PRS IED STUDIO

Configuration Tool

Instruction Manual

CYG SUNRI CO., LTD.

Preface

User's Guideline

This instruction manual contains full information of the equipment, including function descriptions, logic diagrams, input signals, output signals, setting parameters and technical parameters. It also lists the operations on safe handling, commissioning and maintaining of this equipment. The instruction manual can be can be used as a technical reference during the whole product life cycle.

Documentation and manufactured equipments purchased from CYG SUNRI CO., LTD. are dispatched separately due to the necessary manufacturing period. Therefore, they sometimes may not reach the recipients at the same time. Therefore this manual is provided as a technical reference to commission the equipment.

The installation and commissioning personnel should read all relevant chapters carefully and get a thorough knowledge of the contents of this manual, before conducting any operation to the equipment. In this way, the personnel can get the required knowledge in handling electronic equipment.

This manual contains a security chapter which describes the safety precautions recommended when using the equipment. Before installing and using the equipment, this chapter is recommended to be thoroughly read and understood.

Personnel Security

The contents in this chapter are specifically described to prevent and reduce the safety accidents in electric power production and construction processures, to ensure the personal safety and health of employees in production activities and to ensure the power grids stable operation and reliable power supply.

Any kind of direcily touching with the metal parts of the electrical equipment should be avoided when electrical equipment is in operation, because of the potential electric shock risk. Neglecting warning notices should be prevented because the improper operation may damage the device, even cause personnel injury.

The good operating condition of the equipment depends on proper shipping and handling, proper storage, installation, commissioning and maintenance. Therefore, only qualified personnel should be allowed to operate the equipment. Intended personnel are individuals who:

- Have a thorough knowledge of protection systems, protection equipment, protection functions and the configured functional logic in the IEDs;
- Have a basic knowledge in the installation, commissioning, and operation of the equipment;
- Are familiar with the working field where it is being installed;
- Are able to safely perform operations in accordance with accepted safety engineering steps;
- Are authorized to energize and de-energize equipment, and to isolate, ground, and label it;

- Are trained in the maintanence and use of safety apparatus in accordance with safety engineering regulations;
- Have been trained in first aid if any emergency situations happen.

Warning Indications

The following indicators and standard definitions are used:

DANGER! means that death, severe personal injury and considerable equipment damage will occur if safety precautions are disregarded.

WARNING! means that death, severe personal and considerable equipment damage could occur if safety precautions are disregarded.

CAUTION! means that light personal injury or equipment damage may occur if safety precautions are disregarded.

NOTICE! is particularly applies to damage to device and to resulting damage of the protected equipment.

DANGER!

NEVER allow the current transformer (CT) secondary circuit connected to this equipment to be opened while the primary system is live. Opening the CT circuit will produce a dangerously high voltage.

WARNING!

ONLY qualified personnel should work on or in the vicinity of this device. This personnel **MUST** be familiar with all safety regulations and service procedures described in this manual. During operating of electrical device, certain part of the device is under high voltage. Severe personal injury and significant device damage could result from improper behavior.

WARNING!

Do **NOT** touch the exposed terminals of this device while the power supply is on. The generated high voltage causes death, injury, and device damage.

WARNING!

Thirty seconds is **NECESSARY** for discharging the voltage. Hazardous voltage can be present in the DC circuit just after switching off the DC power supply.

CAUTION!

- **Earthing**

  Securely earthed the earthing terminal of the device.

- **Operating environment**

  ONLY use the device within the range of ambient environment and in an environment free of abnormal vibration.

- **Ratings**

  Check the input ratings **BEFORE** applying AC voltage/current and power supply to the device.

- **Printed circuit board**

  Do **NOT** attach or remove printed circuit board if the device is powered on.

- **External circuit**

  Check the supply voltage used when connecting the device output contacts to external circuits, in order to prevent overheating.

- **Connection cable**

  Carefully handle connection cables without applying excessive force.

NOTICE!

The firmware may be upgraded to add new features or enhance/modify existing features, please **MAKE SURE** that the version of this manual is compatible with the product in your hand.

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Version: 1.3

Table of Contents

1 Summary

1.1 Application Scope

The configuration tool based on IEC61850 communication protocol, can acquire IED real-time data, including data set reading, setting management, remote control operation, disturbance inquiry and alarm event reading, etc. The configuration tool facilitate engineer or customer to commission device and eliminate any fault.

The configuration tool is applied by a device to achieve configuration for device parameters and self-ability descriptive files and then the configuration will be downloaded to a physical device to accomplish the configuration. Specifically, the configuration tool possesses the function of finishing related logic configuration in graphic modes, making the process easy and the configuration reused, simplifying configuration operation performed by engineering personnel, improving the re-usage rate of configuration, finally enhancing the efficiency of project configuration.

1.2 Standard configuration process.

After the R&D personnel completes device function development, an initial device capability description file, cellcfg.xml (driver package), will be manually output. The project configurator manages the import of the driver package into the basic library in the configuration tool through an overseas device driver package manager tool (ManagerTool). The configuration tool creates an engineering project and uses the driver package template of the base library to create a device configuration instance. At the same time, the device instance configuration of the engineering project can be exported as a device configuration backup file to be reused for other project configurations. Finally, the engineering project configuration personnel exports the operating driver files configured in the tool and download it to the physical device to meet the configuration requirements.

2 Installation of Configuration Tool

The configuration tool package " Prs_Ied_Studio_Win_32bit_20240227150407.7z " is downloaded, and can be directly used after unzipped to a local catalog. It contains "Overseas Device Driver Package Management Tools" ManagerTool.exe and "Overseas Configuration Tools" PRS_IED_STUDIO.exe .

2.1 File Structure

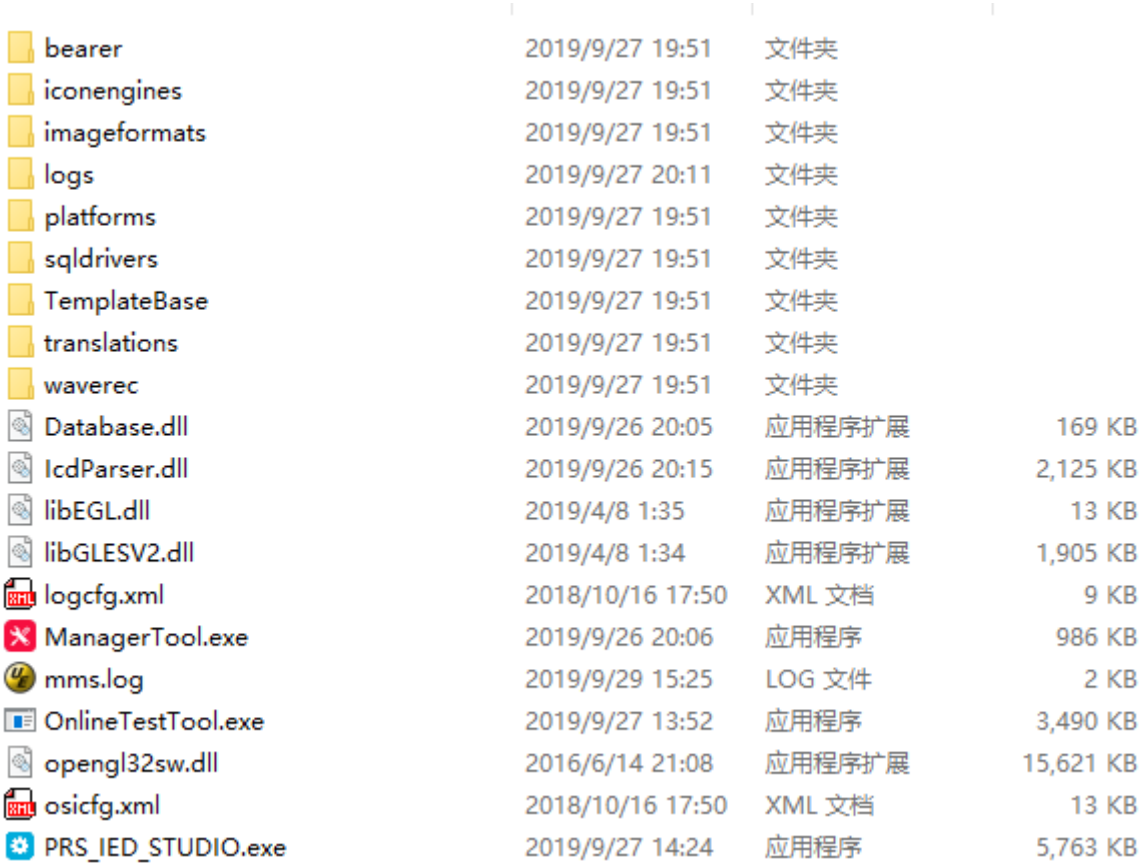


Figure 2.1.1 File structure display

3 Software operating environment and configuration

3.1 Hareware Parameter

Table 3.1.1 Hareware Parameter

No.	ID	Module Description
1	CPU	Intel Dual-core @ 2.50GHz or higher (the higher CPU parameter, the more smoothly operation condition)
2	Disk	40G or more
3	Memory	Recommend 32bit system with 4G RAM，64 bit system with 4G RAM, or larger RAM
4	Display	Resolution 1024*768 or above
5	Peripherals	USB interface, keyboard, mouse
6	Operating System	Windows XP, Win7 or above

4 Terminals Configuration Tool

4.1 Overview

The configuration tool creates the project on the basis of base library. The device driver package of the base library is used to create the device configuration instance, set its parameters, and complete the related logic configuration in a graphical way.

Currently, the following functions can be realized by the configuration tool:

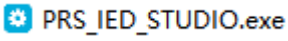
- Project management; (reference: 4.7. Description of project management functions)
- Device management: (reference: 4.8. Description of device management functions)
- Device Parameter configuration; (reference: 4.9. Functional description of device parameter setting)
- Device logic diagram drawing; (reference: 4.10. Instructions for drawing device logic screen)
- User authority management; (reference: 4.11. User authorization management instructions)
- Drawing device main wiring diagram; (reference: 4.12. Drawing the main wiring diagram of device)

Configuration tool usage rule description:

1. To install and use the configuration tool for the first time, the user must first set the valid parameters needed by the current tool according to "4.6. Setup dialog box description", otherwise the configuration tool may not work properly.

If a new device driver package is needed in the created project configuration, first import the device driver package into the base library via "Driver Package Management Tool", and then use the configuration tool to create the device configuration instance corresponding to the driver package.

4.2 Description of main interface of configuration tool

Open the configuration tool 

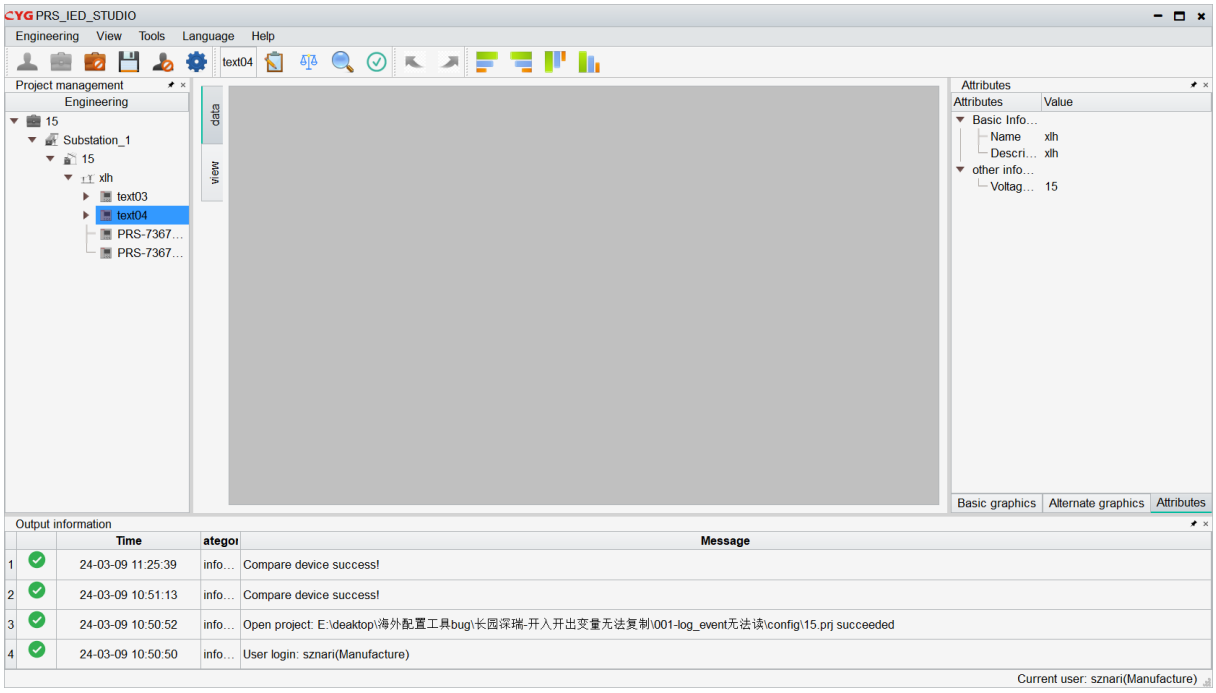


Figure 4.2.1 Overview of Description of main interface of configuration tool window

4.3 Description of menu bar functions

4.3.1 Project menu

The general operation of the project is provided.

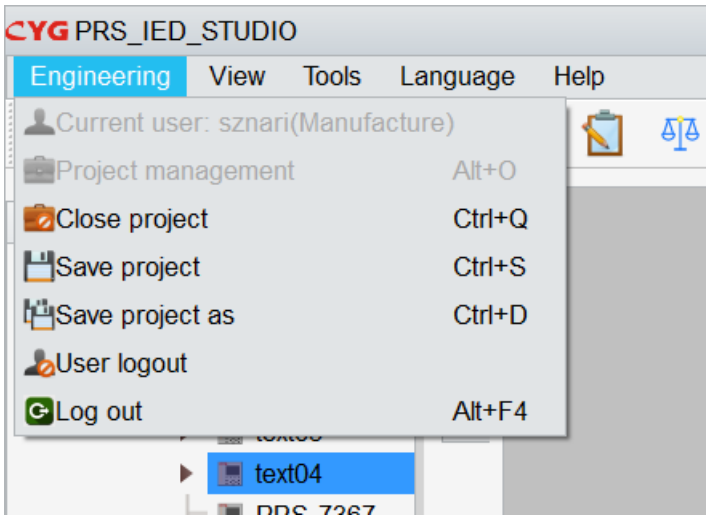


Figure 4.3.1 Project Menu Bar

Table 4.3.1 Description of Project Menu Bar

Icon	Name	Description
	Current User	Operator login. The user login aims to provide specific operation authority according to user authority set by configuration tool and different login users.

Icon	Name	Description
	Project Management	Including create new project, delete project, backup project, import project and open project.
	Close Project	Close the currently opened project.
	Save Project	Save the current project data，Ensuring that the parameter changes, logic drawings, etc. have been updated to the database. **Notice: The users should actively save when modifying the parameters and logic drawings, which ensure the current configuration data are updated and saved.**
	Save Project As	Save the currently opened project file as a new one.
	User Logout	Operator logs out.
	Quit	Quit and close configuration tool.

4.3.2 View menu

The display/hide processing of the sidebar information window of the main interface is provided. (Tips: when showing the parameter form and logic graphics of the device component, part of the sidebar information window can be hided to provide larger room for displaying the central window module.)

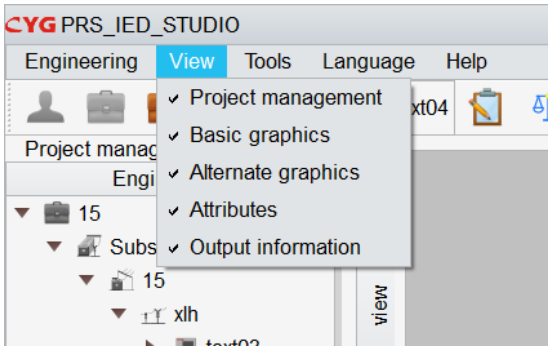


Figure 4.3.2 View Menu Bar

Table 4.3.2 Description of View Menu Bar

Name	Description
Project management	Display/hide project management information sidebar.
Basic graphics	Display/hide basic graphics information sidebar.
Alternate graphics	Display/hide Alternate graphics information sidebar.
Alternate	Display/hide Alternate information sidebar.
Output information	Display/hide the output log information sidebar.

4.3.3 Instrument menu

Instrument menu of the configuration tool is provided to set project catalogue, basic project library path, etc.

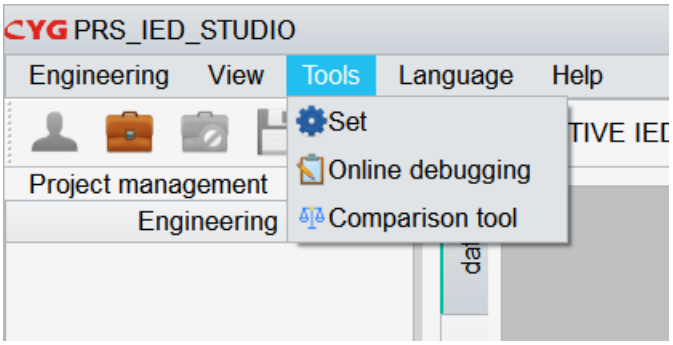


Figure 4.3.3 Instrument Menu Bar

Table 4.3.3 Description of Instrument Menu Bar

Icon	Name	Description
	Setting	Pop up setting dialog box, provide project catalogue, basic project library path, standard icd template path, user management and other tool parameters settings.
	Online Testing	Start the online testing tool.
	Comparison	Comparison of the differences between the two IED devices (fixed value, PORT graphic element section)

4.3.4 Language menu

It provides the configuration tool language switching menu. Current tool only supports restarting switching languages, that is, setting new language options will take effect only after the configuration tool is re-started.

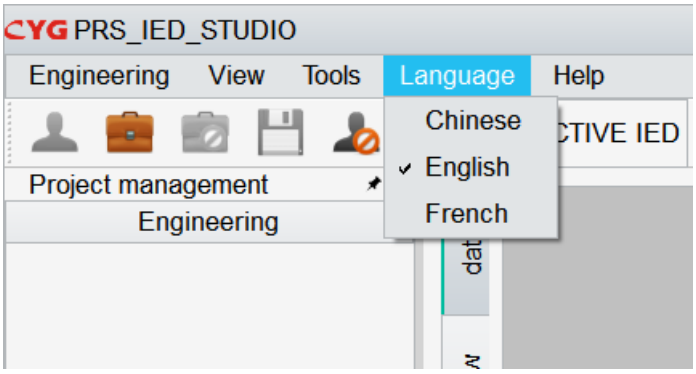


Figure 4.3.4 Language Menu Bar

Table 4.3.4 Setting of language menu

Icon	Name	Description
Chinese	Chinese	Click/check to set the current language configuration in Chinese.
✔ English	English	Click/check to set the current language configuration in English.
French	French	Click/check to set the current language configuration in French..

4.3.5 Help menu

The “help”, “about” menu are provided.

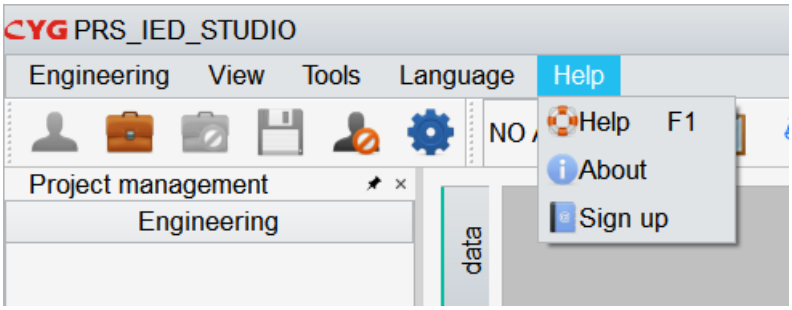


Figure 4.3.5 Help Menu Bar

Table 4.3.5 Setting of Help menu

Icon	Name	Description
Help F1	Help F1	Provide information to get help.
About	About	Provide tool information.
Sign up	Sign up	Show user's registration information, or Input registration code to activate the software.

4.4 Description of tool bar

The tool bar lists functions of some frequently-used menu, referring to “4.3 Description of menu bar f`unctions”

Figure 4.4.1 Overview of description of tool bar

Table 4.4.1 tool bar

Icon	Name	Description
	User Login	Enter your username and password here, and you can use the tool after a successful login.
	Project Management	Including create new project, delete project, backup project, import project and open project.
	Close Project	Close the currently opened project.
	Save Project	Save the current project data，Ensuring that the parameter changes, logic drawings, etc. have been updated to the database. **Notice: The users should actively save when modifying the parameters and logic drawings, which ensure the current configuration data are updated and saved.**
	User Logout	Operator logs out.
	Setting	Pop up setting dialog box, provide project catalogue, basic project library path, standard icd template path, user management and other tool parameters settings.
	IED Name	The name of the IED currently displayed in the workspace
	Online Testing	Start the online testing tool.
	Comparison	Comparison of the differences between the two IED devices (fixed value, PORT graphic element section)
	Search	Search for nodes and tuples in the IED that contain this name by content
	Check	Checking for non-compliance in IED configurations
	Undo	Undo the previous step
	Line up	Batch selection of logical tuples for easy alignment for aesthetics

4.5 Status bar

It is mainly used to display the current user and status of an operation (e.g. process of opening a project).

4.6 Description of setting dialog in detail

Click the Settings item on the Instrument menu to pop up the Settings dialog box.

4.6.1 Set project catalog and base template library path

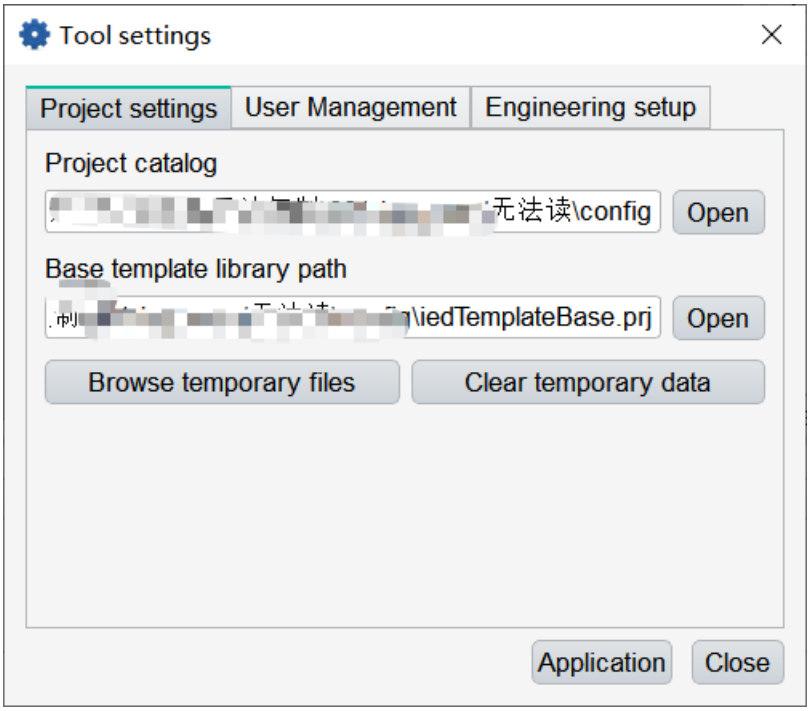


Figure 4.6.1 Project directory setting

4.6.2 User management settings

User management settings include add/delete user, view/modify user passwords, etc. For specific user management application instructions, refer to "4.12. User authority management instructions".

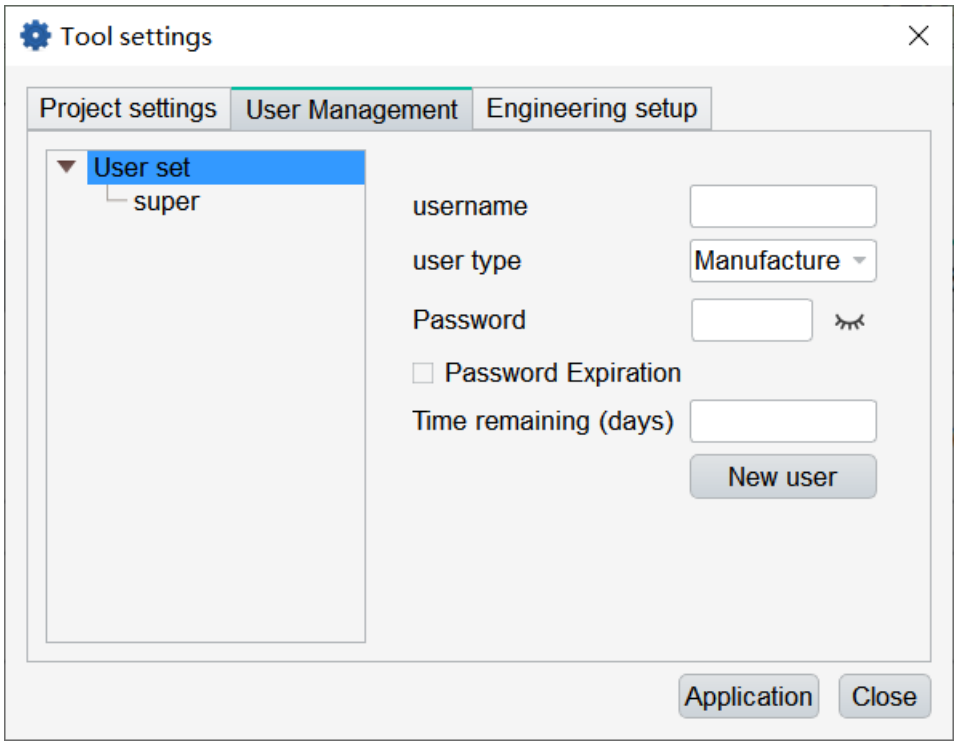


Figure 4.6.2 Setting of basic project library path

After setting up, click the "Apply" button to save the current settings.

4.6.3 Engineering setup

The project settings include the following functions

- Set the time to save the project automatically
- Set the ICD export type

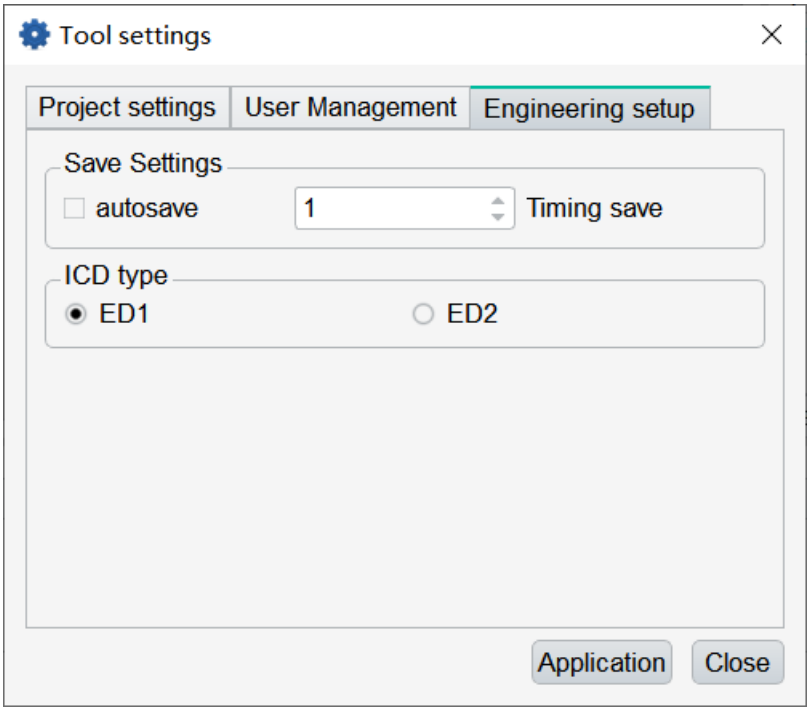


Figure 4.6.3

4.7 Description of project management functions

Project Management provides functions of create, delete, backup projects, import project and open project. The project management window is shown in the following figure:

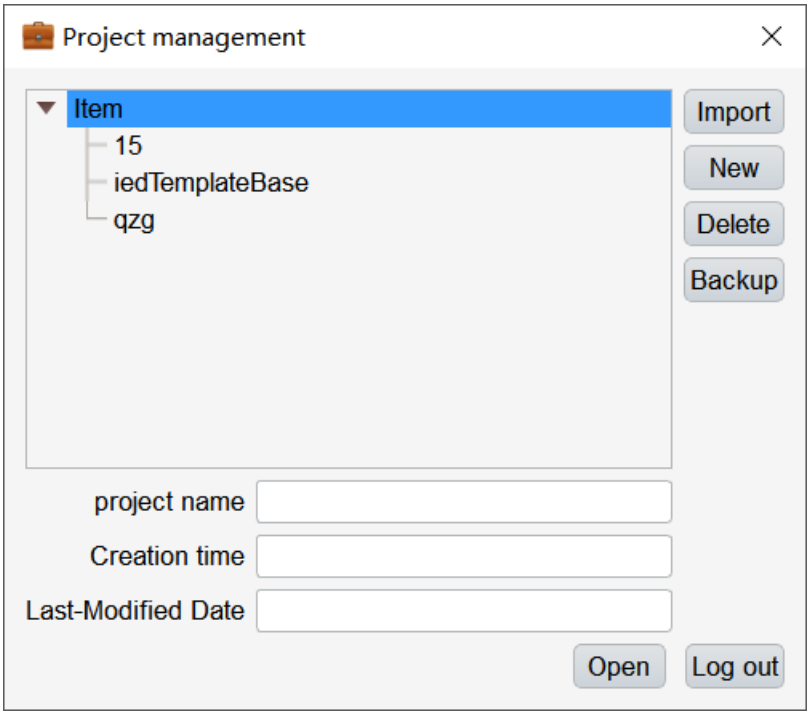


Figure 4.7.1 Setting of basic project library path

4.7.1 Create project

- Click the "Project" node in the middle window, the "New Project" on the left side of the window will be in a highlighted state, indicating that this operation can be performed.
- Click "New Project" on the left side to pop up the New Project Parameter Settings dialog, as shown in the following figure

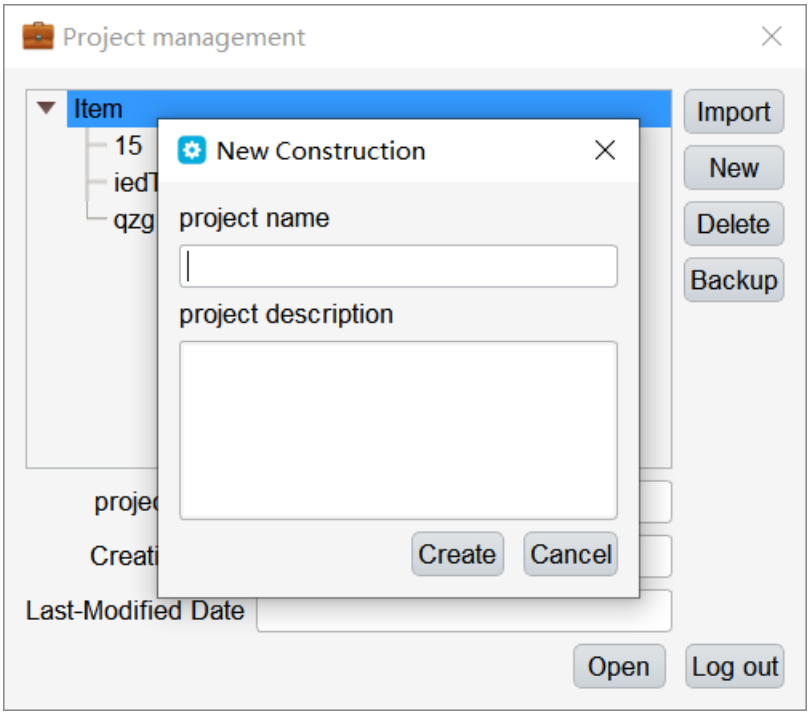


Figure 4.7.2 Diagram of Create project

- Fill in the project name (Must fill in, generally name after the substation), project description (optional), select the “Creat” to creat a project.

4.7.2 Delete project

- Click on the specific item to be deleted under the "Project" node to make it in the selected state, the "Delete Project" on the left side of the window is highlighted, indicating that the operation can be performed;
- Click "Delete project" on the left side to confirm deletion.

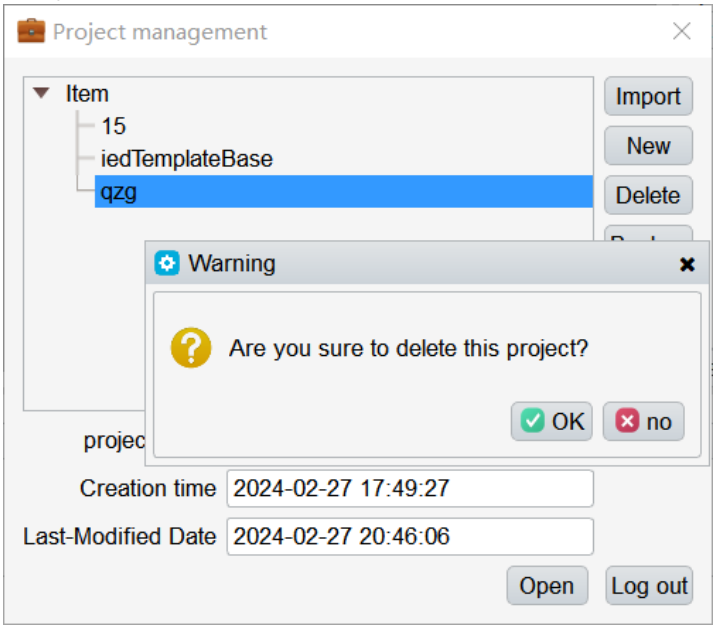


Figure 4.7.3 Diagram of Delete project

4.7.3 Backup project

- Click the project need to be backuped under the “project” node, and make it in selected status，The "backup project" on the left side of the window is highlighted, indicating that the operation can be performed;
- Click the left “backup project” to pop up the backup dialog. Select the backup path and enter the name of the project backup file..

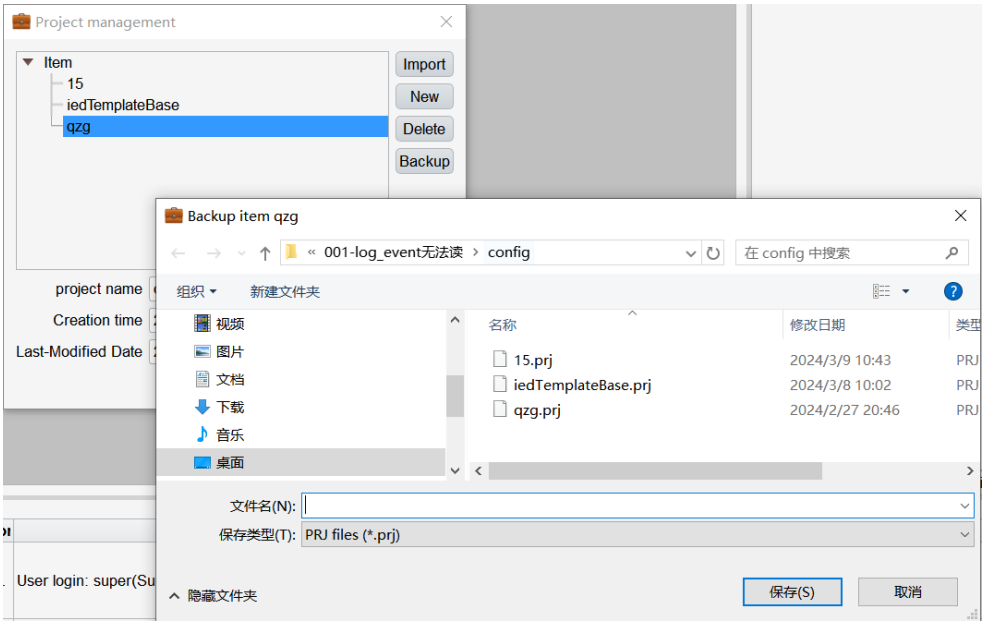
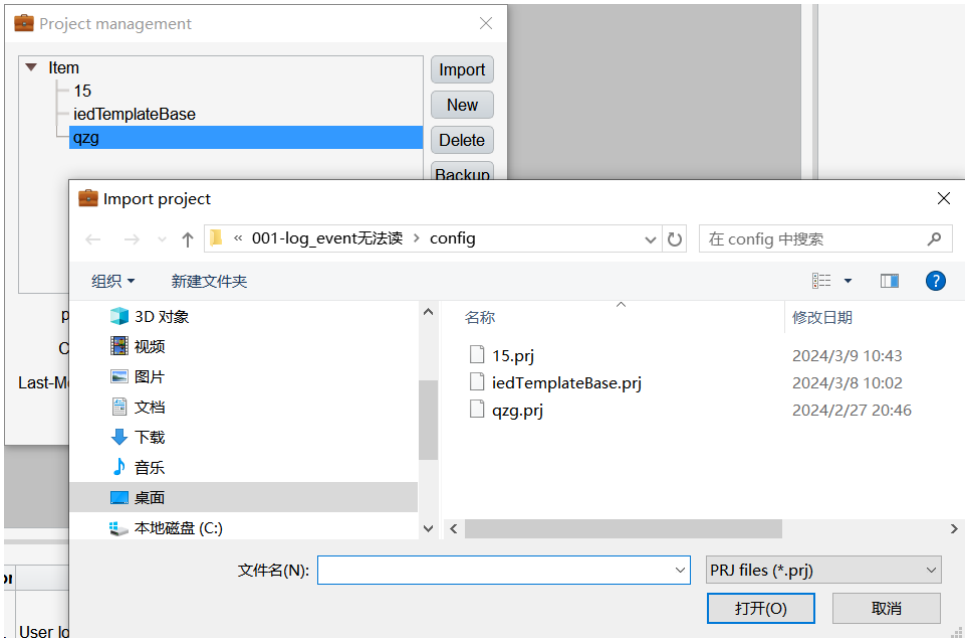


Figure 4.7.4 Diagram of backup project

4.7.4 Import project

- Click “project” node and make it in selected status. It means that the imported project will be saved in the path where the project directory is;
- Click "Import Project" on the left to pop up the Import Project dialog. Select and import existing project files. Open it. The imported project file name will be added “_bak” as the suffix

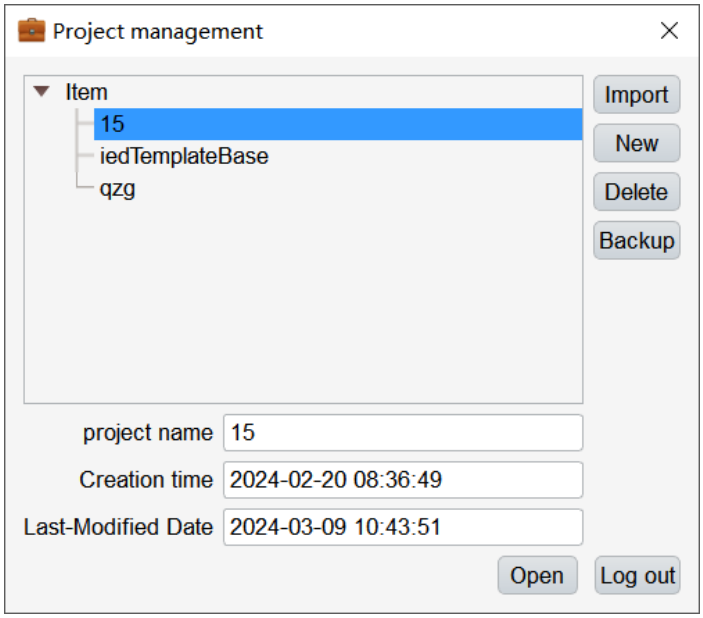


- **Figure 4.7.5 Diagram of Improt project**

4.7.5 Open project

Two operating modes can be executed to open a project:

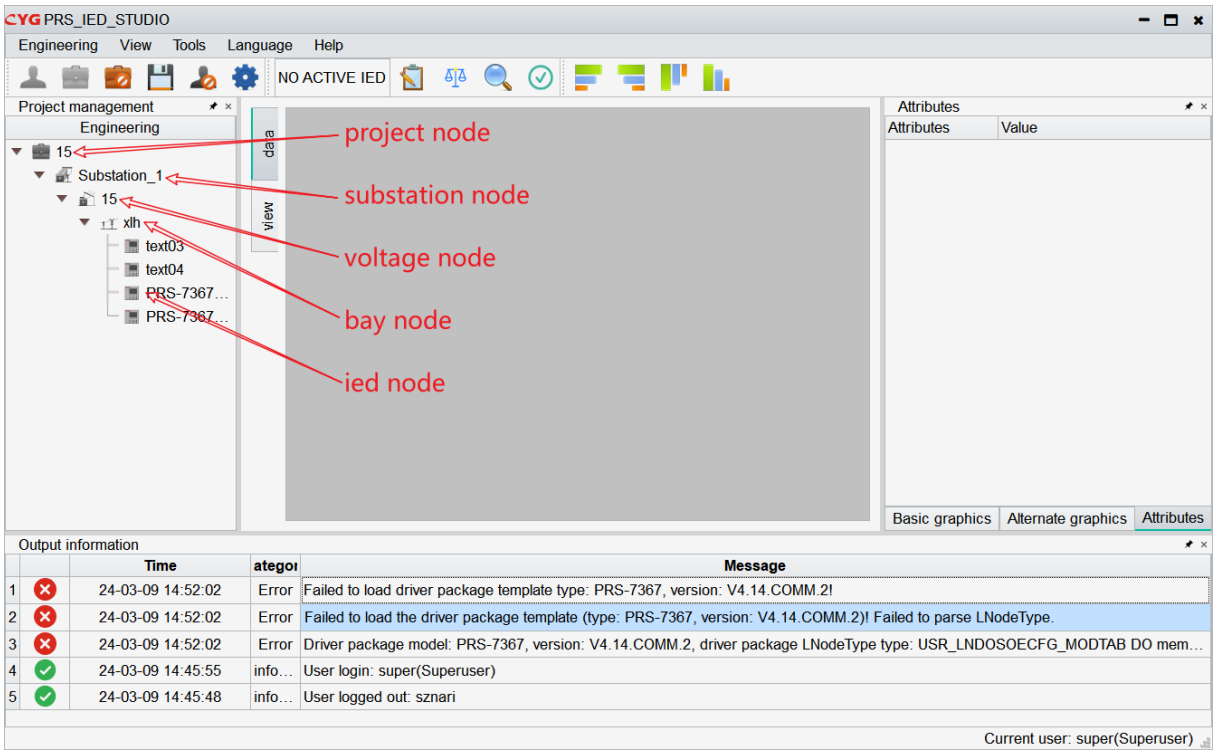
- Double-click the project to open it;
- Click the project and make it in selected status. Click the “Open Project” button in the rightlower corner of the window to open the project, as shown in the following figure:



- **Figure 4.7.6 Diagram of opren project**

4.8 Description for device management functions

Open the newly-created project, and only the project node, substation node and equipment group node are listed in the project tree, as shown in the following figure:



- **Figure 4.8.1 Description of Device Management Function**

In projects, the configuration tool manages devices according to two levels: project - > substation - > voltage level - > bay - > device, or project - > substation - > equipment group - > device. Therefore, the user can create device instance object under the "device group" node according to his own device management needs, or create voltage levels, bays and devices in turn under the substation node to carry out the device management.

Click any level node of the project tree, and a list of all the lower level nodes of the node will be displayed in the central window of the main window, and the properties of the node displayed in the property sidebar. The user can choose to modify editable properties in the central window or in the property sidebar.

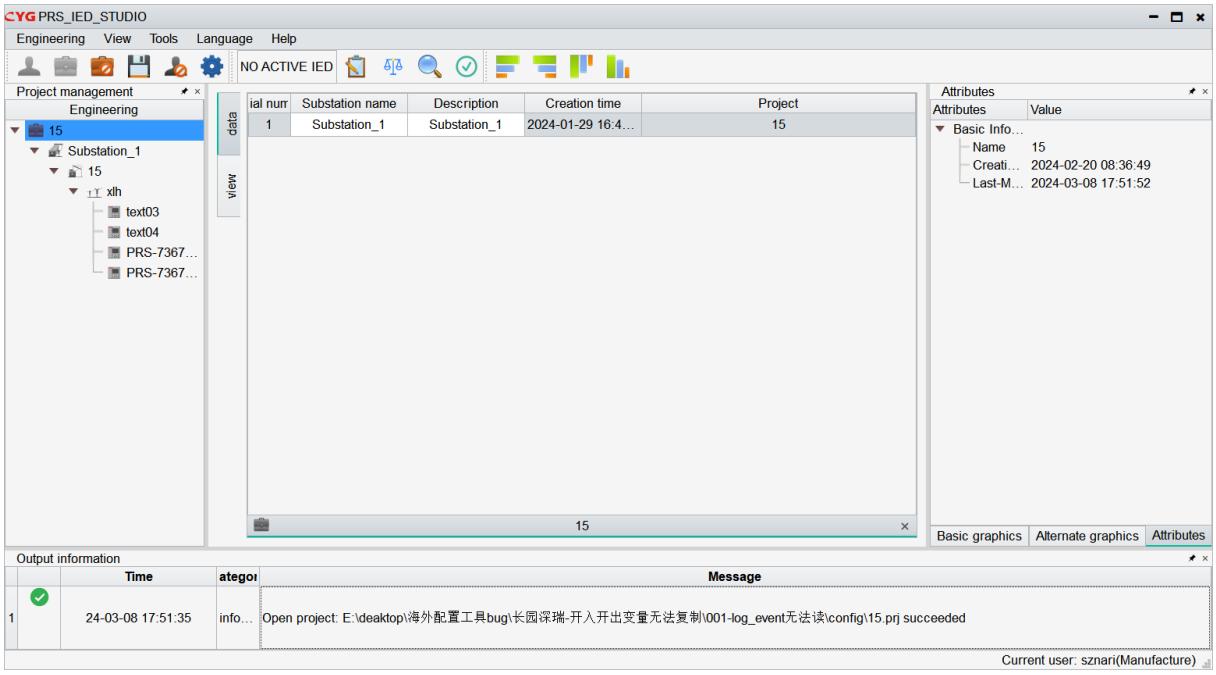


Figure 4.8.2 Project Detail Window View

4.8.1 Create voltage grade

Right-click the substation node to pop up "New voltage grade" option:

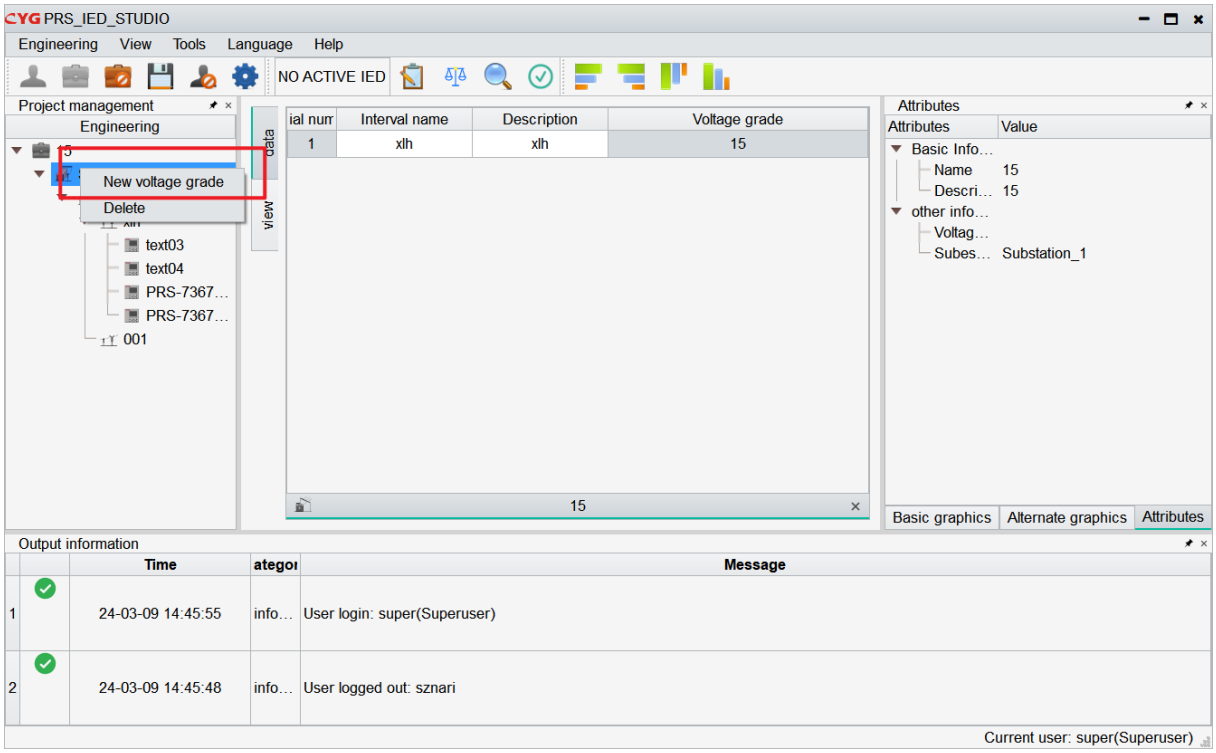


Figure 4.8.3 Create Voltage grade Step 1

Click "New voltage grade". Fill in the name of voltage level (required), description (optional) and voltage level as needed. Click "Create" to complete it.

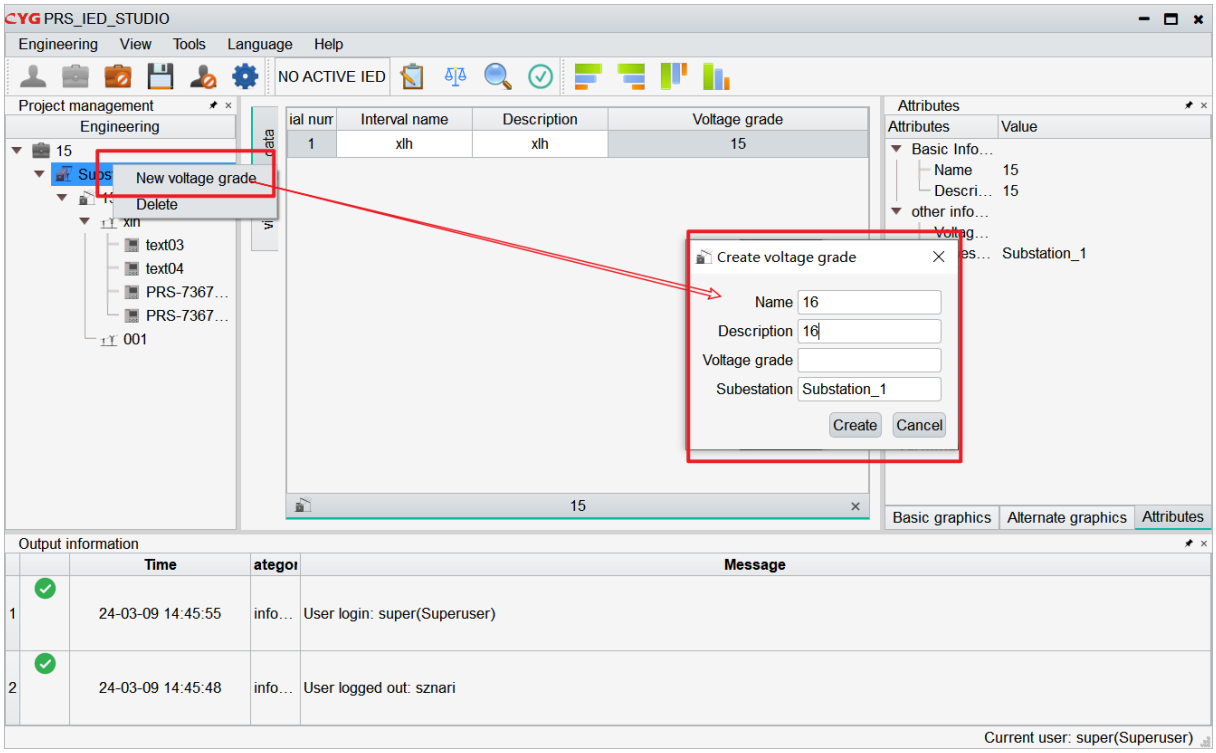


Figure 4.8.4 Create Voltage grade Step 2

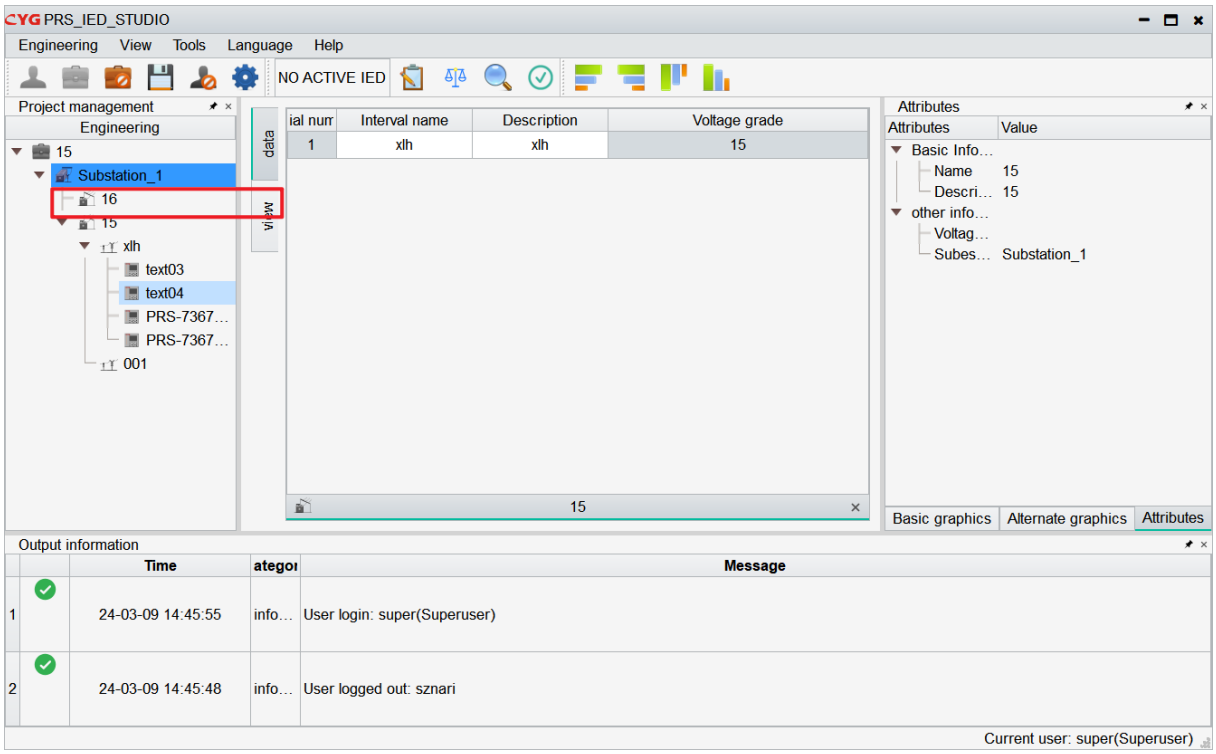


Figure 4.8.5 Create Voltage Level Step 3

4.8.2 Create interval

Right-click the voltage level node to create interval and pop up the menu of "New interval" menu:

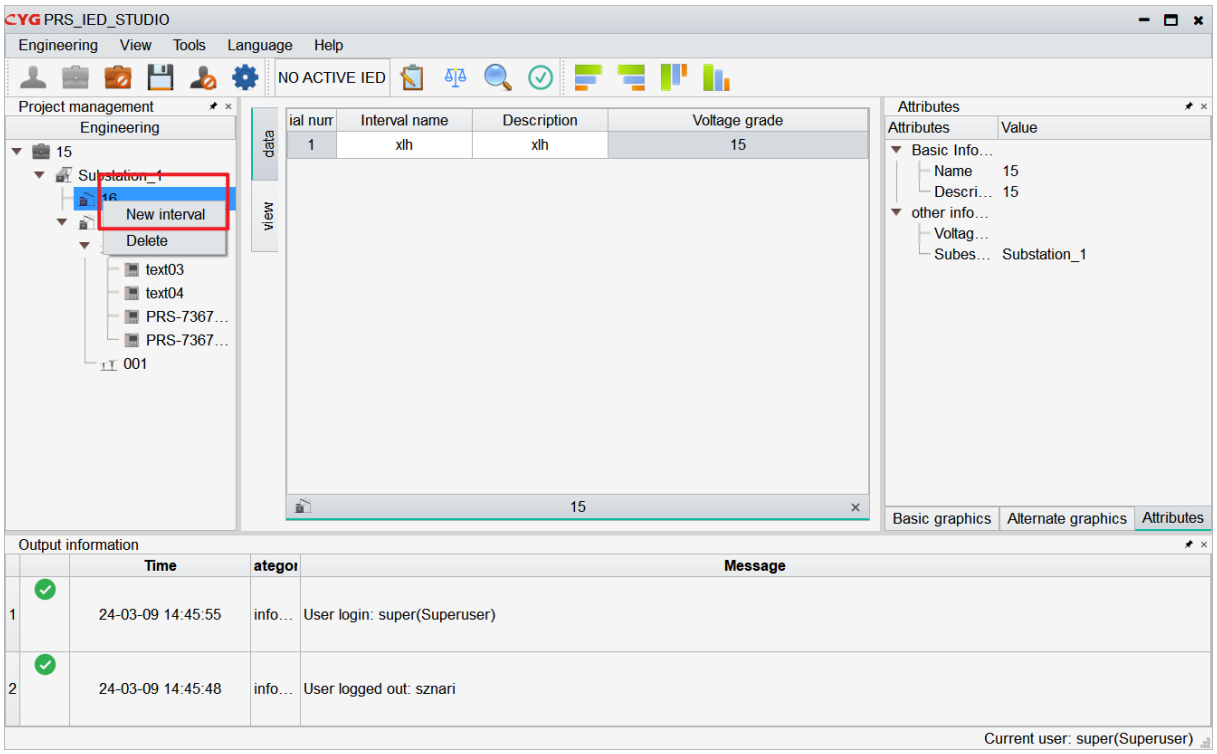


Figure 4.8.6 Creating a interval Process Step 1

Click "New interval ", fill in the bay name (required), description (optional), and click Create to complete it.

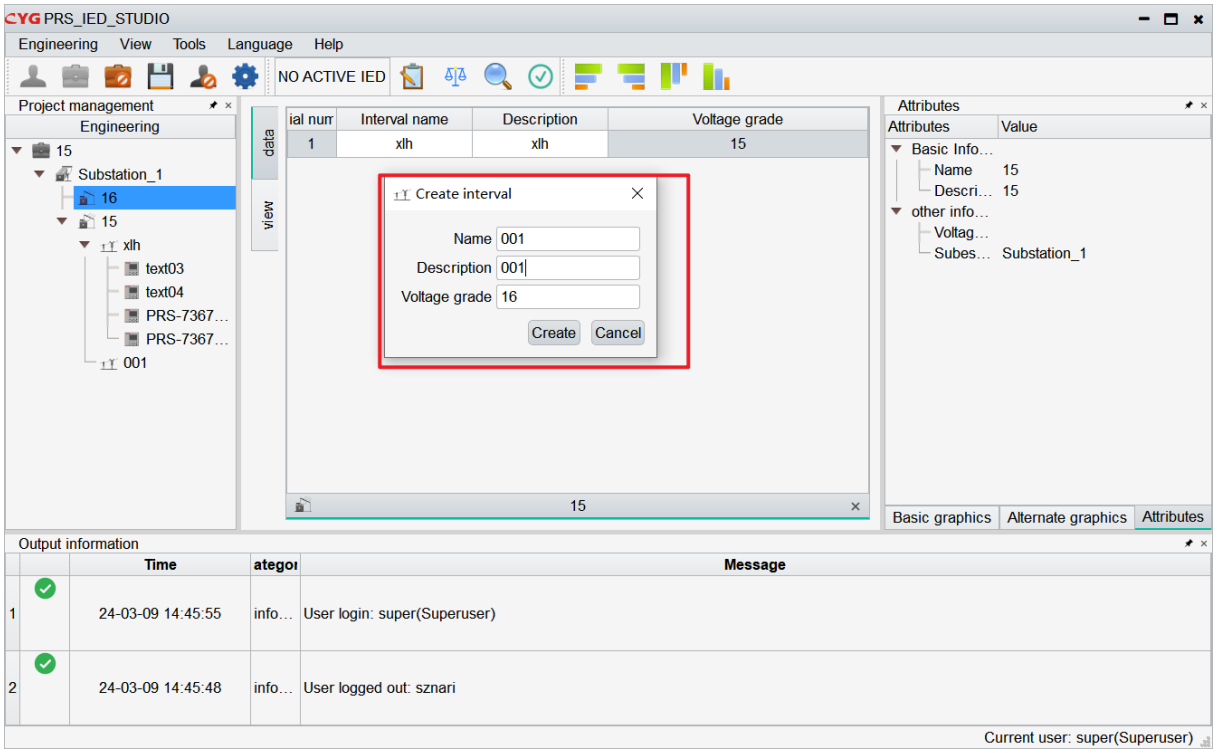


Figure 4.8.7 Creating a interval Process Step 2

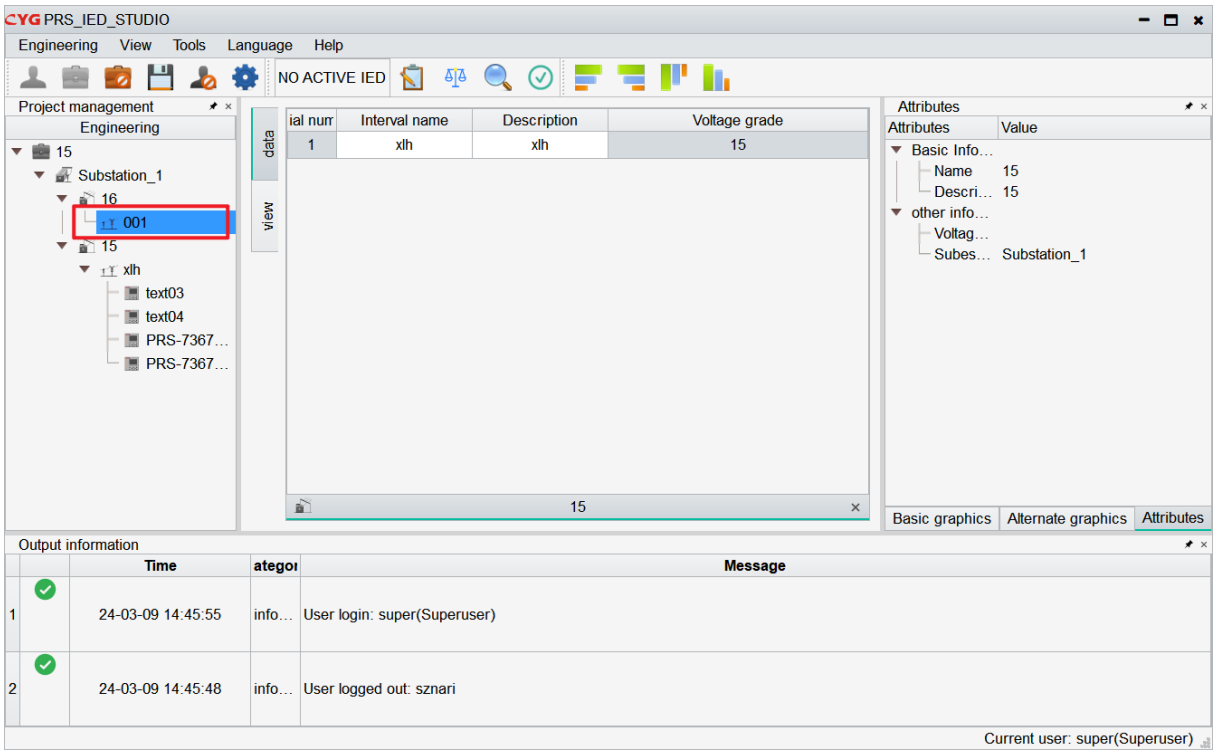


Figure 4.8.8 Creating a interval Process Step 3

4.8.3 Delete existing project level nodes

Except for the project, substation and equipment group nodes, all the other nodes can be deleted. Just right-click the corresponding node, pop up the "Delete" menu which provides the function of deleting the node.

"Delete device in device group" in the device group node right-click menu provides the function of deleting all device instance objects under the device group.

4.8.4 Create device through device backup file

If the configuration personnel have completed the basic configuration of a device in Project A, and want to reuse the configuration of this type of device in Project B, then the backup file of device configuration can be exported from the instance of device configuration in Project A (refer to "4.8.5 Description of basic operation function of device"); Project B can create the device configuration instance, which is the same with Project A configuration, by selecting “Create from device backup file…”by right-clicking the bay (device group) node needing to create such type of device configuration instance, so as to reduce the workload of repeated configuration.

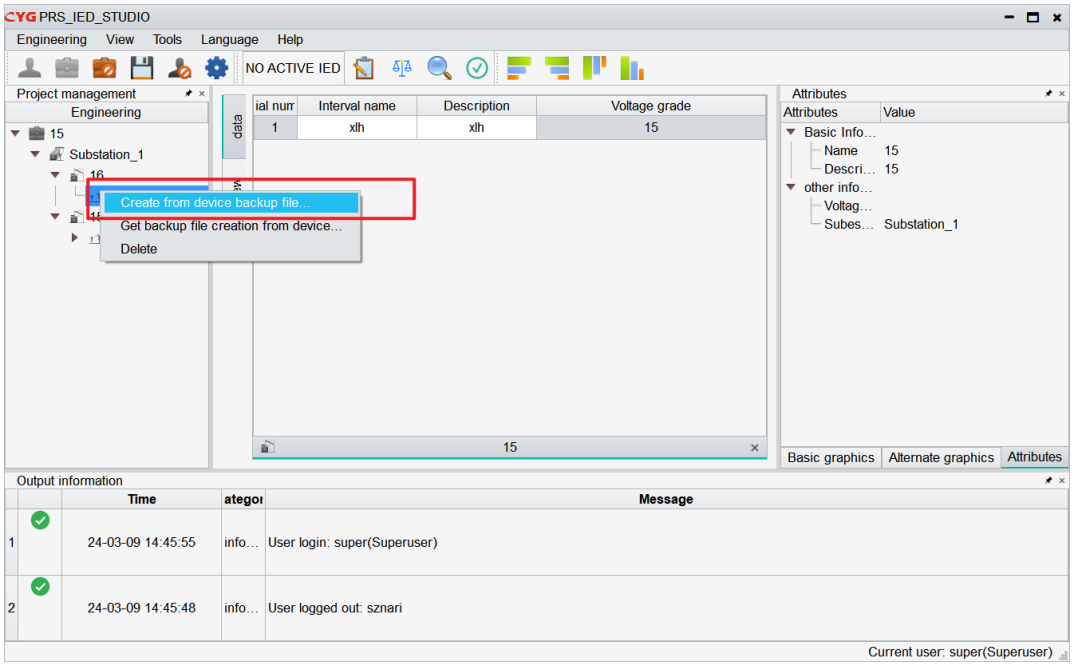


Figure 4.8.9 Creating device through backup file Process Step 1

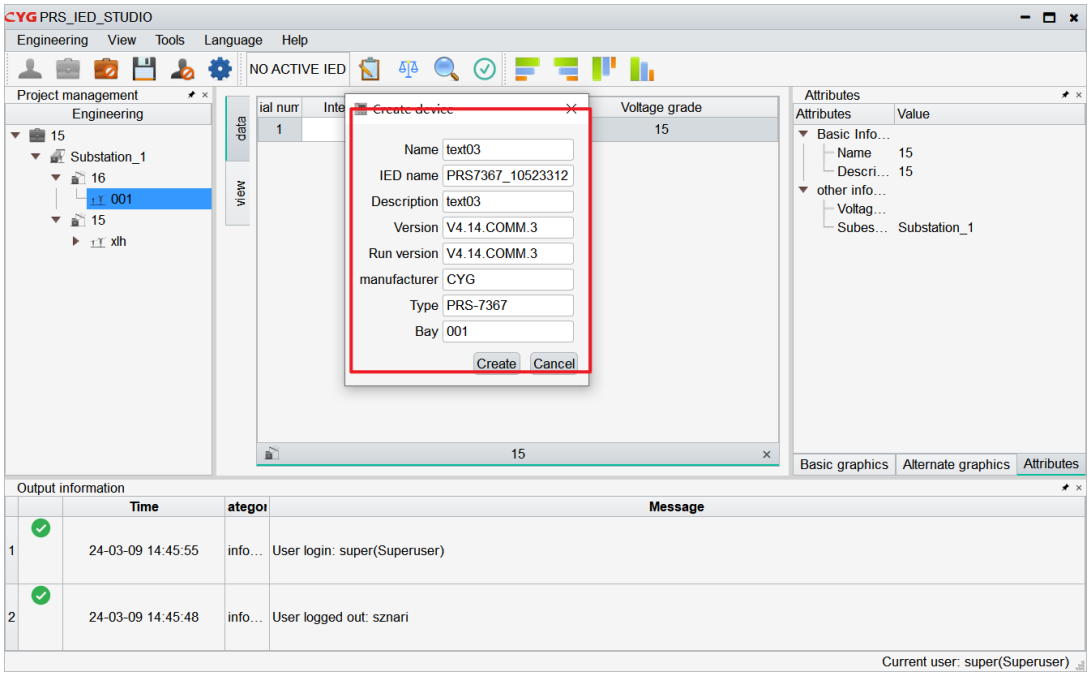


Figure 4.8.10 Creating device through backup file Process Step 2

4.8.5 Description of basic operation function of device

The project's device configuration instance object provides such functional menus as "device main wiring diagram, delete, copy, find, export DNP 3.0 communication point sheet, export 61850 model file, export 61850 model list, import local 61850 model file, import device 61850 model file, export device backup file, export the run driver file, download configuration, and connect device", etc.

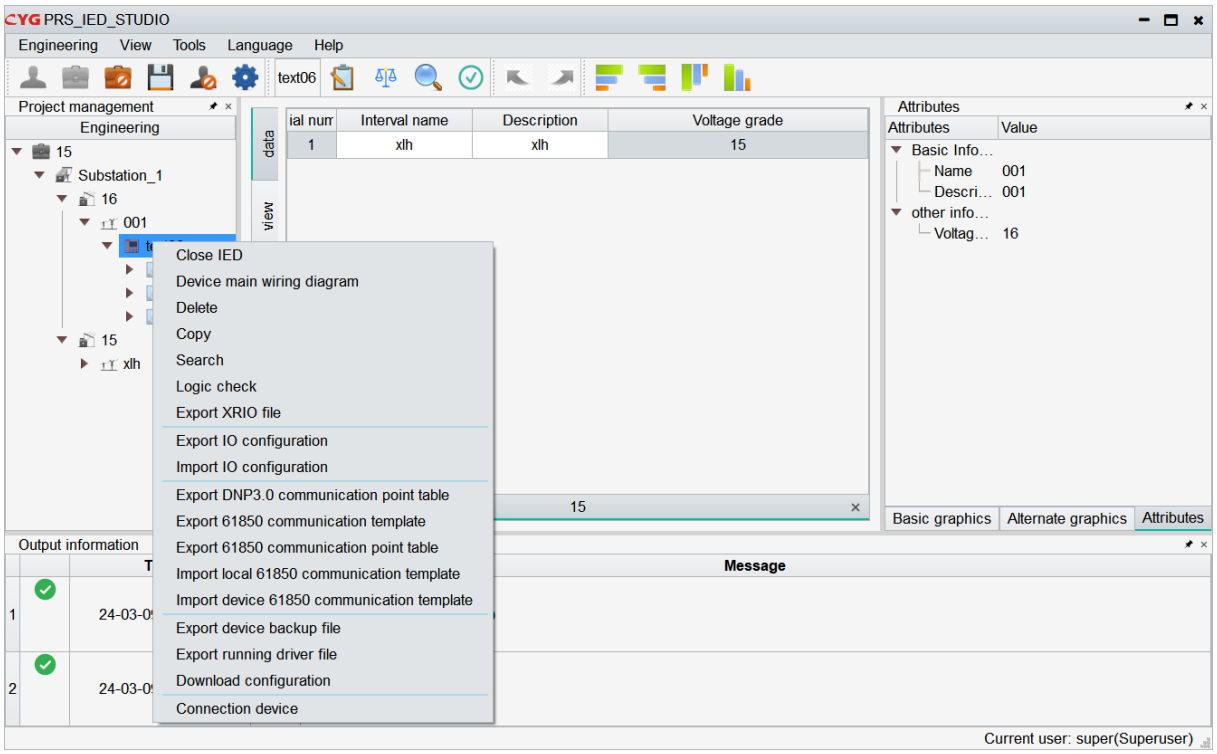


Figure 4.8.11 Instruction of Basic Operation Functions of Device

1. Close IED

关闭当前加载 IED

2. Device main wiring diagram

It provides a drawing tool to draw the device main wiring diagram, and binds to the components, such as disconnector switch and circuit breaker, according to the remote signal/remote control channel number configured by the current device instance, so as to finally export the cfg file of the main wiring diagram and transmit it to the physical device to complete the configuration of the main wiring diagram.

Refer to "4.12. Drawing the main wiring diagram of device" for the specific function application of the device wiring diagram drawing tool.

3. Delete

Right-click "Delete" to remove the currently selected device configuration instance from the project.

4. Copy

It provides bulk copy to create the device configuration instance object, reduces the repeated configuration work, and improves the configuration efficiency of the project. At the same time, the device configuration instance object can be renamed to meet the requirement for bulk copy naming. Right-click the instance object node of the device configuration instance that needs bulk copy and click "Copy", as shown in the following figure:

As it is necessary to ensure that the previous modifications of the device instance object are saved before copy, so as to ensure the consistency of the source object and the target object of copy, a window is popped up to inform the user to save before copy, as shown in the following figure:

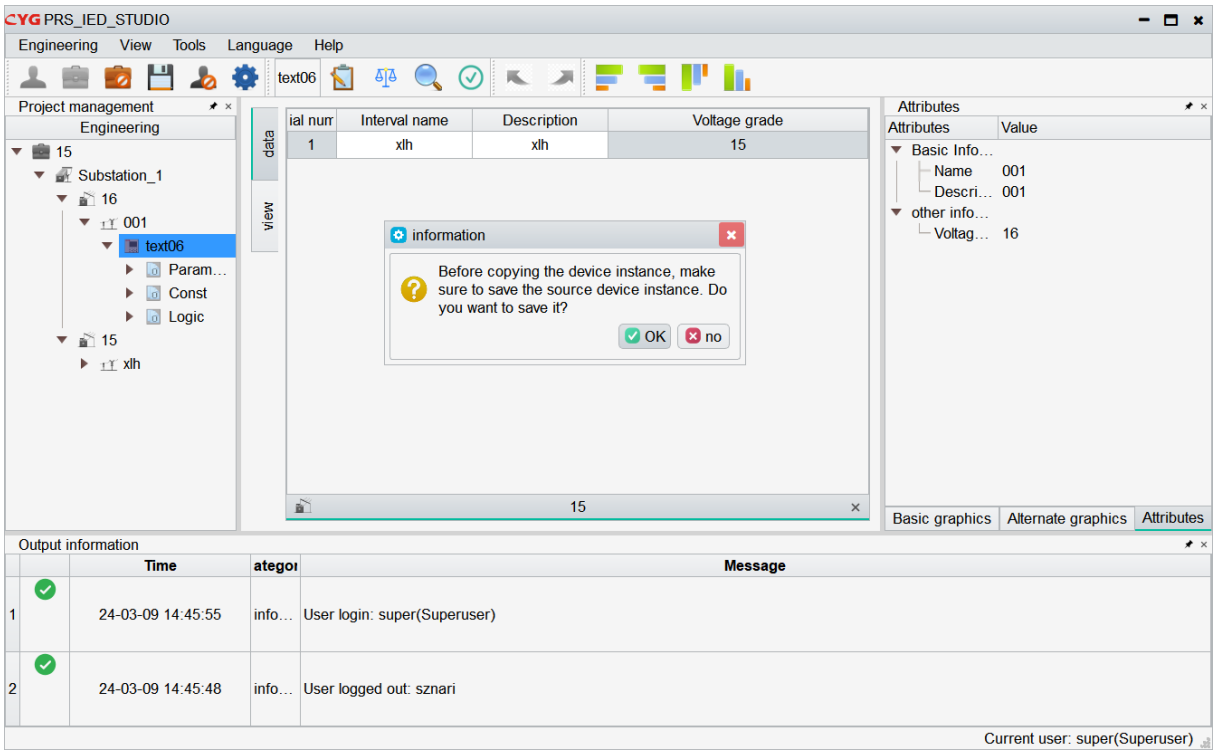


Figure 4.8.12 Copy Information Modification Alert

Click the Save button to enter the dialog box of device instance copy and set the copy number and the target node, as shown in the following figure:

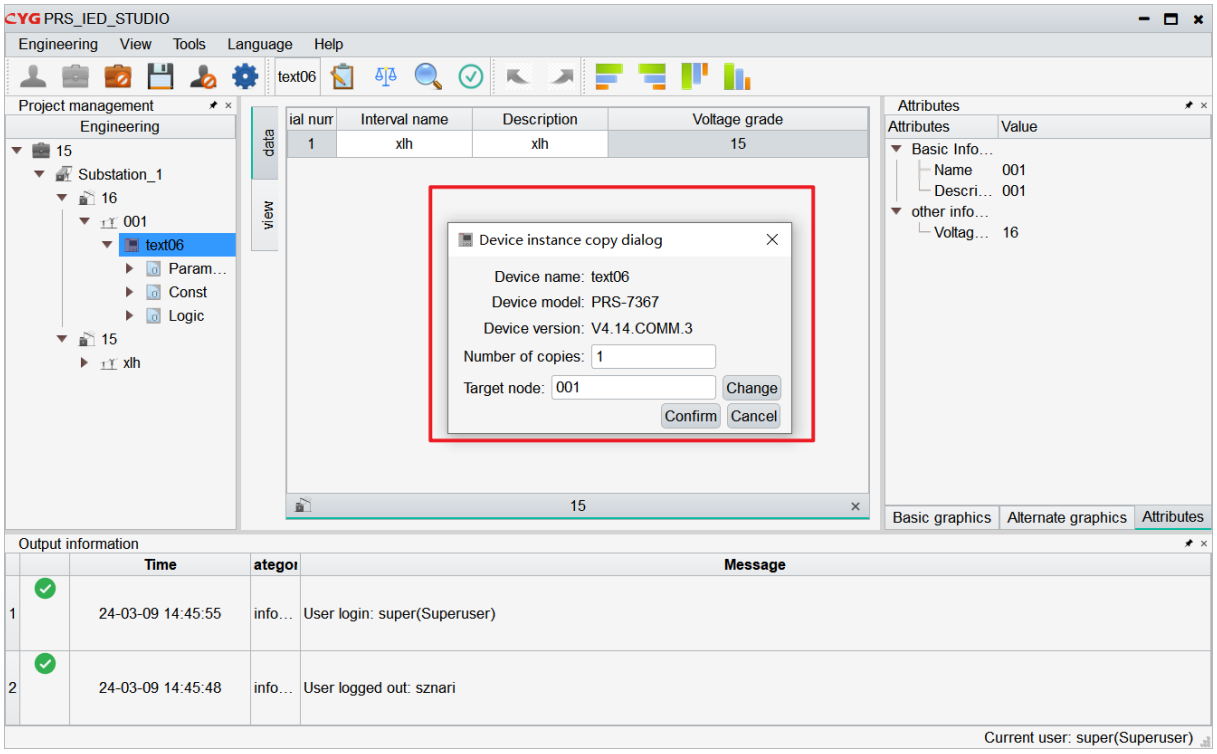


Figure 4.8.13 Conform copied Information

The copy target node is the upper node where the source device instance object is located by default. The configuration personnel can double-click the target bay (or device group) node to make changes as needed, as shown in the following figure:

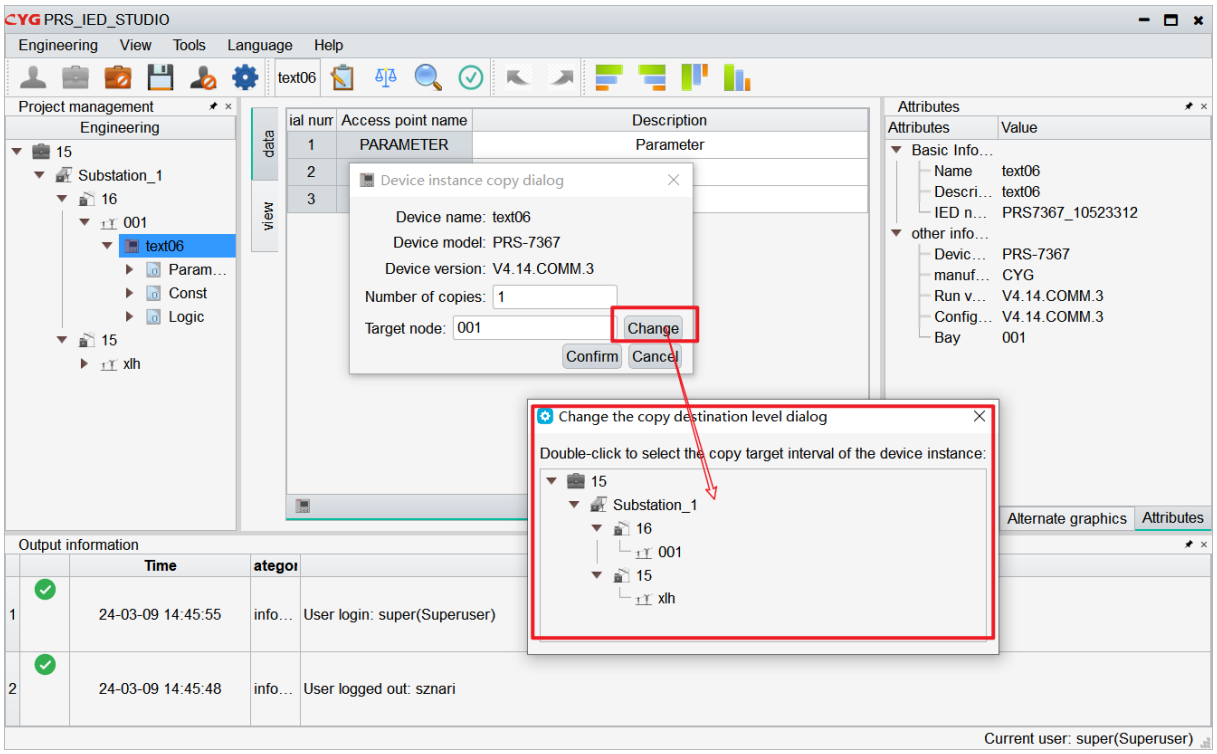


Figure 4.8.14 Default Target Copy Node

When the copy parameters are set, the copy can be executed after confirmation. The default name of the new copy device is "Source Device Name_New Device Instance Number". The configuration personnel can change the name of the new device instance as needed. By clicking on the new device node, the relevant property fields of the device node are displayed in the property sidebar window; click to edit and change its name field, and the renaming will be completed. (Note: the device name should ensure the uniqueness of the project, otherwise the name repetition is prompted and the modification is prohibited), as shown in the following figure:

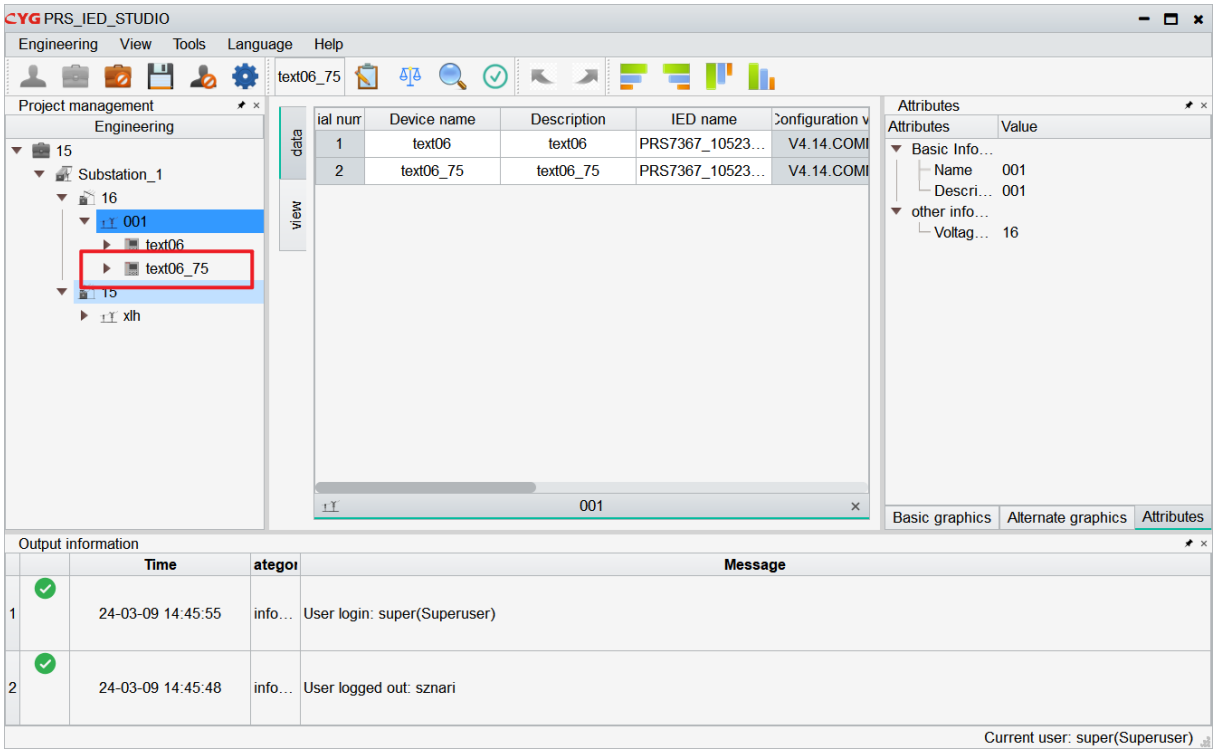


Figure 4.8.15 Edit the Project File Name

5. Search

Right-click "Search" and the search dialog box pops up on the interface, as shown in the following figure:

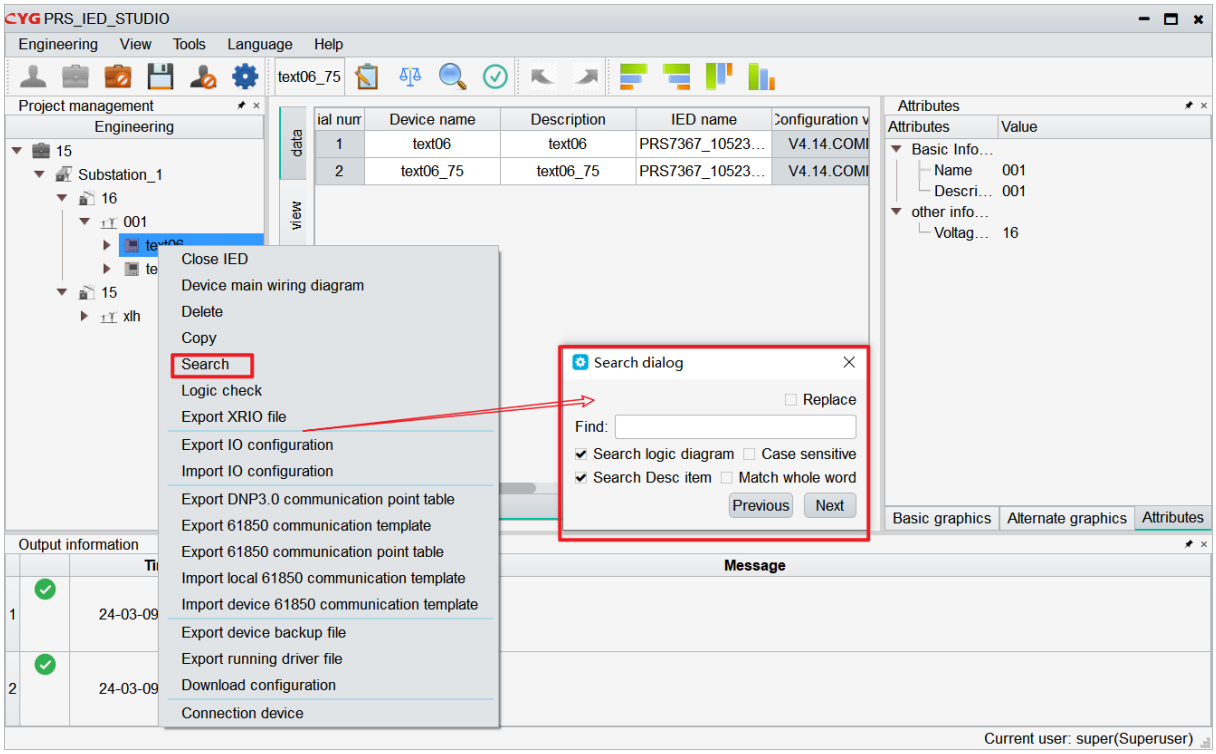


Figure 4.8.16 Search Information

In the Find input box, enter the name to be searched, select the module to be searched, whether it is case-sensitive or not, whether it supports full word matching or not, and click the Previous and Next buttons to switch between the previous and the next one.

6. Logic check

Checks for non-compliant information in the logic tuples output to the OutPut window.

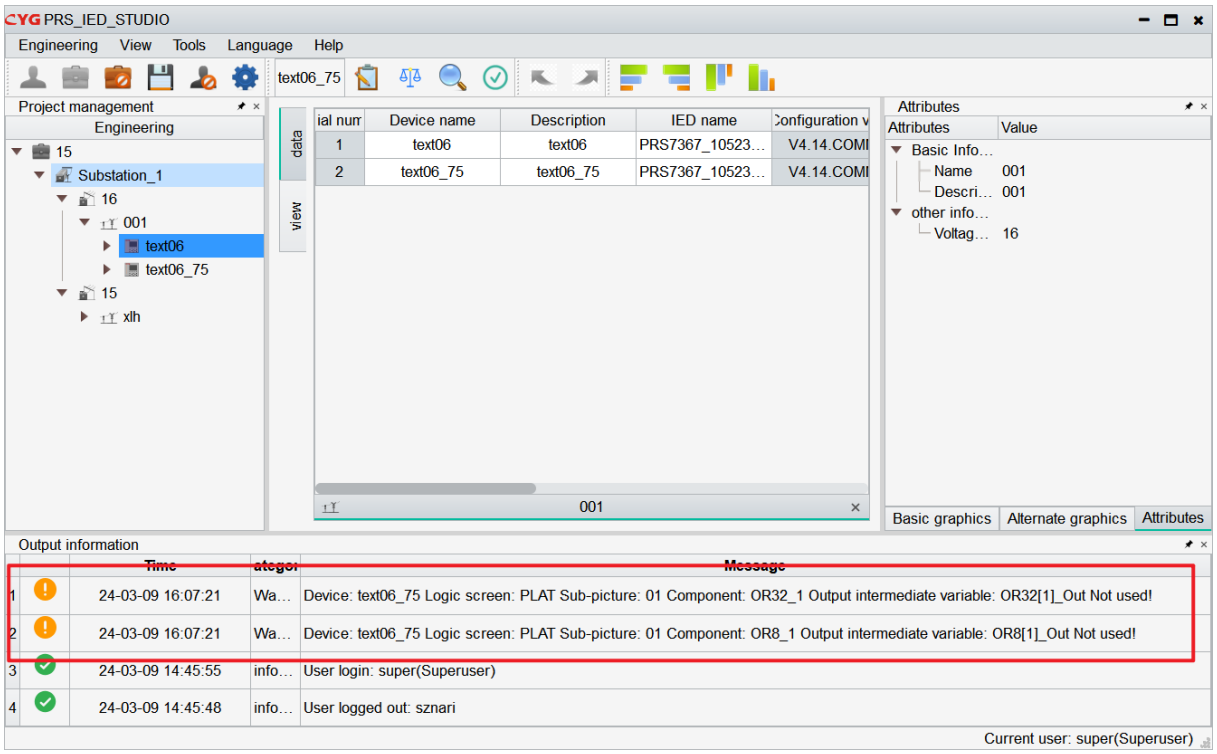


Figure 4.8.17 Logic check output information

7. Export XRIO file
8. Export IO configuration
9. Import IO configuration
10. Export DNP 3.0 communication point table

Generate DNP 3.0 communication point table according to the device's current configuration.

11. Export 61850 communication template

"Export 61850 model file" can automatically export the device's icd file through the standard ICD template set by "4.6.3. Standard ICD template settings".

12. Export 61850 communication table

Generate 61850 Communication point sheet according to the current configuration of the device.

13. Import local 61850 communication template

Right-click "Import local 61850 model file" and find the local icd model file to be imported. After selecting, click "Open" to import.

14. Import device 61850 communication template

Right-click "Import device 61850 model file", select IP of the connected net port, and click "Yes" to import.

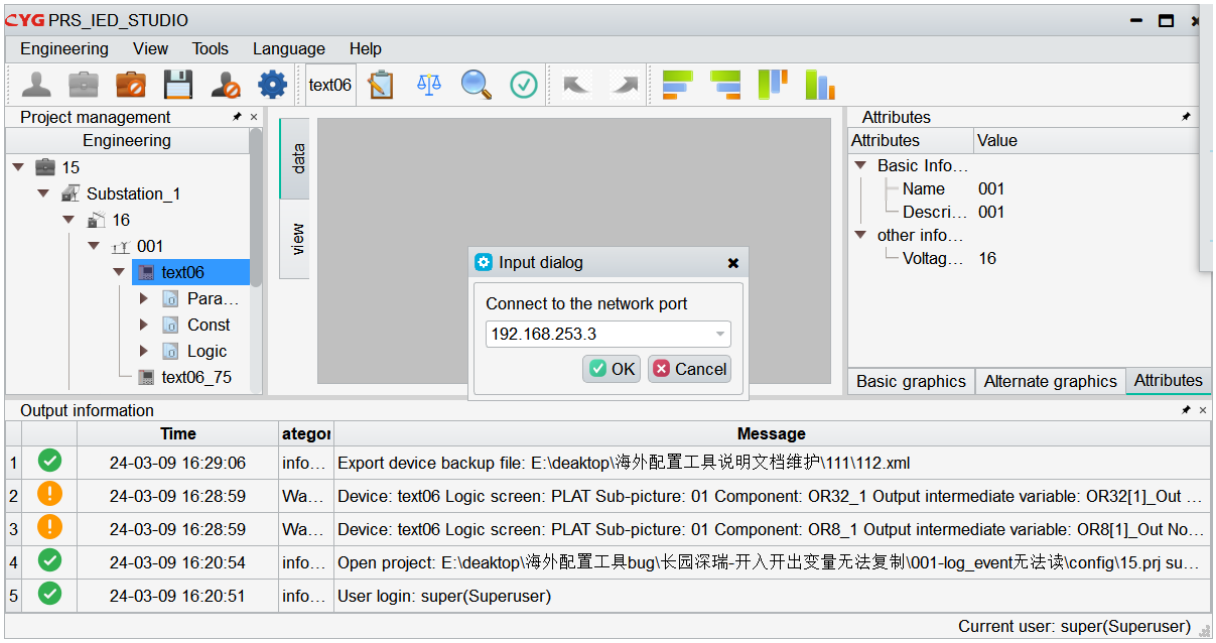


Figure 4.8.18 Import device 61850 model file

15. Export device backup file

Right-click "Export device backup file" to save the device configuration instance object first, as shown in the following figure:

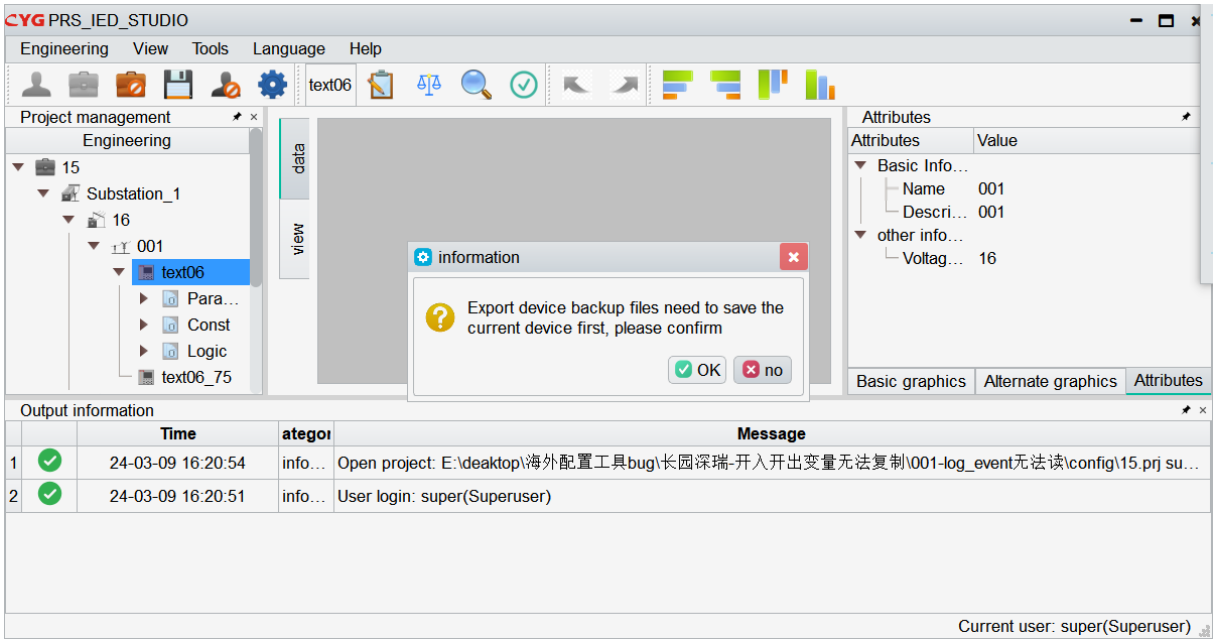


Figure 4.8.19 Export device backup file Process step 1

The configuration user can choose the target path to export the device configuration backup files suffixed with. xml.

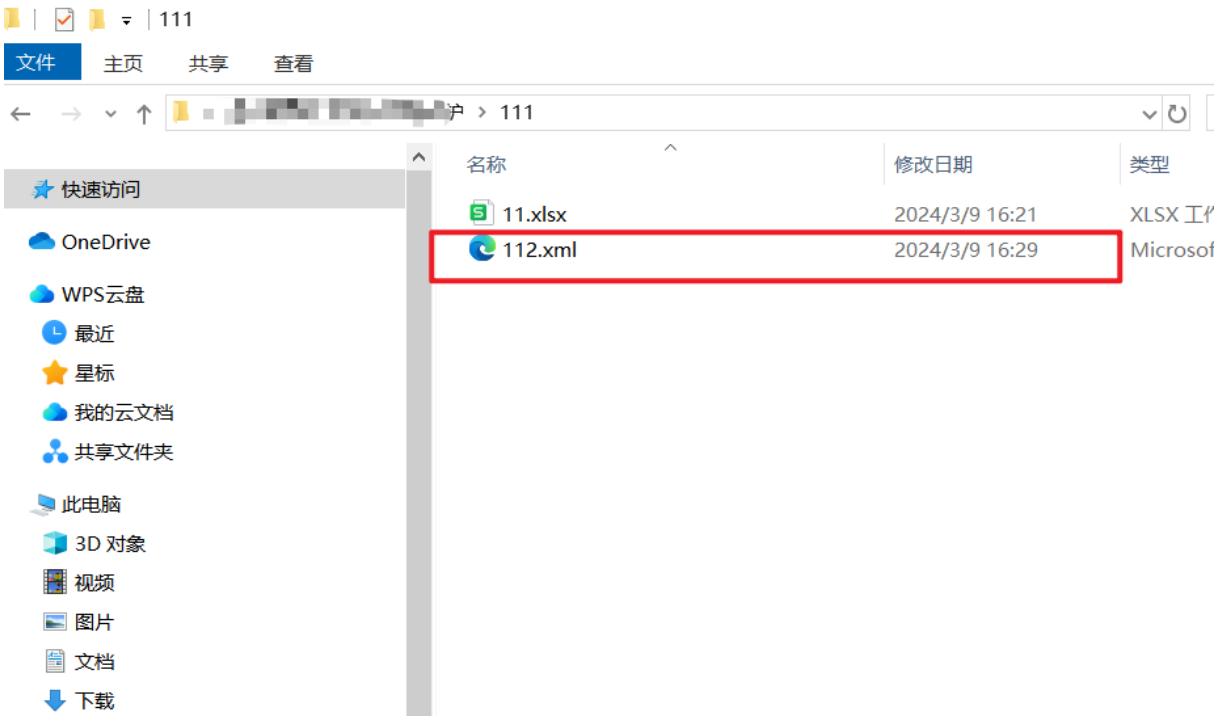


Figure 4.8.20 Export device backup file Process step 2

16. Export the run driver file

The configuration user can choose to export the run driver files of device configuration instances separately and download them to physical devices in other ways to realize configuration.

17. Download configuration

Right-click "Download configuration" and save the device configuration instance object first, as shown in the following figure:

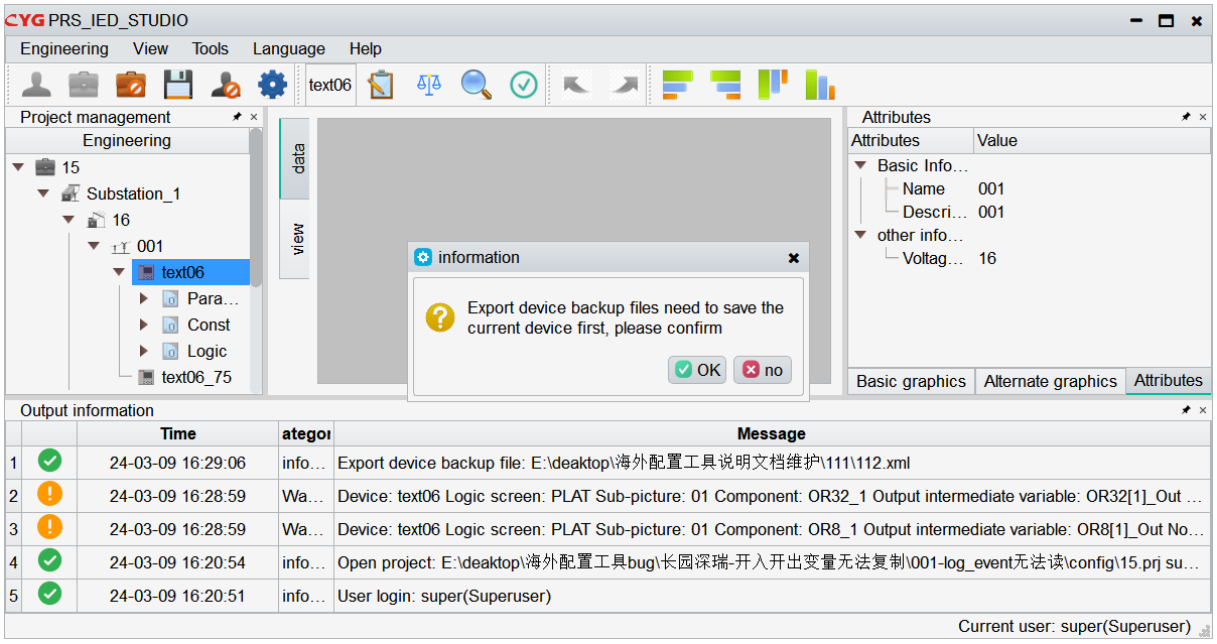


Figure 4.8.21 Safe before Downloading Configurations

The tool will generate the run driver file of the device configuration instance, and send the run driver file to the target physical device in the form of ftp.

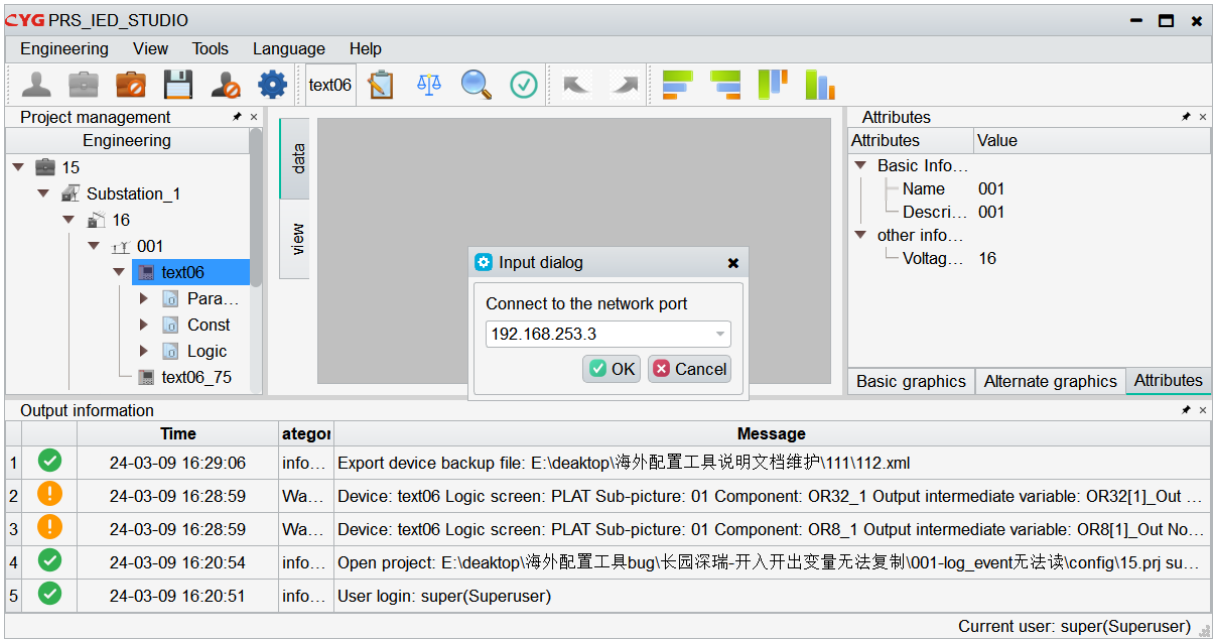


Figure 4.8.22 Downloading Configurations

In the download configuration process, the tool communicates with the physical device, feeds back the configuration state information to the tool, and outputs the corresponding state information to the log information sidebar in the form of a log, which facilitates the configuration personnel to obtain the configuration state information of the target physical device.

18. Connect device

After the successful import of 61850 model file, right-click "Connect device", select the IP of the connected device, click "OK"; when the connection is successful, the notice of "Connect successful" will pop up.

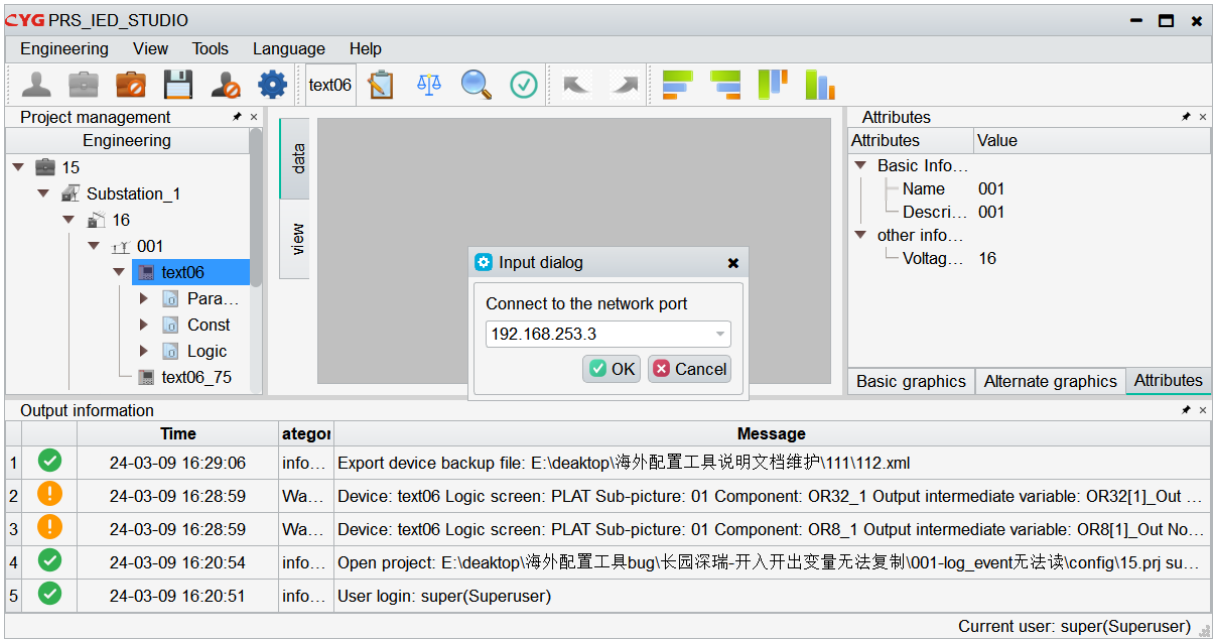


Figure 4.8.23 Connect device

4.9 Functional description of device parameter setting

The device instance object is created according to the driver package in the base library. The device instance object creates the access point (AccessPoint) needed according to the instance node <IED> of the driver package template (generally “common parameter", "interface resource", "logic resource"), logic device node (e.g.: input configuration, output configuration, etc.), logical component nodes (e.g. input configuration “remote operation input link” components etc.) objects. Access nodes and logic device nodes can not be added or deleted (depending on the configuration of the driver package template file), and logical component nodes can be added or deleted according to the configuration requirements. The user can set the parameter form data of logical components.

A list of access points at the lower level of the device instance is shown in the following figure:

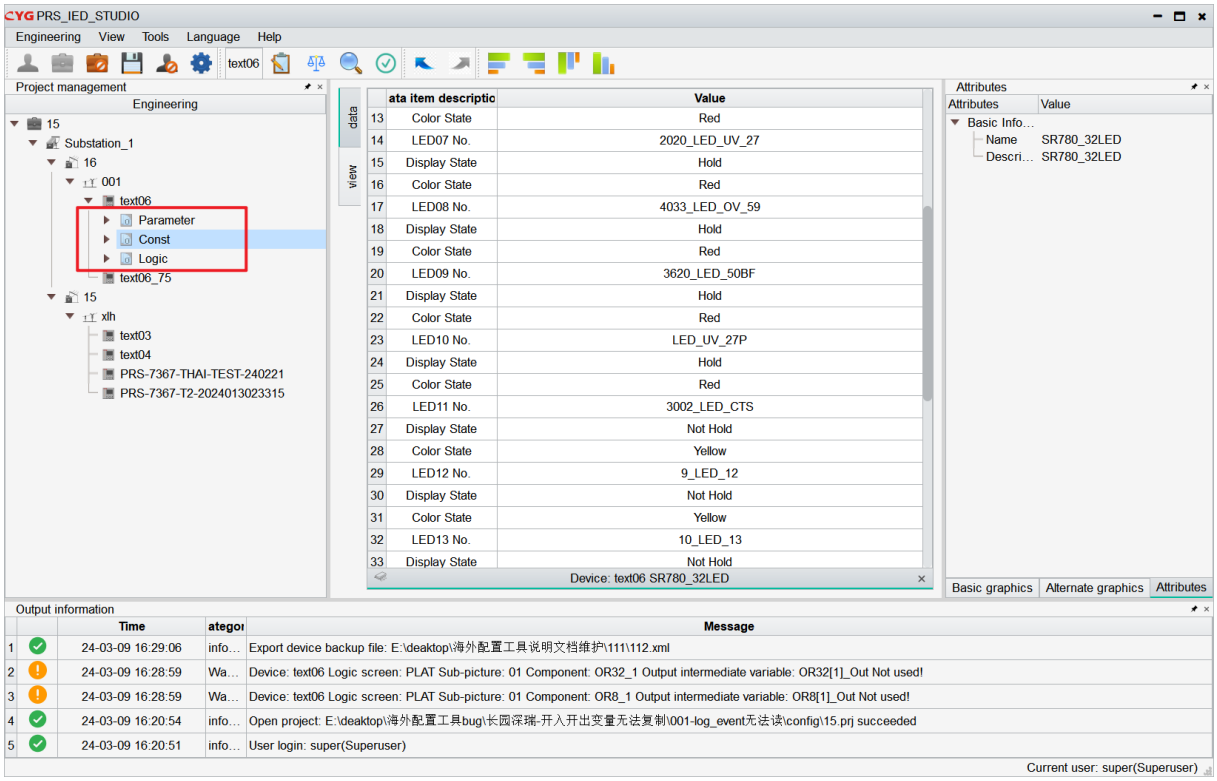


Figure 4.9.1 Access List of Device Instance

List of INPUT, OUTPUT and other logic device nodes under access point "interface resources":

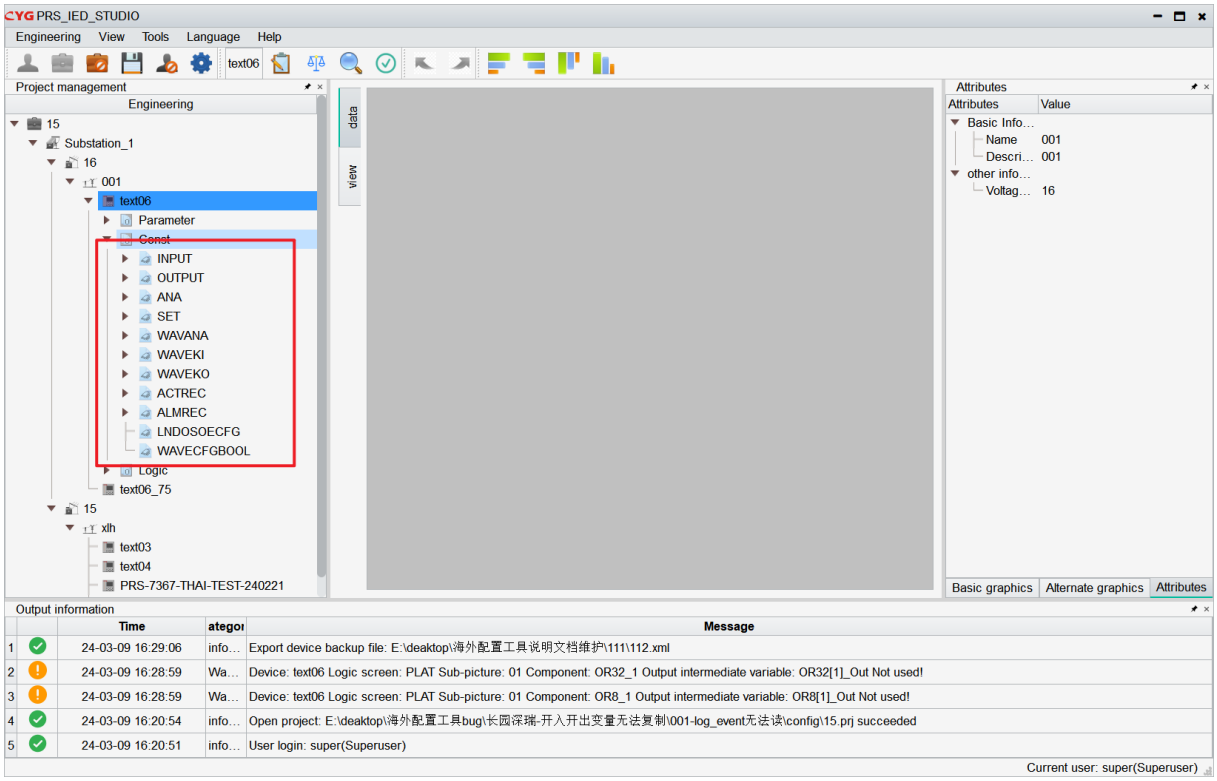


Figure 4.9.2 Interface Resources

4.9.1 Virtual terminal of associated interface resources

The data items set by logical component parameters need virtual terminal application for logical component of associated interface resource.

Double-click the "Value" column cell of the data item associated with the virtual terminal, and the virtual terminal form of the corresponding type of associated interface resource pops up; and then double-click the virtual terminal item to be connected (or drag and drop the node of the component where the virtual terminal of the corresponding type interface resource belongs to toward the required associated data item), and complete the configuration of the virtual terminal of the associated interface resource.

Click the pop up window for association, as shown in the following figure:

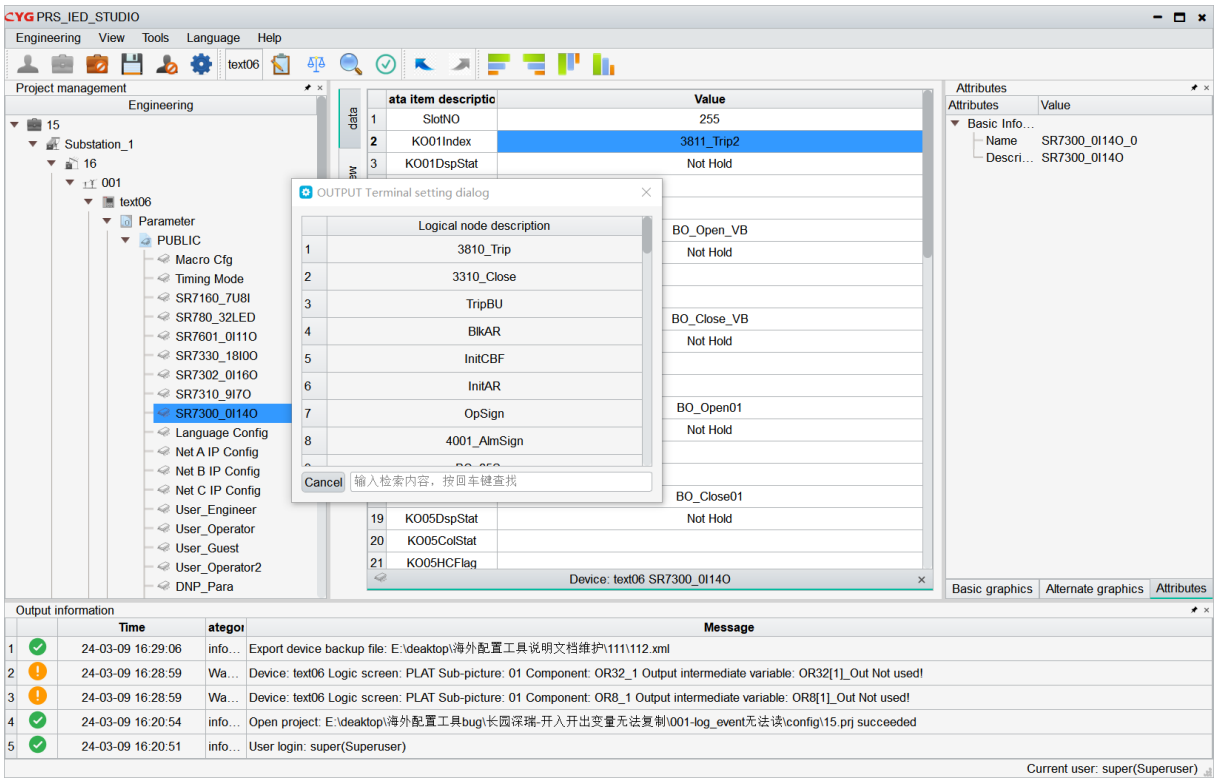


Figure 4.9.3 Associated Interface Resource Virtual Terminal

4.10 Comparison Tool Functions

The comparison tool allows you to compare the differences between two IED configurations. The currently supported comparison functions include the comparison of fixed values, and the differences in the connection of logical tuples under the PORT node. This function can be accessed via the menu bar and toolbar.

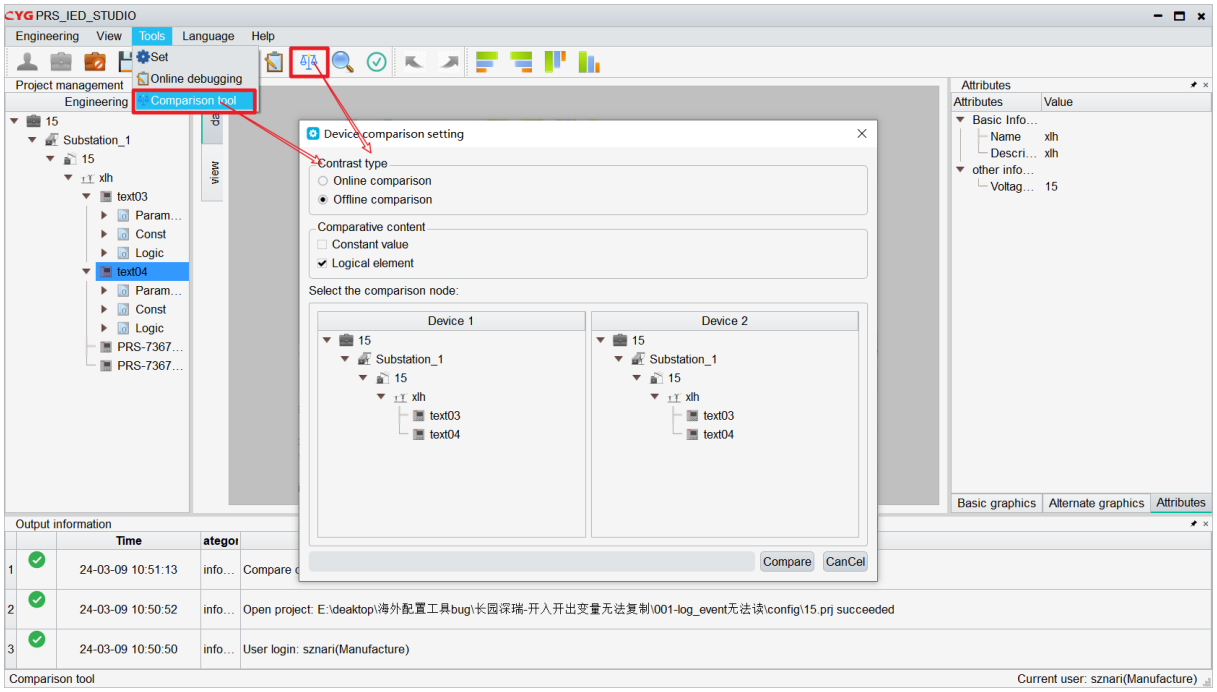


Figure 4.10.1 compare tool UI

4.10.1 Comparison tool useage

1. Offline comparison

Compare the two IEDs already in the project

Step 1: Load the IED as shown in the figure below,open the compare tool to see the loaded devices.

Step 2: As shown in the figure below, select Offline comparison and choose what you need to compare. Select the IED you want to compare, click Compare to start the comparison, the progress bar at the bottom left represents the current progress of the comparison.

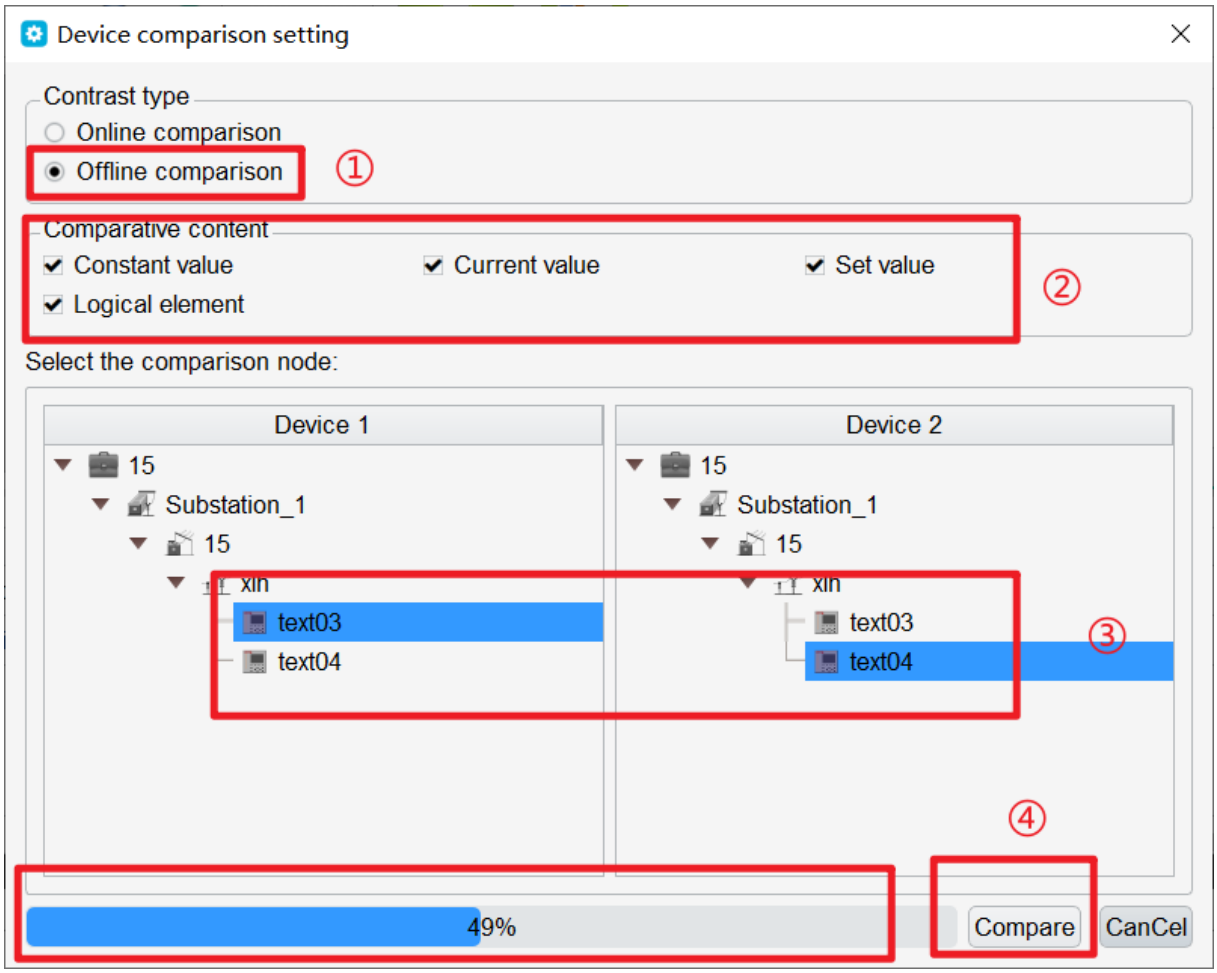


Figure 4.10.2 Offline comparison Step 2

2. Online comparison

You need to connect the device and compare the IEDs loaded in the project with the IEDs in the connected device.

Step 1: Consistent with offline comparison.

Step 2: As shown in the figure below, select Online comparison and choose the IEDs you want to compare. click Compare to start the comparison, the progress bar at the bottom left represents the current progress of the comparison.

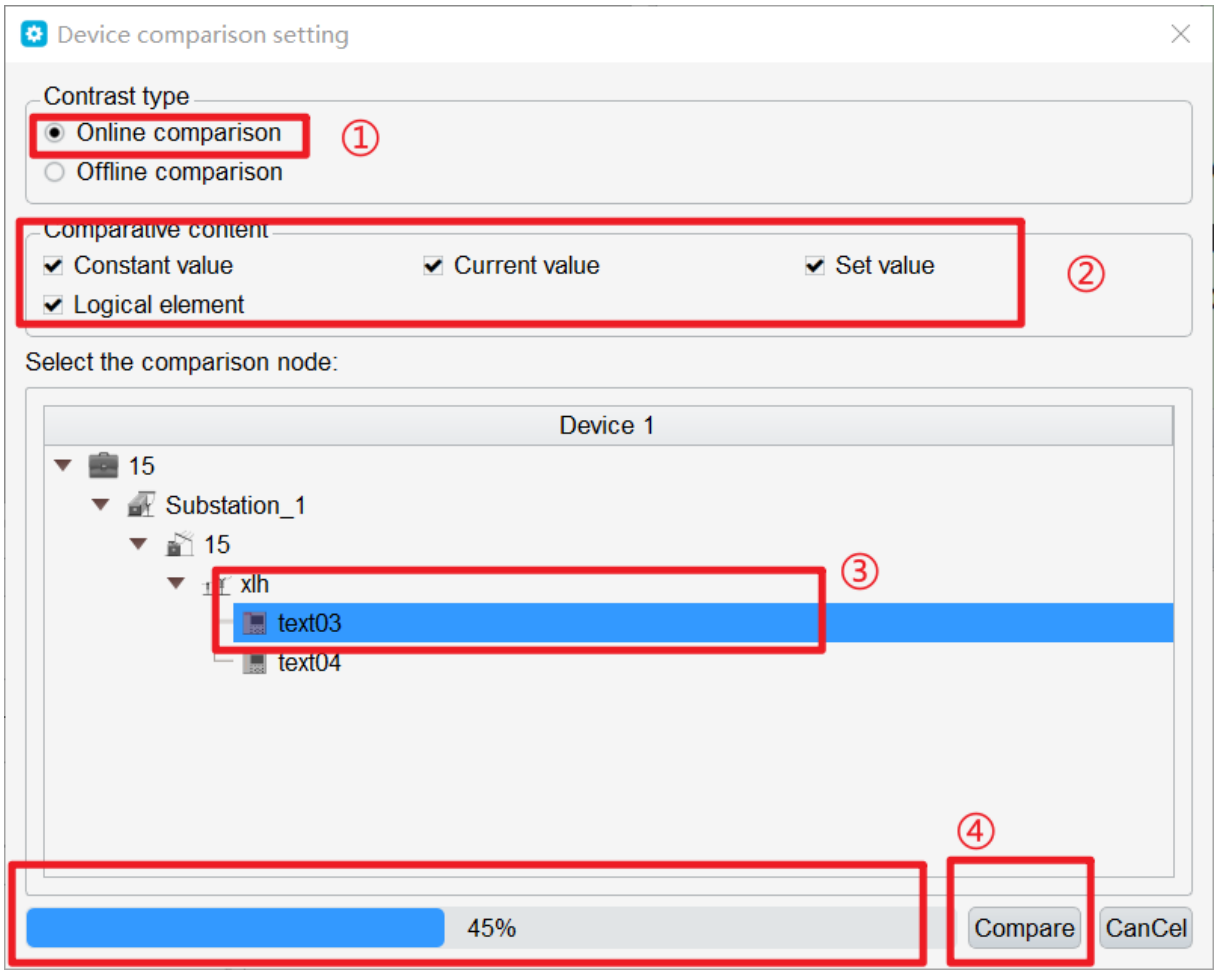


Figure 4.10.3 Online comparison Step 2

4.10.2 Check the results

The results are displayed through the table, as shown in the figure below; support for exporting execl tables, PDF documents.

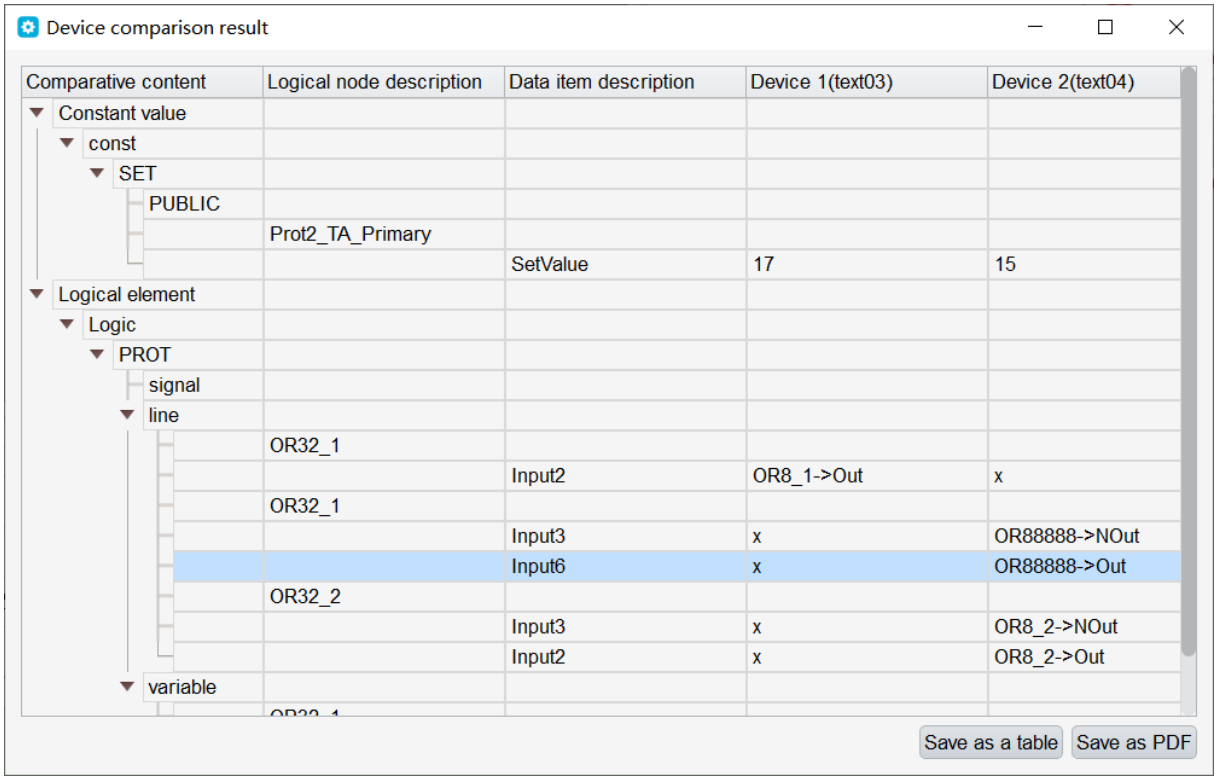


Figure 4.10.4 Result

4.11 Instructions for drawing device logic screen

Logic resource access points of device configuration instances generally include three kinds of logic device nodes, i.e. PLAT (platform), PROT (protection), MEA_CTL (measurement and control). The creation and deletion of logical component objects are realized under the logic screen by drawing. At the same time, for the created logical component objects, besides the general basic parameter settings, the input/output ports of the same component, the input/output ports between components, the input ports of components and the signal association between the virtual terminal components and the output ports of components and the virtual terminal components are realized by means of drawing.

4.11.1 Create and delete logic screen subgraph

1. Create subgraph

STEP1: Right-click on the nodes of PLAT (platform), PROT (protection), MEA_CTL (measurement and control), and click “logic graph ” menu. If there is no logic graph in the logic device node, there will be a prompt to create a new logic graph , or the existing logic graph will be directly opened.

Preset the basic property of the logic graph to create logic graph.

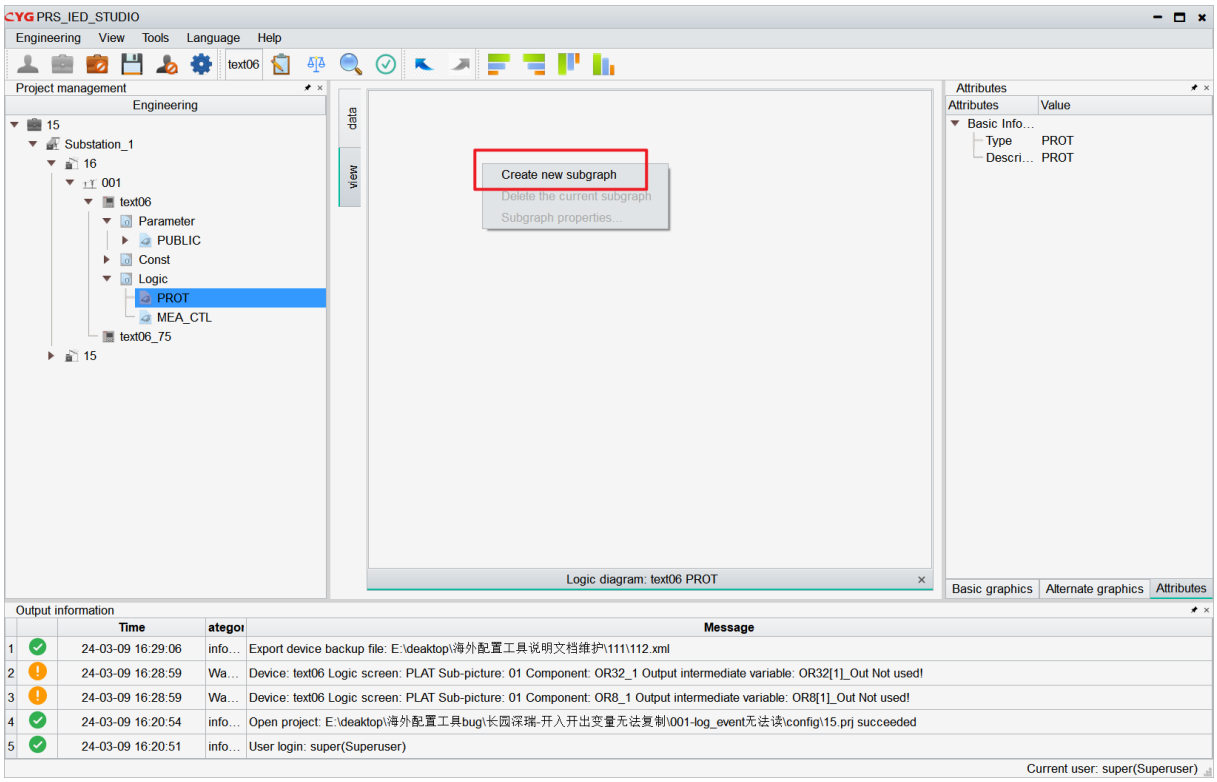


Figure 4.11.1 Creation of Logic Graph Step 1

STEP2: Configure new subgraph properties

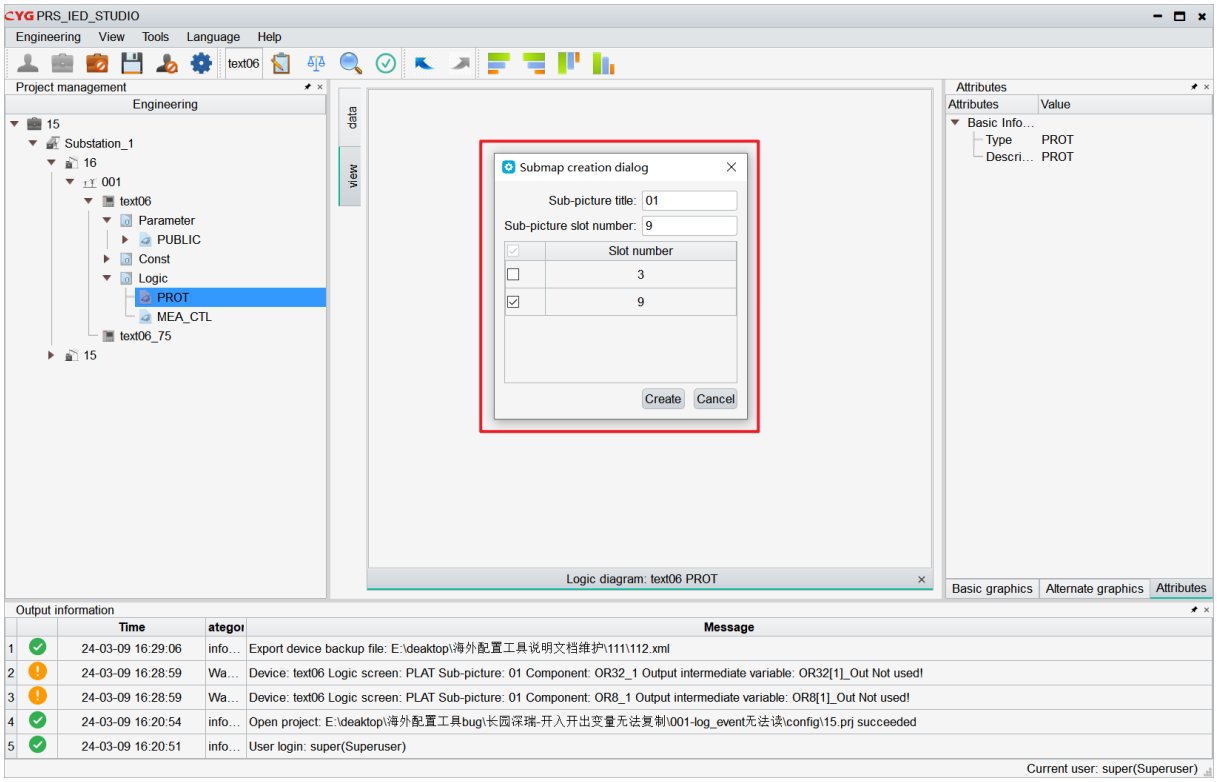


Figure 4.11.2 Creation of Logic Graph Step 2

To create a new subgraph, you need to set the basic attributes of the subgraph:

A）Subgraph title

Subgraph title is the basic description of the logic definition expressed by the subgraph.

B）Subgraph slot number

When the attribute of the subgraph slot number of the logic screen is "limited", the slot number of the subgraph is the same as the slot number of the logic screen and cannot be edited and changed; when the attribute of the subgraph slot number of the logic screen is "subordinate", the subgraph initially defaults to the slot number of the logic screen, but can be set to any subset. Once a subgraph is created, its slot number cannot be modified again.

The effect of the new subgraph is as follows:

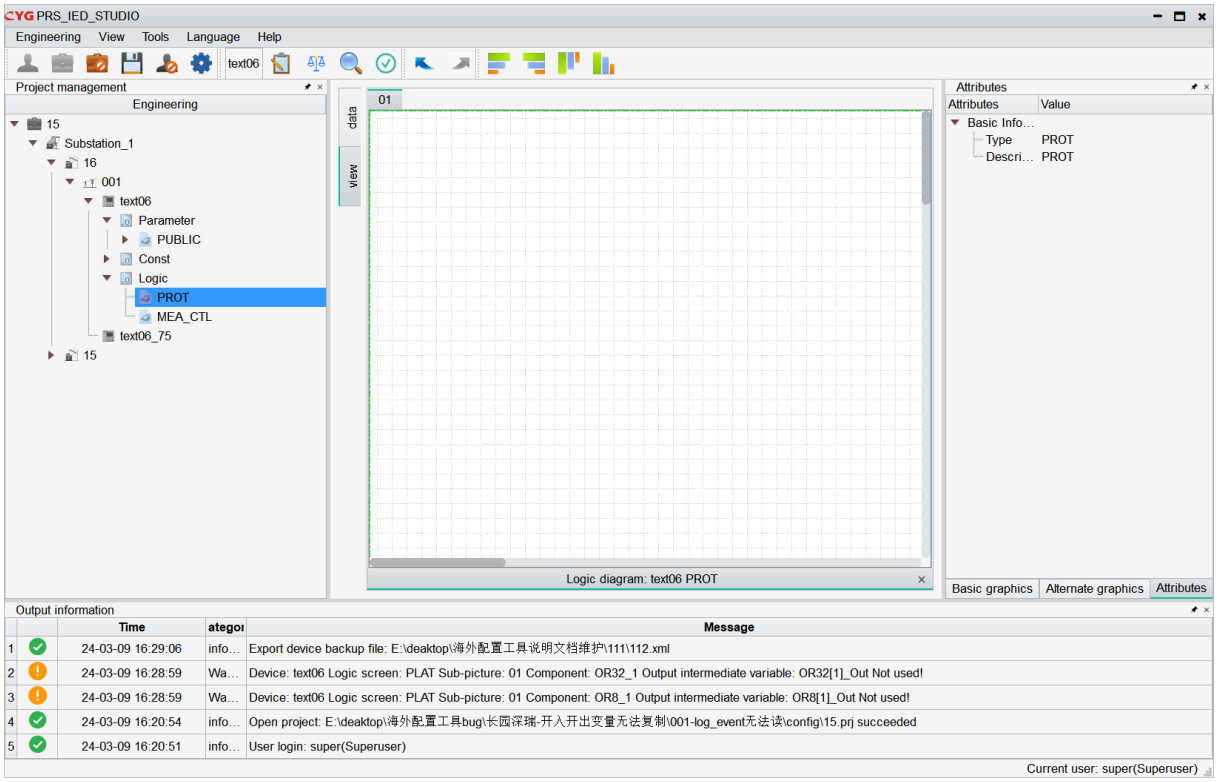


Figure 4.11.3 Effect of the new subgraph

2. Delete subgraph

STEP1: Right-click the margin of the logic screen or subgraph and click "Delete current subgraph", then the pop-up window warns the configuration user to confirm whether to delete the current subgraph.

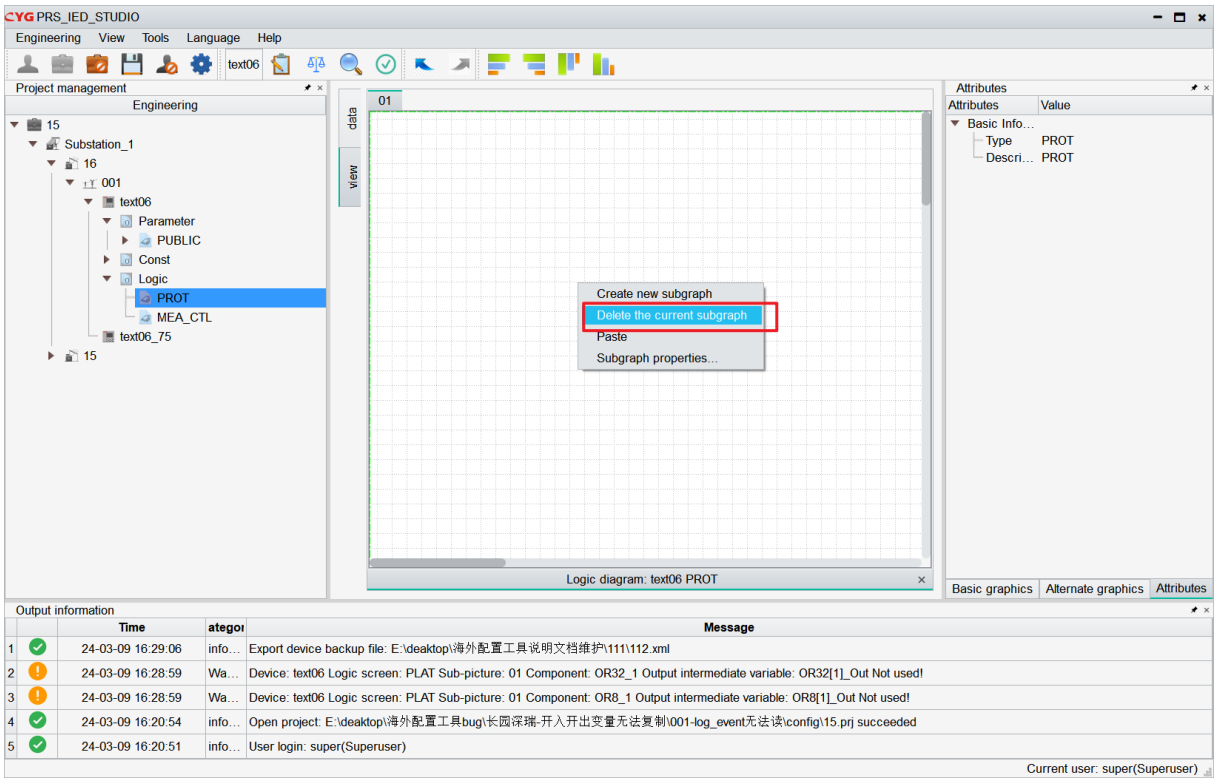


Figure 4.11.4 Delete Process of Logic Graph Step 1

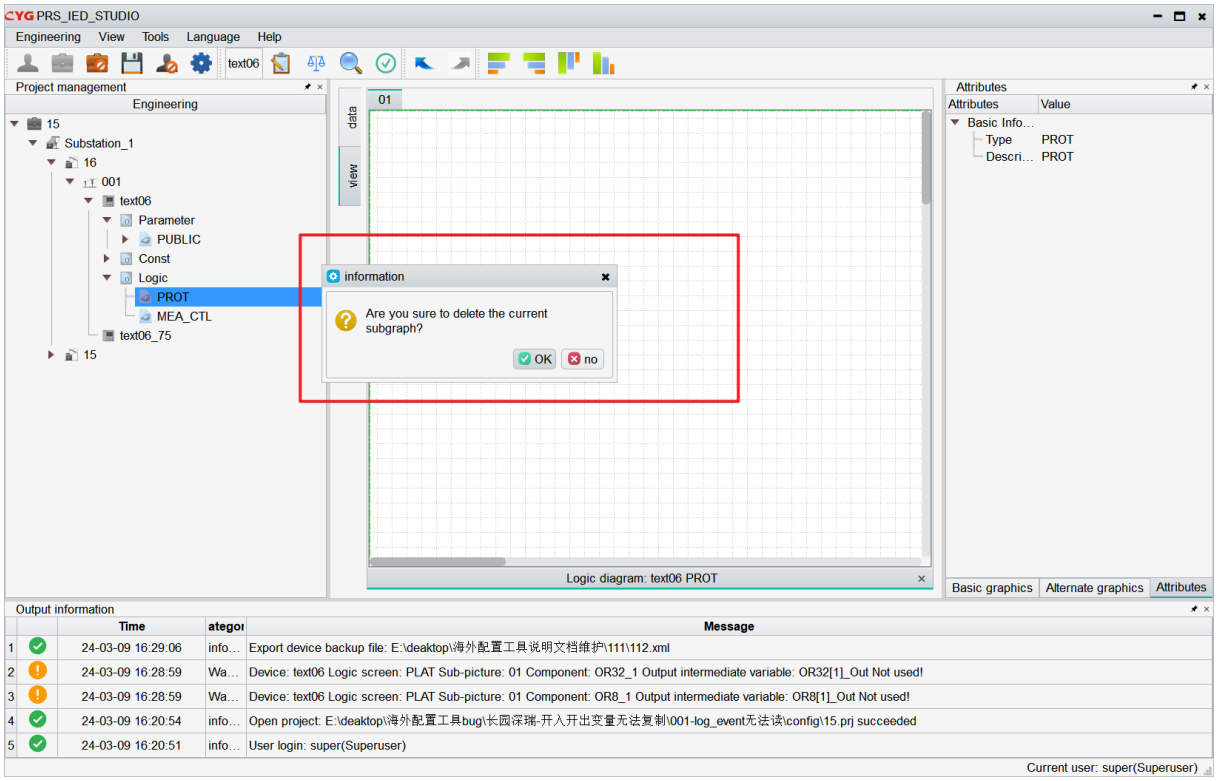


Figure 4.11.5 Delete Process of Logic Graph Step 2

3. View subgraph properties

The configuration user can view attributes related to subgraph during configuration and edit and

change attributes to meet configuration requirements. Click Properties on the top right corner of the logic screen or subgraph to pop up the current subgraph properties dialog box for viewing.

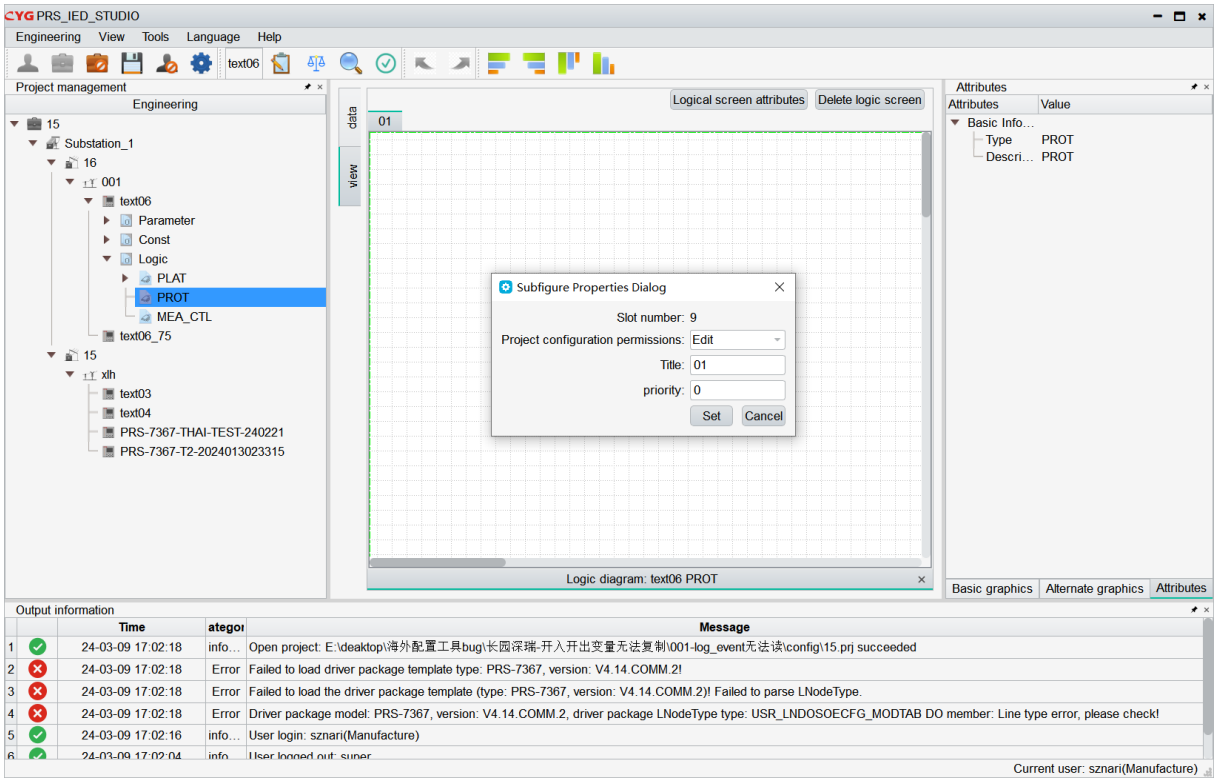


Figure 4.11.6 View Subgraph Properties

4. Modify subgraph properties

The configuration user can view properties related to subgraph during configuration and edit and change attributes to meet configuration requirements. Right-click "Subgraph Properties..." in the margin of the logic screen or subgraph menu, the subgraph properties dialog box pops up for viewing and modification.

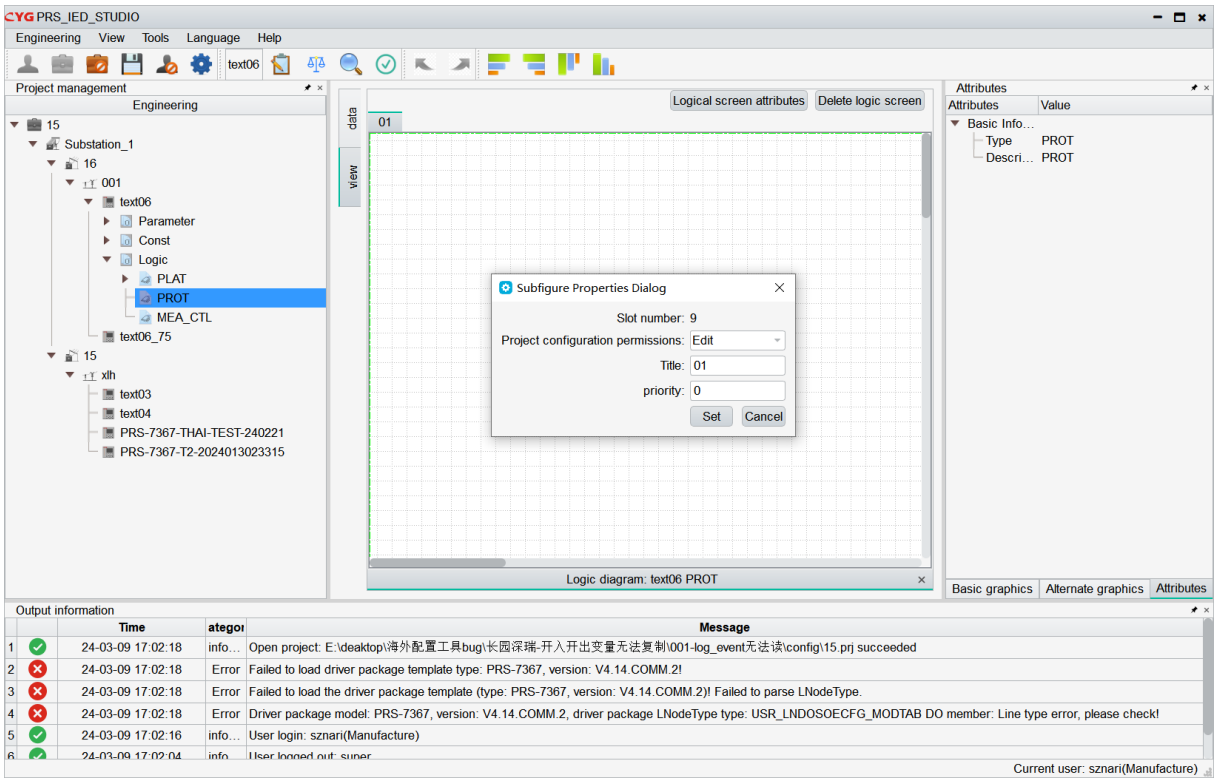


Figure 4.11.7 Modify **Subgraph Properties**

Subgraph properties include:

A） slot number

Subgraph slot number is set when the subgraph is created, and cannot be changed.

B） Project configuration permissions

Set whether the subgraph is hidden/visible to the project's configuration personnel. Only the configuration account of Manufacturer can view the configuration of this property and change it. It enables Manufacturer to shield the logic subgraph of some manufacturer internal configuration, so that the customer's relevant configuration personnel can not view and modify the hidden subgraph. Refer to "4.11. User authority management instructions" for the definition of specific operation authority.

C） Title

During the configuration process, the title of a subgraph can be changed according to the changes in the logic meaning of the subgraph.

D） Priority

The priority of subgraph is related to the logic resource component sorting of run driver file generated by device configuration instance object, which needs to refer to the logic resource component sorting scheme of configuration tool. The default value of the priority of the new subgraph is 0. The higher the value, the higher the priority, and the lower priority components of the inner subgraph rank first.

4.11.2 Create and delete logical components of logic resources

1. Creating logical components of logic resources

A) Open the list of available logical component types for device instance logic screen

Open the logic screen, click the application management sidebar, and display all types of logical components available for the current device according to the classification ofPROT (protection), MEA_CTL (measurement and control). Only the logic device nodes belonging to the current logic screen are in usable state; the rest of the grayed classification can only view the list of subordinate logical component types, and can not be used to create the logical component of the current subgraph.

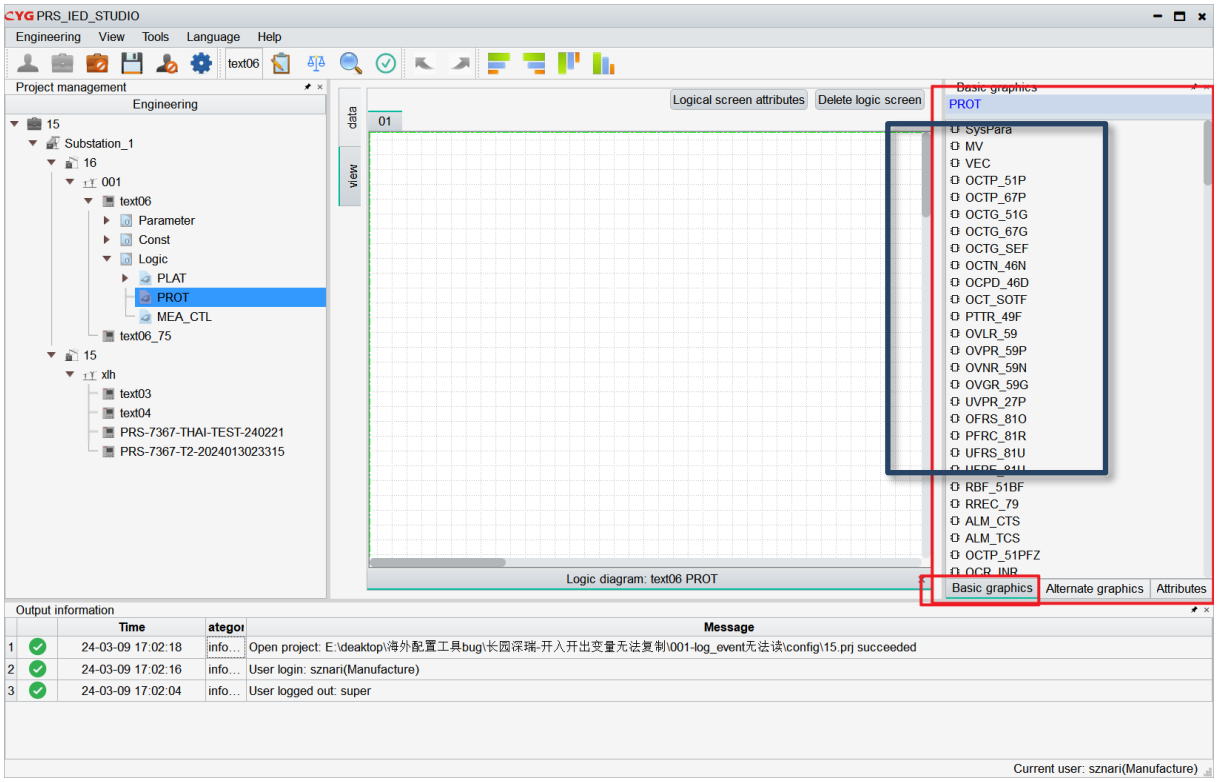


Figure 4.11.8 Logic Resources

B) Draw logical component elements in logic screen subgraph

Drawing a logical component element in a logic screen subgraph is the process of creating this type of logical component object.

In the application management sidebar, click and select the item of the logical component type created as required under the current available logic device category, and drag to the location of the element to be created in the subgraph created as required. A dialog box for creating the logical component element will pop up, as shown in the following figure:

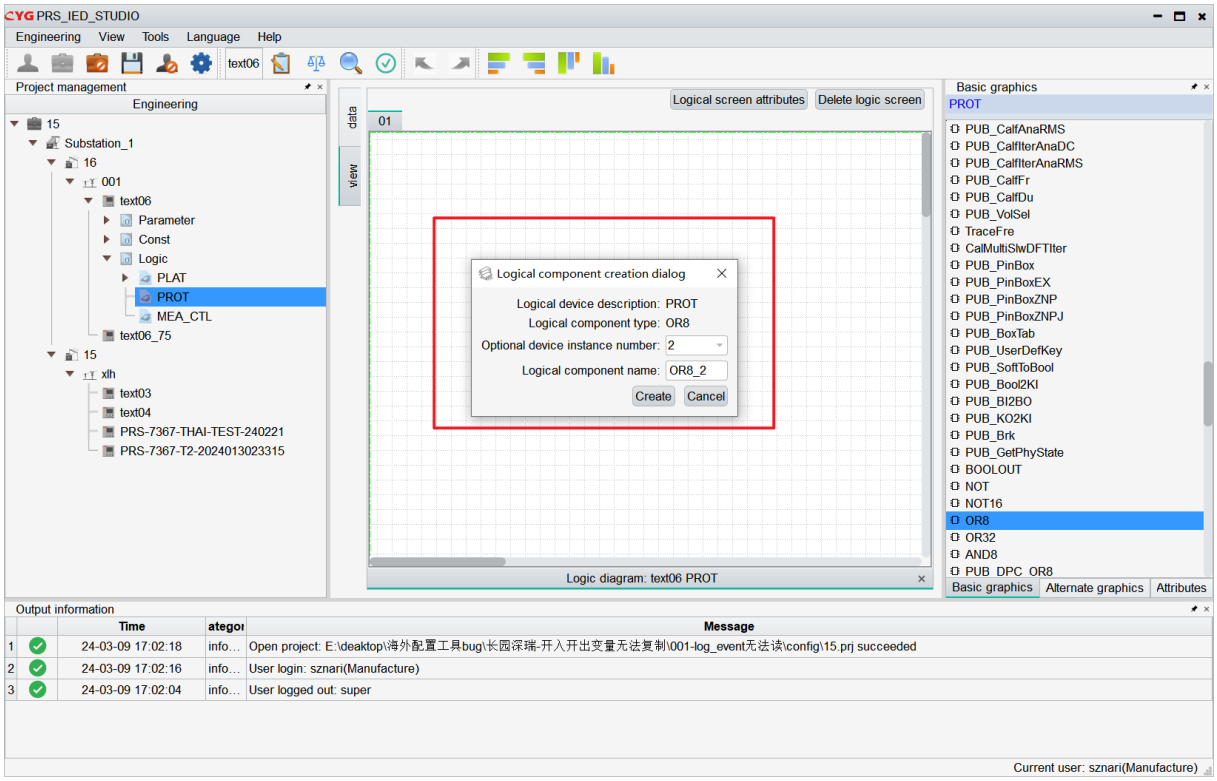


Figure 4.11.9 Logical Component Creates the Dialog

"Selectable device inst number" is the device instance number available to the logic resource component in the current device instance (the scope of the logic resource type component's instance number ranges from 1 to 64, and the used instance number will be occupied until the component element used is deleted for reuse). The default value at creation is the minimum value in the list of available instance numbers, and the configuration personnel can select any available instance number according to the need; "Logical device description" is the name of the logical component object, but the name of its element is named in the form of "LNode Type (logical component type)_inst (instance umber)"; finally, click the Create button, and the graph element drawing and object creation of this type of logical component can be completed, and the component object can be found under the logic device node to which the logical component type belongs.

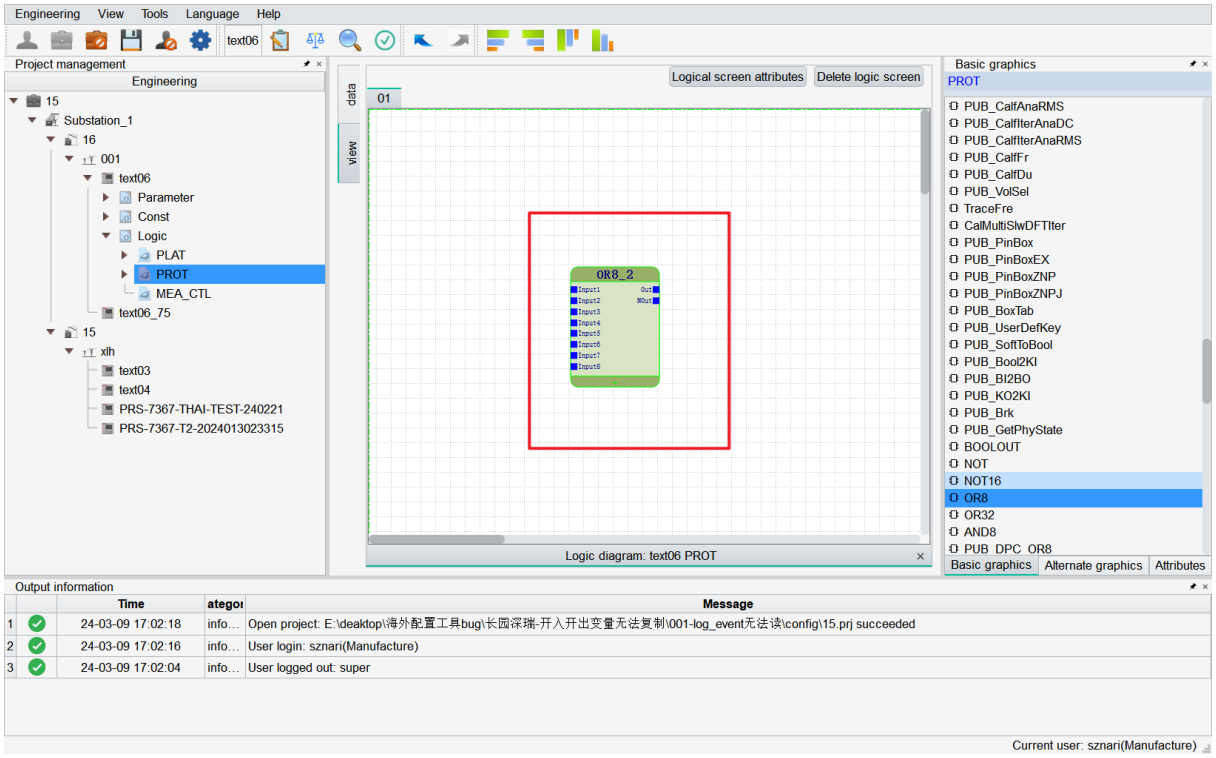


Figure 4.11.10 Logical Resource Components

2. Delete logic resource components

Deleting the logical component element of the drawing page under the logic screen is itself the process of deleting the logical component object.

The user opens the drawing page where the logical component is located and right-clicks the "Delete" menu on the logical component element to complete.

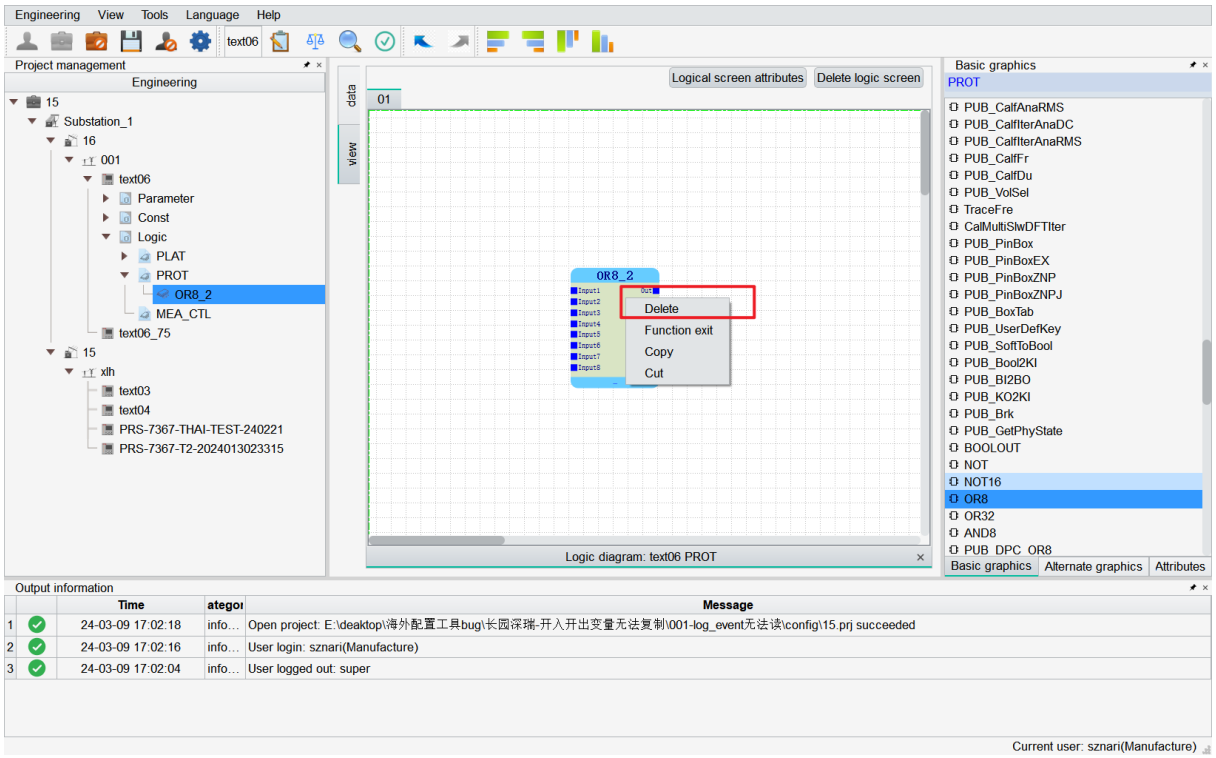


Figure 4.11.11 Delete Logical Resource Components

4.11.3 Logical component object parameter configuration

1. General parameter configuration

Logical component object configuration of logic resources is the same as that of non-logical resources. Click the logical component object node of the project tree and display the form of its parameter configuration in the central window of the main window. The configuration user can fill in the valid value according to the data type of each row of data items, as shown in the following figure:

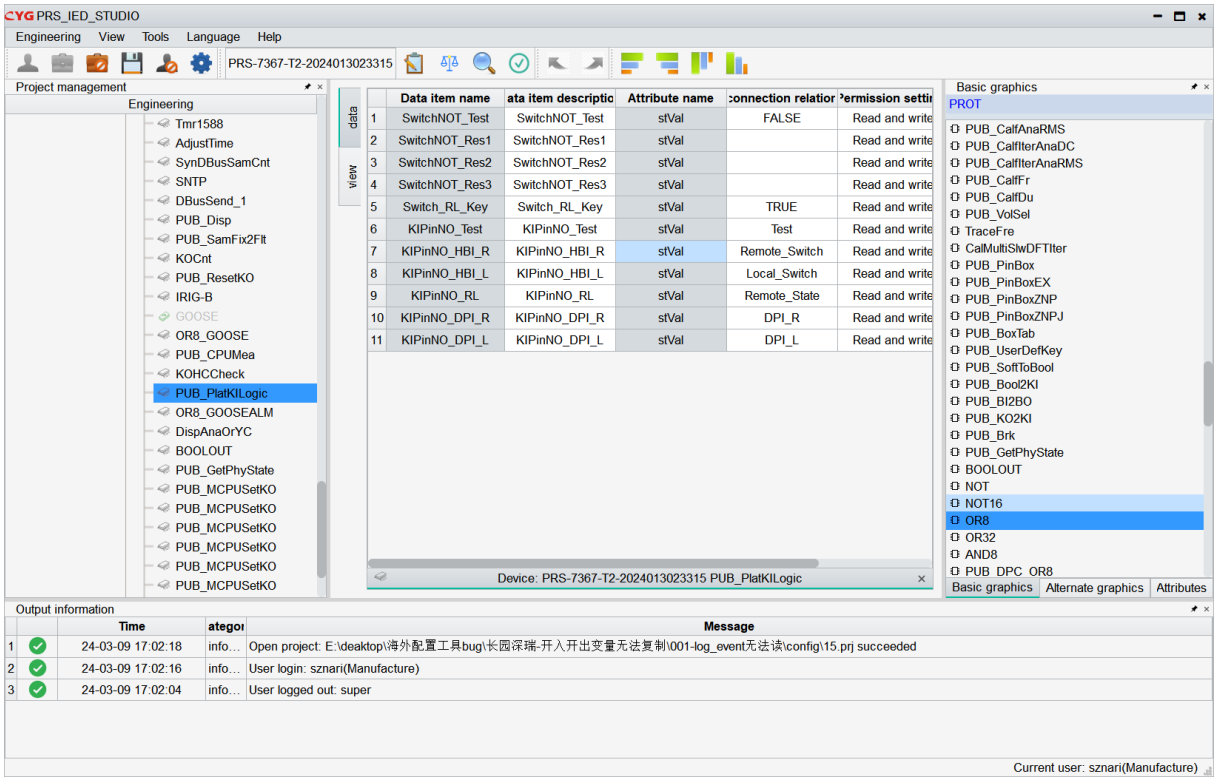


Figure 4.11.12 General parameter configuration Interface

NOTICE!

Incidence relation is the item column to fill in the parameter configuration;

Double-click the parameter configuration blank to pop up an option bar that matches the current parameter type, as shown in the figure below.

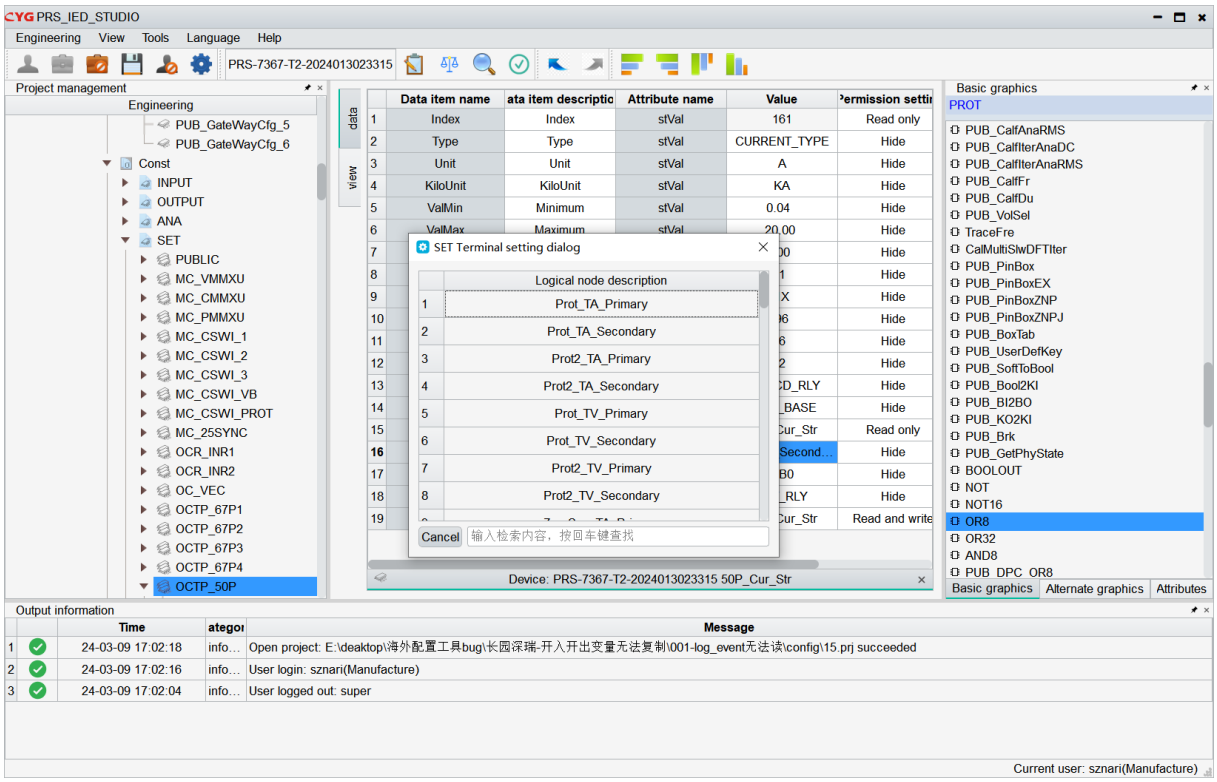


Figure 4.11.13 General parameter configuration

4.11.4 Logic module object port connecting with BI & BO virtual terminal module

BI/BO terminal connection drawing of logic module is used to fulfill the logic connection of the logic module interface.

4.11.4.1 Rules for connecting input and output ports

1. The input port can only be connected with one external signal, that is, there can only be one link.
2. The output port can be configured with multiple external signal connections at the same time, that is, the output port can be output to multiple input ports.
3. The connection between input and input ports, output and output ports can not be created.

4.11.4.2 Port connection of logical components

Particular attention: any connection mode shall follow "4.10.4.1. Input and output port connection rules".

4.11.5 Create direct connection

1. Create connection

Double-click the output (or input) port of the element of component A (the text area range of the port name), and the port is in a highlighted state then, as shown in the following figure:

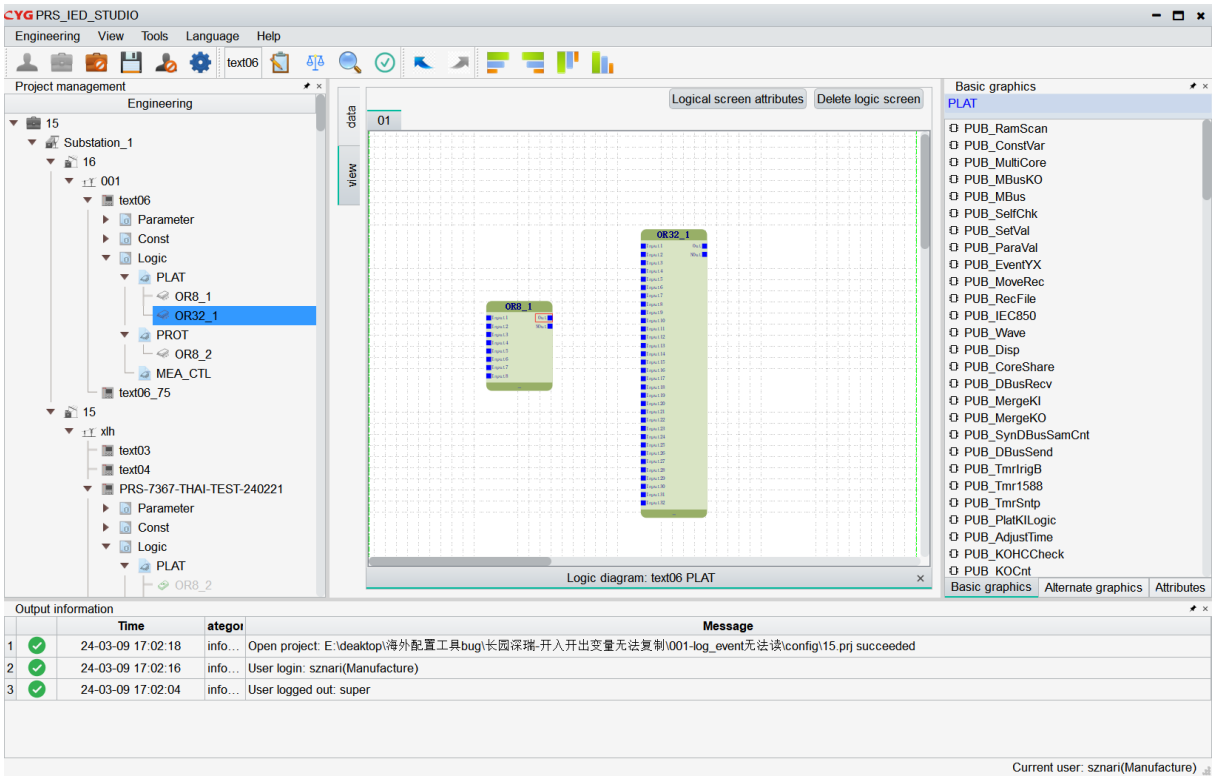


Figure 4.11.14 Connection Establish Step 1

Double-click the input (or output) port of component B, the port will also be highlighted, and create a connection with the output (or input) port of component A to complete the port connection drawing, and then cancel the highlighted state of the two ports, as shown in the following figure:

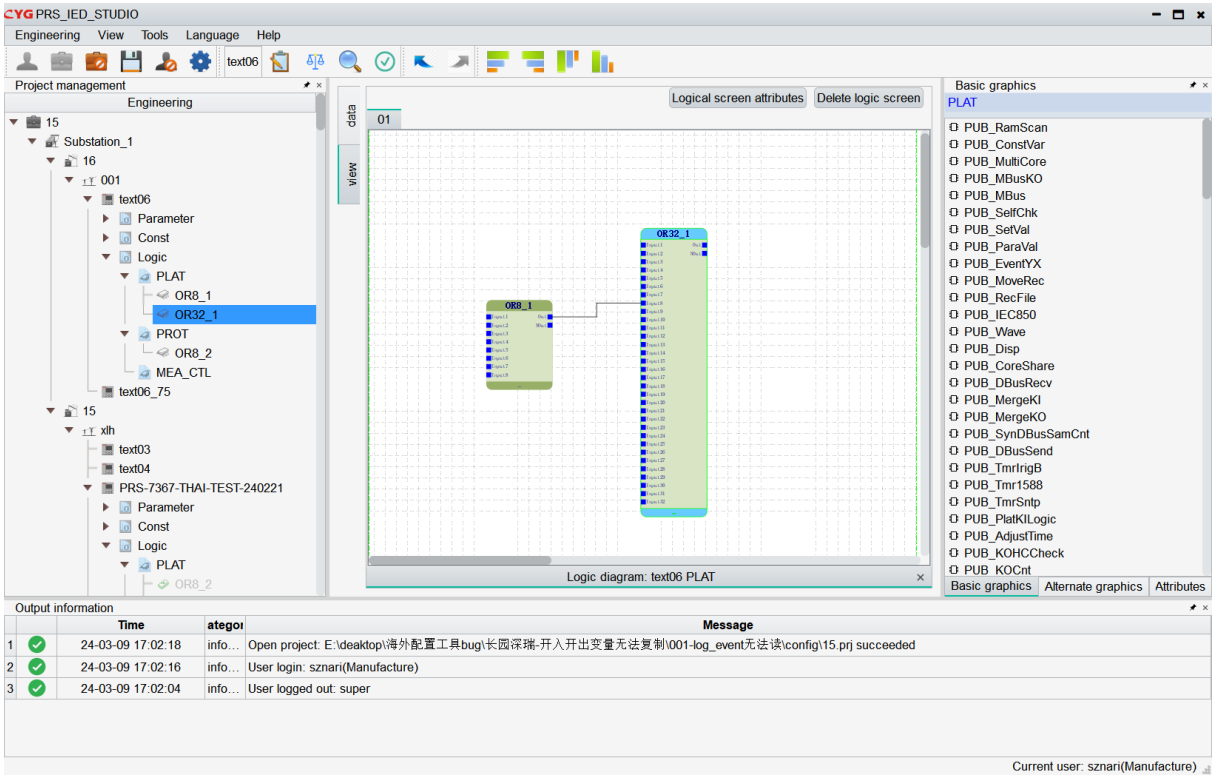


Figure 4.11.15 Connection Establish Step 2

NOTICE!

When an input signal of a module has been connected with an external connection and cannot be connected with other outgoing signals according to the 4.10.4.1 rule, the tool will rebound the corresponding alarm signal to indicate that the operation is wrong, as shown in the following figure.

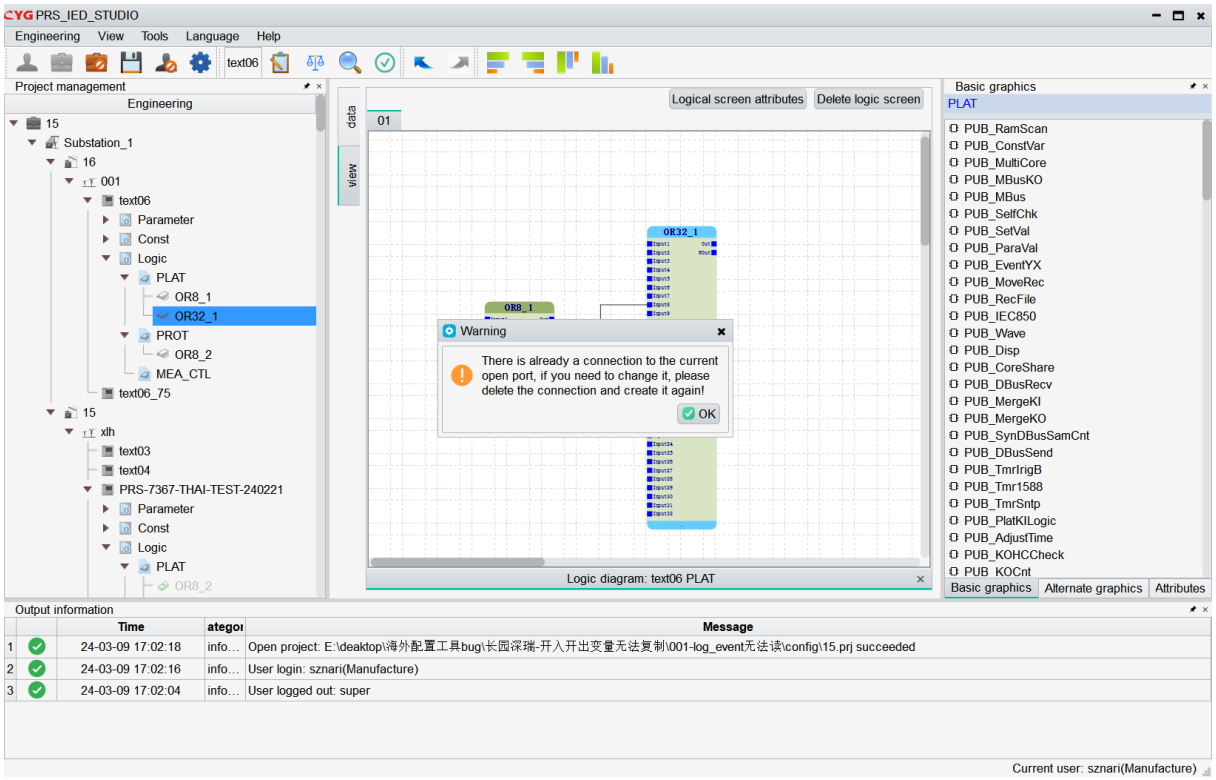


Figure 4.11.16 Wrong Operation

The components where the input and output ports of the direct connection are located can be the same components.

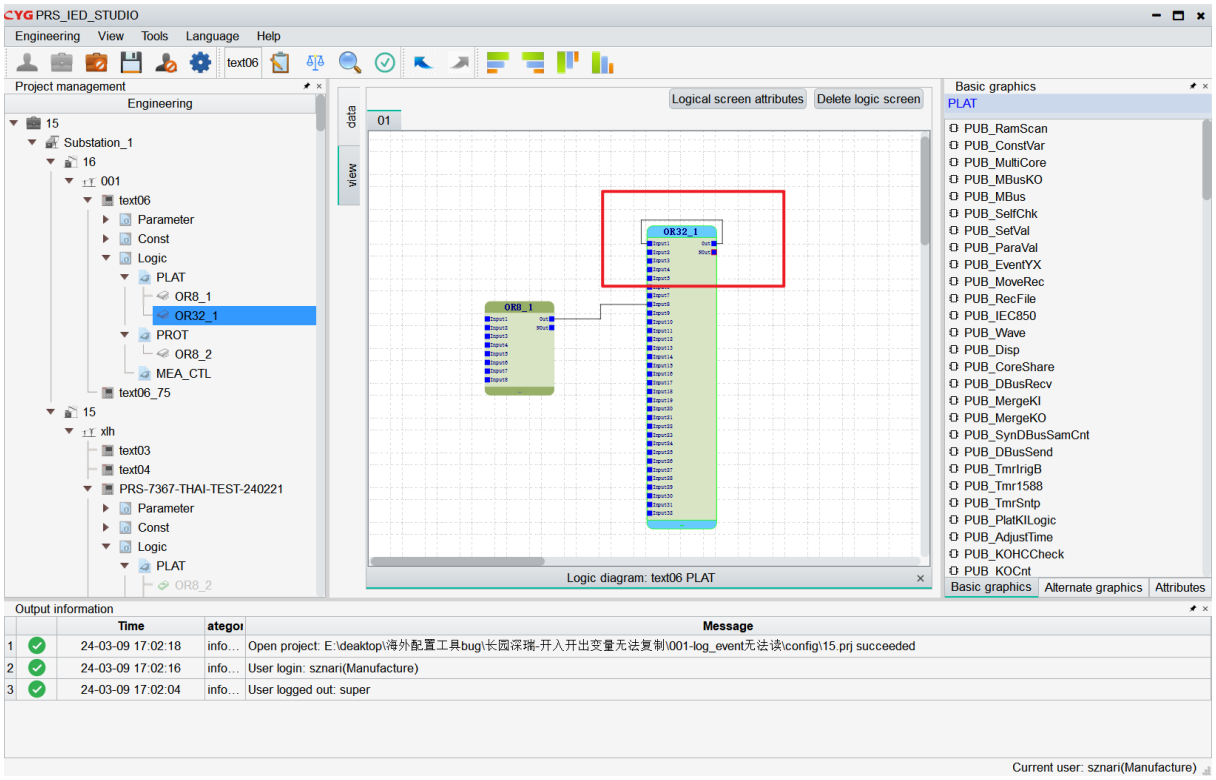


Figure 4.11.17 Connection Establish Step 3

2. Adjust the connection position

The user can put the mouse on the vertical line of the connection, and the connection is in a highlighted state. Then drag the mouse left and right to adjust the position of the middle vertical line of the connection. The input and output ports of the same component are connected. In addition to position of the vertical line, the horizontal line position of the middle part can also be adjusted.

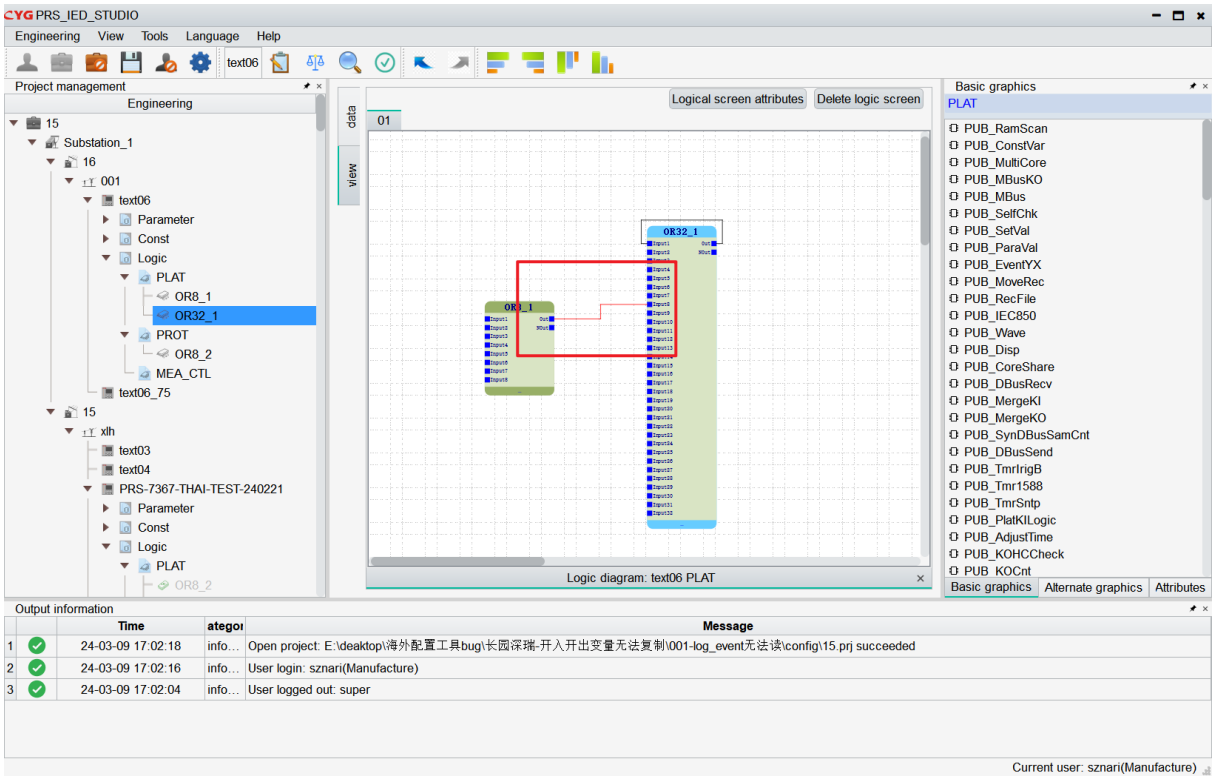


Figure 4.11.18 Adjustment of the Position of the Connection

3. Delete direct connection

Delete the direct connection and cancel the logical connection between the input and output ports. Place the mouse on the line, right-click the "Delete" menu, and click to complete the deletion.

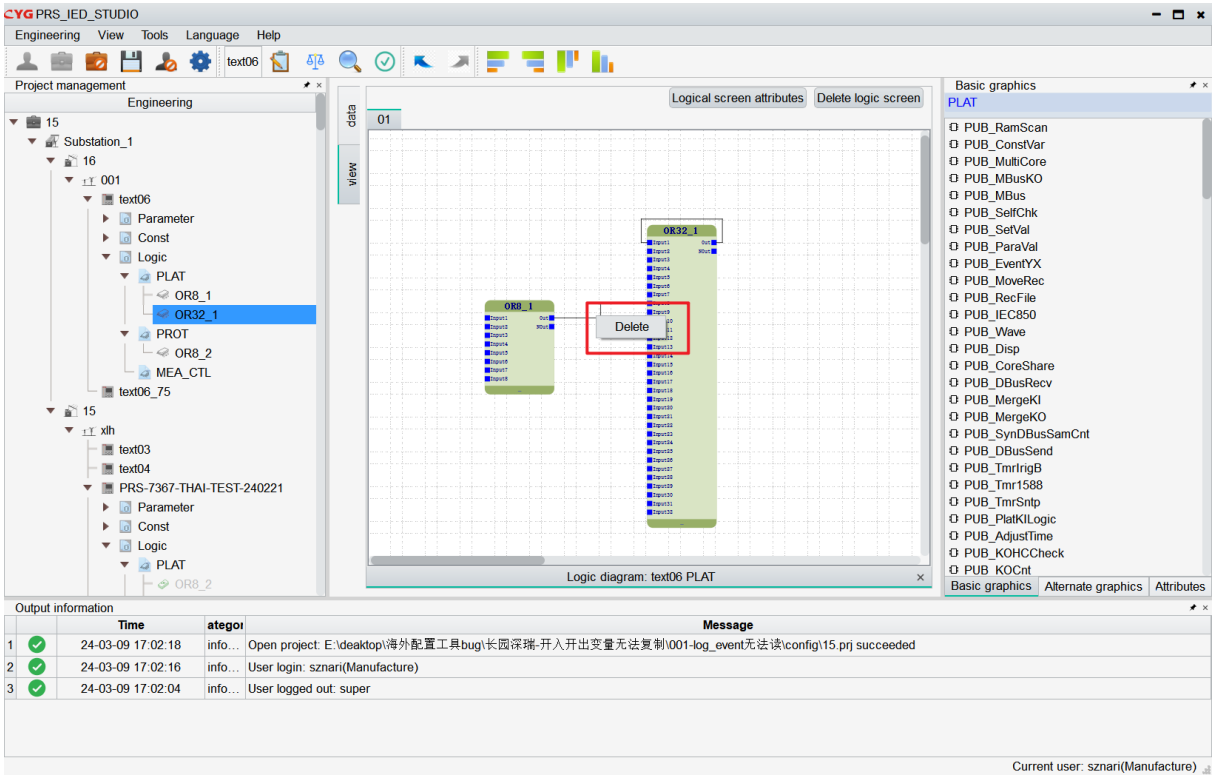


Figure 4.11.19 Delete Direct Connection

4.11.6 Create connections through intermediate variables

When there are complex relationships among several functional modules, a lot of signal transmission is needed; or when functional modules in multiple picture subgraph need signal transmission, the intermediate variables can be used to create connections. The advantages of this method are as follows:

1. Avoid the blurred picture in the case of too many direct connection lines and staggered element ports.
2. Provide a connection between two component elements across subgraphs.

There are also two ways to create intermediate variable connection:

1. Create intermediate variables separately
   A. Create intermediate variables for ports

Move the mouse to the side rectangle of the port, and the port is highlighted as shown in the following figure:

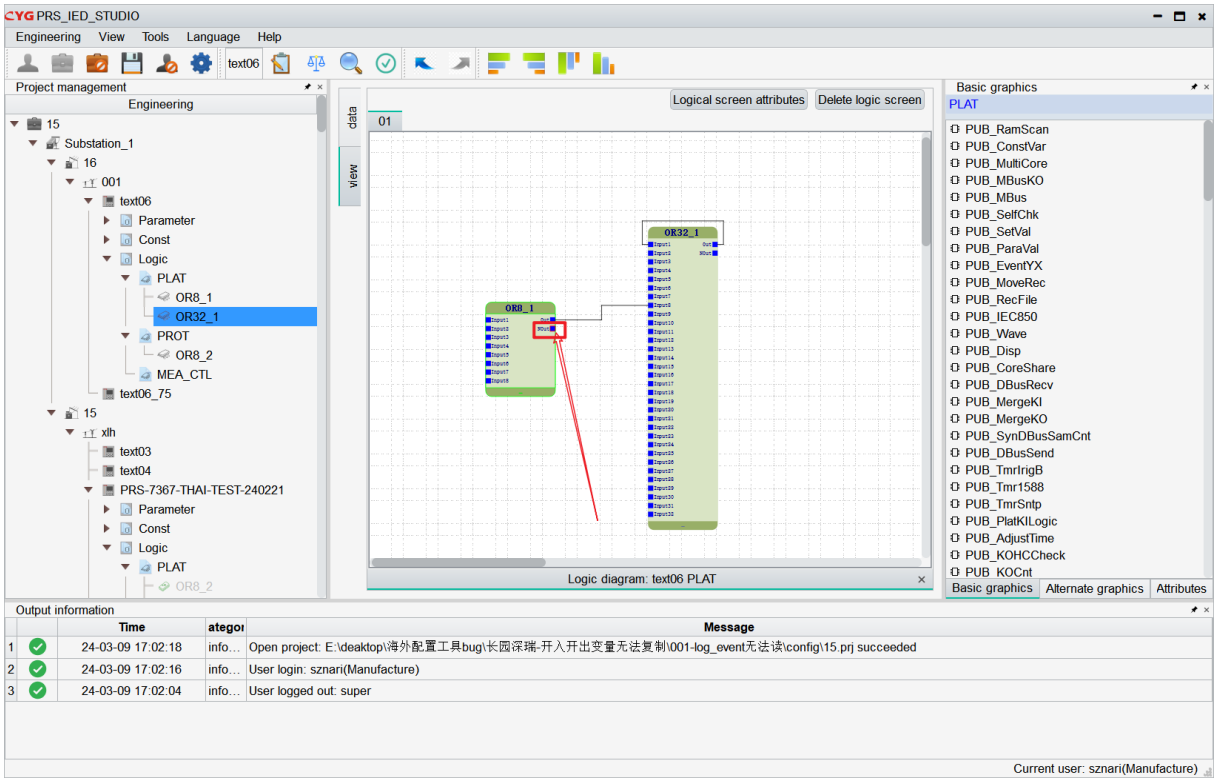


Figure 4.11.20 Create intermediate variables for port Step 1

Right-click the mouse, and the menu item "Create output/input new variables" pops up. Click to create an intermediate variable element for the port. By default, the intermediate variable element is named in the format of "LNodeType [inst]_PortName" ("Logical component Type [Instance Number]_Port Name"). If a new intermediate variable name is created so that it shares the same name as the intermediate variable connected to other input (output) ports, a connection is created between the two ports. The configuration user can name intermediate variables according to their needs, but it should be noted that two different output ports can not use the same name of intermediate variables, otherwise it violates "4.10.4.1. Input and output port connection rules", as shown in the following figure:

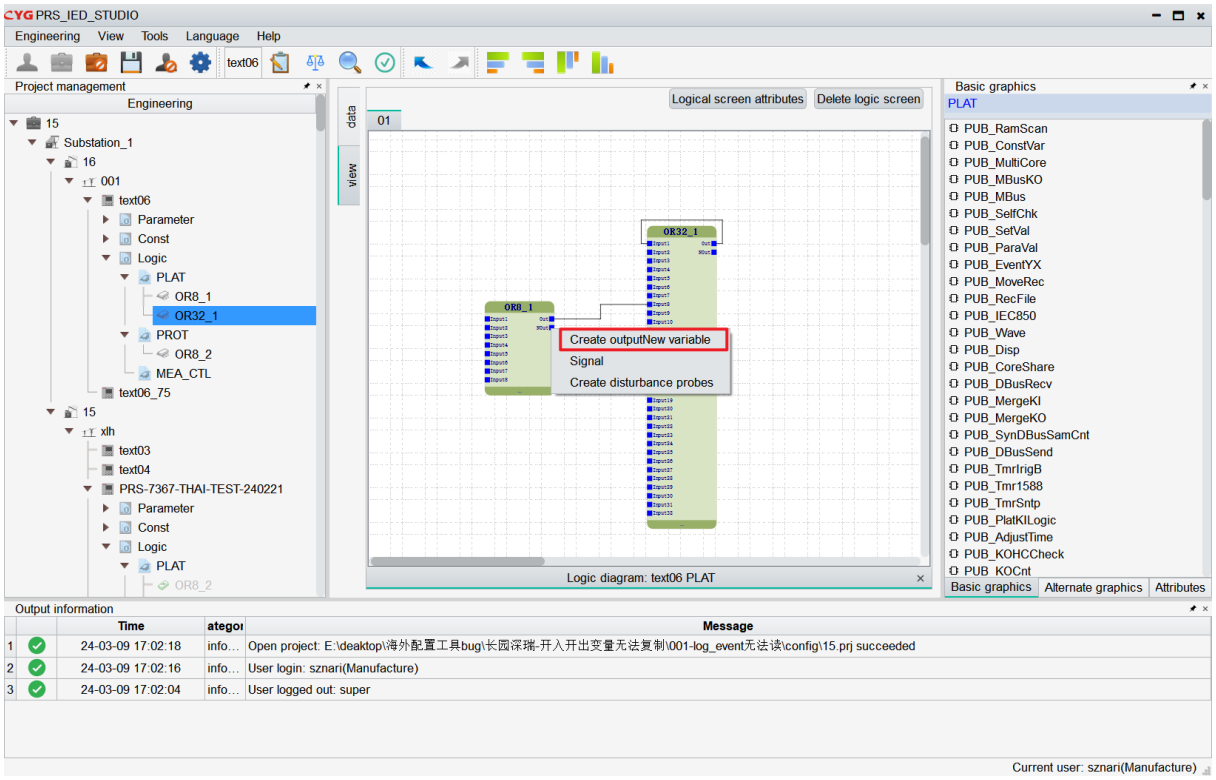


Figure 4.11.21 Create intermediate variables for port Step 2

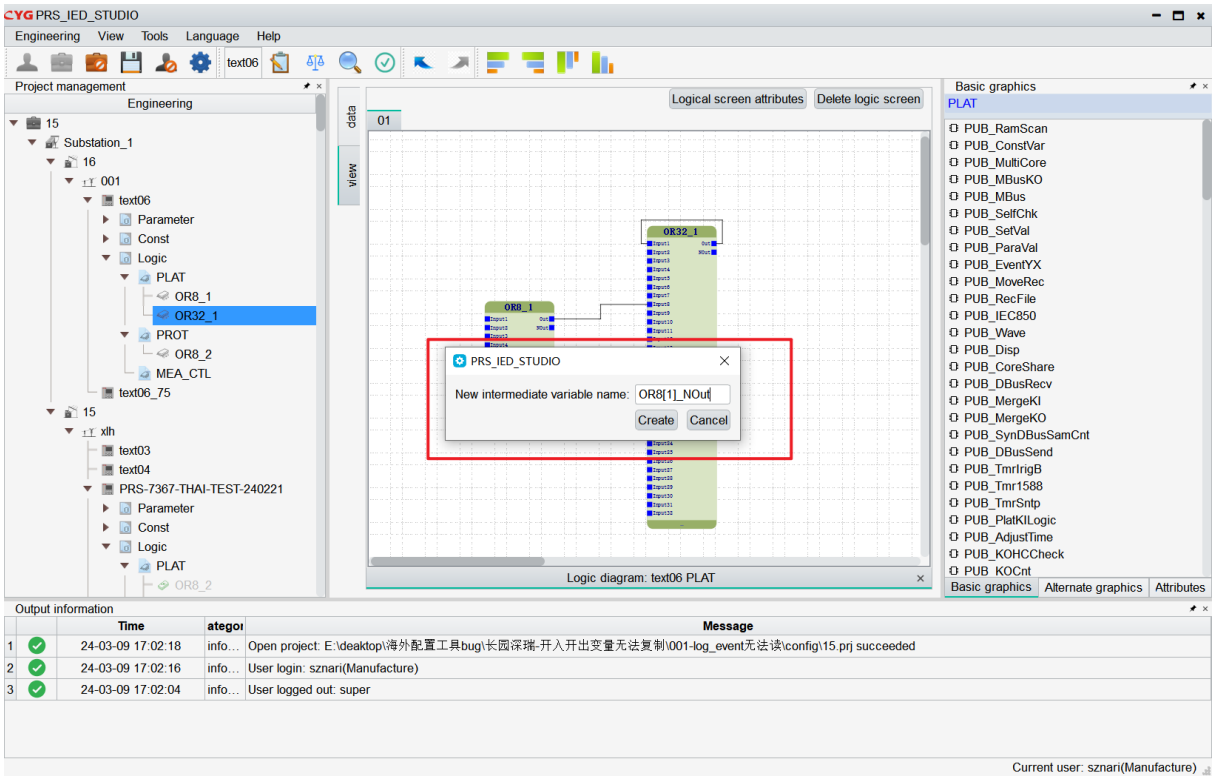


Figure 4.11.22 Create intermediate variables for port Step 3

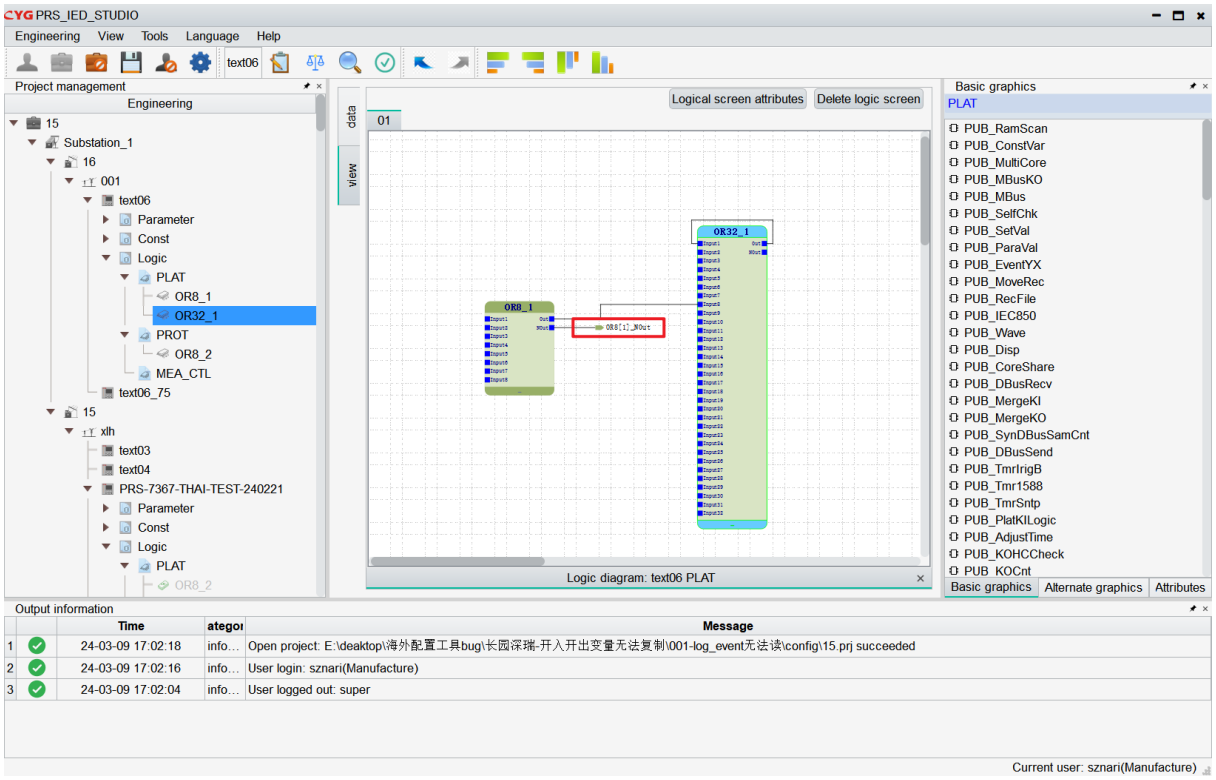


Figure 4.11.23 Create intermediate variables for port Step 4

B.Modify the name of the intermediate variable associated with the port

Double-click the text area of the intermediate variable whose name needs to be changed, and pop up the edit dialog box of the intermediate variable name. Change the name and confirm it as needed. If the name of the intermediate variable is changed to be the same name as the intermediate variable of other input (output) ports, a connection is created between the two ports.

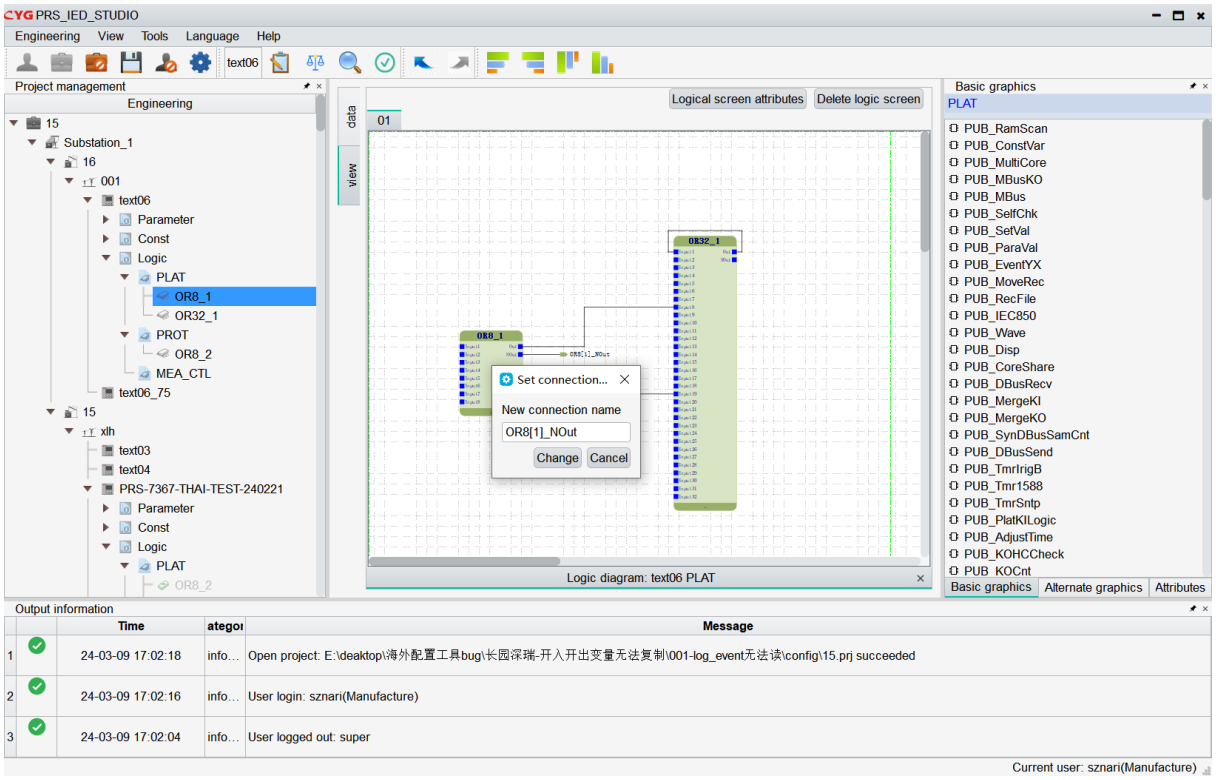


Figure 4.11.24 Modify the name of the intermediate variable associated with the port

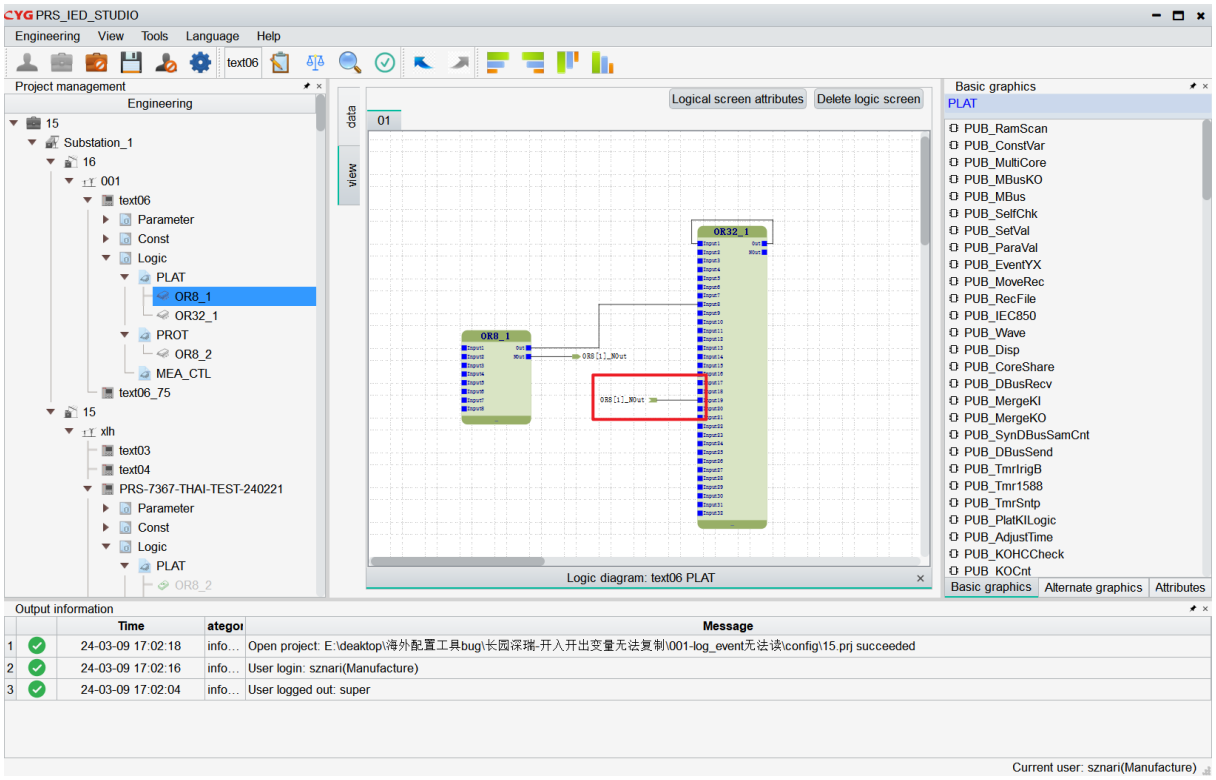


Figure 4.11.25 success Modify

C. Delete intermediate variables

Move the mouse to the middle variable element (including text area), right-click the "Delete" menu, and click Delete to complete it. If the port has been connected to the ports of other components through this intermediate variable, the connection-related information will be cleared.

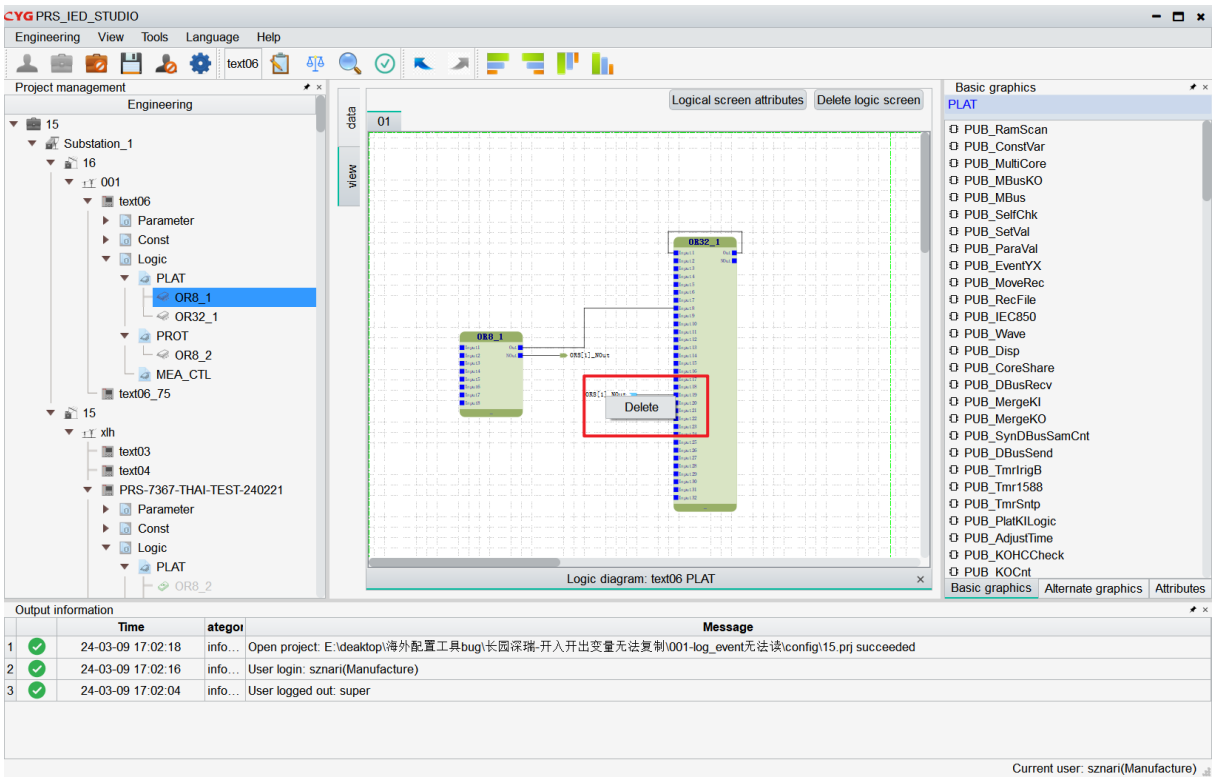


Figure 4.11.26 Delete intermediate variables

2. Directly create port connection intermediate variables by “Signal” association

It is essentially consistent with "1) create intermediate variables separately", which are connected by intermediate variables with the same name. It simplifies the operation by clearly correlating the input (output) port with the output (input) port on the opposite side.

The user moves the mouse to the rectangle on the side of the port to make it highlighted. Right-click the pop-up menu, click the "Signal" menu item, and pop up the signal correlation dialog box.

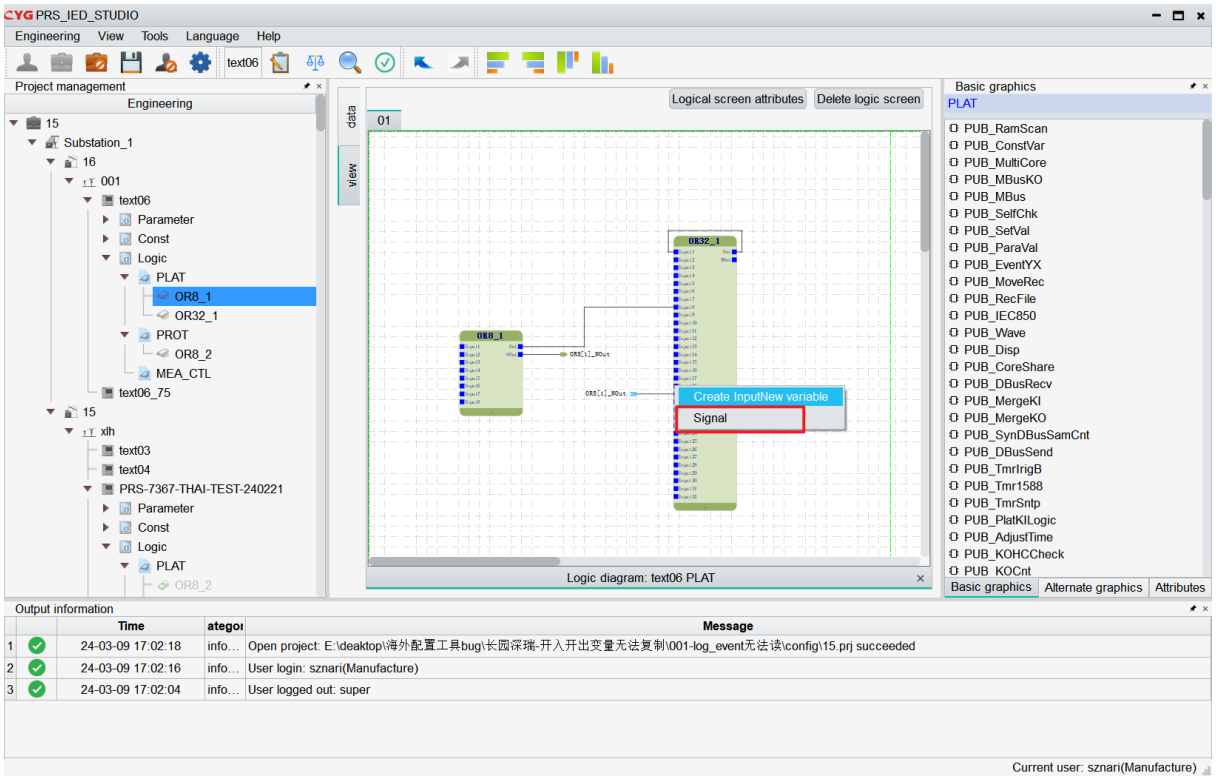


Figure 4.11.27 Create port connection intermediate variables by “Signal” association Step 1

The configuration user finds the port to be connected according to the hierarchy of "Subgraph-> Logical component-> Port". (If the port has created intermediate variables, the name of intermediate variables of its current connection will be displayed at the end of the port item actively so that the configuration personnel can understand the connection definition of the port). Double-click the port item to create the connection.

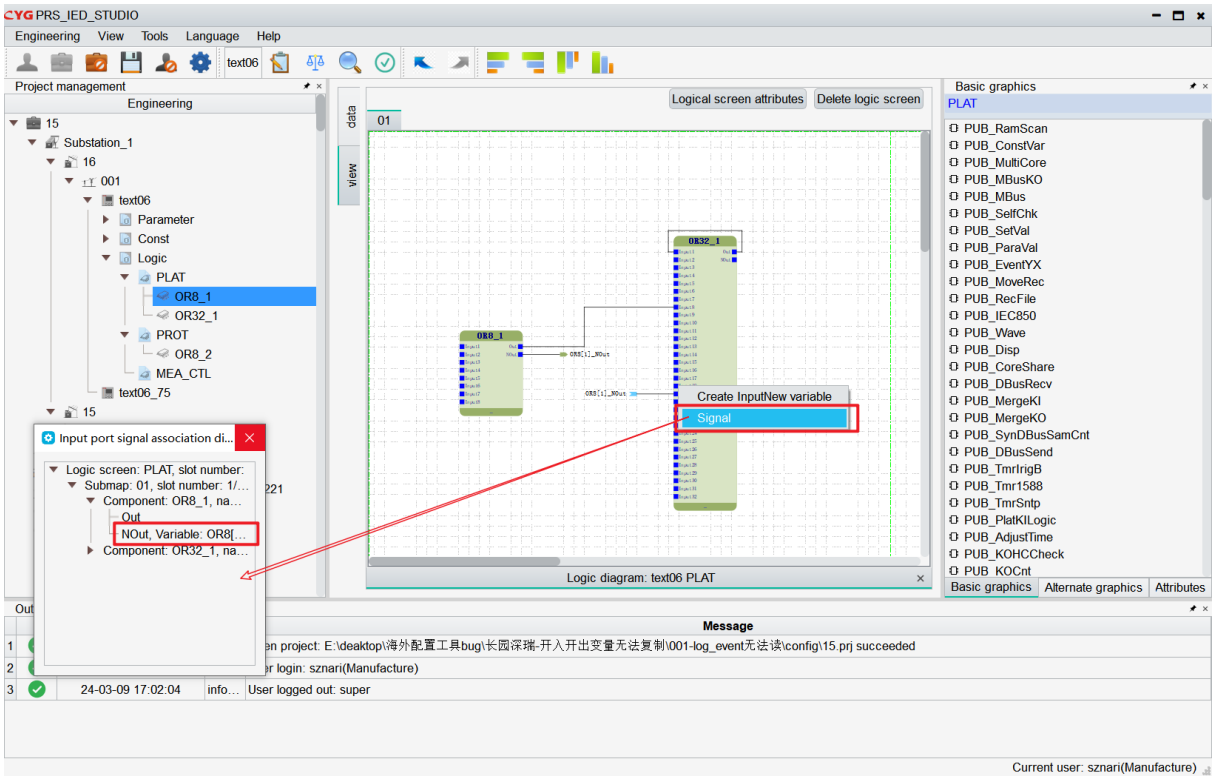


Figure 4.11.28 Create port connection intermediate variables by "Signal" association Step 2

The naming rules of intermediate variables for creating signal connection: if there is no intermediate variable initially, the default is to name the default intermediate variable for the output port; if there is only intermediate variable for the output port, the intermediate variable for the input port will be created by its variable name; if there is intermediate variable in the input port, the intermediate variable of output port will be created by its variable name.

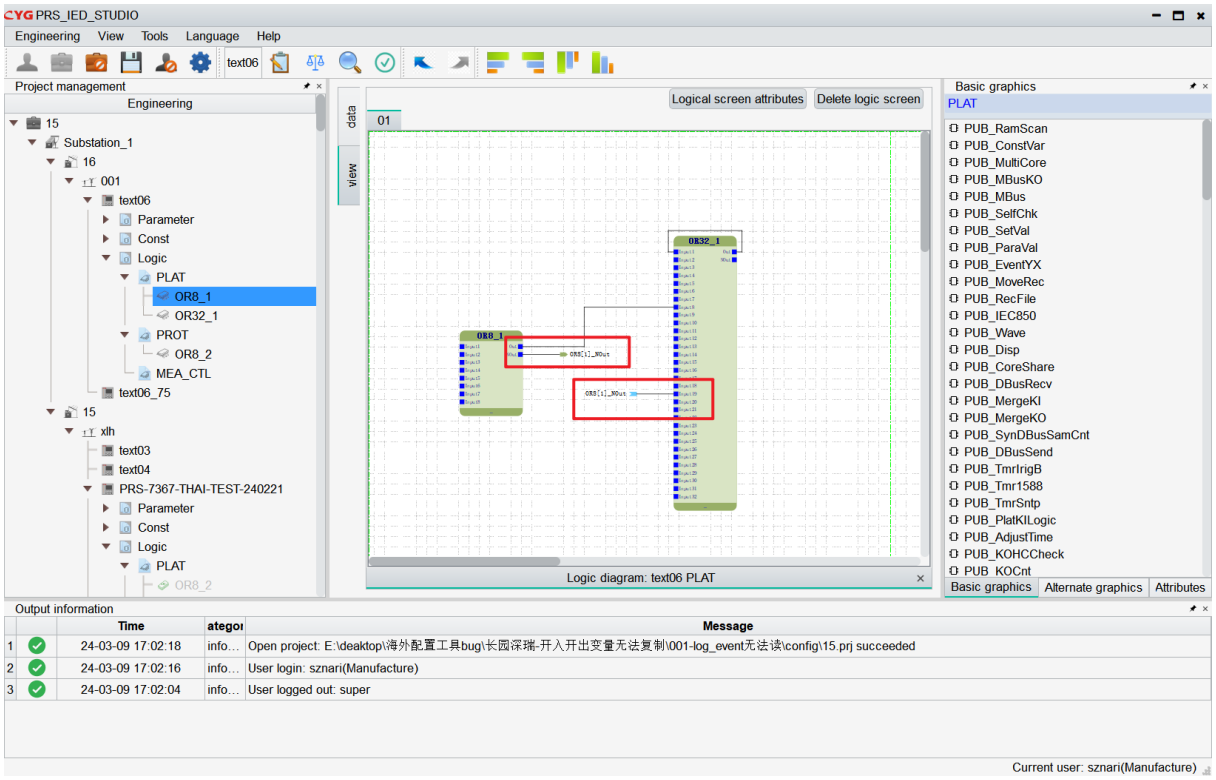


Figure 4.11.29 Create port connection intermediate variables by "Signal" association Step 3

3. Intermediate variable connection jump

Intermediate variable connection jump is to find the location of components of other ports connected to a port.

Move the mouse to the rectangle on the side of the port to make it highlighted. Right-click the "Jump to connected logic component input/output port" menu to view the list of input/output ports connected to the port through intermediate variables.

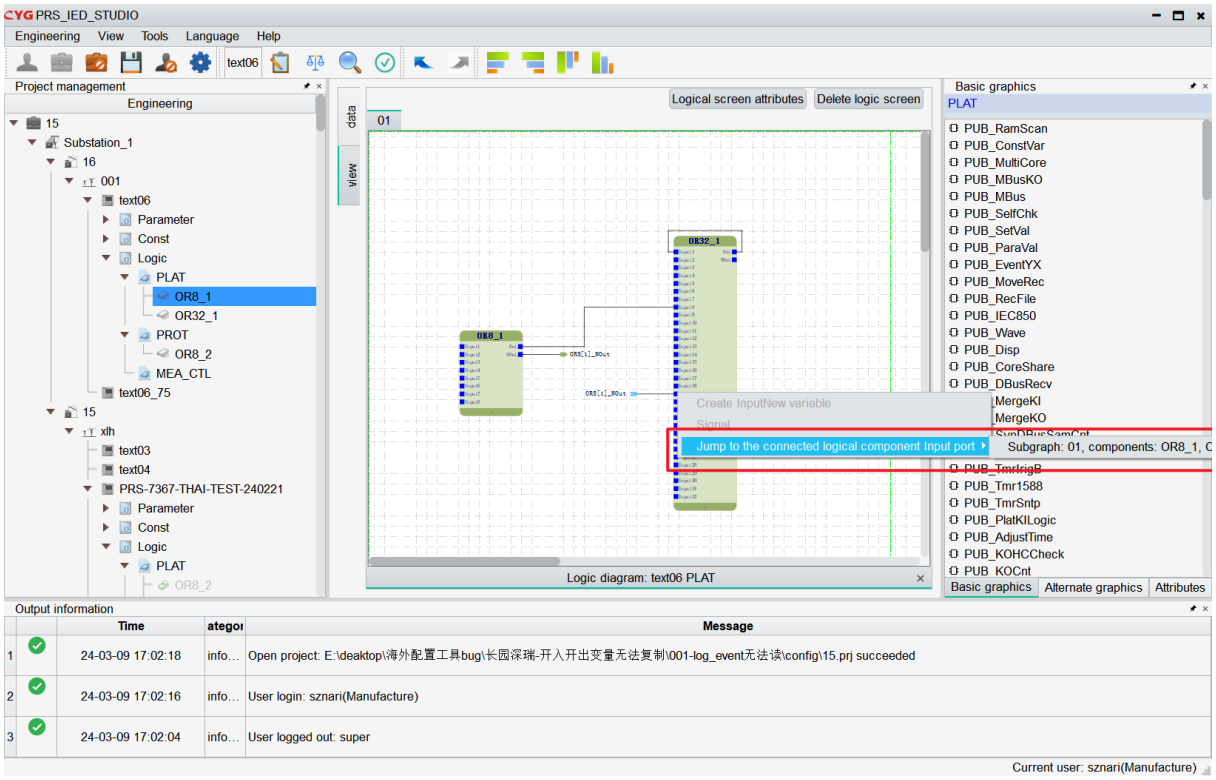


Figure 4.11.30 Intermediate variable connection jump Step 1

Click the port you want to jump to switch the subgraph showing the component of the target port, and the intermediate variables of the connection of the target port will be highlighted. The user can cancel the highlight of the jump by right-clicking (or clicking on other widgets), as shown in the following figure:

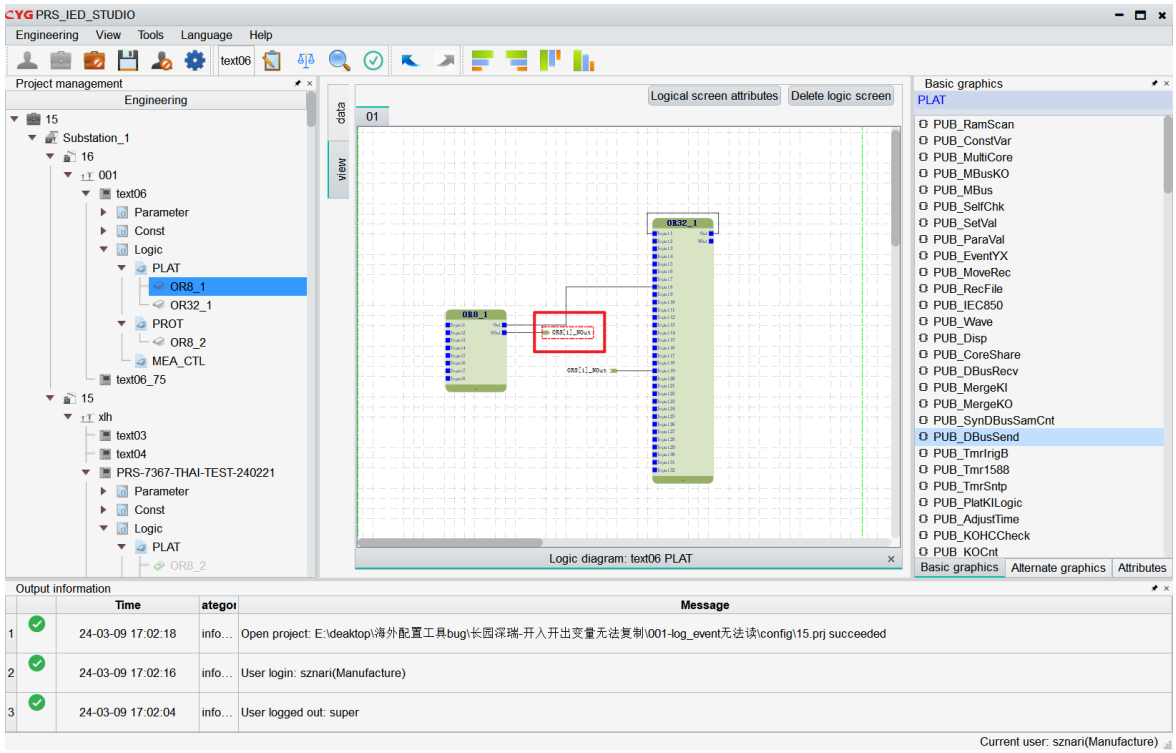


Figure 4.11.31 Intermediate variable connection jump Step 2

NOTICE!

To create a connection between two ports, the user can modify one of the intermediate variables to have the same name as the intermediate variable of the other port, and create a connection between the two ports.

The above modifications are made in accordance with Rule 4.10.4.1. Otherwise, errors will be reported when backup files are saved or downloaded.

Intermediate variable signal transmission must be made between subgraphs with the same slot (board) attributes, otherwise errors will be prompted.

4.11.7 Logical component object port connection input/output virtual terminal components

Input virtual terminal component element creation needs to rely on input interface resource logical component, and output virtual terminal component element creation needs to rely on output interface resource logical component. The same input interface resource logical component can create multiple input virtual terminal component elements, and the same output interface resource logical component can only create one output virtual terminal component element at most. The input/output virtual terminal component elements essentially represent the virtual terminal numbers of the corresponding input/output interface resource logical components.

The input port of the logical component can be connected with the input virtual terminal component, and the output port can be connected with the output virtual terminal component.

1. Create input virtual terminal component element

Drag and drop the logical component node of the project's access interface resources into the logic screen subgraph, and create the corresponding input virtual terminal subcomponent elements, as shown in the following figure:

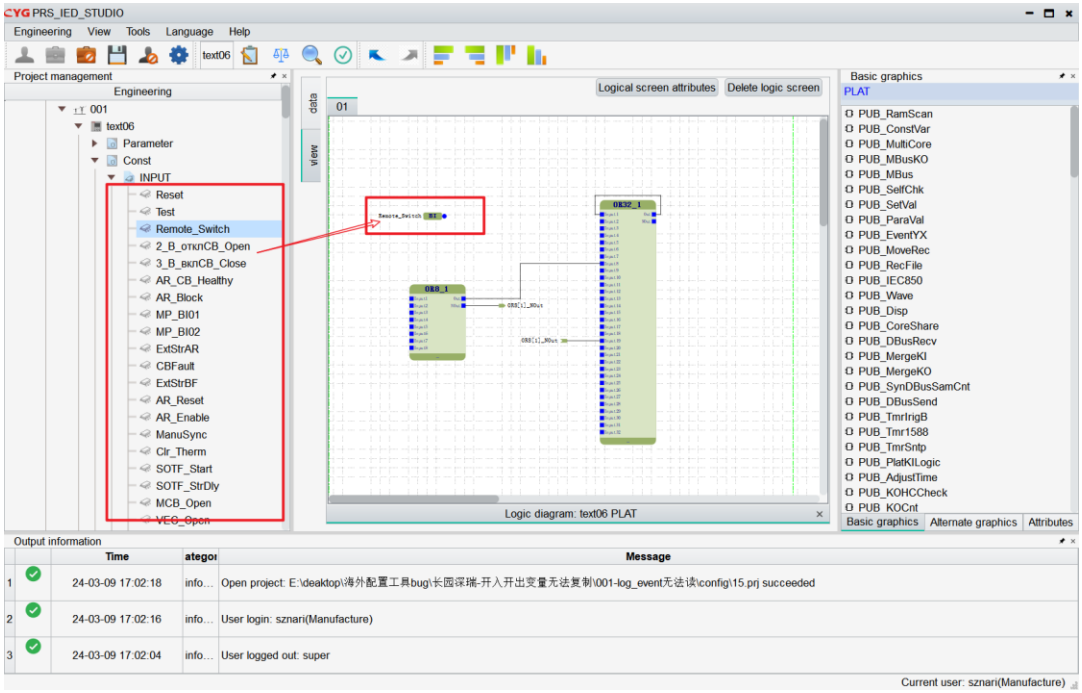


Figure 4.11.32 Create a BI Virtual Terminal Component Element

2. Create output virtual terminal component element

Drag and drop the logical component nodes of the project's output interface resources into the logic screen subgraph, and then create the corresponding output virtual terminal subcomponent elements, as shown in the following figure:

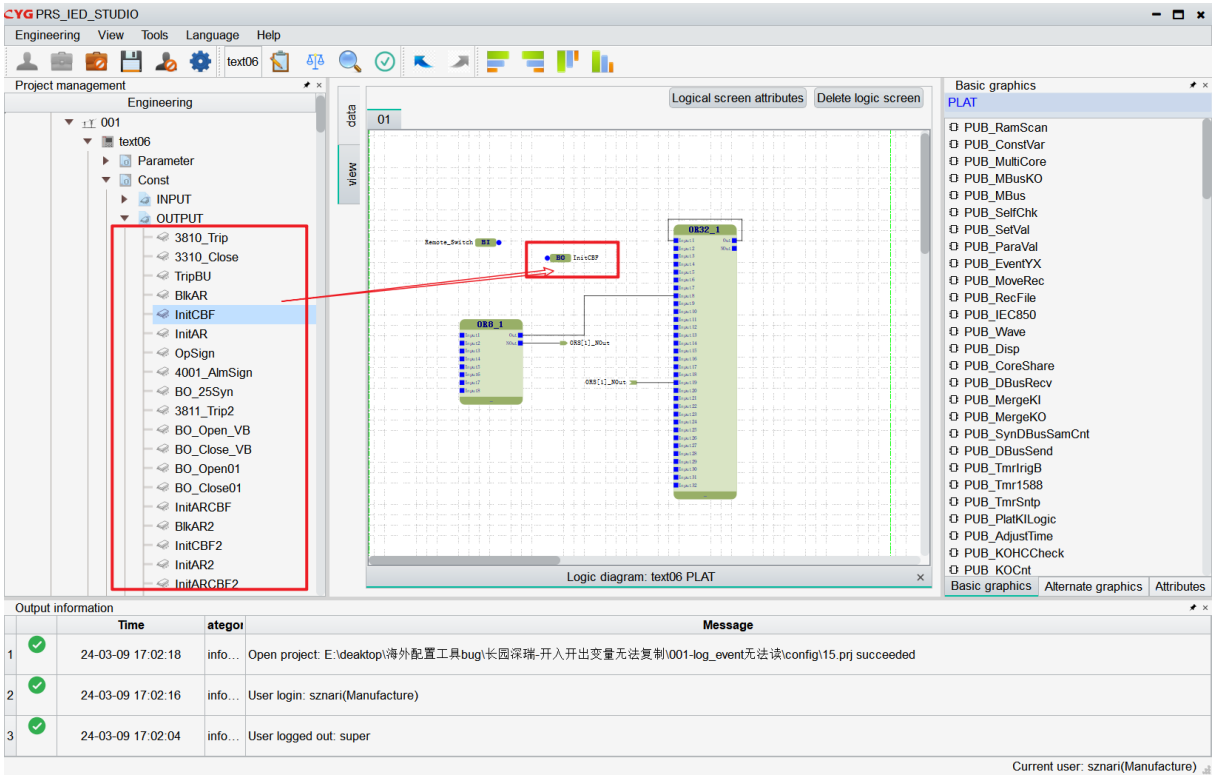


Figure 4.11.33 Create a BO Virtual Terminal Component Element

3. Input/output virtual terminal component element creates connection with logic resource component input/output port

Double-click the input/output virtual terminal component element to make it bright.

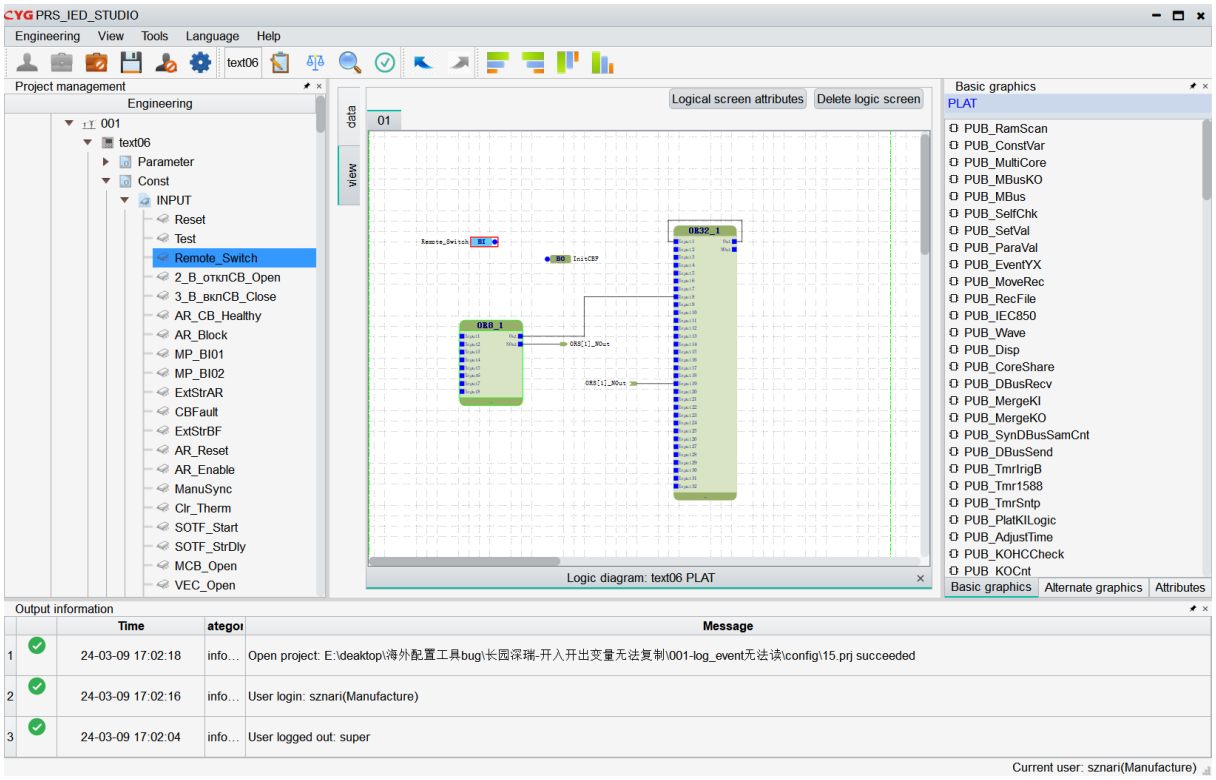


Figure 4.11.34 BI Virtual Terminal Component Connection Step 1

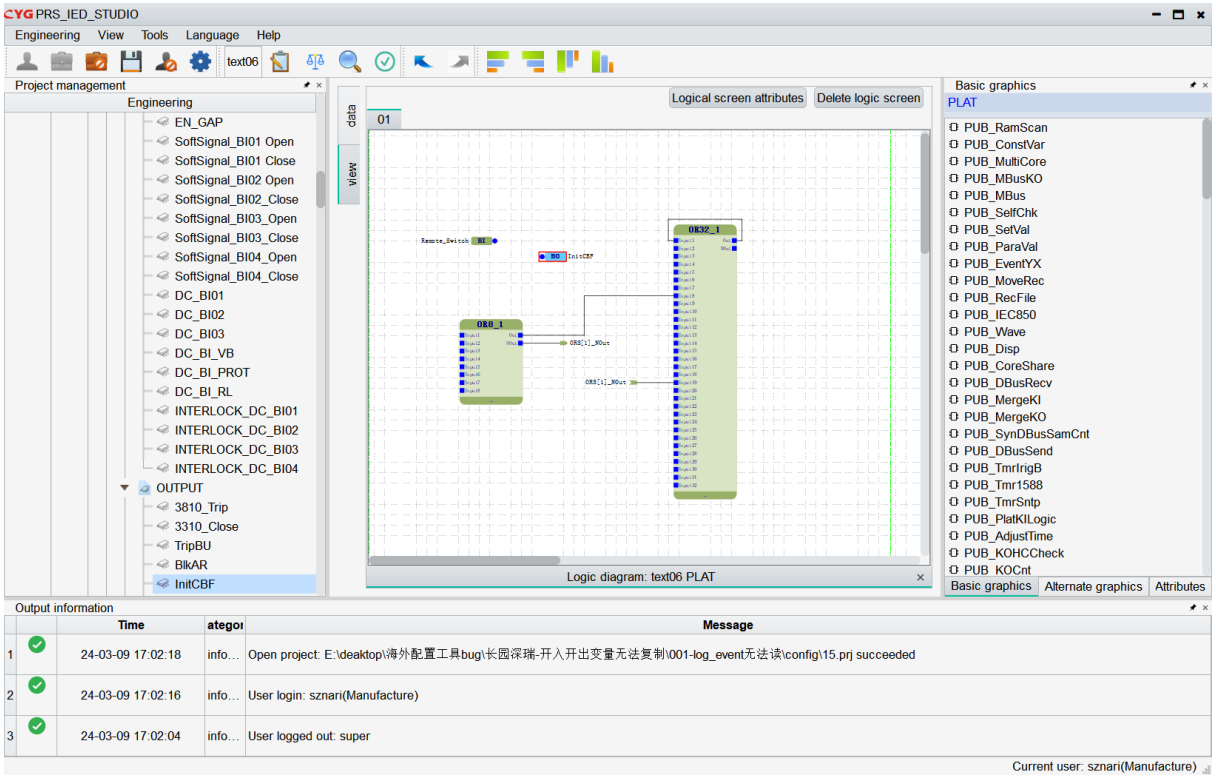


Figure 4.11.35 BI Virtual Terminal Component Connection Step 2

Double-click the input (output) port of the logical component, then draw the connection between

the two and create the connection.

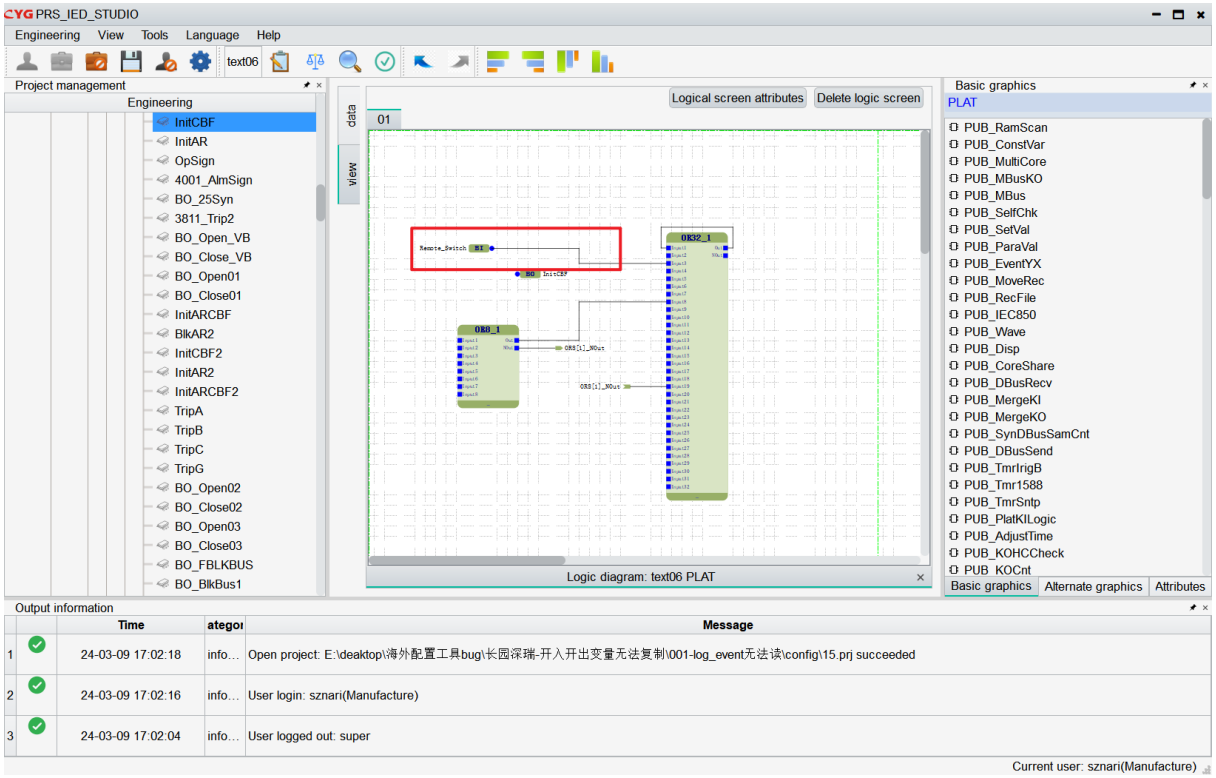


Figure 4.11.36 BO Virtual Terminal Component Connection Step 1

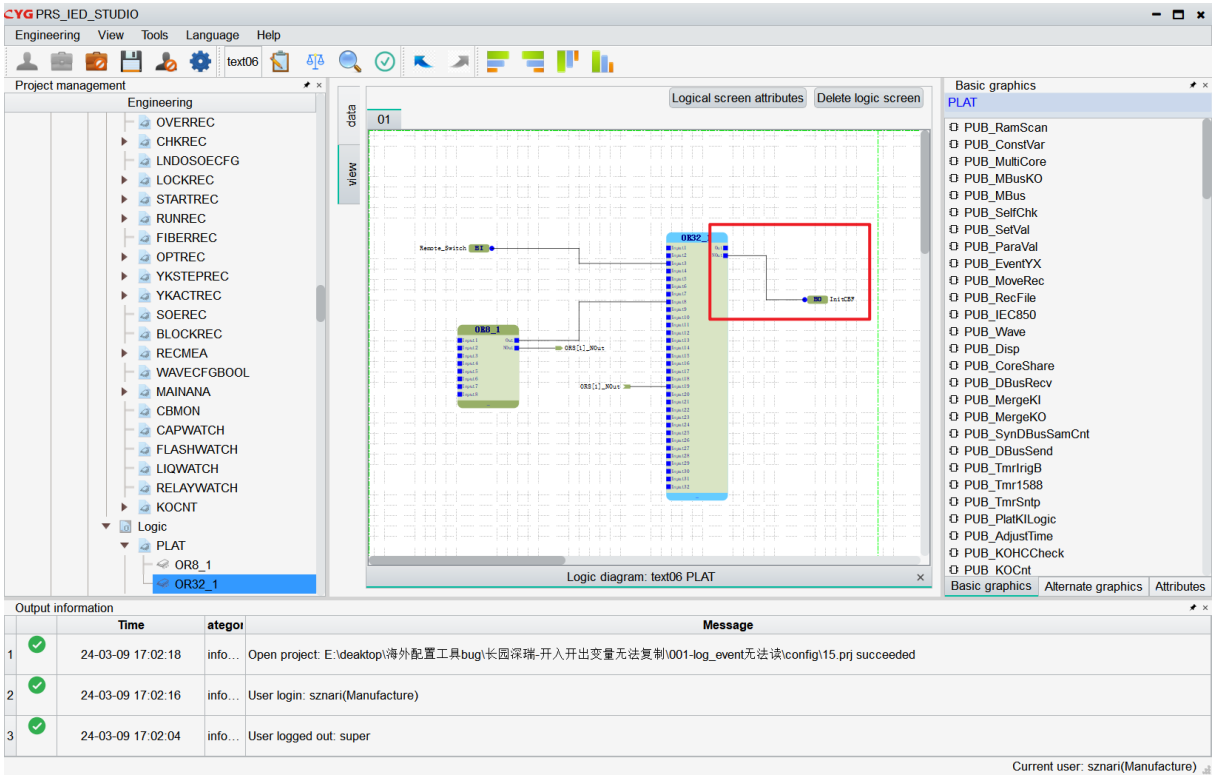


Figure 4.11.37 BO Virtual Terminal Component Connection Step 2

4.12 User authority management instructions

Configuration tool internally designs four levels of users: Manufacturer, Superuser, Engineer and Operator. Current login user can not change his own user name or authority level, but he can change the password.

1. Manufacturer

Manufacturer is used internally by the manufacturer and is not open to the user.

Manufacturer possess all configuration functions of the project, meanwhile, only the Manufacturer has the authorization on logic equipment, logic component, logic component data of the device instance configuration and the sub-graph setting hidden/display, read only and read-write of logic graphs, so as to fulfill the basic configuration of the device by the manufacturer. As for the relevant content that inappropriate to open to the user for checking, it shall be set in hidden; while the content that is unnecessary to alter by the user but to check by the user shall be set in read-only.

2. Superuser

Manufacturer may select whether to create the Superuser for the client or not. Superuser is characterized by the following authorization features:

A. Having all functions of device configuration (except the hidden, read-only and read-write authorizations of the relevant nodes set by the Manufacturer).
B. Only adopting Manufacturer account to create Superuser, Superuser can change its own password but cannot alter its own account name.
C. Superuser can create/delete other users of lower levels and check & alter their password.
D. Superuser has the configuration of creating the device internal users (engineer/operator/guest), while the user of lower level cannot configure and check the device users.

3. Engineer

Engineer is created by Superuser. Engineer is characterized by the following authorization features:

A. Engineer has all general configuration functions (create, delete, check, alter) of configuration tools, including drawing logic graphs, main wiring diagrams, etc. but cannot create the account configuration for checking the device.
B. Engineer only can check and alter its own password.
C. This account number shall exit automatically without operation in 30 minutes.

4. Operator

Operator is created by Superuser. Operator is characterized by the following authorization features:

A. Operator only can see the configuration made by the Engineer generally (such as, logic graphs and main wiring diagrams for Operator to check, but cannot change anything in the diagram), only the data item with read-write authorization of logic equipment component is permitted to make parameter modification by the Operator.

4.13 Drawing the main wiring diagram of device

After the configuration tool completes the configuration of the device configuration instance, the main wiring diagram can be drawn through the internal main wiring tool of the drawing device, and

the remote signal and remote control signal of the device configuration instance can be bound to the disconnector switch and circuit breaker elements of the main wiring to complete the signal association, so as to export the configuration file of the main wiring diagram and send it down to the physical device to complete configuration.

4.13.1 Open the drawing tools of the device main wiring diagram

Right click the “Device Main Wiring Diagram” of the device configuration instance node, then the configuration tools shall be hidden and the drawing tools of the main wiring diagram shall be opened.

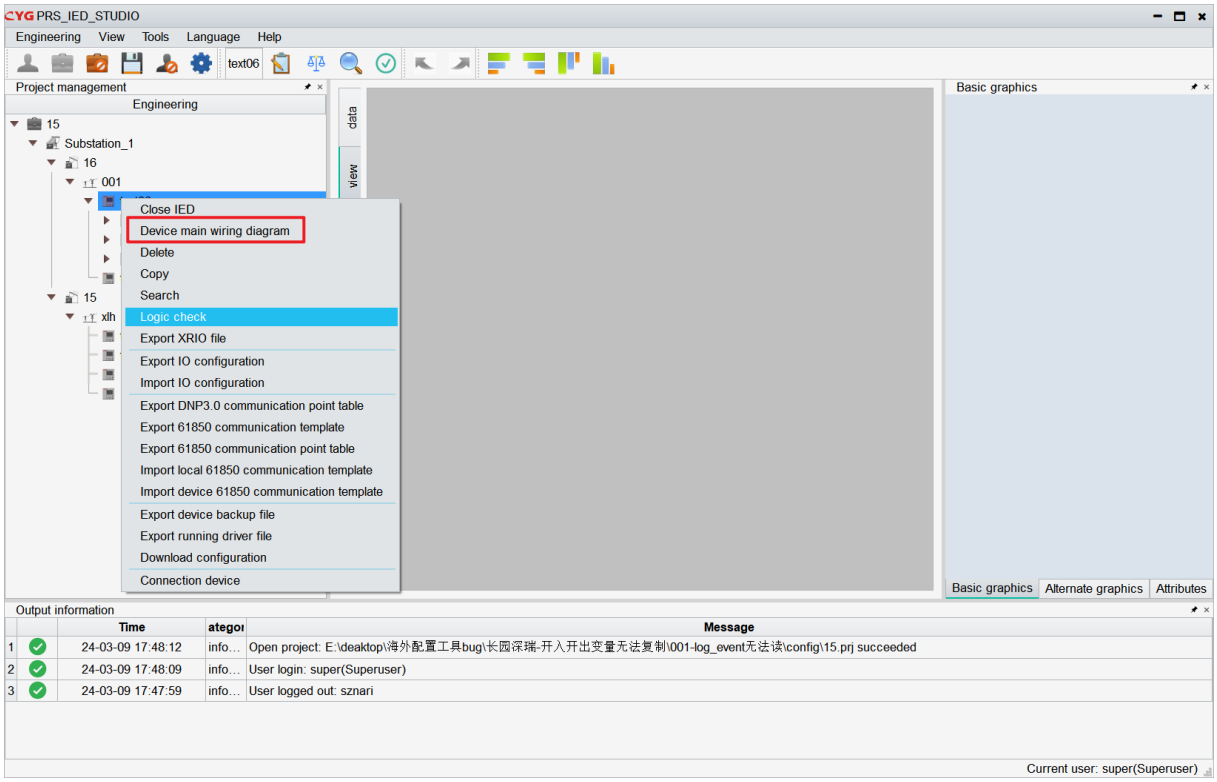


Figure 4.13.1 Diagram of Device Mian Wiring

Drawing tools of the main wiring diagram

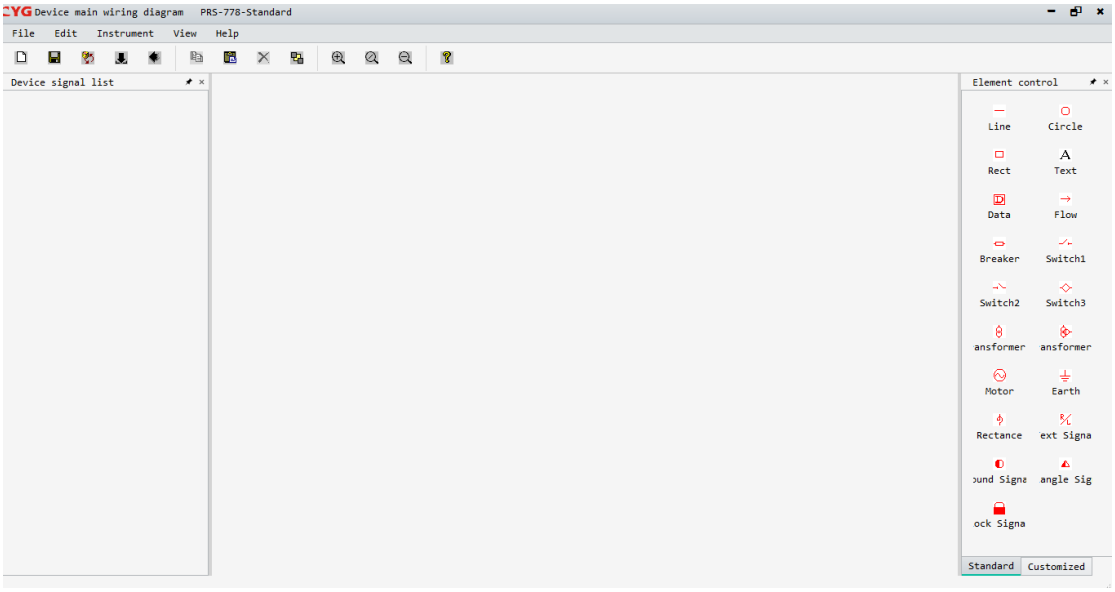


Figure 4.13.2 Drawing Tools of the Main Wiring Diagram

Draw the main wiring diagram of the device:

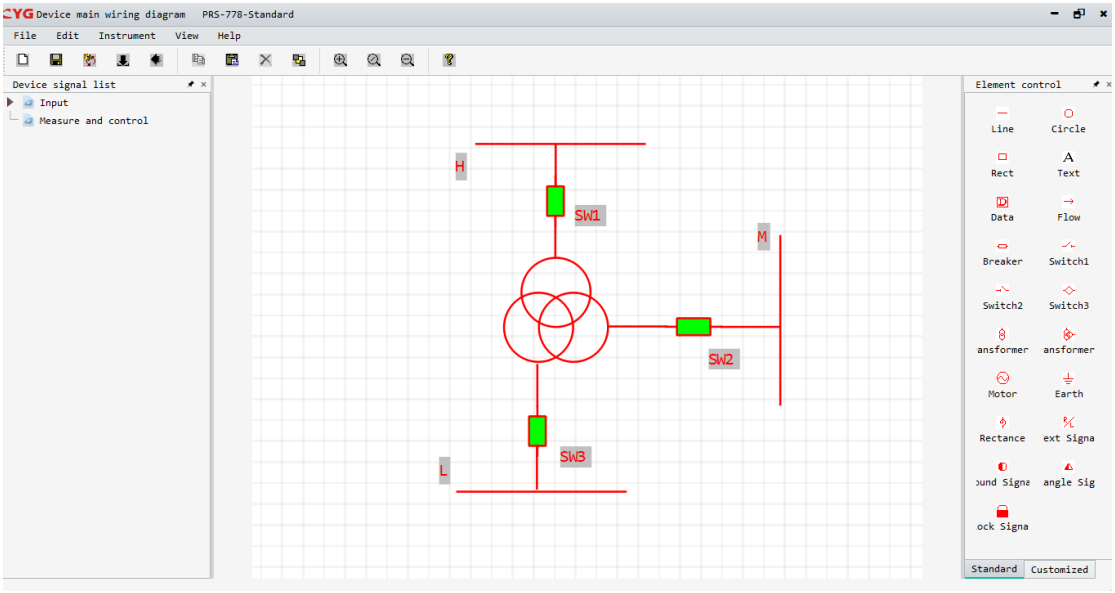


Figure 4.13.3 Draw the Main Wiring Diagram of the Device

4.13.2 Main interface description

The standard parts are as follows:

① Title, tail is the current device name;

② Menu bar;

③ Toolbar;

④ Device signal list bar to provide remote message/measuring signal list;

⑤ Main wiring diagram screen window;

⑥ Element control, basic elements provided to draw the main wiring diagram.

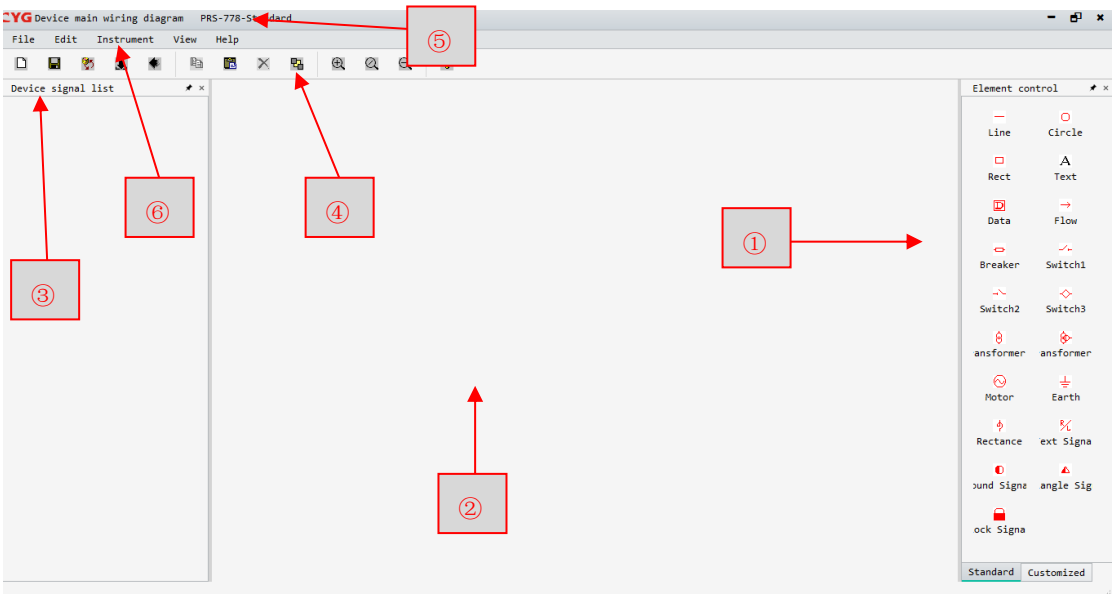


Figure 4.13.4 Diagram of Main Interface Description

4.13.3 Menu bar menu item function description

4.13.3.1 Document menu

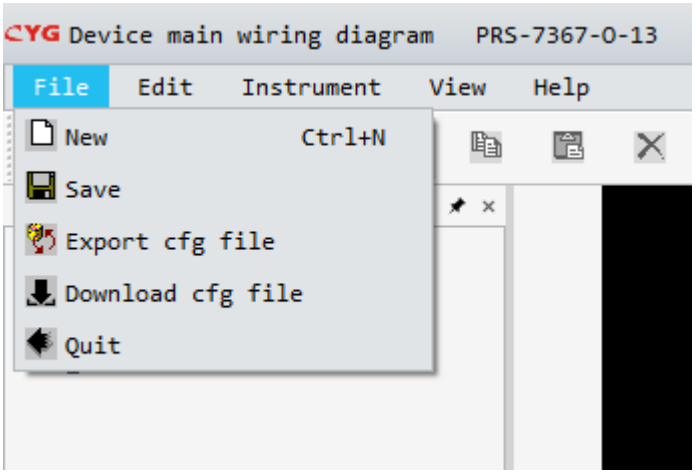


Figure 4.13.5 Document Menu

Table 4.13.1 Table of Document menus

Name	Description
	Create main wiring diagram, the main wiring diagram of device configuration is initially null
	Save graph, save the currently drawn main wiring diagram to the engineering project to make continue editing next time when you open it.
	Export the configuration cfg document of the main wiring diagram and download them to the physical device to finish the configuration
	Exit the drawing tools of main wiring diagram and return to the configuration tools. If there is a main wiring diagram currently, it will ask whether to save

Name	Description
	the configuration of the main wiring before exiting.

4.13.3.2 Edit menu

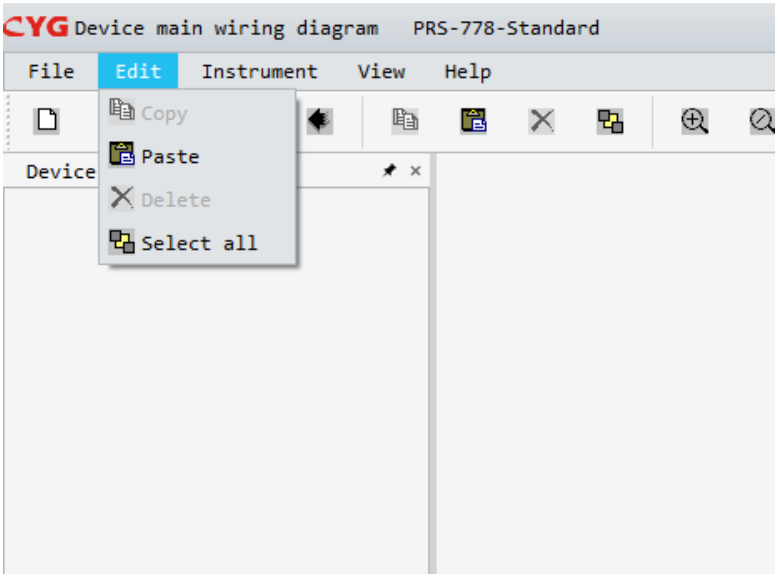


Figure 4.13.6 Edit Menu

Table 4.13.2 Table of Edit Menu

Name	Description
	Copy the currently selected elements of the main wiring diagram, wait for the drawer to click "Paste" to complete copy.
	Paste the elements copied to the cache element and complete copy.
	Delete the selected element.
	Select all elements of the current main wiring.

4.13.3.3 Instrument menu

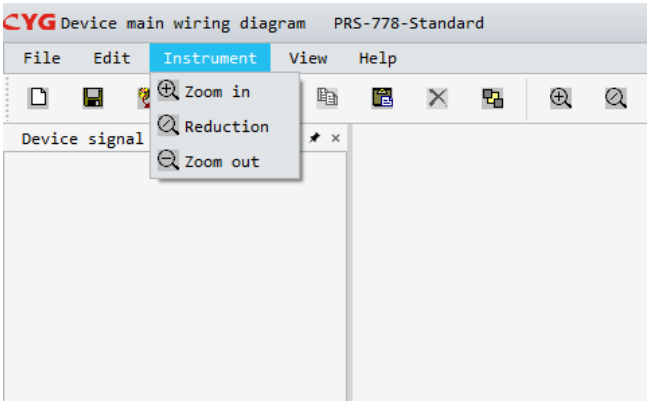


Figure 4.13.7 Diagram of Instrument Menu

Table 4.13.3 Table of Instrument Menu

Name	Description
	Zoom in the main wiring diagram currently displayed.
	Reduce the main wiring diagram to show the actual size.
	Zoom out the main wiring diagram currently displayed.

4.13.3.4 View menu

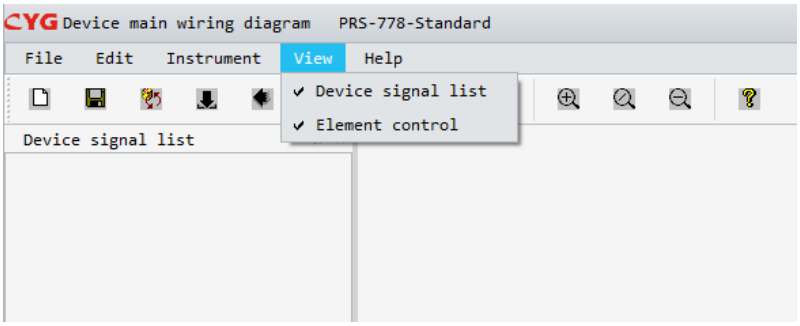


Figure 4.13.8 Diagram of View Menu

Table 4.13.4 Table of Instrument Menu

Name	Description
✔ Device signal list	Display/hide the Device signal list sidebar.
✔ Element control	Display/hide Element control sidebar.

4.13.3.5 Help menu

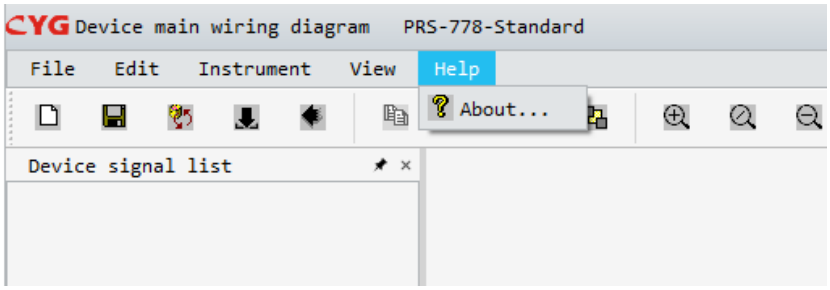


Figure 4.13.9 Diagram of Help Menu

Table 4.13.5 Table of Help Menu

Name	Description
	Provide basic information about software.

4.13.4 Operation instructions of drawing main wiring diagram

Create a new main wiring diagram, at this time; the main wiring diagram is still in a blank state. Configure personnel is needed to add related lines, disconnectors, circuit breakers, ground leads and other related elements according to the application requirements of the physical device. Finally

draw the overall effect of the main wiring diagram. At the same time, it is necessary to connect the remote signals and remote control signals with the elements such as the disconnectors and the circuit breakers to realize the signal correlation.

4.13.4.1 Modify the image property

Create a new main wiring diagram, the initial default main wiring diagram size is 320 x 240 (width x height), which is the general size of the physical device screen, with the white background. The configuration user can modify the configuration according to the needs and preferences.

For main wiring diagram range, click the right button “image property”:

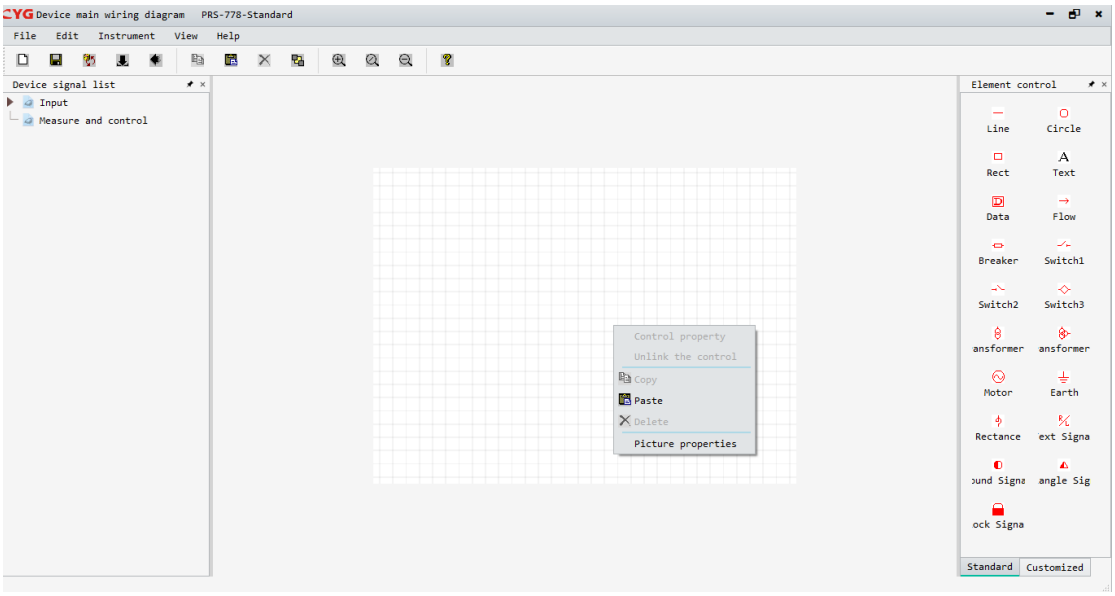


Figure 4.13.10 Diagram of Modify the Image Properties Step 1

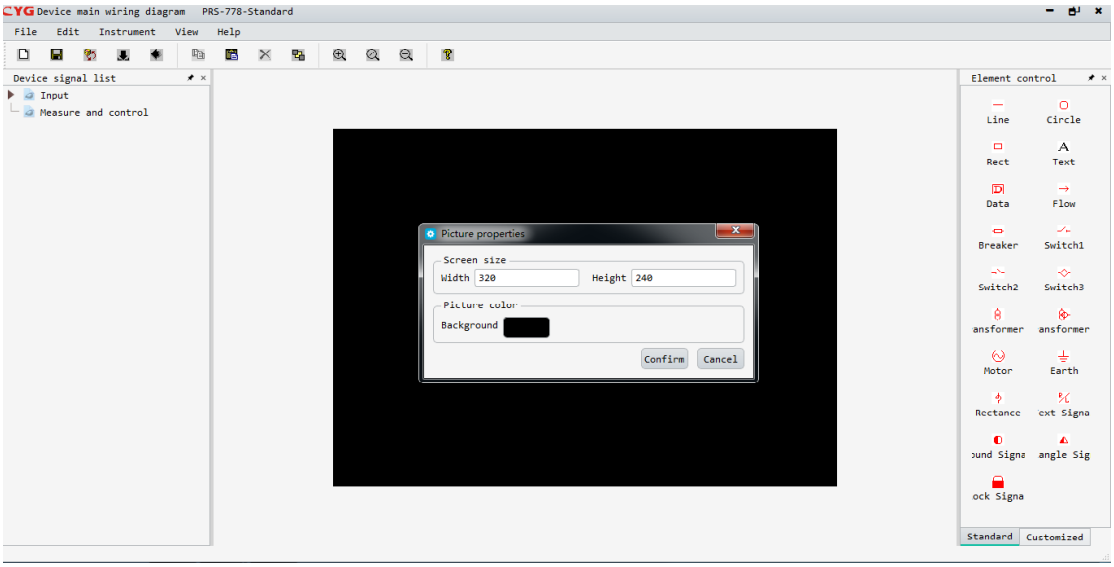


Figure 4.13.11 Diagram of Modify the Image Properties Step 2

4.13.4.2 Draw primitives

Drag and drop the basic graphic elements of the “Element” sidebar to the main wiring diagram to draw a basic graphic element. The configurator can click to select the element and adjust the size of the element by dragging and dropping the edge of the element. A basic pixel size adjustment is completed. The configuration personnel can create a same-size element by copying and pasting Right click to choose the “Drawing property” within the scope of the main wiring scope.

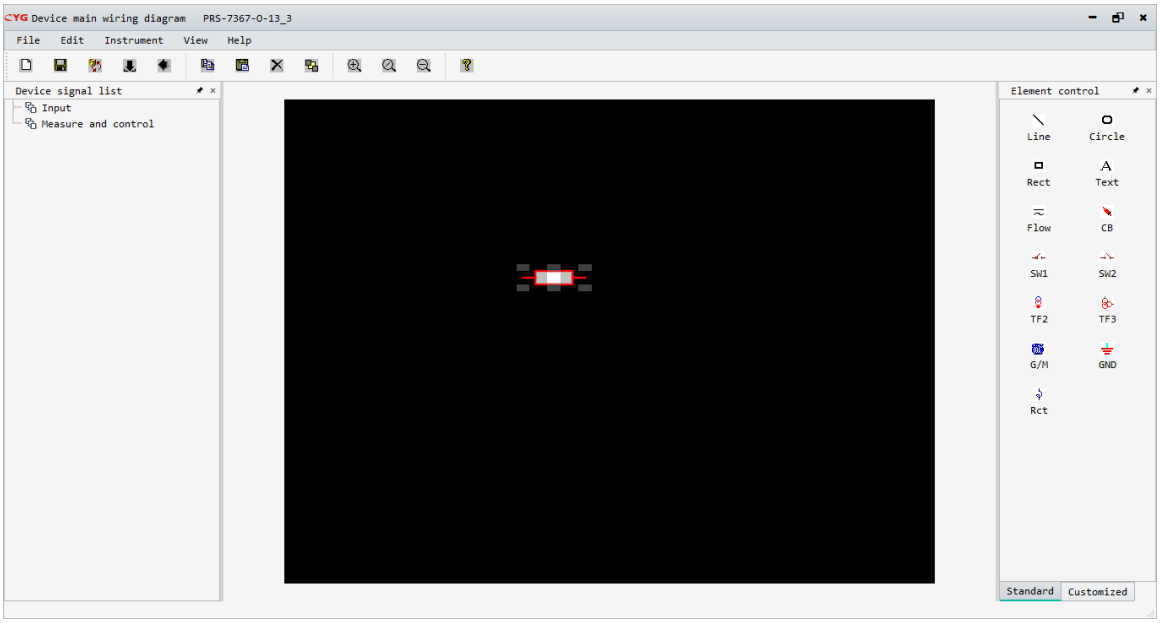


Figure 4.13.12 Drawing primitives

4.13.4.3 Element Property Settings

Move the mouse over the graphic element and right-click "Element Property" to pop up its current property settings.

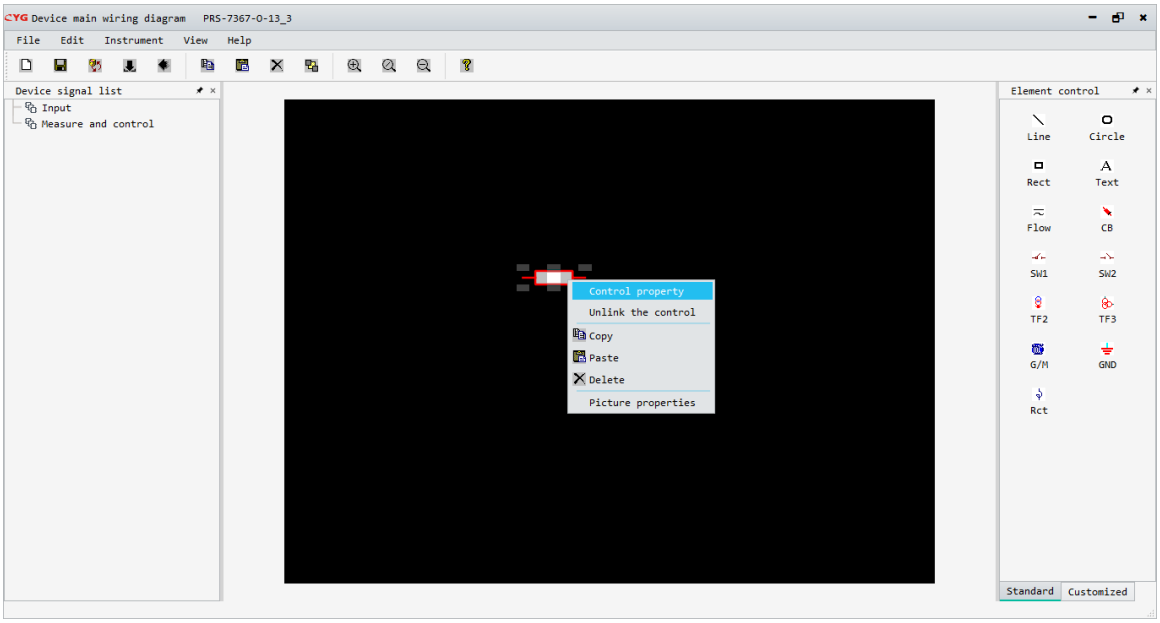


Figure 4.13.13 Setting of Element Property Step 1

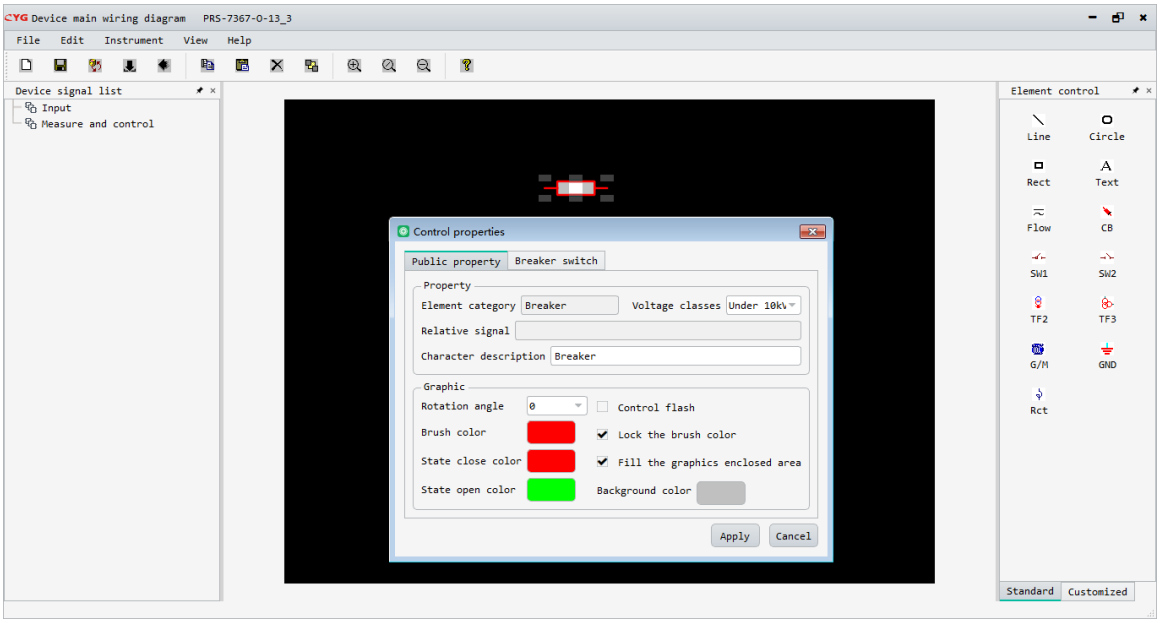


Figure 4.13.14 Setting of Element Property Step 2

4.13.5 Pixel Control Signal Settings

There are two operation modes for signal connection of the graphic control of the switch and circuit breaker.

1. Drag and drop the required signal item from the sidebar of the “Device Signal List” to the graph element of the main wiring diagram to complete the connection of the specific signal. The BI signal corresponds to the close state signal and the open state signal of the picture element, and the measurement and control signal corresponds to the close control signal of the picture element. Only the close state signal and the close control signal can be connected to the picture element by dragging and dropping the signal item from the “device signal list”. The open status signal must be selected through the "Control Properties" dialog box.
2. Right click the "Control Properties" on the graph element and click on "Breaker" to configure each type of signal at the bottom. Finally, click Apply to complete the configuration.

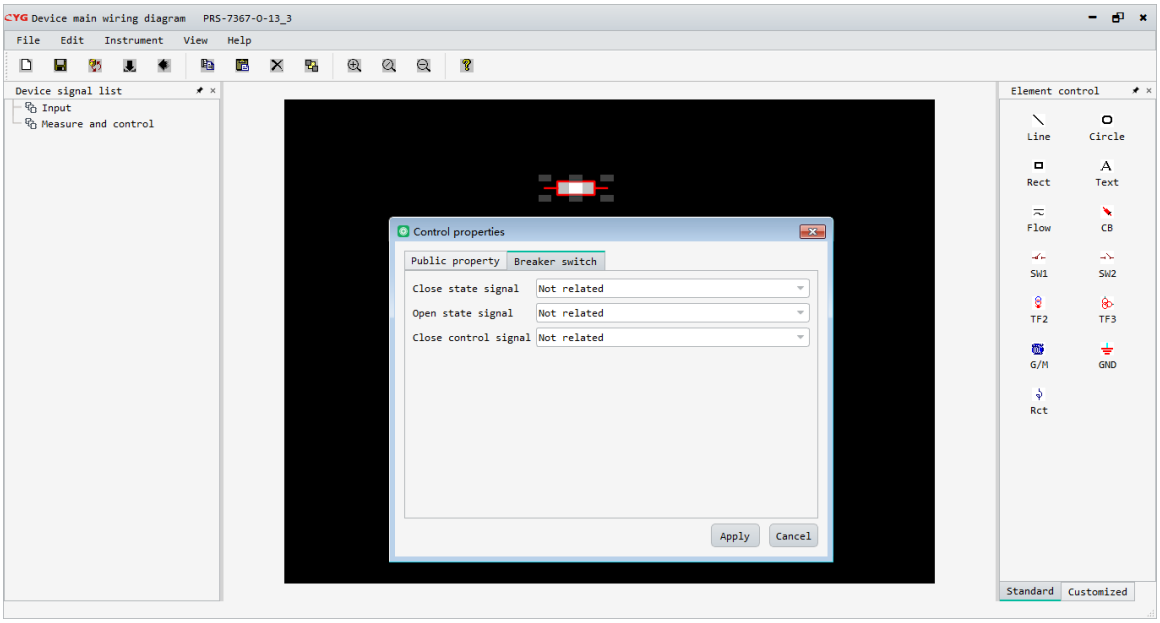


Figure 4.13.15 Control Properties

5 Online Tool Introduction

5.1 Overview

The test tool is based on communication, and it is able to obtain real-time data in IED, including primarily Device information, Wave, SOE, Analog, Input, State and Alm. It will facilitate engineers or customers to test equipment and troubleshoot.

5.2 Software operation

After connecting the target IED. Click the menu of “Online Testing” (or toolbar ), and the device test window can be opened.

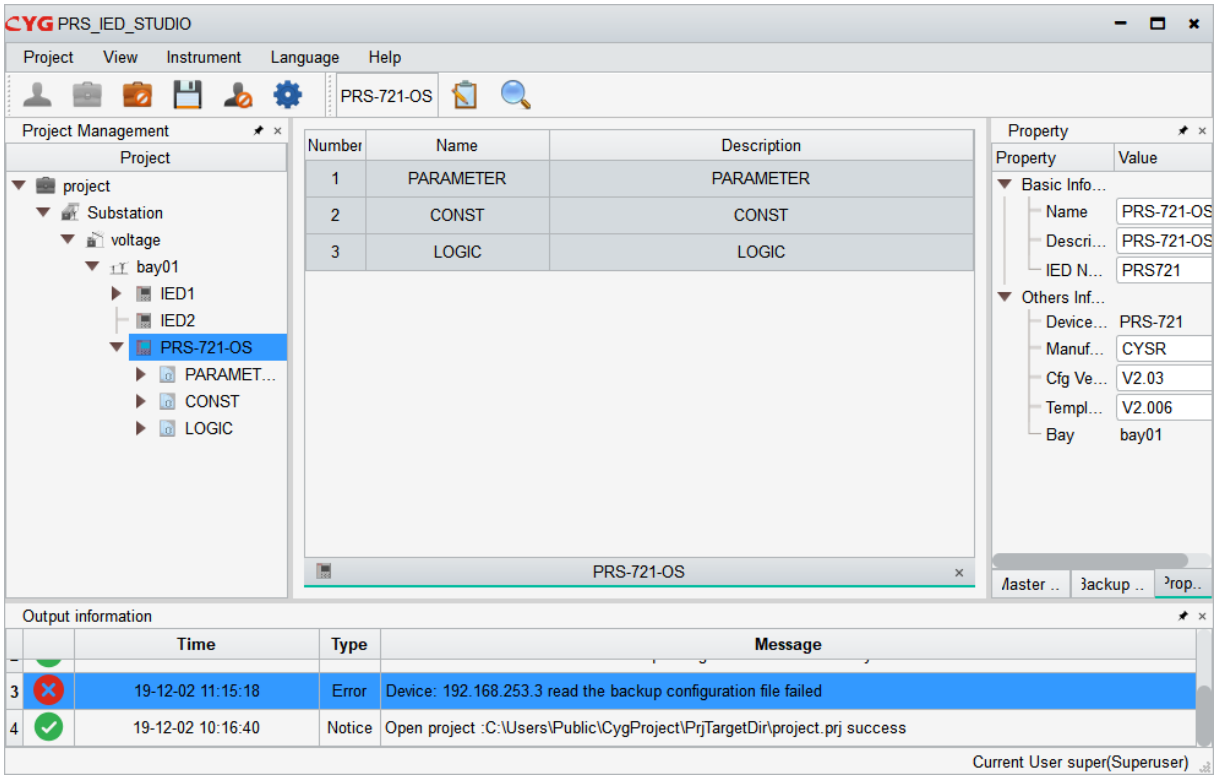


Figure 5.2.1 Start Online Testing

5.3 Function introduction

5.3.1 Main interface

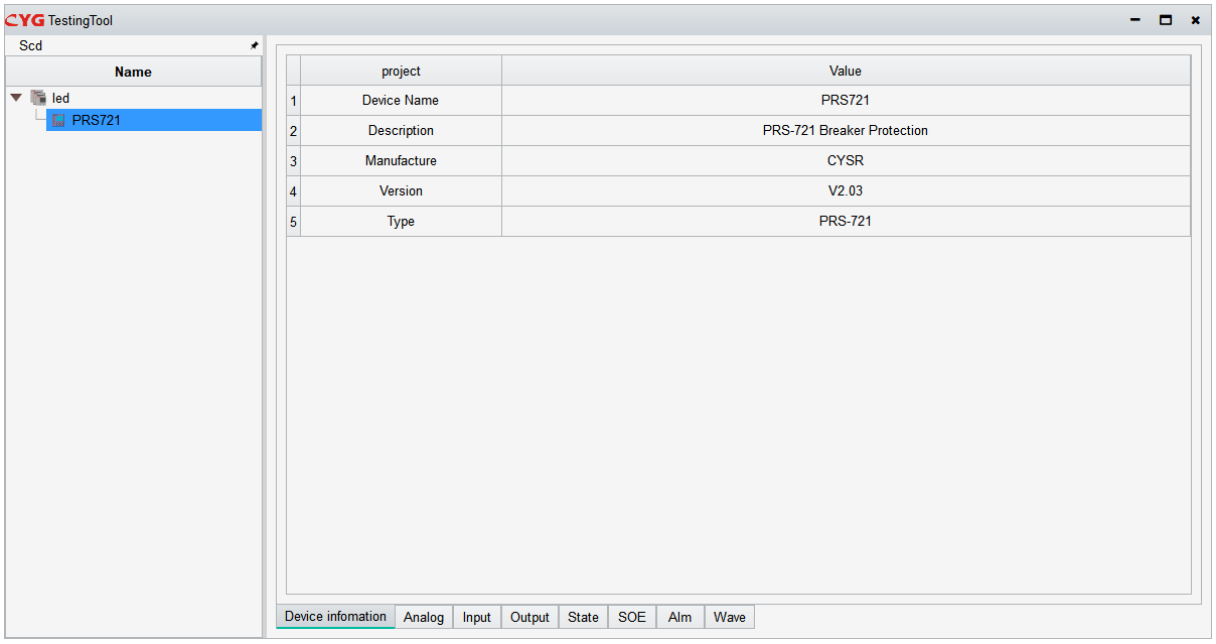


Figure 5.3.1 Main interface display

The device tree is on the left side and the corresponding information display is on the right side. There are respectively device information, Analog, Input, Output, State, SOE, Alm events and Wave Records.

5.3.2 Device information

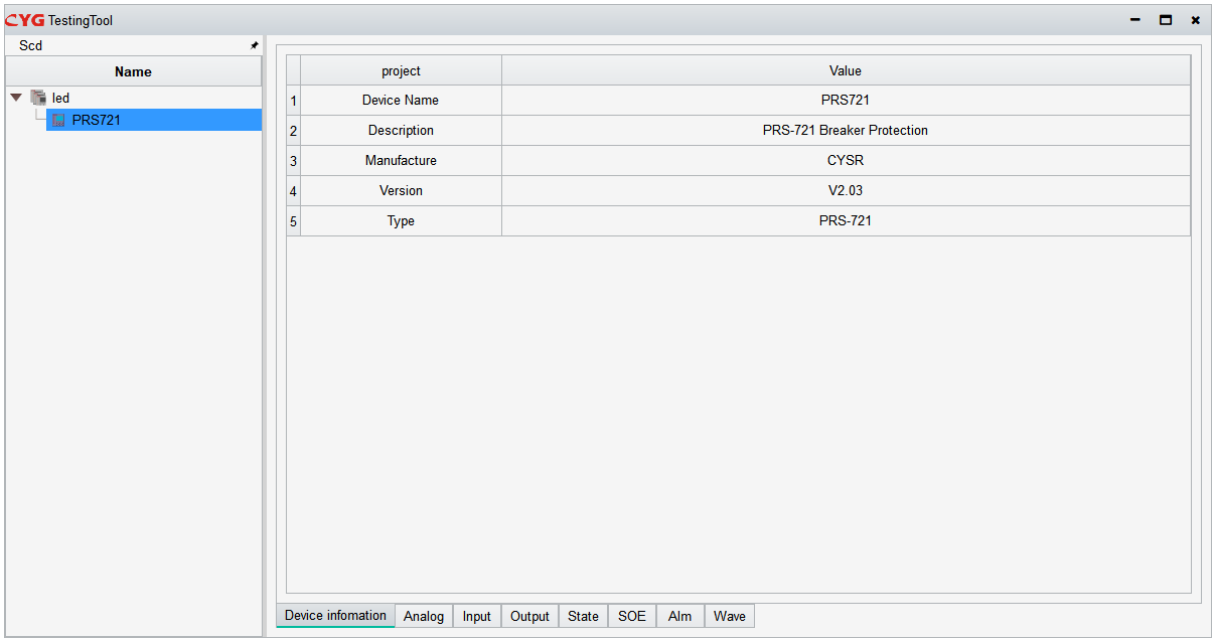


Figure 5.3.2 Device information display

Device information consists of the following items:

- Device name
- Description
- Manufacturer
- Version
- Type

5.3.3 Analog

Analog menu automatically reads the AC quantity sent from the protection device, and primarily displays name, value and vector.

Two menus are available for manual operation, i.e. update time and vector graph.

- Update time: set the update time interval time of automatic reading device analog quantity. The default time is 2000ms, and it can be manually modified as required, ranging from 1s-3600s.

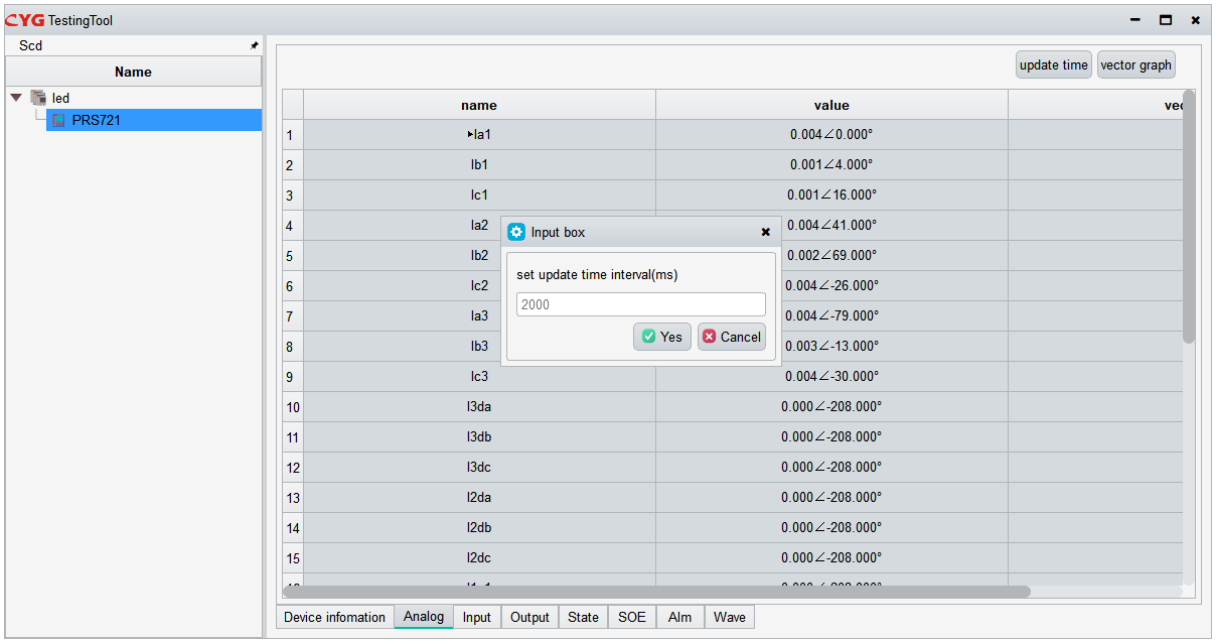
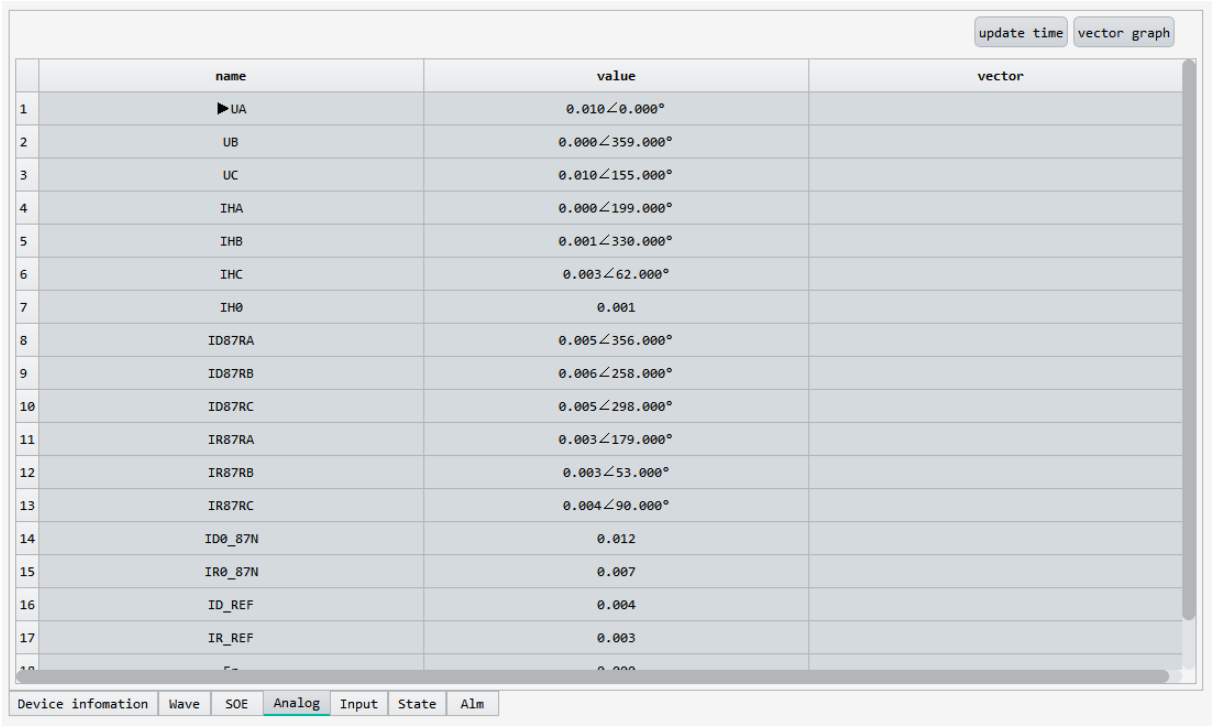


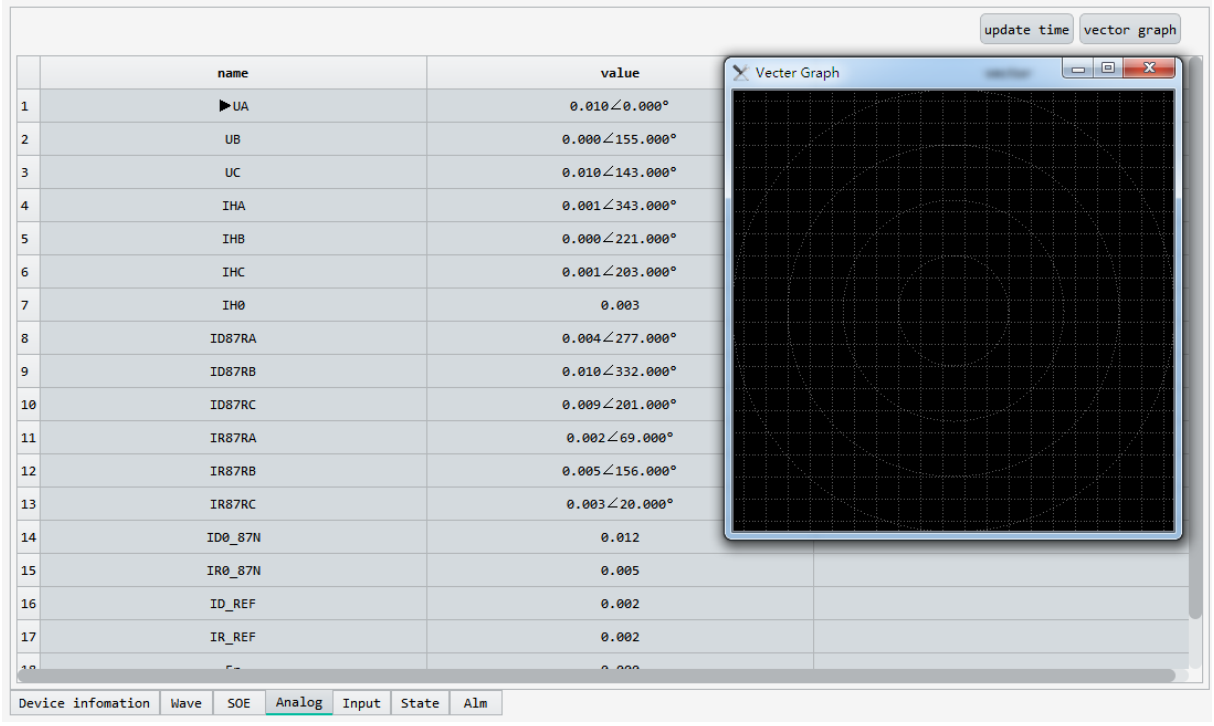
Figure 5.3.3 Update Analog Refresh Time display

- Vector graph: The corresponding vector graph is generated according to the analog quantity sent from the device.



	name	value	vector
1	▶UA	0.010∠0.000°	
2	UB	0.000∠359.000°	
3	UC	0.010∠155.000°	
4	IHA	0.000∠199.000°	
5	IHB	0.001∠330.000°	
6	IHC	0.003∠62.000°	
7	IH0	0.001	
8	ID87RA	0.005∠356.000°	
9	ID87RB	0.006∠258.000°	
10	ID87RC	0.005∠298.000°	
11	IR87RA	0.003∠179.000°	
12	IR87RB	0.003∠53.000°	
13	IR87RC	0.004∠90.000°	
14	ID0_87N	0.012	
15	IR0_87N	0.007	
16	ID_REF	0.004	
17	IR_REF	0.003	

Figure 5.3.4 Vector Graph display 1



	name	value
1	▶UA	0.010∠0.000°
2	UB	0.000∠155.000°
3	UC	0.010∠143.000°
4	IHA	0.001∠343.000°
5	IHB	0.000∠221.000°
6	IHC	0.001∠203.000°
7	IH0	0.003
8	ID87RA	0.004∠277.000°
9	ID87RB	0.010∠332.000°
10	ID87RC	0.009∠201.000°
11	IR87RA	0.002∠69.000°
12	IR87RB	0.005∠156.000°
13	IR87RC	0.003∠20.000°
14	ID0_87N	0.012
15	IR0_87N	0.005
16	ID_REF	0.002
17	IR_REF	0.002

Figure 5.3.5 Vector Graph display 2

5.3.4 Input

Input menu can read the input position sent by the device, and primarily displays name and input.

Only the “update time” menu is available for operation.

- Update time: Set the update time interval of automatically reading device input. The default time is 2000ms, and it can be manually modified as required, ranging from 1s-3600s.

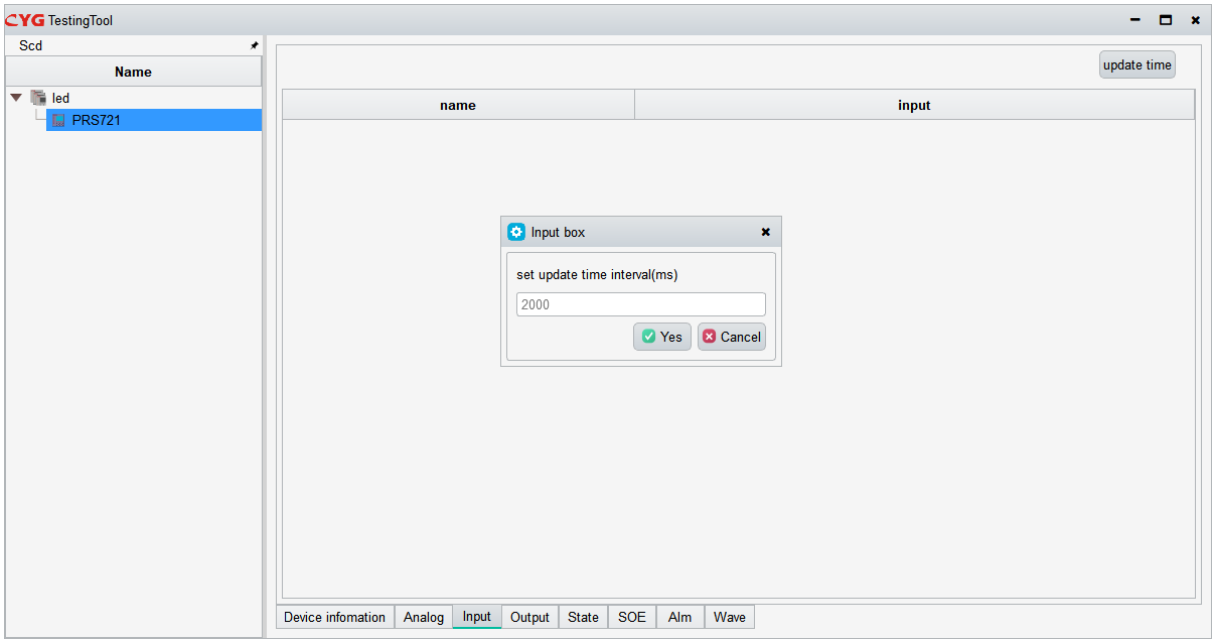


Figure 5.3.1 Update Input Refresh Time display

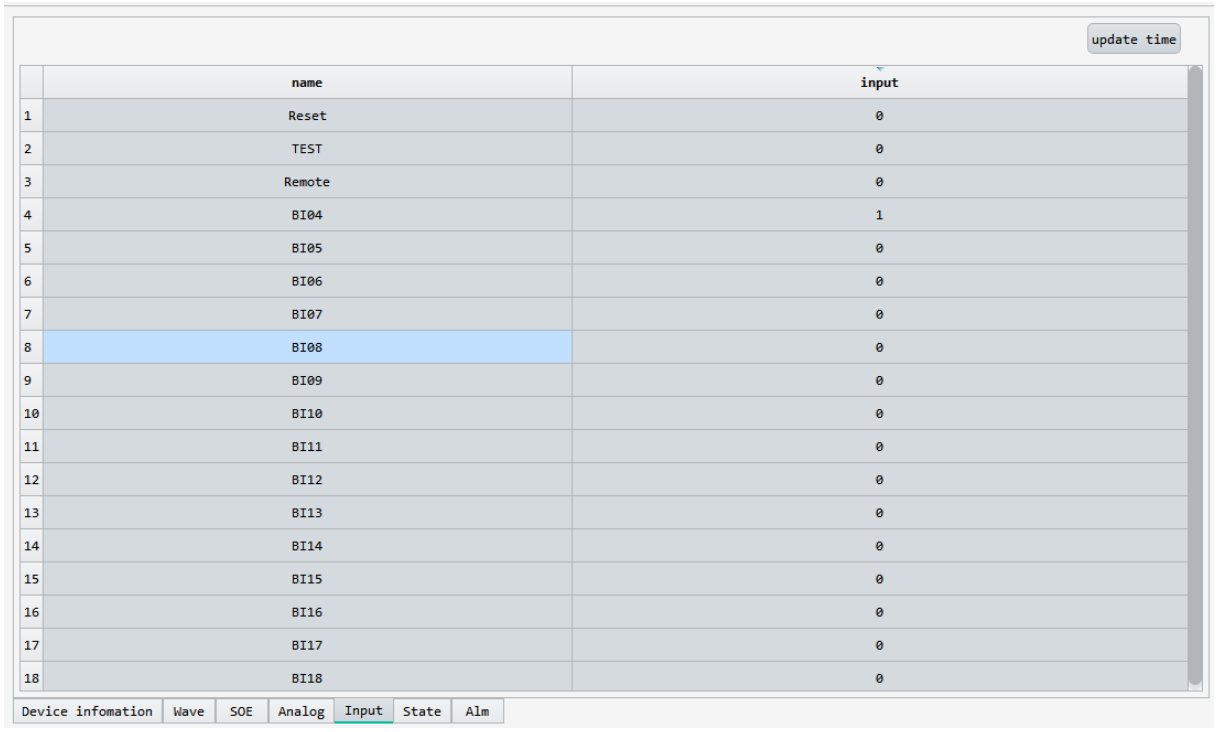


Figure 5.3.7 Input display

5.3.5 Output

Output menu can read the input position sent by the device, and primarily displays name and Output.

Only the “update time” menu is available for operation.

- Update time: Set the update time interval of automatically reading device Output. The default time is 2000ms, and it can be manually modified as required, ranging from 1s-3600s.

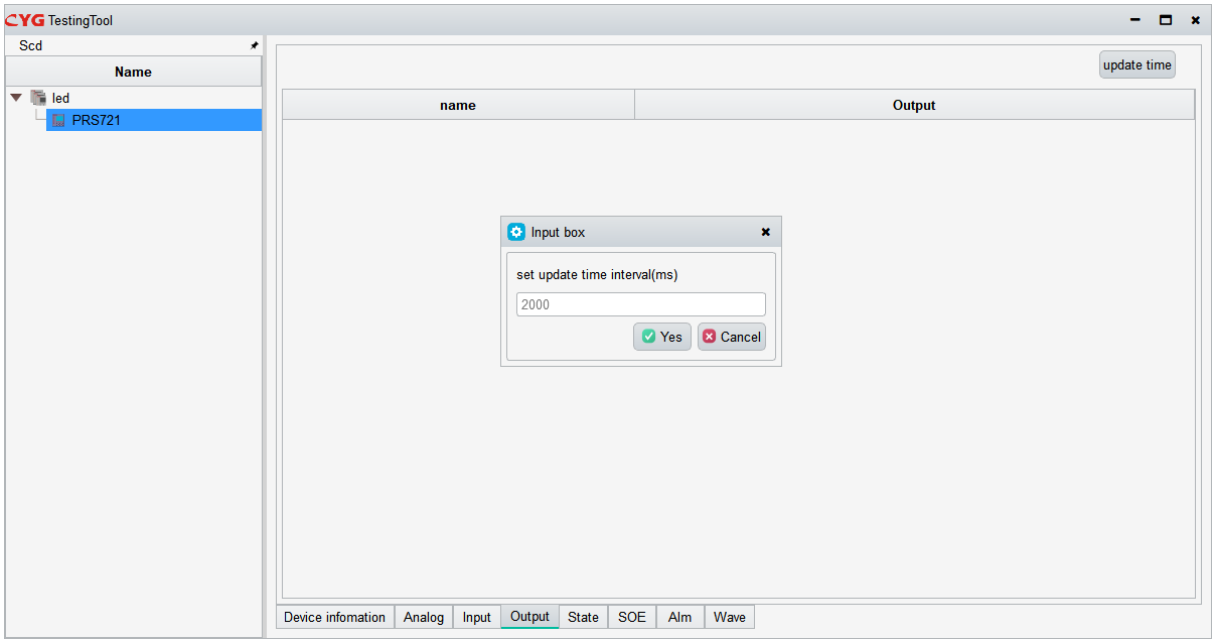


Figure 5.3.8 Update Output Refresh Time display

5.3.6 State

State menu can read the protection action and Alm sent by the device, and State displays primarily name and state.

Only the “update time” menu is available for operation.

- Update time: set the update time interval of automatically reading device states. The default time is 2000ms, and it can be manually modified as required, ranging from 1s-3600s.

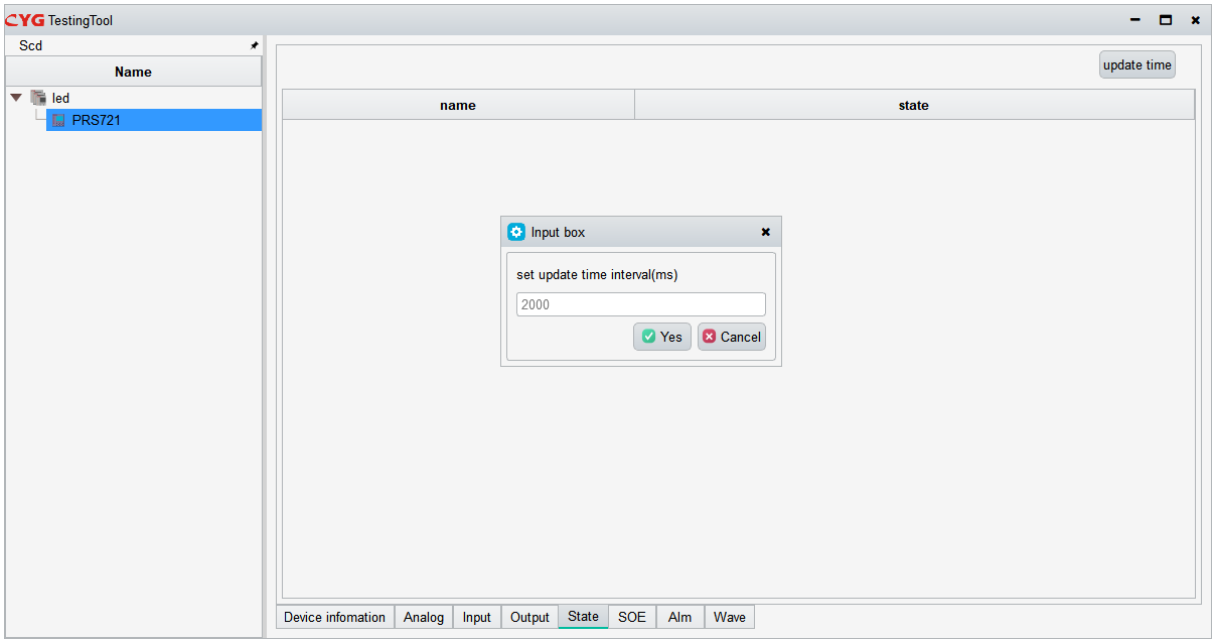


Figure 5.3.9 Update State Refresh Time display

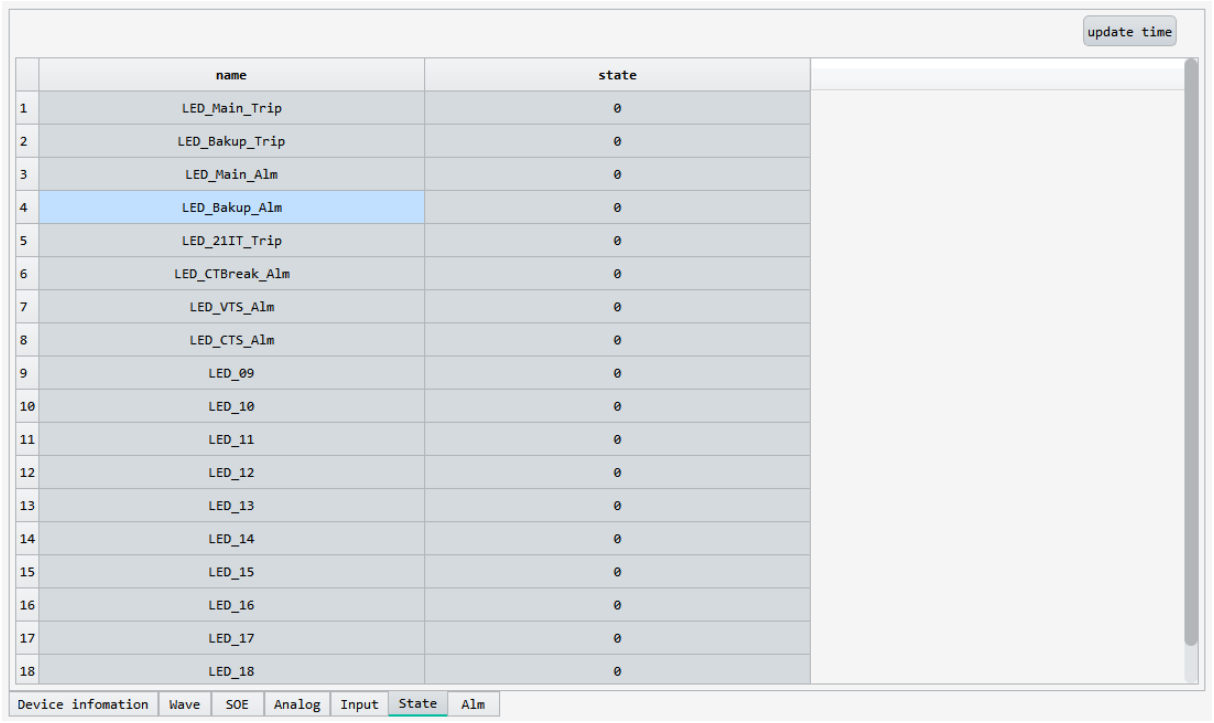


Figure 5.3.10 State display

5.3.7 SOE

SOE menu can read the start and action records of the device, including primarily time, type, name, action, measure value and fault number.

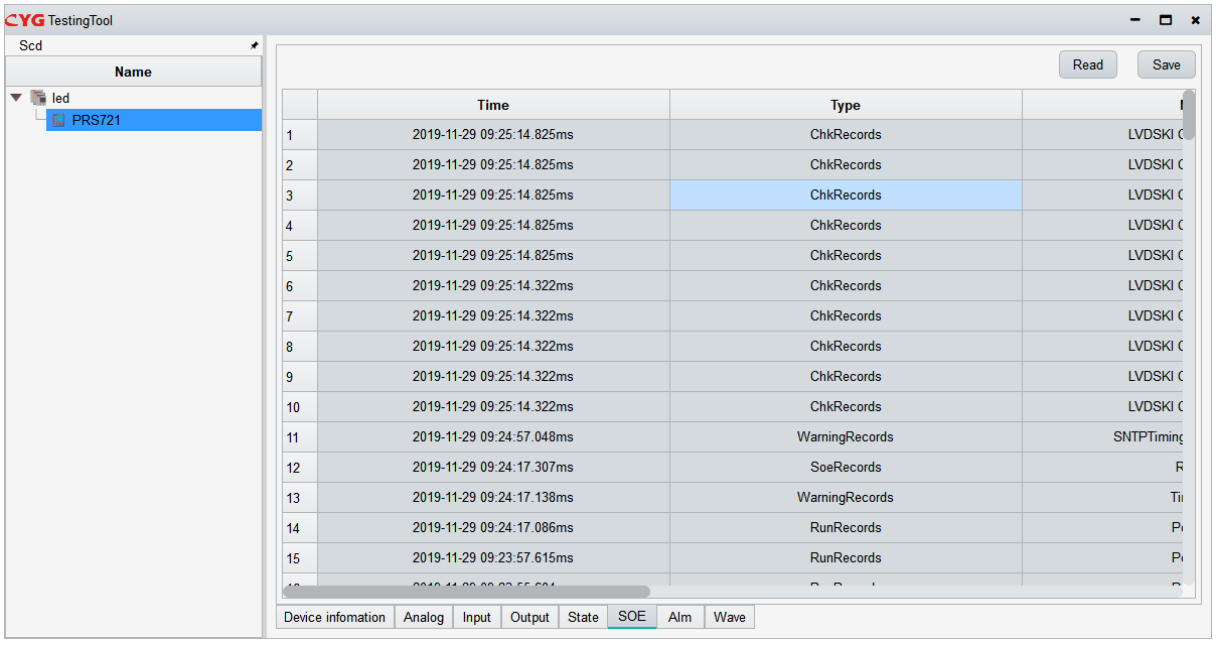


Figure 5.3.11 Read SOE display

Two menus are available for manual operation, i.e. read and save.

- Read: Manually read all event records of the device.
- Save: Manually save all events read, manually select the save path, save it and an xlsx file will be generated then.

5.3.8 Alm

Alm menu can read the abnormal alarm sent by the device, and primarily displays name and state.

Only “update time” menu is available for operation.

- Update time: set update time interval of automatically reading the alarm of the device. The default time is 2000ms, and it can be manually modified according as required, ranging from 1s-3600s.

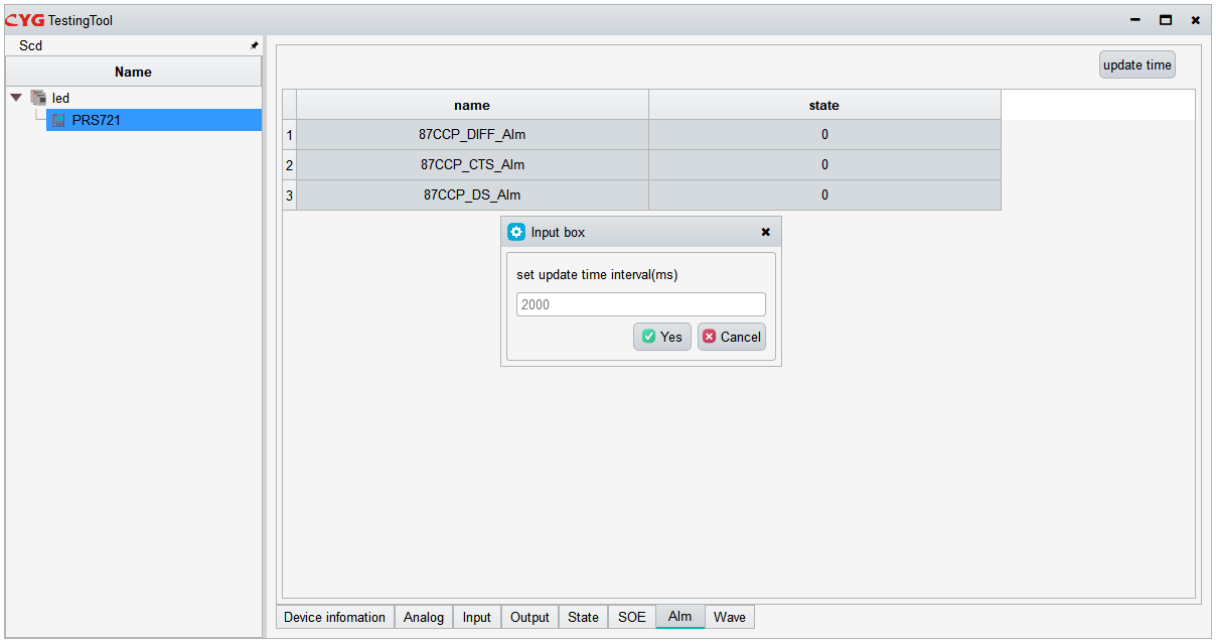


Figure 5.3.12 Update Alm Refresh Time display

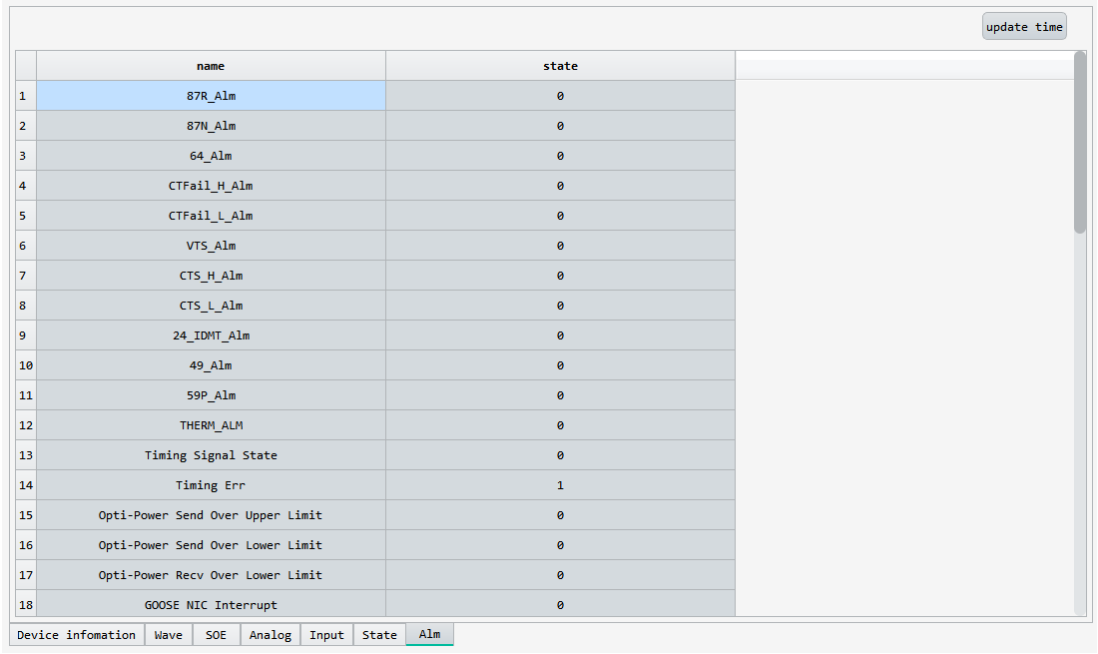


Figure 5.3.13 Alm display

5.3.9 Disturbance Operation

Wave menu can read and view all wave record files of the device, and primarily displays three items, i.e. the file name, the file size and the last revision.

Three menus are available for manual operation: i.e. Modify wave path, Read all wave records, and Update wave list.

- Modify wave path: Click “Modify wave path” to pop up the input box of wave record file path. The default path is waverec folder, which can be modified as needed.

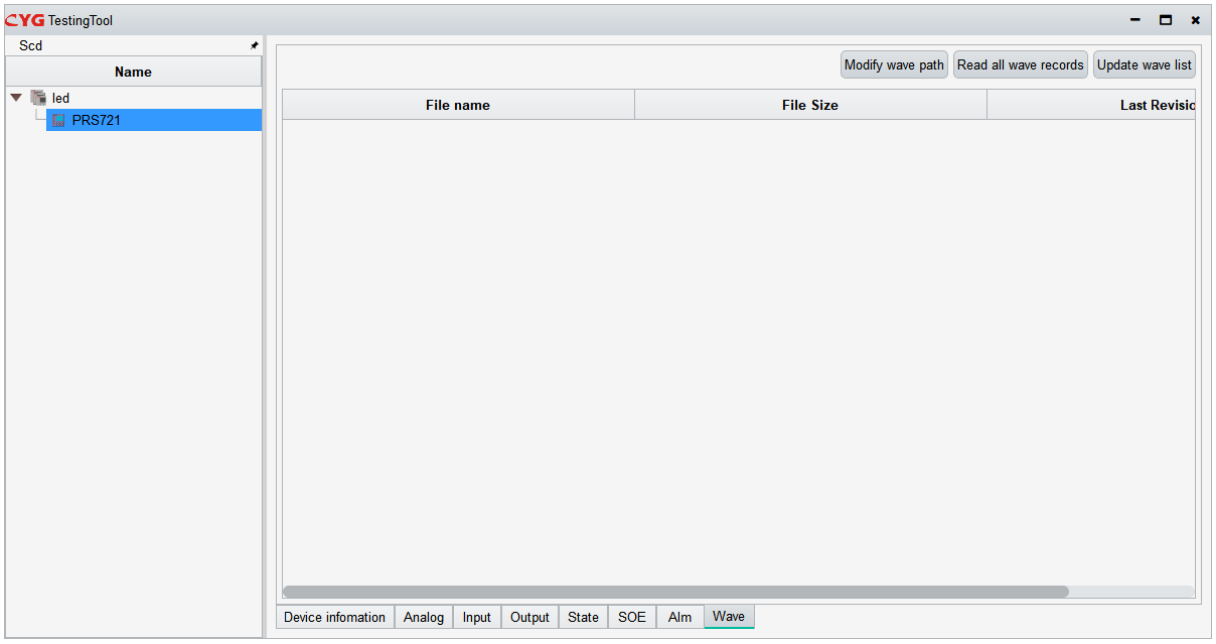


Figure 5.3.14 Modify Wave Path

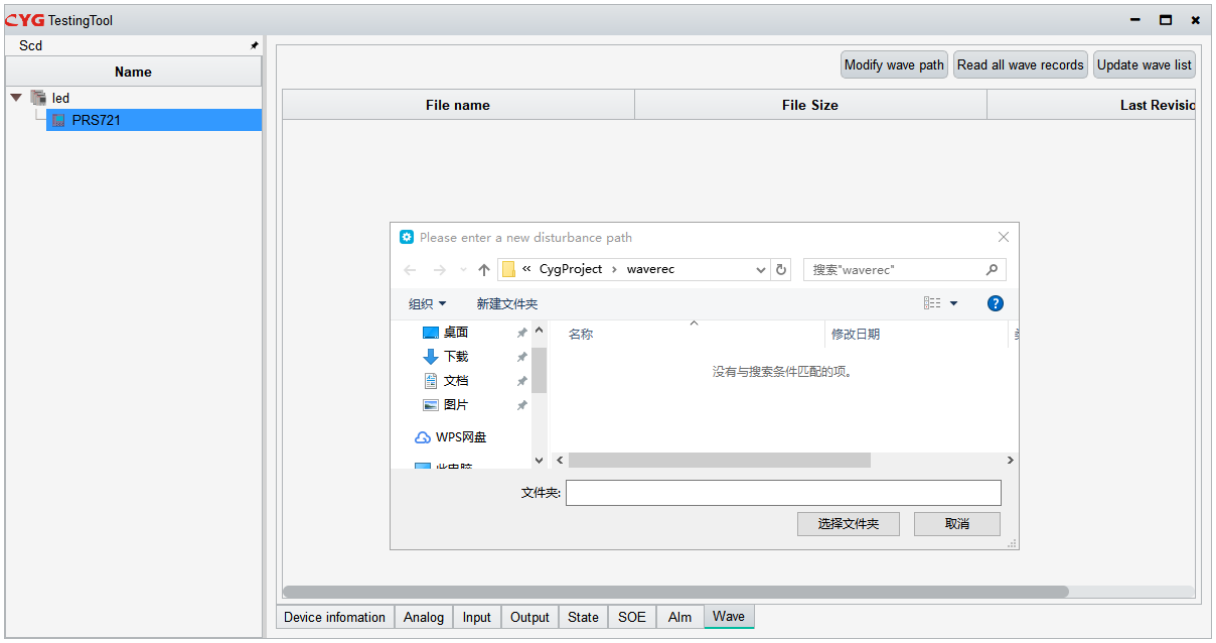


Figure 5.3.2 Wave path

- Update wave list: After reading the record list of the device, you can double-click the wave record file you need to view separately.

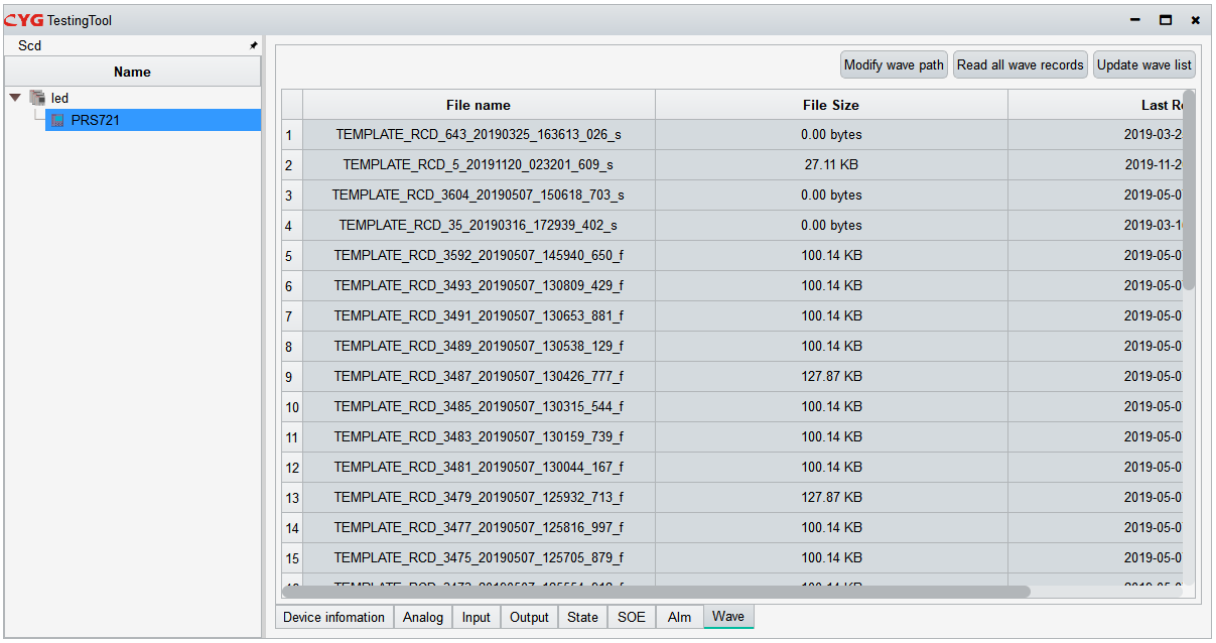


Figure 5.3.3 Update Wave List

- Read all wave records: After updating the wave list, click “Read all wave records”, and all wave records will be automatically saved under the set path.Or double-click on the list item to read the disturbance file to the local, then automatically open the disturbance analysis tool to display the disturbance information, which is shown as below:

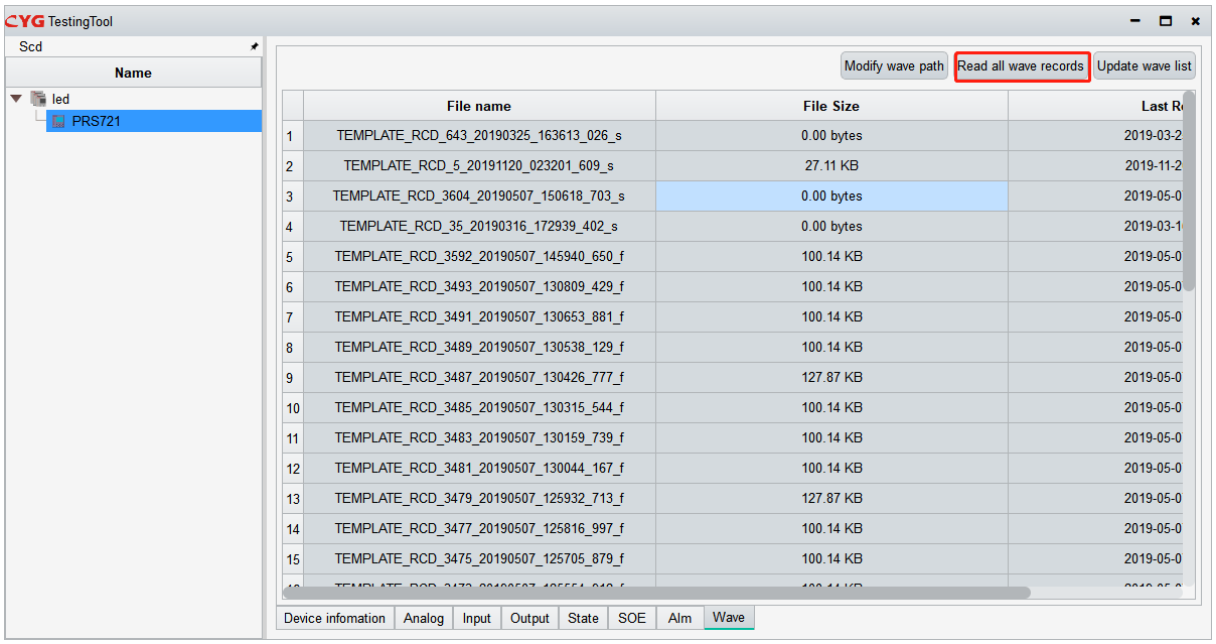


Figure 5.3.4 Read All Wave Records

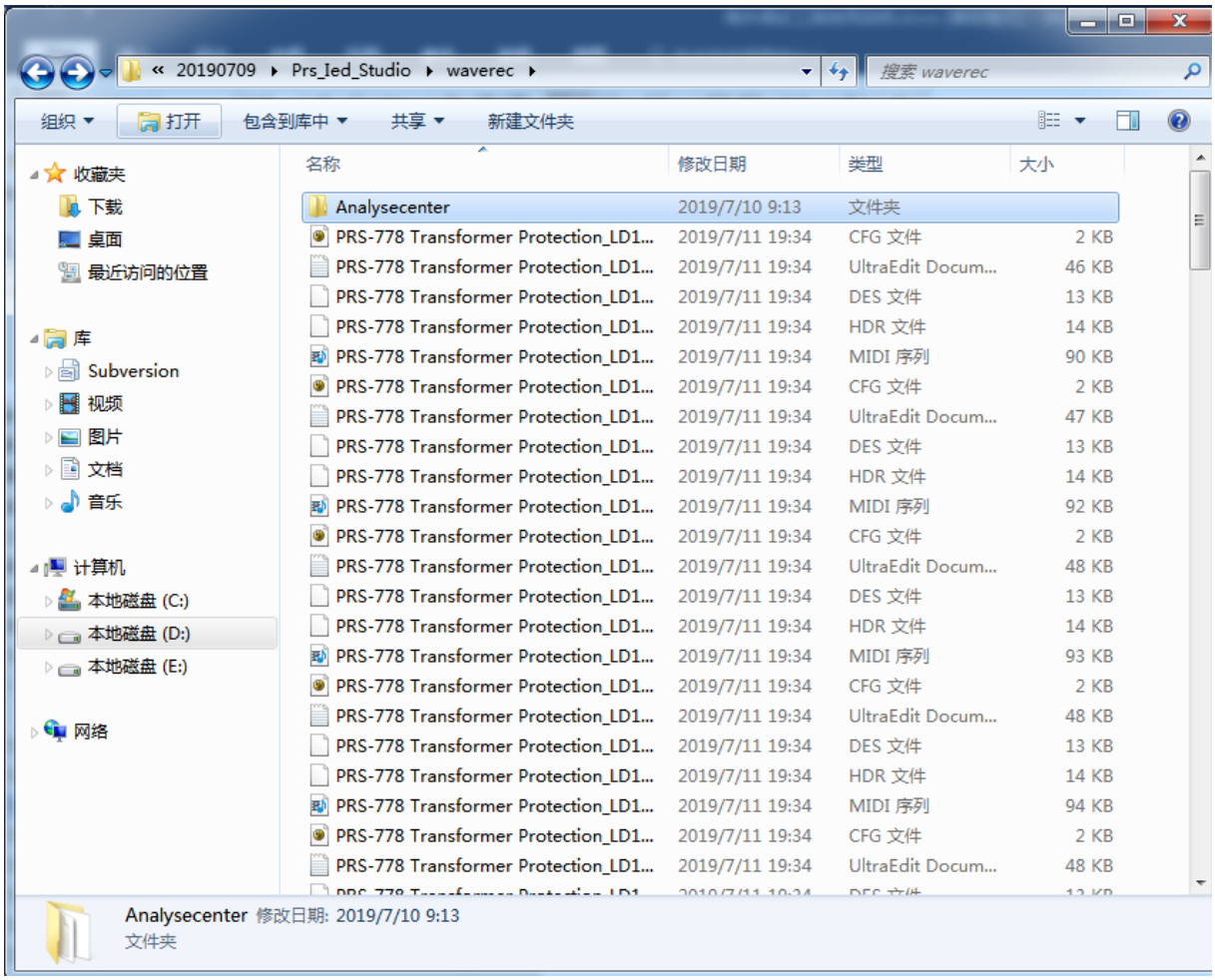
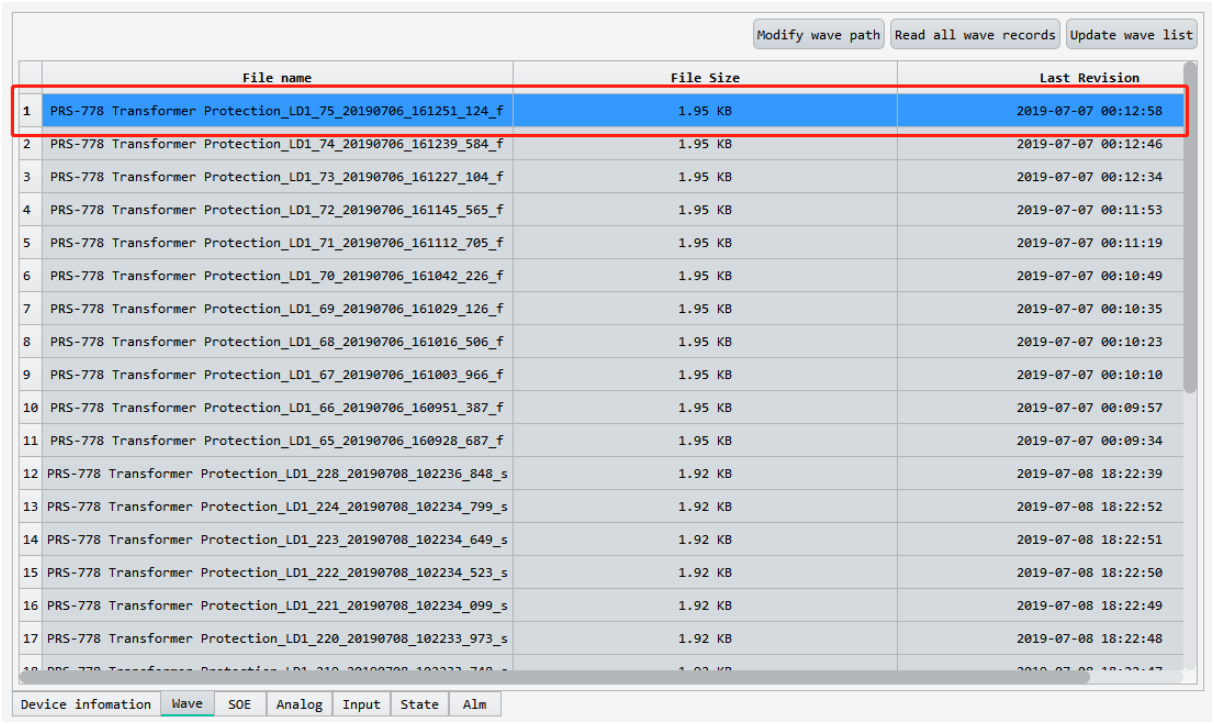


Figure 5.3.5 Local Wave Path

- View the wave record file:

Double-click any item in the wave record list to open the wave record viewing tool and view the recorded content.



	File name	File Size	Last Revision
1	PRS-778 Transformer Protection_LD1_75_20190706_161251_124_f	1.95 KB	2019-07-07 00:12:58
2	PRS-778 Transformer Protection_LD1_74_20190706_161239_584_f	1.95 KB	2019-07-07 00:12:46
3	PRS-778 Transformer Protection_LD1_73_20190706_161227_104_f	1.95 KB	2019-07-07 00:12:34
4	PRS-778 Transformer Protection_LD1_72_20190706_161145_565_f	1.95 KB	2019-07-07 00:11:53
5	PRS-778 Transformer Protection_LD1_71_20190706_161112_705_f	1.95 KB	2019-07-07 00:11:19
6	PRS-778 Transformer Protection_LD1_70_20190706_161042_226_f	1.95 KB	2019-07-07 00:10:49
7	PRS-778 Transformer Protection_LD1_69_20190706_161029_126_f	1.95 KB	2019-07-07 00:10:35
8	PRS-778 Transformer Protection_LD1_68_20190706_161016_506_f	1.95 KB	2019-07-07 00:10:23
9	PRS-778 Transformer Protection_LD1_67_20190706_161003_966_f	1.95 KB	2019-07-07 00:10:10
10	PRS-778 Transformer Protection_LD1_66_20190706_160951_387_f	1.95 KB	2019-07-07 00:09:57
11	PRS-778 Transformer Protection_LD1_65_20190706_160928_687_f	1.95 KB	2019-07-07 00:09:34
12	PRS-778 Transformer Protection_LD1_228_20190708_102236_848_s	1.92 KB	2019-07-08 18:22:39
13	PRS-778 Transformer Protection_LD1_224_20190708_102234_799_s	1.92 KB	2019-07-08 18:22:52
14	PRS-778 Transformer Protection_LD1_223_20190708_102234_649_s	1.92 KB	2019-07-08 18:22:51
15	PRS-778 Transformer Protection_LD1_222_20190708_102234_523_s	1.92 KB	2019-07-08 18:22:50
16	PRS-778 Transformer Protection_LD1_221_20190708_102234_099_s	1.92 KB	2019-07-08 18:22:49
17	PRS-778 Transformer Protection_LD1_220_20190708_102233_973_s	1.92 KB	2019-07-08 18:22:48

Figure 5.3.6 View The Wave Record File

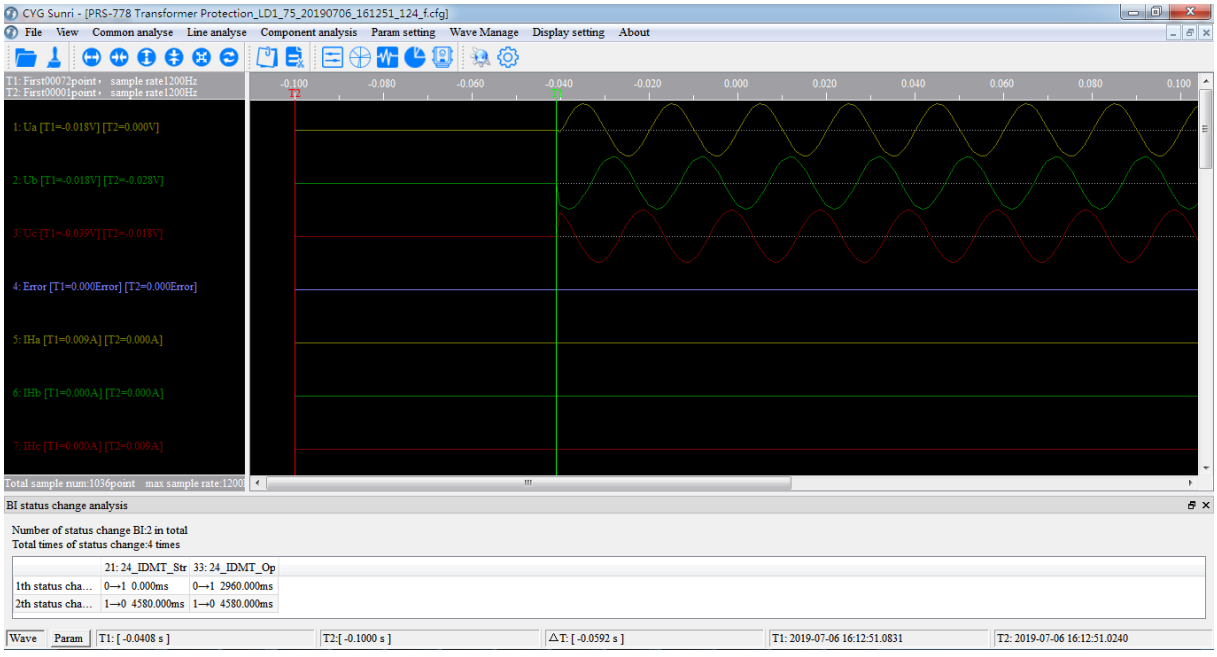


Figure 5.3.20 Wave Record

6 Manual Version History

In the current version of the instruction manual, several descriptions on existing features have been modified.

Table 5.3.1 Manual version and modification history records

Manual Version		Software Version	Date	Description of change
Source	New			
Beta	1.00	1.00	2014-04-15	Form the original manual.
1.00	1.01	1.01	2015-05-21	Update the number of the binary inputs and binary outputs.. Add the binary input hardware demo diagrams in the binary input tables. Update the description of IEC61850 dual-MMS Ethernet.
1.01	1.02	1.02	2016-01-24	Add parameters of fault location function. Output TEMP_RL is added Internal improvements. Update the configurable signals.
1.02	1.03	1.10	2016-08-16	Update the communication description. Update the mechanical specifications. Update the main CPU module picture. Update the setting list.
1.04	1.05	1.2	2019-08-10	Update the configuration tool description. Update the online tool specifications.
1.05	1.06	1.3	2024-03-09	Update the interface layout and addition of the compare function module