

When working on large projects, it is common to have difficult to manage a large amount of documents. For this reason, there is a Documents tab in **COMOS** that is reserved for organizing documents by type in a single place.

Right-click on the circuit diagram **FS.001** and select **Navigate|Reference documents|Plant documentation**, as shown in **Figure 31**.

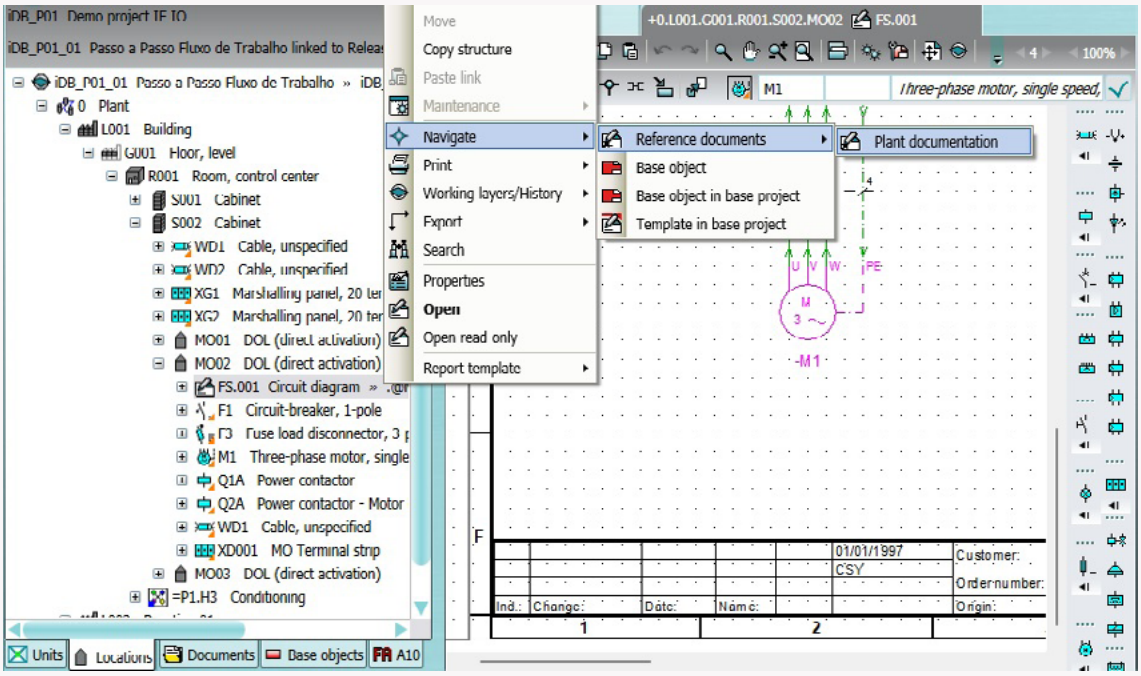


Figure 31 – Navigating to the Documents Tab

The system will take you to the circuit diagram **FS.001** in the Documents tab (**Figure 32**), in a folder containing all circuit diagrams of this type in the project.

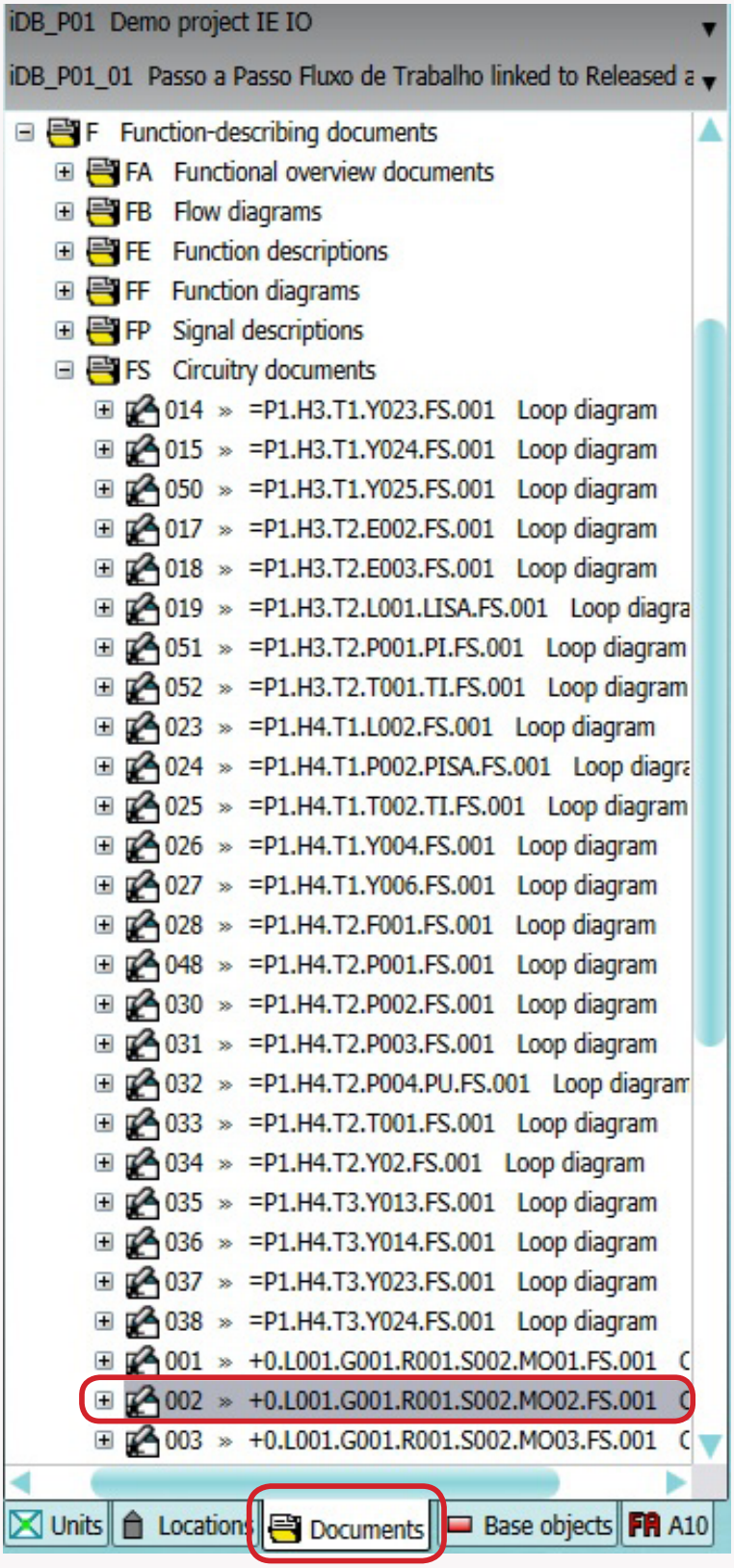


Figure 32 - Circuit diagram on the Documents tab

STEP 17 Batch Editing Objects Using Query

It is common in **COMOS** projects, having to maintain a large list of objects, which can be in different places within the structure. Depending on the number of objects, it can become a arduous task.

To make this kind of task easier, **COMOS** provides a tool for searching and editing objects through queries.

Suppose you need to change the temperature field of all the pumps in unit **H3** in plant **P1**, we can perform this task quickly using **query**.

On the **Icon** Bar, click on **Query** and select: **Queries for engineering objects|Query: Engineering objects** (**Figure 33**).

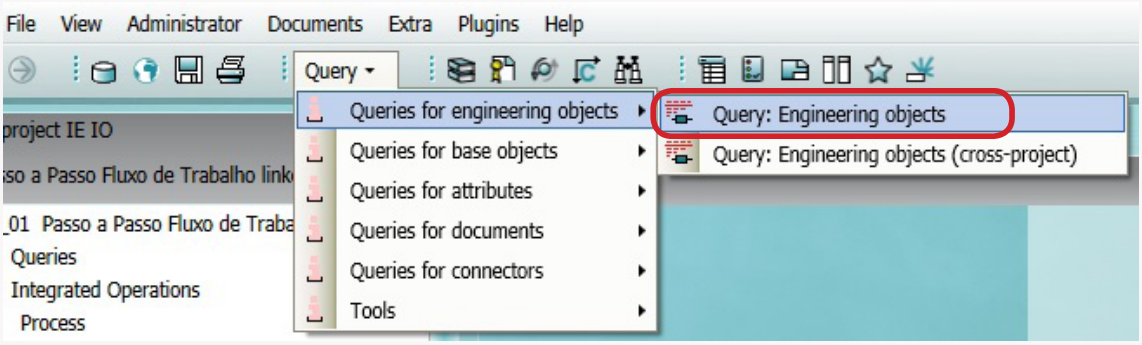


Figure 33 - Opening a Query

- Drag the **H3** unit to the **Start object(s)** field to set the searching to start from **H3** unit;
- Drag one of the pumps to the **Base object(s)** field to define the type of object that should be displayed in the query result;
- Click on the button, in the form of **binoculars**, located in the query toolbar to run the query.

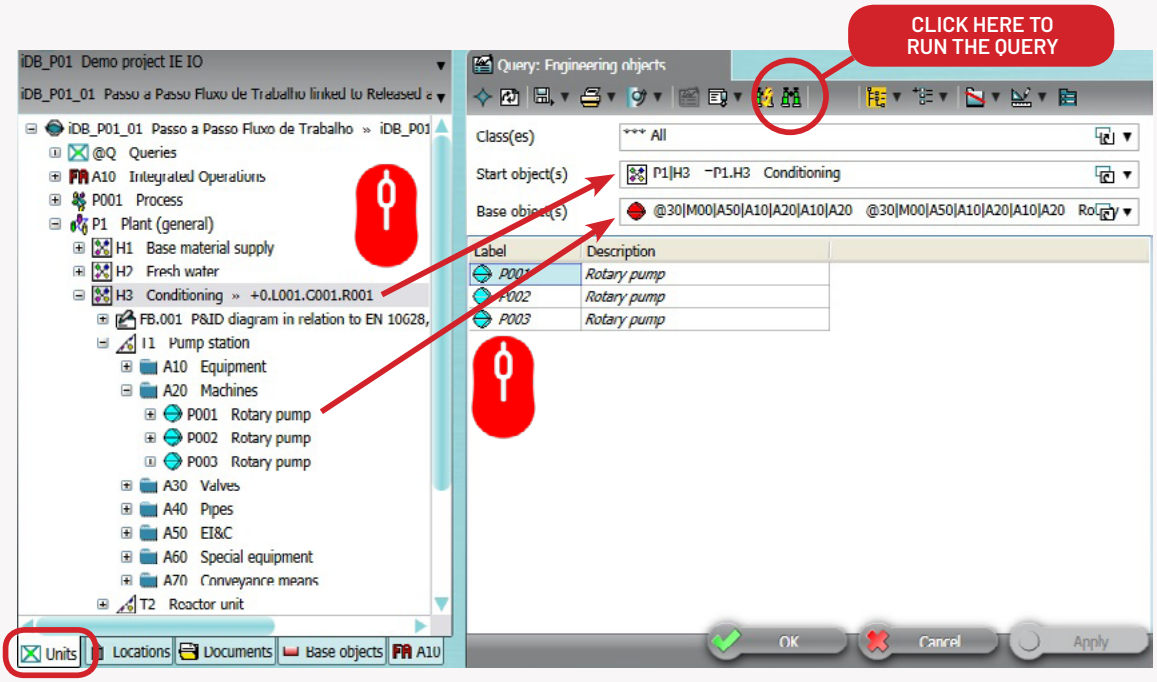


Figure 34 - Query result

Include the **Ambient temp** field as a new **query** column (**Figure 35**). To do this:

- Right-click on the **Label** column in the header;
- Select: **New|Attributes|Process data|Ambient temp**.

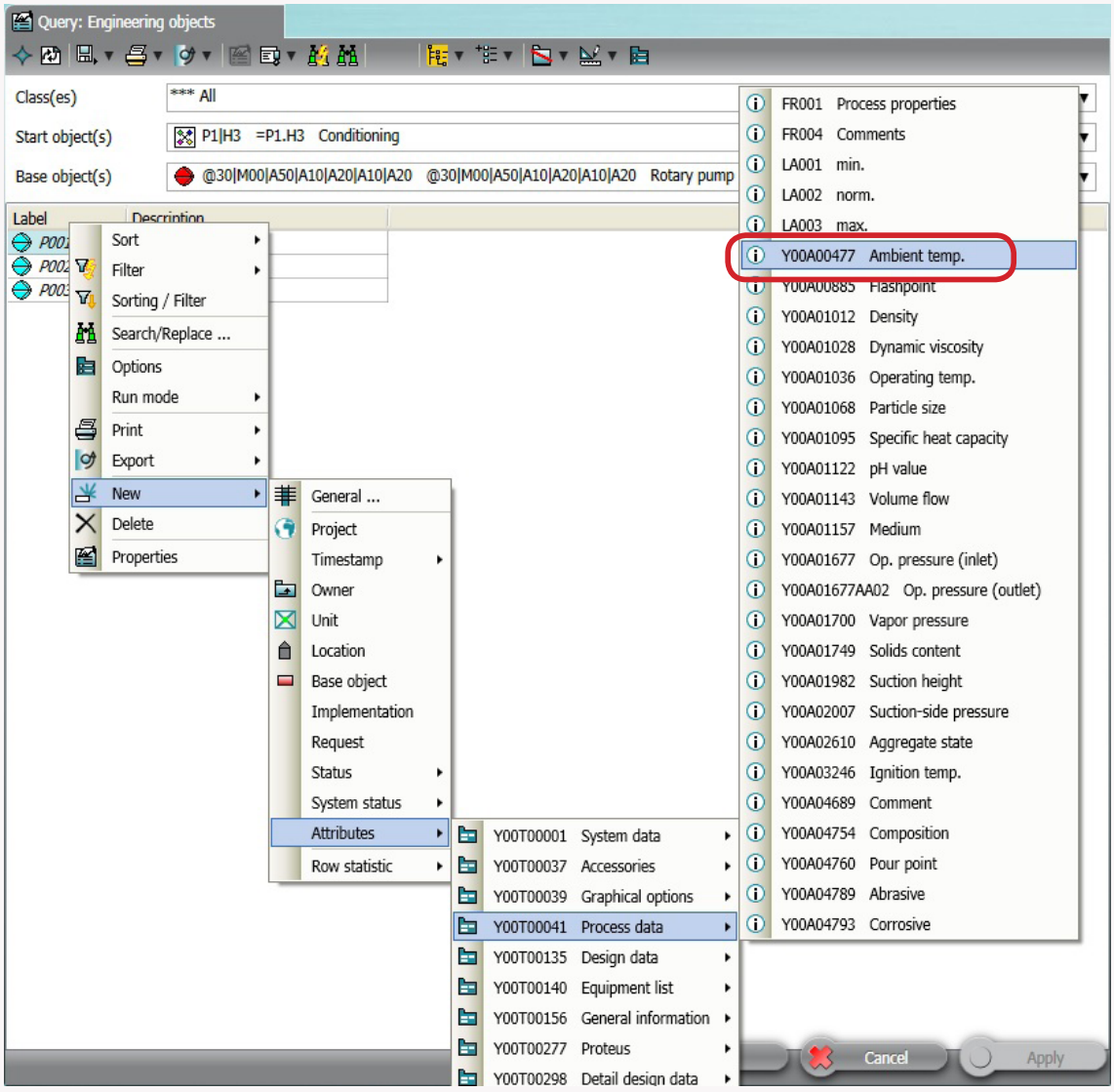


Figure 35 - Creating a column for the query

Notice that the value of the minimum temperature filled in **STEP 8** for pump **P001** appears in the query. Left-click on the **Ambient** temp min field for the other pumps and fill in the same value as for pump **P001**, as shown in **Figure 36**. Then click the **Apply** button to save the changes made.

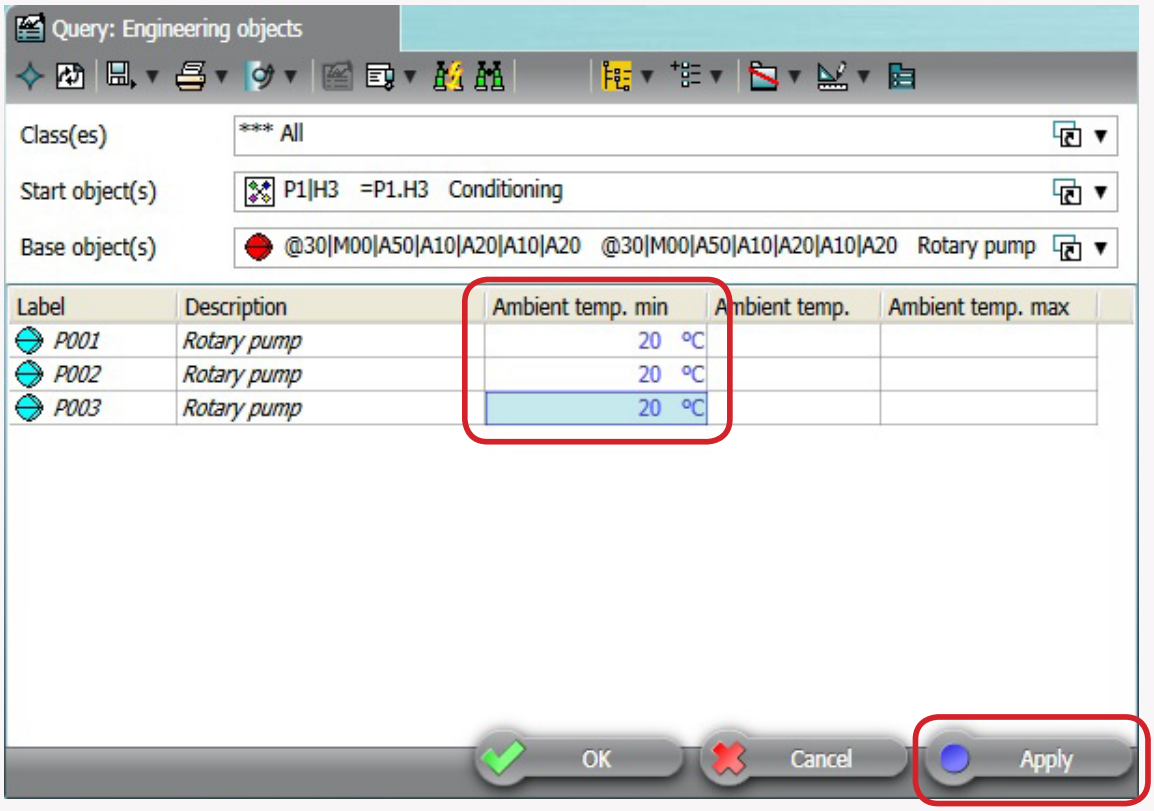


Figura 36 - Filled Query

All pumps have been updated.

STEP 18 Working Layer Release

To finish, we will do the release for the working layer we have created in **STEP 4** to update the project with the updates we've made so far.

- Click the **globe-shaped** icon on the icon bar (**Figure 7**), to open the project list again;
- Right click on the layer created in the **STEP 4**;
- Select the option: **Release to the released area** (**Figure 37**);
- Click **Ok** to confirm the action;
- A message will appear saying that the **Release** has been finished, click **Ok** again. The project will be updated according to the changes made in the working layer.

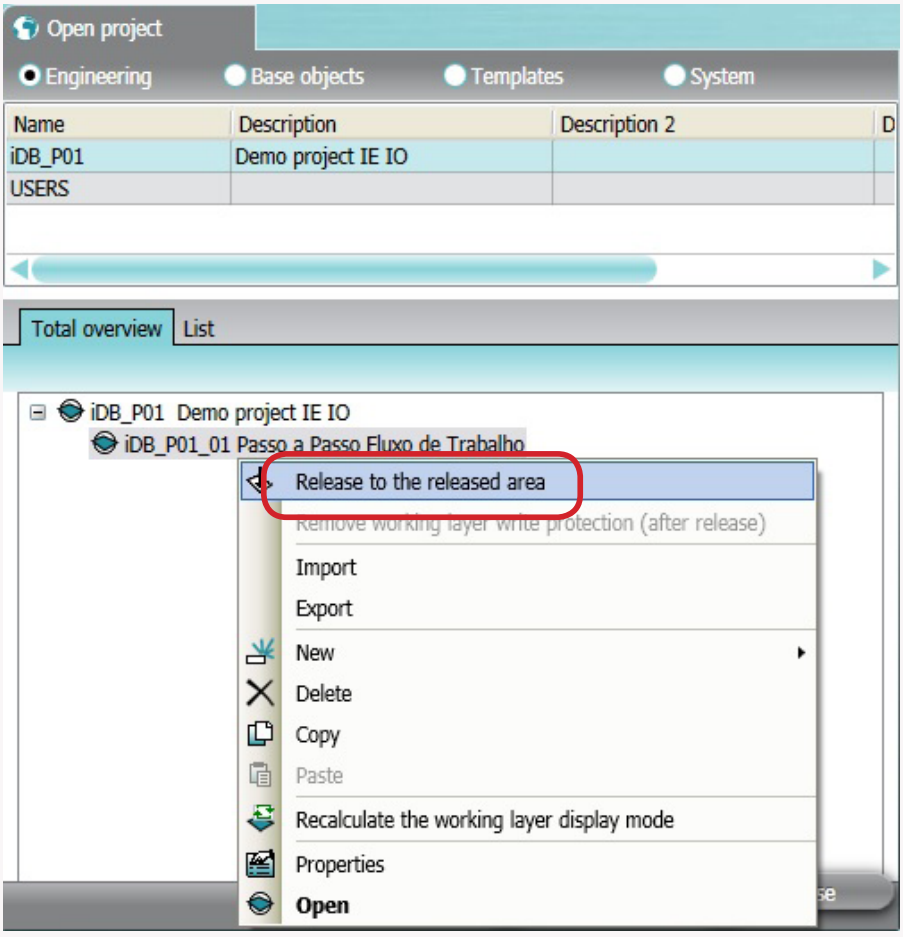


Figure 37 - Working layer release

4. Conclusão

Here I finish the step-by-step workflow proposed at the beginning of this document. It was quite a lot of content for those who are just starting out, but I am sure that the reader who has made it so far could get a much more concrete view of how **COMOS** is used daily.

In these **18 steps**, the reader learned how to open **COMOS**, how to open a Microsoft Jet database, and how to open the list of projects available in the database.

Starting from an existing project, you were shown how to create and open a working layer, how to open a **P&ID**, and how to navigate from a pump drawn in the diagram to the object that represents the pump in the structure.

Then it was shown how to edit the properties of the pump, how to open the pump data sheet, how to create a pump, how to draw a new pump on the **P&ID**, and how to save the changes made to the project.

From an instrument drawn in the **P&ID**, the reader learned how to navigate to the automation structure associated with the instrument, and from the pump driver was shown how to navigate to the object representing the motor in the electrical structure.

In the electrical structure, the reader saw how to open a circuit diagram, where the electric motor was drawn, and learned that it is possible to navigate from the diagram, in the **Locations** tab, to the diagram in the **Documents** tab, where the documents are organized and grouped by folders.

In addition, it was shown how to batch edit objects using **Query**. And to finish, the working layer release was done to update the project.

This workflow could be carried out by a user to fulfill an update request on a real project. Even with a slightly different workflow, the user could make simple changes to an existing project based on the knowledge gained here.

With that, I hope this walk through some of the most used features in **COMOS** has helped you take your first steps in learning about the platform.

However, this is only a small demonstration of what is possible to do using **COMOS**, there are still a huge variety of features to explore. And that's why I want to continue helping you with my free content on Linkedin and Instagram:

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@alucyregis

See you there!