SUPCON

OMC

Integrity Component

User Manual

ZHEJIANG SUPCON TECHNOLOGY CO., LTD.

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Symbol Definition	
	WARNING: Indicates information that a potentially hazardous situation which, if not avoided, could result in serious injury or death.
	RISK OF ELECTRICAL SHOCK: Indicates information that Potential shock hazard where HAZARDOUS LIVE voltages greater than 30V RMS, 42.4V peak, or 60V DC may be accessible.
	ESD HAZARD: Indicates information that Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user.

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Integrity

Section 1 About This Manual

This manual introduces the functions of Integrity component and how to use it. For the typical network topology, please refer to "System Structure". For introduction of license, please refer to "Licenses". Because of the different characteristics of different control systems, please read "Application Process" first before use.

Section 2 Terms

Term	Abbreviation	Meaning
Information Technology	IT	—
Operation Technology	OT	—
Distributed Control System	DCS	Based on microprocessor, it is the new instrument control system which applies distributed control functions, concentrated operation display and combination of independent operation and comprehensive coordination. Its basic characteristics are concentrated management and distributed control.
Safety Instrumented System	SIS	Safety instrumented system, also called safety interlock system, is the alarm and interlock parts of plant control system. Implementing alarm action or adjustment or shutdown control for test results of the control system, it is an important part of automatic control.
Coordination Control System	CCS	It is the ensemble of turbine and boiler closed-loop control system, and includes various subsystems. It sends commands to automatic control system of boiler and turbine simultaneously to quickly respond to the load change, as far as possible to maximize the frequency modulation and peak modulation capacity of unit, and to ensure the stability of parameters during operation.
Programmable Logic Controller	PLC	Programmable logic controller is an electronic device for number operations designed for industrial production. It applies a programmable memorizer for its internal memory program, to run user-oriented commands like logic operation, order control, timing, counting and arithmetic operations, etc. And it controls various kinds of machines or production process through digital or analog input/output. It is the core part of industrial control system.
Integrity	—	It refers to configuration properties check related to OT asset of all control systems in a unit, including check items like control logic integrity, configuration defects and so on.
Asset	—	As the component in the running process of control system, it includes all the hardware modules (such as controller, communication module, I/O module) and control system configuration (such as function block, tag, graphics, trend).

Section 3 Overview

As connectivity between operational technology (OT) systems and information technology (IT) systems grows, so do the risks associated with their openness. Malicious control, accidental modifications of configuration program logic, and illegal operations can all cause serious safety accidents that put plants at risk. And in a complex production environment with multiple control systems dispersed throughout the plant, it can be challenging for engineers and managers to monitor the status of each part, making maintenance and fault diagnosis cumbersome.

By digitizing and establishing processes for managing OT assets, OMC Integrity component (refer as Integrity below) allows you to dynamically manage profiles and uniformly monitor control systems. With this powerful component, you can quickly detect asset operational risks, configuration defects, and any illegal configuration changes. This means you can identify issues and prevent OT risks promptly and effectively, all while keeping the plant safe and secure.

3.1 Functions and Features

- Control system asset management

  Generates statistics of OT assets like controller, module and control logic of the control system.

- Signal flow data tracing

  It supports tracing the direction of data signals, including the signal and logic paths from the field instruments to the control system (including between control stations) and between control systems.

- Meterloop checking

  It supports checking the control loops of the field instruments to form a complete signal flow diagram from the field instruments to the system logic programming design, and form a logic tree of direct and indirect relationships.

- Baseline audit tracing

  It supports online auditing of configuration data changes, and forming version baselines and record changes.

- Loop hidden risk identification

  It supports identifying typical hidden risk of loops with custom rules to improve control system accuracy and efficiency.

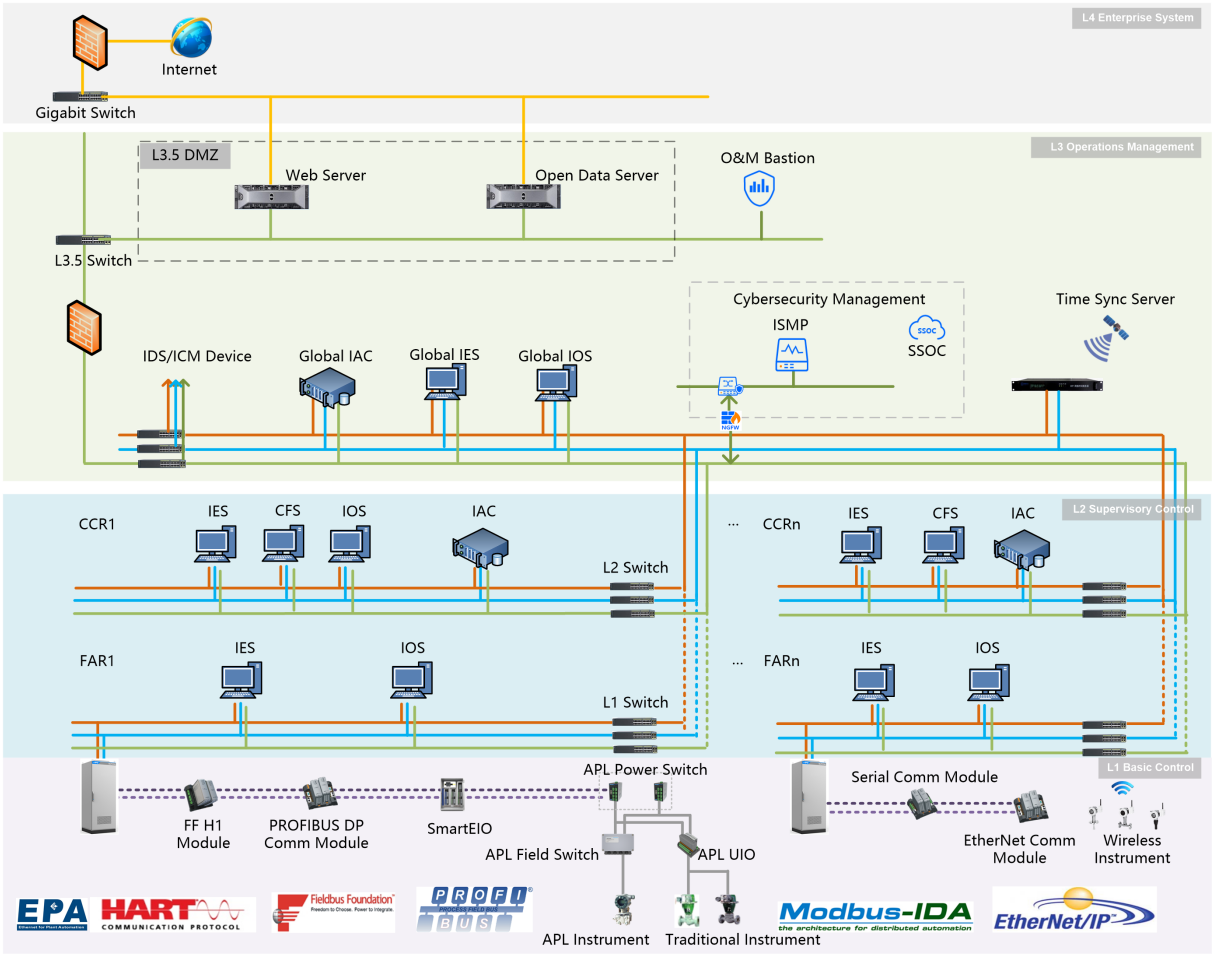
- Configuration defects detection

  You can customize the built-in rules to quickly identify the defects in the configuration, thus ensuring the correctness of the configuration and preventing risks.

3.2 System Structure

Integrity is a supplementary component for control systems. The main devices and networks are shown in Figure 3-1.

- When the Integrity component only collects the data from the current configuration server (1 for 1), the server of Integrity component should be deployed in the IAC (Intelligent Application Center) of corresponding CCR.
- When the Integrity component collects data from several configuration servers, the server of Integrity component should be deployed in the Global IAC.



IES: Intelligent Engineer Station
IOS: Intelligent Operation Station
IAC: Intelligent Application Center
IDS: Intrusion Detective System
ICM: Industrial Cybersecurity Monitor
SSOC: SUPCON Security Operation Center
ISMP: Industrial Security Management Platform
CFS: Configuration Server

Figure 3-1 System structure diagram

3.3 Licenses

With different types of licenses, you can access different functions of Integrity, and the description of licenses is shown in the table below. In Integrity, you can click in the upper right corner to open the window of authority, and view the version and current authority.

Table 3-1 Licenses of Integrity

Name	Scope	Description
Integrity-SYSCNT	Software basic functions, configuration audit function and control system projects number allowed (required)	1. With authority, basic functions are allowed to be used, including home page, signal flow diagram, hardware diagram, baseline management, configuration management, baseline audit, etc. 2. Without authority, only one project can be connected, basic functions are only allowed to be used for 2 hours, and information page will display the remaining time; the login account will be logged out after 2 hours, and the current user will be logged out. 3. The number of control systems allowed to connect is 3, 10, 20 or unlimited. The control system allowed to connect refers to the DCS (OMC system) and the SIS system (TCS-900 system, Tricon system) with OPC UA configuration data interface.
Integrity DEFECTS	Defects AUTH (optional)	1. With authority, configuration defects function will be enabled 2. Without authority, it is available for trial for only 2 hours. After 2 hours, it will become a non-authorized status, and the tab page in industrial control asset will no longer display data.
Integrity LOOP	Meterloop AUTH (optional)	1. With authority, meterloop function will be enabled. 2. Without authority, it is available for trial for 2 hours, but will turn to no authority status after 2 hours, and you can’t import file or operate on **Meterloop**, and the tab page in industrial control asset will no longer display data.

Section 4 Application Process

Integrity can connect data of OMC, TCS-900 or Tricon system. Viewing the different characteristics of different control systems, this manual takes OMC as an example to introduce the application process, the basic application process of Integrity is shown in Figure 4-1 and Table 4-1. For data difference of systems, please refer to "Appendix: Environment Requirements and Information of Systems".

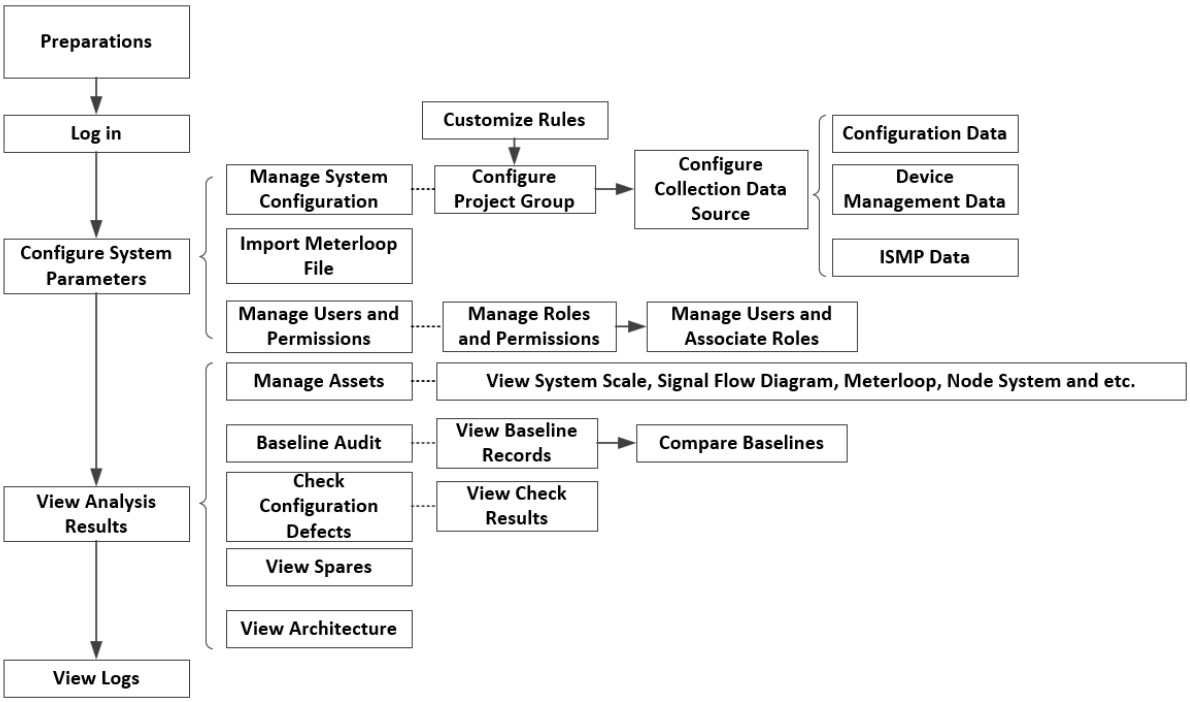


Figure 4-1 Configuration graphics

Table 4-1 Software configuration guide

To	You should	Go to	Refer to
Manage configuration items of Integrity	Configure project group	**Config > Project Group**	Project Groups
	Configure configuration data source	**Config > Data Collection > Configuration Data**	Configuration Data
	Configure device management data source	**Config > Data Collection > Device Management Data**	Device Management Data
	Configure security management platform data source	**Config > Data Collection > ISMP**	ISMP
	Import meterloop file	**Meterloop**	Importing Meterloop File

To	You should	Go to	Refer to
Manage asset of operating conditions	View system scale, signal flow diagram, meterloop diagram, node system information, etc.	**Asset**	Asset Management
Manage baseline	Understand default rules of configuration defects	–	Auditing Rule
	Set custom rules	**Config > Rule Config > Configuration Auditing**	Configuration Auditing
	View baseline record	**Change**	Viewing Audit Records
	Compare configuration difference between baselines through baseline audit	**Change > Compare**	Viewing Audit Records
Check configuration defects	Customize defects judging rules	**Config > Rule Config > Configuration Custom Loops**	Configuration Custom Loops and Rules
	Configure list of configuration defects rules	**Config > Rule Config > Configuration Defects**	Configuration
	View the defects analysis result	**Configuration Defects**	Defects
View spares	View the usage and redundant status of module, channel and tag, etc.	**Spares**	Spares
View hardware structure diagram	Understand Hardware hierarchical relationship of project configuration	**Architecture**	Architecture

Section 5 Login

As the main operation page of Integrity system, Integrity client provides functions including asset statistics generating, dynamic profile viewing, configuration defects check and audit, statistics analysis and result display, etc.

5.1 Preparations

- Complete physical connection between devices and installation of software according to the requirements in Figure 3-1 (refer to "3.2 System Structure"), and ensure there is no communication fault.
- Install the High-performanceHMI component and IDM component, complete and publish the engineering configuration, and start the server for the IDM component. For details, please refer to the corresponding manuals of the components.
- In the IAC, select [Start / OMC / Intelligent Application Management / Integrity], start the server of Integrity component.
- License
  Please confirm that you have used dongle correctly, and license meets the field requirements. For details, please refer to "3.3 Licenses".
- Clear browser history
  If you are a first-time user, you can skip this step; it not, please select **Settings > Advanced > Privacy and security > Clear browsing data** before login.

5.2 Home

Select [Start / OMC / Intelligent Application Management / Integrity], click the button to open the home page of Integrity. Also, you can click the "Smart Control" button at top of the HMI interface of the system and select "Integrity" in the drop-down list.

After system configuration, the home page will display the result of the system integrity check, including configuration asset statistics, scale, defects, spares, auditing data, etc., as shown in Figure 5-1.

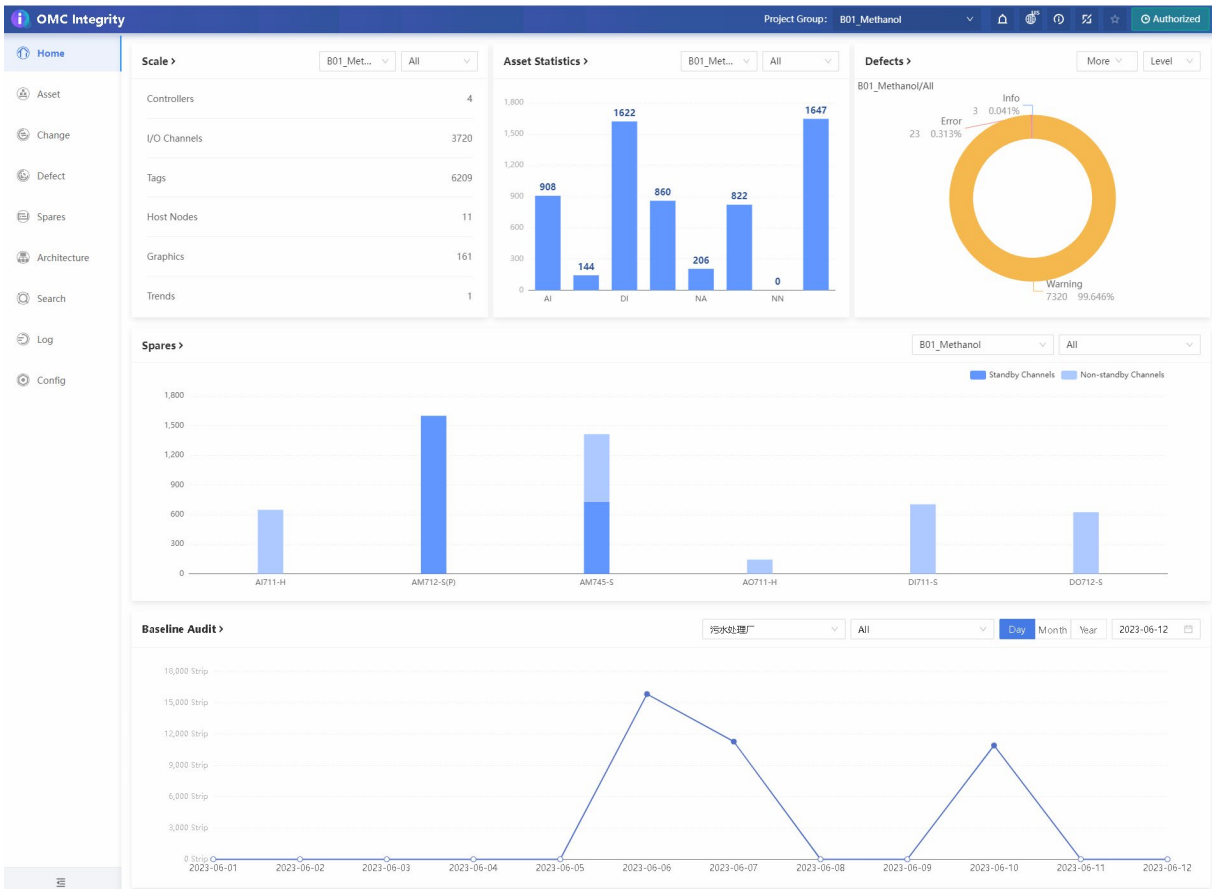


Figure 5-1 Home page of Integrity

Table 5-1 illustrates the composing parts of the home page of Integrity and the functions of each part.

Table 5-1 Sections of Integrity homepage

Section	Function Description	
Quick buttons	Quick buttons are on the right of the webpage header, the following buttons are displayed from left to right.	
	Project Group	You can switch the data of project group displayed on the monitoring area through drop-down menu
	Notice	Including these tabs: ● Update Time: Used to view the update time of project data ● Software Update: Used to view the software that hasn't been updated in OMC system project ● Install Patches: Used to view the Windows system patch that hasn't been installed in OMC system project ● Blacklist and whitelist: Used to view the blacklist or whitelist that hasn't been updated in OMC system project
	Language Switching	Select the display language to Chinese or English
	Software Info	Used to view the version of Integrity and the licenses. For detailed description of authority, please refer to "3.3 Licenses". If the software is on trial, the remaining time will be displayed here.

Section	Function Description	
	Service Monitoring	Used to monitor the operation status of the services. For details, please refer to "Section 13 Service Status Management".
	Attention List	The button is highlighted when there are followed nodes. Clicking it will display the list of followed nodes. If there are no followed nodes, the button is . For more details, please refer to "Set Attention Node".
	Authorization Status	Current authorization status, including Authorized and Trial countdown .
		●
Left navigation tree	Click the node on navigation tree to enter the corresponding page. Click at the bottom of navigation tree to fold it.	
Monitoring display area	The main area used to configure system parameters or view the analysis results. For the data displayed here, please refer to the description below.	

In the home page, you can view the results of system integrity check after selecting project group on the upper right corner, including the following data. When the mouse is moved over the statistical chart, detailed data can be viewed by tooltip.

- Scale: hardware scale, tag scale, user configuration scale, etc.
  - You can click **Scale** to switch to **Asset**. For details, please refer to "Asset Management".
  - You can click the drop-down box on the upper right corner to switch the data source. For OMC system, you can select control domain and control station.

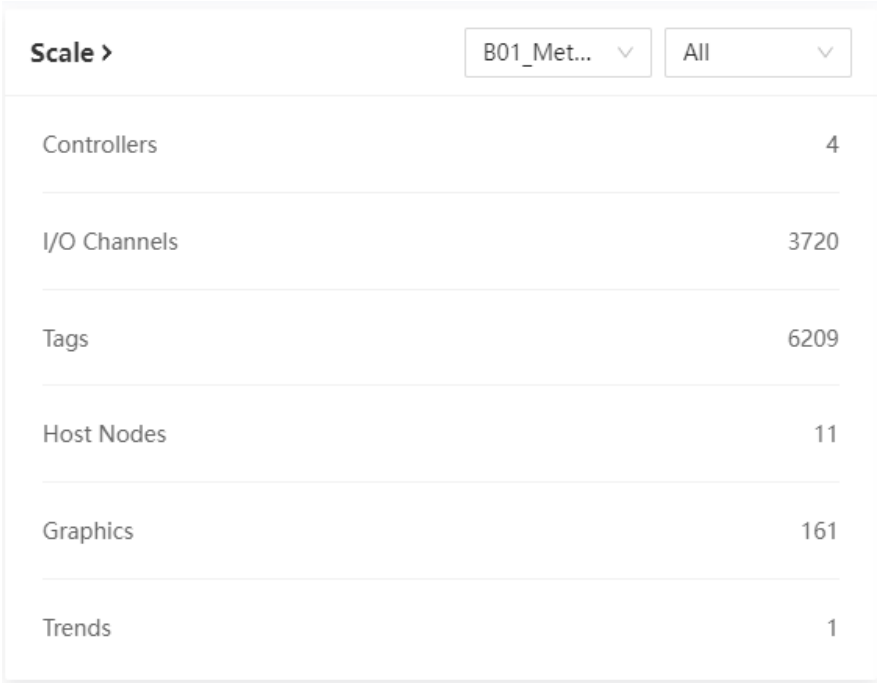


Figure 5-2 Scales

- Asset statistics: the number of statistical items by tag types, such as AI tags, AO tags, DI tags, DO tags, NA tags, ND tags, NN tags and function block tags.
  - You can click **Asset Statistics** to switch to **Asset**. For details, please refer to "Asset Management".
  - You can click the drop-down box on the upper right corner to switch the data source. For OMC system, you can select control domain and control station.

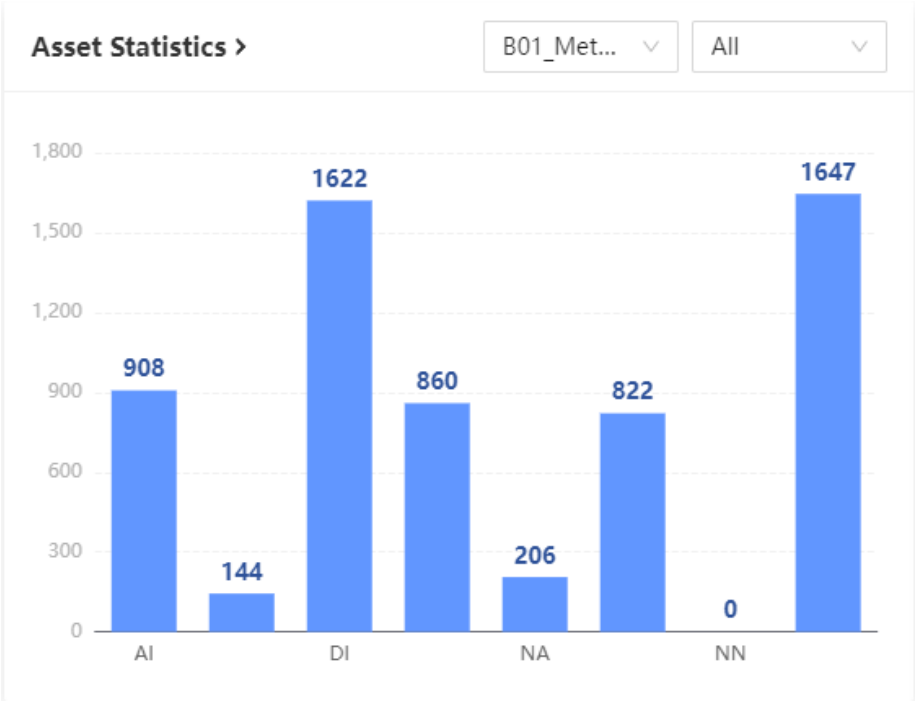


Figure 5-3 Asset statistics

- Defects: all defects of the project are classified and counted according to defect level by default, and are display in a pie chart.

- You can click **Defects** to switch to **Defect**. For details, please refer to "Defects Check".
- You can click **More** to switch the system and the control domain.
- You can click the drop-down box on the upper right corner to switch the filter. If it is OMC, you can display the data by controller.

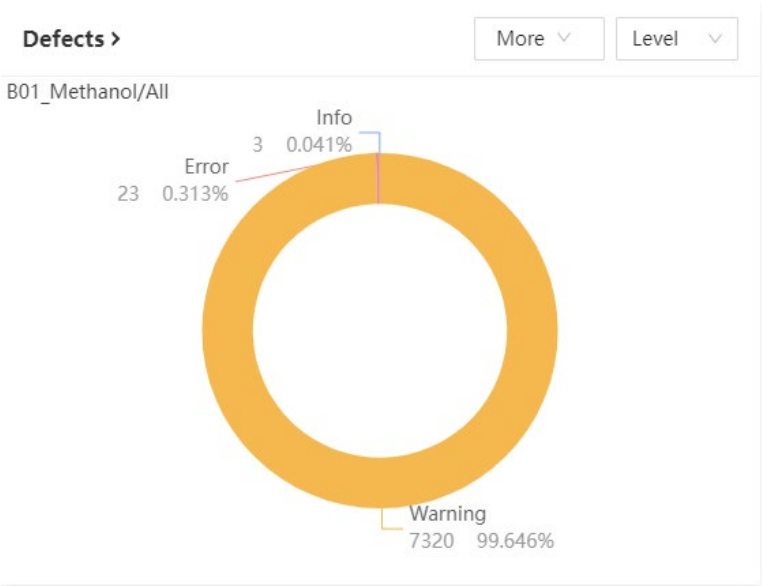


Figure 5-4 Defects

- Spares: select a control domain or a control station, the numbers of standby and non-standby channels are counted by types of I/O module, and the results are displayed on the graphics.
  - You can click **Spares** to switch to **Spares** interface. For details, please refer to "Spares".
  - You can click the drop-down box on the upper right corner to switch the data source. If it is OMC, you can select control domain and control station.

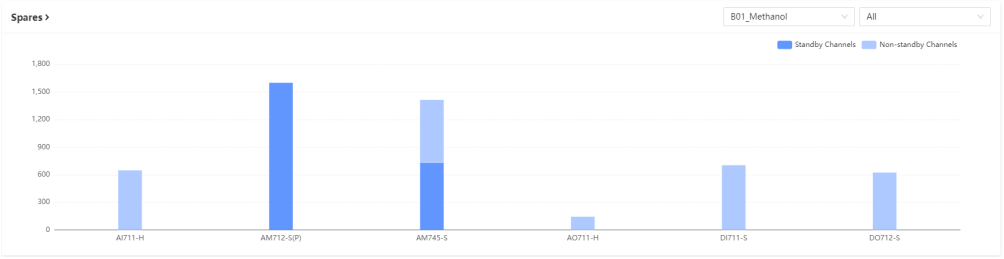


Figure 5-5 Spares statistics

- Baseline audit: select a control domain or a control station, and the number of configuration changes will be displayed on the graphics. Hover the cursor over the node to view the specific value.
  - You can click **Baseline Audit** to switch to **Change**, and it will automatically filter the records of current project and control domain. For details, please refer to "Baseline Audit".
  - You can click the drop-down box on the upper right corner to switch the data source. If it is OMC, you can select control domain and control station.

- You can click **Day**, **Month** and **Year** to filter the data by time.
- You can click the date selector to modify time range of statistics.

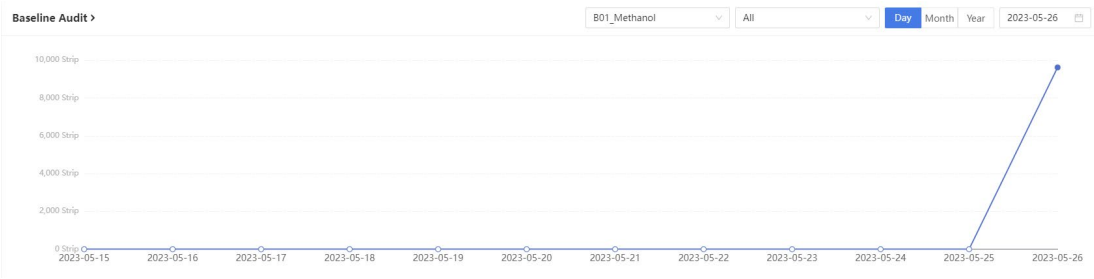


Figure 5-6 Baseline audit

5.3 Common Operations

The instructions of some common operations are as follows. For details, please refer to corresponding section.

5.3.1 Adding Records

1) Click **Add**.
2) On the pop-up window, configure the parameters. Generally, the item with ***** is required.
3) Click **Save**.

5.3.2 Modifying Records

1) Select the record to be modified in the list.
2) Click **Edit** in **Operation** column.
3) On the pop-up window, modify the parameters and click **Save**.

5.3.3 Deleting Records

1) Select the record to be deleted in the list.
2) Click **Delete** in **Operation** column.
3) Click **OK** to delete the selected record.

Batch delete: select multiple records in the list, and click **Delete** or **Batch Delete** button.

5.3.4 Querying Records

Select or enter keywords in the search bar on the top of the page, click **Query**, and the results will be displayed in the table below.

You can click **Reset** to reset the filters, and click **Query** to display all records.

Advanced query: if there is a button on the page, you can click it to unfold more filters. Click to fold the query conditions, the set filters will be displayed below the query bar, as shown in the figure below.

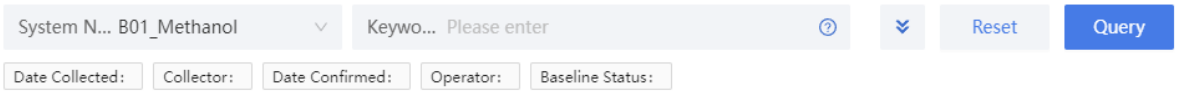


Figure 5-7 Query bar

5.3.5 Exporting Records

Click **Export** button on the upper right corner, set export range and export file name in the pop-up dialog box, and click **Save**, then you can export the records in the selected range to a XLSX file. If it is a signal flow diagram or meterloop diagram, the exported file is a .png file.

The default file name is "default file name-export time-initial page-end page.xlsx". The relationship of default file name and menu commands is shown in Table 5-2, the form of "Export Time" is "yyyy_MM_dd_HH_mm_ss". For a signal flow diagram or meterloop diagram, the default file name is the name of the current node selected in asset tree.

Table 5-2 Relationship of export file name and menu

Function Module	Menu Command	Default File Name
Asset	Export data of rack list of OMC system	System name-hardware -control station -COM module
	Export data of normal tag list of OMC system	System name-normaltagtable-control station
	Export data of communication tag list of OMC system	System name-commtagtable-control station
	Export data of rack list of SIS system	System name-hardware
	Export data of tag list of SIS system	System name-tagtable
Change	Export collection records or baseline	System name-baselinedata
	Compare adjacent baselines, export comparison data on the "Config Audit" page	System name-cfgchange
	Compare adjacent baselines, export configuration change logs of OMC system on the "Configuration Operation Log" page	System Name-ecs700log
Defects	Export data of defects	System name-cfgdefect
Spares	Export data of channel list	System name-allchannel
Architecture	Export data of spare nodes	System name-channeldata
Log	Export log data	userlog
Config	Customize loop rule configuration, export current effective custom loop rules and defect rules	looprule
	Meterloop. export the displayed configuration records on the page	System Name-wiring list
	Meterloop, import meterloop and you can export analysis report after analysis	System Name-meterloopreport

5.3.6 Global Search

Through the global search function, you can search for system data containing keywords. The search scope includes functional modules such as Assets, Change, Defects, Spares, and Log. The search box displays the last 4 search records of the currently logged-in user on the right side.

The operation steps are as follows:

1. Select "Search" in the function navigation bar, enter a keyword in the search box. The search keyword is not case sensitive.
2. If you want to search specifically, you can set the search scope according to project name, module type, or node type. If not required, skip this step.
3. After completing the settings, press Enter or click the button. The component will filter out all data containing the keywords, as shown in Figure 5-8.

The search results are displayed by module type. Click the name of the functional module to expand or collapse the search results under each module. Each object in the search results is a data card, showing its detailed path and node type. When the mouse moves over the lower half of the card, the tooltip will display the information omitted in the card. Click the marked text (module type or node name) with # symbol in the data card and you can jump to the corresponding detail page.

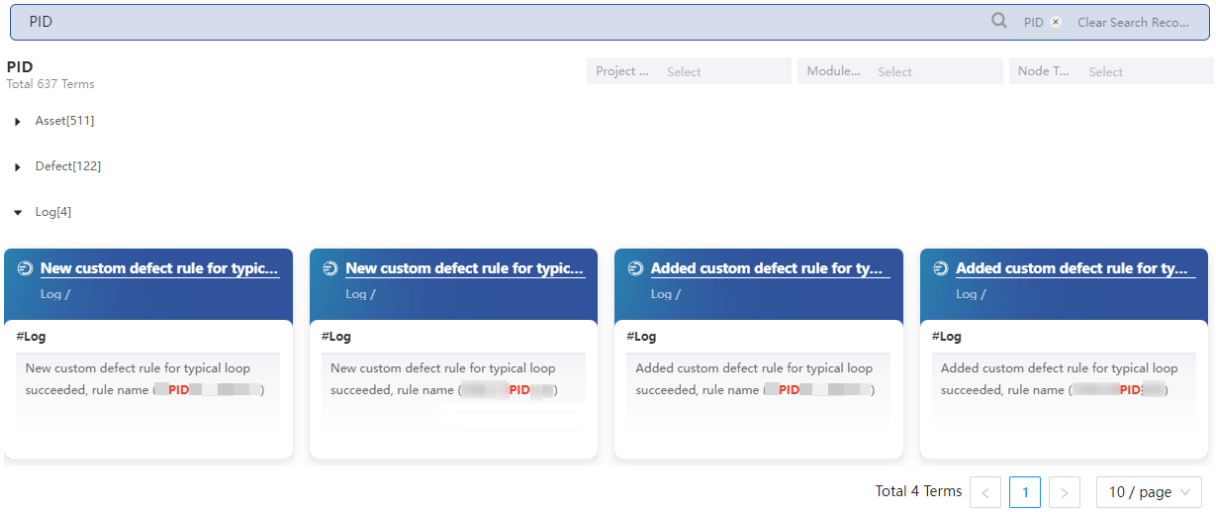


Figure 5-8 Result of global search (example)

Section 6 Configuration Management

Before using Integrity, you should complete basic system configuration, including setting project group, configuring and collecting data source of configuration, configuring address of ISMP, importing meterloop file and configuring user, etc.

This section mainly introduces steps of system configuration.

6.1 Project Groups

Select **Config** in the navigation tree, and select **Project Group** in the right interface, then you can enter project group list, as shown in the figure below. You can set in this page the project groups that need to collect data and the systems in the group.

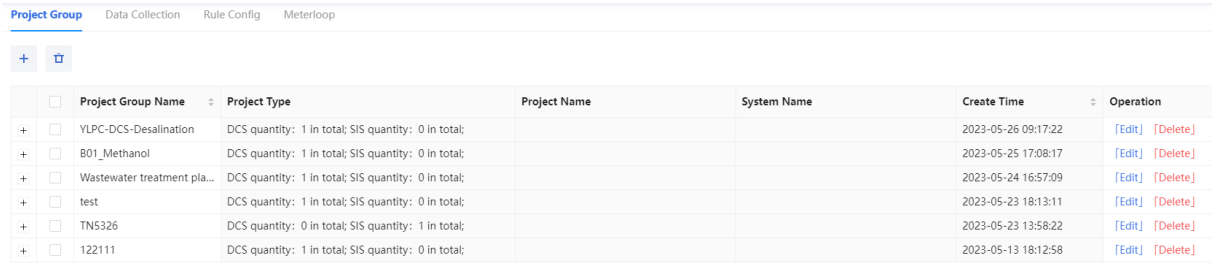


Figure 6-1 Project group

In the homepage, after selecting group, the software will analyze all the system statistics in the group.

The steps of adding group are as follows, for other operations please refer to "Common Operations".

1. Click + to pop up **Add Project Group** dialog box, as shown in Figure 6-2.

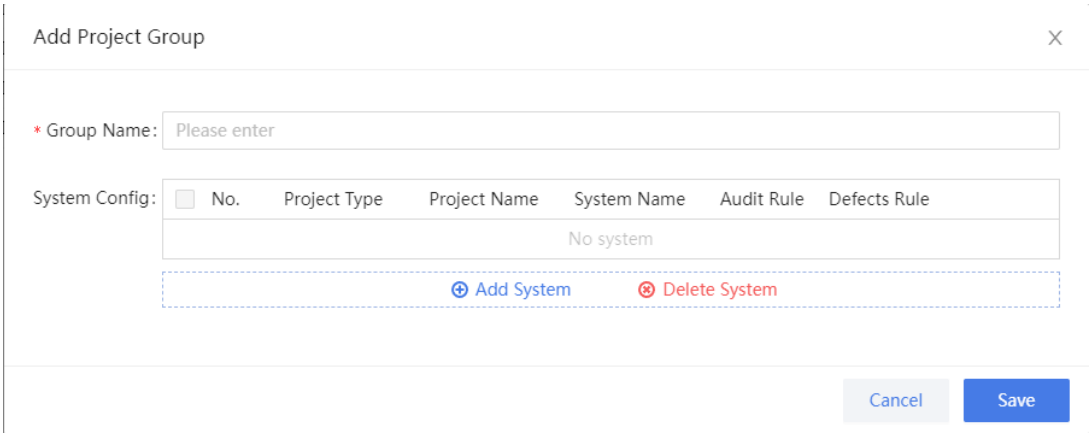


Figure 6-2 Add project group

2. Enter group name. The group name can’t be repeated.

3. Add or edit system project included in project group. The number of projects depends on your license, please refer to "Licenses".

- You can edit system information or delete the system project through the button on the right of the project.
- You can add system project or batch delete system project through the button below.

Take adding project as example, the steps are as follows:

1) Click **Add System** and a dialog box will pop up, as shown in the figure below.

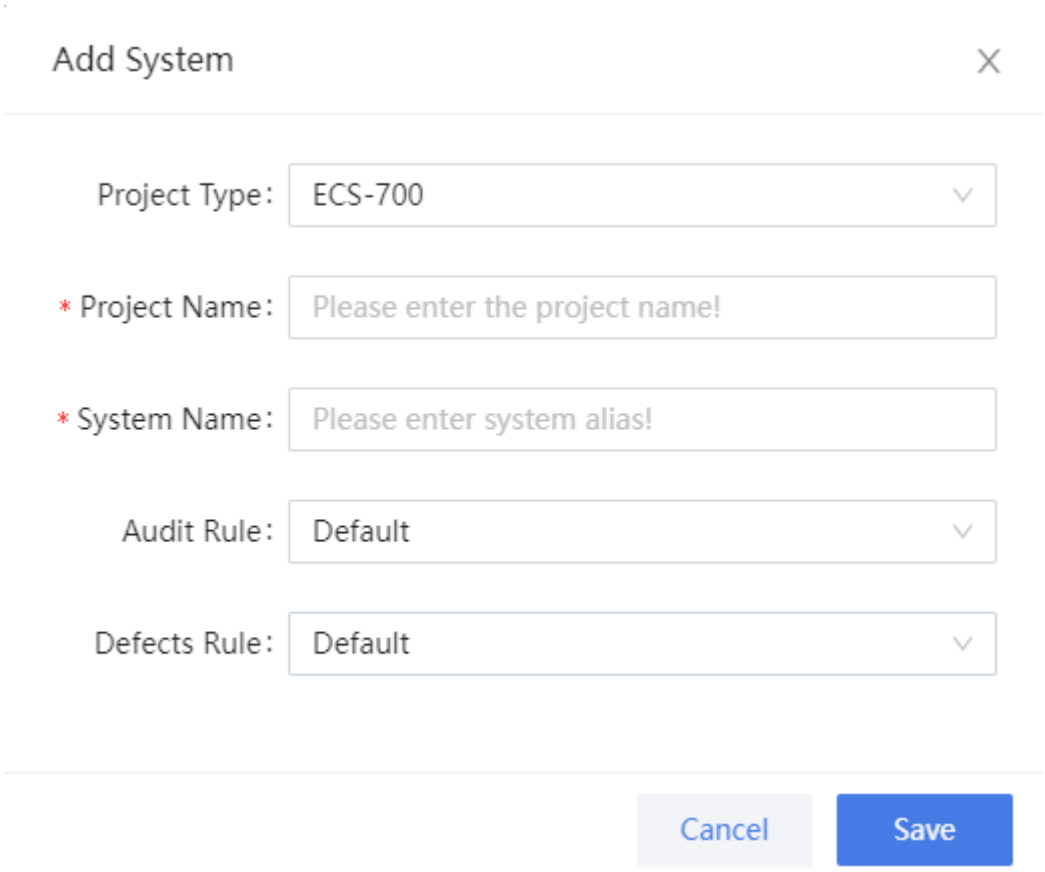


Figure 6-3 "Add System" dialog box

2) Configure basic properties according to the description in the table below.

Table 6-1 Basic properties configuration of system

Configuration Item	Property Description	Configuration Description
Project Type	Control system type	Select control system type from the drop-down menu
Project Name	Project name	Project name must be consistent with the project name in control system configuration, and it can't exceed 64 characters
System Name	Name or alias of control system	Customizable. It can be consistent with the project name, but can't exceed 64 characters.

Configuration Item	Property Description	Configuration Description
Audit Rule	You can bind baseline audit rule (after selecting project type, only the rules applicable to the selected system type are displayed here)	● **Default**: then the default rule of the system type will be used. For details, please refer to "Auditing Rule". ● Custom rule: select a custom rule. To customize a rule, go to **Config > Rules Config > Configuration Auditing**. For details, please refer to "Configuration Auditing Rules".
Defects Rule	You can bind configuration check rule (after selecting project type, only the rules applicable to the selected system type are displayed here)	● **Default**: the default rule of the system type will be used. ● Custom rule: select a custom rule. To customize a rule, go to **Config > Rules Config > Configuration Defects**. For details, please refer to "Configuration Defect Rules".

3) Click **Save** to complete the configuration.

4. Check on **System Configuration** area to select the project included in the group. Projects in the same or different groups cannot be repeated.

5. When all configuration has been completed, click **Save**.

6.2 Data Collection Configuration

Select **Config** in the navigation tree, and select **Data Collection** in the right interface to enter data collection configuration page. This page includes three sub-pages, which are used to set data source of configuration data, device management data and ISMP.

- Configuration data: set the OPC UA service address of control system software, it is used to receive the configuration data from OPC UA server.
  - DCS: take OMC as an example, the data collected includes system structure configuration, hardware structure configuration, function block data, tag instance list, tag properties and monitoring configuration information. But it does not include the data of referenced domain (for example: configuration data of TCS-900 system in OMC system).
  - SIS: the data collected includes system structure configuration, hardware structure configuration, function block data, tag instance list, and tag properties.
- Device management data: used to set the address of the computer which is the server of IDM component, and to receive meterloop data information provided by IDM component. This page needs to be configured only when Integrity is used with OMC system.
- ISMP: set the Ethernet port address of gateway module of the industrial security management platform (ISMP). This page is used to collect details of servers, including operating system (OS), events, software update, Windows system patch and black and white list, and show them in **Asset**. This page needs to be configured only when Integrity is used with OMC system.

6.2.1 Configuration Data

1. Select **Config** in the navigation tree, and select **Configuration Data** in **Data Collection**,

then all the projects added in the group, manual/auto collection mode and the results of last collection will be displayed in the list, as shown in Figure 6-4.

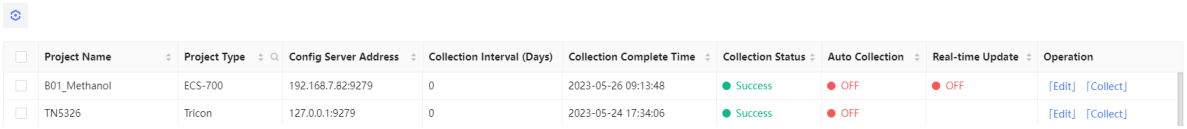


Figure 6-4 Configuration data list

2. Find the project to be configured, and click **Edit** in **Operation** column to pop up the configuration dialog box.

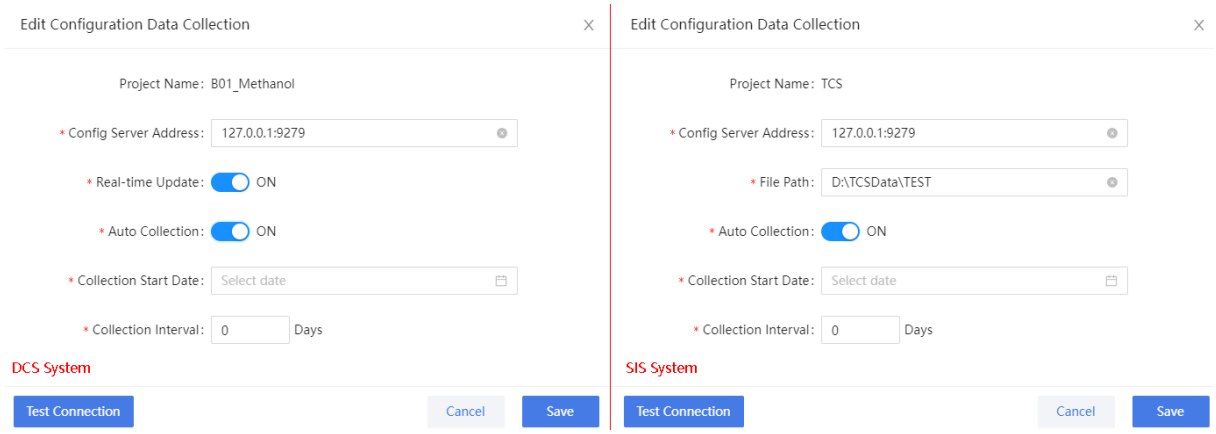


Figure 6-5 Configuration dialog box of OPC UA data collection (single project)

3. Enter the address and the port (9279 by default) of OPC UA service. If it's used with High-performanceHMI component, you can enter the address of configuration station.

4. If it is SIS system (TCS-900 system or Tricon system), you need to enter **File Path**.

- TCS-900: open the directory of sisPrj configuration file in TCS-900, and enter the address of the folder which has the same name as sisPrj configuration file. For example, the folder of configuration file is shown in the figure below, and file path that you need to enter is "D:\TCSData\TEST",

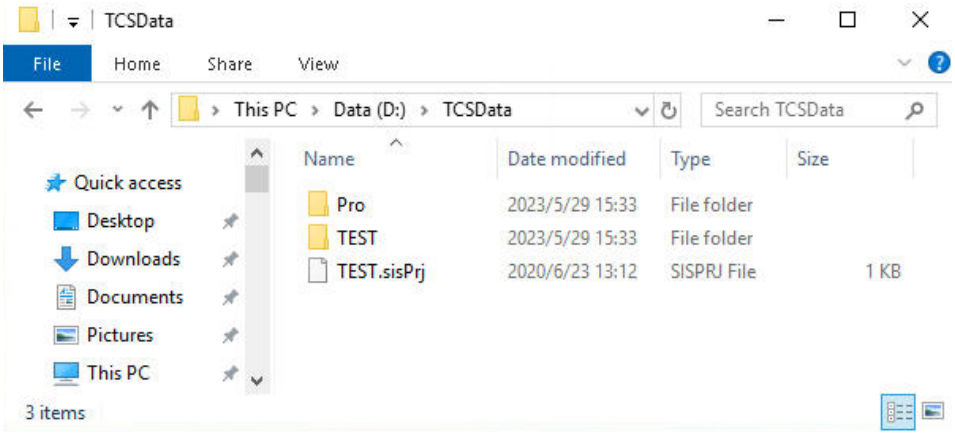


Figure 6-6 Example of TCS-900 configuration file path

- Tricon system: enter PT2X configuration file path. For example, the folder of configuration file is shown in the figure below, and file path that you need to enter is " E:\virtualbox share\ExModbus_CX\ExModbus_CX.PT2X",

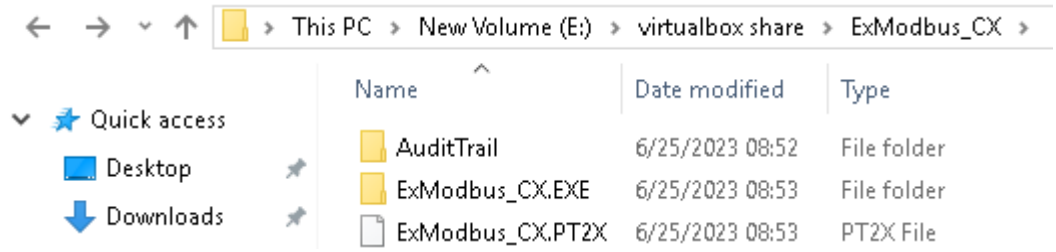


Figure 6-7 Example of Tricon configuration file path

5. Set whether to enable auto collection. If it is enabled, you have to set the start time and collection cycle; if disabled, you have to collect data manually.
6. Click **Test Connection** to test the connection of the project, and verify the validity of the current project. If the OPC UA address is wrong, or the project isn't the default project of High-performanceHMI component, you will get an error prompt and need to reconfigure parameters according to the prompt.
7. When configuration have been completed, click **Save** button, then you return to the interface as shown in Figure 6-4, and there will be a **Collect** button in **Operation**.
8. Data collection: the component provides manual mode and auto mode.

- Manual collection: click **Collect** in **Operation**, then **Collect** will turn to **Collecting**, that means collection has started. After the collection, the button will recover as Collect. If you have not switched the page, you will receive the prompt of collection results. If the collection fails, you can view the error message in the audit log. Please refer to "Log".
- Auto collection: you can set whether to enable auto collection and the start time and collection cycle in the dialog box shown in Figure 6-5. If you want to set same collection method for multiple projects, you can select multiple projects in the interface shown in Figure 6-4, and click **Batch Edit** button on the upper left corner to perform batch settings in the pop-up dialog box.

Tips:

- **When collecting system data for the first time, please wait for about 5 minutes after the data collection service starts, and then you can collect the data normally.**
- **Every time the software collects data of the project bound with wiring, it will analyze the meterloop of the whole system. Before successful analysis, you cannot view the meterloop of the system in Asset. Please wait until the analysis finishes.**

6.2.2 Device Management Data

Tips:

Collection source of device management data is required only when the software is used with OMC system.

1. Select **Config** in the navigation tree, and select **Device Management Data** in **Data Collection**, then the addresses that have been configured and the results of last collection will be displayed in list, as shown in Figure 6-8.

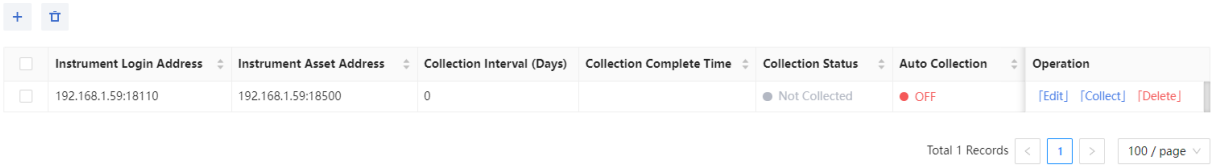


Figure 6-8 Device management data list

2. Click + button in the upper left corner to pop up the configuration dialog box.

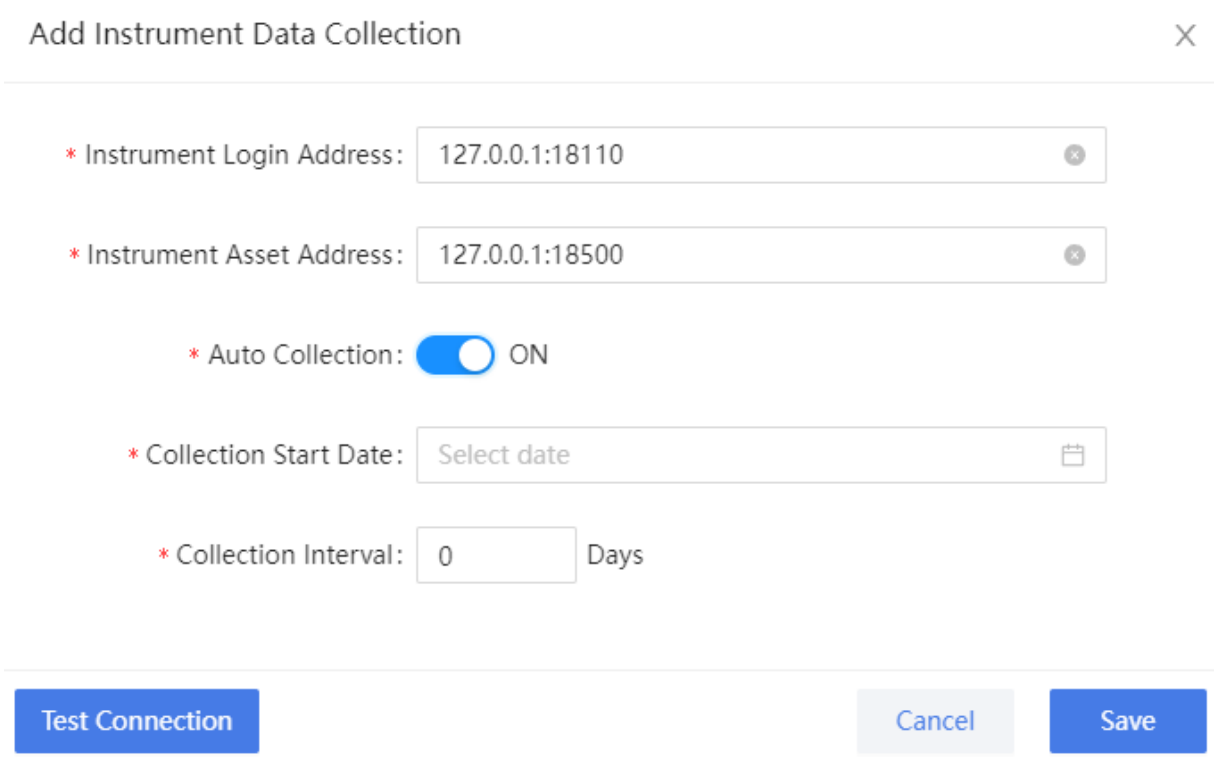


Figure 6-9 Configuration dialog box of instrument data collection

3. You can set the instrument login address, instrument asset address, and whether to enable auto collection. The instrument login address and instrument asset address are the address of IDM central server. But the port number of the instrument login address is 18110, while 18500 is for instrument asset address. If there is no central server, you can configure the address of each device server one by one.
4. You can set whether to enable auto collection. If it is enabled, you have to set the start time and collection cycle; if disabled, you have to collect data manually.
5. You can click **Test Connection** to test the connection of the project, and verify the validity of the current project. If the address is wrong, the component will pop up a prompt, please reconfigure parameters according to the prompt.
6. When configuration have been completed, click **Save** button, then you return to the interface as shown in Figure 6-8, and there will be a **Collect** button in **Operation** column.

7. Data collection:

- Manual collection: click **Collect** in **Operation**, then **Collect** will turn to **Collecting**, that means collection has started. After the collection, the button will become **Collect**. If you have not switched the page, you will receive the prompt of collection results. If the collection fails, you can view the error message in the audit log. Please refer to "Log".
- Auto collection: you can set whether to enable auto collection and the start time and collection cycle in the dialog box shown in Figure 6-9.

6.2.3 ISMP

Tips:

Collection source of security management platform data is required only when the software is used with OMC system.

1. Select **Config** in the navigation tree, and select **ISMP** in **Data Collection**, as shown in Figure 6-10.

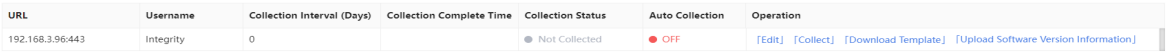


Figure 6-10 ISMP list

Tips:

At present, only one ISMP server is allowed. If there is already a server, please modify the server address, or delete it and add again.

2. Click **Add** to pop up the dialog box of adding ISMP.

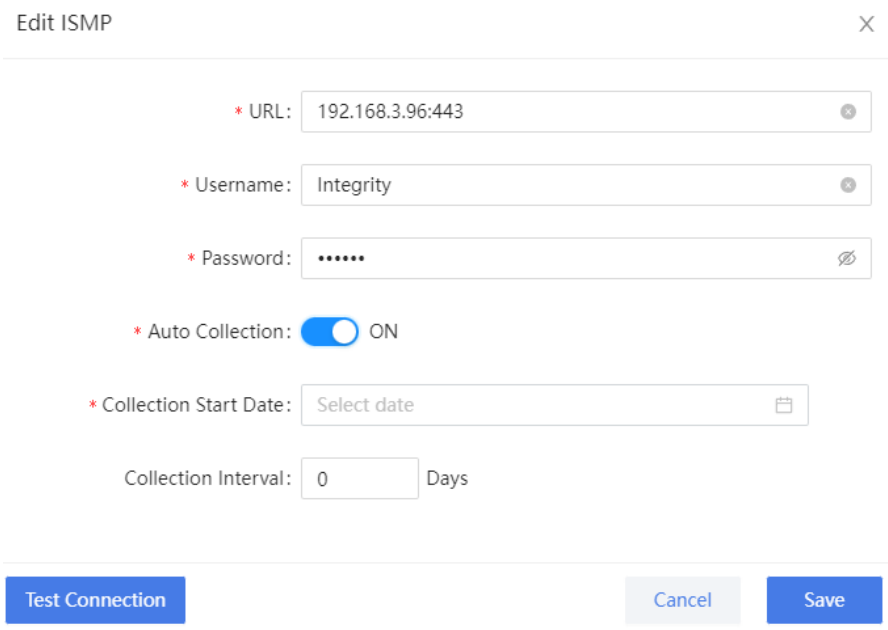


Figure 6-11 Dialog box of adding ISMP

3. Enter the gateway address, username and password of the ISMP.
4. You can click **Test Connection** to test the connection of the security management platform address. If the address is wrong, you will get an error prompt and need to reconfigure address according to the prompt.
5. When configuration has been completed, click **Save** button.

The address configuration for the security management platform is now complete. Click the "Collect" button on the interface shown in Figure 6-10 to collect data from the ISMP and display it in the corresponding information of control system node.

If you need to confirm whether the software, Windows system patches, and black/white list versions installed in the DCS system are up-to-date, click "Download Template" on the interface shown in Figure 6-10, fill in the latest version requirements in the downloaded template and save it, and then click "Upload Software Version Information" to import the modified document. Integrity will compare the version requirements of the document with the data obtained from the ISMP. If the versions do not match, a prompt for update will appear on the Integrity interface. For more information, please refer to "Asset Management". When version information has not been uploaded, a prompt for update will also appear on the Integrity interface if the data obtained from the security management platform contains an update prompt.

6.3 Custom Rules

Select **Config** in the navigation tree, and select **Rule Config** to enter rule configuration page. It is used to configure the rules of configuration auditing and configuration defect checking.

6.3.1 Configuration Auditing Rules

You can customize rules by filtering the audit items. Different systems have different default rules. For the description of default rules, please refer to "Auditing Rule".

Select **Configuration Auditing** in **Rule Config**, the page is shown in the figure below.

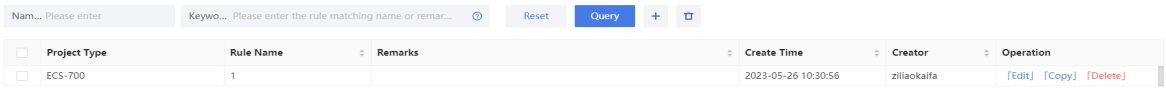


Figure 6-12 Configuration Auditing

The steps of adding custom rule are as follows. For operations of **Edit** and **Delete** please refer to "Common Operations".

1) Click + above the list to pop up the **Add Auditing Rule** dialog box. You can enter the rule name and remarks, as shown in Figure 6-13.

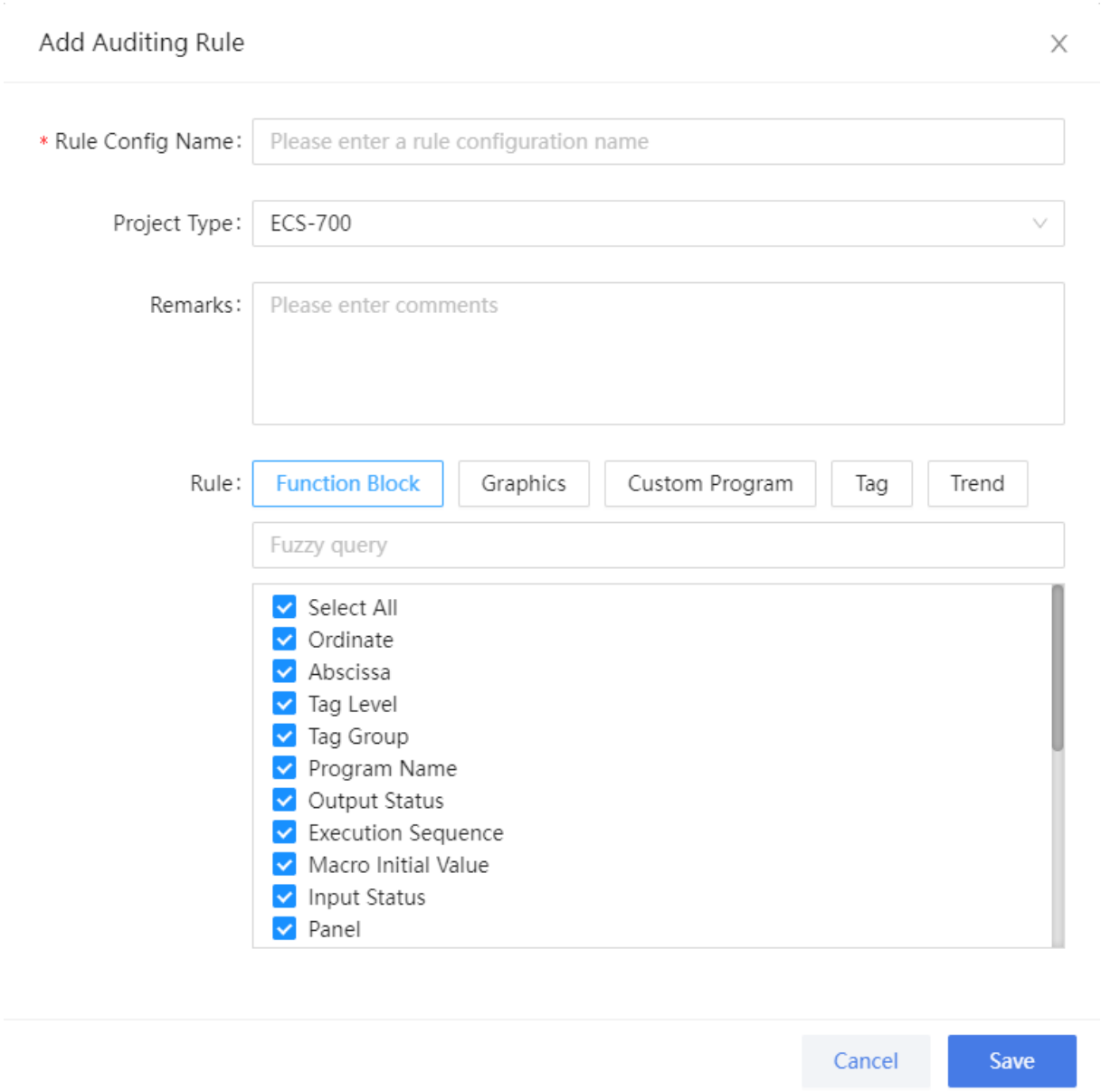


Figure 6-13 Add Auditing Rule dialog box

2) After selecting the project type, the default rule categories of the corresponding system will be displayed next to **Rule**. For OMC system, it includes tag, function block, custom program, graphics and trend; for TCS-900 system, it includes function block and tag; for

Tricon system, it includes function block, custom program and tag. The default rule checks on all judgment items. You can deselect the items you don't need, or cancel **Select All** and check on the items needed. Items in different category should be modified independently.

3) When all configurations have been completed, click **Save** Button.

Application of custom rule: you can select configuration auditing rules for the system in **Add System** dialog box as shown in Figure 6-3.

6.3.2 Configuration Defect Rules

You can set the filters to customize the rules. Different systems have different default rules.

Select **Configuration Defects** in **Rule Config**, the page is shown in the figure below.

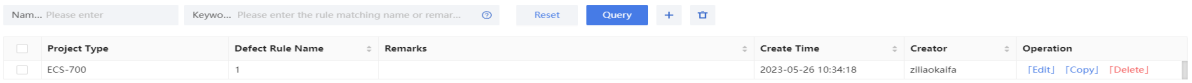


Figure 6-14 Configuration defects

Configuration Procedure

The steps of adding custom rule are as follows. For operations of **Edit** and **Delete** please refer to "Common Operations".

1) Click + above the list to pop up the **Add Defect Rule** dialog box. You can enter the rule name and remarks, as shown in Figure 6-15.

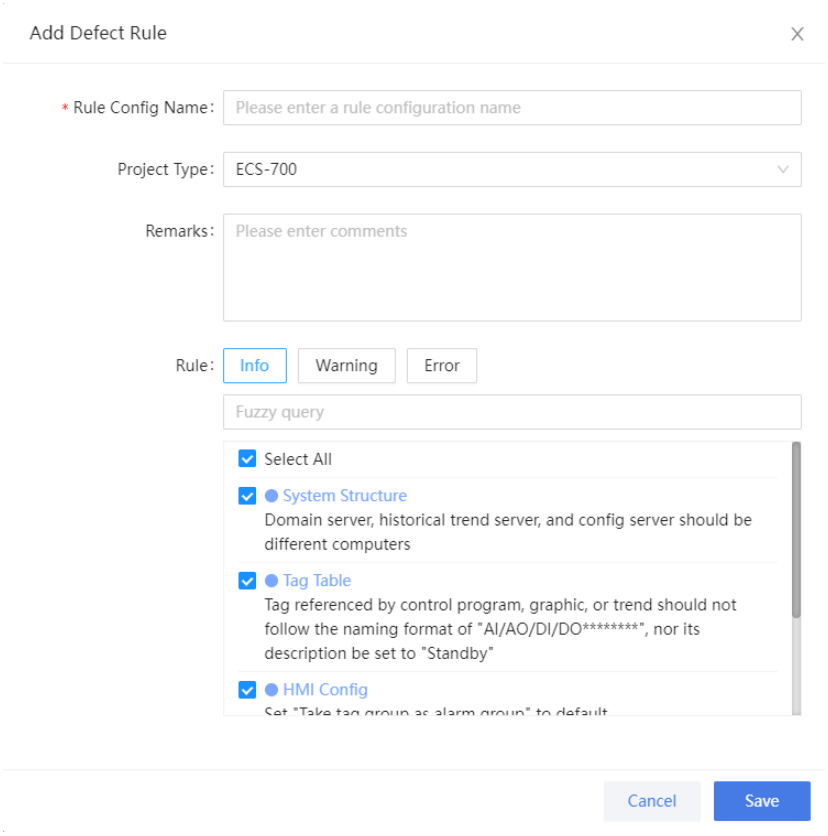


Figure 6-15 Add Defect Rule dialog box

2) After selecting project type, the default rule categories of the corresponding system will be displayed under **Rule**, and they are divided into three categories by defect level: Info, Warning and Error. All check items are selected by default. You can deselect the items you don't need, or cancel **Select All** and check on the items needed. Items in different category should be modified independently.

3) When all configurations have been completed, click **Save** Button.

Application of custom rule: you can select configuration defect rules for the corresponding system in **Add System** dialog box as shown in Figure 6-3.

6.3.3 Configuration Custom Loops and Rules

Tip:

This page needs to be configured only when the software is used with OMC system.

Select **Configuration Custom Loops** in **Rule Config**, the rules whose creator is **Auto** are the default rules. The page is shown in Figure 6-16.

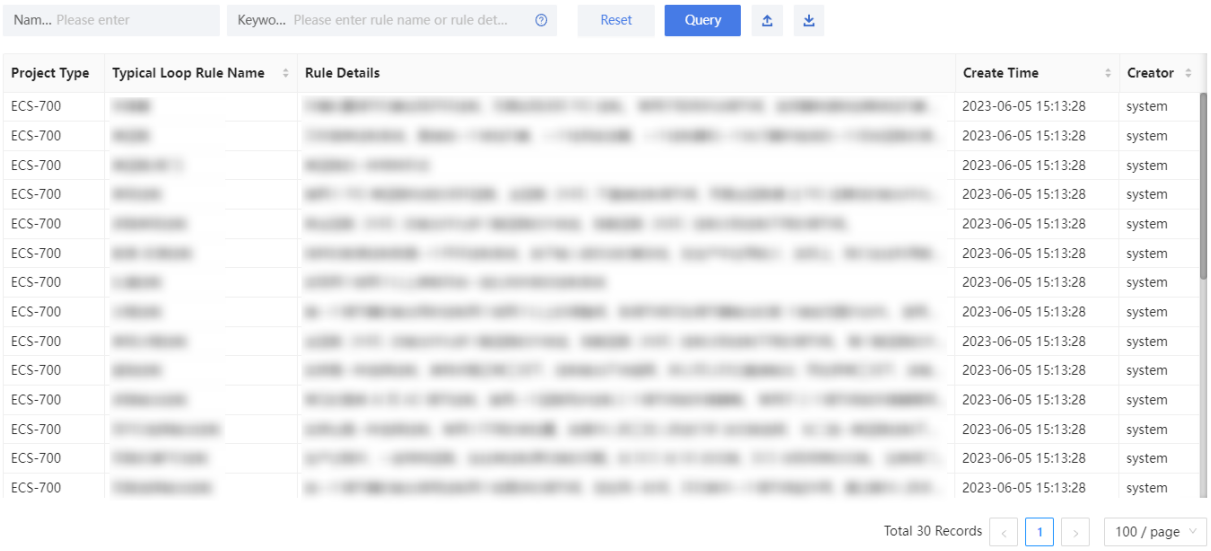


Figure 6-16 Typical loops

The component provides rules for several typical circuits, as well as defect judgment rules for these circuits. Based on these rules, the component recognizes typical loops that meet the conditions in the engineering configuration and classifies them under the "Assets/Plant Model/Typical Loops" node for display. For more information, please refer to the "Typical Loops" section in the "Plant Model" at the same time, if the parameter configuration of the actual configuration loop does not comply with the defect rules, the component will determine that there is a defect in the loop and display it on the "Defects" interface.

In addition to the default rules, you can also add or modify rules to create custom rules that are applicable to on-site situations.

Configuration Steps:

1. Click the button in the upper-right corner of the interface, select "Download Template" to export the default rules, or select "Export Custom Rules" to export the current rules. Enter a file name, and click the "Save" button to download the configuration file to your local computer.
   It is recommended that you backup the exported rule file before modifying the configuration rules, so that you can quickly restore the configuration when needed.
2. Open the configuration file using office software, as shown in the figure below.
   The "Data Relationship" page displays configuration prompts. Do not modify them.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	自定义回路属性 (Custom Loop Properties)		节点信息 (Node Information)		连接关系 (Connection Relationships)					缺陷规则配置 (对象/值关联) Defect Rule Configuration(Object/Value Association)					
2	*名称 (Name)	描述 (Description)	*节点类型 (Node Type)	*节点名 (Node Name)	前置节点名 (Predecessor Node)	输出引脚 (Output Pin)	关系 (Relation Type)	后置节点名 (Successor Node)	输入引脚 (Input Pin)	缺陷等级 (Defect Level)	节点名 (Node Name)	参数名 (Parameter Name)	关系 (Relation Type)	节点名 (Node Name)	参数名/值 (Parameter Name/Value)
3	手操器	手操器同名	MANUAL	first_node	second_node	BKOUT	YES	first_node	BKIN	ERROR	first_node	PVSCH	=		100
4			AO	second_node	second_node	BKOUTERR	YES	first_node	BKINERR	ERROR	first_node	PVEU	=		%
5					first_node	MV	YES	second_node	any	ERROR	first_node	MVSCL	=		0
6							NO	first_node	IN	ERROR	first_node	MVSCH	=		100
7							NO	first_node	PV	ERROR	first_node	MVL	=		0
8										ERROR	first_node	MVH	=		100
9										ERROR	first_node	MVEU	=		%
10										ERROR	first_node	MODE_OPT	=		ON
11										ERROR	first_node	PSWAM	=		OFF
12															
13	单回路	单回路	PIDEX,PID	first_node	second_node	BKOUT	YES	first_node	BKIN	ERROR	first_node	SVSCL	=	first_node	MVSCL
14			AO	second_node	second_node	BKOUTERR	YES	first_node	BKINERR	ERROR	first_node	SVSCH	=	first_node	MVSCH
15					first_node	MV	YES	second_node	any	ERROR	first_node	SVEU	=	first_node	MVEU
16							NO	first_node	CSV	ERROR	first_node	MVSCL	=		0
17							NO	first_node	PVERR	ERROR	first_node	MVSCH	=		100
18							NO	first_node	PV	ERROR	first_node	MVEU	=		%
19										ERROR	first_node	PID_OPT	=		2
20										ERROR	first_node	MODE_OPT	=		OFF
21										ERROR	first_node	SV_OPT	=		ON

Sheet1 Sheet2 数据关系 +

Figure 6-17 Configuration file of loop and defect rules

3. Please follow the instructions below to modify the configuration document: Separate the configuration content between the two loop types with a blank line; if there is a lot of configuration content, you can create a separate sheet page, copy the header items, and fill in according to the configuration rules.

- Custom loop properties: Configure the loop's name and description. The name should not exceed 128 characters. The loop name is the typical loop type shown in the industrial control asset organization tree, as shown in the figure below. The description is the detailed rules for the typical loop, as shown in Figure 6-17.

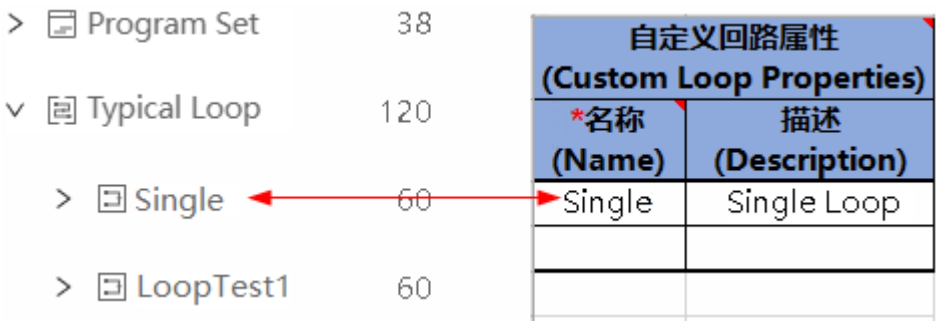


Figure 6-18 Correspondence of Circuit Names

- Node Information: Set the node type and node name.
  - Node Type: The type of node that makes up the loop, function block, bit number, etc.

    The first line defaults to the key nodes that the component recognizes for a typical loop, and the specific node type needs to be set and the settings here must be consistent with the configuration of the control system project configuration. When there are multiple types, they are separated by commas (,).

    From the second line, it is the key node's associated node, either by filling in a specific tag type or by using "any" for any type.

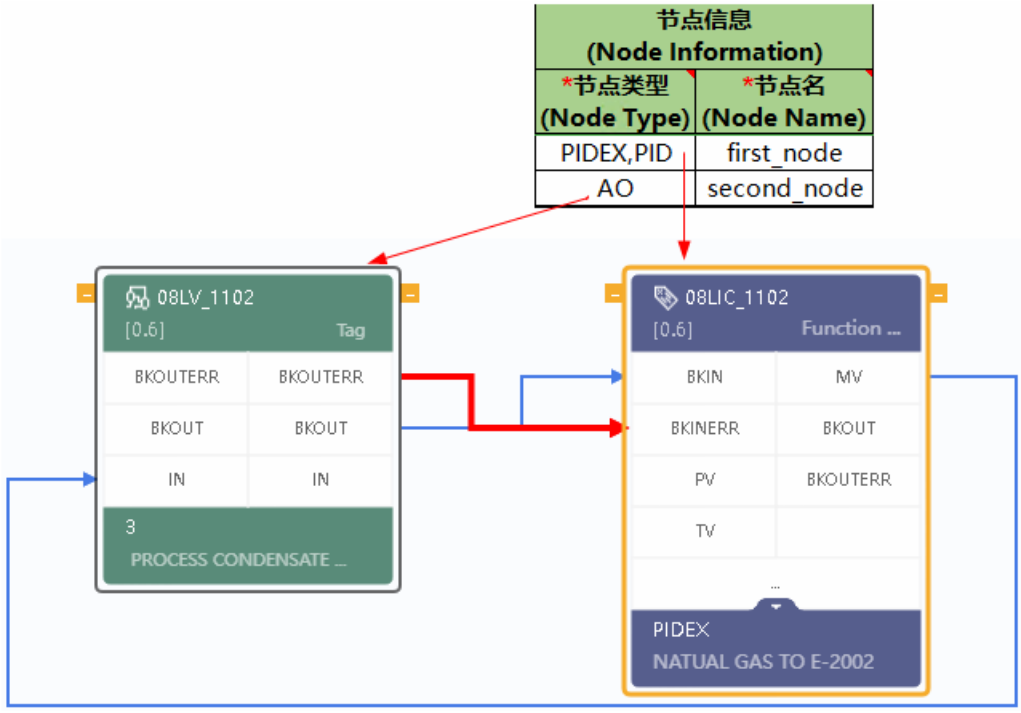
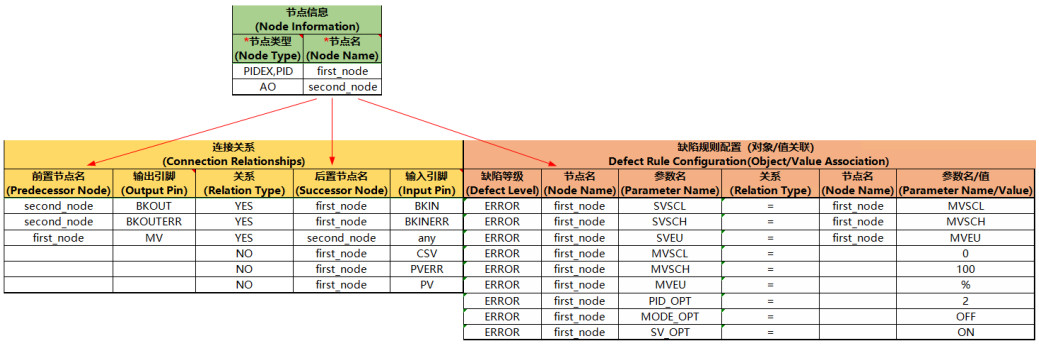


Figure 6-19 Node type mapping

- Node Name: It's the node alias used to set up loop connection relationships and defect rules. The node name in the node information should correspond to the node name used in connection relationships, defect rules, as shown in the following figure.



节点信息 (Node Information)

*节点类型 (Node Type)	*节点名 (Node Name)
PIDEX,PID	first_node
AO	second_node

连接关系 (Connection Relationships)

前置节点名 (Predecessor Node)	输出引脚 (Output Pin)	关系 (Relation Type)	后置节点名 (Successor Node)	输入引脚 (Input Pin)
second_node	BKOUT	YES	first_node	BKIN
second_node	BKOUTERR	YES	first_node	BKINERR
first_node	MV	YES	second_node	any
		NO	first_node	CSV
		NO	first_node	PVERR
		NO	first_node	PV

缺陷规则配置（对象/值关联） Defect Rule Configuration(Object/Value Association)

缺陷等级 (Defect Level)	节点名 (Node Name)	参数名 (Parameter Name)	关系 (Relation Type)	节点名 (Node Name)	参数名/值 (Parameter Name/Value)
ERROR	first_node	SVSCL	=	first_node	MVSCL
ERROR	first_node	SVSCH	=	first_node	MVSCH
ERROR	first_node	SVEU	=	first_node	MVEU
ERROR	first_node	MVSCL	=		0
ERROR	first_node	MVSCH	=		100
ERROR	first_node	MVEU	=		%
ERROR	first_node	PID_OPT	=		2
ERROR	first_node	MODE_OPT	=		OFF
ERROR	first_node	SV_OPT	=		ON

Figure 6-20 Node name correspondence

- Connection Relationship: Configures the pin connection (from output to input) for each node in the loop. The relationship is YES, meaning that both predecessor and successor node pins are present and connected, and NO, meaning that the pins are not connected, or the pins on both sides of NO cannot be connected.

  For example, in the loop shown in Figure 6-19, the output pin MV of the PIDEX function block (first_node) and the input pin IN of the AO tag (second_node) are connected, then the connection should be configured as "predecessor node name is first_node, output pin is MV, relation type is YES, successor node name is second_node and input pin is IN (or any)", as configured in line 3 of Figure 6-20.

- Loop Defect Rule: After the loop configuration is complete, you can configure a defect rule. See Figure 6-20 for an example configuration. When any of the rules are not met, the defect of the corresponding grade is shown in the Configuration Defect node for that

loop.

- Defect Level: Select ERROR, WARNING or INFO from the drop-down box.
- Relation Type: Logical operator, select equal to (=), not equal to (! =), greater than (>), less than (<), greater than or equal to (> =), or less than or equal to (<=) by drop-down box.

4. Save and close the file when the configuration is complete.
5. Click in the interface as Figure 6-16 and select the modified configuration file to import it.

Tips:

- **The node types, pins, parameters, and such parameters set in the configuration file must be identical to the configuration of the control system project configuration; otherwise Integrity may not recognize typical loops and the Assets node will not show the addition of loop nodes, the configuration defect reported errors, and so on.**
- **When the control system configuration loop changes, modify the loop configuration file and import it in Integrity again.**

Rule Reusing

You can reuse rules in different platforms or different project configuration through the Import/Export button above the list. This can improve the efficiency of configuration.

Rule reusing is applicable to following situations:

- Most of the rules are similar for platform A and platform B, and rule configuration has been completed in platform A but not in platform B. In this case, you can export the rules of platform A and import them to platform B and reuse them. And you can adjust them according to the actual requirements.
- Field require same judging rules for two platforms. In this case, you can complete rule configuration in one platform and export, then import rules to another platform.
- After export and saving of rules, if you delete one or some rules in platform by mistake, you can import files of rules again.

6.4 Importing Meterloop File

Tips:

This page needs to be configured only when Integrity is used with OMC system.

Select **Config** in the navigation tree, and select **Meterloop** to enter rule configuration page. as

shown in Figure 6-21. The names of the imported meterloop file are displayed in **Content**.

The marked ⚠ indicates that the user has modified the wiring table in the Meterloop page, please export the wiring table backup in time, confirm that the modification is correct and re-import the latest wiring table. After reparsing, the new wiring table overwrites the old data of the baseline and ⚠ marker disappears. It should be noted that if you do not import a new file or if you import an old file, the modifications you made in the Integrity component will be overwritten after the re-parsing.

Figure 6-21 Meterloop

The steps of adding meterloop file are as follows. For other operations please refer to "Common Operations".

1. Click **Add** to pop up the dialog box of **Add Wiring for Meterloop**.

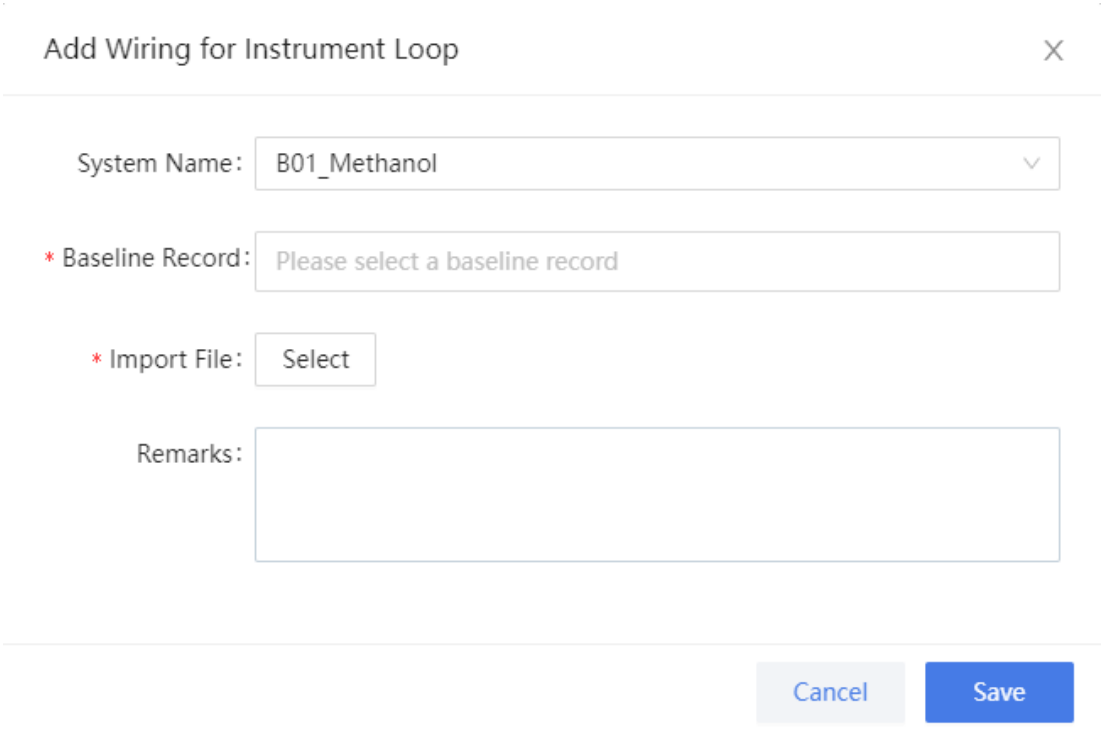


Figure 6-22 Add meterloop

2. Select system in **System Name**. Only systems with data permissions can be selected for operations.
3. Select the corresponding baselines of the wiring table in **Baseline Record**. Generally, select the latest baseline record.
4. Click the button on the right of **Import File** to select the original file of instrument diagram (only Excel file in xlsx or xlsm form is supported) or the package of instrument diagrams (.zip file).

5. When configuration has been completed, click **Save** button.
6. Click **Parse** in **Operation**, then the component will parse the imported files.
7. After successful parse, following operations can be implemented:

- Click **Parsing Report** in the interface shown in Figure 6-21 to switch to **Parsing Report** window, as shown in Figure 6-23. You can view the parsing report and the number of failed parsing loops in **Parsing Report**; and you can export the records to xlsx file by clicking **Export** on the upper right corner. For details of query and export, please refer to "Common Operations".

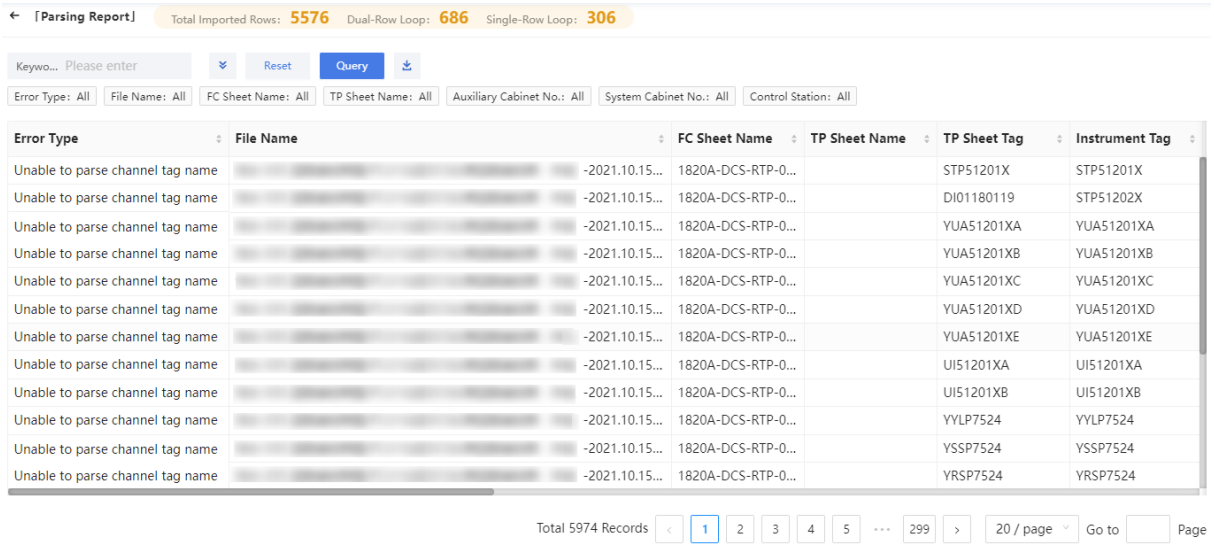


Figure 6-23 Parsing Report window

- You can view the meterloop of the system in **Meterloop** of **Asset**. Please refer to "Meterloop".

Tips:

Every time the software parses a wiring table of meterloop, it will parse the meterloop of the whole system. Before successful parse, you cannot view the meterloop of the system in Asset. Please wait until it parses successfully.

Section 7 Asset Management

Asset displays the list of internal hardware and software assets loaded in the current project group, including the following two categories. For details, please refer to "Appendix: Environment Requirements and Information of Systems".

- DCS, such as OMC system: Asset includes function block, tag instance of function block, control domain, controller, link module, rack, I/O module, channel, operation domain, host nodes, graphics, trend, common configurations, etc.
- SIS, such as TCS-900 system or Tricon system: Asset includes function block, tag instance of function block, rack nodes, tag table, program set, etc.

Select **Asset** in the navigation tree to switch to asset page, as shown in Figure 7-1 .

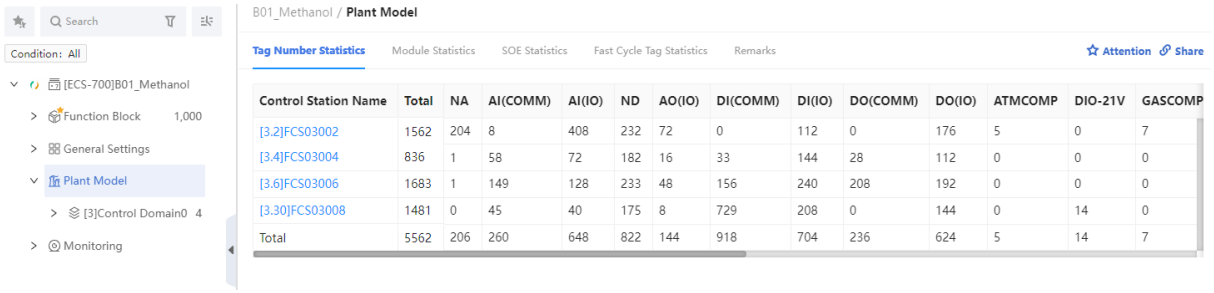


Figure 7-1 Asset page (example)

On the left is the configuration tree. DCS includes 4 nodes: function block, general settings, plant model and monitoring. SIS includes 2 nodes: function block and plant model.

- The number on the right of the node refers to the number of instances of the node.
- An asterisk appears in the upper-right corner of the node (for example), which indicates that the node has been added to the attention list.
- Dynamic marker appear to the left of the node name to indicate that there are unupdated software blacklist/ whitelist or uninstalled Windows system patches in the project for the OMC system, and you can expand the configuration tree step by step to locate the specific node.

Search box is above the configuration tree. It supports fuzzy search of node in tree list, or you can click to filter the standby tags. You can unfold the tree list and select a child node, then the path of the node, its detailed properties and asset data will be displayed on the right.

Tips:

After modifying the configuration data of the control system and saving it to the configuration server, please get the configuration data again in Integrity, and click the parent node of the modified data to refresh the data, or you can refresh all the data with refreshing function of browser.

7.1 Quick function

The component provides quick features such as attention list, viewing history, link sharing, and so on, so you can better manage your industrial asset data.

7.1.1 Set Attention Node

After you add a node that you often need to see as a node of interest, you can quickly locate the node through the list of concerns.

Add/ Remove Attention Node

You can add a node of interest in the following ways:

- On the node's detail page, click the button Attention in the upper-right corner. When the button changes to Unfollow, the node has been in the attention list.
- In the configuration tree on the left side of the Assets interface, click the button to turn on Attention Model. The attention button appears to the right of the node. When you click the button, the button changes from to , which means the node is been added to the attention list. As shown in the figure below. When you are finished setting, click to exit the Attention Model.

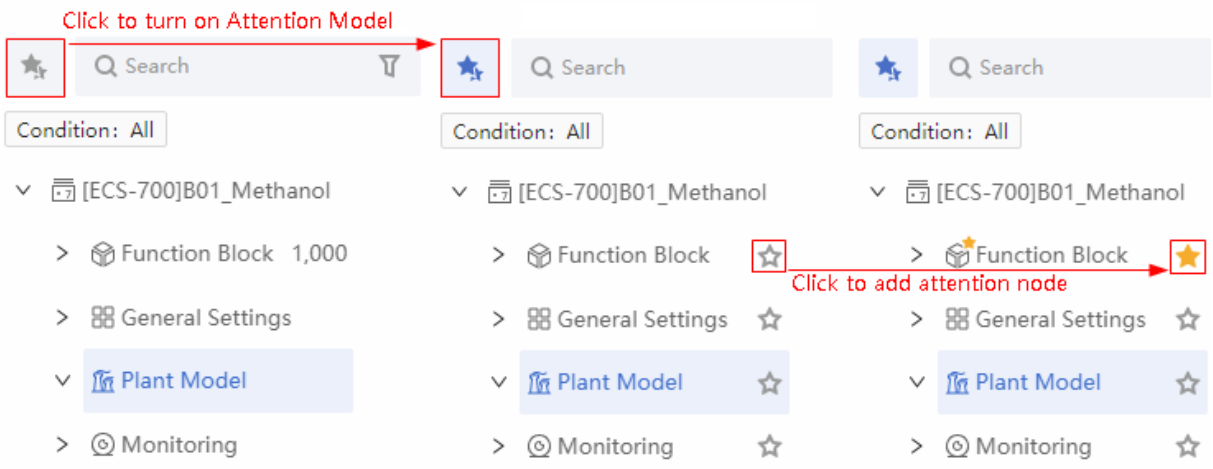


Figure 7-2 Set the node of interest

You can remove the attention node by:

- On the node's detail page, click the button in the upper-right corner Unfollow. When the button changes to Attention, the attention is removed.
- In the configuration tree on the left side of the Assets interface, click the button to turn on Attention Model. The attention button appears to the right of the node. When you click the button, the button changes from to, which means the attention node has been removed. When you are finished setting up, click to exit the Attention Model.
- In the follow list shown in Figure 7-3, click the button to remove the attention node directly.

View Attention List

- A yellow signal marker appears on the node icon, for example, to quickly locate the node in the configuration tree.
- Click the button at the top right of the page to open the focus list, which displays the attention nodes for the current project group. Click a node in the attention list to view the node's detailed page.

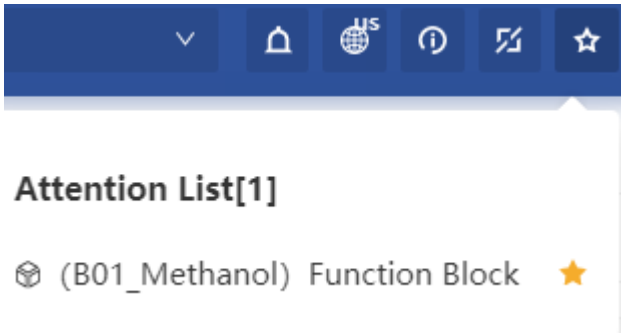


Figure 7-3 Attention list

7.1.2 Share Link

1. Select a node in the configuration tree and the detailed page of the node is displayed on the right.
2. Click the **Share** button at the top right of the detail page and a link to the detail page appears in a pop-up dialog box.
3. Click the **Copy Link** button and the link will be copied to the computer's clipboard, which you can paste to share with other users. Under the same network, any member who obtains a link can access the node and the link is valid for 7 days.

Tip:

You can view the information for that node detailed sub-tab in a new browser page by clicking on the link directly.

7.1.3 Historical View Record

Under the Assets in Control node, click the button to the right of the search box to view the recently browsed node records in the pop-up information box, as shown in Figure 7-4. The maximum number of history records is 20. You can click a node to jump to the detailed page for that node

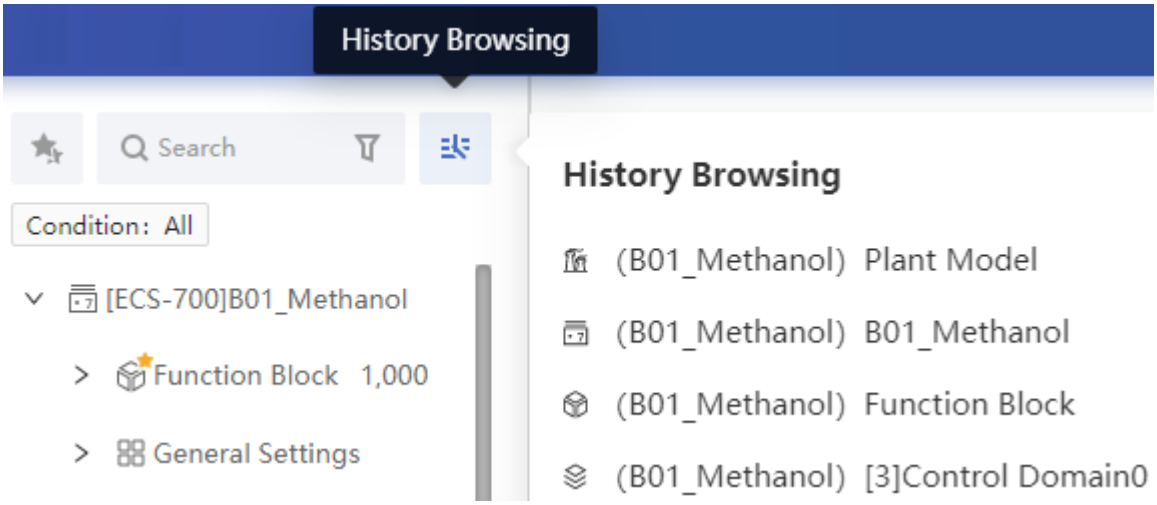


Figure 7-4 Historical view recodes

7.2 Pubic Tabs

In the asset data area on the right, there is a public tab:

Remarks: it is used to record the information related to the asset node. The length cannot exceed 1,024 characters.

7.3 Function Block Data

All the instances of function block in the current system are displayed in **Function Block**. The structure of the tree list in this node is **Function Block Base > Function Block Type > Function Block Instance Tag**.

- Select a function block library, the list will unfold and type of function block and the instances of the type will be displayed under the node name. Select a type of function block, the basic parameters, extended parameters and remarks will be displayed on the right.
- If you select a type of function block, the instances of this type will be displayed in the node name, and the form of the name is "[control domain address.control station address]instance name(description of the function block)". As shown in Figure 7-5, if you select an instance tag of function block, the function block parameters, basic parameters, extended parameters, alarm parameters, macro, reference, signal flow diagram, meterloop, config audit, configuration operation log, defects and remarks will be displayed on the right.

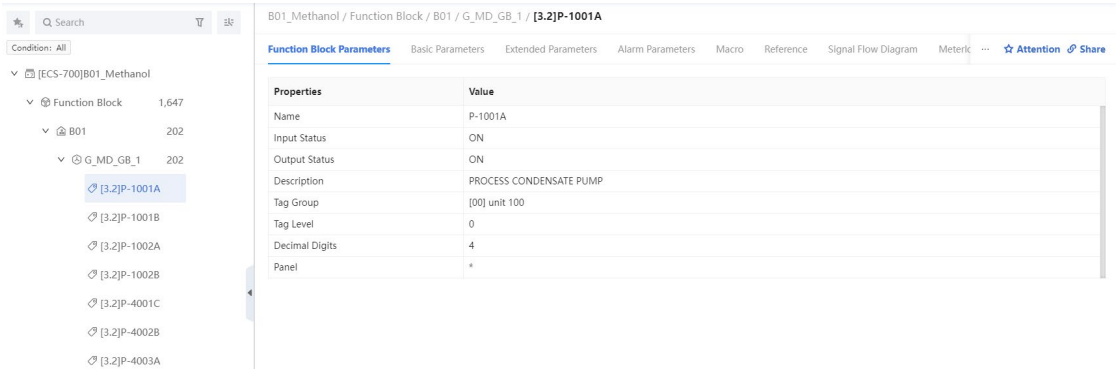


Figure 7-5 Information of function block instance (example)

- Function block parameters: it is used to display the contents of **Function Block Properties** in FBD configuration.

Tips:

If you modify the properties of function block in control system configuration, including tag name, tag group, tag level, decimal digits and panel, please execute Compile and Save to Configuration Server operations in High-performanceHMI component, and recollect configuration data in Integrity component through Config. After collection, the latest data will be displayed on the page of function block parameters.

- Basic parameters: display the contents of **Basic Parameters** in FBD configuration.
- Extend parameters: display the contents of **Extended Parameters** in FBD configuration.
- Alarm parameters: display the alarm parameters of ENALM pin configuration.
- Macro: display the contents of **Macro** in FBD configuration. If there is no Macro in the dialog box of function block properties, no data will be displayed in this page.
- Reference: display the relationship between the pins of the current function block and the pins of other function blocks. And the relationship of data is indicated by arrow. For example, **Reference→Current Object** indicates that the function block or the graphics in **Reference** uses the data of the current object.
- Signal flow diagram: display the data flow relationship between function blocks. For details please refer to "Signal Flow Diagram".
- Meterloop: display a signal flow diagram from the field instruments to the system logic programming design. For details, please refer to "Meterloop".
- Config Audit: the node selected has configuration audit records, and the records are displayed in this tab. For example, if you select a tag node, the config audit records of the tag will be displayed in this tab. If a function block pin changes, the software will generate a record for this function block. "Function block name" or "Program name: internal function block name" will be displayed in **Object**.
  (Note: only text records are displayed in this tab, for graphics records please refer to "Viewing Audit Records")
- Configuration Operation Log: Displays the operation log in the control system configuration software, including the operating time, object, description, type, and so on.

- Defects: it means the node selected has configuration defects, and the defects records are displayed in this tab. For example, if you select a tag node, the defects records of the tag will be displayed in this tab.

- The function block which is already instantiated in DCS configuration but has not been named will not be displayed in the tree list. But the unnamed function block of SIS configuration will be displayed in the tree list. You can manually add icons in signal flow diagram, and build relationship with other function blocks. For details please refer to "Custom Node Management".

7.4 General Settings

Tips:

This node is displayed only when the software is used with OMC system.

This node shows the global configuration of the system, including four sub-nodes: global default settings, unit, security, and alarm priority, as shown in Figure 7-6. Every node has a **Remarks** page in which you can add remarks.

- Global default settings: the global default settings of configuration and clock synchronization server settings are displayed in **Properties**, and the defects data of the configuration whose defect type is system structure is displayed in **Defects**.
- Unit: used to display all the available units in the configuration.
- Alarm priority: used to display alarm level and its settings.
- Security: The tag level that requires secondary confirmation when changing values through the panel in HMI. The configuration of electronic signatures is displayed under Security.

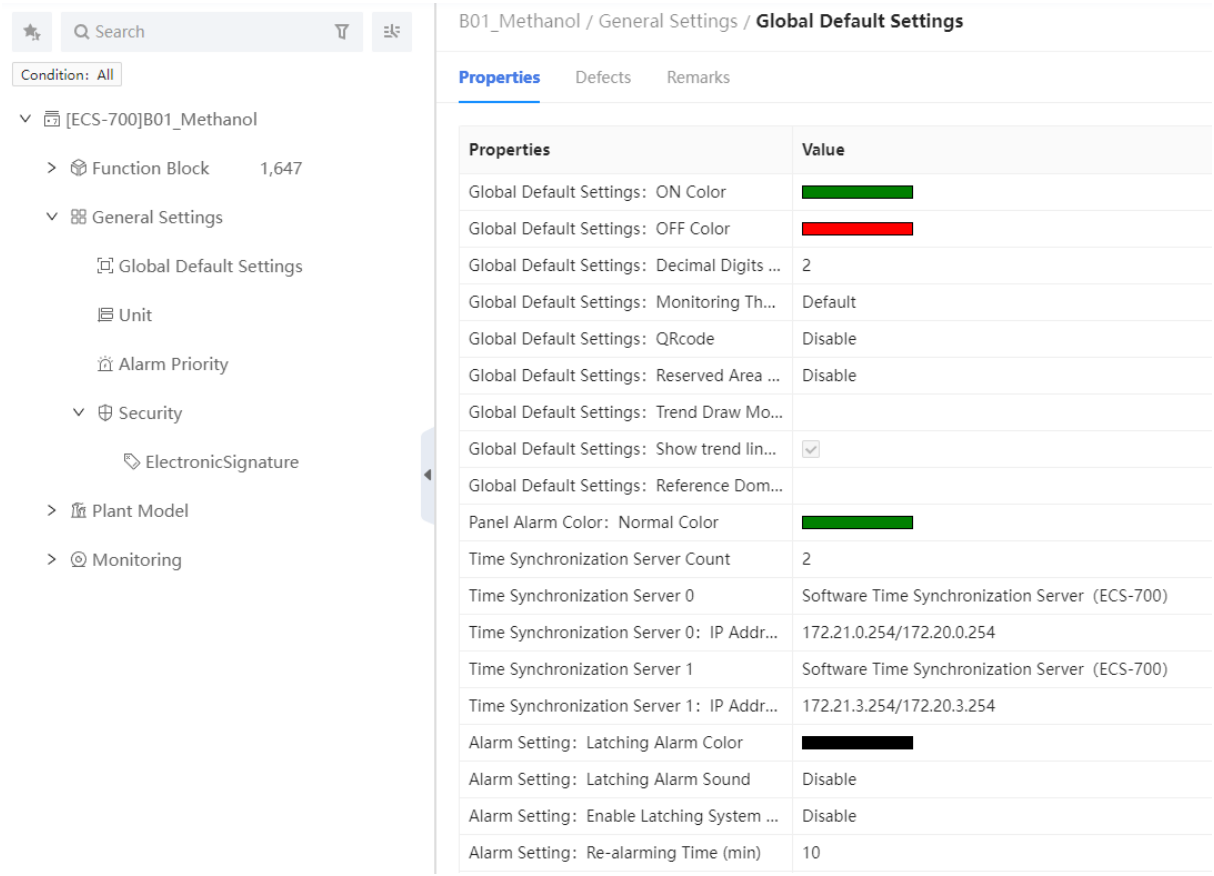


Figure 7-6 Details of general settings (example)

7.5 Plant Model

This node displays assets related to control logic and hardware configuration in the system, such as data from the control domain in DCS system configuration. Select "Plant Model" node, the right area displays the number of used tags for each control station (counted by signal tag type or module type, separately counting SOE signal tags and fast cycle signal tags). As shown in Figure 7-7, Click on the control station name and you can jump to the corresponding node.

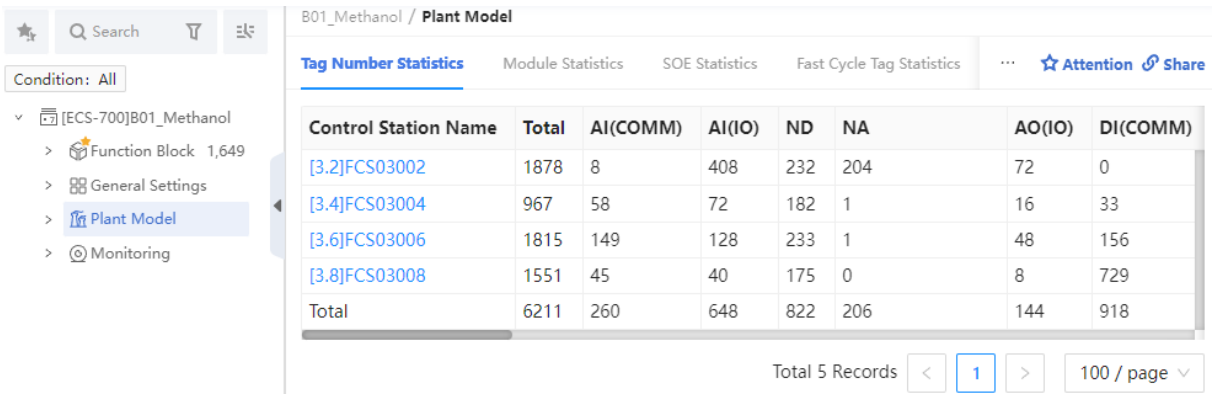


Figure 7-7 Plant Model node (for example)

Under "Plant Model" node, the hierarchical structure of the tree list is "Control Domain > Control Station > I/O Connection Module (or Communication Module) > Rack > I/O Module". For example the interface of control station node is shown in Figure 7-8.

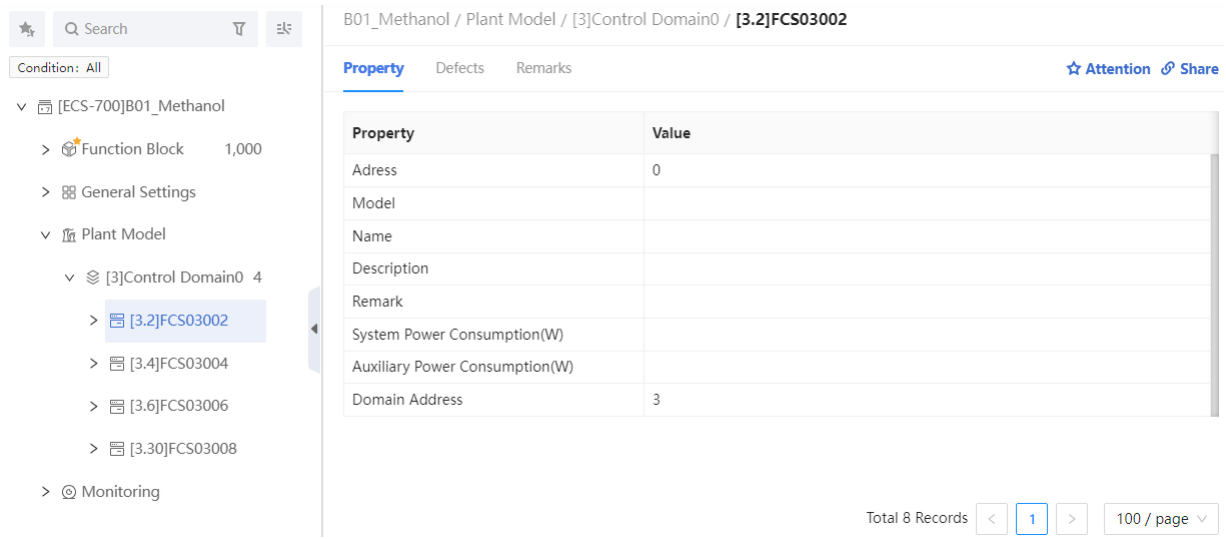


Figure 7-8 Sub-node information of plant model (for example)

- Select a control domain node, its basic properties and signal groupings are displayed on the right.
- Select a control station node, the controller modules below the control station and their property parameters are displayed on the right.
- Select a control station node, these types of sub-nodes are available in the expanded list:
  - I/O connection module (or communication module): Selecting a module and its properties are shown on the right. Continuing to select sub-nodes, you can view the rack properties. The lowest-level node is the I/O module and you can view the module properties and the tag list on the right after you select a I/O module. By clicking on the signal name in the list, you can jump to the detailed information page of that signal.
  - Tag list: Expand the node and the name of the sub-node is "Signal Type (Quantity)", in which you can view all the tags contained within the controller. As shown in the figure below, select a tag and you can view its detailed information on the right, such as basic parameters, alarm parameters, signal flow diagram, meterloop, defects, config audit and so on. If there are corresponding user manuals for the rack and I/O modules involved in the control configuration, the "Hardware Manual" tab will appear here, in which you can read the PDF documentation. On the Reference page, you can know which functional blocks or process diagrams reference the signal and view the direction of data flow. For details about Signal Flow Diagram and Meterloop, please refer to "Signal Flow Diagram" and "Meterloop" respectively.

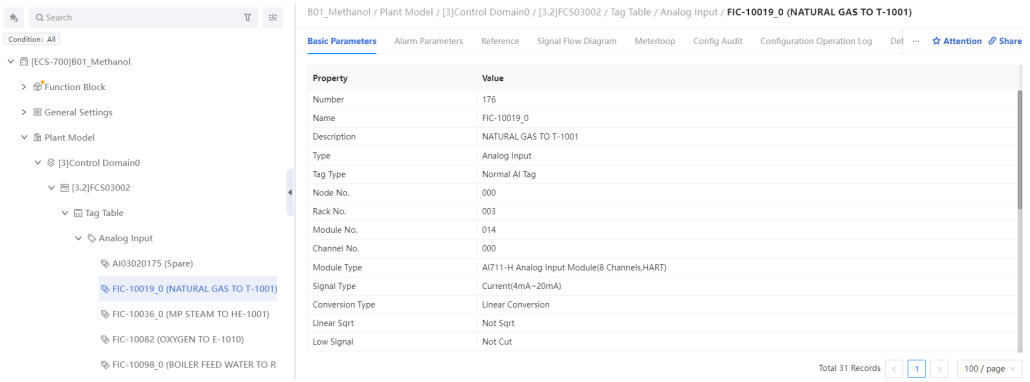


Figure 7-9 Tag Properties Page

- Program set: Expand the node and you can see user programs. Select a program to view its basic properties, config audit, configuration operation log and so on,

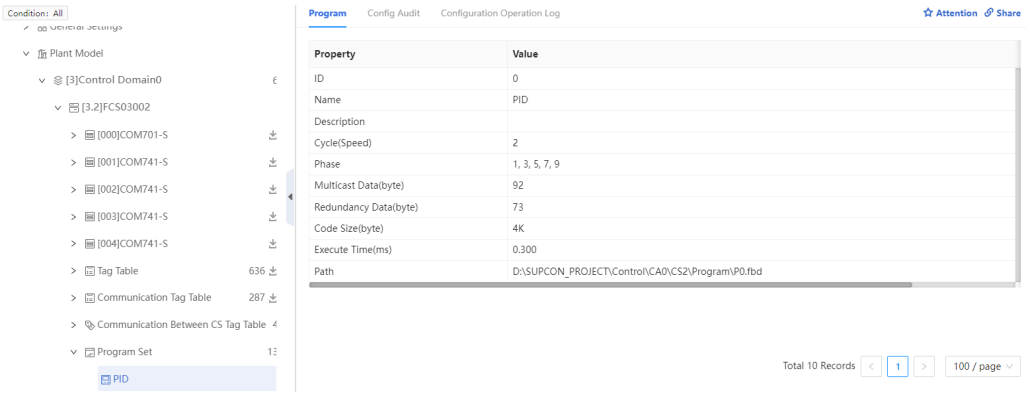


Figure 7-10 Program Properties Page

- Typical loop: Displays information on typical loops under this controller, whose sub-node is the typical loop type. Each loop is named as the key node and is used to view relevant typical loop and defect information related to the key nodes.
  As shown in the figure below, there is a single loop under this controller with the PIDEX functional block as the key node, so the loop node named after the functional block signal name can be found under the "Single Loop" node in the left tree. Select the loop node in the left list, you can see the typical loop diagram for that single loop on the right. Please refer to "Signal Flow Diagram" for detailed page operations.

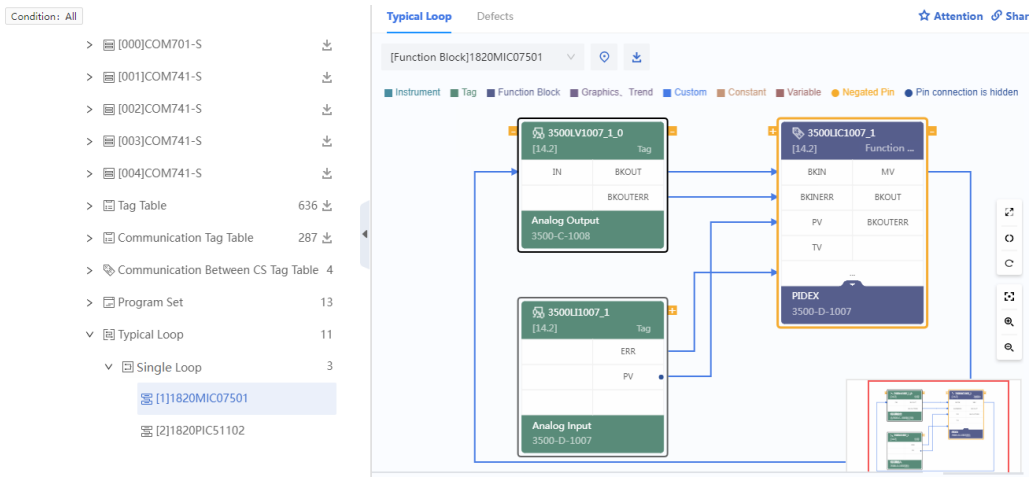


Figure 7-11 Typical loop (single loop for example)

In a typical loop, if there are any signal nodes connected to other nodes, clicking the expand button "+" above the block diagram will expand the corresponding nodes, but the nodes within the typical loop will be highlighted. As shown below, the darker part of the block diagram (right side) is the typical loop, while the lighter part (left side) is non-typical loop nodes.

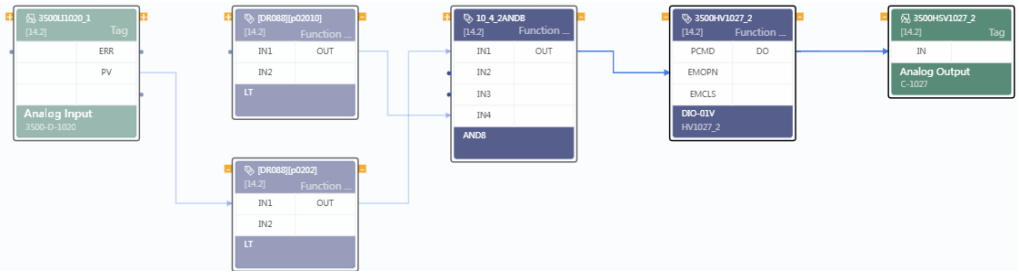


Figure 7-12 Display Differences of Nodes in Typical Loop

7.6 Monitoring

Tips:

This node is displayed only when the software is used with OMC system.

This node shows the asset related to the monitoring configuration of the master computer, such as operation domain data in DCS configuration. Select an operation domain, the name, description and alias of operation domain will be displayed on the right. The tree list has three sub-nodes.

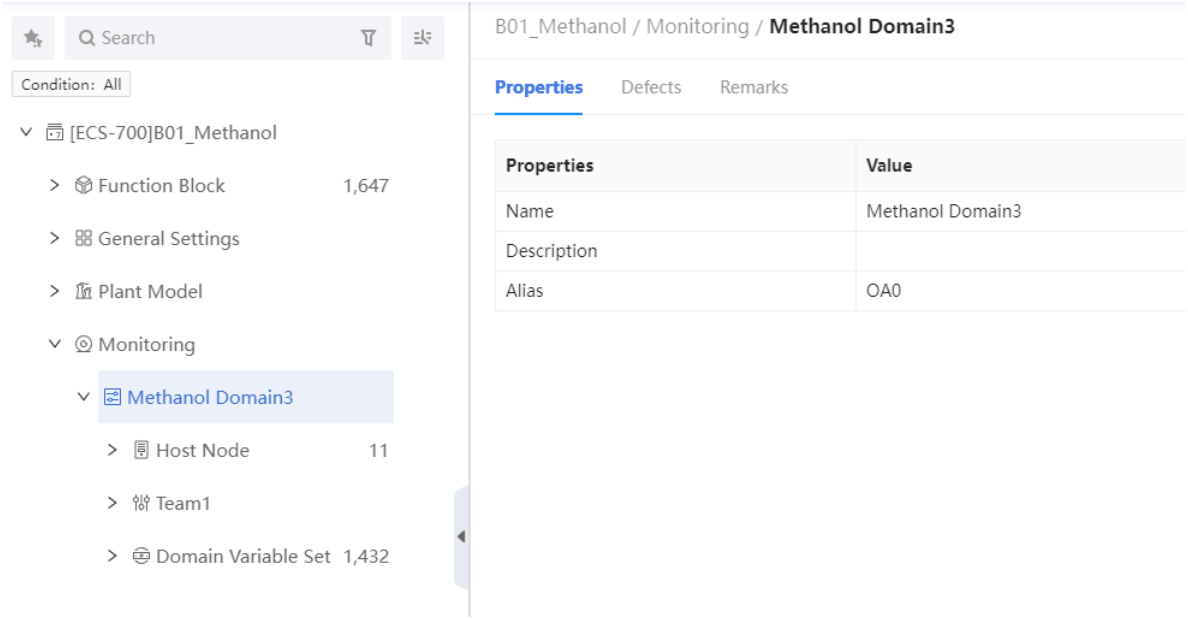


Figure 7-13 Information of monitoring (example)

7.6.1 Host Node

The interface displays system security information for the host, including the information of all servers and operation nodes. Select this node and select a host in the expanded list, and then you

can view the **Property** tab on the right, which shows the host name and address settings for the control network, and other tabs **OS**, **Event**, **Software Update**, **Windows System Patch** and **Black and White List** display the data from ISMP software, such as system event, operation event, intrusion event, software version, Windows patch lists, virus library version (blacklist) and the whitelist file for antivirus.

- If there is a software version that is not updated, the **Software Update** tab text appears in green and an update mark appears. In the tab, you can know information about software, such as the software name, installed version, installation date, the latest version, release date, and software vendor.
- If there are unupdated patches for Windows, the **Windows System Patch** tab text appears in yellow with an update mark appears. In the tab, you can know information about Windows patch, such as the patch name, security level, release time, patch size and installation status.
- If there is a blacklist or whitelist that is not updated, the **Black and White List** tab text appears in green and an update mark appears. In the tab, you can know name of black and white list. The update mark will appear on the left side of the list name that needs to be updated.

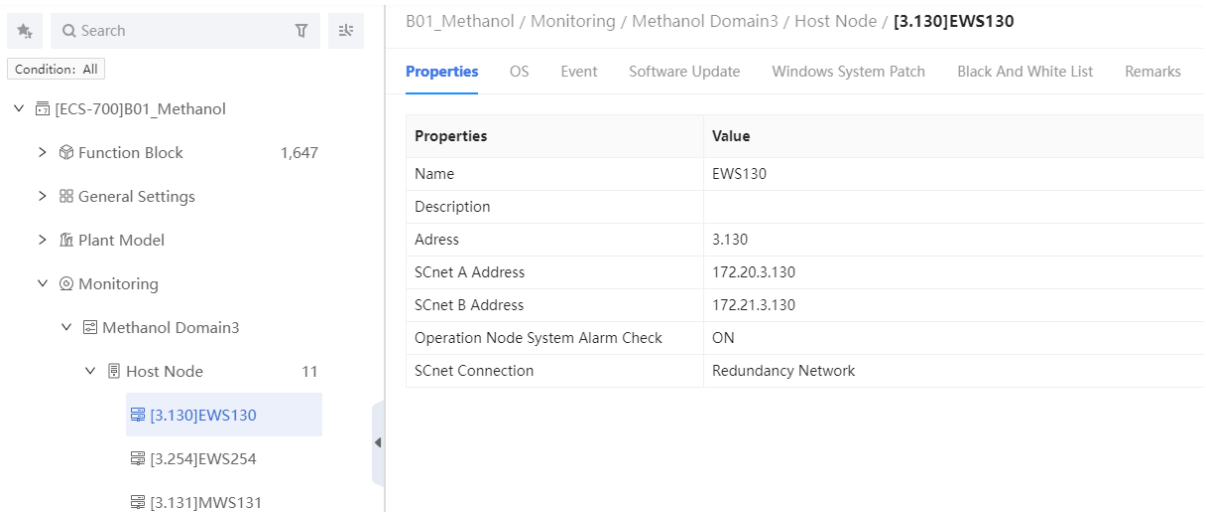


Figure 7-14 Host node

7.6.2 Team

It includes two sub-nodes, which are **Graphics** and **Trends**. You can select a graphics or a trend to view the tag information, and you can switch to the detailed page of tag by clicking the tag name.

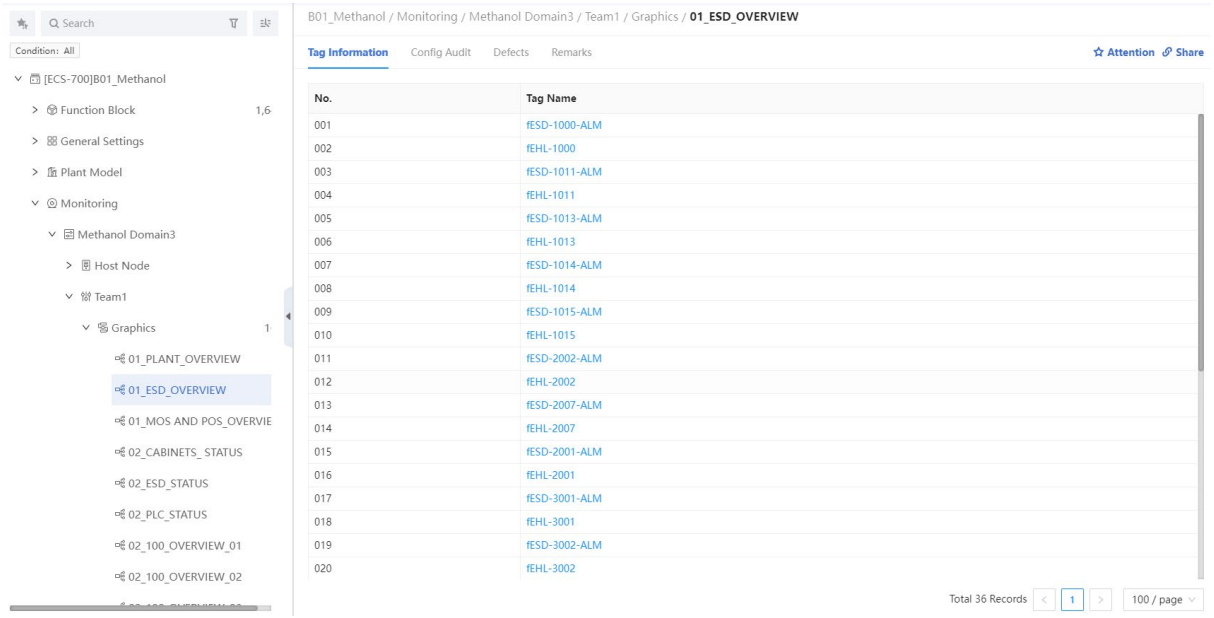


Figure 7-15 Node information of operating group (take graphics as an example)

7.6.3 Domain Variables Set

It shows all the domain variables and their details below the operation domain, including string variable, analog variable, digital variable, extended configuration variable, alarm count variable and so on. You can select a domain variable to view its basic properties and alarm properties. (There is no alarm information for String domain variable.)

Tip:

If Integrity is used with OMC system, and the configuration data of TCS-900 is connected to OMC system, only configuration data of OMC system will be displayed in Integrity.

7.7 Signal Flow Diagram

After Integrity has parsed the project configuration, it will display the signal flows among assets according to the logic data flow, and generate a signal flow diagram to display the reference relationship and data flow between assets.

You can find the "Signal Flow Diagram" tab on the right side of the page by selecting either of the following two methods:

- In the configuration tree, select: Functional Block > Function Block Library > Function Block Type > Function Block Instance Tag.
- In the configuration tree, select: Plant Model > Control Domain > Control Station > Tag List or Typical Loop.

In the signal flow diagram, you can click the fold/unfold button to hide/expand the links, and you can also add custom nodes.

Figure 7-16 shows the contents of **Signal Flow Diagram** of a tag, and this section will take this as an example to introduce.

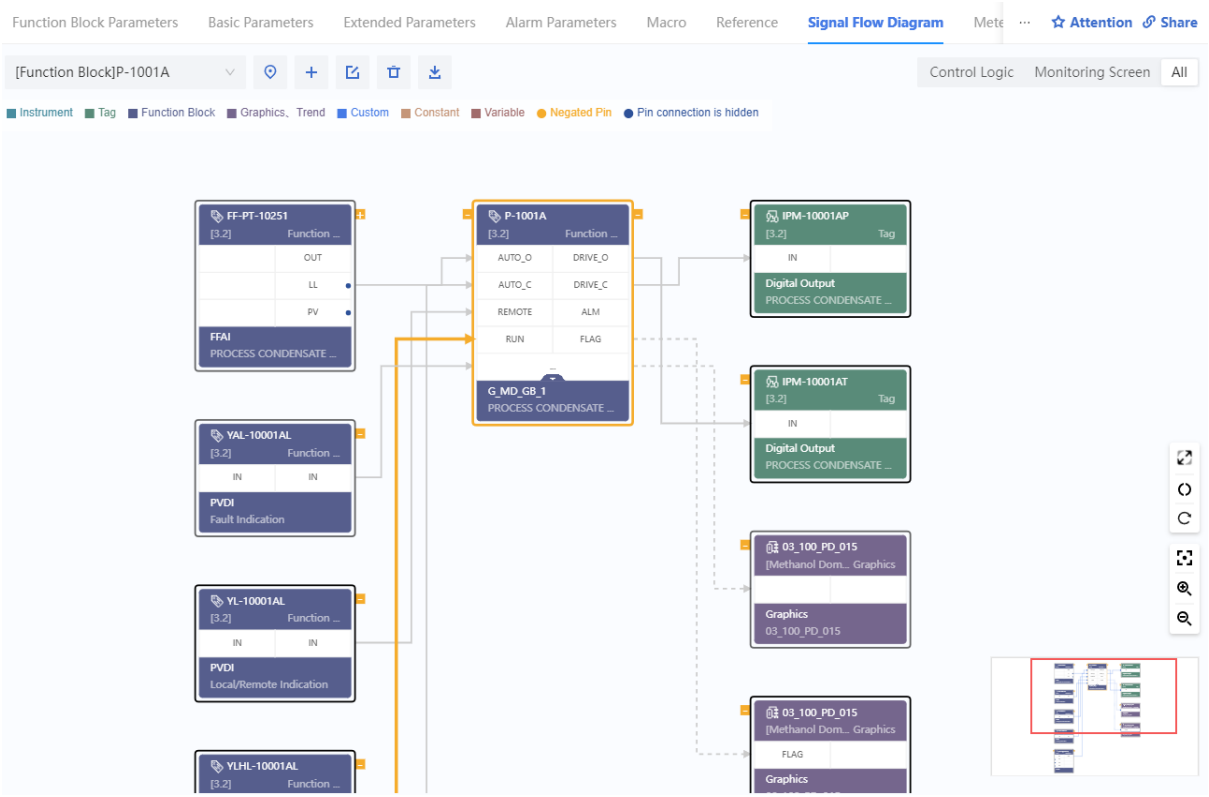


Figure 7-16 Signal flow diagram (example)

7.7.1 Page Introduction

Signal flow diagram mainly includes field instrument, channel tag, function block and function block tag, graphics and trend, etc. And they are showed in different colors.

Node Type

For the different node types of different colors, please refer to the legends above. Detailed description is shown in Table 7-1.

Table 7-1 Relationship of asset type and graphics color

Label	Color	Node icon example	Applicable to
Field instrument		Instrument tag	DCS (OMC)
Channel tag of I/O module		I/O tag	DCS (OMC), SIS (TCS-900, Tricon)
Calculation module (for example: function block and function block tag)		Function block tag	DCS (OMC), SIS (TCS-900, Tricon)
Display module (for example: graphics and trend)		Graphics	DCS (OMC)
Custom asset (custom nodes added)		-	DCS (OMC), SIS (TCS-900, Tricon)
Constant data		Constant	SIS (TCS-900)
Variable data		Variable	SIS (TCS-900, Tricon)

Label	Color	Node icon example	Applicable to
Negated pin (BOOL type data in general, pins with marks will take negation and add data to the internal logic to calculate after receiving data)		b_out1	SIS (TCS-900, Tricon)
Pin connection is hidden		AND	DCS (OMC), SIS (TCS-900, Tricon)

Node Diagram

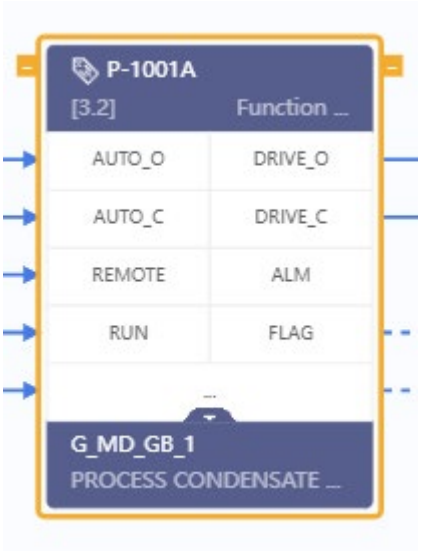


Figure 7-17 Function block

Take the FBD above as an example, node diagram can be divided into three levels from top down.

- First level: name, superior level and type of node.
- Second level: input pins and output pins of the node. If there are more than 5 pins on one side, they will be hidden. You can view them by clicking below **...**.
- Third level: subdivision type of the node and its description, such as tag type or function block type name.

  If it is an instrument node, the information displayed at the third level can be either of the following:
  - Instrument information comes from the meterloop imported: it displays the name of imported file package.
  - Instrument information comes from IDM component: it displays manufacturer of the field instrument and the corresponding protocol.
- You can right-click node diagram to view details of the tag, including basic parameters, alarm parameters, function block parameters or tag information related to graphics. You can view different parameters in different nodes.

Unfold/Fold Button

If you enter signal flow diagram, the page only shows the node diagram and signal flow related to the current node, as shown in Figure 7-18. If there is a blue dot on the right of the data name (such as the input pin CSV of SPLIT function block), this node has hidden connection with other nodes. You can click the unfold button **+** to display connections of the current node with other nodes; and you can click fold button **-** to hide the connections of the button side.

When all the hidden nodes and connections are unfolded, you can have a full view of system signal flow through signal flow diagram.

Reference Relationship Line (Link Line)

It represents the flow of signal or data. The line will become red if you select it. The typical signal flow is "Field Instrument → Input Module → Calculation Module (Function Block for example) → Output Module → Field Instrument". The corresponding module (such as trends and graphics) may be shown in the diagram.

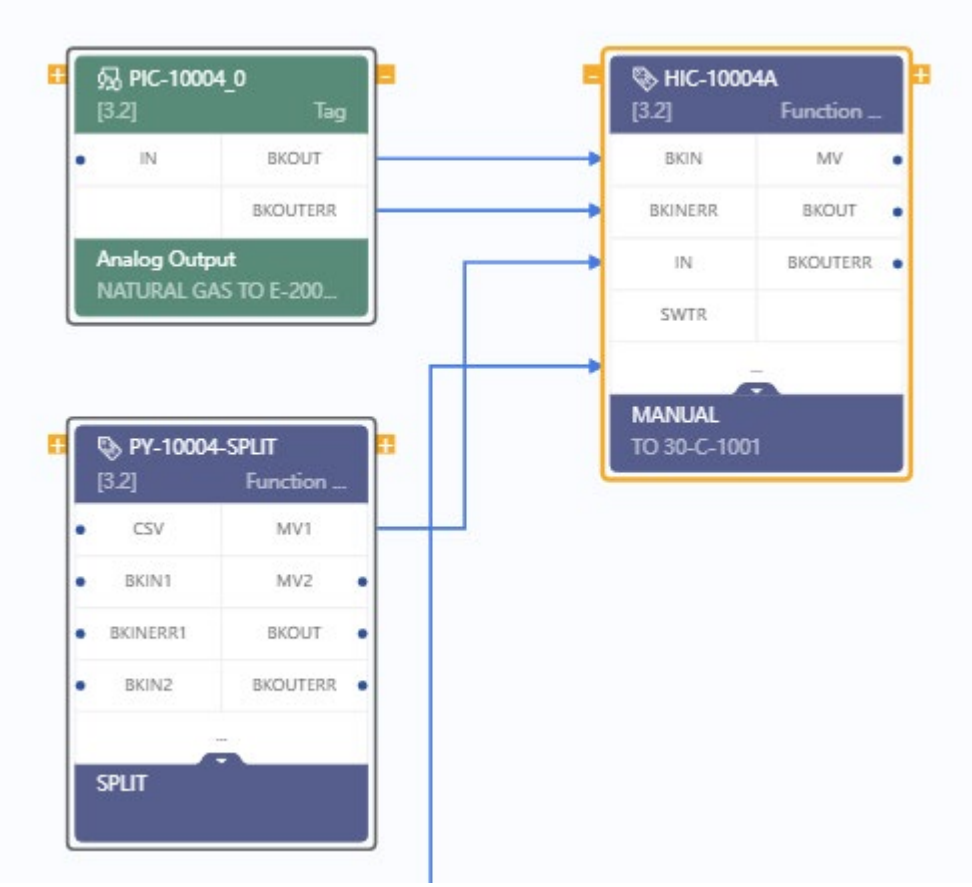


Figure 7-18 Signal flow diagram (partly)

In signal flow diagram, different node diagrams are connected by lines with arrows, to indicate the reference relationship and data flow direction between different asset nodes. Solid lines represent the flow direction of the signal, while dotted lines represent the reference of data by modules.

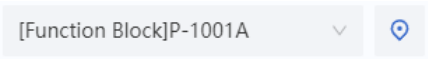
Tips:

Except signal flow diagram, you can also view the description of the table in Reference of the tag. But in Reference, the direction of the arrows that indicate reference relationship is in opposite to it on signal flow diagram. For example:

- **In Reference, "Reference→Current Object" means that function blocks or graphics in Reference refer to the data of current object.**
- **In Signal Flow Diagram, "Current Node Diagram→Next Node Diagram" means that next node refers to the data of current node.**

7.7.2 Auxiliary Buttons

Auxiliary buttons include selection and location of node diagram, custom node management, export button and navigation tree on the right.

Selection and Location of Node Diagram 

It is on the top of the page, and the drop-down selection box displays all the diagrams. Select a node diagram, and then the diagram will be displayed at the center of the page.

Click the Navigation button to quickly locate the current node in the diagram, that is, the currently selected tag, function block, or typical loop node in the configuration tree.

Custom Node Diagram Buttons

It is on the top of the page, from left to right:

- Add: add a custom node. For details, please refer to "Custom Node Management".
- Edit: you can select a custom node, and click this button to modify properties of the node diagram.
- Delete: you can select a custom node, and click this button to delete the node diagram.

Export

Save the current signal flow diagram as a .png file.

Show/Hide Real-time Data

Preparation: go to **Config > Data Collection > Configuration Data**, click **Edit** in **Operation**, and enable **Real-time Update** in the pop-up dialog box. If it is disabled, **Real-time Data** will not be displayed on **Signal Flow Diagram** page.

This is only applicable to DCS, and it is off by default. If it is enabled, the real-time value of pins of the function block node will be displayed, as shown in the figure below.

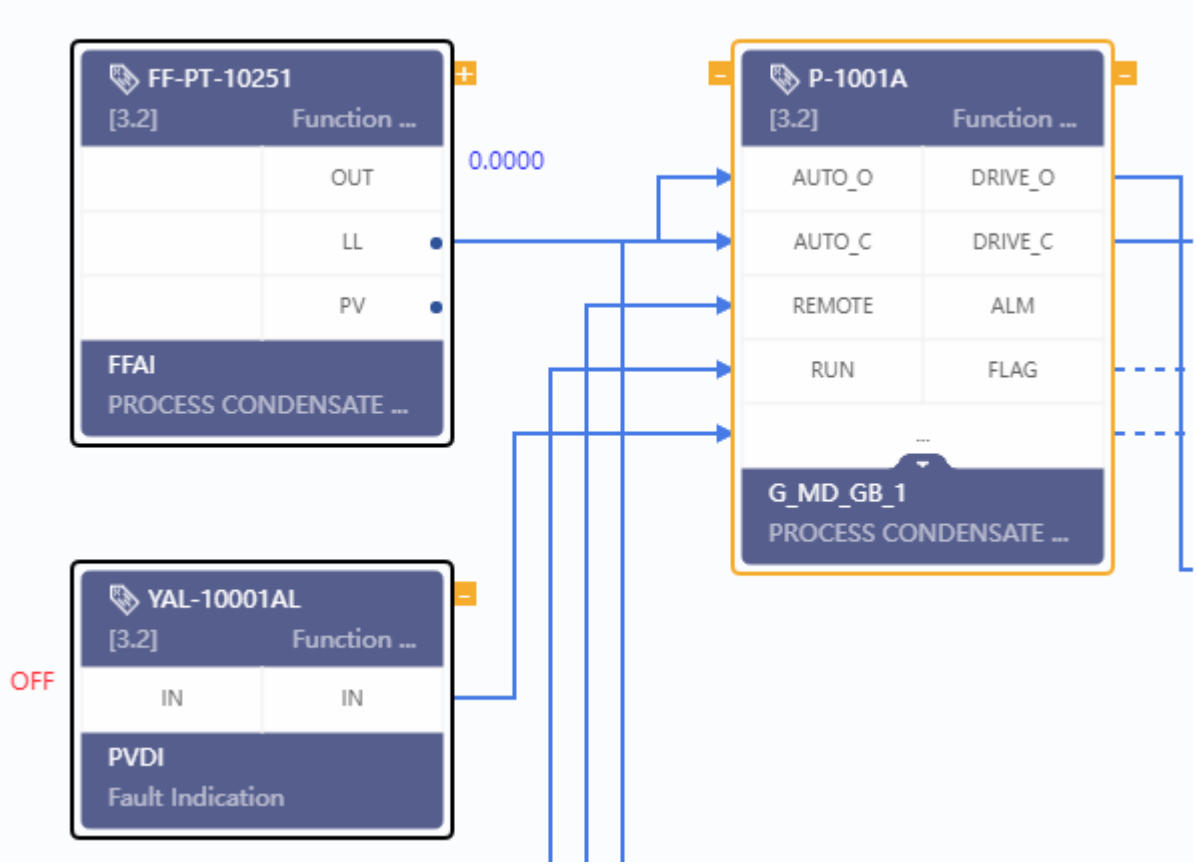


Figure 7-19 Enable real-time data

Node Filters

It is only applicable to DCS, and is used to filter the node diagrams displayed on the page. The logic of filtering is shown as the table below, √ means displayed, **-** means not displayed.

Table 7-2 Node types displayed with different filter conditions

Filter Condition / Asset Node Type	Logic Control	Monitoring Screen	Total
Field instrument	√	-	√
Channel tag of I/O module	√	√	√
Calculation module (for example: function block and function block tag)	√	√	√
Display module (for example: graphics and trend)	-	√	√
Custom asset (custom nodes manually added)	√	-	√

Navigation Buttons

Navigation buttons is on the right of the picture, and the functions of buttons are shown in Table 7-3.

Table 7-3 Icons of navigation tree

Icon	Button Name	Illustration
	Full Screen	You can click this button to enter full screen mode; in full screen mode, you can click this button again or click × button on the top of the page to quit full screen mode.
	Restore	Click the button, and the page is restored to the status when you first enter it.
	Remove Highlights	If you select a diagram, its frame will change from normal status (black) to highlighted status (earthy yellow), and lines will change from normal status (blue) to highlighted status (red). You can click this button to cancel all the highlighted status in the picture.
	Normal	Cancel zoom in or zoom out, and restore the scale to 100%.
	Zoom in	Zoom in the scale
	Zoom out	Zoom out the scale

Thumbnail

The thumbnail is in the lower right corner, and the part in the red frame is the contents of current page. You can view the contents by quickly moving the red frame.

7.7.3 Custom Node Management

For some assets that are not pre-defined, such as field instrument, I/O tag and function block instance, you can manually add asset node and build its association.

The steps of adding custom asset node are as follows. For operations of **Edit** and **Delete** please refer to "Common Operations".

1) Click **Add** + to pop up **Add Node** dialog box, as shown in Figure 7-20.
2) Set node name, superior level, location, type, description, and add at least one pin and its association.
3) Click **Save** after completing the configuration, custom node diagram will be displayed in signal flow diagram (sky blue, as shown in the lower left corner of Figure 7-16), but custom node will not be displayed in the asset tree.

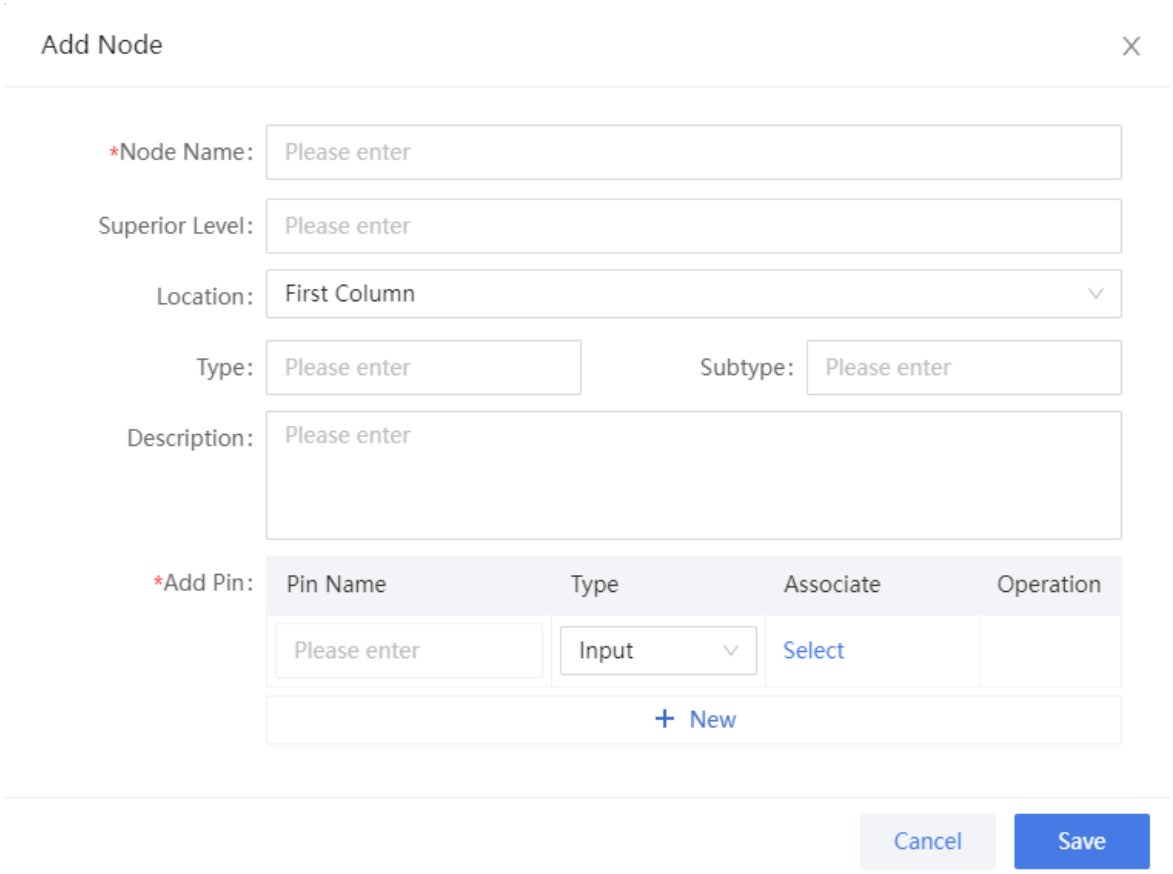


Figure 7-20 Add custom asset node

7.8 Meterloop

Tips:

Meterloop is displayed only when the software is used with OMC system.

After you imported a meterloop file to **Config**, Integrity will check the control loop of field instrument, forming a complete loop "Field instrument generates data--Auxiliary cabinet to input tag--Loop calculation to output tag--Output tag feeds back to field instrument", and displaying it on the meterloop page.

You can find the "Meterloop" tab on the right side of the page by selecting either of the following two methods:

- In the configuration tree, select: Functional Block > Function Block Library > Function Block Type > Function Block Instance Tag.
- In the configuration tree, select: Plant Model > Control Domain > Control Station > Tag List.

Figure 7-21 shows a **Meterloop** of a tag.

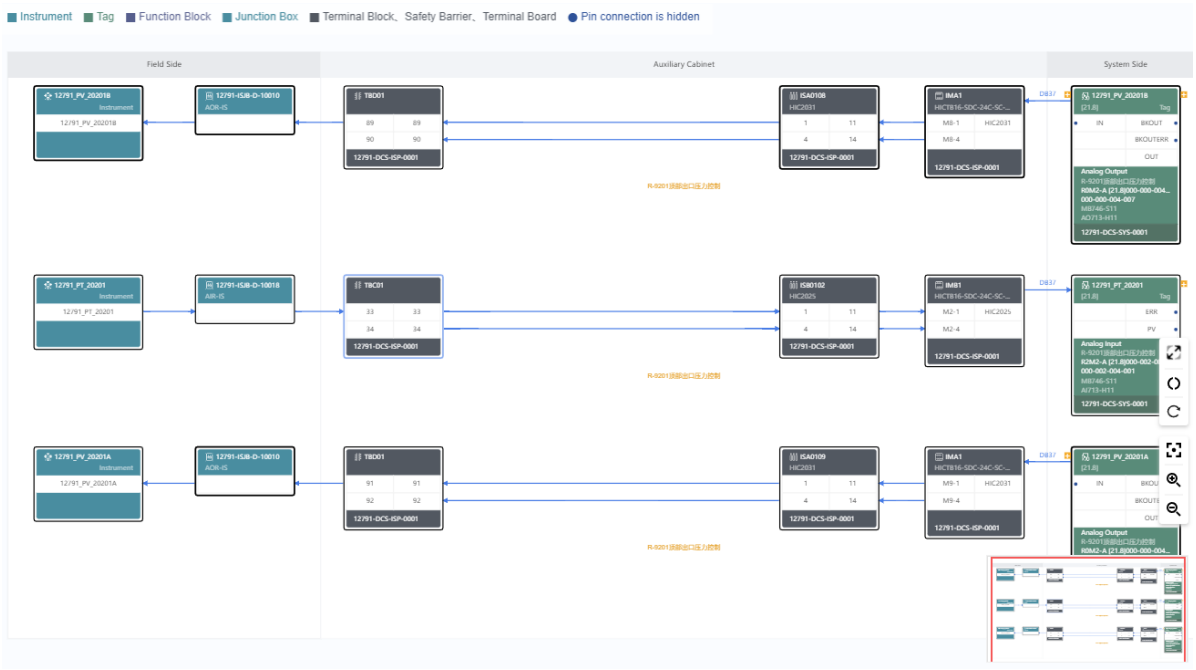


Figure 7-21 Meterloop (example)

7.8.1 Page Introduction

Meterloop is divided into three parts from left to right: field side, auxiliary cabinet and system side. Each part is composed of node diagrams in different colors, link lines and remarks. Node diagrams are connected by link lines with one-way arrow, and the direction of the arrow represents the flow of data signal.

Node Type

The relationship between node type and color of node diagram is shown as Table 7-4.

Table 7-4 Node type

Node type	Color	Description
Field side		Display field instrument and its data loop, including field instrument and junction box.
Auxiliary cabinet		Display modules including terminal line/surge, safety barrier/isolator/relay and terminal board.
System Side		Display the inter-program connection relationship of tags inside the project, including I/O tag and function block tag of I/O module. The color of node is same as the signal flow diagram

Loop Node

Similar to the node diagram in signal flow diagram, it is divided into three levels from top down, and different node displays different data.

Table 7-5 Nodes

Node Type	Node Name	Icon	Node Levels and Descriptions
Field side	Field instrument		● First level: system tag ● Second level: instrument tag
	Junction box		Display code and model of junction box
Auxiliary cabinet	Terminal blocks/Surge		● First level: code and model of device ● Second level: input pins and output pins
	Safety barrier/Isolator/Relay		
	Terminal board		
System side	I/O tag		● First level: system tag, control domain, and node type ● Second level: input pins and output pins ● Third level: tag type, description, address, related I/O module and base, system cabinet number
	Function block tag		● First level: system tag, control domain, and node type ● Second level: input pins and output pins ● Third level: function block type and description

Unfold/Fold Button

You can click unfold button **+** to display connections of the current node with other nodes; and you can click fold button **-** to hide the connections of the button side.

7.8.2 Auxiliary Buttons

Auxiliary buttons include selection and location of node, export and navigation buttons on the right. The methods of using buttons such as selection and location, show/hide real-time data, navigation buttons and thumbnail are similar to the signal flow diagram, please refer to "Auxiliary Buttons". Other buttons are introduced below.

Custom Node Management

It is on the top of the page, from left to right: add, edit and delete. For details, please refer to "Custom Node Management".

Export

Save the current meterloop as a .png file.

Display System Side Pins

It is on the upper right corner of the page, and is used to set whether to display details of pins. Take function block tags as an example, the results are shown in the figure below. If there are too many pins so that the control loop cannot be completely showed in the page, you can turn off this button to hide pins, as shown in Figure 7-22.

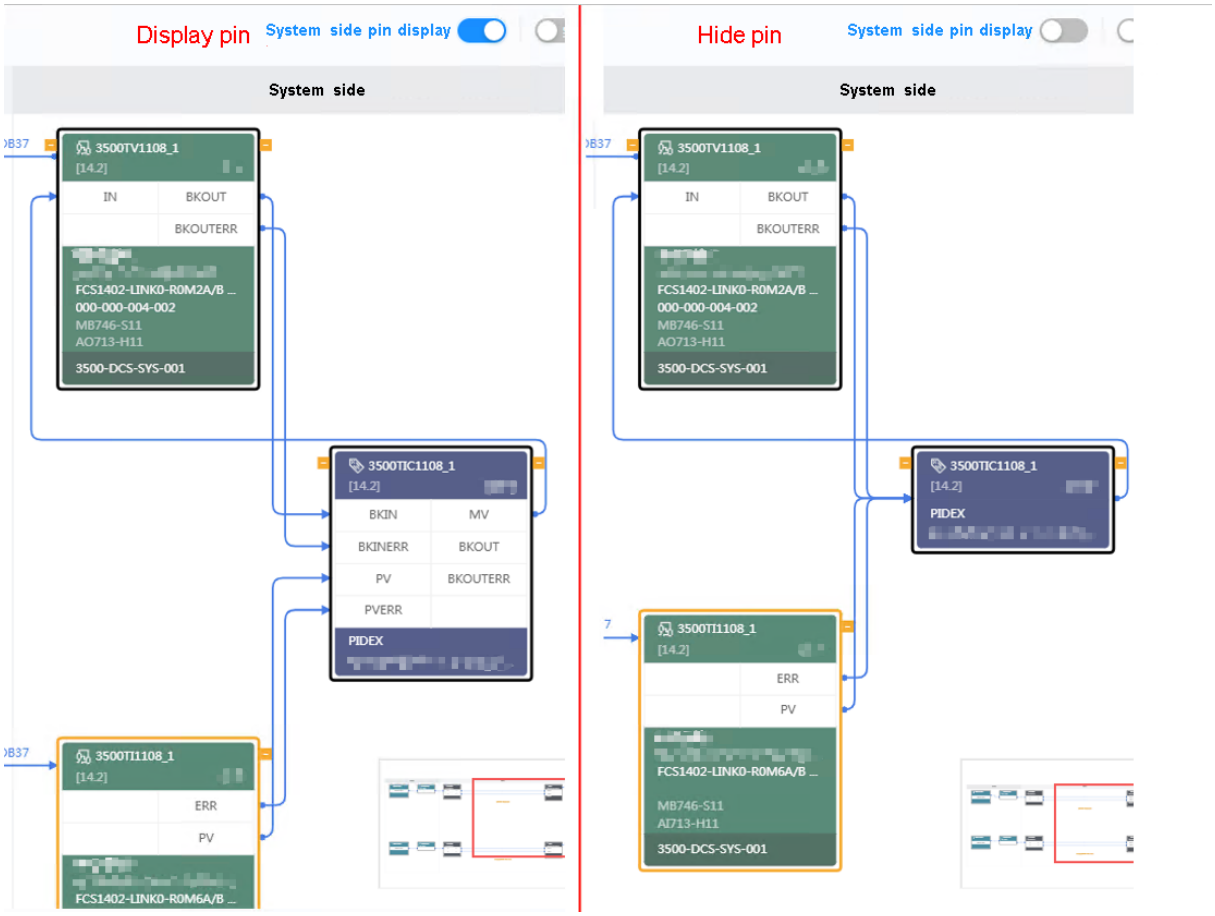


Figure 7-22 Enable/Disable pins display

7.8.3 Custom Node Management

In the following cases, you can manually add a node of auxiliary cabinet and build association using the + button on the top.

- Meterloop file has been imported, but a tag has no meterloop association. In this case, you can add a group of meterloop wiring table for the tag.
- Meterloop file has been imported, but a system side tag of meterloop has no instrument wiring table. In this case, you can add a group of meterloop wiring table for the tag.
- If the imported meterloop wiring table lacks a certain hardware information, you can add hardware device information.

Add Node

Click +, and select **Add Node** or **Add Instrument**.

- Add node: set node name, type, number and model, etc., and add at least one pin and its association. When you completed configuration, click **Save**, and the new node will be displayed in meterloop.
- Add instrument: select a I/O tag without wiring relationship, and click this button, configure instrument tag in **Add instrument wiring information**. Click **Save** when you

completed configuration. Then the new instrument node will be displayed on the field side, and a loop from field instrument node to I/O tag node will be added in the meterloop.

Example: analog output tag AO21020000 is an I/O tag without wiring association, so the **Meterloop** tab shows a blank page. Click + and select "Add Instrument" to add an instrument tag 2102_Dev_Out, the result is shown in Figure 7-23. The new instrument tag node is displayed on field side, and a link line appears between the analog output tag and instrument tag.

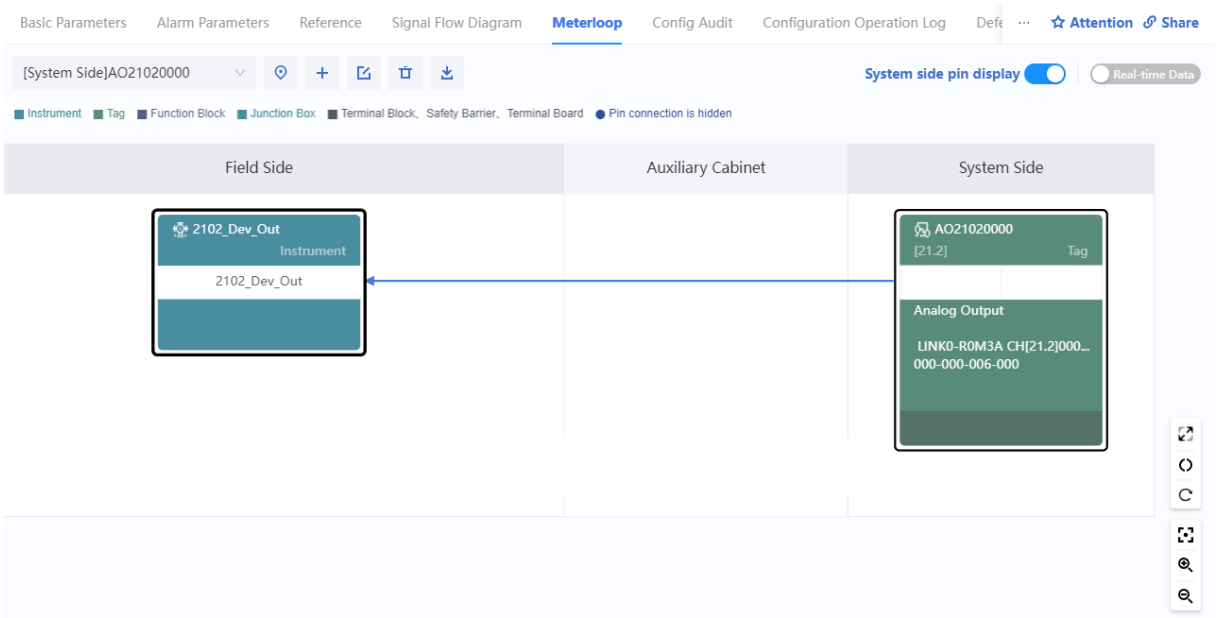


Figure 7-23 Loop after adding instrument

Edit Node

Select a node in meterloop, and click to edit node information.

Delete Node

Select a custom node, and click , then select **Delete Hardware Node** or **Delete Instrument Wiring Loop**.

- Delete hardware node: you can select a manually added auxiliary cabinet node, and click this button to delete this custom node.
- Delete instrument wiring loop: you can select an I/O tag node and click this button to delete this node and the meterloop related to it.

Tips:

If there is only one input tag and one output tag on a loop, the loop will be deleted after one of them is deleted.

Section 8 Baseline Audit

Integrity collects configuration data from control systems. Every time it successfully collects and compare the configurations through configuration auditing, if the configurations are different, it will add a collection record in **Change**. With field modification records, baseline audit function helps you eliminate any possible internal illegal modification.

Baseline Audit is used to audit and record the modification of the configuration. Integrity can automatically identify modifications of the configuration, and show the modifications and comparison results between new and old values for tracing.

Tips:

Each system has up to 10,000 records. If the upper limit is reached, the new record will overwrite the earliest record.

8.1 Auditing Rules

Every time Integrity successfully collects configuration, and finds that there are differences between two configurations collected through configuration audit, it will add a collection record in **Baseline Audit** and named it as "System Name-Collection Time" by default. After you entered baseline remarks, the collection record will become a baseline record.

Integrity determines configuration differences by following the rules below:

- OMC system:
  - Tag properties: if you modify basic properties and alarm properties of a tag, such as modifying tag group, enabling or disabling an alarm type, modifying alarm limits, it will create audit records. Tag type includes analog input, analog output, digital input, digital output, custom analog, custom integer and custom digital, but does not include page exchange analog, page exchange digital and page exchange integer.
  - Program: edit user program and function block, such as adding, modifying or deleting program; adding, modifying or deleting function blocks; modifying description, type name, ID or tag of function blocks; modifying location of function blocks; adding, modifying or deleting pins of function block, etc.
  - Operating team: audit records are generated when user modifying tag referenced by graphics, modifying tag referenced in static or dynamic properties of a graphic object, modifying tag referenced by trends. But modifying background template will not generate records.
- TCS-900 system:
  - Function block: modifying location of function block; adding, modifying or deleting pins of function block, etc.

- Tag: modifying basic properties and SOE parameters of tags. Tag type includes I/O variable, memory variable, operating variable, synchronization variable, communication variable, extended interstation communication variable, extended communication port variable.

- Tricon system:
  - Function block: modifying application type of function blocks; modifying location of function blocks; adding, modifying or deleting pins of function block, etc.
  - User program: modify application type of user programs.
  - Tag: modifying basic properties, display effect, pin parameters, upper and lower limits, alias of tags.

Tips:

You can customize rules by filtering the default rules, and deleting the audit item you don't need. For details, please refer to "Configuration Auditing Rules".

8.2 Viewing Audit Records

Select **Change** in the navigation tree to enter the baseline audit page, as shown in Figure 8-1.

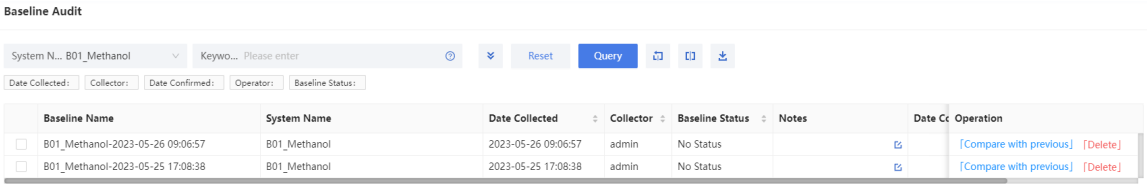


Figure 8-1 Baseline audit

If you need to view statistics of baseline audit records, please go to the home page (refer to "Home"). The following operations can be performed in the **Baseline Audit**:

- Query, advanced query and record export: refer to "Common Operations".
- Create a baseline: you can add or edit the notes for collection record by clicking in **Notes**. After adding the notes, **Baseline Status** will turn to **Baseline** from **No Status**, and that means this record becomes a baseline record. The time of editing baseline and information of operator will be displayed in **Confirmed Date** and **Operator**.
- Delete baseline: click the **Delete** button in **Operation** column, and click **OK** in the pop-up dialog box. Then the baseline and its configuration data will be deleted, and **Baseline Status** will turn to **No Status** from **Baseline**.
- Compare two baseline records: click **Compare with previous** in **Operations**, Integrity will compare the baseline selected with previous baseline according to the collection time. You can view details of adding, deleting and modifying configuration in the page after switch, as shown in Figure 8-2 and Figure 8-3.
- You can compare any two baseline records by checking on two baselines in the table and

clicking on the top.

- And you can view the last comparison result by clicking .

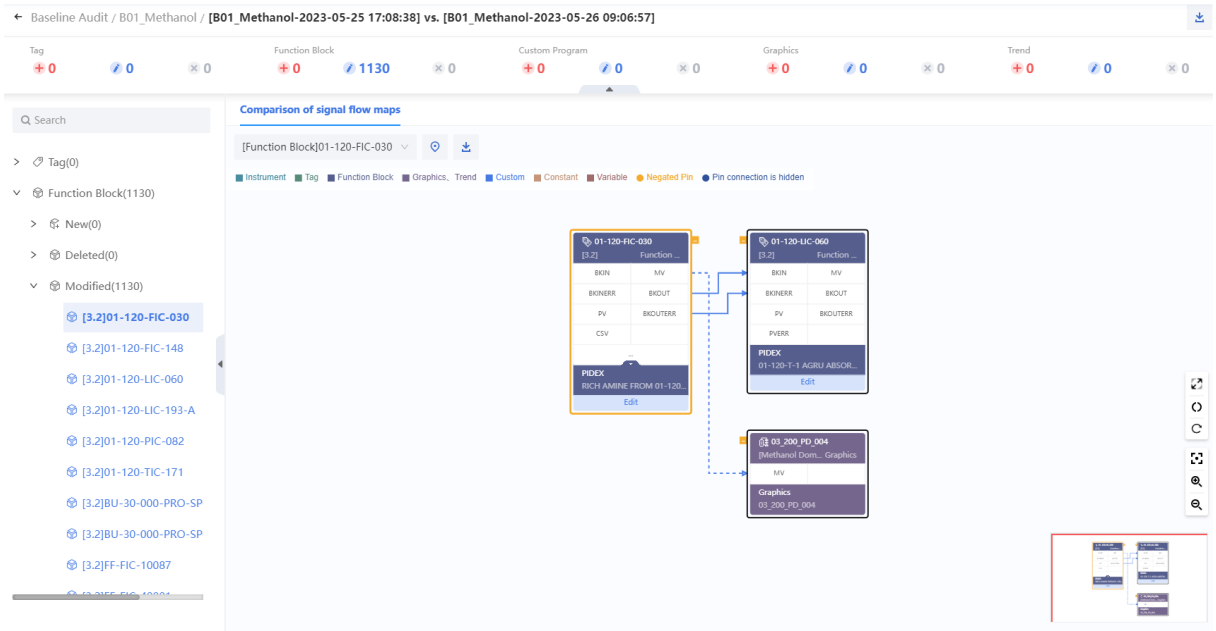


Figure 8-2 Baseline comparison result (signal flow diagram)

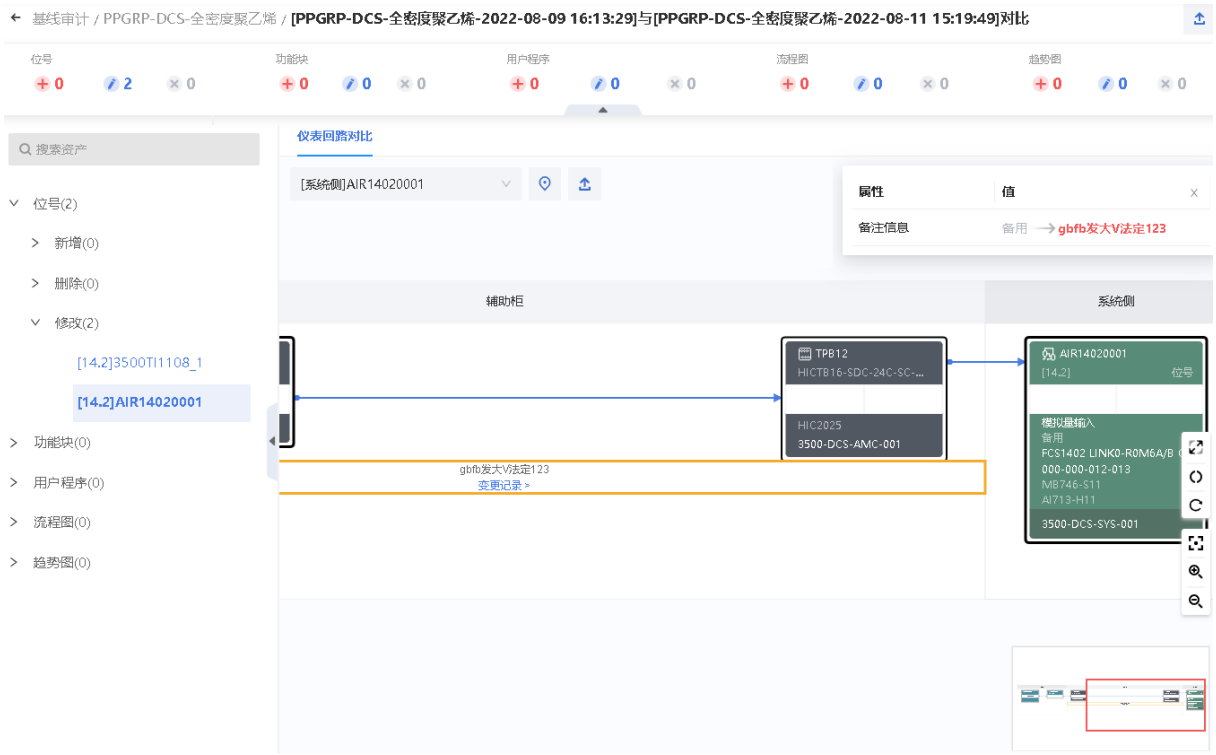


Figure 8-3 Baseline comparison result (meterloop)

Take OMC system as an example, as shown in Figure 8-2 and Figure 8-3. Modifications of tag, function block, user program, graphics and trend are counted by adding, modifying and deleting, and are displayed on the top of the page.

The left tree shows different configuration data. Select a node to view the configuration modification record on the right **Configuration Audit** page, comparing the old values to the new values.If you need to view the modification configuration operation time, operator and such information, you can switch to the **Configuration Operation Log** page to view the operation log of the control system.

When you expand the tree list on the left, you can see that each modified object, which is named as "Station address+Domain address+Object name". Select a sub-node, and details of modification will be displayed on the right.

- You can right-click the mark **Edit** at the bottom of the node and click the new button "Config Audit", to view modifications of set values in the pop-up window on the right.
- Different line color represents different modification of wiring: red means add, grey means delete, blue means change.

Select a most subordinate node in **Asset** except **Change**, and you can view the configuration audit records of the node in **Config Audit**, refer to "Pubic Tab".

Section 9 Defects Check

Based on the collected control system configuration data, Integrity will perform defect inspection on the configuration according to the configuration inspection rules and defect rules customized in the system configuration, automatically identify nonconformities within the configuration and generate three levels of configuration defects. From high to low severity, the defect levels are classified as Error, Warning, and Info.

In OMC system, if the loop configuration does not comply with the loop defect rules, it is also recognized as a configured defect item and displayed here. For configuration instructions, please refer to "Configuration Custom Loops and Rules".

View Defects

Select the **Defects** node in the navigation tree to enter the configuration defect list, as shown in Figure 9-1. Click on the object name to display the asset details page of the corresponding node on the right. For instructions on how to query and export records, please refer to the "Common Operations". If you need to view statistical data for configuration defects, please see the home page (refer to "Home" for details).

Confirm the defect

Confirm the defect by clicking the **OK** button in the **Action** column. The confirmed defects will disappear from the defect list and will be automatically ignored during the next collection process. It is used to mark defects that cannot be fixed immediately or that do not need to be fixed temporarily.

The operation method is as follows:

- In the defect list, click the **OK** button in the **Action** column to confirm the defect.
- Click the **Confirm List** button in the upper right corner of the page to view confirmed defects.
- In the confirmation list, click the **Cancel** button to undo the confirmation, and the defect will reappear in the defect list.

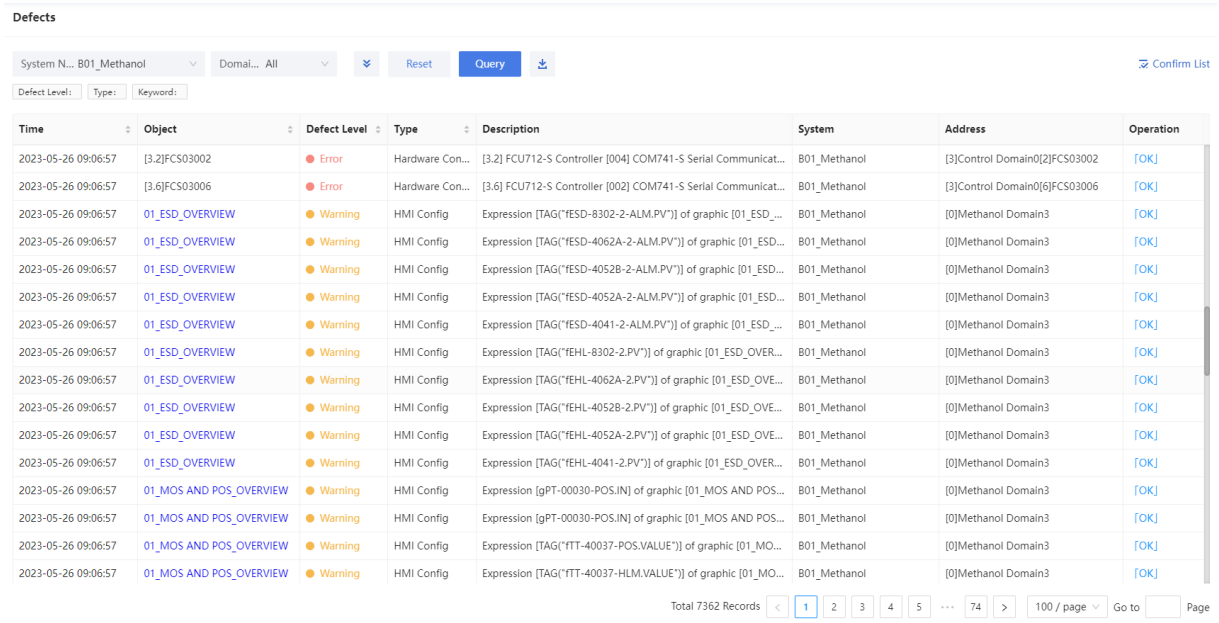


Figure 9-1 Configuration defect list

Section 10 Spares

In **Spares**, you can view the usage and redundant status of modules, channels and tags, etc. If you need to view statistics of spares, please go to the home page (refer to "Home").

Select **Spares** in the navigation tree to go to spares page, as shown in Figure 10-1. Click a tag name to open its detailed page on the right. For details of query and export, please refer to "Common Operations".

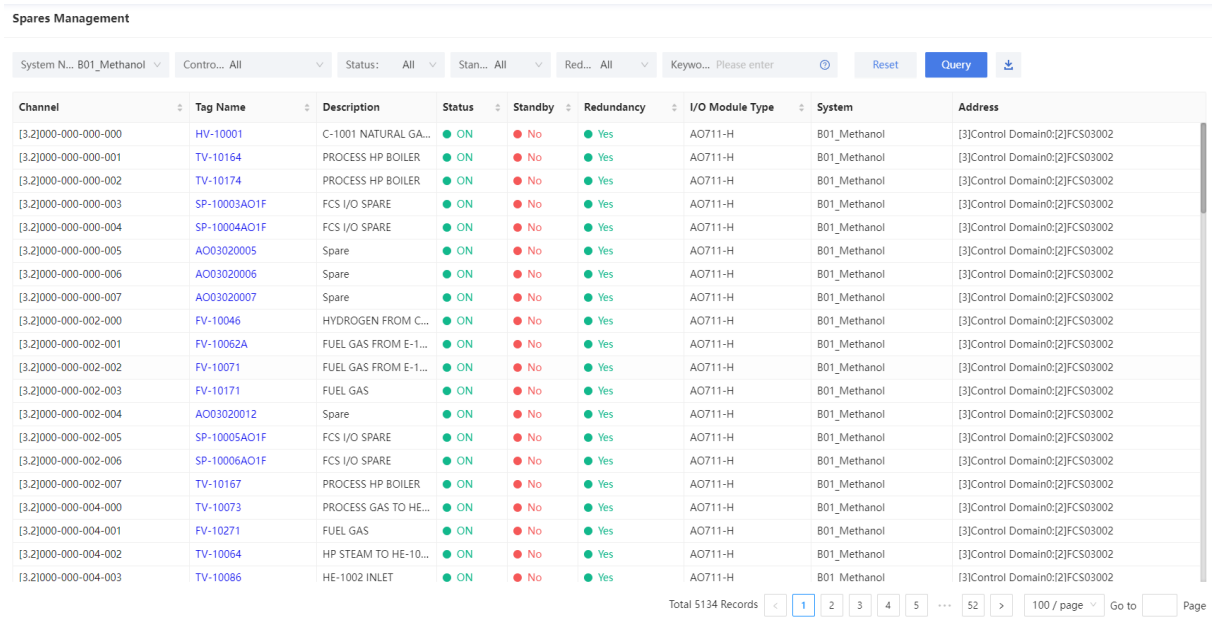


Figure 10-1 Spares management

- OMC system: Integrity will determine the channel is in spare status if one of following conditions is met.
  - Channel is disabled.
  - Channel is enabled, but the tag table in the control system configuration has no corresponding tag name.
  - Channel is enabled and its description is "Standby", tag name conforms to the name rule, and tag is not referenced by control domain or operation domain (not referenced by ant program logic, graphics or trend), then Integrity will judge the channel is in spare status. Otherwise, it will be identified as defect.

  Naming rule: named as "AI/AO/DI/DOxxxxxxxx". "xxxxxxxx" uses a decimal system. The first and second digits on the left represent control domain address (for example: if control domain address is 0, then it is 00 here), the third and fourth digits represent control station address (for example: if control station address is 10, it is 10 here).
- TCS-900 system: Integrity will determine the channel is in spare status if one of following conditions is met. If the channels of a module are all spare channels, this module is a spare module.
  - Channel is disabled.

- Channel tag is not referenced by program, description is "Standby", and last six digits of the tag represent respectively the station address, module address and address channel.

- Tricon system: the conditions are the same as the conditions of TCS-900 system. Please refer to the introductions above.

Section 11 Hardware Architecture

Hardware Diagram is used to show hardware hierarchical relationship of the project. You can view operation domain, hardware of control station, module redundancy relationship, channel idle condition and its properties. This section takes OMC system as an example. The architecture of SIS (TCS-900 and Tricon) is "Rack--Module--Tag".

Select **Architecture** in the navigation tree to open the Hardware Diagram page, as shown in Figure 11-1 and Figure 11-2.

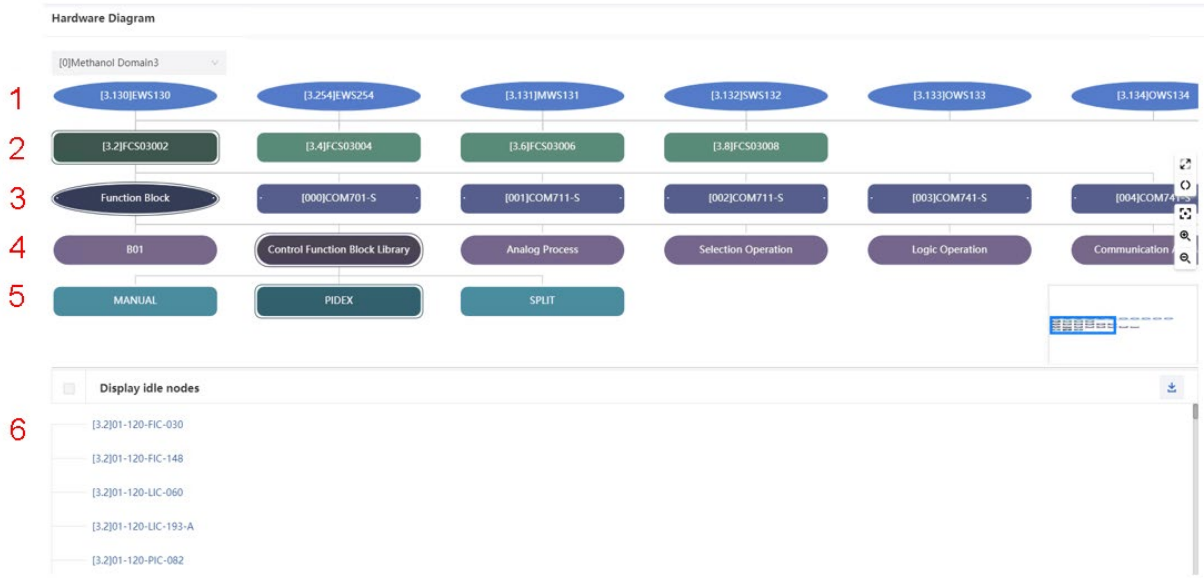


Figure 11-1 Hardware Diagram (unfolded by function block)

Figure 11-2 Hardware Diagram (unfolded by hardware)

Hardware Diagram shows master computer node and hardware configuration in the tree form, the level is shown in Table 11-1. You can click a node to unfold its subordinate nodes.

Table 11-1 Levels of Hardware Diagram

Level	Description
1	Show the master computer node of the operation domain selected (nodes of this level cannot be selected)
2	Show control station nodes in the control domain monitored by the selected operation domain
3	The function block node is fixed on the leftmost side, and other nodes are lists of modules connected to the selected control station, such as COM module.
4	● If you select a function block, it will show the list of function block libraries in this control station ● If you select a communication module, it will show the rack list.
5	● If you select a function block library, it will show objects of function block instance in this control station ● If you select a rack node, it will show I/O module list
6	● If you select a function block instance object, it will show objects of function block instance in this control station ● If you select an I/O module list, it will show I/O tag channel list. For details, please refer to the description below the table.

The list at the bottom is the channel list of modules in the controller, or the instantiation tag list of function block object.

- Check on the selection box on the left of **Display idle nodes**, the spare channels or spare tags will be marked as red.
- You can click **Export** to export list data, refer to "Common Operations".
- If you click an object, the corresponding details page will pop up on the right. The

description of details page is similar to asset management. For details please refer to "Asset Management".

Section 12 Log

In **Log**, you can view configuration audit log and operation log, including data collection and results, baseline operation, configuration management, logins and logouts, and user management.

Select **Log** in the navigation tree to enter the operation log page, as shown in Figure 12-1. You can search for the records you need on the search bar above, and click **Export** to export list data. For details, please refer to "Common Operations". Integrity can record up to 100,000 operation logs. When the upper limit is reached, the new records will overwrite the old records.

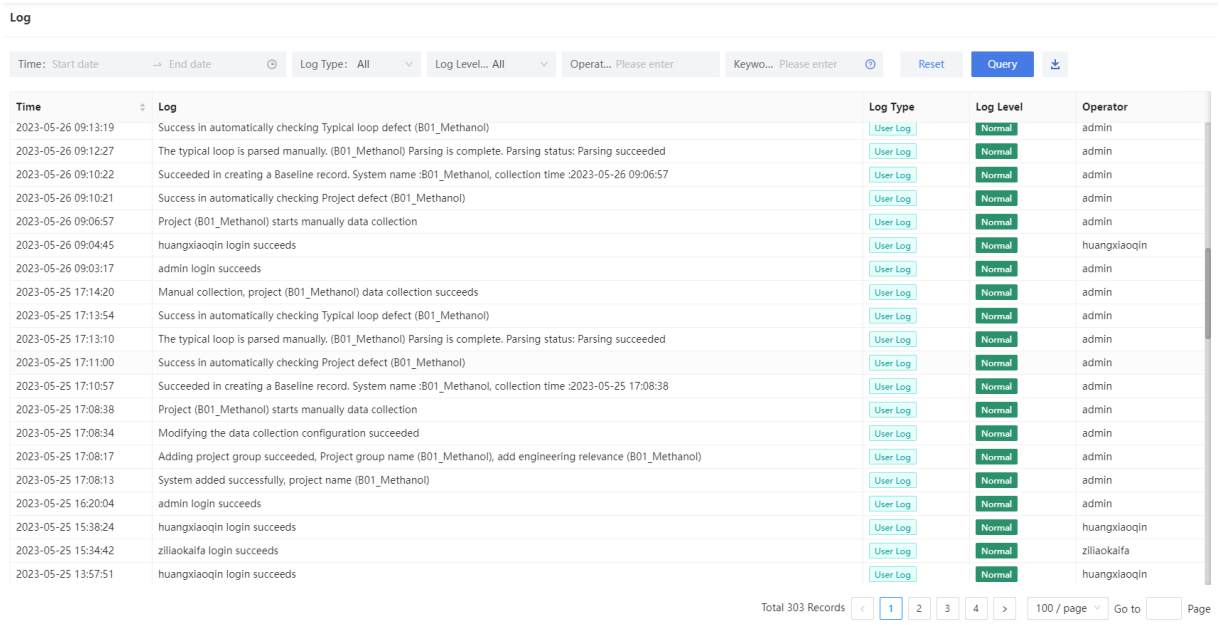
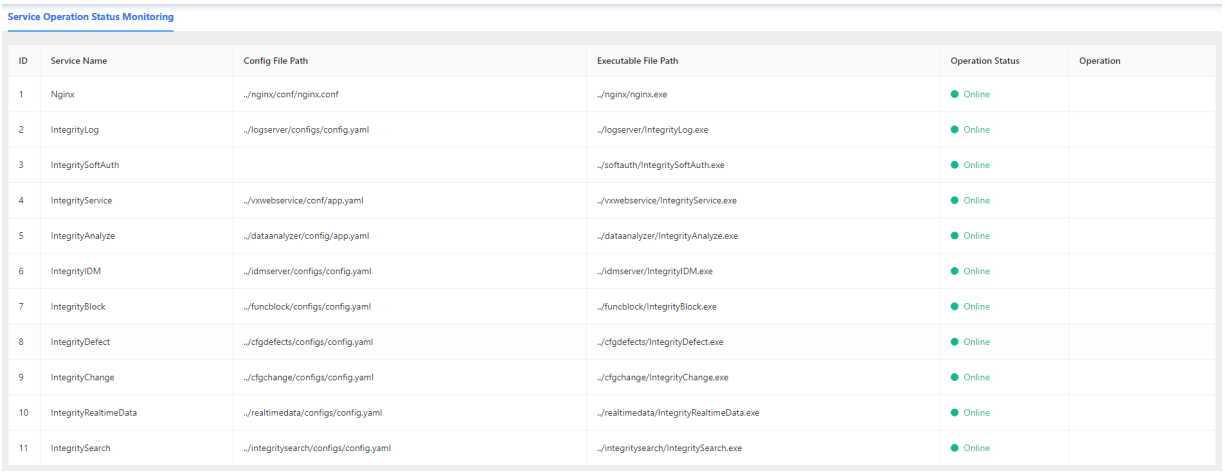


Figure 12-1 Log

Section 13 Service Status Management

Click **Service Monitoring** on the upper right corner of the home page to open the **Service Operation Status Monitoring** page, and view operation status of services of Integrity, as shown in the figure below.



ID	Service Name	Config File Path	Executable File Path	Operation Status	Operation
1	Nginx	../nginx/conf/nginx.conf	../nginx/nginx.exe	Online	
2	IntegrityLog	../logserver/configs/config.yaml	../logserver/IntegrityLog.exe	Online	
3	IntegritySoftAuth		../softauth/IntegritySoftAuth.exe	Online	
4	IntegrityService	../vxwebservice/conf/app.yaml	../vxwebservice/IntegrityService.exe	Online	
5	IntegrityAnalyze	../dataanalyzer/config/app.yaml	../dataanalyzer/IntegrityAnalyze.exe	Online	
6	IntegrityIDM	../idmserver/configs/config.yaml	../idmserver/IntegrityIDM.exe	Online	
7	IntegrityBlock	../funcblock/configs/config.yaml	../funcblock/IntegrityBlock.exe	Online	
8	IntegrityDefect	../cfgdefects/configs/config.yaml	../cfgdefects/IntegrityDefect.exe	Online	
9	IntegrityChange	../cfgchange/configs/config.yaml	../cfgchange/IntegrityChange.exe	Online	
10	IntegrityRealtimeData	../realtimedata/configs/config.yaml	../realtimedata/IntegrityRealtimeData.exe	Online	
11	IntegritySearch	../integritysearch/configs/config.yaml	../integritysearch/IntegritySearch.exe	Online	

Figure 13-1 Service operation status

As shown in the figure above, in normal state, operation status of all services should be **Online**. If there is service that is in abnormal status or stop status, please login the software by admin account and enable or restart the service through buttons in **Operation** column. If the service still cannot operate normally after you completed operation, please contact SUPCON engineer for help.

Section 14 Appendix: Environment Requirements and Information of Systems

This chapter introduces the preparations and the analysis contents that can be viewed when using Integrity.

14.1 OMC Data Management

1. Finish the following configurations:
   1) Prepares software and hardware according to *OMC Software Installation and Initialization Guide* and "Preparations".
   2) Configure project group, collection data source, configuration audit rules and defects check rules in Integrity according to the table below.

Table 14-1 Environment requirements (OMC)

To	Go to	Refer to
Configure project group	**Config > Project Group**	Project Groups
Configure configuration data source	**Config > Data Collection > Configuration Data**	Configuration Data
Configure device management data source	**Config > Data Collection > Device Management Data**	Device Management Data
Configure security management platform data source	**Config > Data Collection > ISMP**	ISMP
Import Meterloop File	**Config > Meterloop**	Importing Meterloop File
Know default rules of configuration audit or customize rules	**Config > Rule Config > Configuration Auditing**	Configuration Auditing Rules
Know default rules of defect check or customize rules	**Config > Rule Config > Configuration Defects**	Configuration Defect Rules
Configure the definition and defect checking rules of typical loops	**Config > Rule Config > Configuration Custom Loops**	Configuration Custom Loops

2. The analysis data that can be viewed is shown in the table below.

Table 14-2 Analysis data can be viewed for each node (OMC)

Node	Data classification	Contents
Home	Scale	Controller number, IO channel number, tag scale, host node scale, graphics scale and trend scale, etc.
	Asset statistics	It calculates the number of AI tag, AO tag, DI tag, DO tag, NA tag, ND tag, NN tag, function block tag.

<table>
<tr><th>Node</th><th>Data classification</th><th colspan="2">Contents</th></tr>
<tr><td rowspan="3"></td><td>Defects</td><td colspan="2">It calculates the number of defects by defect level, controller type or defect type.</td></tr>
<tr><td>Spares</td><td colspan="2">Select a control domain or a control station, it calculates the number of channels enabled and disabled by I/O module type</td></tr>
<tr><td>Baseline audit</td><td colspan="2">Select a control domain or a control station, the number of configuration changes will be displayed in graphics</td></tr>
<tr><td rowspan="11">Asset</td><td rowspan="4">Function block</td><td>Hierarchy</td><td>Function Block Base > Function Block Type > Function Block Instance Tag</td></tr>
<tr><td>Function block type</td><td>It displays basic parameters, extended parameters and remarks of the function block</td></tr>
<tr><td>Function block instance</td><td>Instance name: [Control domain address:Control station address]instance name (description of function block)</td></tr>
<tr><td>Function block instance tag</td><td>It displays information of the tag, including function block parameters, basic parameters, extended parameters, alarm parameters (ENALM pin), macro, reference (reference relationship between current function block pins and other function block pins), signal flow diagram, meterloop, config audit, configuration operation log, defects and remarks</td></tr>
<tr><td>General settings</td><td colspan="2">It displays global configuration, unit configuration, alarm level, electronic signature, clock synchronization server settings of the system</td></tr>
<tr><td rowspan="7">Plant model</td><td colspan="2">● It displays assets related to control logic and hardware configuration, including control domain, control station (redundant controller), module, rack, I/O module, communication module, channel (tag).
● Select "Plant Model" node, the right area displays the number of used tags for each control station (counted by signal tag type or module type, separately counting SOE signal tags and fast cycle signal tags)</td></tr>
<tr><td>Control domain, module, rack</td><td>It displays properties and remarks</td></tr>
<tr><td>Controller</td><td>It displays properties, remarks and defects</td></tr>
<tr><td>Communication module</td><td>It displays properties, remarks and hardware user manual. You can click to export the tag information of the current node.</td></tr>
<tr><td>I/O module</td><td>It displays tag information, properties, remarks and hardware user manual. You can click to export the tag information of the current node.</td></tr>
<tr><td>Tag table</td><td>● It includes details of all tags in the controller, and displays them by AI, AO, DI, DO, custom analog, custom digital, custom integer, page exchange analog, page exchange digital, page exchange integer.
● Tag details: it displays information including basic parameters, alarm parameters, reference, signal flow diagram, meterloop, config audit, configuration operation log, remarks and defects.</td></tr>
<tr><td>Program set</td><td>It displays all the programs of the controller and their details</td></tr>
<tr><td>Typical loop</td><td>● It displays all the typical loops of the controller
● Each loop is named after the key node, the graphics and defects of typical loop are displayed after it is selected</td></tr>
</table>

<table>
<tr><th>Node</th><th>Data classification</th><th colspan="2">Contents</th></tr>
<tr><td rowspan="6"></td><td rowspan="5">Monitoring</td><td colspan="2">It displays assets related to host monitoring configuration, including operation domain, host nodes, graphics and trend</td></tr>
<tr><td>Operation domain</td><td>It displays properties, remarks and defects of operation domain</td></tr>
<tr><td>Host nodes</td><td>It displays properties, remarks, OS, event, software update, Windows system patch and black and white list</td></tr>
<tr><td>Graphics, trend</td><td>It displays tag information, config audit, remarks and defects</td></tr>
<tr><td>Domain Variable Set</td><td>● It displays domain variable by string variable, analog variable, digital variable, secondary calculation variable, statistical variable
● Detailed page of domain variable: it displays basic properties, alarm and remarks (string domain variable has no alarm)</td></tr>
<tr><td>Signal flow diagram</td><td colspan="2">Node types included: field instrument tag, channel tag of I/O module, calculation module (for example: function block and function block tag), associated module (for example: graphics and trend), and custom asset nodes</td></tr>
<tr><td>Meterloop</td><td colspan="2">It displays complete loop of device connection: field instrument generates data--auxiliary cabinet to input tag--loop calculation to output tag--output tag feedbacks to field instrument</td></tr>
<tr><td colspan="2">Change</td><td colspan="2">● For the default auditing rules please refer to "Auditing Rule"
● You can view baseline records and compare configuration difference between adjacent baselines through baseline audit</td></tr>
<tr><td colspan="2">Defects</td><td colspan="2">● View the rules of defects check
● View the defects analysis result of Integrity</td></tr>
<tr><td colspan="2">Spares</td><td colspan="2">Display usage status of modules and tags. For detailed rules please refer to "Spares"</td></tr>
<tr><td colspan="2">Architecture</td><td colspan="2">Display hardware hierarchical relationship of project configuration
● Unfold by function block: host node of operation domain, control station node in control domain monitored by operation domain, function block base, function block instance object, function block tag instance object
● Unfold by hardware: host node of operation domain, control station node in control domain monitored by operation domain, connection module in control station, rack, I/O module, I/O tag channel</td></tr>
</table>

14.2 TCS-900 Data Management

1. Finish the following configurations:

   1) Prepare software and hardware according to *OMC Software Installation and Initialization Guide* and "Preparations".

   2) Configure project group, collection data source, configuration audit rules and defects check rules in Integrity according to the table below.

Table 14-3 Environment requirements (TCS-900)

To	Go to	Refer to
Configure project group	**Config > Project Group**	Project Groups
Configure configuration data source	**Config > Data Collection > Configuration Data**	Configuration Data
Know default rules of configuration audit or customize rules	**Config > Rule Config > Configuration Auditing**	Configuration Auditing Rules
Know default rules of defect check or customize rules	**Config > Rule Config > Configuration Defects**	Configuration Defect Rules

2. The analysis data that can be viewed is shown in the table below.

Table 14-4 Analysis data can be viewed for each node (TCS-900)

Node	Data classification	Contents	
Home	Scale	Rack number, module number, tag scale, program node number, etc.	
	Asset statistics	It calculates the number of I/O variable, memory variable, operating variable, synchronization variable, communication variable, extended interstation communication variable, extended communication port variable, function block tag	
	Defects	It calculates the number of defects by defect level or defect type.	
	Spares	Select a control domain or a control station, it calculates the number of channels enabled and disabled by I/O module type	
	Baseline audit	Select a control domain or a control station, the number of configuration changes will be displayed in graphics	
Asset	Function block	Level structure	Function Block Base > Function Block Type > Function Block Instance Tag
		Function block type	It displays basic parameters, extended parameters and remarks of the function block
		Function block instance	● Instance name: user program name:function block name ● It displays information of the tag, including function block parameters, extended parameters, reference (reference relationship between current function block pins and other function block pins), signal flow diagram, config audit, defects and remarks,
	Plant model	It displays assets related to control logic and hardware configuration, including rack and all the modules on the rack	
		Rack	You can click to export all tag information, rack properties and remarks are displayed on the right
		Controller module	It displays properties, remarks and defects
		Communication module	It displays tag information, properties, remarks and defects
		I/O module	● It displays tag information, properties, remarks and defects ● Expand the node, you can see the signal point below it. Select the signal point, you can know information such as signal point parameters, SOE parameters, signal point tag and signal thresholds on the right.

Node	Data classification	Contents	
		Tag table	● You can click to export all tag information ● Tag information includes the details of all tags, and it is displayed by I/O variable, memory variable, operating variable, synchronization variable, communication variable, extended interstation communication variable, extended communication port variable. ● Tag details: it displays information including basic parameters, reference, signal flow diagram, config audit, remarks and defects.
		Program set	It displays all the programs of the controller and their details
	Signal flow diagram	Node types included: channel tag of I/O module, calculation module (for example: function block and function block tag), custom asset nodes, constant data, variable data, etc.	
Change		● For the default auditing rules please refer to "Auditing Rule" ● You can view baseline records and compare configuration difference between adjacent baselines through baseline audit	
Defects		● View the rules of defects check ● View the defects analysis result of Integrity	
Spares		Display usage status of modules, channels and tags. For detailed rules please refer to "Spares"	
Architecture		Display hardware hierarchical relationship of project configuration: rack, module, tag	

14.3 Tricon Data Management

1. Finish the following configuration:

   1) Prepare the software and hardware according to *OMC Software Installation and Initialization Guide* and "Preparations".

   2) Configure project group, collection data source, configuration audit rules and defects check rules in Integrity according to the table below.

Table 14-5 Environment requirements (Tricon)

To	Go to	Refer to
Configure project group	**Config > Project Group**	Project Groups
Configure configuration data source	**Config > Data Collection > Configuration Data**	Configuration Data
Know default rules of configuration audit or customize rules	**Config > Rule Config > Configuration Auditing**	Configuration Auditing Rules
Know default rules of defect check or customize rules	**Config > Rule Config > Configuration Defects**	Configuration Defect Rules

2. The analysis data that can be viewed is shown in the table below.

Table 14-6 Analysis data can be viewed for each node (Tricon)

<table>
<tr><th>Node</th><th>Data classification</th><th colspan="2">Contents</th></tr>
<tr><td rowspan="5">Home</td><td>Scale</td><td colspan="2">Rack number, module number, tag scale, program node number, etc.</td></tr>
<tr><td>Asset statistics</td><td colspan="2">It calculates the number of MEMORY, INPUT, OUTPUT and function block tag</td></tr>
<tr><td>Defects</td><td colspan="2">It calculates the number of defects by defect level or defect type.</td></tr>
<tr><td>Spares</td><td colspan="2">Select a control domain or a control station, it calculates the number of channels enabled and disabled by I/O module type</td></tr>
<tr><td>Baseline audit</td><td colspan="2">Select a control domain or a control station, the number of configuration changes will be displayed in graphics</td></tr>
<tr><td rowspan="8">Asset</td><td rowspan="3">Function block</td><td>Level structure</td><td>Function Block Type > Function Block Instance Tag</td></tr>
<tr><td>Function block type</td><td>It displays basic parameters, extended parameters and remarks of the function block</td></tr>
<tr><td>Function block instance</td><td>● Instance name: program name:function block instance name
● It displays information of the tag, including function block parameters, extended parameters, reference (reference relationship between current function block pins and other function block pins), signal flow diagram, config audit, defects and remarks,</td></tr>
<tr><td rowspan="4">Plant model</td><td colspan="2">It displays assets related to control logic and hardware configuration, including rack and module</td></tr>
<tr><td>Rack</td><td>You can click to export all tag information, rack properties and remarks are displayed on the right</td></tr>
<tr><td>Module</td><td>It displays properties, remarks, defects and tag associated to the module</td></tr>
<tr><td>Tag table</td><td>● You can click to export all tag information
● It includes details of all tags, and is displayed by Memory, Input, Output, etc.
● Tag details: it displays information including basic parameters, reference, signal flow diagram, config audit, remarks and defects.</td></tr>
<tr><td>Program set</td><td>It displays all the programs of the controller and their details</td></tr>
<tr><td>Signal flow diagram</td><td colspan="2">Node types included: channel tag of I/O module, calculation module (for example: function block and function block tag), custom asset nodes, variable data, etc.</td></tr>
<tr><td colspan="2">Change</td><td colspan="2">● For the default auditing rules please refer to "Auditing Rule"
● You can view baseline records and compare configuration difference between adjacent baselines through baseline audit</td></tr>
<tr><td colspan="2">Defects</td><td colspan="2">● View the rules of defects check
● View the defects analysis result of Integrity</td></tr>
<tr><td colspan="2">Architecture</td><td colspan="2">Display hardware hierarchical relationship of project configuration: rack, module, tag</td></tr>
</table>

Section 15 Revision

Table 15-1 Retrofit list of the version

Document Version	Applicable Product Version	Remarks
V1.0 (20230828)	OMC Integrity V3.10.00.00	First release