SIEMENS

SIMATIC HMI

WinCC Unified Performance Insight - Optimizing processes with KPIs

System Manual

Online documentation

12/2022

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Migrating V17 projects

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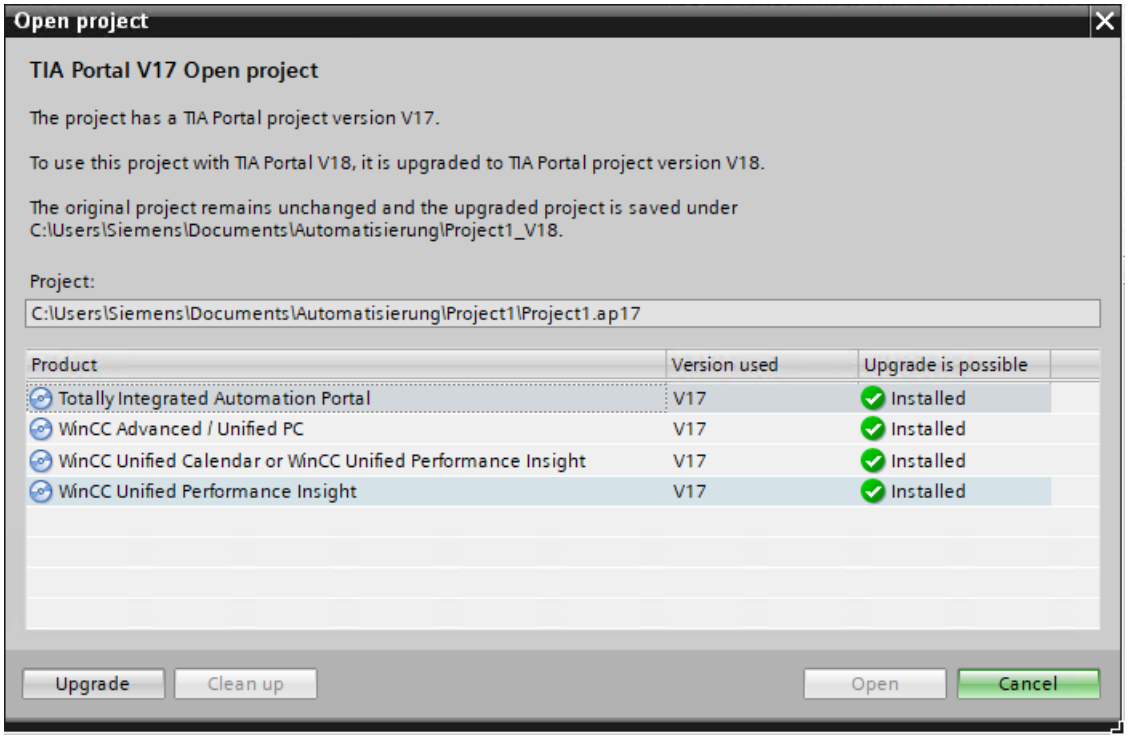
Introduction

When you open your V17 project with Performance Insight configuration in TIA Portal V18, you have the option of upgrading the project to V18.

The configured runtime version of the HMI device must be separately changed to V18. The Performance Insight controls used in the screen must then be updated.

Upgrade project

1. Open your V17 project in TIA Portal V18.
   The "Open project" dialog opens:



Note

An upgrade is not possible when a product is used in the V17 project but it is not installed. Install the missing product and then perform the upgrade.

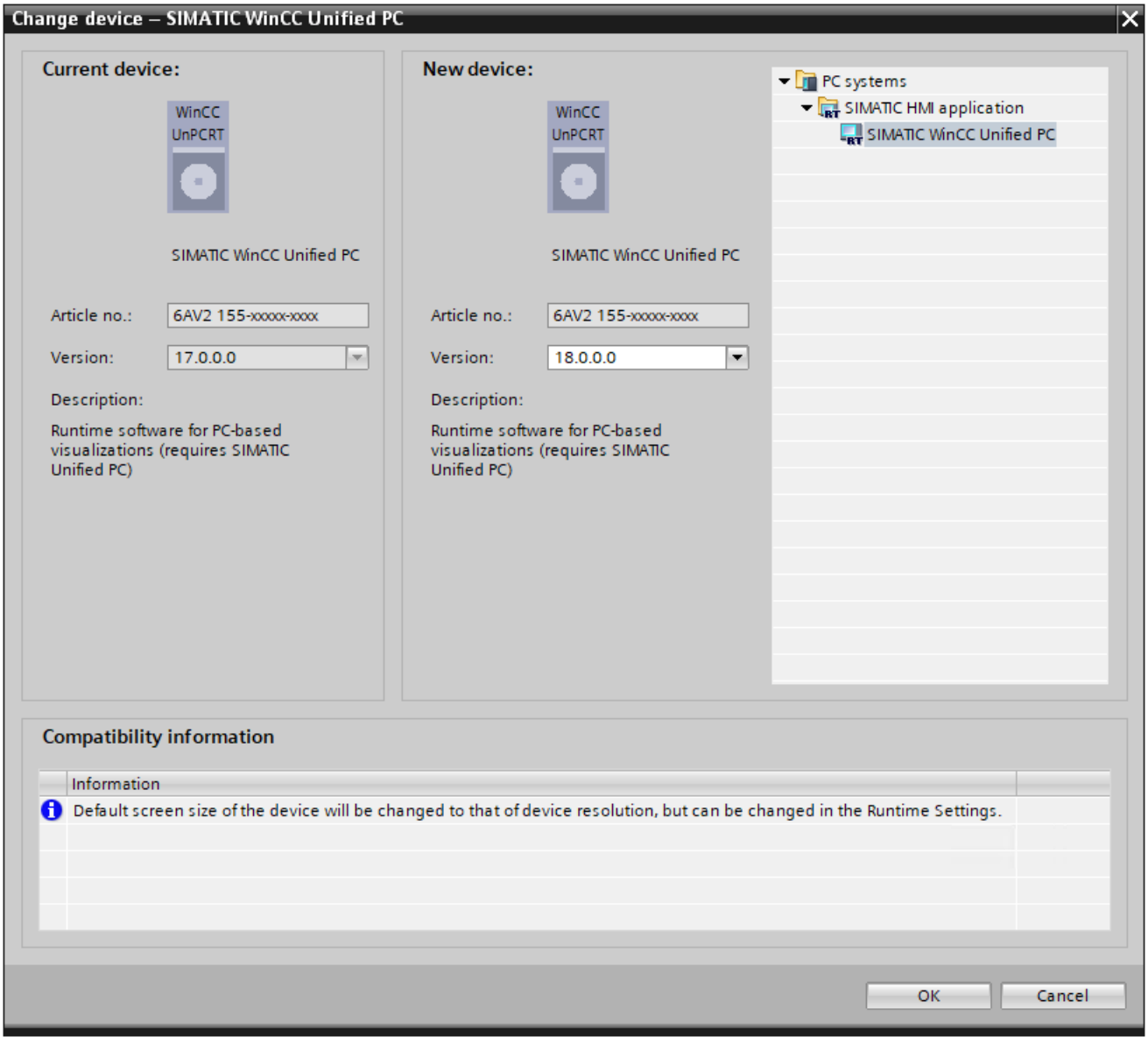
2. Click "Upgrade".
   The upgrade will take a few minutes.
   The project is opened.

Result

- The contents of the V17 project are saved in a new project with the V18 project version.
- The original project is not overwritten and can still be edited with TIA Portal V17.

Changing the configured Runtime version of the HMI device

1. Right-click on the HMI device in the project tree.
2. Select "Change device / version".
   The "Change device - SIMATIC WinCC Unified PC" dialog opens.
3. Navigate to "SIMATIC WinCC Unified PC" in the tree.
   The existing HMI device with version V18 is automatically displayed under "New device".



4. Confirm your change with "OK".

Updating Performance Insight controls

1. Open a screen in your project.
2. Click "Update" in the task card "Toolbox > My controls".

Opening a runtime project after migration

After you have upgraded your project to V18 in the engineering system, you must either change the runtime version of the HMI device to V18 or copy the Performance Insight controls to the runtime project as described below:

1. Copy the contents of the folder "<Installation path TIA Portal V18>\Data\Hmi\CustomControls\", e.g. "C:\Program Files\Siemens\Automation\Portal V18\Data\Hmi\CustomControls\".
2. Paste the copied files into the configuration folder of your runtime project, e.g. "C:\ProgramData\SCADAProjects\HMI_RT_1\currentConfiguration\".

Version compatibility

A runtime project of an HMI device V17 can be downloaded, displayed and operated in an installed runtime version V18.

Basics

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2.1 Introduction to Performance Insight

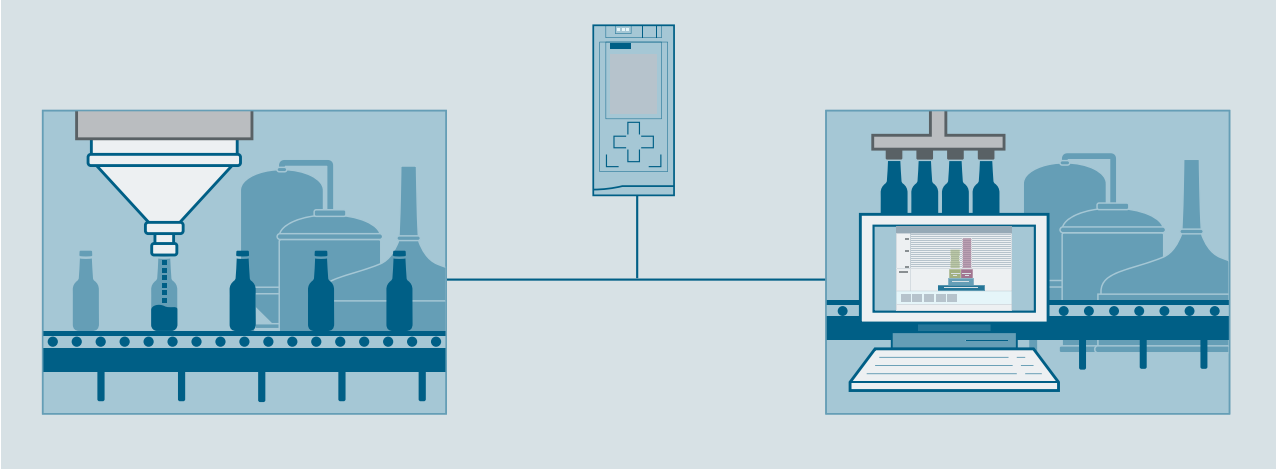
Introduction

SIMATIC WinCC Unified Performance Insight is an option package in the TIA Portal.

The Performance Insight option helps you to optimize production processes and minimize downtimes. Performance Insight allows you to measure the efficiency of a plant or line and troubleshoot inefficiencies using various controls.

You use Performance Insight to calculate the individual "Key Performance indicators" (KPIs) for individual machines or entire production lines in the plant. You use these plant-specific KPIs to you analyze and examine, for example, the overall effectiveness, the fault frequency or the repair time of the plant. The resulting data provides information on the effectiveness of individual machines and entire production plants.

You can visualize the KPIs of your machine or plant on an HMI device during runtime using various charts. You can thus correct the input values at a later date.



Functional scope

You have the following options with Performance Insight:

- You create global operands containing values from tags or formulas.
- You define KPIs for calculating and analyzing global operands.
- You define global KPIs for analyzing processes in the plant from one or several operands and KPI formulas.
- You analyze the calculated data and visualize the results in runtime using various controls.

Benefits

Detect weak points in production processes and recognize potential for optimization using Performance Insight.

1. Detect problems and performance losses
   You create transparency for the machines in the plant by means of plant-specific KPIs, controls and reports.
2. Find causes
   You calculate the failure times and find the causes in the event of an error.
3. Optimize
   Use the acquired data to analyze vulnerabilities in production processes and optimize the processes in your plant.

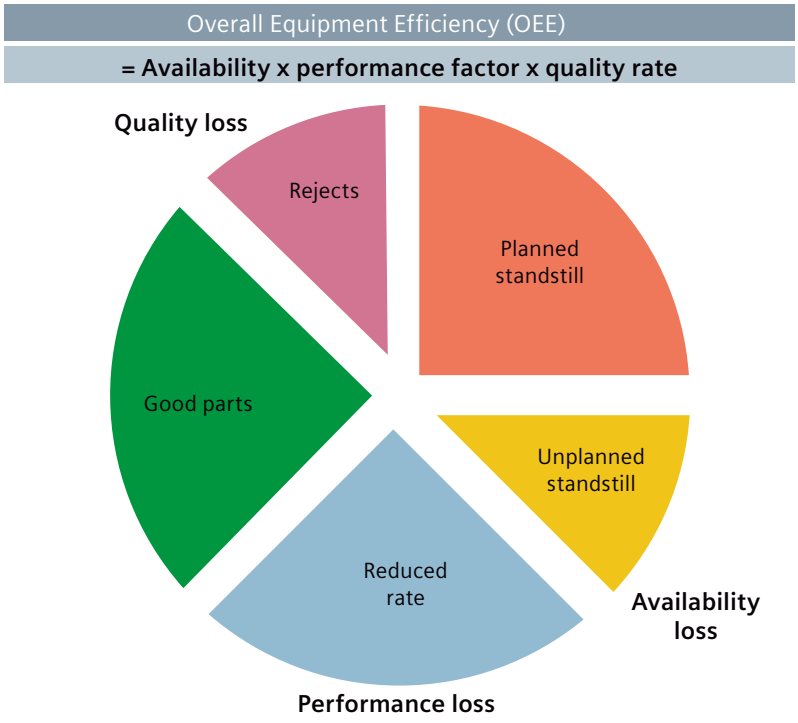
2.2 Applications

Overview

Performance Insight supports you in analyzing and optimizing production based on plant-specific KPIs.

For example, you can implement the following KPIs:

- With Overall Equipment Effectiveness (OEE), you analyze the overall effectiveness of the plant with respect to productivity and losses.
- With Mean Time Between Failures (MTBF), you analyze the fault frequency based on the operating time between failures of a unit.
- With Comprehensive Energy Consumption (CEC), you analyze the power consumption in a production cycle in the plant.



Area of application and advantages

Evaluating KPIs provides added value in the following areas of application:

- Management and quality assurance
  - You record the failure times, find the causes of the failure times and monitor the efficiency of the plant.
  - You identify the production relationships through the combination of KPIs.
  - You create transparency for the plant as a basis to optimize plant productivity.
- Maintenance and service
  - You analyze weak points in production processes.
  - You can troubleshoot errors in the plant directly at your workstation.
  - You identify and log the events of undesired process behavior.
- Line management and operation of the plant
  - You visualize the analysis results as tables and charts.
  - You correct the logged values retrospectively.
  - You identify weak points in the process through cyclic calculation of the KPIs.

2.3 Requirements

Introduction

You use Performance Insight to configure and evaluate plant-specific KPIs. You require a license to use this option. You can find information about the licenses in the "Performance Insight licenses" section of the Plant Intelligence Options installation instructions.

Software requirements

To install Performance Insight in the Engineering System and Runtime, you need the following products:

- TIA Portal V18 or higher with STEP 7 Professional
- WinCC Unified PC Engineering System V18
- WinCC Unified Runtime PC V18
- All relevant language packages of WinCC Unified PC Engineering System V18

Browsers

WinCC Unified Performance Insight supports the same browsers as WinCC Unified Runtime PC.

For more information, refer to section "Internet browsers for WinCC Unified PC" in the "SIMATIC Unified PC readme".

User knowledge

You have the following knowledge:

- General knowledge about TIA Portal
- Configuration of plant views, plant object types and plant objects

Requirements in the TIA Portal

Your TIA Portal project must meet the following requirements so that you can prepare the calculations for WinCC Unified Runtime:

- The project is open.
- A PLC and an HMI device (Unified PC) are created on the "Devices" tab.
- A plant view is created in the "Plant objects" tab.
- The plant objects of the plant view have tags for communication between a PLC and an HMI device.
- An HMI device is assigned to the plant view.
- The HMI device has a screen.

2.4 Configuration concept

Overview

Configuration with Performance Insight is divided into the following tasks:

- Planning and definition of KPIs
- Configuring operands, machine states, KPIs, calculation cycles, reason groups and reasons
- Configuration of controls for visualization of KPIs

The mapping of the real plant, which you configure in the plant view, serves as the basis for determining and planning individual KPIs.

Configuration sequence in the engineering system

You configure KPIs for the plant in the following steps:

1. Define equipment and machines whose data is visualized with Performance Insight as plant object types.
2. You map the plant structure in the plant view.
3. Create interface tags in the plant object types.
4. You configure global operands to transfer the process data for calculating KPIs.
5. You plan and define global KPIs.
6. To calculate the KPIs from the process data, configure the KPI formulas.
7. To log and efficiently compare KPIs, define calculation cycles.
8. To analyze the downtimes of the plant, create reason groups.
9. You use the global KPIs on the plant object types.
10. You interconnect the interface tags with the operands in the plant object type.
11. To analyze the reasons for the downtimes, create reasons for the plant object type.
12. To include KPIs of other plant objects in the calculation, configure independent KPIs directly at the plant objects (independent of the global elements).
13. You configure the controls to visualize the KPIs.

Visualizing the efficiency of the plant in runtime

With the controls for plant optimization, you have the option of displaying the current evaluations in Runtime. Configure the controls in the engineering system and specify which data is displayed in runtime.

The following controls are available:

- Performance pie chart
- Performance bar chart
- Performance Gantt chart
- Performance control

- Performance analyzer
- Dashboard element

You can perform the following in Runtime:

- Show the efficiency of the plant at a glance
- Display detailed information on process values
- Compare the data between the machines
- Edit machine states
- Print or export the displayed data
- Insert, delete or change logged operands, machine states or calculation cycles
- Recalculate logged KPIs

Notes on calculating KPIs

You can calculate KPIs as follows:

- In real time after a data change
- As needed for specific data records
- Periodically at defined intervals, e.g. once per day
- In calculating the KPIs, you decide whether short tool lives (microstops) are to be taken into account.

The time required to calculate KPIs depends mainly on the period, the number of recorded values and the number of KPIs to be calculated.

Observe the following notes for calculating KPIs:

- Use only values of one minute or longer as an update cycle.
- Calculate KPIs for a period of up to one day, for example, evaluations after shift end.
- Calculate longer periods on devices without process connection, for example, evaluations covering weeks or a month.

Planning and defining KPIs

You are not bound to a fixed workflow for the definition and evaluation of KPIs for the plant.

The steps can also be distributed to multiple people, for example, manager and configuration engineer:

- The manager defines plant objects, KPIs, operands and the calculation.
- The configuration engineer assigns the KPIs to the equipment and interconnects the operands with tags.

Note

Structuring the plant

Performance Insight calculates the KPIs, but does not check the evaluations for plausibility. The user is responsible for meaningful KPI definition and linking the relevant parameter/process values.

Using SIMATIC WinCC Unified Calendar

You can use the Plant Intelligence option Calendar together with Performance Insight.

After the installation of Calendar, you see the "Calendar" tab in the plant object editor. You have the possibility to configure schedules, shifts and time categories in the calendar and use these time categories when defining the KPIs. In Runtime, the "Calendar Control" control is available to you for creating and managing the schedules.

Performance Insight and Calendar share a time model.

The time model defines:

- Available time categories
- Options for which the time categories are relevant
- How time categories are visualized
- Whether time categories belong to the working time

You define machine states in the time model.

You can find the "Time model" editor in the project tree under "Common data".

You define time categories in the time model. Time categories are combined as time intervals into shifts in Calendar.

Using multiuser engineering

If you use Multiuser Engineering when using KPIs, you can only save your changes in the server project view. The changes that you make in the local session are not applied to the server project.

You can find more information on "Multiuser Engineering" under "Multiuser Engineering".

2.5 "Performance indicators" editor and tab

Introduction

The "Performance indicators" editor and the "Performance indicators" tab are available to you to use Performance Insight.

"Performance indicators" editor

In the "Performance indicators" editor, you configure:

- Global KPIs
- Global operands
- Global calculation cycles
- Global reason groups
- Data logs

The global elements are created once and can be used multiple times on plant object types.

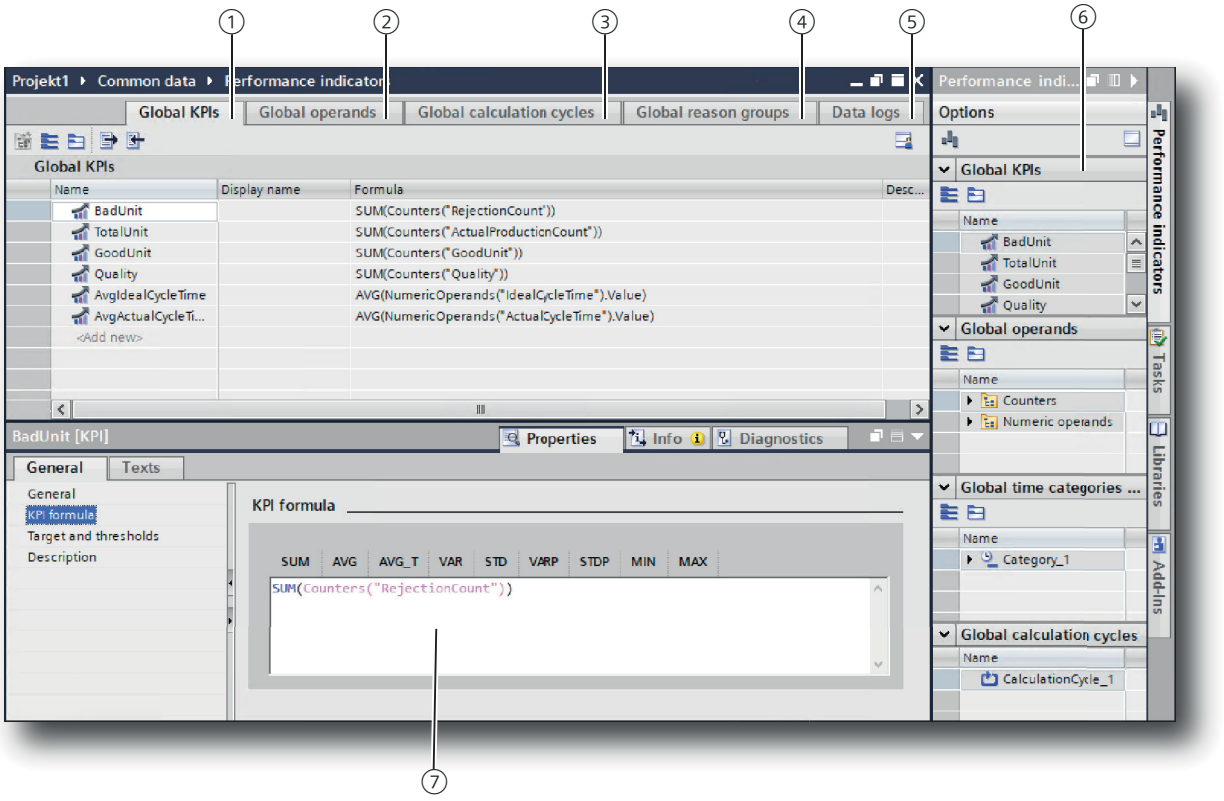
Opening an editor

Under "Plant objects > <project name> > Common data", double-click "Performance indicators" or select "Open" in the shortcut menu.

After opening, the editor is available to you as task card on the right side.

Structure of the editor

The "Performance indicators" editor consists of the following areas:



① "Global KPIs" tab
② "Global operands" tab
③ "Global Calculation Cycle" tab
④ "Global reason groups" tab
⑤ "Data logs" tab
⑥ Panes: "Global KPIs", "Global operands", "Global time categories and machine states", "Global Calculation Cycle"
⑦ "KPI formula" editor in the Inspector window

"Performance indicators" tab

With the "Performance indicators" tab, you define the following for your plant object type:

- KPIs
- Operands
- Machine states
- Calculation cycles
- Reasons
- Settings

You drag the configured global elements into the "Performance indicators" tab on the plant object type.

Opening the tab

- On the plant object type
  Under "Plant object types", double-click on the desired plant object type.
- On the plant object
  Under "Plant object", double-click on the desired plant object.

2.6 KPI, operand and KPI formula

KPI

The Key Performance Indicator is calculated for a specified period to determine the effectiveness of a plant with respect to power, availability, quality, and other measured variables.

The definition of the KPI contains one or more operands, time categories, and machine states. KPIs are defined for plant object types. To calculate a KPI in Runtime, assign a KPI to the respective plant object type.

Operand

An operand returns a process value for calculating KPIs including time stamp.

KPI formula

The KPI formula calculates a value from operand values, time categories, and machine states. The result is returned to a KPI.

2.7 Contexts

Contexts allow you to view plant units according to a certain viewpoint, e.g. according to a certain customer, product, job or shift.

System-generated contexts always belong to a plant object. With installed Performance Insight and Calendar option packages, the contexts are automatically created and executed during runtime:

Example: When a shift starts in Calendar, an archived context value is created with the shift ID.

Each time a context (e.g. "Product") is executed, a log entry is generated in the context log. The logged context saves:

- The context value (e.g. "orange lemonade")
- Start time and end time of the execution time
- The quality code

2.8 Global and used KPIs and operands

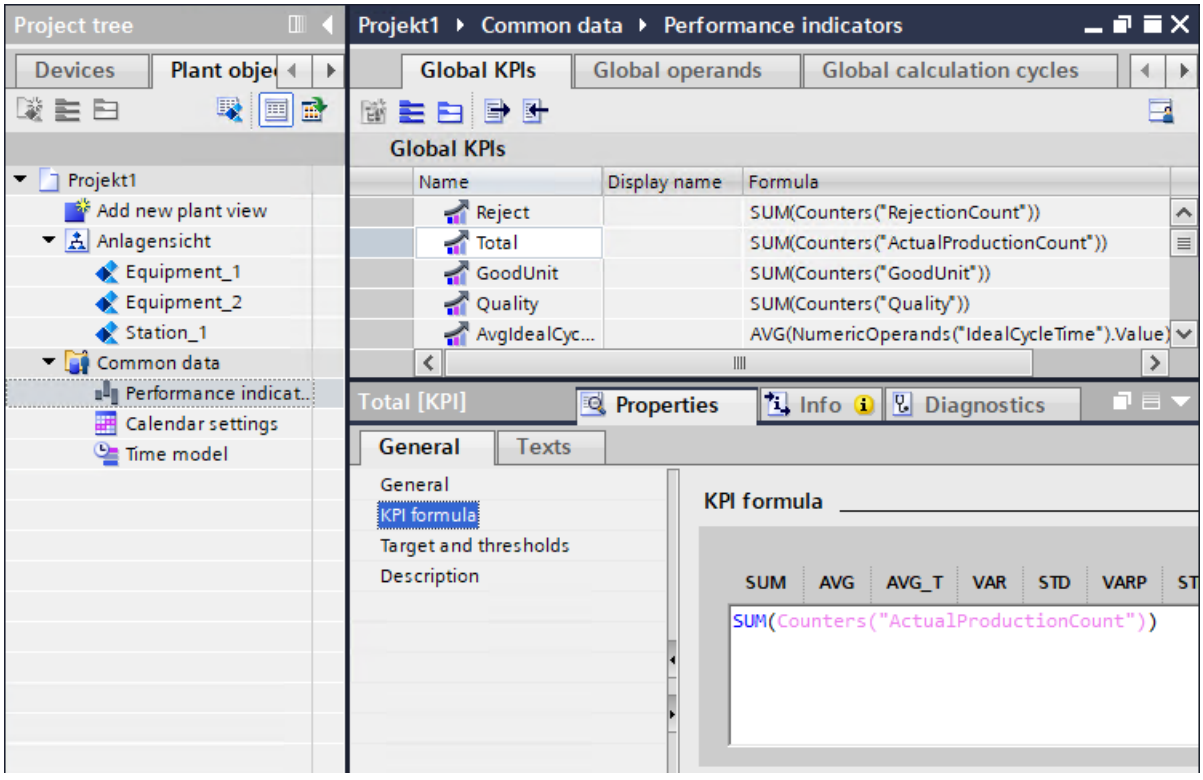
Overview

In Performance Insight, you define global elements that you use in plant object types. Used elements inherit all properties of global elements.

Global KPIs and operands

First, define the usable global KPIs and operands for your plant:

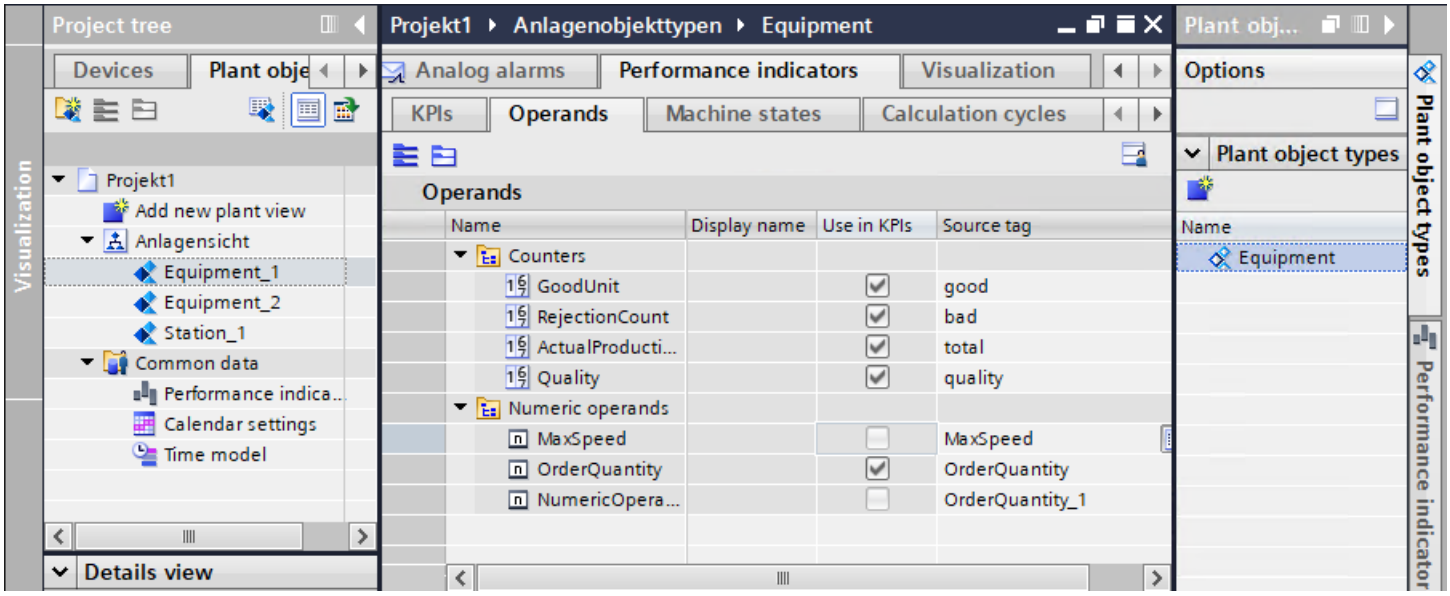
1. Define the global operands.
2. In the time model, define time categories and machine states that are included in the calculation of the KPIs.
3. Define the global KPIs.
   You can structure global KPIs using groups.
4. Define the KPI formulas based on the global operands, global time categories and global machine states.
5. Define the global calculation cycles.
6. Define the global reason groups.
7. Create a data log to back up the runtime data.



Using global KPIs and operands in plant object types

You use global KPIs, operands, calculation cycles and machine states in plant object types:

1. After you have defined the global elements, you assign these to the plant object types.
2. You define interface tags at each plant object type.
3. Assign the interface tags to the used operands as source tags.
4. Use the plant object types in the plant view as plant objects.



Retroactive changes in global elements

Changes to global elements also have an effect on used elements.

When a property is changed in a global KPI or operand, all uses of the KPI and the operands are automatically adapted. The parameter assignment is retained. When you change the KPI formula of a global KPI, you need to connect the source tag of the added operand in the plant object type.

Operands deleted in the KPI formula are automatically deleted in the plant object types and their instances.

Creating independent KPIs (KPI in KPI)

You have the possibility to create an independent KPI directly in the plant object. This KPI is not based on a global KPI. The calculation of the KPI is based exclusively on a KPI of other plant objects (KPI in KPI). Operands, machine states, and time categories are not available.

Note

If the name of the independent KPI is already used once, an error message is displayed when loading.

Independent operands cannot be defined.

2.9 Global calculation cycle

Introduction

To calculate and log KPIs cyclically, use global calculation cycles.

This allows you to compare KPIs of different times without having to recalculate them. This approach improves performance and saves computing power.

Logging takes place at specified intervals with one of the following modes:

- Tag
- Context

In addition, it is possible to configure a "condition" which is then implemented as a Boolean variable and starts and stops the calculation cycle.

You can assign multiple calculation cycles to a KPI. The results are stored and can be output with the PFI controls or the Local Reporting option.

"Tag" mode

For "Tag" mode, you define a tag at the plant object type that is assigned to the calculation cycle. When the tag value changes, a new calculation cycle starts.

Calculation cycle							
Triggered by tag	Triggered by tag						
	08:00	08:15	08:30	08:45	09:00	09:15	09:30
	0 (Initial)	1		2		3	4
Triggered by tag = 1							
Triggered by tag = 2							
Triggered by tag = 3							

"Context" mode

In the "Context" mode, logging is controlled by a shift in the calendar or a user-defined context.

Calculation cycle							
Triggered by context							
ShiftID							
	Triggered by shiftID = 3						
	08:00	08:15	08:30	08:45	09:00	09:15	09:30
Triggered by shiftID = 3		Start		End			
	Triggered by shiftID = 4						
	08:00	08:15	08:30	08:45	09:00	09:15	09:30
Triggered by shiftID = 4					Start		End

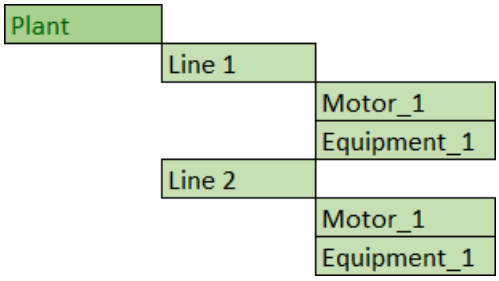
Calculation cycle from a shift

When you use shifts on higher levels in the plant view created previously, the shifts also apply to all lower-level objects. A calculation cycle can be triggered from these shifts. The calculation cycle is used in a KPI.

Example 1:

When you use a shift on the top level at the "Plant" object, the shift applies to the following lower-level objects:

- Line 1
  - Motor_1
  - Equipment_1
- Line 2
  - Motor_1
  - Equipment_1

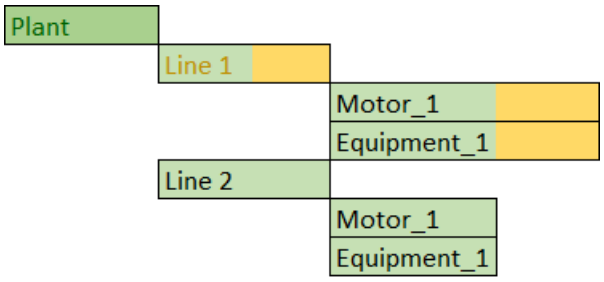


The shift is valid for all objects marked green.

Example 2:

If you also use a shift at the "Line 1" object, this shift applies in addition to the lower-level objects of "Line 1":

- Line 1
  - Motor_1
  - Equipment_1



This additional shift is valid for all objects marked yellow. These objects now have two shifts.

Calculation cycle from user-defined context

A calculation cycle from user-defined context can only be triggered by the defined object in the plant view. There is no reference to lower-level objects. A calculation cycle can be triggered from this context. The calculation cycle is reused in a KPI.

Condition

The calculation cycle can be released or stopped by a Boolean variable.

When the value of the tag is "TRUE", the calculation cycle can be triggered. When the tag value is "FALSE", the running calculation cycle is stopped immediately.

Calculation cycle							
Triggered by condition							
Boolean tag							
	Triggered by boolean tag						
	08:00	08:15	08:30	08:45	09:00	09:15	09:30
Triggered by boolean tag	FALSE	TRUE			FALSE		TRUE

2.10 Global reason groups

Overview

In Performance Insight, you define global reason groups to enable accurate analysis of downtime and its reasons. For example, reasons can include manual stops, overloads, and blockages.

Using global reason groups

1. First, you define the usable global reason groups for the plant.
2. The global reason groups are created automatically when you create new plant object types.
3. At the plant object type, you fill the reason groups with reasons that are applied to each instance in the plant view.
4. In Runtime, you assign the corresponding reasons to each relevant machine state in the "Performance Gantt Chart" control.

2.11 Downtimes

Machine states can be used to analyze machine and system component downtimes.

Performance Insight allows machine states to be specified as Stop state and set whether they are taken into account for the downtime analysis.

You can also specify microstop times for the calculation of KPIs. These define the maximum duration of a machine state up to which the downtime should not be taken into account in the KPIs.

Downtime analysis

1. Define machine states with the setting "Relevant for downtime analysis".
2. For the plant object type, specify which source tag triggers the machine states and activate the option "Usage In KPI / plant object relevant".
3. Use the "Performance analyzer" control to analyze the downtimes in runtime.

Using microstops

1. Define a machine state with the "Stop state" setting.
2. Define the microstop time and the microstop unit for the plant object type.
3. Use the machine state in a KPI formula.

Configuring KPIs

3

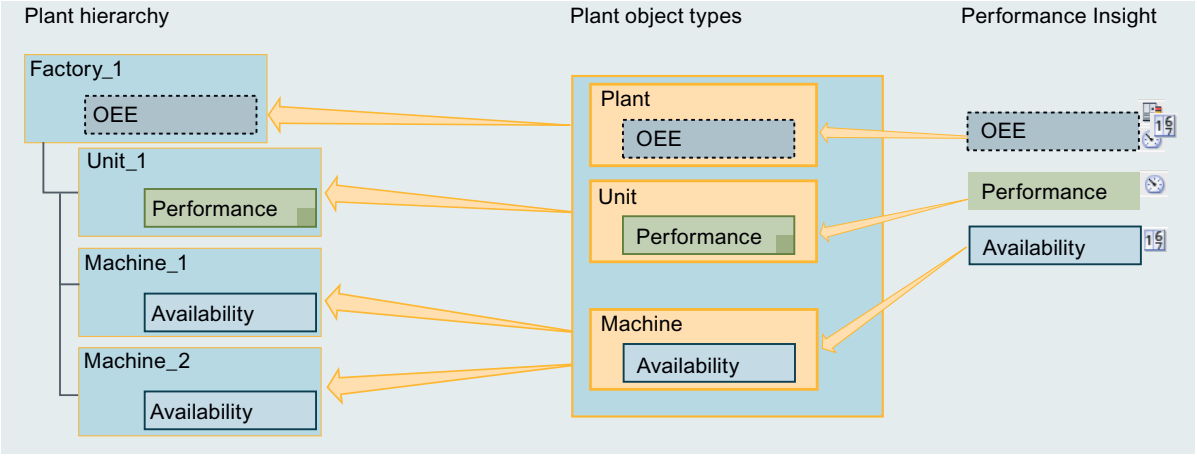
3.1 Configuration sequence

Introduction

The existing plant structure represents the starting point for defining a standardized KPI concept in object-oriented configuration.

Map the components of your plant by means of the plant object types that you use as instances in the plant view. You define global operands and KPIs in the "Performance indicators" global editor, and use standardized KPIs in plant object types. If you want to create a KPI that is based on other KPIs, configure the KPI directly at the plant object.

The definition and use of KPIs can be illustrated as follows:



Requirements

- You have experience in configuring with WinCC.
- The project has been created in the TIA Portal.
- The WinCC Unified PC RT HMI device has been created.
- The plant is mapped in the plant view.
- The HMI device is assigned to the plant view.
- Process tags have been created in the project.

Configuration sequence in the plant structure

The configured plant view is used as the basis for creating and configuring the KPIs and operands for the plant.

Configure global KPIs and operands in the "Performance indicators" editor.

1. You configure global operands to transfer the process data for calculating KPIs.
   - Counters
   - Numerical operands
2. In the "Time model" editor you create time categories and corresponding machine states.
3. You create global, plant-specific KPIs.
4. Configure a KPI formula for each KPI to calculate the KPIs. To do this, use the following:
   - Counters
   - Numerical operands
   - Time categories
   - Machine states
5. You assign the KPIs to the plant object types.
6. You select interface tags for the tags that provide data to the operands.
7. Use global calculation cycles to log the calculated KPIs.
8. To analyze downtime, you use global reason groups and reasons defined for the plant object.

The "Performance indicators" task card provides an overview of the configured global KPIs, operands, and calculation cycles.

3.2 Configuring global operands

You can define global operands of the type "Counters" or "Numeric operands" in order to use them in creating the KPI formula for global KPIs.

You define global operands in the "Global operands" tab of the "Performance indicators" editor.

3.2.1 Configuring counters

Introduction

As counters you store, for example, the number of products manufactured within a certain quality. This gives you the possibility to evaluate the quality of production for a period of time or to compare the production results of individual machines or equipment.

The following properties are available for counters.

Property		Description
General	Name	Unique, language-neutral name of the operand. The operand name must contain a maximum of 128 characters. Unsupported special characters: : :: . #\ / % [ ] $ "
	Display name	Language-dependent display name of the operand, which you store in various languages.
	Unit of measure	Unit of measure for this global operand. Use up to 16 characters.
	Counter type	• Incremental The delta value is written to the tag on every change of the source value. • Manual The value is applied manually. • Incremental with limits Like an "Incremental" counter type, high limit and low limit are defined in addition.
	Tag	Interface tag that manages the counter value. You configure the tag at the use of the operand in the plant object type.
Limits (High limit/ Low limit)	Limit type	• None (default setting) Only the defined limits of the tags apply. • Constant You define the limits using constant values. • Dynamic You define the tags that specify the limits.
	Limit value	Limit value for the "Constant" limit type. The permitted value range is between -1.7E + 308 and 1.7E + 308.
	Dynamic limit	A tag that belongs to the plant object types (e.g. Line) and defines the corresponding dynamic value.
Logging	Mode	• On change (default setting) When the value changes, it is logged. • Cyclic on change You specify value and unit. The value is logged according to a defined cycle. The value is only logged when it changes compared to the previously logged value.
Description		Brief description that serves as a tooltip in runtime and is shown in reports. The description can contain up to 32767 characters.

The "Limits" property is only displayed when the "Incremental with limits" counter type is set.

Requirements

- A project has been created.
- The "Performance indicators" editor is open.

Configuring counters

1. Expand the "Counters" folder in the "Global operands" tab.
2. Click "Add".
   A new global operand of the type "Counter" is created.
3. Enter a meaningful name for the counter, for example, "PartsProduced".
4. Open the Inspector window.
5. Specify the counter type under "Properties > General > General":
   - Incremental
   - Incremental with limits
   - Manual
6. If you have selected the "Incremental with limits" counter type, define the high limit and low limit for the counter under "Properties > General > Limits".
7. Specify the logging mode under "Properties > General > Logging".
   If you have selected "Cyclic on change", specify the interval value and the unit.

   Note

   Logging cycle and calculation cycle

   The shortest possible logging cycle is one minute. The shortest usable calculation cycle for KPIs that are based on this operand is 2 minutes in this case.

8. Under "Properties > General > Description", enter a comment for the counter that will appear as a tooltip in runtime.

Result

Configured global operands are available for use in KPIs in the "Performance indicators > Global operands" task card.

Note

Counter calculation without interpolation at boundaries

The calculation of a counter is based on the logged data in the specified time range. Only data that is completely within the specified time range is used to calculate the counter.

3.2.2 Configuring numeric operands

Introduction

The following properties are available for numeric operands.

Property		Description
General	Name	Unique, language-neutral name of the operand. The operand name must contain a maximum of 128 characters. Unsupported special characters: : :: . #\ / % [ ] $ "
	Display name	Language-dependent display name of the operand, which you store in various languages.
	Unit of measure	Unit of measure for this global operand. Use up to 16 characters.
	Tag	Interface tag that manages the value. You configure the tag at the use of the operand in the plant object type.
Description		Brief description that serves as a tooltip in runtime and is shown in reports. The description can contain up to 32767 characters.

Requirements

- A project has been created.
- The "Performance indicators" editor is open.

Configuring numerical operands

1. Expand the "Numerical operands" folder in the "Global operands" tab.
2. Click "Add".
   A new global operand of the type "Numerical operand" is created.
3. Enter a meaningful name for the numerical operand.
4. (Optional) In the Inspector window, specify additional properties for the operands.

Result

Configured global operands are available for use in KPIs in the "Performance indicators > Global operands" task card.

3.3 Configuring global calculation cycles

Introduction

First you define a calculation cycle to calculate the KPIs during a production process and log them in the database. After that, the logged KPIs can be output as a report. You can find more information at Local reporting for Performance Insight (Page 209).

If you want to additionally use a condition to trigger a calculation cycle, configure the condition on the plant object type. You can find more information at Assigning a calculation cycle to the KPI (Page 54).

You define global calculation cycles in the "Global calculation cycle" tab:

Property		Description
General	Name	Unique, language-neutral name of the calculation cycle. The name cannot contain more than 128 characters. Unsupported special characters: : :: . #\ / % [ ] $ "
	Display name	Language-dependent display name of the calculation cycle, which you store in various languages.

Property		Description
Calculation	Mode	Specifies how the calculation cycle is initiated: • Tag A calculation cycle is started by changing the tag value. • Context A calculation cycle is started by the start of a shift in the calendar or by a user-defined context.
	Tag	Tag that initiates the calculation cycle. Only available in "Tag" mode. You configure the tag at the use of the calculation cycle in the plant object type.
	Context provider	Specifies the tool that is used to control the calculation cycle: • Calendar • User-defined Only available in "Context" mode.
	Context	Specifies the context that controls the calculation cycle: • ShiftID For the "Calendar" context provider • String For the "User-defined" context provider
	Interval value	Duration of a cycle that serves as the time span to calculate the KPI. If the value is 0, the calculation cycle has no time span.
	Unit of measurement	Unit of the interval: • Minutes • Hours • Days • Weeks • Month
Description		Brief description that serves as a tooltip in runtime and is shown in reports. The description can contain up to 32767 characters.

Requirement

- A project has been created.
- The "Performance indicators" editor is open.

Creating a tag-controlled calculation cycle

1. Select the "Global calculation cycle" tab.
2. Click "Add".
   A new global calculation cycle is created.
3. Enter a meaningful name for the global calculation cycle.
4. Open the Inspector window.

5. Select the "Tag" mode under "Properties > General > Calculation > Mode".
   Alternative: In the row of the created calculation cycle, select the "Tag" entry from the drop-down list under "Data type".
6. Specify the length of the calculation cycle under "Properties > General > Calculation > Interval value".
7. Specify the unit for the calculation cycle under "Properties > General > Calculation > Unit".
8. Under "Description > Description", enter a comment for the calculation cycle that will appear as a tooltip in runtime.

Specify the tag as soon as the calculation cycle is used in a KPI, and this KPI is assigned to a plant object type.

Creating a context- or calendar-driven calculation cycle

To start the calculation cycle via a calendar event, a calendar must be configured.

You can find more information in the manual of the PI option "Calendar" under "Defining time schedules for production lines and stations".

1. Select the "Global calculation cycle" tab.
2. Click "Add".
   A new global calculation cycle is created.
3. Enter a meaningful name for the global calculation cycle.
4. Open the Inspector window.
5. Select the "Context" mode under "Properties > General > Calculation > Mode".
   Alternative: In the row of your created calculation cycle, select the "Context" entry from the drop-down list under "Data type".
6. Specify whether the calculation cycle is started via a calendar or custom under "Properties > General > Calculation > Context provider".
7. Specify the length of the calculation cycle under "Properties > General > Calculation > Interval value".
8. Specify the unit for the calculation cycle under "Properties > General > Calculation > Unit".
9. Under "Description > Description", enter a comment for the calculation cycle that will appear as a tooltip in runtime.

Note

Availability of calendar

If the context provider "Calendar" or the selected context is not available, an alarm is output in runtime.

Result

Configured global calculation cycles are available for use in KPIs in the "Performance indicators > Global calculation cycle" task card.

3.4 Time categories and machine states

3.4.1 Configuring time categories

Introduction

The Plant Intelligence options SIMATIC WinCC Unified Performance Insight and SIMATIC WinCC Unified Calendar share a time model.

The time model defines:

- Available time categories
- Options for which the time categories are relevant
- How time categories are visualized

You define the time categories that you use in connection with Performance Insight to evaluate and visualize KPIs in runtime. You have the option with each performance control to evaluate a period by a calendar.

You define time categories in the "Time model" editor.

Property	Description
Name	Unique, language neutral name of the time category The name of the time category can contain a maximum of 128 characters. Unsupported special characters: : :: . #\ / % [ ] $ "
Display name	Language-dependent display name of the time category, which you store in various languages.
Description	Brief description that serves as a tooltip in runtime and is shown in reports. The description can contain up to 32767 characters.
Color	Color that is used for visualization.
Relevance	Information about where the time category can be used.

Note

You create machine states within a time category.

Requirement

- The plant view and plant objects have been configured.

Procedure

1. In the project tree, open the "Time model" editor under "Common data" in the "Plant objects" tab.
2. To create a time category, double-click "<Add>" in the top row of the editor or click on "Add time category".
3. To create additional time categories, select an existing time category and click on "Add time category".
4. Open the Inspector window under "Properties > General > General".
5. Define the properties of the time category in the Inspector window.
   You can also change the properties in the table overview of the editor.

Result

Configured time categories are available for use in KPIs in the "Performance indicators > Global time categories and machine states" task card.

Importing and exporting the time model

- To import time categories from an Excel workbook, click on "Import time categories".
- To export time categories to an Excel workbook, click on "Export time categories".

Note

Do not rename the sheet in Microsoft Excel if you are planning on a reimport.

3.4.2 Configuring machine states

Introduction

With the help of machine states, you record the states of a machine in your plant, for example, to evaluate runtimes, downtimes, and utilization of the machine. Each machine state is assigned to a time category.

Define machine states in the "Time model" editor and use them when creating formulas for the global KPIs.

Property			Description
General	General	Name	Unique, language-neutral name of the machine state. The name cannot contain more than 128 characters. Unsupported special characters: : :: . #\ / % [ ] $ "
		Display name	Language-dependent display name of the machine state, which you store in various languages.
		Default state	The user-defined state that is displayed by default, e.g. on connection loss.
		Color	Is transferred automatically by the defined time category.
		Priority	Priority for this state as compared to other machine states prevailing at the same time. The information must be unique and different for each machine state.
		Sort index	The machine states are sorted in runtime according to this index.
	Machine state type	Data type	When assigning a KPI, configure also the data type for the machine state: • "Bit-based machine state" is set via the bit values. The corresponding bits are controlled by means of conditions. • "Value-based machine state" is specified automatically by a numerical value or a value range. This value is set as default value.
		Source	Specifies the source tag. Define the source tag in the editor of the plant object type in the "Performance indicators > Machine states" tab.
		Condition	• "1" - State is active when the bit is set. • "0" - State is active when the bit is not set. • "X" - The bit is not considered in the evaluation of the state. The condition is only relevant for the bit-based machine state.
		High limit	Specifies the high limit. The high limit is only relevant for the value-based machine state.
		Low limit	Specifies the low limit. High and low limit can have the same value assigned. In this case, the machine state only uses this one value. The limits must not overlap with the limits of other machine states. The low limit is only relevant for the value-based machine state.
	Stop state	Stop state	If this option is selected, the machine state is defined as the "Stop state". This stop state can be con-

Property			Description
			figured with the microstop settings in the plant object type.
	Relevant for downtime analysis	Relevant for downtime analysis	If this option is enabled, the machine state is taken into account with the Performance Analyzer for downtime analysis.
Description	Description		Brief description that serves as a tooltip in runtime and is shown in reports. The description can contain up to 32767 characters.

Note

Time and unit of microstops

In the editor of the plant object type in the "Performance indicators > Settings" tab, specify the microstop time and unit.

Requirements

- A project has been created.
- The "Time model" editor is open.

Defining time categories

To define the machine states, first define time categories. You create time categories under "Common data > Time model". You can find more information at "Configuring time categories (Page 35)".

You can find more information on creating and editing time categories in the documentation of WinCC Unified Option "Calendar".

Configuring the machine state

1. In the project tree, open the "Time model" editor under "Common data" in the "Plant objects" tab.
2. To create a machine state, select a time category in the editor.
3. Click on  "Add machine state".
4. Open the Inspector window under "Properties > General > General" and define the properties. You can also change some properties in the table overview of the editor.
5. Under "Properties > General > General > STOP state", specify whether the machine state describes the stop of a machine or a unit.
6. Under "Properties > General > General > Relevant for downtime analysis", specify whether the machine state for the downtime analysis should be taken into account.
7. (Optional) Select the area "Properties > General > Description". Define a brief description that serves as a tooltip in runtime and is shown in reports.
   The description can contain up to 32767 characters.

Result

Configured machine states are available for use in KPIs in the "Performance indicators > Global time categories and machine states" task card.

See also

Operating the Performance Analyzer (Page 162)

3.4.3 Configuring machine state at the plant object type

Introduction

For the configured machine state to be visible in Runtime, it is configured at the plant object type.

Requirement

- A machine state has been created in the "Time model" editor.
- The editor of a plant object type is open.

Procedure

1. In the editor of the plant object type, switch to the "Performance indicators > Machine states" tab.
2. In the Inspector window, configure the source tag in the "Properties > General > Machine state type" area.
   If you specify the source for a machine state, the value is transferred to all machine states used in this plant object type.

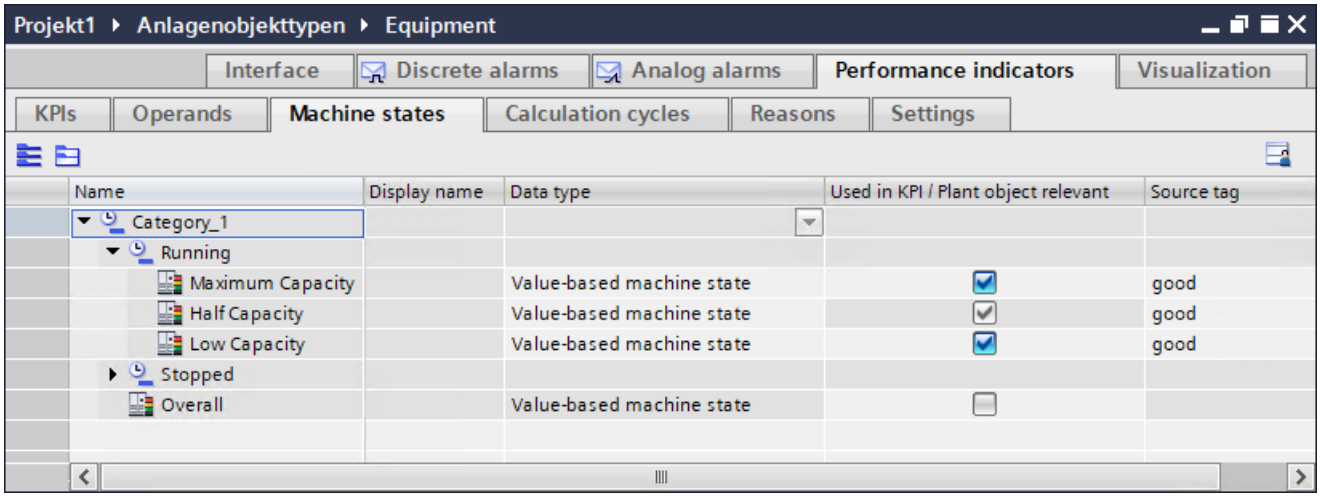
   Note

   Specific properties for plant object types

   You can edit the following machine state properties in the "Performance indicators" editor or in the editor of the plant object type in the "Performance indicators" tab:

   - Data type
   - Condition (only for bit-based machine state)
   - High limit (only for value-based machine state)
   - Low limit (only for value-based machine state)

   Changes to these properties in the plant object type editor are not transferred to the "Performance indicators" editor.
3. The "Used in KPI / Plant object relevant" column indicates whether a machine state can be visualized via a KPI or directly.



☑ The machine state can be visualized in Runtime, as it is used in a KPI.
The option is write-protected.

☑ The machine state can be visualized in Runtime without being used in a KPI.
Select the check box.

☐ The machine state is not visualized in Runtime.
Clear the check box.

Defining the microstop

Specify the length of a microstop in the editor of the plant object type in the "Performance indicators> Settings" area. When calculating a KPI, microstops can be either included, omitted, or displayed separately.

Settings

Microstop time	Size of the period that represents a microstop for this machine state.
Microstop unit	Selection list, unit for the microstop: Minutes, seconds, milliseconds Default value: 0 minutes

3.5 Configuring KPIs

3.5.1 Configure global KPIs

Introduction

You create global KPIs in the "Global KPIs" tab of the "Performance indicators" editor (Page 21).

For each KPI, you define a KPI formula and how this is displayed.

Targets and thresholds

You have the option of defining target and thresholds in the KPI. The "Constant" setting must be selected for the target type or limit type of each property.

You can define the following properties:

- Target
- High limit 2
- High limit 1
- Low limit 1
- Low limit 2

The values must rise from "Low limit 2" to "Target" and fall from "High limit 2" to "Target" (High limit 2 > High limit 1 > Target > Low limit 1 > Low limit 2).

Requirements

- A project has been created.
- Global operands, time categories, and machine states required for the KPI are configured.
- The "Performance indicators" editor is open.

Configure global KPIs

1. In the work area, click "<Add>" under "Global KPIs".
   A new KPI is created.
2. Assign a descriptive display name for the KPI in the Inspector window in the "Properties" tab under "General > General".
3. Under "Unit of measure", specify the unit of measure in which the KPI is calculated.
4. In the Inspector window under "General > Color > Bar color", specify the color with which the bar for this KPI is visualized in runtime.
5. Under "General > Color > Text color", specify the color in which the text label for the KPI is displayed in runtime.
6. Create the KPI formula for the KPI under "KPI formula".
7. Define a type and value for each property under "Target and thresholds".
8. Enter a brief description that serves as a tooltip in runtime and is shown in reports.
   The description can contain up to 32767 characters.

Note

Set the calculation cycles and dynamic targets and thresholds as soon as you use the KPI in a plant object type. To do this, use the "Performance indicators" tab in the editor of the plant object type.

Group KPIs

1. In the work area, right-click "Add" under "Global KPIs".
2. Select "Add a new group" in the shortcut menu.
3. Assign a meaningful name to the group.
4. Confirm your entry with <Enter> or by clicking on any field.
5. Right-click on the name of a group in the work area under "Global KPIs".
6. Select "Add new KPI" or "Add a new group" again in the shortcut menu.
7. Move KPIs or groups using drag-and-drop. To do this, drag the icon of the KPI or group to a different location.

Delete KPIs

1. Click the left, dark gray column in front of the entry of the KPI that you want to delete.
2. Press <Del> or select "Delete" in the shortcut menu.
   The selected KPI or group is deleted without a prompt for confirmation.

Result

Configured KPIs are available in the "Performance indicators > Global KPIs" task card.

See also

Configuring a KPI formula (Page 51)

Frequently used KPIs, microstops and scripts (Page 199)

3.5.2 KPI formula

3.5.2.1 Formula syntax

Note

Syntax parts within pointed brackets in this section must be replaced by other syntax parts during entry in the editor, for example, by a specific arithmetic operator, the name of a function or an operand, an operand type or evaluation type.

Introduction

You configure KPI formulas in the "KPI formula" editor for every global KPI.

The following elements are permitted in the calculation of a KPI formula:

- Counters
- Numerical operands
- Other KPIs
- Time categories
- Machine states
- Aggregate functions
- Arithmetic operators

Syntax

You create the formulas for calculating the KPIs in the "KPI formula" editor according to the following pattern:

Operation	Syntax	Example
Arithmetic operators (only within aggregate functions or as a mathematical operation of aggregate functions)	<Operand> <Operator> <Operand>	`SUM(NumericOperands("Speed").Value * NumericOperands("Speed").Duration)`
Aggregate functions	<Aggregate function name>(<Operand>)	`AVG(NumericOperands("Speed_1").Value)`
Evaluation types	<Operand type>("<operand name>").<evaluation type>	`SUM(MachineStates("Running").Occurrences)`
KPI in KPI	KPIs("<NamePlantHierarchy>/<NamePlantObject>/>NameLowerLevelPlantObject>/<NameKPI>")	`KPIs("Plantview/Station_1/Motor_1/Performance")`

Note

Restrictions for the formula syntax

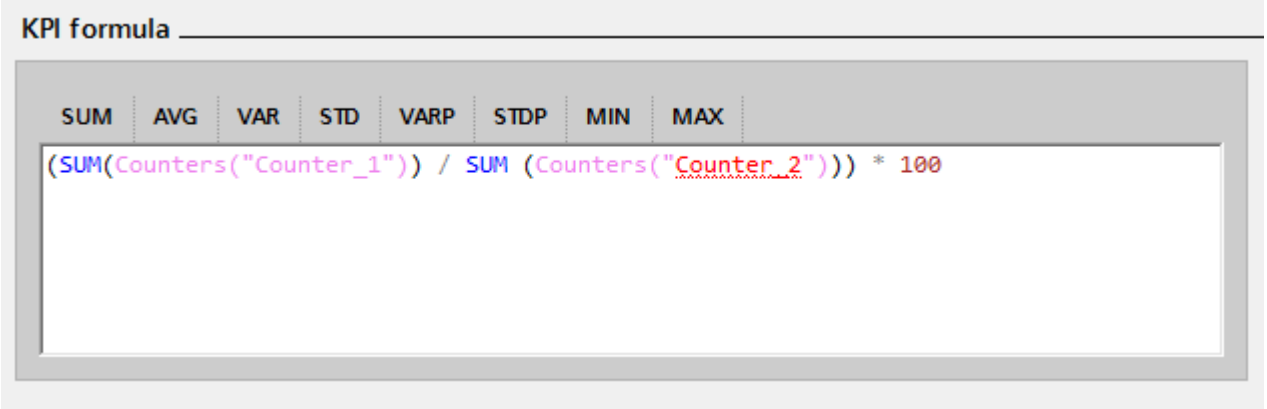
KPIs cannot be used reciprocally in formulas.

Note

Operands, time categories, and machine states must only be used within aggregate functions.

The aggregate functions **SUM**, **AVG**, **AVG_T,** **VAR**, **STD**, **VARP**, **STDP**, **MIN**, and **MAX** are supported.

The syntax highlighting in the editor helps you to distinguish between different operands and detect errors. Invalid elements and syntax errors are highlighted in a formula with a red text color, and you will receive a tooltip.



3.5.2.2 Evaluation types

Introduction

Evaluation types determine which values are used for the calculation. The following evaluation types are available in the "KPI formula" editor:

Evaluation type	Meaning
Value	Specifies that the value of the numerical operand is calculated in the formula. Only available for numerical operands.
Occurrences	Default value Specifies that the occurrence of the operand is calculated in the formula.
Duration	Default value Specifies that the duration of the state is calculated in the formula.
Planned	Specifies that the time category is requested from the calendar. For the query to take place, the time category or at least one lower-level time category must be marked as "Relevant for calendar" in the time model during the configuration. If the Planned parameter is not specified, the data from the machine states is requested. Only available as an option for time categories.
WithoutMicroStops	Microstops are not taken into consideration. Only available as an option for time categories and machine states.
OnlyMicroStops	Only microstops are considered. Only available as an option for time categories and machine states.

Operands

For operands, the evaluation types must be specified as follows:

- "Counter" operand type: Evaluation type must not be specified.
- "Numerical operand" operand type: Evaluation type must be specified.

Syntax	Example
Counters("<Counter name>")	`SUM(Counters("TotalIncrementWithLimits"))`
NumericOperands("<Name of the numerical operand>").Value	`SUM(NumericOperands("Speed_1").Value)`
NumericOperands("<Name of the numerical operand>").Duration	`SUM(NumericOperands("Speed_1").Duration)`
NumericOperands("<Name of the numerical operand>").Occurences	`SUM(NumericOperands("Speed_1").Occurrences)`

Time categories

For time categories, the evaluation type "Duration" or "Occurences" must be used. A second optional evaluation type is also available.

Syntax	Example
TimeCategories("<Name of the time category>").Duration	`SUM(TimeCategories("ReducedSpeed").Duration)`
TimeCategories("<Name of the time category>").Duration.Planned	`SUM(TimeCategories("ReducedSpeed").Duration.Planned)`
TimeCategories("<Name of the time category>").Duration.WithOutMicroStops	`SUM(TimeCategories("ReducedSpeed").Duration.WithOutMicroStops)`
TimeCategories("<Name of the time category>").Duration.OnlyMicroStops	`SUM(TimeCategories("ReducedSpeed").Duration.OnlyMicroStops)`
TimeCategories("<Name of the time category>").Occurrences	`SUM(TimeCategories("ReducedSpeed").Occurrences)`
TimeCategories("<Name of the time category>").Occurrences.Planned	`SUM(TimeCategories("ReducedSpeed").Occurrences.Planned)`
TimeCategories("<Name of the time category>").Occurrences.WithOutMicroStops	`SUM(TimeCategories("ReducedSpeed").Occurrences.WithOutMicroStops)`
TimeCategories("<Name of the time category>").Occurrences.OnlyMicroStops	`SUM(TimeCategories("ReducedSpeed").Occurrences.OnlyMicroStops)`

Machine states

For machine states, the evaluation type "Duration" or "Occurences" must be used. A second optional evaluation type is also available.

Syntax	Example
MachineStates("<Name of the machine state>").Duration	`SUM(MachineStates("Running").Duration)`
MachineStates("<Name of the machine state>").Duration.WithOutMicroStops	`SUM(MachineStates("Running").Duration.WithOutMicroStops`
MachineStates("<Name of the machine state>").Duration.OnlyMicroStops	`SUM(MachineStates("Running").Duration.OnlyMicroStops`
MachineStates("<Name of the machine state>").Occurrences	`SUM(MachineStates("Running").Occurrences)`
MachineStates("<Name of the machine state>").Occurrences.WithOutMicroStops	`SUM(MachineStates("Running").Occurences.WithOutMicroStops`
MachineStates("<Name of the machine state>").Occurences.OnlyMicroStops	`SUM(MachineStates("Running").Occurences.OnlyMicroStops`

Note

Time and unit of microstops

In the editor of the plant object type in the "Performance indicators > Settings" tab, specify the microstop time and unit.

3.5.2.3 Arithmetic operators

With arithmetic operators, you calculate numerical values, such as the product of two counters.

The following arithmetic operators are available:

Operator	Meaning
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Division with remainder

3.5.2.4 Aggregate functions

Introduction

Aggregate functions can be operands, time categories, machine states, or related arithmetic operations.

The following aggregate functions are available:

Function	Meaning	Example
SUM	Adds one or more values to form a sum.	SUM(Counters("Counter_1")) SUM(Counters("Counter_1") + NumericOperands("NumericOperand_1").Value)
AVG	Calculates the arithmetic average between the given values.	AVG(TimeCategories("Category_1").Occurences) AVG(Counters("Counter_1") + Counters("Counter_2"))
AVG_T	Calculates the time-weighted mean value between the given values. The timestamps of the individual values are subtracted for this purpose. It can be used only for the "Counter" operand type or for the "Numeric operand" type in conjunction with the "Value" evaluation type.	AVG_T(NumericOperands("NumericOperand_1").Value)
VAR	Estimates the variance based on a random sample. This function assumes that the values represent a random sample of the entire population.	VAR(NumericOperands(“NumericOperand_1”).Value) VAR(Counters("Counter_1") + Counters("Counter_2"))

Function	Meaning	Example
STD	Estimates the standard deviation based on a random sample.	STD(NumericOperands(“NumericOperand_1”).Value) STD(Counters("Counter_1") + Counters("Counter_2"))
VARP	Estimates the statistical variance based on the entire population.	VARP(NumericOperands(“NumericOperand_1”).Value) VARP(Counters("Counter_1") + Counters("Counter_2"))
STDP	Calculates the standard deviation based on an entire population.	STDP(NumericOperands(“NumericOperand_1”).Value) STDP(Counters("Counter_1") + Counters("Counter_2"))
MIN	Calculates the minimum of the values.	MIN(NumericOperands(“NumericOperand_1”).Value) MIN(Counters("Counter_1") + Counters("Counter_2"))
MAX	Calculates the maximum of the values.	MAX(NumericOperands(“NumericOperand_1”).Value) MAX(Counters("Counter_1") + Counters("Counter_2"))

Note

Restrictions for the aggregate functions

- The use of an aggregate function in another aggregate function is not permitted.
- Use of KPIs in aggregate functions is not permitted.

Special feature of aggregate functions

When you use aggregate functions in combination with an evaluation type, such as "Occurences", there are various ways to calculate numerical operands.

Timeslicing takes place with the aggregate functions.

Add values

The number of changed values within the calculation period are added.

The start value is included.

Time stamp	Speed_1	Speed_2
08:50:00 (start value)	5	5
08:50:20		10
08:50:41	15	
08:51:00		20
Sum	2	3

Example	Result
`SUM(NumericOperands("Speed_1").Occurrences) +SUM(NumericOperands("Speed_2").Occurrences)`	2+3=5

Add time stamps

The number of time stamps of all operands are added.

An output time stamp is added even if no new value is output by the operand.

Time stamp	Speed_1	Speed_2
08:50:00 (start value)	5	5
08:50:20	5	10
08:50:41	15	10
08:51:00	15	20
Sum	4	4

Example	Result
`SUM(NumericOperands("Speed_1").Occurrences) +NumericOperands("Speed_2").Occurrences)`	4+4=8

3.5.2.5 Using KPI in KPI

You can use other KPIs in a KPI formula:

- KPIs of the same plant object type
- KPIs of other plant objects

In a formula, you use both KPIs from lower-level plant objects and KPIs from plant objects of other hierarchy levels.

The syntax for using KPIs from other plant objects in a KPI is:

```
KPIs("<Name_PlantView>/<Name_PlantObject>/
<Name_LowerLevelPlantObject>/<Name_KPI>")
```

The path of a plant object in the plant view serves as plant object path.

Note

Observe the following notes on the usage of KPIs in KPI formulas:

- KPIs must not be used in aggregate functions.
- KPIs cannot be used reciprocally in formulas.

3.5.2.6 Configuring a KPI formula

Configuring a KPI formula

In the KPI formula, you specify dependencies between the following elements:

- Global operands
- Time categories
- Machine states
- Other KPIs

To configure a KPI formula, follow these steps:

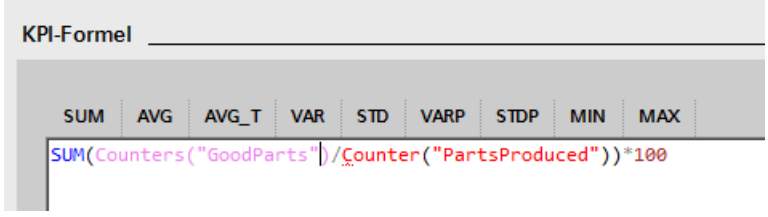
1. Open the "Performance indicators" editor.
2. Select a KPI in the "Global KPIs" tab.
3. In the Inspector window, switch to "General > KPI formula" in the "Properties" area.
4. Define the KPI formula:
   - Drag-and-drop global operands, time categories, and machine states from the "Performance indicators" task card to the definition area of the "KPI formula" editor.
   - Set the calculation using arithmetic operators and aggregate functions.

   Alternatively, enter the operand, taking the syntax rules (Page 44) into account.

Configuration support

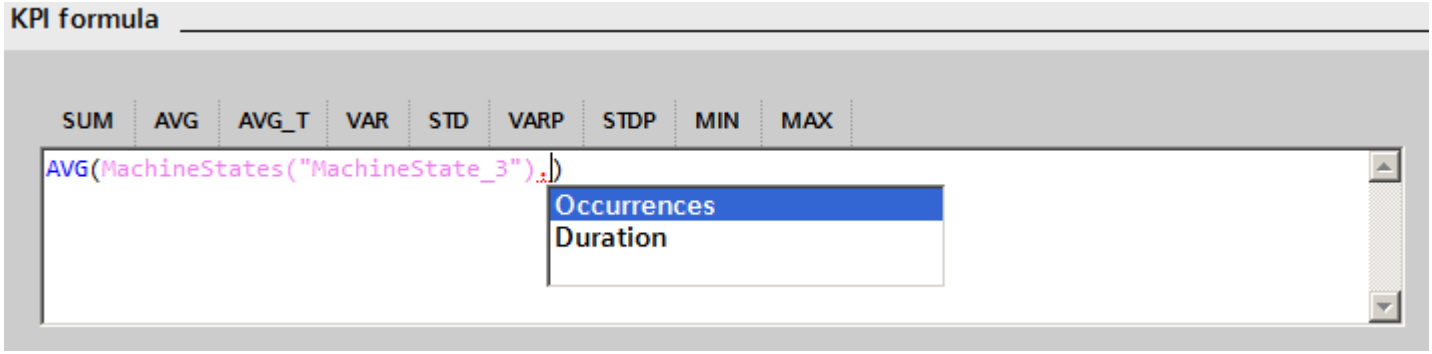
Incomplete or incorrect configurations are shown with a colored background in the "KPI formula" editor.

The inputs in the editor are constantly checked for validity. When an operand is no longer valid, for example, or the formula syntax is not observed, the corresponding area is highlighted in red. If there are several errors, the errors are marked in red step-by-step. You will receive a tooltip.



Support with inputting formulas

Autocomplete offers suggestions during input.



Examples:

- When the single letter "C" is entered, the entries permitted at this point are offered.
- When a period is entered after an operand, the permitted evaluation types are offered.

3.5.3 Assigning a KPI to the plant object type

Introduction

After you have configured the global KPIs and operands, assign the global KPIs to the individual plant object types. The operands configured in the KPI are automatically visible at the plant object type in the "Performance indicators > Operands" tab.

Requirements

- A plant object type is configured.
- The plant view is configured.
- Global operands, time categories, and machine states required for the KPI are configured.
- At least one global KPI is configured.

Assigning KPIs

1. Open the "Performance indicators > KPIs" tab in the editor of a plant object type.
2. To view the previously configured KPIs and operands at a glance, click on the "Performance indicators" task card.

   Note

   To edit global KPIs and operands, click on "Open Performance indicators editor".

3. Drag and drop the KPI relevant to this plant object type from the "Performance indicators" task card to the "KPIs" area.
   A reuse of the KPI and the operands used is created.
4. Open the Inspector window under "Properties > General > Targets and thresholds".

5. Define dynamic targets and thresholds for the KPI.
6. Change to the "Operands" area.
7. Configure the properties of the operands, for example, the tag.

	**Tip for an efficient procedure**
To use multiple KPIs in a plant object type, you have the following option: • Select several global KPIs by multiple selection and add them to the "KPI" area of the plant object type using drag and drop.	

Result

A global KPI is reused on the plant object type.

See also

Configuration sequence (Page 27)

KPI parameter assignment (Page 53)

3.5.4 KPI parameter assignment

Introduction

You configure the tags of the operands in the usage at the plant object type. In this way, data of the plant objects can be calculated and combined in the KPIs. The tags that need to be defined depend on the operand type.

Interconnect the tags with the interface tags that you configured beforehand at the corresponding plant object type.

Requirements

- A plant view is configured.
- A plant object type is configured.
- Interface tags are created at the plant object type.
- KPI is assigned to a plant object type.

KPI parameter assignment

To supply the operands with process data, you configure the tags at the use of the KPI at the plant object type.

1. Open the respective plant object type.
2. To expand all operands, open the overview of all operands used with "Expand hierarchical structure".
3. Select the desired operand.
4. Select the interface tag from the data structure in the Inspector window under "General > General > Source".

Result

You have configured a KPI by connecting the operand with the interface tag of the plant object type.

See also

Assigning a KPI to the plant object type (Page 52)

3.5.5 Assigning a calculation cycle to the KPI

Introduction

You can assign a global calculation cycle to a KPI.

If the calculation cycle is created in "Tag" mode, define the interface tag at the plant object type, which, when changed, starts a new calculation cycle.

Regardless of the mode of the calculation cycle, you have the possibility to define another condition that must be met during the calculation cycle. You configure this condition using a Boolean variable that is created as an interface tag in the plant object type.

Note

Adapting the calculation cycle

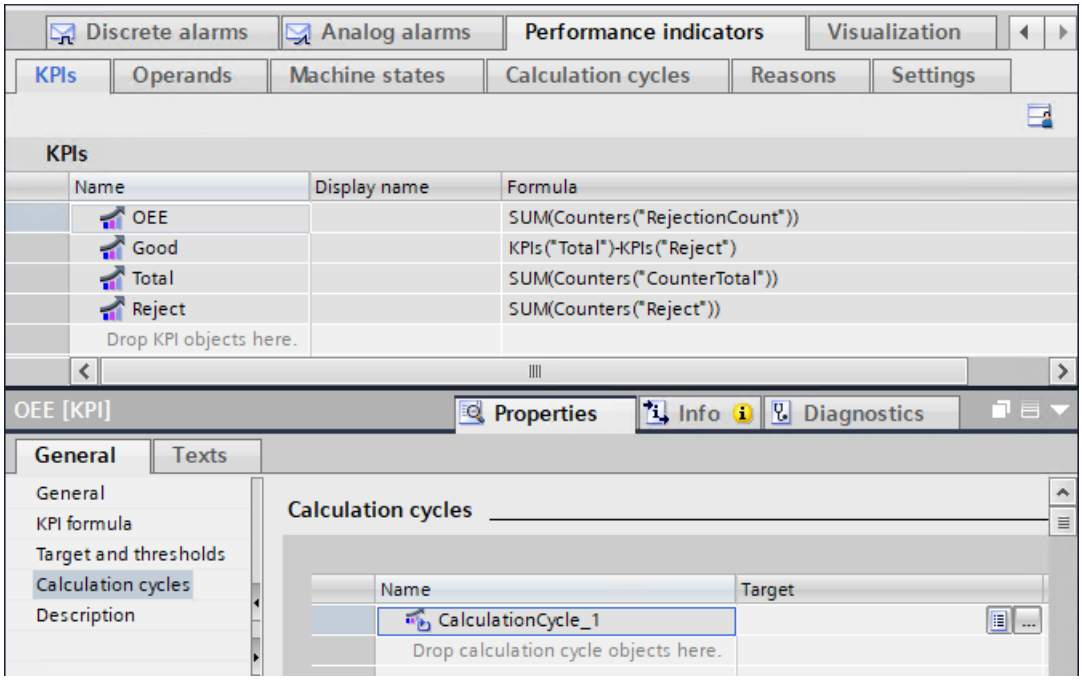
In runtime you have the option to start and stop calculation cycles manually or to modify the logged calculation cycles via the "Performance Analyzer" control. You can find more information at Performance analyzer (Page 162).

Requirement

- At least one KPI is assigned to a plant object type.
- For calculation cycles in "Tag" mode and for conditions:
  The corresponding interface tags are created in the plant object type.
- A calculation cycle has been created.
  You can find more information at Configuring global calculation cycles (Page 32).

Assigning a calculation cycle to a KPI

1. Open the "Performance indicators > KPIs" tab in the editor of a plant object type.
2. Select a KPI.
3. In the Inspector window go to "Properties > General > Calculation cycles".
4. Open the "Performance indicators" task card.
5. Drag a calculation cycle from the "Global Calculation Cycles" pane to the "Calculation Cycles" table in the Inspector window under "Properties > General > Calculation Cycles".



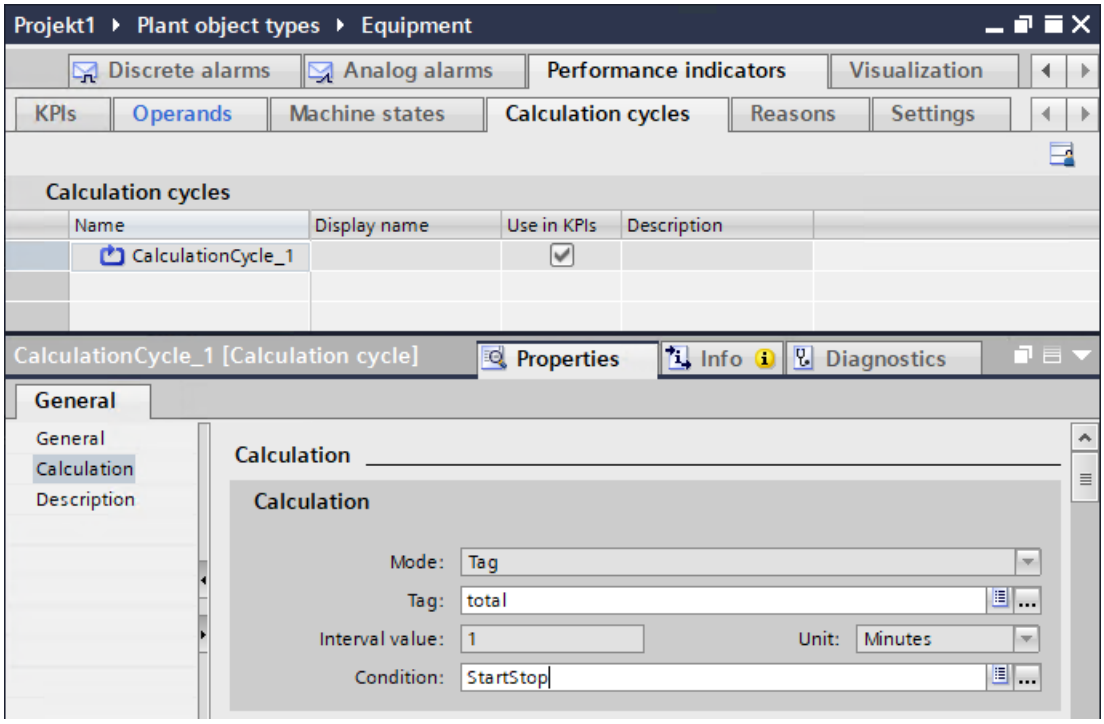
   The calculation cycle is assigned to the KPI.

6. In the "Target" column, as an option, select the interface tag in which the KPI results are stored during a calculation cycle. You can use these interface tags in an I/O field, for example.
7. If the calculation cycle is created with "Context" mode, you are finished.
   If the calculation cycle is created with "Tag" mode, open the "Performance indicators > Calculation cycle" tab.
8. Select the calculation cycle.
9. Open the Inspector window under "Properties > General > Calculation".

10. Under "Tag", click on ....
    The dialog for selecting a tag opens.
11. Select an interface tag and click on ✓.

Setting the condition for the calculation cycle

1. Open the "Performance indicators > Calculation cycle" tab in the editor of a plant object type.
2. Select a calculation cycle.
3. Open the Inspector window under "Properties > General > Calculation".
4. Under "Condition", click on ....
   The dialog for selecting a tag opens.
5. Select a Boolean tag and click on ✓.



See also

Assigning a KPI to the plant object type (Page 52)

3.5.6 Configuring independent KPIs on a plant object

Introduction

You create independent KPIs in the editor of the plant object in the "Performance indicators > KPIs" tab.

For each KPI, you define a KPI formula and how this is displayed. In the KPI formulas, you use only KPIs from other plant objects. Operands, time categories, and machine states are not available.

The "Performance indicators > KPIs" tab of the plant object show the elements that were previously configured on the plant object type. These cannot be edited.

Targets and thresholds

When you choose the "Constant" type, you can define the following optional targets and thresholds:

- Target
- High limit 2
- High limit 1
- Low limit 1
- Low limit 2

The values must rise from "Low limit 2" to "Target" and fall from "High limit 2" to "Target" (High limit 2 > High limit 1 > Target > Low limit 1 > Low limit 2).

Requirement

- At least one plant object has been created in the plant view.
- The "Performance indicators > KPIs" tab is open on the plant object.

Procedure

1. Click "<Add>".
   A new KPI is created.
2. Assign a unique display name for the KPI in the Inspector window in the "Properties" tab under "General > General".
3. Under "Unit of measure", specify the unit of measure in which the KPI is calculated.
4. In the Inspector window under "General > Color > Bar color", specify the color with which the bar for this KPI is visualized in runtime.
5. Under "General > Color > Text color", specify the color in which the text label for the KPI is displayed in runtime.

6. Create the KPI formula for the KPI under "KPI formula". To use the KPI of a different plant object in the formula, follow these steps:
   - Select the specific plant object in the plant view.
     The available KPIs are shown in the Details view.
   - Drag the KPI from the Details view to the "KPI formula" editor.

   The KPI is used in the formula.

   Note

   You can also drag and drop multiple KPIs into the "KPI formula" editor. Enter a "+" between the KPIs.

7. If required, define the type and value under "Target and thresholds".
8. If required, assign a calculation cycle to the KPI under "Properties > General > Calculation cycles". The procedure is analogous to calculation cycles for KPIs of plant object types. You can find more information at Assigning a calculation cycle to the KPI (Page 54).

   Note

   Calculation cycles for independent KPIs are automatically available on the plant object type as well.

   For calculation cycles with "Tag" mode, the interface tag is configured at the plant object type.

9. Enter a brief description that serves as a tooltip in runtime and is shown in reports. The description can contain up to 32767 characters.

Result

You have created an independent KPI at a plant object.

3.6 Configuring reasons

3.6.1 Configuring global reason groups

Introduction

You define a reason group to create reasons under it for plant objects or plant object types, which you use to analyze the downtime of your plant.
You define global reason groups in the "Global reason groups" tab:

Property			Description
General	General	Name	Unique language-neutral name for the reason group. The name cannot contain more than 128 characters. Unsupported special characters: : :: . #\ / % [ ] $ "
		ID	Unique ID for the reason group.
		Display name	Language-dependent display name of the calculation cycle, which you store in various languages. The display name may contain a maximum of 128 characters. Unsupported special characters: : :: . #\ / % [ ] $ "
	Source	Low limit	Specifies the low limit of the source tag at which this reason group is activated. The areas of reason groups must not overlap. The source tag can only be specified in the plant object type.
		High limit	Specifies the high limit of the source tag for which this reason group is activated. The areas of reason groups must not overlap. The source tag can only be specified in the plant object type.
Description			Brief description that serves as a tooltip in runtime and is shown in reports. The description can contain up to 32767 characters.

Requirement

- A project has been created.
- The "Performance indicators" editor is open.

Configure reason group

1. Select the "Reason groups" tab.
2. Double-click "<Add>".
   A new reason group is created.

   Note

   Use folders to keep an overview when using numerous reason groups.

   You can create a new folder either by clicking the "Folder" button or by right-clicking > "Add new reason group folder".

3. Assign a descriptive name for the reason group, e.g. "Machine Faults".
4. Open the Inspector window under "Properties > General > General".
5. Define the properties of the reason group in the Inspector window.
6. Create a comment for the reason group under "Properties > General > Description", which will appear as a tooltip in Runtime.

Result

Configured global reason groups are available in the "Performance indicators > Reasons" tab of all plant objects and plant object types.

3.6.2 Causes

Introduction

Once you have configured the global reason groups, fill them with reasons at the plant object types. The configured reason groups are automatically available in the "Performance indicators > Reasons" tab of the plant object types.

Requirement

- A plant object type is configured.
- The plant view is configured.
- At least one reason group is configured.

Create reason

1. Open the "Performance indicators > Reasons" tab in the editor of a plant object type.
2. Select the line of the reason group in which the reason is to be created.
3. Click "Add new reason".
   Alternatively, open the shortcut menu of the line and select "Add new reason".

4. Enter a name and an ID for the reason.
   Optionally, assign a display name and a description as well.
5. Specify the source tag under "Properties > Source > Tag".
   Alternatively, click on the cell in the "Source tag" column in the editor.
6. Specify the high and low limit for the tag value under "Properties > Source".
   The limits must be within the range of the reason group.

Note

- The upper and lower limits for a reason must be within the value range of the parent reason group.
- The ranges of two reasons must not overlap.

Result

The reason is available at the plant object type and the plant objects based on it.

3.7 Example: Calculating quality rate

Sample scenario

The quality rate over a specific period of time is to be calculated for a machine in an existing plant. The process tags for calculating good parts and all produced parts have already been created. The plant and the machines are mapped in the plant view. The interface tags for connection to the HMI device are defined.

Implementation concept

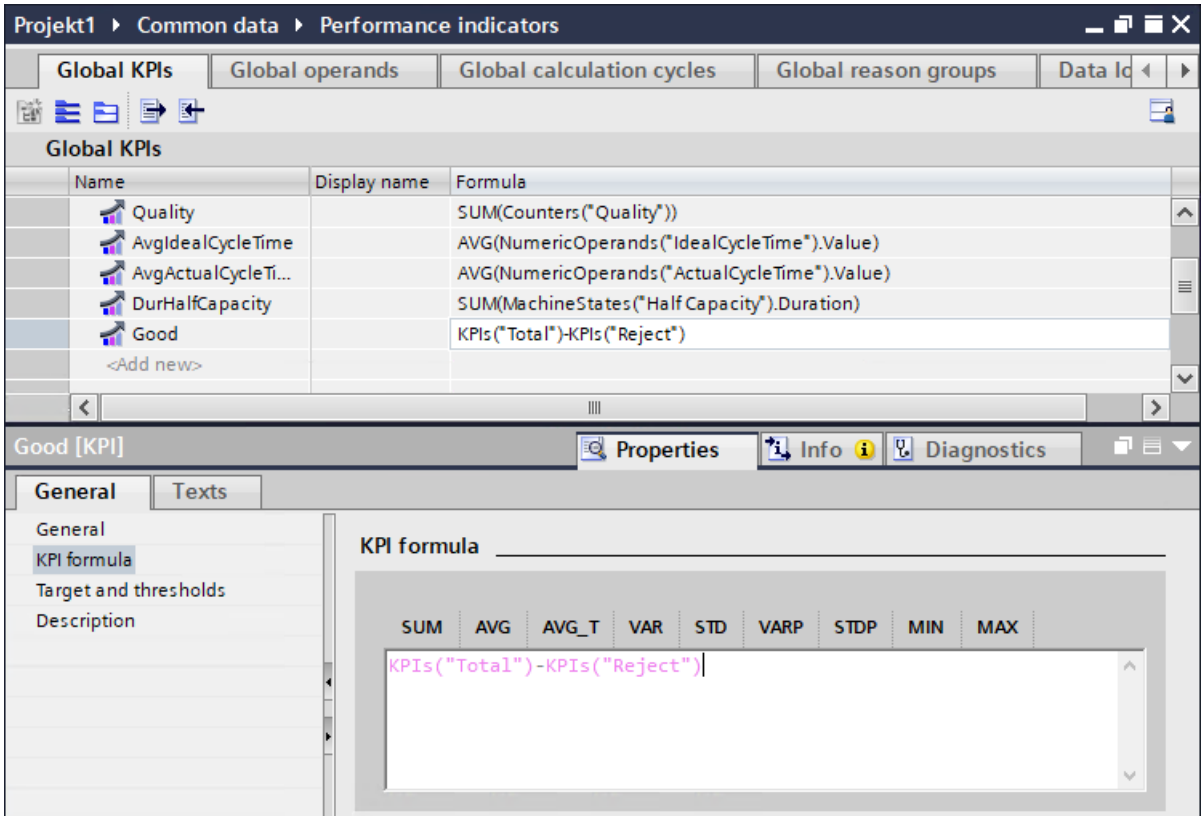
You create global operands and define the corresponding KPI formula for calculating the quality rate. You then assign the KPI to a plant object type and configure the operands in such a way that the process values are calculated.

Defining KPI for quality rate

1. Open the "Common data" folder in the "Plant objects" area in the project tree.
2. Double click on "Performance indicators".
   The "Performance indicators" editor opens.
3. Open the "Counters" folder in the "Global operands" tab.
4. Select "<Add>".
   A new global operand of the type "Counter" is created.
5. Enter a meaningful name for the operand, for example, "RejectionCounts".
   This operand is used to calculate good parts.
6. Create the second global operand of the "Counter" type for the total number of all produced parts, e.g. "ActualProductionCount".

7. Configure the counter type "Incremental" for both operands.
8. Click "Add" in the "Global KPIs" tab.
   A new KPI is created.
9. Enter a meaningful name for the KPI, for example, "Quality".
10. In the Inspector window, under "General" in the "Properties" tab, configure the following:
    - Display name
    - Unit of measure
    - Colors
11. Define the KPI formula:
    - Drag the two operands from the "Global operands" pane into the "KPI formula" editor.
    - Set a division operator in-between.

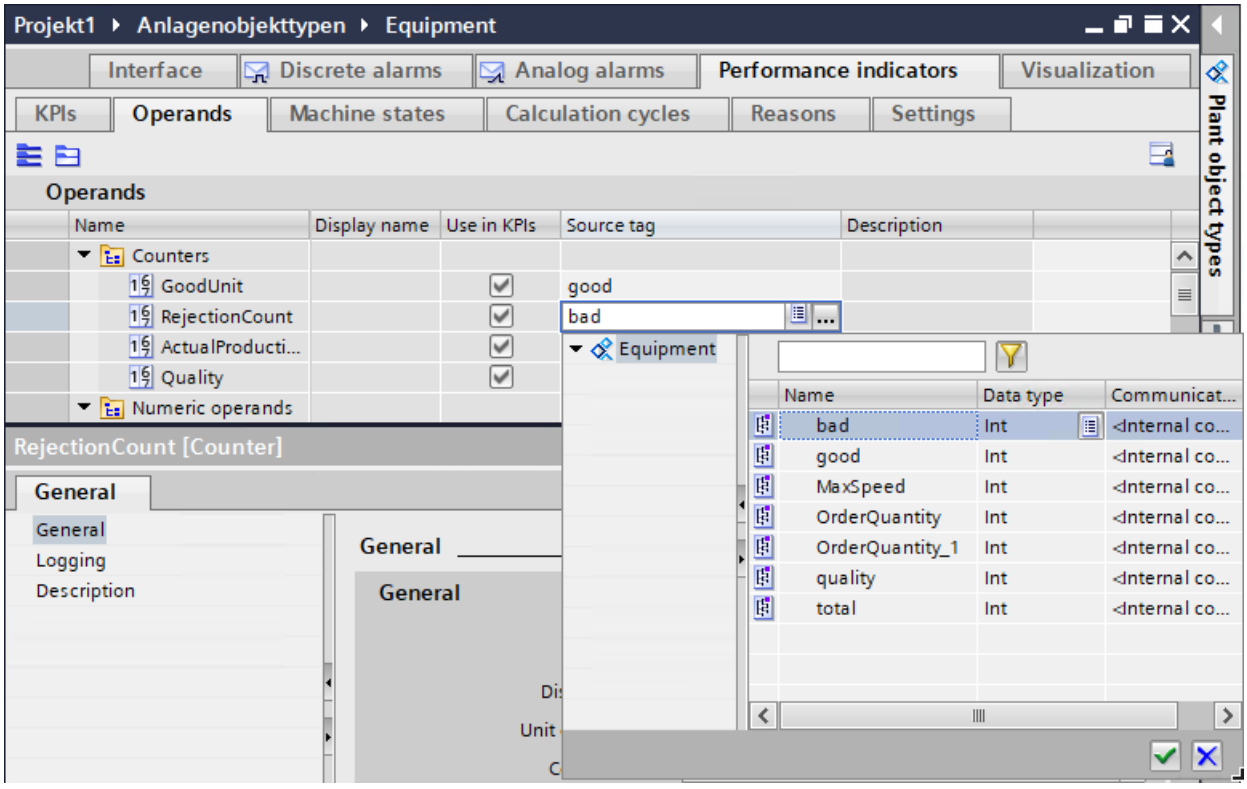
    Alternatively, enter the formula manually with consideration of the formula syntax.
    When manually entering a KPI formula, you are supported by the autocomplete. You can find more information at Configuring a KPI formula (Page 51).



Assigning and configuring KPIs

1. Click "Plant objects" in the project tree.
2. Click on "Show plant object types".

3. Double-click on the plant object type of the machine for which you want to calculate the quality rate.
   The editor of the plant object type opens.
4. Go to the "Performance indicators" tab.
5. Open the "Performance indicators" task card.
6. Drag the "Quality" KPI from the "Performance indicators" task card to the "KPI" area.
   The corresponding operands "ActualProductionCount" and "RejectionCounts" are automatically created.
7. Go to the lower-level "Operands" tab.
8. Define a tag for each operand.



Result

You have created a KPI to calculate the quality rate, used it in the plant object type and supplied it with process values.

3.8 Example: Using KPIs from other plant objects

Introduction

You configure the plant in the plant view and map the equipment as plant objects. With Performance Insight, you have the option of using KPIs of different plant objects within the same plant view in a KPI formula. In a formula, you define both KPIs from lower-level plant objects and KPIs from plant objects of the same and higher-level hierarchy levels.

In the following example, you define a KPI for a station in which you use KPIs from lower-level plant objects.

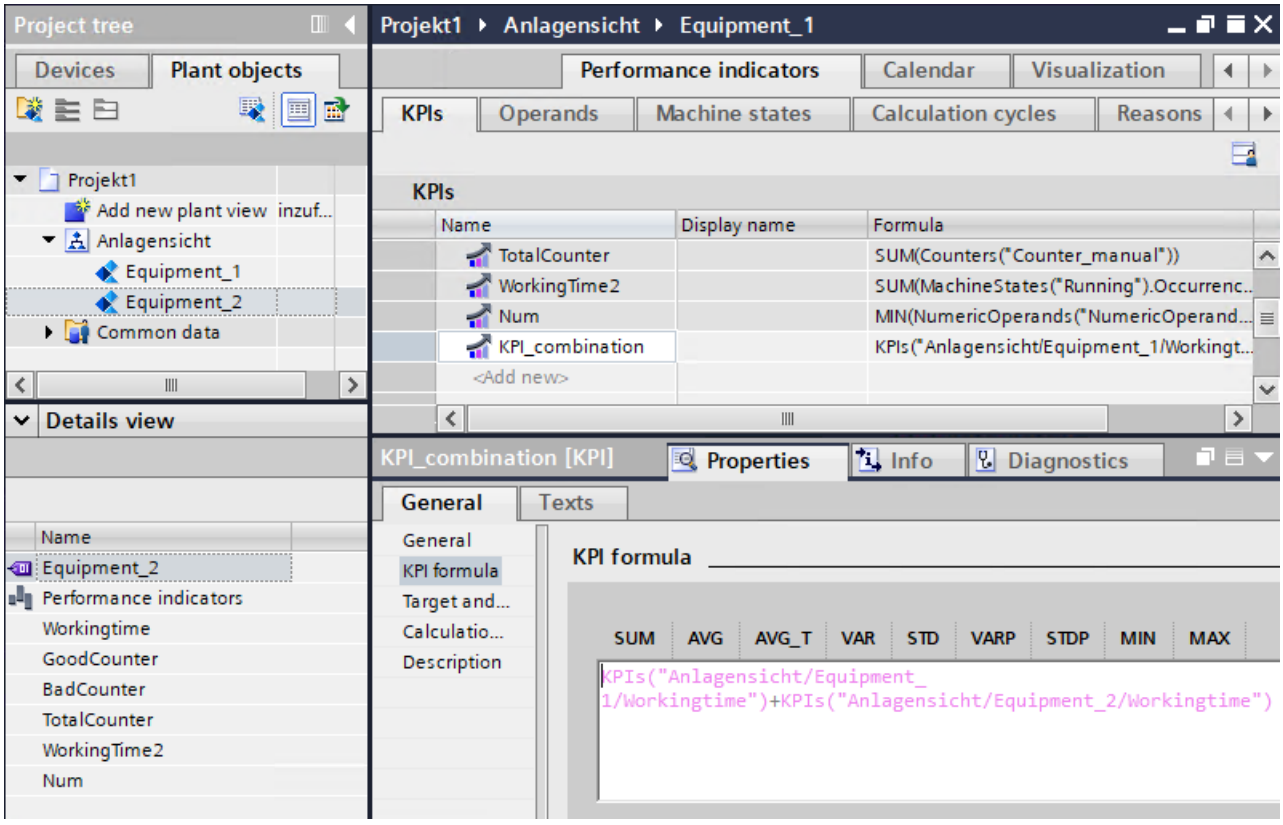
Requirement

- Two plant object types are created:
  - Station
  - Engine
- The "Engine" plant object type contains a "KPI_1" KPI.
- In the plant view, Engine is used twice as a plant object under Station, for example, Engine_1 and Engine_2.
- The editor of the "Station" plant object is open.

Procedure

1. Switch to the "Performance indicators > KPIs" tab.
2. Select "<Add>".
   A new KPI is created.
3. Open the Inspector window under "Properties > General > KPI formula".
4. Select the plant object "Engine_1" in the plant view.
   The available KPIs of "Engine_1" are shown in the Details view.
5. Drag the "KPI_1" KPI from the Details view to the "KPI-Formel" editor.
   "KPI_1" of "Engine_1" is used in the KPI formula.
6. Select the plant object "Engine_2" in the plant view.
   The available KPIs of "Engine_2" are shown in the Details view.

7. Drag the "KPI_1" KPI from the Details view to the "KPI formula" editor.
   "KPI_1" of "Engine_2" is used in the KPI formula.
8. Connect the two KPIs with the "+" sign.



Result

You have configured a KPI in which KPIs from other plant objects of the same plant view are used. This means you can access data of other plant objects or plant objects and use them in KPI formulas.

Note

Restrictions for the formula syntax

KPIs cannot be used reciprocally in formulas.

3.9 Example: Using global calculation cycle

Introduction

Calculation cycles are used to calculate and log KPIs at specified time intervals. This allows you to compare KPIs at different times without having to recalculate them. In the following example, the calculation cycle of the KPI is tag-controlled without condition.

Requirement

- A plant object type (e.g. "Station") has been created.
- The plant object type contains a KPI, e.g. "QualityRate".
- Two interface tags (e.g. "CC_Trigger" and "Status") are configured at the plant object type.
- A Boolean tag (e.g. "CC_Condition") is configured.
- The "Performance indicators" editor is open.

Procedure

1. Change to the "Global calculation cycle" tab of the "Performance indicators" editor.
2. To create a global calculation cycle, click on " <Add> ".
3. Assign a meaningful name, e.g. "CalculationCycle_Quality".
4. Enter a display name for the calculation cycle in the Inspector window under "Properties > General > General".
5. In the Inspector window, under "Properties > General > Calculation", specify the following calculation properties:
   - Mode: "Tag"
   - Interval value: 10
   - Unit: Minutes
6. Under "Properties > General > Description" in the Inspector window, enter a description that will appear as a tooltip in runtime.
7. Open the editor of the plant object type.
8. Switch to the "Performance indicators > KPIs" tab.
9. Select the "QualityRate" KPI.
10. Open the Inspector window of the KPI under "Properties > General > Calculation cycles".
11. Drag the configured calculation cycle from the "Performance indicators > Global calculation cycle" task card to the "Calculation cycles" workspace of the inspector window.
12. In the "Target" column, define an interface tag of the plant object type in which the value of the KPI is recorded, for example, "Status".
13. Change to the "Performance indicators > Calculation cycles of the plant object type" tab.

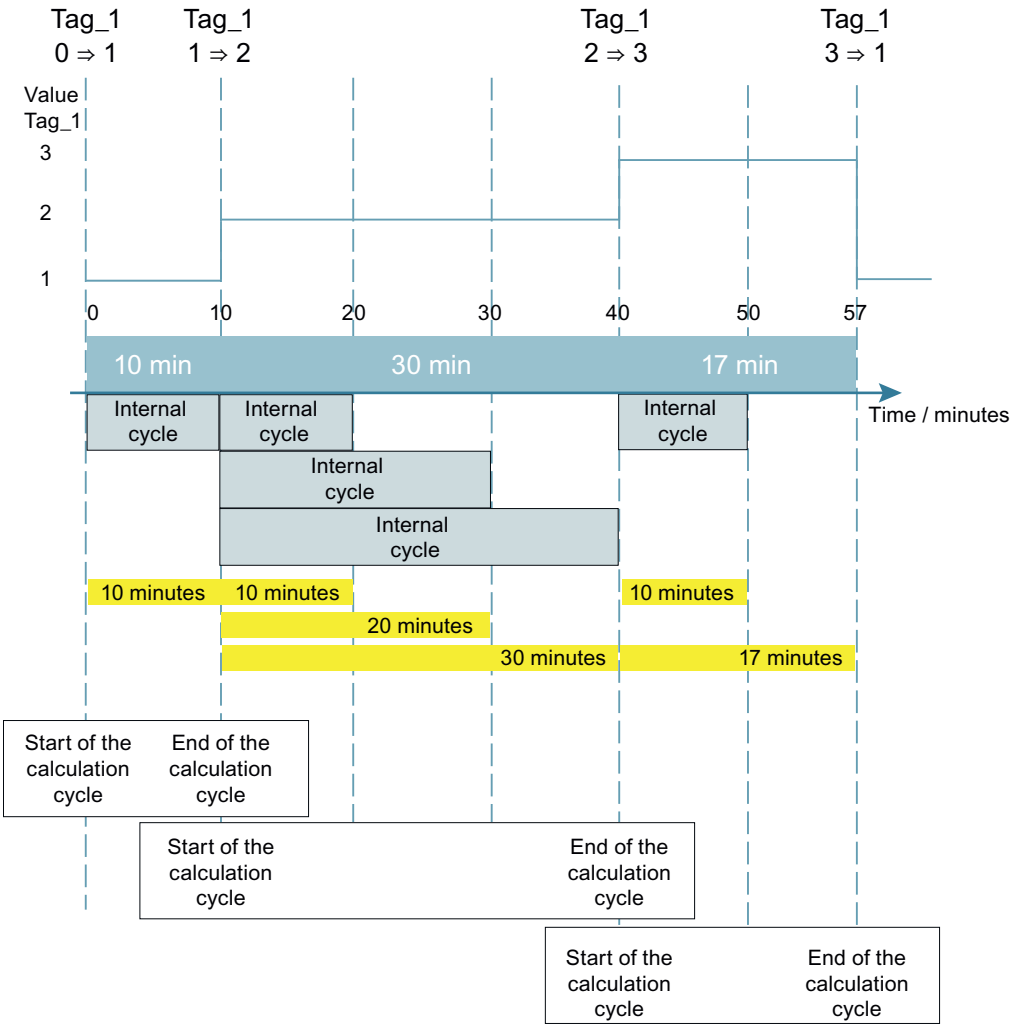
14. In the "Tag" column, define an interface tag of the plant object type which triggers the calculation cycles, for example, "CC_Trigger".
15. In the "Condition" column, define a Boolean tag that starts or stops the calculation cycles, e.g. "CC_Condition".

Result

- The calculation cycle of the "QualityRate" KPI has been configured.
- The "CalculationCycle_Quality" calculation cycle is used in a plant object type.
- The "CalculationCycle_Quality" calculation cycle is connected to one trigger and one target tag each.
- The "CalculationCycle_Quality" calculation cycle is connected with a Boolean tag.

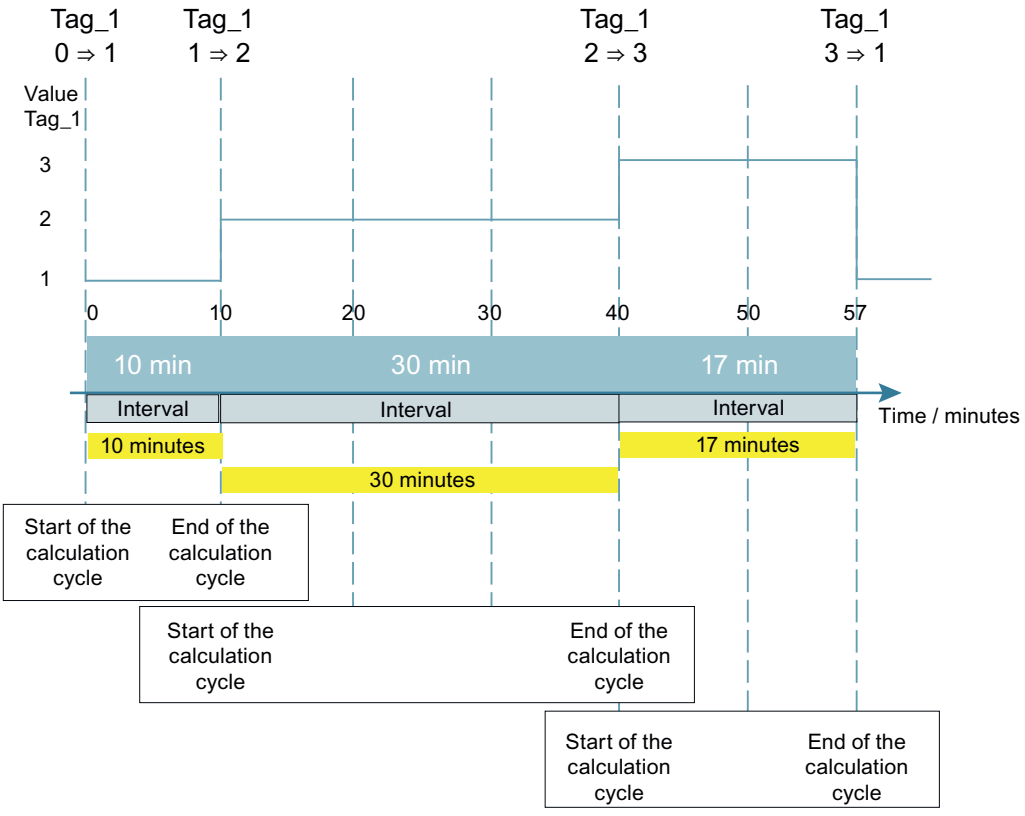
As soon as the calculation cycle is triggered, the calculation cycle starts to calculate and archive the KPI.

With the specified calculation properties, the KPI is calculated and logged at the intervals shown:


Tag_1
0 ⇒ 1
Tag_1
1 ⇒ 2
Tag_1
2 ⇒ 3
Tag_1
3 ⇒ 1
Value
Tag_1
3
2
1
0
10
20
30
40
50
57
10 min
30 min
17 min
Time / minutes
Internal cycle
Internal cycle
Internal cycle
Internal cycle
Internal cycle
10 minutes
10 minutes
10 minutes
20 minutes
30 minutes
17 minutes
Start of the calculation cycle
End of the calculation cycle
Start of the calculation cycle
End of the calculation cycle
Start of the calculation cycle
End of the calculation cycle

Interval value = 0

When you set the interval value 0, the following calculation cycle results:



3.10 Exporting and importing configuration data

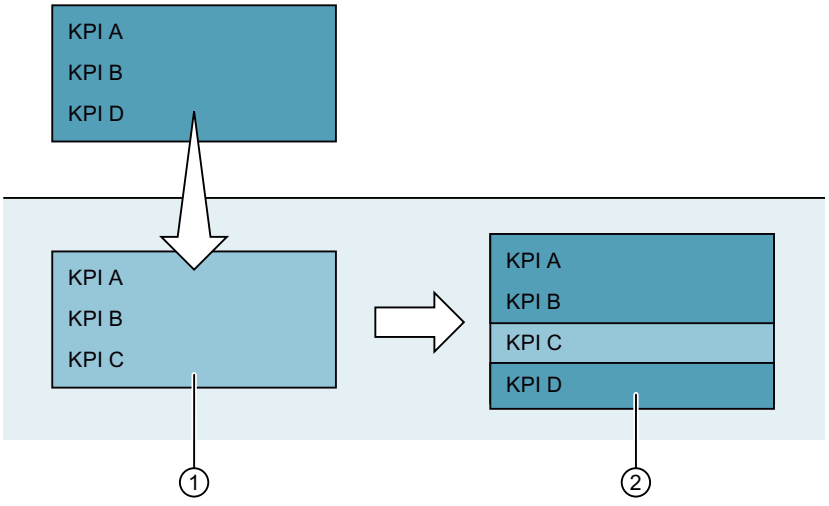
Introduction

To save time during configuration, you can distribute these configuration files to multiple WinCC projects, for example, and import them into Performance Insight.

You can export and import the following configuration data as .xlsx file:

- Global KPIs with operands and reason groups
- Reasons of a plant object type
- Time model: You can find more information under "Calendar - Defining shift schedules for production > Configuring time model and calendar > Configuring calendar" in the WinCC Unified Help.

Before the import, the plausibility of the data with respect to validity and logic of the configuration data is checked. When the plausibility check reports a valid file structure, all configuration data is imported in full. You have the possibility to choose whether configuration data of the same name is overwritten during the import.



① KPIs before the import

② KPIs after the import. The configuration data of the KPIs "A", "B" and "D" was overwritten during the import. The configuration data of KPI "C" is unchanged after the import.

If the plausibility check evaluates the file structure as invalid, the data is not imported.

Exporting global KPIs and reason groups

The configuration data is stored in the "Performance indicators" editor.

1. In the editor, click "Performance indicators" in the "Global KPIs" tab.
2. In the menu bar, select "Export KPIs and operands" .
   The file selection dialog opens.
3. Enter the file name for the export file.
4. Select the required file format.
5. Navigate to the storage location.
6. Click "Export".

Importing global KPIs and reason groups

The import file with exported configuration data is stored in the file system.

1. In the editor, click "Performance indicators" in the "Global KPIs" tab.
2. In the menu bar, select "Import KPIs and operands"  .
   The file selection dialog opens.
3. Select the file for import.
4. When importing the file, select one of the two options:
   - Whether objects with already existing names are renamed during the import
   - Whether existing objects are overwritten
5. Click "Import".
6. Save the configuration with <Ctrl+S> or select "File > Save" in the menu bar.

Exporting reasons of a plant object type

The reasons are contained in the "Performance Indicators" tab of the plant object type.

1. Open the "Reasons" tab.
2. Select "Export reasons"  from the menu bar.
   The file selection dialog opens.
3. Enter the file name for the export file.
4. Select the required file format.
5. Navigate to the storage location.
6. Click "Export".

Importing reasons into a plant object type

The import file with exported configuration data is stored in the file system.

1. Open the "Reasons" tab.
2. Select "Import reasons"  in the menu bar.
   The file selection dialog opens.
3. Select the file for import.
4. When importing the file, select one of the two options:
   - Whether objects with already existing names are renamed during the import
   - Whether existing objects are overwritten
5. Click "Import".
6. Save the configuration with <Ctrl+S> or select "File > Save" in the menu bar.

Create and save data log

4

Introduction

Create a data log to log the runtime data of the operands, KPIs and calculation cycles. You also have the option of creating a backup of the data log.

The following settings are available:

Property		Description
General	Name	Name of the data log.
	Storage medium	• Standard The data log is stored in the "Main database directory" of the TIA Portal. • Local The data log is saved locally.
	Storage directory	If the "Default" storage medium is selected, the field cannot be edited. If the "Local" storage medium is selected, specify your storage directory here.
	Log time period	Log time period of the data log. The default setting is 8.00:00:00, equivalent to 8 days.
	Maximum log size (MB)	Maximum log size (MB) of the data log 10000 (10 GB) is set by default. The maximum log size may not be smaller than 200 MB. If no backup of the data log is set, the maximum log size must not exceed twice the value specified under "Maximum segment size (MB)". If a backup of the data log set, the maximum log size must not exceed three times the value specified under "Maximum segment size (MB)".
Segment	Segment time period	Time period of logged segment in days. The default setting is 1.00:00:00, equivalent to 1 day. The time period must not be greater than the specified log time period.
	Maximum segment size (MB)	Maximum segment size 100 MB is set by default. The maximum segment size may not be smaller than 20 MB.
	Segment start time	Start time of the logged segment.

Property		Description
Backup	Backup mode	• No backup A backup of the data log is not created. • Path A backup of the data log is created. If the "SQLite" database type is used as the storage medium in the runtime settings, only the "No backup" backup mode is available.
	Path	If the "Default" storage medium is selected, the field cannot be edited. If the "Local" storage medium is selected, specify your storage directory here.

Note

Only one data log can be created.

Create database

1. Open the "Performance Insight" editor.
2. Click on the "Data log" tab.
3. Click on the "<Add>" row in the "Name" column.
   A data log is created with the default values.
4. Open the Inspector window.
5. Change the properties of the database under "Properties > General".
6. Compile and download your project.

   Note

   A delta download and delta compile is not possible.

Back up database

Requirement

- The "Microsoft SQL" database type is used as the storage medium for the project in the runtime settings.

Procedure

1. Open the "Performance Insight" editor.
2. Click on the "Data log" tab.
3. Open the Inspector window.
4. Select the "Path" option under "Properties > Backup".

5. Specify the storage location under "Path".
6. Compile and download your project.

Note

A delta download and delta compile is not possible.

Resetting the data log

5

Introduction

You have the option to reset the data log. All runtime data in the data log is cleared.

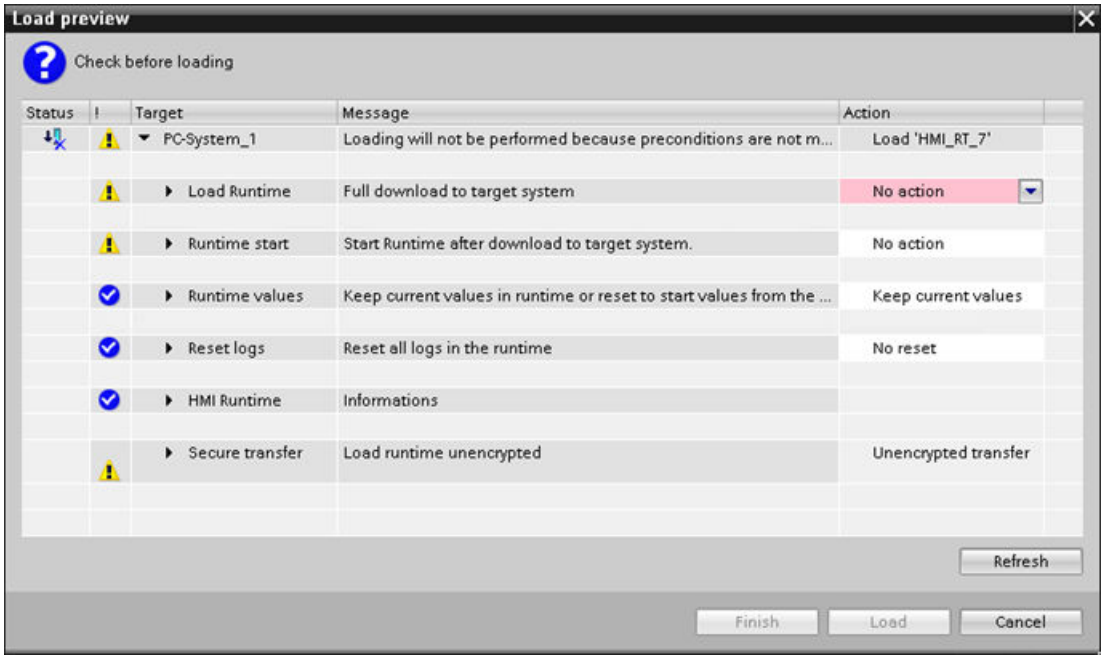
Procedure

1. Download the project.

   Note

   A delta download is not possible.

   The "Load preview" dialog opens.



2. Enter the required settings.
3. Under "Reset logs", select the "Reset all" option.
4. Click "Load".

Configuring the controls

6

6.1 Basics on outputting KPIs

Introduction

The visualized performance lets you display critical information relating to the following areas:

- Efficiency
- Production figures
- Quality of production processes

With the display of the values you obtain an overview of the production rate and the opportunity of detecting potential for improvement.

You can visualize KPIs, operands, and other production data in different ways in a screen of the HMI device. The following controls are available for visualizing the performance:

PFI control	Visualization
Performance pie chart (Page 113)	Free KPI calculation
Performance bar chart (Page 122)	Free KPI calculation
Performance control (Page 148)	Free KPI calculation
Performance Gantt chart (Page 133)	Machine states and reasons
Performance analyzer (Page 162)	Logged KPIs, operands and machine states, downtimes and recalculations
Dashboard element (Page 194)	Current KPI values from the KPI calculation cycle

Configuration

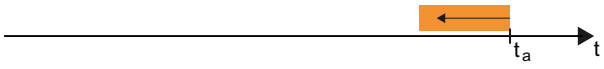
You can change the configuration of the controls both in the engineering system and in runtime using the configuration dialog. You can configure the following properties in particular:

- KPIs and operands
  Define KPIs that are calculated and visualized in the respective control system.
- Time ranges
  Define the time ranges for which the KPIs are calculated.

Time ranges

A time range is the basis for outputting indicators. The indicators are shown within this time range. There are several options to configure a time range:

- Duration with relative time



t_a Current time

You select a duration starting from the current time into the past (start time). The following units of measure are available:

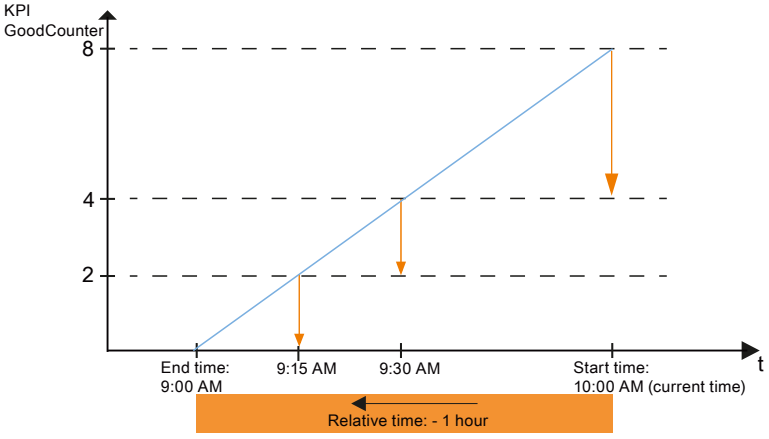
– Hour

– Day

– Week

– Fiscal week (for the period by calendar when a calendar is configured)

Example:
The current time is 10:00 AM and you specify a relative time of -1 hour. You want to output the values for the KPI "GoodCounter" during this time period:



The following values are output for the KPI "GoodCounter":

KPI	Time stamp	Value	Delta value
GoodCounter	10:00	8	4
	9:30	4	2
	9:15	2	2
	9:00	0	0

When the end time is reached, the value "0" is output.

- Time duration with fixed time range (absolute time)

t_a Current time
t_1 Start time
t_2 End time

Contexts

Context information is evaluation and filter criteria that describe equipment in greater detail. To filter the display of indicators depending on the equipment according to these criteria, assign context information. This context information comes from context providers, such as the calendar of an item of equipment. You have the option of using custom context providers. You define the context information in the configuration dialog in the following controls:

- Performance control
- Performance bar chart
- Performance pie chart

Grouping

During "Grouping", the KPIs are grouped according to context information. You define the grouping of the equipment module in the configuration dialog of the "Performance control".

See also

Configuring the output of KPIs (Page 81)

Configuring time categories (Page 35)

Use time range of a calendar for evaluation (Page 110)

6.2 Configuring the output of KPIs

In the engineering system, you define the data that is displayed in a control.

- Assign KPIs, operands and machine states to a plant object type.

Define properties that influence the representation of controls and the displayed data in the engineering system or in runtime.

- To change properties in Runtime, you must activate the following options in the engineering system:
  - Activate the option "Allow operator control" in the properties of the control under "Security".
  - Activate the "Visibility" option.

An overview of which elements can be selected, and in which control, can be found in the table:

Control	Element
Performance pie chart	KPI
Performance bar chart	KPI
Performance Gantt chart	Equipment
Performance display	KPI
Performance Analyzer	Entities Available types: Counter, numeric operand, calculation cycle

See also

Basics on outputting KPIs (Page 79)
Configuring the performance control (Page 92)
Configuring the Performance analyzer (Page 95)
Configuring the Performance Gantt chart (Page 89)
Configuring the Performance bar chart (Page 86)
Configuring a Performance pie chart (Page 83)
Configuring time categories (Page 35)
Use time range of a calendar for evaluation (Page 110)

6.3 Configuring time ranges

Introduction

A time range is the basis for outputting operands and KPIs. You define a time range based on a time t and a duration. Within this time range, the KPIs are calculated from the recorded operands.

In the Inspector window, define the time ranges in which the operands and KPIs are calculated and displayed. The following modes are available for the times:

- Absolute time
  You define a fixed start time and a fixed end time for a time range.
- Relative time
  You define a duration. The time range is displayed for the duration relative to the current time, e.g. last hour until now.

Requirement

- The plant hierarchy and plant objects have been configured.
- At least one KPI is configured.

- A screen is configured.
- The corresponding control has been configured

Procedure

1. Expand the "Selected time" entry in the Inspector window under "Properties > Properties > Miscellaneous > Interface".
2. Select the desired mode under "Time mode".
3. If you select "Absolute time" mode, set a start time and end time under the "Absolute time" entry.
4. If you select "Relative time" mode, set a time offset and the time unit under the "Relative time" entry.

6.4 Configuring a Performance pie chart

Introduction

The "Performance pie chart" shows partial values which together add up to a complete circle or pie.

The control appears with the installation of the option package under "My controls" in the "Toolbox" task card.

You have the option to define the data displayed in the control in the engineering system or configure it in runtime:

- To configure the displayed data in runtime:
  - Use the control in a screen.
  - Assign the HMI device to the plant view.
  - Use the indicators you wish to display in a plant object of the plant view.
- To configure the displayed data in the engineering system, define the KPIs and time ranges in the properties of the control.

Layout

You change the settings for the position, visibility, geometry, style, color, and font of the control in the Inspector window.

You can find more information in the WinCC Unified help under "Visualizing processes > Configuring screens > Basic information".

Properties of the Performance pie chart

The following properties are available for the Performance pie chart in the Inspector window under "Properties > Miscellaneous > Interface":

Property	Description
Display	Specifies whether the chart is displayed.
Selected KPIs	Adding KPIs that are displayed as pie slice.
Selected time	Adding one or more time spans.
Auto refresh	Specifies the time interval for the automatic update in minutes.
Display mode	The following display modes are available: • Pie: • Pie and donut:
Opacity	Specifies the opacity.
Background color	Specifies the background color.
Indicator format	Data is formatted automatically.
Indicator mode	Operands are displayed with or without label.
Donut separator size	Information on the size of the separation line with the display type "Circle and ring"
Change runtime configuration	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).
Foreground color	Specifies the foreground color.
Counter calculation without interpolation at boundaries	The calculation of a counter is based on the logged data in the specified time range. Only data that is completely within the specified time range is used to calculate the counter. If the option "Counter calculation without interpolation at boundaries" is disabled, the data at the start time and at the end time of the time range will be interpolated.

Requirement

- A screen is configured and open.
- KPIs are configured.

Inserting a control in a screen

1. Insert the "Performance pie chart" control from the "Toolbox > My controls" task card into the screen.
2. Select the control.
3. In the Inspector window under "Properties > Properties", you define the properties of the control.

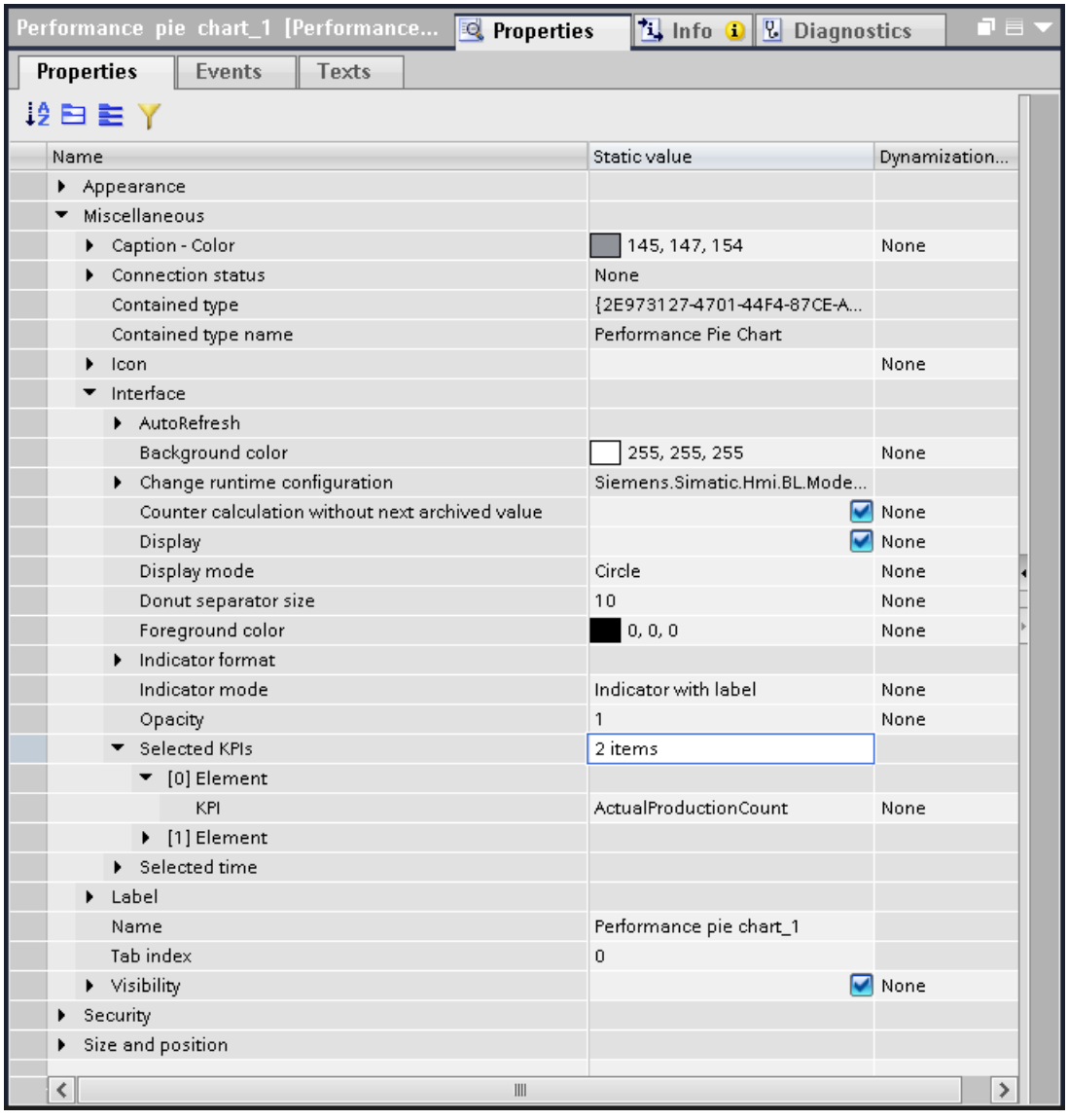
Adding KPIs

1. Select the control in the screen.
2. In the Inspector window, under "Properties", select the "Properties" tab.
3. Open the "Interface" group in the Inspector window under "Miscellaneous".

4. In the "Selected KPIs" row, click on the "0 entries" field in the "Static value" column.
   The "Selected KPIs" editor is opened on the right side of the Inspector window.
5. Click "<Add>".
   A new element (index starting with 0) is created.
6. Under "KPI", navigate to the plant view and then to the unit for which you have already configured KPIs.
7. Select the KPI and click on  to apply the KPI for display in the control.
8. Repeat steps 5 to 7 for all configured elements.

Result

The created elements are displayed in the Inspector window under "Miscellaneous > Interface" and can be changed there in the "Static value" column if required.



See also

Configuring the output of KPIs (Page 81)
Configuring time categories (Page 35)
Operating a Performance pie chart (Page 113)
Configuring a performance pie chart in runtime (Page 116)

6.5 Configuring the Performance bar chart

Introduction

The "Performance bar chart" control shows KPIs as bars and thereby illustrates a quantity or frequency of values.

The control appears with the installation of the option package under "My controls" in the "Toolbox" task card.

You have the option to define the data displayed in the control directly in the engineering system or configure it in runtime:

- To configure the displayed data in runtime:
  - Use the control in a screen.
  - Assign the HMI device to the plant view.
  - Use the indicators you wish to display in a plant object of the plant view.
- To configure the displayed data in the engineering system, define the KPIs and time ranges in the properties of the control.

Layout

You change the settings for the position, visibility, geometry, style, color, and font of the control in the Inspector window.

You can find more information in the WinCC Unified help under "Visualizing processes > Configuring screens > Basic information".

Properties of the Performance bar chart

The following properties are available for the Performance bar chart in the Inspector window under "Properties > Miscellaneous > Interface":

Property	Description
Axes	Formatting of axes (values, label, alignment, color, ...)
Display	Specifies whether the chart is displayed.
Selected KPIs	Adding KPIs that are displayed as bars.

Property	Description
Selected time	Adding one or more time spans.
Auto refresh	Specifies the time interval for the automatic update in minutes.
Bar mode	The following display modes are available: • Columns • Bar
Opacity	Specifies the opacity.
Background color	Specifies the background color.
Indicator format	Data is formatted automatically.
Indicator mode	Operands are displayed with or without label.
Grid	Specifies the properties for grid.
Change runtime configuration	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).
Scales	Specifies the properties for scales.
Foreground color	Specifies the foreground color.
Counter calculation without interpolation at boundaries	The calculation of a counter is based on the logged data in the specified time range. Only data that is completely within the specified time range is used to calculate the counter. If the option "Counter calculation without interpolation at boundaries" is disabled, the data at the start time and at the end time of the time range will be interpolated.

Requirement

- A screen is configured.
- KPIs are configured.

Inserting a control in a screen

1. Insert the "Performance bar chart" control from the "Toolbox > My controls" task card into the screen.
2. Select the control.
3. In the Inspector window under "Properties > Properties", you define the properties of the control.

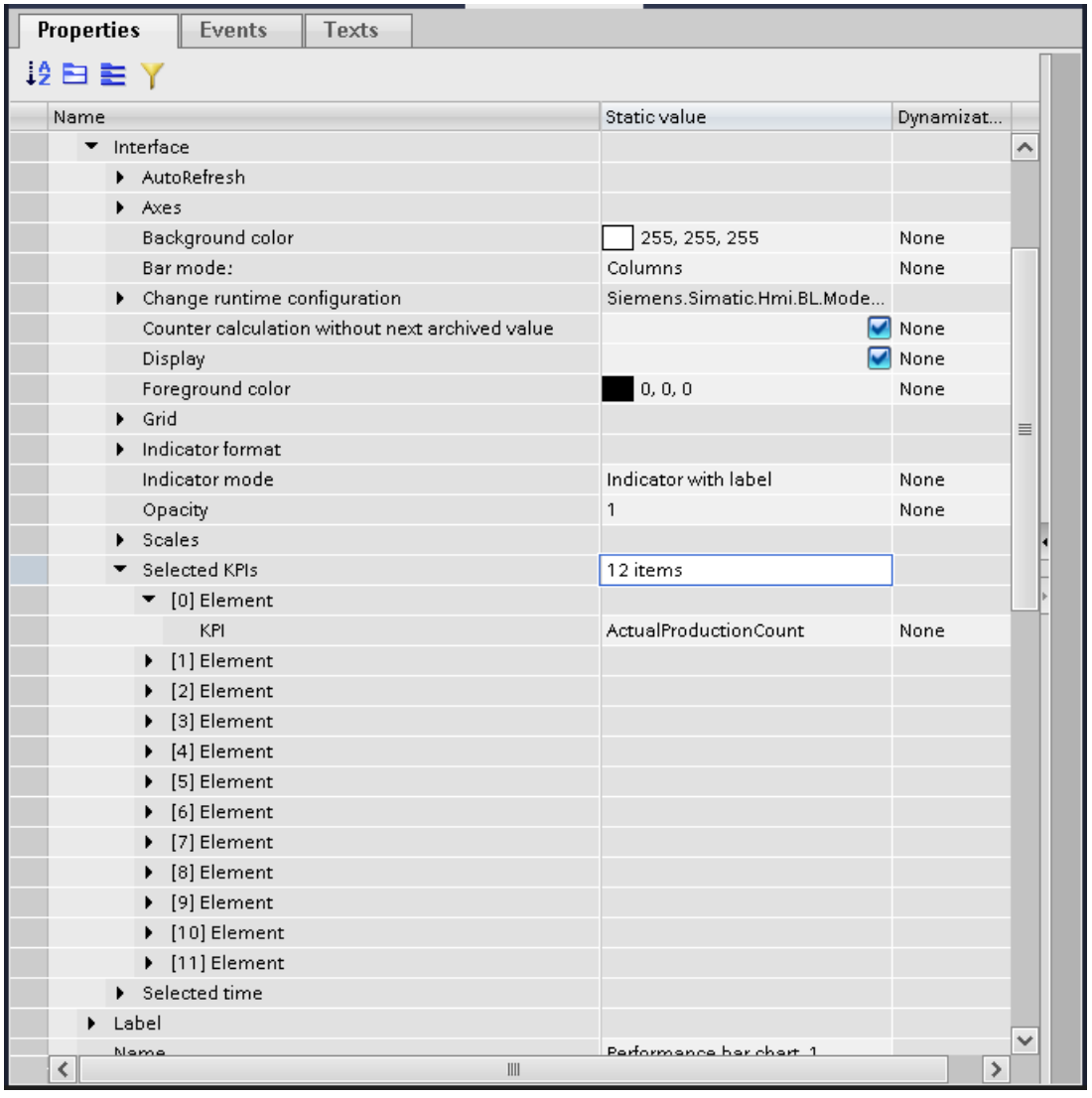
Adding KPIs

1. Select the control in the screen.
2. In the Inspector window, under "Properties", select the "Properties" tab.
3. Open the "Interface" group in the Inspector window under "Miscellaneous".
4. In the "Selected KPIs" row, click on the "0 entries" field in the "Static value" column.
   The "Selected KPIs" editor is opened on the right side of the Inspector window.
5. Click "<Add>".
   A new element (index starting with 0) is created.
6. Under "KPI", navigate to the plant view and then to the unit for which you have already configured KPIs.

7. Select the KPI and click on ✔ to apply the KPI for display in the control.
8. Repeat steps 5 to 7 for all configured elements.

Result

The created elements are displayed in the Inspector window under "Miscellaneous > Interface" and can be changed there in the "Static value" column if required.



See also

Configuring time categories (Page 35)

Configuring the output of KPIs (Page 81)

Operating a Performance bar chart (Page 122)

Configuring a performance bar chart in runtime (Page 124)

6.6 Configuring the Performance Gantt chart

Introduction

The "Performance Gantt chart" control shows the chronological sequence of machine states as a bar on a time axis. You can see at a glance which machine states occurred at which times.

The control appears with the installation of the option package under "My controls" in the "Toolbox" task card.

You have the option to define the data displayed in the control in the engineering system or configure it in runtime:

- To configure the displayed data in runtime:
  - Use the control in a screen.
  - Assign the HMI device to the plant view.
  - Use the indicators you wish to display in a plant object of the plant view.
- To configure the displayed data in the engineering system, define the equipment and time ranges in the properties of the control.

Layout

You change the settings for the position, visibility, geometry, style, color, and font of the control in the Inspector window.

You can find more information in the WinCC Unified help under "Visualizing processes > Configuring screens > Basic information".

Properties of the Performance Gantt chart

The following properties are available for the Performance Gantt chart in the Inspector window under "Properties > Miscellaneous > Interface":

Property	Description
View mode	Details view or equipment view
Display	Specifies whether the chart is displayed.
Selected equipment	Adding equipment whose machine states is displayed.
Selected time	Adding one or more time spans.
Auto refresh	Specifies the time interval for the automatic update in minutes.
Scroll bar	Selection of width, color, and visibility of the scroll bar
Columns	Show or hide individual columns in the detail view
Opacity	Specifies the opacity.
Show overall status	• None • First line • Last line

Property	Description
Background color	Specifies the background color.
Grid	Specifies the properties for grid.
Change runtime data	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).
Change runtime configuration	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).
Foreground color	Specifies the foreground color.
Zoom	Specifies the zoom factor.

Requirement

- A screen is configured.
- KPIs are configured.

Inserting a control in a screen

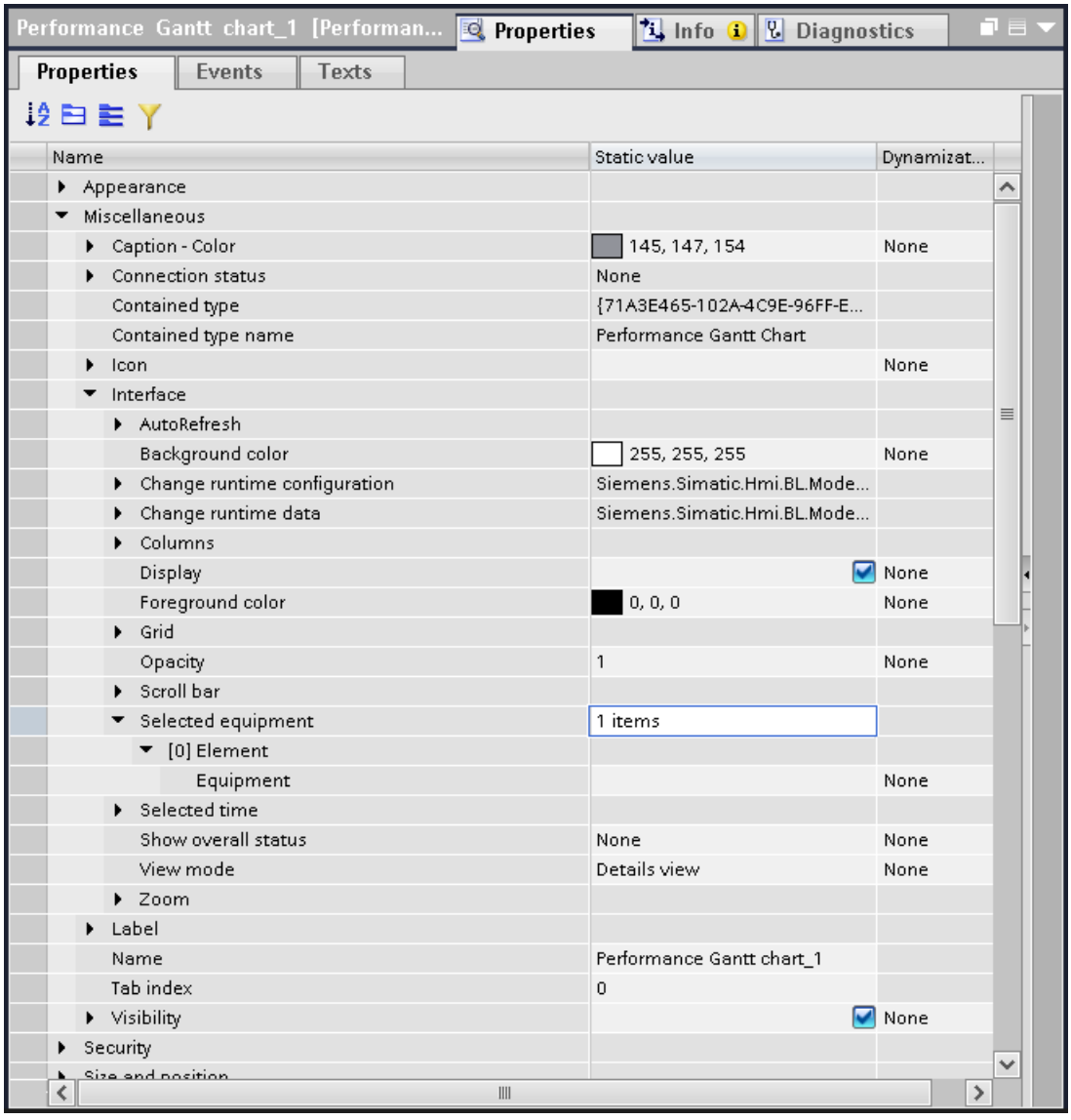
1. Insert the "Performance Gantt chart" control from the "Toolbox > My controls" task card into the screen.
2. Select the control in the screen.
3. In the Inspector window under "Properties > Properties", you define the properties of the control.

Adding equipment

1. Select the control in the screen.
2. In the Inspector window, under "Properties", select the "Properties" tab.
3. Open the "Interface" group in the Inspector window under "Miscellaneous".
4. In the "Selected equipment" row, click the "0 items" field in the "Static value" column.
   The "Selected equipment" editor opens on the right side of the Inspector window.
5. Click "<Add>".
   A new element (index starting with 0) is created.
6. Navigate under "Equipment" to the plant view and further to the unit for which you have already configured equipment.
7. Select the equipment and click on  to accept the equipment for display in the control.
8. Repeat steps 5 to 7 for all configured elements.

Result

The created elements are displayed in the Inspector window under "Miscellaneous > Interface" and can be changed there in the "Static value" column if required.



See also

Configuring the output of KPIs (Page 81)

Configuring time categories (Page 35)

Operating a Performance Gantt chart (Page 133)

Configuring a performance Gantt chart in runtime (Page 136)

6.7 Configuring the performance control

Introduction

The "Performance control" represents the KPIs in relation to relevant equipment. In this way, you can compare the data of parallel production lines, for example.

The control appears with the installation of the option package under "My controls" in the "Toolbox" task card.

You have the option to define the data displayed in the control in the engineering system or configure it in runtime:

- To configure the displayed data in runtime:
  - Use the control in a screen.
  - Assign the HMI device to the plant view.
  - Use the indicators you wish to display in a plant object of the plant view.
- To configure the displayed data in the engineering system, define the KPIs and time ranges in the properties of the control.

Layout

You change the settings for the position, visibility, geometry, style, color, and font of the control in the Inspector window.

You can find more information in the WinCC Unified help under "Visualizing processes > Configuring screens > Basic information".

Properties of the performance control

The following properties are available for the performance control in the Inspector window under "Properties > Miscellaneous > Interface":

Property	Description
Fit to window	Specifies the "Fit to window" property.
Display	Specifies whether the chart is displayed.
Selected KPIs	Adding KPIs that are displayed.
Selected time	Adding one or more time spans.
Auto refresh	Specifies the time interval for the automatic update in minutes.
Bar style	Options for the appearance of the bar style.
Bar window	Options for appearance of the bar window.
Opacity	Specifies the opacity.
Background color	Specifies the background color.
Indicator format	Data is formatted automatically.

Property	Description
Sort KPIs	Specifies the sorting of the KPIs: • Default • Value ascending • Value descending • Alphabetical • Reverse alphabetical
Change runtime configuration	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).
Scales	Specifies the "Y rotation label".
Foreground color	Specifies the foreground color.
Value axes	Options for the appearance of the value axes.
Counter calculation without interpolation at boundaries	The calculation of a counter is based on the logged data in the specified time range. Only data that is completely within the specified time range is used to calculate the counter. If the option "Counter calculation without interpolation at boundaries" is disabled, the data at the start time and at the end time of the time range will be interpolated.

Requirement

- A screen is configured.
- KPIs are configured.

Inserting a control in a screen

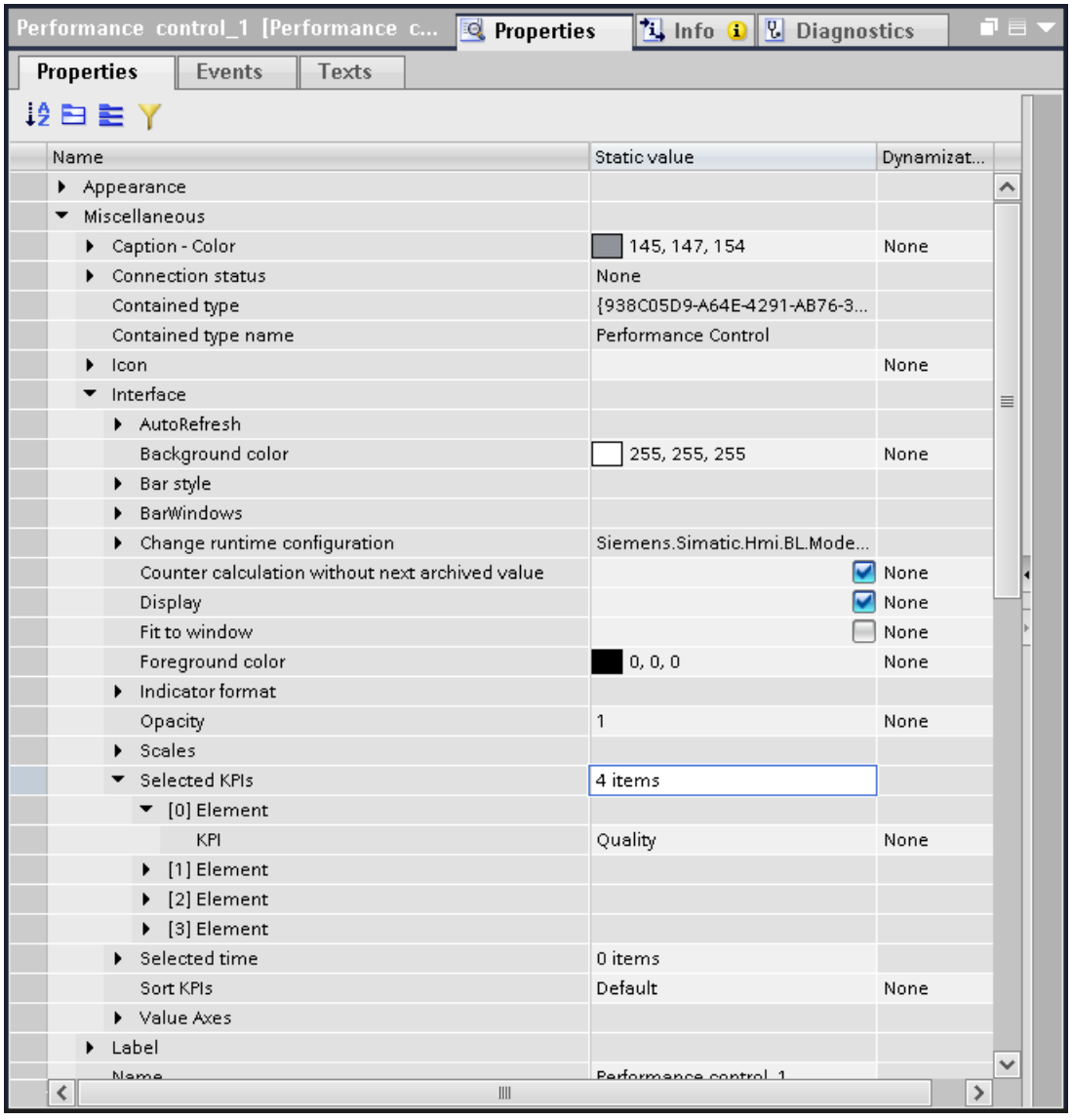
1. Insert the "Performance control" from the "Toolbox > My controls" task card into the screen.
2. Select the control.
3. In the Inspector window under "Properties > Properties", you define the properties of the control.

Adding KPIs

1. Select the control in the screen.
2. In the Inspector window, under "Properties", select the "Properties" tab.
3. Open the "Interface" group in the Inspector window under "Miscellaneous".
4. In the "Selected KPIs" row, click on the "0 entries" field in the "Static value" column.
   The "Selected KPIs" editor is opened on the right side of the Inspector window.
5. Click "<Add>".
   A new element (index starting with 0) is created.
6. Under "KPI", navigate to the plant view and then to the unit for which you have already configured KPIs.
7. Select the KPI and click on  to apply the KPI for display in the control.
8. Repeat steps 5 to 7 for all configured elements.

Result

The created elements are displayed in the Inspector window under "Miscellaneous > Interface" and can be changed there in the "Static value" column if required.



See also

Configuring the output of KPIs (Page 81)

Configuring time categories (Page 35)

Operating the Performance control (Page 148)

Configuring a performance control in runtime (Page 151)

6.8 Configuring the Performance analyzer

Introduction

The "Performance analyzer" control represents indicators as a function display.

The control appears with the installation of the option package under "My controls" in the "Toolbox" task card.

You have the option to define the data displayed in the control in the engineering system or configure it in runtime:

- To configure the displayed data in runtime:
  - Use the control in a screen.
  - Assign the HMI device to the plant view.
  - Use the indicators you wish to display in a plant object of the plant view.
- To configure the displayed data in the engineering system, define the KPIs and time ranges in the properties of the control.

Layout

You change the settings for the position, visibility, geometry, style, color, and font of the control in the Inspector window.

You can find more information in the WinCC Unified help under "Visualizing processes > Configuring screens > Basic information".

Properties of the Performance analyzer

The following properties are available for the Performance analyzer in the Inspector window under "Properties > Miscellaneous > Interface":

Property	Description
Selected objects	Adding indicators that are displayed. Indicators can be of the counter, numeric operand, calculation cycle or KPI (with calculation cycle) type.
Selected time	Sets the time range as relative or absolute time.
Auto refresh	Specifies the time interval for the automatic update in minutes.
Change runtime data	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).
Change runtime configuration	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).

Requirement

- A screen is configured.
- KPIs are configured.

Inserting a control in a screen

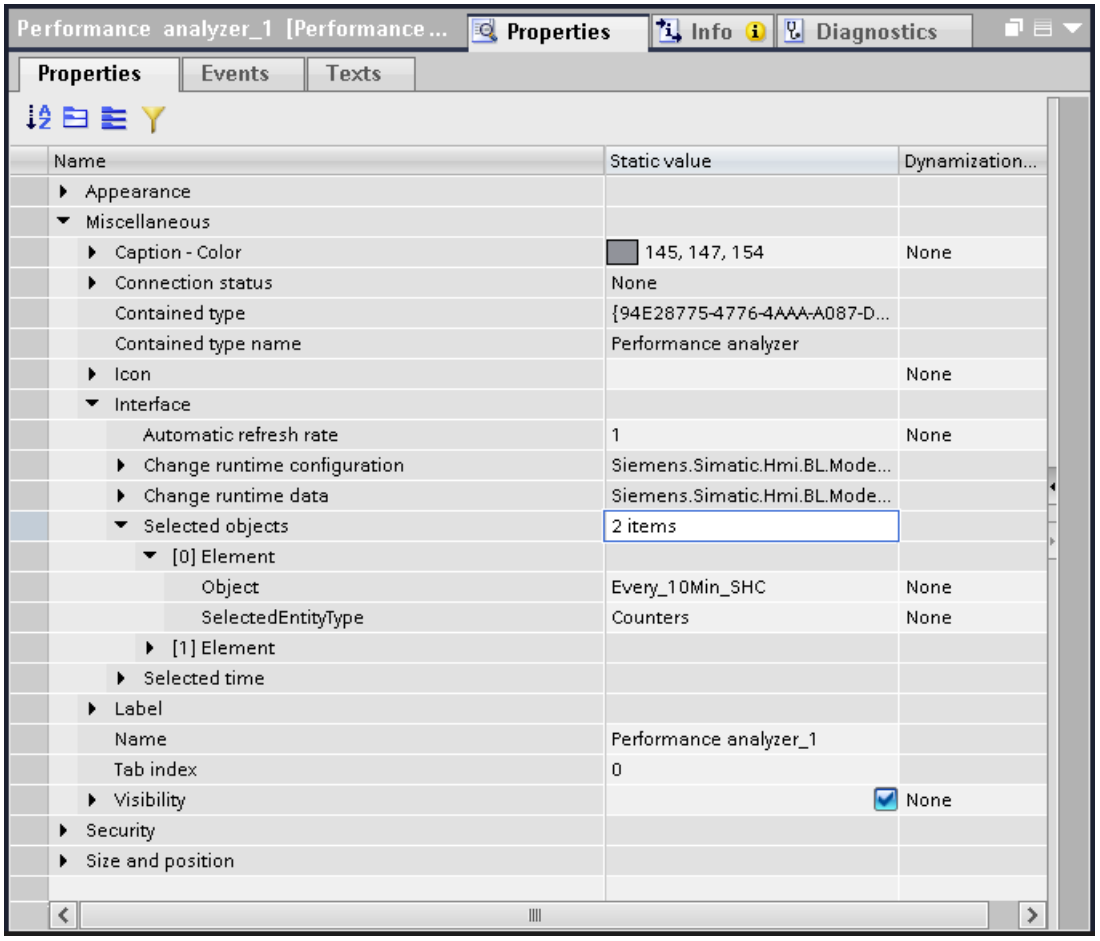
1. Insert the "Performance analyzer" control from the "Toolbox > My controls" task card into the screen.
2. Select the control.
3. In the Inspector window under "Properties > Properties", you define the properties of the control.

Adding entities

1. Select the control in the screen.
2. In the Inspector window, under "Properties", select the "Properties" tab.
3. Open the "Interface" group in the Inspector window under "Miscellaneous".
4. In the "Selected objects" row, click on the "0 items" field in the "Static value" column.
   The "Selected objects" editor opens on the right side of the Inspector window.
5. Click "<Add>".
   A new element (index starting with 0) is created.
6. Navigate under "Object" to the plant view and further to the unit for which you have already configured items.
7. Select the entity and click on  to apply the entity for display in the control.
8. Set the type of entity to be displayed under "Selected entity type":
   - Counter
   - Numeric operand
   - Calculation cycle
9. Repeat steps 5 to 8 for all configured elements.

Result

The created elements are displayed in the Inspector window under "Miscellaneous > Interface" and can be changed there in the "Static value" column if required.



See also

Configuring the output of KPIs (Page 81)

Configuring time categories (Page 35)

Performance analyzer (Page 162)

6.9 Configuring a dashboard element

Introduction

The "Dashboard element" control shows the current values of the KPI calculation cycle as bar or number.

The control appears with the installation of the option package under "My controls" in the "Toolbox" task card.

You have the option to define the data displayed in the control in the engineering system or configure it in runtime:

- To configure the displayed data in runtime:
  - Use the control in a screen.
  - Assign the HMI device to the plant view.
  - Use the indicators you wish to display in a plant object of the plant view.
- To configure the displayed data in the engineering system, specify the display mode and the KPIs in the properties of the control.

Layout

You change the settings for the position, visibility, geometry, style, color, and font of the control in the Inspector window.

You can find more information in the WinCC Unified help under "Visualizing processes > Configuring screens > Basic information".

Properties of the dashboard element

The following properties are available for the performance dashboard element in the Inspector window under "Properties > Miscellaneous > Interface":

Property	Description
Auto refresh	Specifies the time interval for the automatic update in minutes.
Change runtime configuration	Defines the function right for the runtime user. You can find more information at Set up access control for PFI controls (Page 101).
Display mode	The following display modes are available: • Value • Bar
Selected objects	Adding KPI calculation cycles whose values are displayed.

Requirement

- A screen is configured and open.
- KPIs are configured.

Inserting a control in a screen

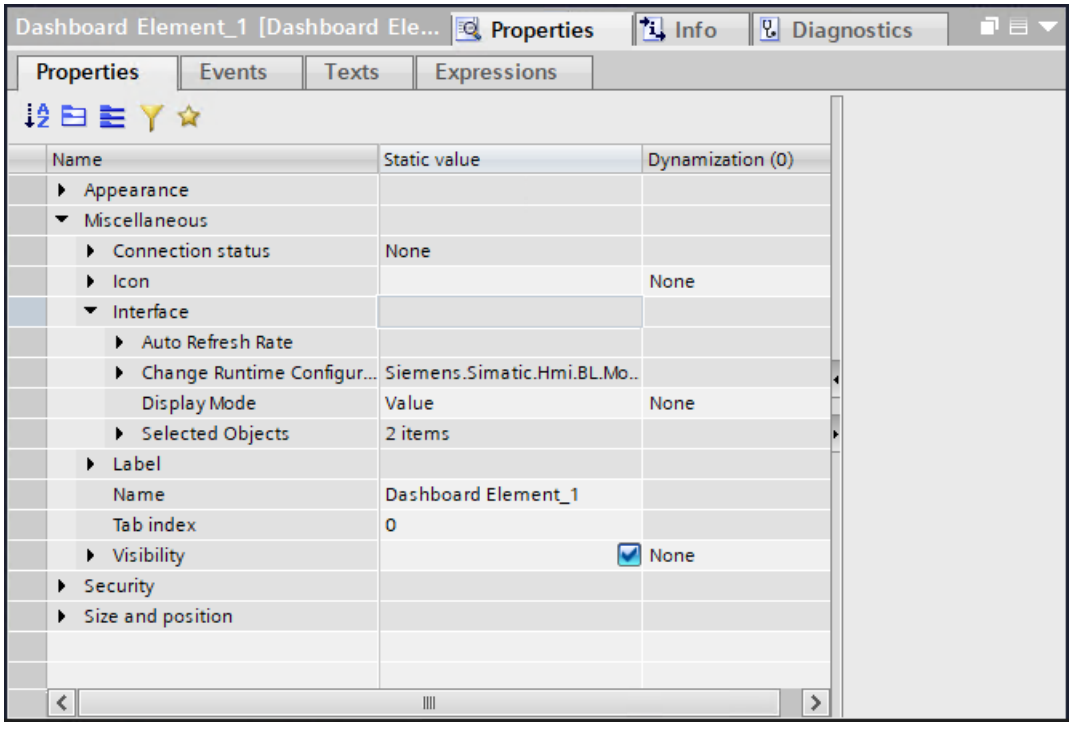
1. Insert the "Performance dashboard element" control from the "Toolbox > My controls" task card into the screen.
2. Select the control.
3. In the Inspector window under "Properties > Properties", you define the properties of the control.

Adding KPI calculation cycles

1. Select the control in the screen.
2. In the Inspector window, under "Properties", select the "Properties" tab.
3. Open the "Interface" group in the Inspector window under "Miscellaneous".
4. In the "Selected objects" row, click on the "0 items" field in the "Static value" column.
   The "Selected objects" editor opens on the right side of the Inspector window.
5. Click "<Add>".
   A new element (index starting with 0) is created.
6. Navigate under "Object" to the plant view and further to the unit for which you have already configured KPIs.
7. Select the KPI calculation cycle and click  to apply the KPI for display in the control.
8. Repeat steps 5 to 7 for all displayed elements.

Result

The created elements are displayed in the Inspector window under "Miscellaneous > Interface" and can be changed there in the "Static value" column if required.



6.10 Setting up Collaboration for Performance Insight controls

Introduction

Performance Insight offers the possibility to use performance controls by means of collaboration from another HMI device. This allows operators, plant management, and maintenance personnel to access and evaluate the KPIs of other stations in the plant from their own screens.

Note

Access to the file system during import and export activities

When using Collaboration, the local file system is accessed, not the file system of the unit for which the particular control is configured.

Setting up Collaboration

Collaboration enables you to import the screen of an HMI device from another HMI device and display it there in a screen window. The performance controls can thus be operated from both HMI devices and KPIs can be used. To do this, Collaboration needs to be activated in the Runtime settings of both HMI devices.

You can find more information in the WinCC Unified help under "Information system > Visualize processes (RT Unified) > Configure remote access (RT Unified)".

6.11 Set up access control for PFI controls

Introduction

You can set up access control for the individual PFI controls. You do this to determine the rights the runtime user gets in the respective control. To do this, you can assign pre-defined or user-specific runtime rights to the "Change runtime configuration" or "Change runtime data" properties.

The "Change runtime configuration" property is only available in the "Performance Gantt chart" and "Performance analyzer" controls.

Property	Description
Change runtime configuration	With this right, the runtime user can configure the control and change runtime data. You can find more information in the following table.
Change runtime data	With this right, the runtime user can change runtime data in the control but cannot perform any runtime configuration. The "Settings" button is not operable in the PFI controls. Other buttons that are not operable: • "Edit" button in Performance Gantt chart • "Recalculation" button and "Expand" button in the Performance Analyzer

If no function right is assigned to a property, all runtime users have the right.

Function rights of the runtime user

Change runtime configuration	Change runtime data	Function rights of the runtime user
X	X	User has only read rights. Operation is not possible.
✓	X	The user has the right to "Change runtime configuration".
X/✓	✓	The user has the right to "Change runtime configuration" and "Change runtime data".

Legend:

X = The runtime user does not have the function right that is set in the property.

✓ = The runtime user has the function right that is set in the property.

Or the property is empty.

Requirement

- In the security settings, you have configured "Users and roles" in accordance with your needs. You can find more information in the section "Configuring users and roles" in the WinCC Unified help.
- The "Allow operator control" option is activated in the properties of the control under "Security".
- The "Authorization" option is empty in the properties of the control under "Security".
- The "Require explicit unlock" option is deactivated under the "Change runtime configuration" and "Change runtime data" properties in the properties of the control under "Properties > Miscellaneous > Interface".
  This control property is for multipoint touch displays and is not supported in V17.

Procedure

1. Select the desired control in the screen.
2. Expand the "Change runtime configuration" or "Change runtime data" property under "Properties > Miscellaneous > Interface".
3. Expand the drop-down list in the "Static value" column under "Authorization".
   The function rights are displayed.
4. Select a function right.
5. Configure additional properties if required.

Compiling configuration data and loading it into Runtime

7

Introduction

To receive configuration data in runtime, you have the option of performing a delta compile and delta download.

You can find more information in the WinCC Unified help under "Visualize processes > Compile and load".

Configuration changes to PFI data

Not all configuration changes support delta compile and delta download. The following table shows you for which changes to the PFI data a delta compile and delta download are possible:

Element	Delta download is possible	Full download required
Global elements that are used in the plant object	**Global KPIs** • New KPI created • KPI deleted • KPI changed • Operand added to KPI formula • Operand deleted from KPI formula **Global operands** • New operand created • Operand deleted • Operand changed **Global calculation cycle** • Calculation cycle created • Calculation cycle deleted • Calculation cycle changed **Global time categories** • New time category created • Time category deleted • Time category changed **Global machine states** • New machine state created • Machine state deleted • Machine state changed **Global reason groups** • Source tag changed • Limits changed	**Data logs** • Data log changed **Global calculation cycle (Context mode)** • Context provider changed • Context changed • Interval value changed • Unit changed
Plant object	**KPI** • New KPI created • KPI deleted • KPI changed	**Plant object general:** • Created, renamed or deleted • Copied and pasted • Moved within the plant view

Element	Delta download is possible	Full download required
Plant object type	**KPIs** • KPI stored • KPI removed • Target and thresholds changed • Calculation cycle stored • Calculation cycle deleted **Operands** • Source tag changed **Machine states** • Data type changed • Use in KPI / plant object relevant changed • Source tag changed **Calculation cycles (Tag mode)** • Tag under "Tag" changed • Tag under "Condition" changed **Calculation cycles (Context mode)** • Tag under "Condition" changed **Reasons** • Source tag changed • Limits changed **Settings** • Microstop settings changed	**Plant object general, if an instance of the plant object type exists:** • Renamed or deleted
PFI controls	• KPIs, equipment and entities in the properties of PFI controls assigned or changed • Function rights assigned or changed	-

Effects on the active runtime project

Active runtime is not terminated by delta download. The changes are immediately applied in the active RT project and are visible in runtime after a screen change or browser refresh.

When a KPI formula is changed and a delta download is performed, the calculation cycle is stopped in runtime. The calculation cycle is automatically started again with the next trigger.

When the tag under "Condition" is changed in the calculation cycle and a delta download is performed, the calculation cycle is stopped in runtime. The calculation cycle is only triggered when the tag value is "TRUE". When the tag value is "FALSE", the calculation cycle remains in the stop state.

Validation of the configuration of plant objects

8

Introduction

If validation errors in the plant view, missing or faulty properties of plant objects or plant object types have arisen, these errors are displayed during compilation. With the "Go to" function, you can jump directly to the source of the error and eliminate the error.

In addition, the number of plant objects (instances) used that are relevant for PFT are displayed during compilation. This information helps you to decide which runtime licenses you need and how many.

Solve causes of errors during validation

1. Navigate in the Inspector window to "Info > Compile".
2. Set the filter so that error messages are displayed.
   If a green arrow is displayed in the "Go to" column for messages, you can go directly to the appropriate tab to correct the cause.
3. Select the green arrow .
   The tab in which corrections are expected is displayed. The corresponding property is selected.

Exceptions and special cases

For errors that are found for an instance of a plant object type, navigation takes you to the property of the plant object type or to the global object.

Examples:

- An invalid limit has been configured for a counter. The properties of the corresponding plant object type are displayed.
- An invalid formula has been specified. The editor for global KPIs is opened.

Showing the number of plant objects (instances)

The number of plant objects that are used in the plant view and in which at least one PFI object (KPI, operand or machine state) is configured are displayed under "Info > Compile" in the Inspector window.

If no instances exist, the count is not displayed in the Inspector window.

Configuring and visualizing KPIs in Runtime

9

9.1 Information on operator control in Runtime

Display of the buttons

- The buttons of the toolbar are hidden.
- To display the buttons again, double-click in the display area of the control.

Chinese representation

- To display localized texts for Chinese (simplified), select the SimSun font family from the "Fonts" tab.

See also

Set up access control for PFI controls (Page 101)

9.2 Visualization of operands that are not used in KPIs

Introduction

You have the option to use operands directly in plant object types without the operands being used in a KPI. The runtime user can, for example, view the current value of a counter.

Operands are displayed in the "Performance Analyzer" control.

Requirement

- WinCC Unified PC has been created.
- The plant view and plant objects have been configured.
- A screen is configured.
- The "Performance Analyzer" control is configured on the screen.
- Interface tags and the associated logging tags are configured.

Procedure

1. Configure a global operand in the "Performance indicators" editor.
2. Assign the operand to a plant object type by dragging it from the "Performance indicators" task card to the plant object type.
3. Assign a source tag to the operand.
4. Compile the project and start runtime.
5. In runtime, select the operands for visualization in the "Performance Analyzer" control.

9.3 Use time range of a calendar for evaluation

Introduction

The Plant Intelligence options WinCC Unified Performance Insight and WinCC Unified Calendar share a time model. The time model defines which time categories are available and for which options they are relevant. how they are visualized, and whether or not they belong to the working time. You can find more information under "Calendar - Defining shift schedules for production > Configuring time model and calendar > Configuring calendar" in the WinCC Unified Help.

For your production line or plant, you define the plant-specific time model and time categories that you use in connection with the Performance Insight option to evaluate and visualize KPIs in runtime. With the controls "Pie chart", "Bar chart" and "Performance control" you can use the following calendar-based time duration for evaluation:

- Fiscal week

Requirement

- The plant objects of the configured plant view have tags for communication between a PLC and an HMI device.
- The time model with at least one user-defined time category has been created.
- A performance control for visualizing KPIs is configured.
- The project runs in runtime.

Procedure

1. Open the settings of the control.
2. Go to the "Indicators" tab.
3. Select the equipment whose entities you want to evaluate.
4. Go to the "Time" tab.
5. Under "Mode", select the "Relative time" setting.
6. Under "Relative time", specify the duration starting with the current time.

7. Under "Unit of measure", select "Working week".
8. Confirm your selection with "Apply".
   The selected time from the calendar is used for evaluating the entities.

See also

Configuring time categories (Page 35)

Basics on outputting KPIs (Page 79)

Configuring the output of KPIs (Page 81)

9.4 Quality code

Introduction

The quality code has the binary 8-bit structure QQSSSSLL. The two positions 1 and 2 (QQ) of the quality code define the quality of the KPI:

Quality	Description
Bad	KPI cannot be used.
Uncertain	Quality of the KPI is worse than usual. However, it might still be possible to use the KPI.
Good (non-cascade)	Quality of the KPI is good. Pay attention to substatus.
Good (cascade)	Quality of the KPI is good. KPI can be used.

Positions 3 to 6 (SSSS) of the quality code specify the substatus of the quality. Positions 7 and 8 (LL) are optional and define possible limits.

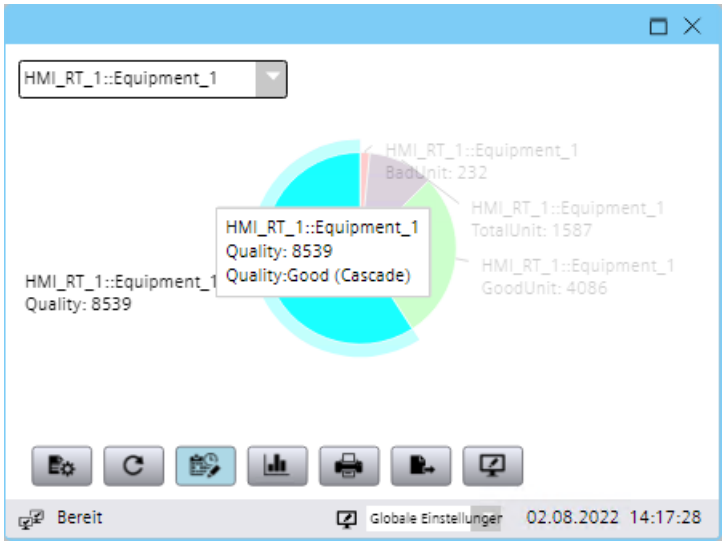
The concept of the quality code for KPIs corresponds to that of the quality code for tags in the WinCC Unified object model. You can find more information on the quality code in the WinCC Unified object model.

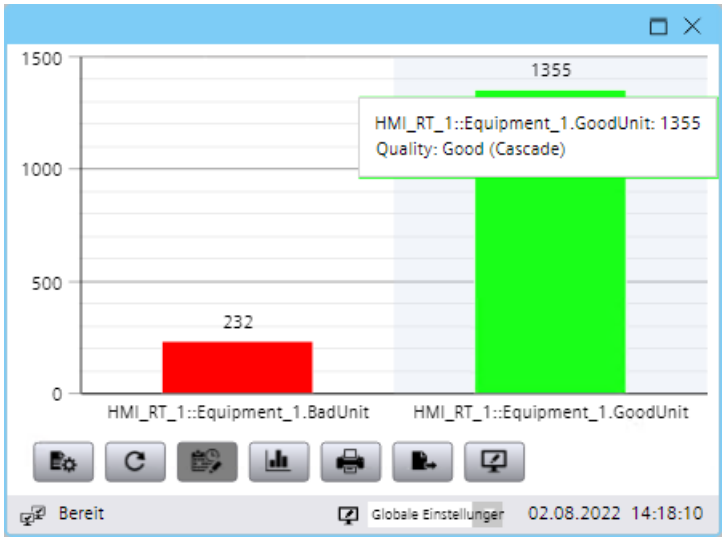
Show quality code

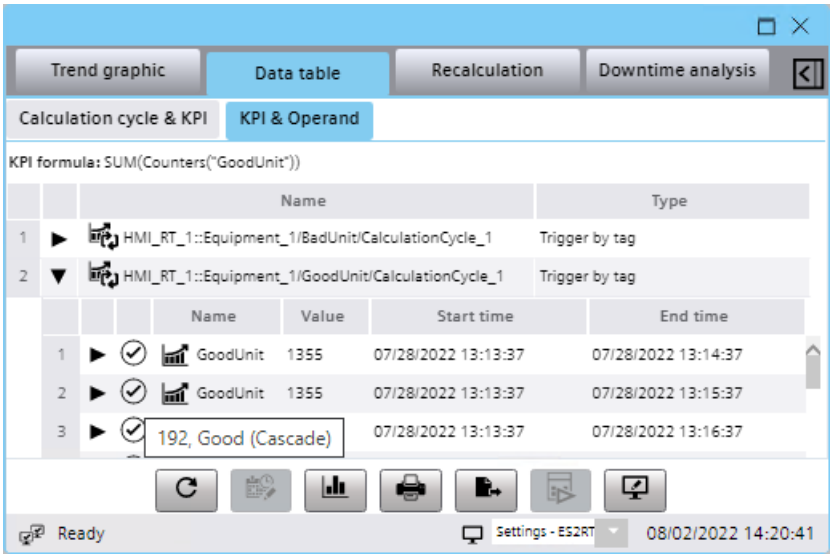
The quality code is displayed in the following controls:

- Performance pie chart
- Performance bar chart
- Performance analyzer

1. Move the mouse cursor over the respective pie slice, bar or icon.
   The quality code is displayed as a tooltip.





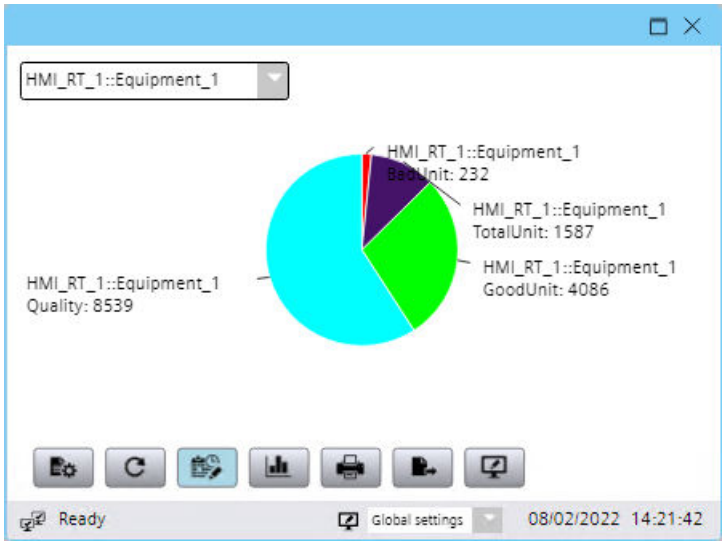


9.5 Performance pie chart

9.5.1 Operating a Performance pie chart

Use

The "Performance pie chart" control shows partial values that correspond in total to a filled circle or pie.



The color of the pie slices is taken from the configured color of the respective KPI. The default values are used when no color is configured.

Note

When you move the mouse pointer over the respective pie slice, the following information is displayed:

- Name of the plant object
- Name of the KPI
- Value of the KPI
- Description of the KPI
- Value of the quality code

Note

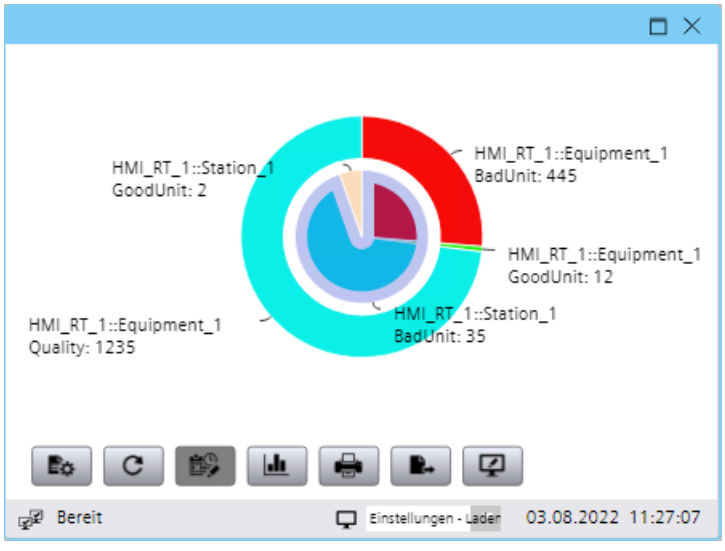
Highlighting KPIs

- Click the pie slice to highlight the pie slice for a KPI, for example, for a printout. The pie slice is moved out of the center and thus highlighted.
- With <Ctrl>-click, you highlight another pie slice.

Display modes

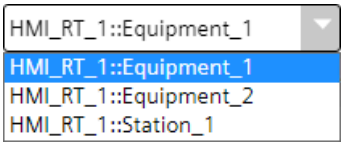
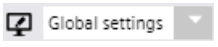
In the Performance pie chart, you represent KPIs from one or more items of equipment. Using different display modes, you have the option of visualizing data as follows:

- To display the KPIs of a single item of equipment, use the display mode "Circle".
- To clearly display the KPIs of multiple items of equipment, use the display mode "Circle and ring". In this mode, an item of equipment is displayed as circle and the next item of equipment is displayed as ring.



Define the distance between the concentric arcs with the help of the "Donut separator size" property.

Operator controls

Button	Name	Function
		Only with "Pie" display mode: Selection list with plant objects. Select a plant object. All KPIs assigned to this plant object are displayed. On the "Indicators" tab, you determine which KPIs are available. Only those plant objects for which KPIs are activated as indicators are available.
	Settings	Opens the configuration dialog Settings (Page 116). Configure the display of the data in runtime. Requirement: The configuration of the control allows operator control.
	Data request to the server	Updates the data.
	Automatic data refresh	Refreshes the displayed data automatically in a configured cycle. Default value: 10 seconds
	Only show data	Hides the buttons of the toolbar. To display the buttons again, double-click in the display area of the control.
	Print	Prints the output.
	Export	Exports the output of the displayed data to a CSV file.
	User profile settings	Saves the current configuration globally so that the display is consistent for all users. To reset the configuration to the settings from the engineering system, select "Reset" in the dialog. Requirement: The user rights allow an operation.
	Switch configuration	Selection list for the configuration to switch between the global settings and the default settings that were defined in the engineering system. Requirement: The user rights allow an operation.

Styles

The "Performance pie chart" control supports the pre-defined styles of the HMI device.

You change the style of an HMI device in the engineering system in the runtime settings of the HMI device.

Alternatively, configure a script in the engineering system to change the style, for example, to a button, and change the style in runtime after downloading.

See also

Configuring a Performance pie chart (Page 83)

Basics on outputting KPIs (Page 79)

9.5.2 Configuring a performance pie chart in runtime

Introduction

You configure the graphic output of the KPIs in runtime in the configuration dialog of the control.

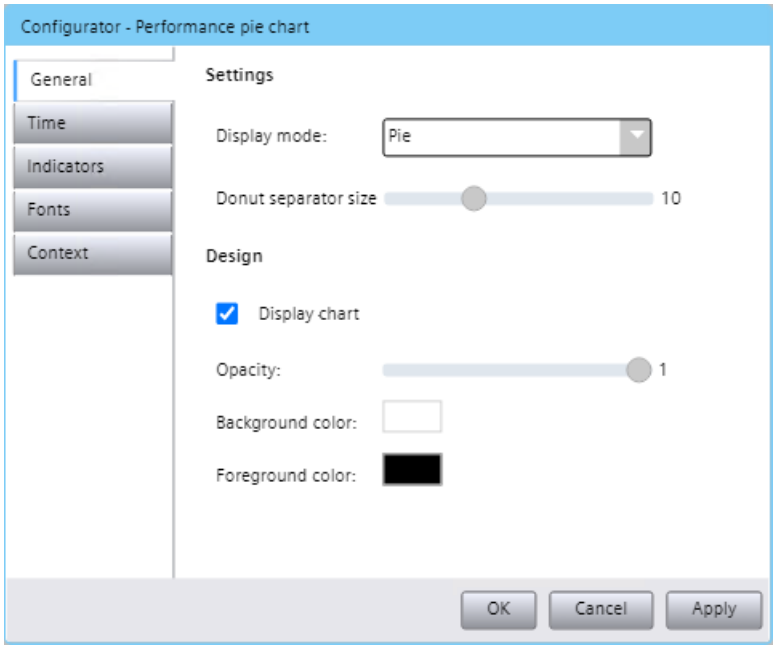
To open the configuration dialog, click "Settings".

A message is output if you have selected a combination of settings that cannot be displayed. For example, the end time of the visualization cannot be before the start time.

General buttons

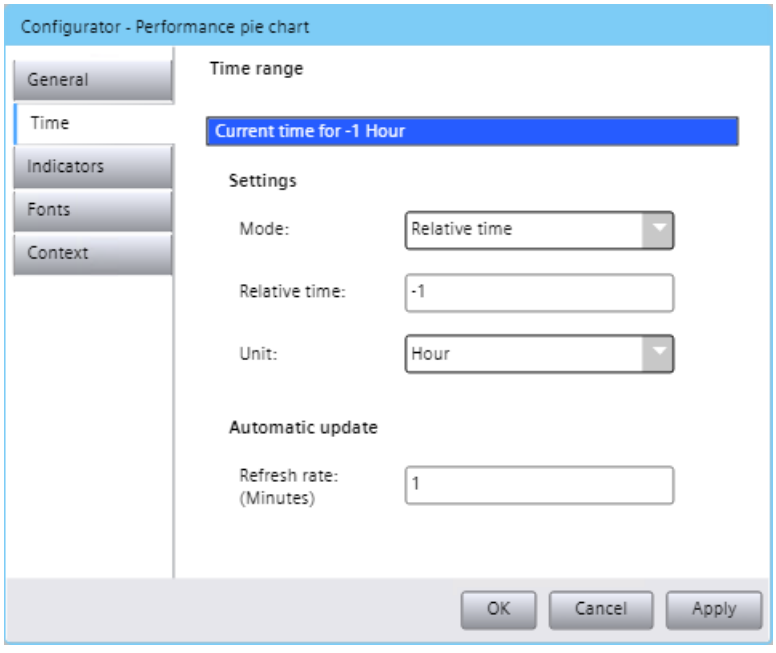
OK	Applies the settings and closes the configuration dialog.
Cancel	Closes the configuration dialog without applying the changes.
Apply	Applies the changes. The configuration dialog remains open. The changes are immediately visualized.

Configuring general settings



Property	Type	Description
Settings		
Display mode	Selection	Specifies the display mode. You choose from the following modes: • Pie: KPIs of an item of equipment are visualized as a circle • Pie and donut: KPIs of several items of equipment are visualized as a circle with surrounding rings.
Donut separator size	Number	Specifies the width of the separation line.
Design		
Display chart	Boolean value	Specifies whether the chart is visible. • Default setting: True
Opacity	Number	Specifies the degree of transparency for the chart. • 1: Not transparent (default value) • 0.5: 50% transparent • 0: Completely transparent
Background color	Color	Specifies the background color in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.
Foreground color	Color	Specifies the foreground color, for example, the font color for values in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.

Configuring the time

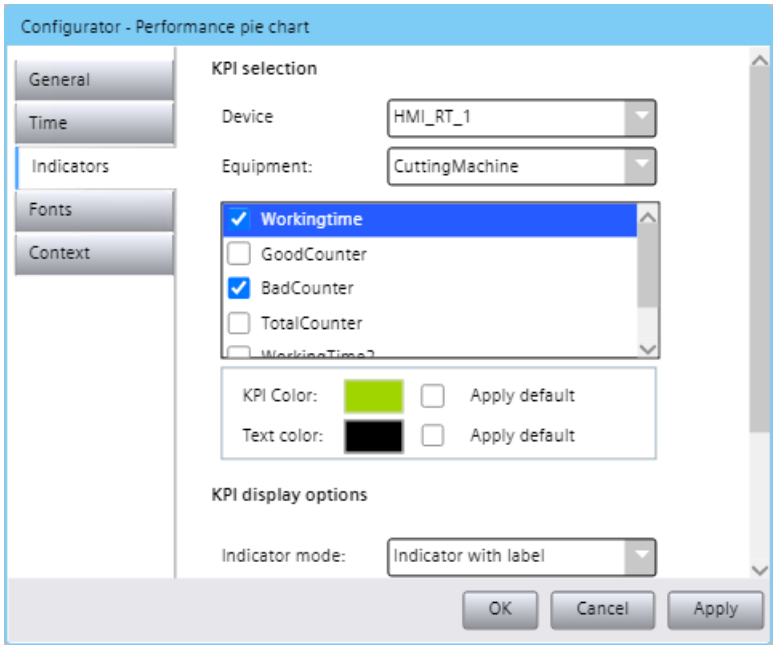


Property	Type	Description
Time range		Displays the time range that is defined under "Settings".
Settings		
Mode	Selection	Defines the mode for calculating the time: • Absolute time: You define a fixed start time and a fixed end time for a time range. • Relative time: You define a duration. The time range is displayed for the duration relative to the current time, e.g. last hour until now.
Start time	Number	Specifies the standard starting time for the calculation. Only available in "Absolute time" mode.
End time	Number	Specifies the standard end time for the calculation. Only available in "Absolute time" mode.
Relative time	Number	Specifies the period starting with the current time. Only available in "Relative time" mode.
Unit of measurement	Selection	Specifies the duration of the calculation in hours, days or weeks. If you select "Fiscal week", only the work days defined in the calendar settings are taken into account. You can find more information at Use time range of a calendar for evaluation (Page 110). Only available in "Relative time" mode.
Automatic update		
Refresh rate	Number	Specifies the refresh rate in minutes. Default value: 1 minute When you enter the value 0, the automatic update is disabled.

Note

If the user-defined time range is in the future, no results of the KPI calculation are displayed in the control.

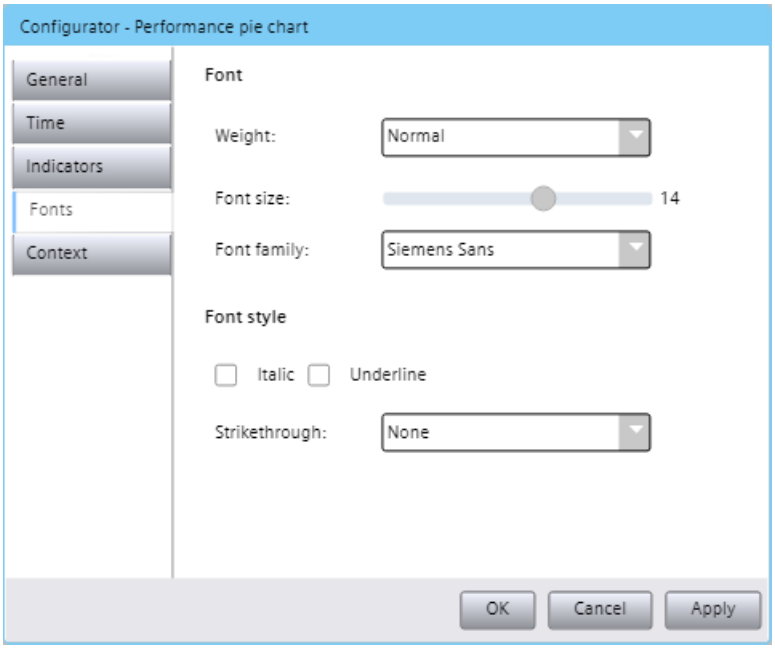
Configuring indicators



Property	Type	Description
KPI selection		
Device	Selection	Specifies for which device the following selection of equipment and KPIs is displayed in the settings. Switching is only possible between devices for which collaboration is set up. You can find more information at Setting up Collaboration for Performance Insight controls (Page 100).
Equipment	Selection	Specifies which equipment and KPIs thereof are visualized in the control. • Select the KPIs of the equipment you want to visualize. • Select the display color and the text color for the corresponding KPI or activate the use of the standard color.
KPI color: Apply default	Boolean value	Specifies whether the default color is used to display the KPI. The color can be set individually using the color icon.
Text color: Apply default	Boolean value	Specifies whether the default color is used to display the text. The color can be set individually using the color icon.
KPI display options		
Indicator mode	Selection	Specifies the mode for the display of the KPIs. • Indicator: Only the slices of the pie (circle segments corresponding to the KPI value) are displayed. • Indicator with label: The plant object, name of the KPI and the value of the KPI are displayed for each visualized KPI.
Automatic decimal format	Boolean value	Specifies whether the decimal format is set automatically.

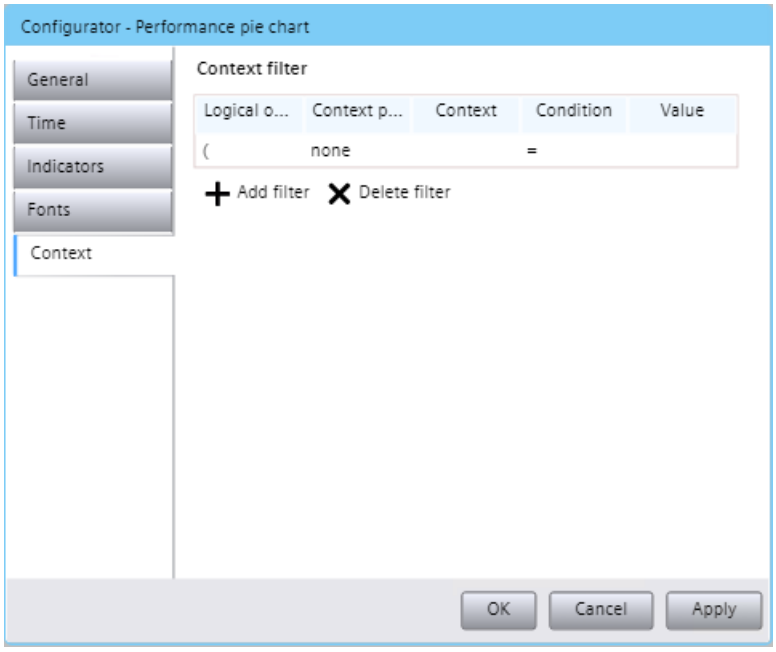
Property	Type	Description
Decimal places	Number	Specifies the number of decimal places between 0 and 10. Default value: 2
Counter calculation without interpolation at boundaries	Boolean value	The calculation of a counter is based on the logged data in the specified time range. Only data that is completely within the specified time range is used to calculate the counter. If the option "Counter calculation without interpolation at boundaries" is disabled, the data at the start time and at the end time of the time range will be interpolated.

Configuring fonts



Property	Type	Description
Font		
Width	Selection	Specifies the font weight of the displayed texts.
Font size	Number	Slider, specifies the font size in the range between 5 pt and 20 pt.
Font family	Selection	Specifies the font family.
Font style		
Italic	Boolean value	Specifies whether the texts in the control are displayed in italics.
Underline	Boolean value	Specifies whether the texts in the control are displayed underlined.
Strikethrough	Selection	Specifies whether the texts in the control are displayed struck-out. The following values are available: • None: The texts are not displayed struck-out. • Single: The texts are displayed struck-out with one horizontal line.

Context configuration



Property	Type	Description
Context filter		
Logical operator	Selection	Specifies the logical operator for linking the filter rules: • (•) • AND • OR
Context provider	Selection	Specifies the tool on which the filter rule is based: • Calendar • None
Context	Selection	Specifies the context: • ShiftID For the "Calendar" context provider
Condition	Selection	Specifies the condition for the filter rule: • = • < Only available for "Calendar" context provider • <= Only available for "Calendar" context provider • > Only available for "Calendar" context provider • >= Only available for "Calendar" context provider
Value	Number	Specifies the value for the condition.

See also

Operating a Performance pie chart (Page 113)

Configuring a Performance pie chart (Page 83)

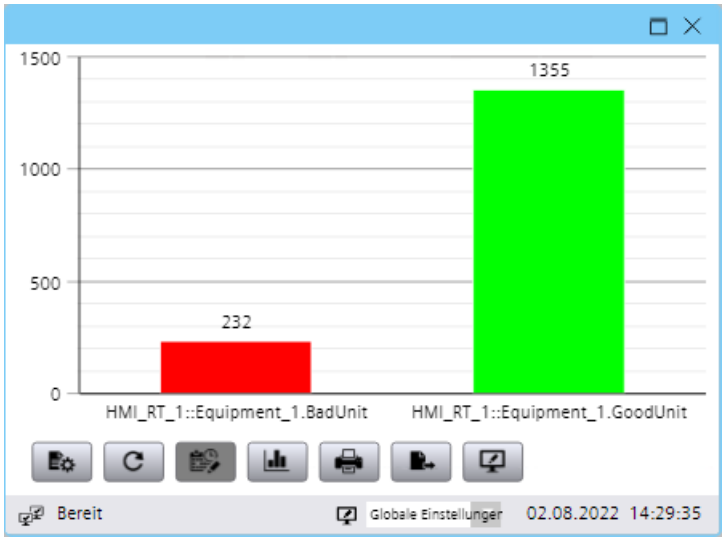
Information on operator control in Runtime (Page 109)

9.6 Performance bar chart

9.6.1 Operating a Performance bar chart

Use

The "Performance bar chart" control shows KPIs as bars and thereby illustrates a quantity or frequency. For example, you represent multiple KPIs of an item of equipment in a bar chart for comparison.



Note

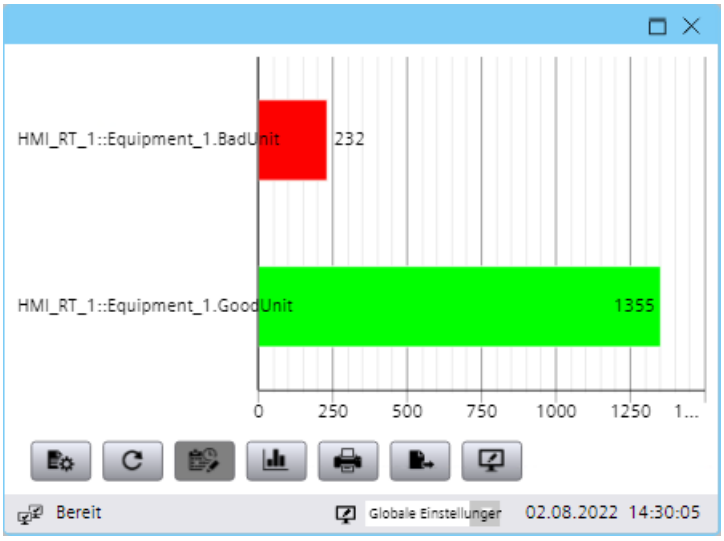
When you move the mouse pointer over the respective bar, the following information is displayed:

- Name of the plant object
- Name of the KPI
- Value of the KPI
- Description of the KPI
- Value of the quality code

Display modes

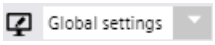
The Performance bar chart can be displayed in two different modes:

- Columns
- Bar



Operator controls

Button	Name	Function
	Settings	Opens the configuration dialog Settings (Page 124). Configure the display of the data in runtime. Requirement: The configuration of the control allows operator control.
	Data request to the server	Updates the data.
	Automatic data refresh	Refreshes the displayed data automatically in a configured cycle. Default value: 10 seconds
	Only show data	Hides the buttons of the toolbar. To display the buttons again, double-click in the display area of the control.
	Print	Prints the output.
	Export	Exports the output of the displayed data to a CSV file.

Button	Name	Function
	User profile settings	Saves the current configuration globally so that the display is consistent for all users. To reset the configuration to the settings from the engineering system, select "Reset" in the dialog. Requirement: The user rights allow an operation.
	Switch configuration	Selection list for the configuration to switch between the global settings and the default settings that were defined in the engineering system. Requirement: The user rights allow an operation.

Styles

The "Performance bar chart" control supports the pre-defined styles of the HMI device.

You change the style of an HMI device in the engineering system in the runtime settings of the HMI device.

Alternatively, configure a script in the engineering system to change the style, for example, to a button, and change the style in runtime after downloading.

See also

Configuring the Performance bar chart (Page 86)

Basics on outputting KPIs (Page 79)

9.6.2 Configuring a performance bar chart in runtime

Introduction

You configure the graphic output of the KPIs in runtime in the configuration dialog of the control.

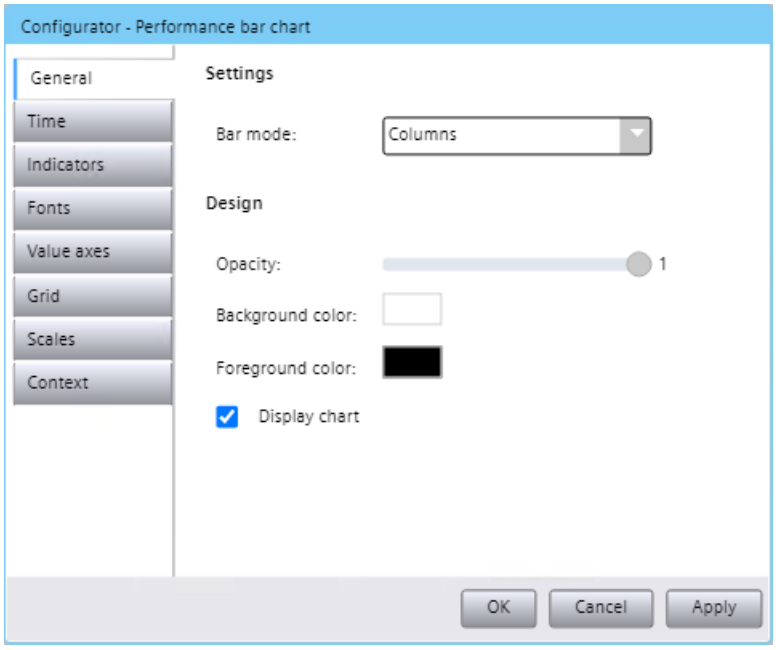
To open the configuration dialog, click "Settings".

A message is output if you have selected a combination of settings that cannot be displayed. For example, the end time of the visualization cannot be before the start time.

General buttons

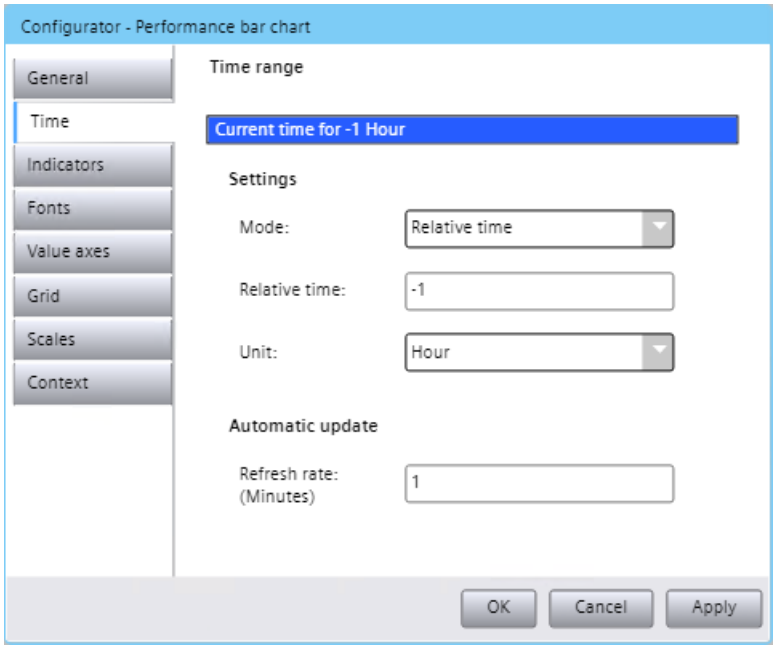
OK	Applies the settings and closes the configuration dialog.
Cancel	Closes the configuration dialog without applying the changes.
Apply	Applies the changes. The configuration dialog remains open. The changes are immediately visualized.

Configuring general settings



Property	Type	Description
Settings		
Bar mode	Selection	Specifies the display mode in the bar graph: • Columns Horizontal • Bar Vertical
Design		
Display chart	Boolean value	Specifies whether the chart is visible. • Default setting: True
Opacity	Number	Specifies the degree of transparency for the chart. • 1: Not transparent (default value) • 0.5: 50% transparent • 0: Completely transparent
Background color	Color	Specifies the background color in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.
Foreground color	Color	Specifies the foreground color, for example, the font color for values in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.

Configuring the time

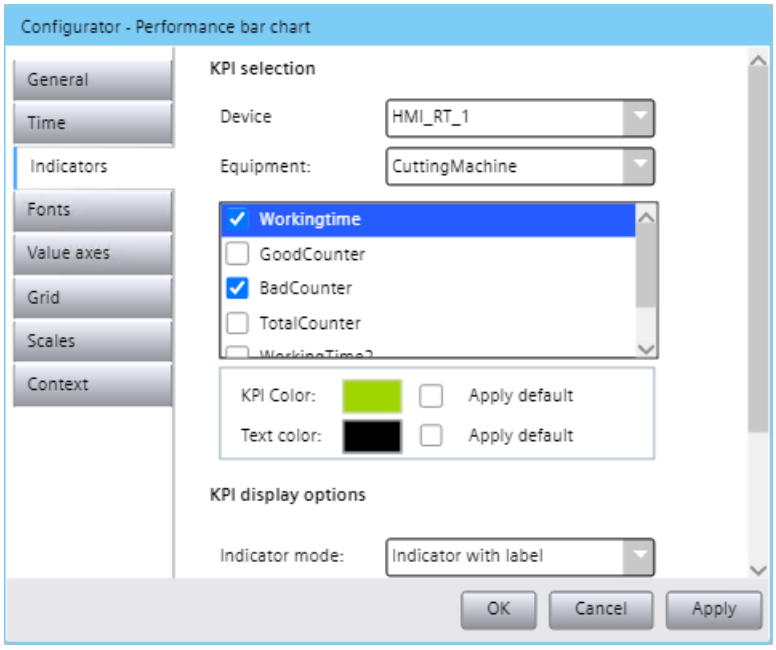


Property	Type	Description
Time range		Displays the time range that is defined under "Settings".
Settings		
Mode	Selection	Defines the mode for calculating the time: • Absolute time: You define a fixed start time and a fixed end time for a time range. • Relative time: You define a duration. The time range is displayed for the duration relative to the current time, e.g. last hour until now.
Start time	Number	Specifies the standard starting time for the calculation. Only available in "Absolute time" mode.
End time	Number	Specifies the standard end time for the calculation. Only available in "Absolute time" mode.
Relative time	Number	Specifies the period starting with the current time. Only available in "Relative time" mode.
Unit of measurement	Selection	Specifies the duration of the calculation in hours, days or weeks. If you select "Fiscal week", only the work days defined in the calendar settings are taken into account. You can find more information at Use time range of a calendar for evaluation (Page 110). Only available in "Relative time" mode.
Automatic update		
Refresh rate	Number	Specifies the refresh rate in minutes. Default value: 1 minute When you enter the value 0, the automatic update is disabled.

Note

If the user-defined time range is in the future, no results of the KPI calculation are displayed in the control.

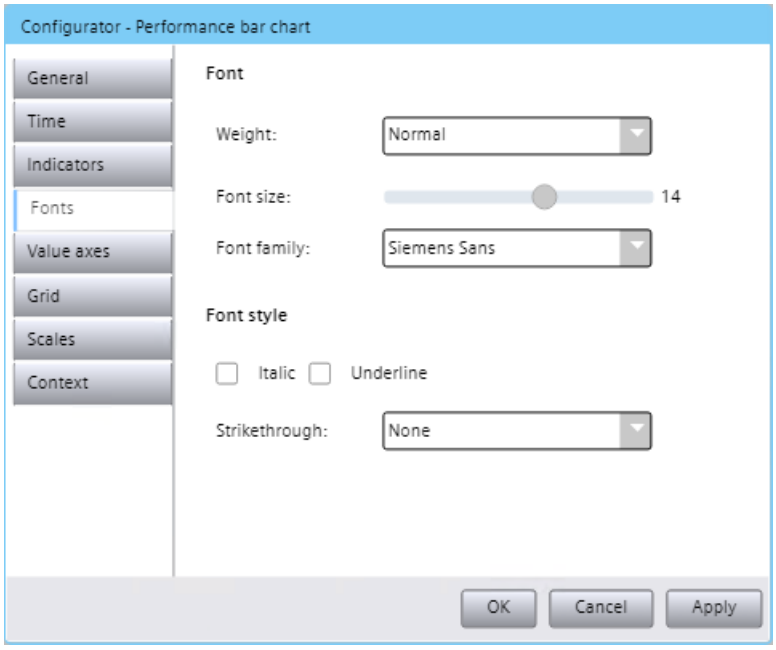
Configuring indicators



Property	Type	Description
KPI selection		
Device	Selection	Specifies for which device the following selection of equipment and KPIs is displayed in the settings. Switching is only possible between devices for which collaboration is set up. You can find more information at Setting up Collaboration for Performance Insight controls (Page 100).
Equipment	Selection	Specifies which equipment and KPIs thereof are visualized in the control. If you activate KPIs of different plant objects, they are displayed next to each other in the chart. • Select the KPIs of the equipment you want to visualize. • Select the display color and the text color for the corresponding KPI or activate the use of the standard color.
KPI color: Apply default	Boolean value	Specifies whether the default color is used to display the KPI. The color can be set individually using the color icon.
Text color: Apply default	Boolean value	Specifies whether the default color is used to display the text. The color can be set individually using the color icon.
KPI display options		

Property	Type	Description
Indicator mode	Selection	Specifies the mode for the display of the KPIs. • Indicator: Only the bars are displayed. • Indicator with label: The name of the KPI and the value of the KPI are displayed for each visualized KPI.
Automatic decimal format	Boolean value	Specifies whether the decimal format is set automatically.
Decimal places	Number	Specifies the number of decimal places between 0 and 10. Default value: 2
Counter calculation without interpolation at boundaries	Boolean value	The calculation of a counter is based on the logged data in the specified time range. Only data that is completely within the specified time range is used to calculate the counter. If the option "Counter calculation without interpolation at boundaries" is disabled, the data at the start time and at the end time of the time range will be interpolated.

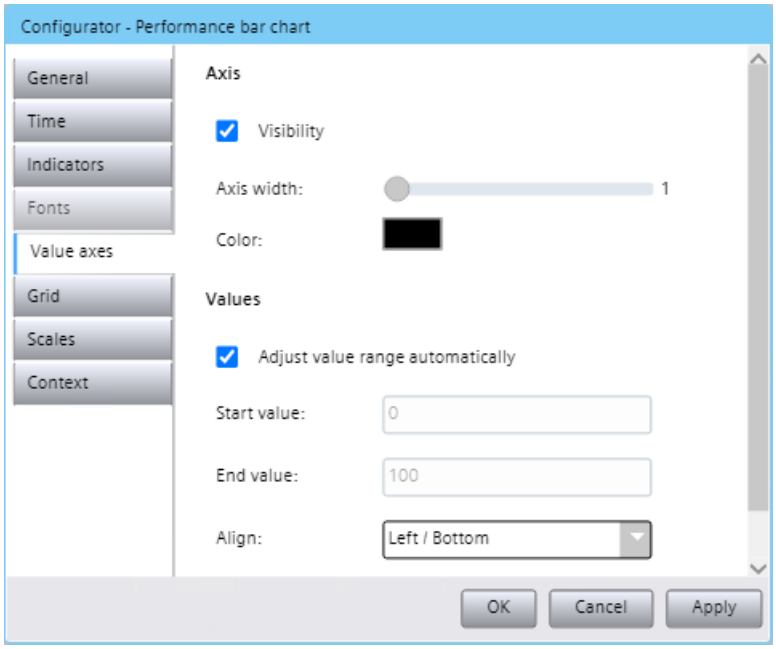
Configuring fonts



Property	Type	Description
Font		
Width	Selection	Specifies the font weight of the displayed texts.
Font size	Number	Slider, specifies the font size in the range between 5 pt and 20 pt.
Font family	Selection	Specifies the font family.
Font style		
Italic	Boolean value	Specifies whether the texts in the control are displayed in italics.

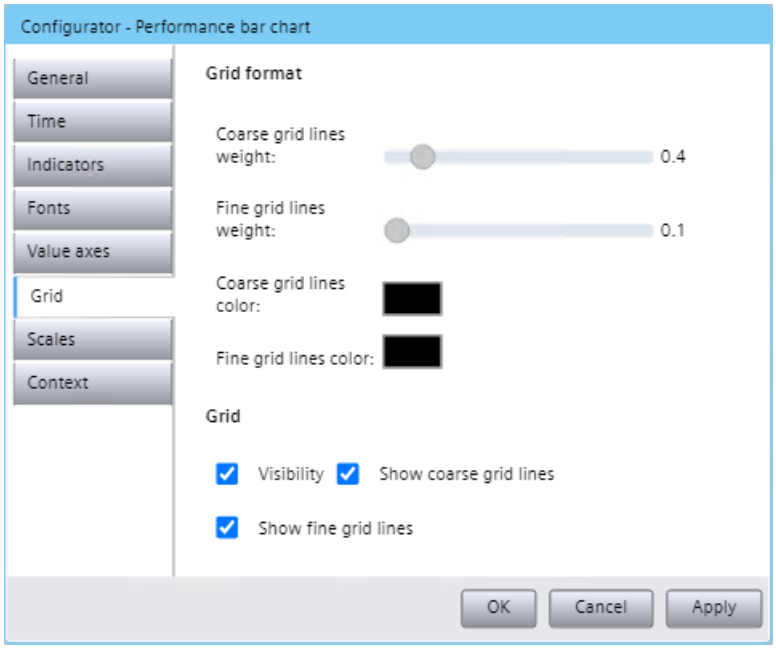
Property	Type	Description
Underline	Boolean value	Specifies whether the texts in the control are displayed underlined.
Strikethrough	Selection	Specifies whether the texts in the control are displayed struck-out. The following values are available: • None: The texts are not displayed struck-out. • Single: The texts are displayed struck-out with one horizontal line.

Configuring axes



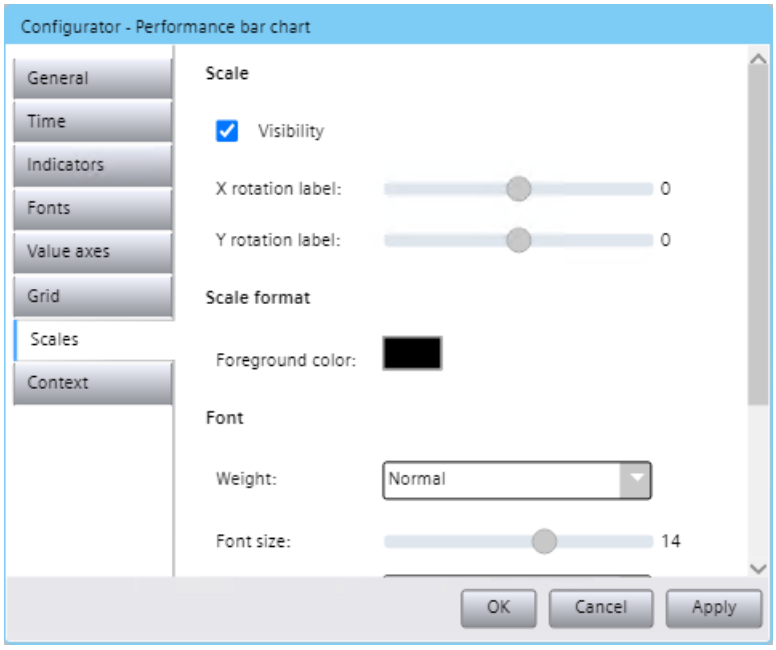
Property	Type	Description
Axis		
Visibility	Boolean value	Specifies whether the axes are displayed in the control.
Axis width	Number	Specifies the width of the axis. The permissible value range is between 1 and 10.
Color	Color	Specifies the axis color.
Values		
Automatically adapt value range	Boolean value	Specifies whether automatic scaling is activated.
Start value	Number	Specifies the minimum value for the axis. Only configurable when automatic scaling is disabled.
End value	Number	Specifies the maximum value for the axis. Only configurable when automatic scaling is disabled.
Align	Selection	Specifies the alignment of the axis: • Left/bottom • Right/top
Show labels	Boolean value	Specifies whether the labels of the value axes are displayed.

Configuring the grid



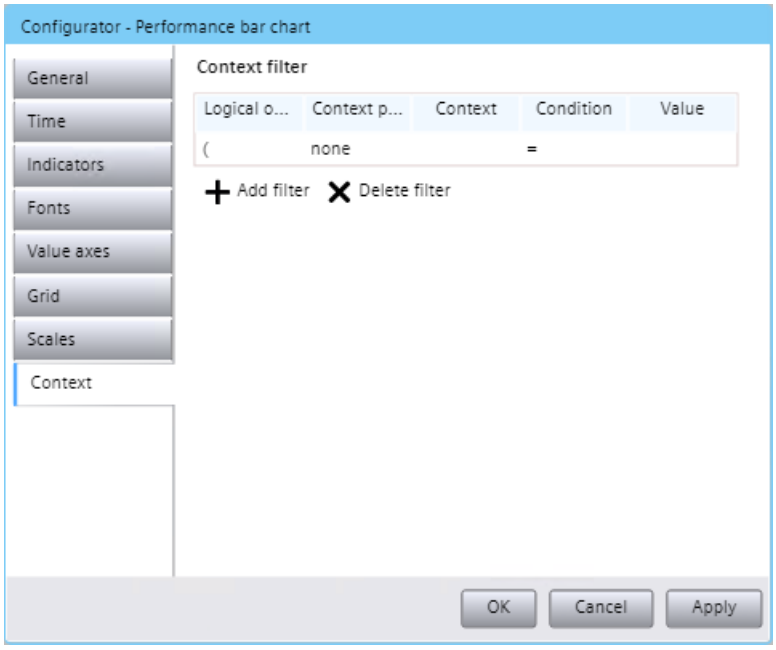
Property	Type	Description
Grid format		
Coarse grid lines weight	Number	Specifies the width of the coarse grid lines in the control. • Permitted value range: 0.1 ... 3 • Default setting: 0.4.
Fine grid lines weight	Number	Specifies the width of the fine grid lines in the control. • Permitted value range: 0.1 ... 3 • Default setting: 0.1.
Coarse grid lines color	Color	Specifies the color of the coarse grid lines in the control.
Fine grid lines color	Color	Specifies the color of the fine grid lines in the control.
Grid		
Visibility	Boolean value	Specifies whether the grid is displayed in the control.
Show coarse grid lines	Boolean value	Specifies whether coarse grid lines are displayed in the control.
Show fine grid lines	Boolean value	Specifies whether fine grid lines are displayed in the control.

Configuring scales



Property	Type	Description
Scale		
Visibility	Boolean value	Specifies whether the scales are displayed in the control.
X rotation label	Number	Specifies the rotation of the label on position X. The default value is 0.
Y rotation label	Number	Specifies the rotation of the label on position Y. The default value is 0.
Scale format		
Foreground color	Color	Specifies the color of the scale.
Font		
Width	Selection	Specifies the font weight of the displayed texts.
Font size	Number	Specifies the font size in the range between 0 and 20 pt.
Font family	Selection	Specifies the font family. • Arial (default) • Times New Roman • SimSun (required for Chinese) • Siemens Sans
Font style		
Italic	Boolean value	Specifies whether the label of the scale is displayed in italics in the control.
Underline	Boolean value	Specifies whether the label of the scale is displayed underlined in the control.
Strikethrough	Selection	Specifies whether the label of the scale is displayed struck-out in the control. The following values are available: • None: The text is not displayed struck-out. • Single: The text is displayed struck-out with one horizontal line.

Context configuration



Property	Type	Description
Context filter		
Logical operator	Selection	Specifies the logical operator for linking the filter rules: • (•) • AND • OR
Context provider	Selection	Specifies the tool on which the filter rule is based: • Calendar • None
Context	Selection	Specifies the context: • ShiftID For the "Calendar" context provider
Condition	Selection	Specifies the condition for the filter rule: • = • < Only available for "Calendar" context provider • <= Only available for "Calendar" context provider • > Only available for "Calendar" context provider • >= Only available for "Calendar" context provider
Value	Number	Specifies the value for the condition.

See also

Operating a Performance bar chart (Page 122)
Configuring the Performance bar chart (Page 86)
Information on operator control in Runtime (Page 109)

9.7 Performance Gantt chart

9.7.1 Operating a Performance Gantt chart

Use

The "Performance Gantt chart" control shows the chronological sequence of machine states as a bar on a time axis. You can see at a glance which machine states occurred at which times. The control also offers the option of assigning data about standstill times to a machine. In this way, you can understand why certain events have occurred on a machine or production line.

The time ranges are arranged according to the names of the equipment and priorities, but the order can be changed. Each bar with its own color is proportional to the duration of an item of equipment in terms of its length and is standardized to the scale used. This means that each bar can show sections in different colors (e.g. red for irrelevant data).

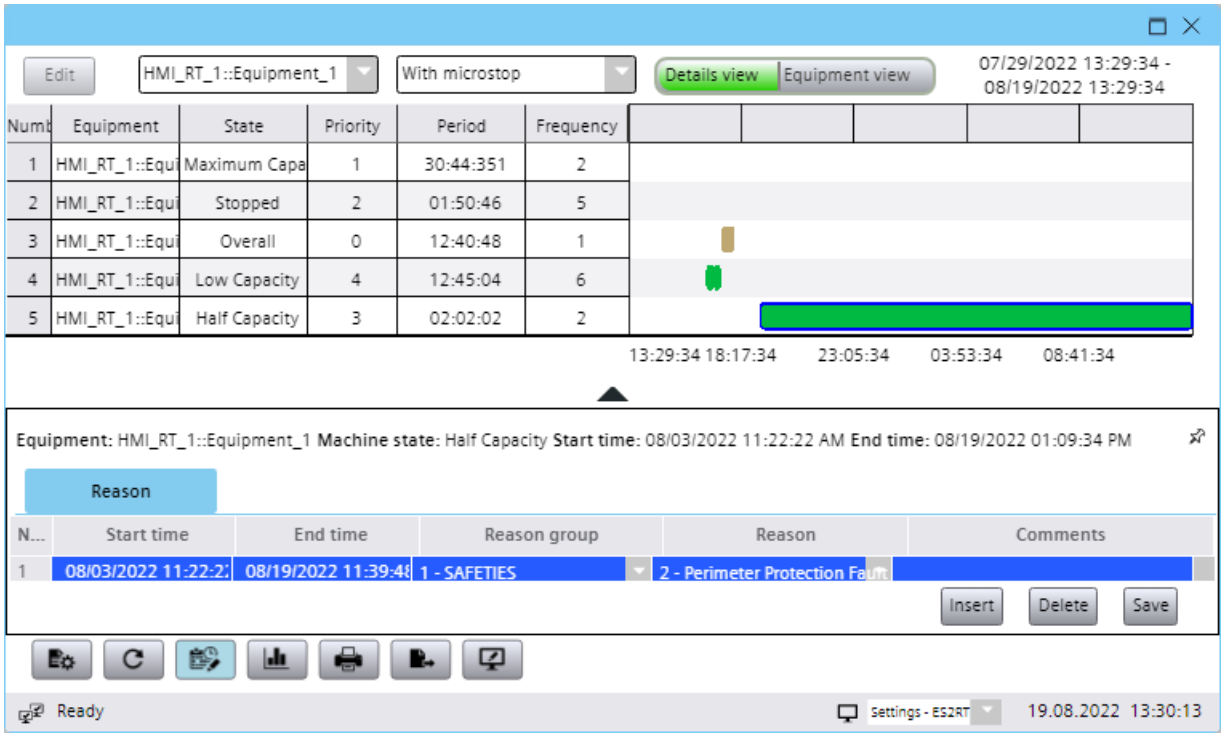
The Performance Gantt chart consists of the following areas:

- Detail view
  The machine states of the selected equipment are shown as a table.
- Equipment view
  The chronological order of all machine states of the selected equipment is displayed.

The following filter methods are available in both areas:

- Filter by plant object
- Filter machine states by MicroStops

The data is arranged according to the names of the equipment and priorities, but the order can be changed. Each bar has its own color which is either taken from the color of the state or automatically assigned by the control. The width of the bar is adjusted to the size of the control.



You can edit machine states in runtime using the following functions:

- Paste
- Change
- Split
- Merge

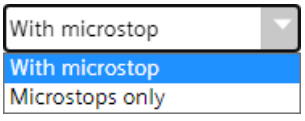
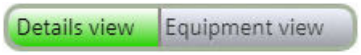
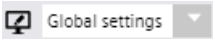
Note

Changes in the engineering system

If a machine state is assigned a reason that is later deleted in the engineering system, the reason is still displayed for this machine state in the Performance Gantt chart.

Operator controls

Button	Name	Function
Edit		Provides the option to edit machine states.
HMI_RT_1::Equipment_1		Selection list with items of equipment. Select a plant object. All machine states assigned to this plant object are displayed. On the "Equipment" tab, you determine which plant objects are available. Only those plant objects for which machine states are enabled as indicators are available.

Button	Name	Function
		Selection list for displaying the machine states: • With microstops • Only microstops
		Toggles between detail view and equipment view
	Reason Editor	Shows or hides the Reason editor. The button is shown when a machine state is selected.
	Paste	Adds a new reason to the selected machine state.
	Delete	Deletes the selected reason.
	Saving	Saves the changes in the Reason Editor.
	Pin	Pins the Reason Editor to the Gantt control. The button for hiding the editor is ineffective as long as the editor is pinned.
	Settings	Opens the configuration dialog Settings (Page 136). Configure the display of the data in runtime. Requirement: The configuration of the control allows operator control.
	Data request to the server	Updates the data.
	Automatic data refresh	Refreshes the displayed data automatically in a configured cycle. Default value: 10 seconds.
	Only show data	Hides the buttons of the toolbar. To display the buttons again, double-click in the display area of the control.
	Print	Prints the output.
	Export	Exports the output of the displayed data to a CSV file.
	User profile settings	Saves the current configuration globally so that the display is consistent for all users. To reset the configuration to the settings from the engineering system, select "Reset" in the dialog. Requirement: The user rights allow an operation.
	Switch configuration	Selection list for the configuration to switch between the global settings and the default settings that were defined in the engineering system. Requirement: The user rights allow an operation.

Styles

The "Performance Gantt chart" control supports the pre-defined styles of the HMI device.

You change the style of an HMI device in the engineering system in the runtime settings of the HMI device.

Alternatively, configure a script in the engineering system to change the style, for example, to a button, and change the style in runtime after downloading.

See also

Configuring the Performance Gantt chart (Page 89)

Basics on outputting KPIs (Page 79)

9.7.2 Configuring a performance Gantt chart in runtime

Introduction

In runtime, you configure the graphic output of the chronological sequence of the machine states of the individual items of equipment in the configuration dialog of the control.

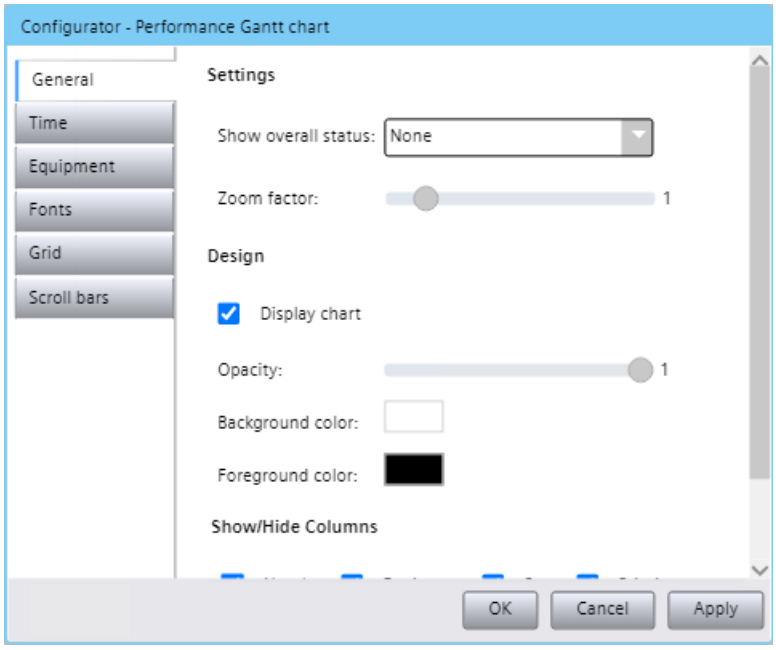
To open the configuration dialog in runtime, select "Settings".

A message is output if you have selected a combination of settings that cannot be displayed. For example, the end time of the visualization cannot be before the start time.

General buttons

OK	Applies the settings and closes the configuration dialog.
Cancel	Closes the configuration dialog without applying the changes.
Apply	Applies the changes. The configuration dialog remains open. The changes are immediately visualized.

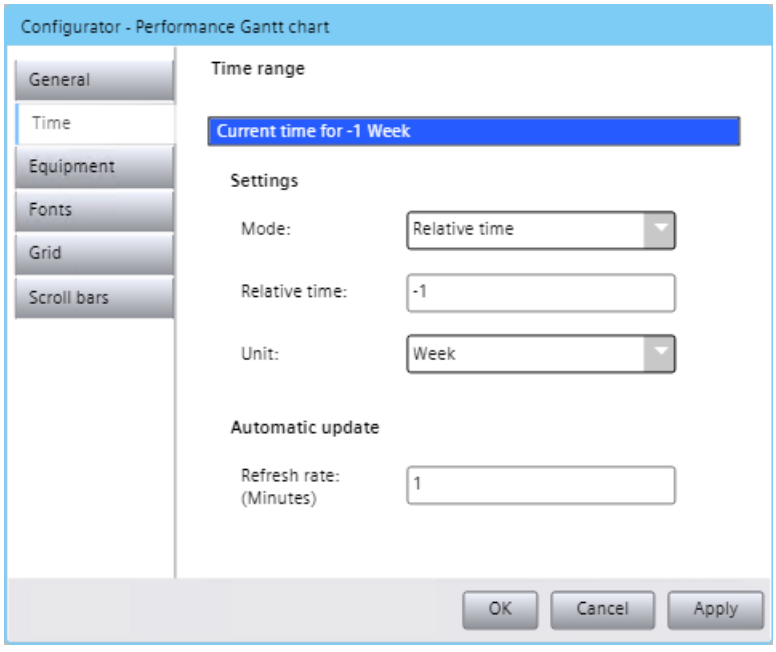
Configuring general settings



Property	Type	Description
Settings		
Show overall status	Selection	Specifies whether the overall status is displayed as an overview of all machine states for an item of equipment for a period of time in one row. Available modes: • None: Do not show overall status • First line: Summarize overall status in the first line • Last line: Summarize overall status in the last line
Zoom factor	Number	Slider; sets the zoom factor in the range between 0.5 and 5. Default value: 1.
Design		
Display chart	Boolean value	Specifies whether the chart is visible. • Default setting: True
Opacity	Number	Specifies the degree of transparency for the chart. • 1: Not transparent (default value) • 0.5: 50% transparent • 0: Completely transparent
Background color	Color	Specifies the background color in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.
Foreground color	Color	Specifies the foreground color, for example, the font color for values in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.
Show/hide columns		

Property	Type	Description
No.	Boolean value	It determines whether the "No." column is visible in the details view. • Default setting: True
Equipment	Boolean value	It determines whether the "Equipment" column is visible in the details view. • Default setting: True
Status	Boolean value	It determines whether the "Status" column is visible in the details view. • Default setting: True
Priority	Boolean value	It determines whether the "Priority" column is visible in the details view. • Default setting: True
Duration	Boolean value	It determines whether the "Period" column is visible in the details view. • Default setting: True
Frequency	Boolean value	It determines whether the "Frequency" column is visible in the details view. • Default setting: True

Configuring the time



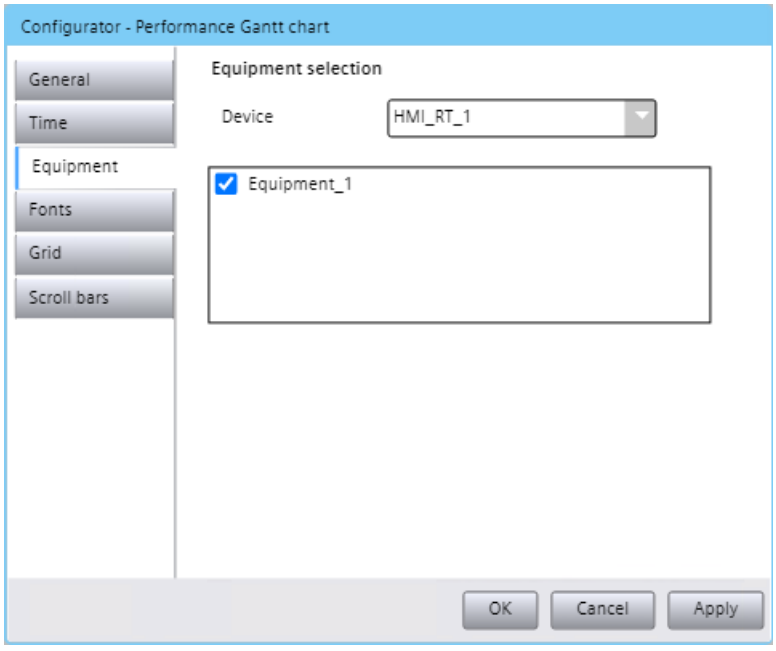
Property	Type	Description
Time range		Displays the time range that is defined under "Settings".
Settings		
Mode	Selection	Defines the mode for calculating the time: • Absolute time: You define a fixed start time and a fixed end time for a time range. • Relative time: You define a duration. The time range is displayed for the duration relative to the current time, e.g. last hour until now.

Property	Type	Description
Start time	Number	Specifies the standard starting time for the calculation. Only available in "Absolute time" mode.
End time	Number	Specifies the standard end time for the calculation. Only available in "Absolute time" mode.
Relative time	Number	Specifies the period starting with the current time. Only available in "Relative time" mode.
Unit of measurement	Selection	Specifies the duration of the calculation in hours, days or weeks. Only available in "Relative time" mode.
Automatic update		
Refresh rate	Number	Specifies the refresh rate in minutes. Default value: 1 minute When you enter the value 0, the automatic update is disabled.

Note

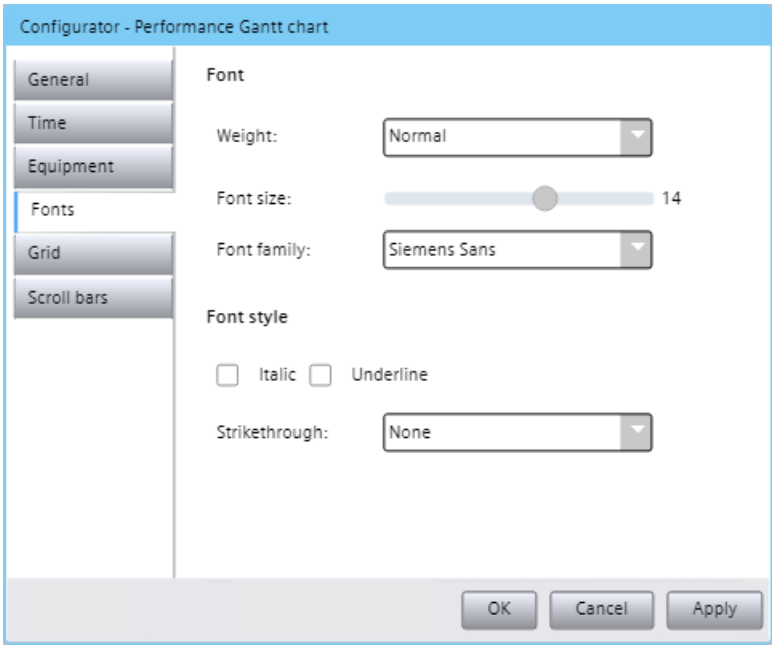
If the user-defined time range is in the future, no results of the KPI calculation are displayed in the control.

Configuring equipment



Property	Type	Description
Equipment selection		
Device	Selection	Specifies for which device the following selection of equipment is displayed in the settings. Switching is only possible between devices for which collaboration is set up. You can find more information at Setting up Collaboration for Performance Insight controls (Page 100). • Select the equipment whose display you want to activate. You can only activate equipment whose plant objects were assigned to the control during configuring.

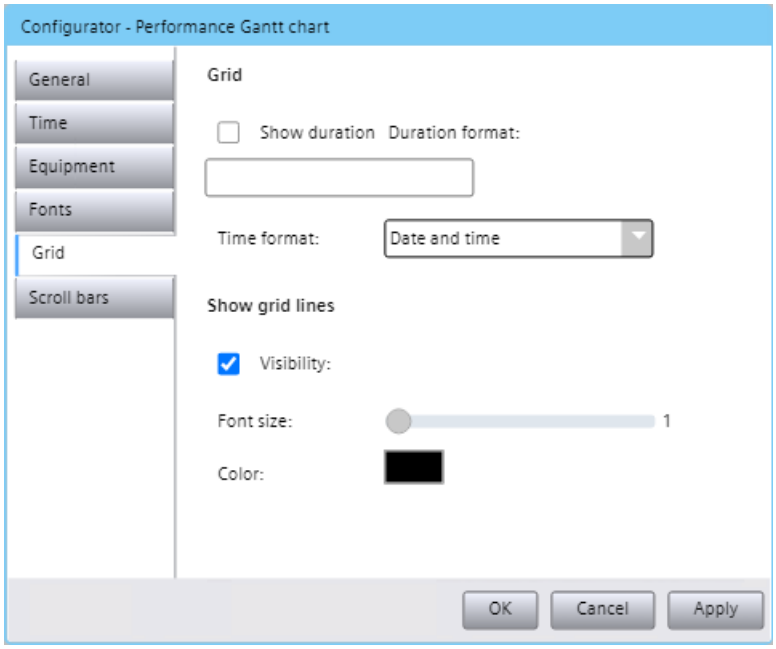
Configuring fonts



Property	Type	Description
Font		
Width	Selection	Specifies the font weight of the displayed texts.
Font size	Number	Slider, specifies the font size in the range between 5 pt and 20 pt.
Font family	Selection	Specifies the font family.
Font style		
Italic	Boolean value	Specifies whether the texts in the control are displayed in italics.

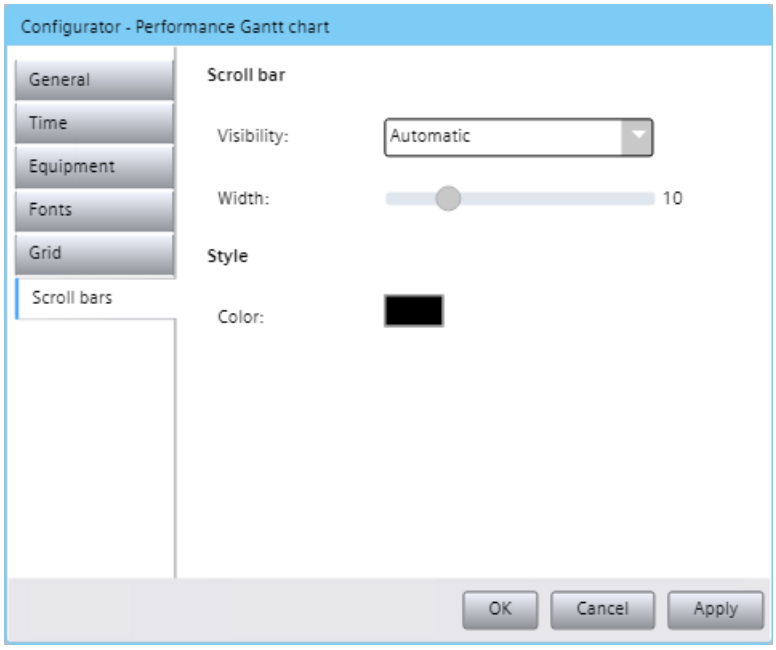
Property	Type	Description
Underline	Boolean value	Specifies whether the texts in the control are displayed underlined.
Strikethrough	Selection	Specifies whether the texts in the control are displayed struck-out. The following values are available: • None: The texts are not displayed struck-out. • Single: The texts are displayed struck-out with one horizontal line.

Configuring the grid



Property	Type	Description
Grid		
Show duration	Boolean value	Determines whether the duration is displayed in the columns.
Duration format	Input	Specifies the time duration format.
Time format	Selection	Specifies the format for the time. Available values: • Date and time • Time only
Show grid lines		
Visibility	Boolean value	Specifies whether grid lines are shown in the control.
Font size	Number	Specifies the font size. Default value: 1
Color	Color	Specifies the color of the grid lines.

Configuring scroll bars



Property	Type	Description
Scroll bar		
Visibility	Selection	Specifies whether scroll bars are shown in the control. Available values: • Automatic: Scroll bars are shown when necessary. • Visibility: Scroll bars are always shown. • Collapsed: Scroll bars are not shown.
Width	Number	Specifies the width of the scroll bar. Default value: 10
Style		
Color	Color	Specifies the color of the scroll bar.

See also

Operating a Performance Gantt chart (Page 133)
Configuring the Performance Gantt chart (Page 89)
Information on operator control in Runtime (Page 109)
Modify machine states (Page 143)

9.7.3 Modify machine states

Introduction

In the "Performance Gantt chart" control, you can modify the displayed machine states in runtime in the corresponding views.

Modify machine state	Available in view	Description
Change	Detail view	• Change machine state • Change start time and end time
Split	Detail view and equipment view	Split machine state
Merge	Equipment view	Merge two machine states that are on the same level.
Adjacent (side by side)	Equipment view	An undefined machine state (gap) exists between two machine states. For the machine states to be adjacent to each other, the machine state is merged with the undefined machine state.

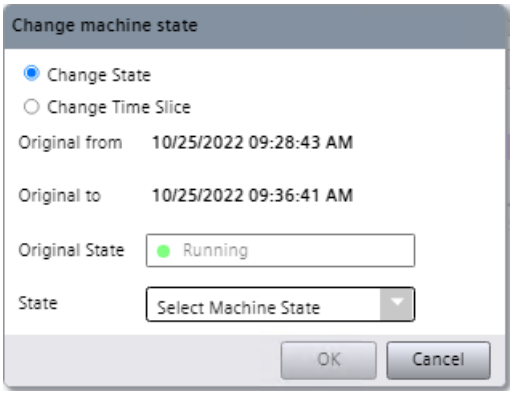
The machine states are logged according to the settings in the engineering system. When processing is currently being performed by another Performance Gantt chart, for example, the "Edit" button cannot be operated. As soon as processing is completed, the data in the control is updated automatically and you can perform the modification using the "Edit" button.

Note

Only available for machine states that are inactive at the time of processing and that are located within the time period shown in the control.

Changing the machine state

1. Click on the "Detail view" in the Performance Gantt chart.
2. Select a bar of a machine in the Performance Gantt chart.
3. Click "Edit".
4. Click "Change".
   The "Change machine state" dialog opens.



5. Select "Change machine state".
6. Select the new machine state.
7. Click "OK" to confirm your input.
   The machine state is updated.
   The machine state is logged according to the specifications in the engineering system.

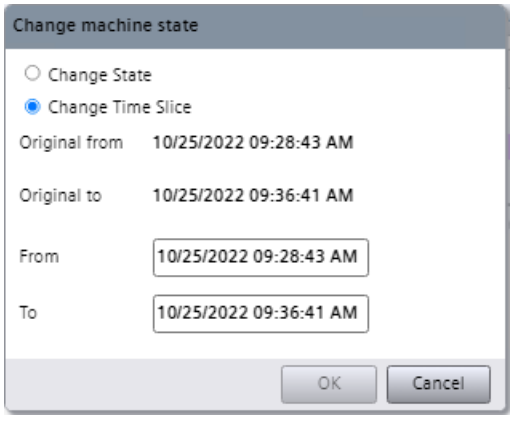
Changing the start time and end time

Note

Machine state adjacent to other machine state (side by side)

Do not set the end time of the first machine state to the start time of the second machine state. Instead, merge the first machine state with the undefined machine state that is adjacent to the second machine state (see "Adjacent machine state (side by side)").

1. Click on the "Detail view" in the Performance Gantt chart.
2. Select a bar of a machine in the Performance Gantt chart.
3. Click "Edit".
4. Click "Change".
   The "Change machine state" dialog opens.



5. Select "Change time window".
6. Define the start time in the "From" input field.

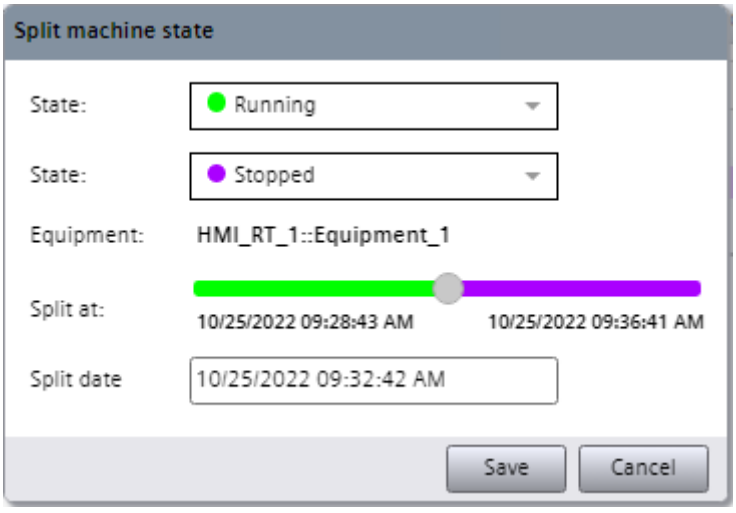
   Note

   If the new start time of the machine state is before the runtime start, the machine state is no longer displayed in the performance Gantt chart.

7. Define the end time in the "To" input field.
8. Click "OK" to confirm your input.
   The machine state is updated.
   The machine state is logged according to the specifications in the engineering system.

Splitting machine state

1. Select a bar of a machine in the Performance Gantt chart.
2. Click "Edit".
3. Click "Split".
   The "Split machine state" dialog opens.



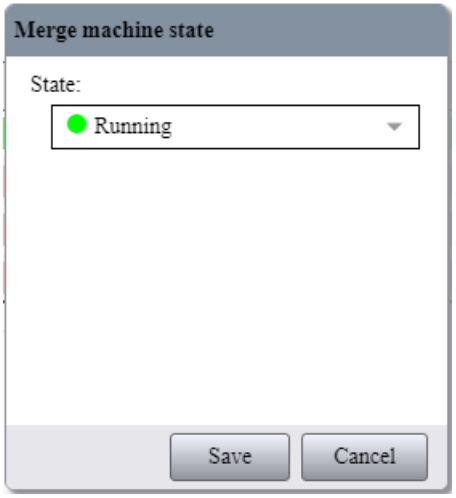
4. In the "State" selection boxes, define the two machine states into which the original machine state is going to be divided.
5. You have two options to define the time of the split:
   - Used the slider.
   - Enter the time in the "Split date" input field.

   The selected time must be later than the shown start time and before the shown end time.
6. Save your input.
   The machine states are updated.
   The machine states are logged according to the specifications in the engineering system.

Merging machine states

1. Click on the "Equipment view" in the Performance Gantt chart.
2. Use multiple selection to select the two machine states you want to combine. Use the <Ctrl> key for multiple selection.
3. Click "Edit".

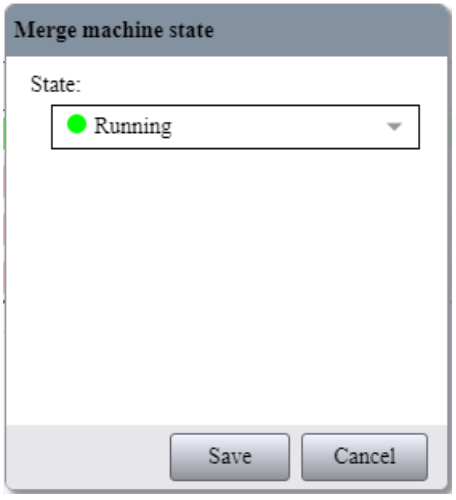
4. Click "Merge".
   The "Merge machine state" dialog opens.



5. Select the machine state in the selection list.
6. Save your input.
   The machine state is updated.
   The machine state is logged according to the specifications in the engineering system.

Adjacent machine state (side by side)

1. Click on the "Equipment view" in the Performance Gantt chart.
2. Using multiple selection, select the machine state and the undefined machine state that are to be merged. Use the <Ctrl> key for multiple selection.
3. Click "Edit".
4. Click "Merge".
   The "Merge machine state" dialog opens.



5. Select the machine state in the selection list.
6. Save your input.
   The machine state is updated.
   The machine state is logged according to the specifications in the engineering system.

See also

Configuring a performance Gantt chart in runtime (Page 136)

9.7.4 Modify reasons

Introduction

In the "Performance Gantt chart" control, you have the option to modify the displayed machine states in runtime in the Reason editor.

Note

Parallel work

- This control supports parallel work by multiple users with the following exception: Reasons cannot be edited or saved while a data correction of the KPIs is running.
  In this case, the status bar will display an error message.
- If reasons have been changed by another user, a corresponding note will appear in the status bar. Reload the content of the control to display the current data.

Insert reason

1. Click on the "Detail view" in the Performance Gantt chart.
2. Select the bar of a machine state.
   The button to open the Reason Editor appears at the bottom of the control. Enlarge the window if the button is not displayed.
3. Click the button to open the Reason Editor.
4. Click "Insert".
   A new reason is created.
5. Set the start and end time of the reason.
6. (Optional) In the "Reason group" selection list, select the reasons group to which the reason belongs.
   Enter a string to filter the list for reason groups that contain that string.
7. In the "Reason" selection list, select the reason.
   Enter a string to filter the list according to reason groups that contain that string.
   If you did not select a reason group beforehand, it will be filled in automatically.
8. (Optional) Enter a comment.
9. Click "Save".

Change reason

1. Click on the "Detail view" in the Performance Gantt chart.
2. Select the bar of a machine state.
   The button to open the Reason Editor appears at the bottom of the control. Enlarge the window if the button is not displayed.
3. Click the button to open the Reason Editor.
4. Select the reason you want to change.
5. Make the desired changes in the Reason Editor.
6. Click "Save".

Delete reason

1. Click on the "Detail view" in the Performance Gantt chart.
2. Select the bar of a machine state.
   The button to open the Reason Editor appears at the bottom of the control. Enlarge the window if the button is not displayed.
3. Click the button to open the Reason Editor.
4. Select the reason you want to delete.
5. Click "Delete".

9.8 Performance control

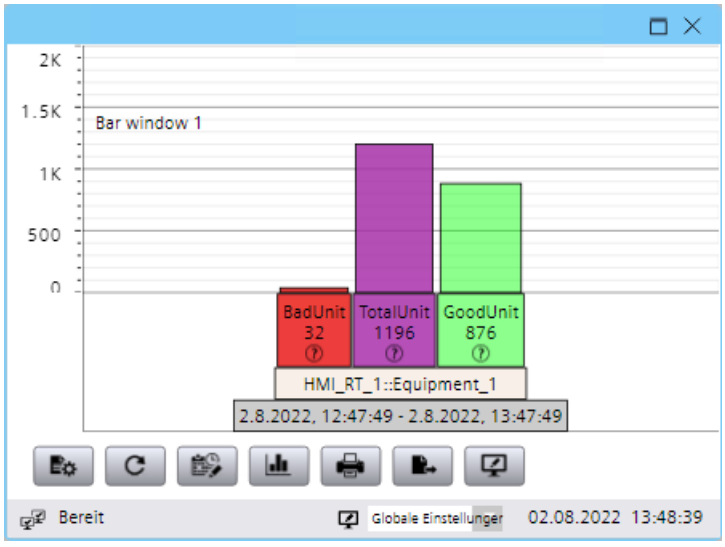
9.8.1 Operating the Performance control

Use

The "Performance control" represents the KPIs in relation to relevant equipment. You can thus compare the data of different equipment, for example.

You have the option to sort the operands according to equipment or according to context.

When displaying KPIs using calculation cycles, targets and thresholds can be displayed. These values can depend dynamically on the KPI or be constant.



The bar for a KPI is divided into the following sections:

- A horizontal bar at the bottom, with the period of the calculation
- One or more horizontal bars, each with the name of equipment that is included in the calculation
- One or more vertical bars of the same height, each with the name of a calculated KPI and the result value.
- One vertical bar for each calculated KPI with a height proportional to the value
  - Target values and thresholds are displayed in the background if the corresponding option is enabled.

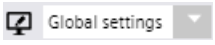
If the bar color is configured, it will be copied from the KPI color. Otherwise, the bar color is automatically assigned by the control.

Note

When you move the mouse pointer over the respective bar, the following information is displayed:

- Name of the plant object
- Name of the KPI
- Value of the KPI
- Description of the KPI
- Value of the quality code

Operator controls

Button	Name	Function
	Settings	Opens the configuration dialog Settings (Page 151). You configure the display of the data in runtime. Requirement: The configuration of the control allows operator control.
	Data request to the server	Updates the data.
	Automatic data refresh	Refreshes the displayed data automatically in a configured cycle. Default value: 10 seconds
	Only show data	Hides the buttons of the toolbar. To display the buttons again, double-click in the display area of the control.
	Print	Prints the output.
	Export	Exports the output of the displayed data to a CSV file.
	User profile settings	Saves the current configuration globally so that the display is consistent for all users. To reset the configuration to the settings from the engineering system, select "Reset" in the dialog. Requirement: The user rights allow an operation.
	Switch configuration	Selection list for the configuration to switch between the global settings and the default settings that were defined in the engineering system. Requirement: The user rights allow an operation.

Styles

The "Performance control" control supports the pre-defined styles of the HMI device.

You change the style of an HMI device in the engineering system in the runtime settings of the HMI device.

Alternatively, configure a script in the engineering system to change the style, for example, to a button, and change the style in runtime after downloading.

See also

Configuring the performance control (Page 92)

Basics on outputting KPIs (Page 79)

9.8.2 Configuring a performance control in runtime

Introduction

You configure the graphic output of the KPIs in runtime in the configuration dialog of the control.

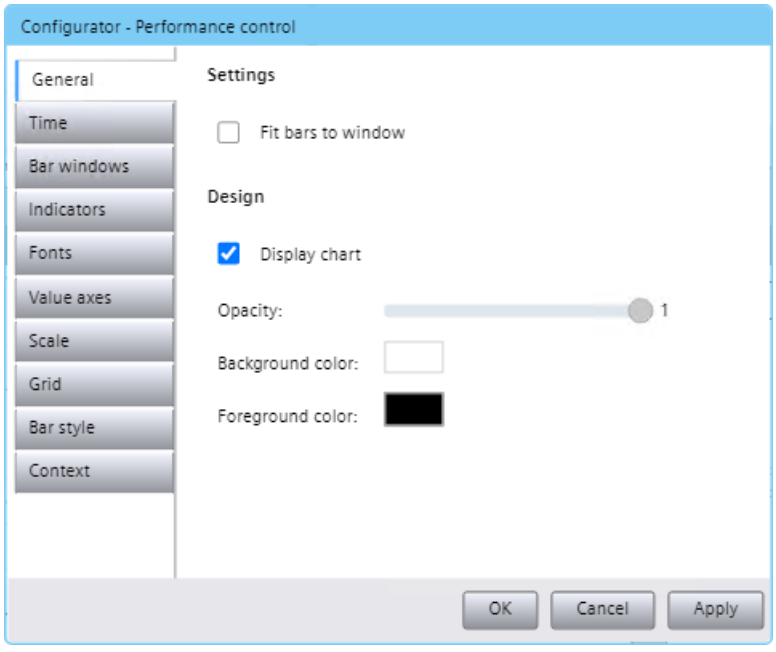
To open the configuration dialog, click "Settings".

A message is output if you have selected a combination of settings that cannot be displayed. For example, the end time of the visualization cannot be before the start time.

General buttons

OK	Applies the settings and closes the configuration dialog.
Cancel	Closes the configuration dialog without applying the changes.
Apply	Applies the changes. The configuration dialog remains open. The changes are immediately visualized.

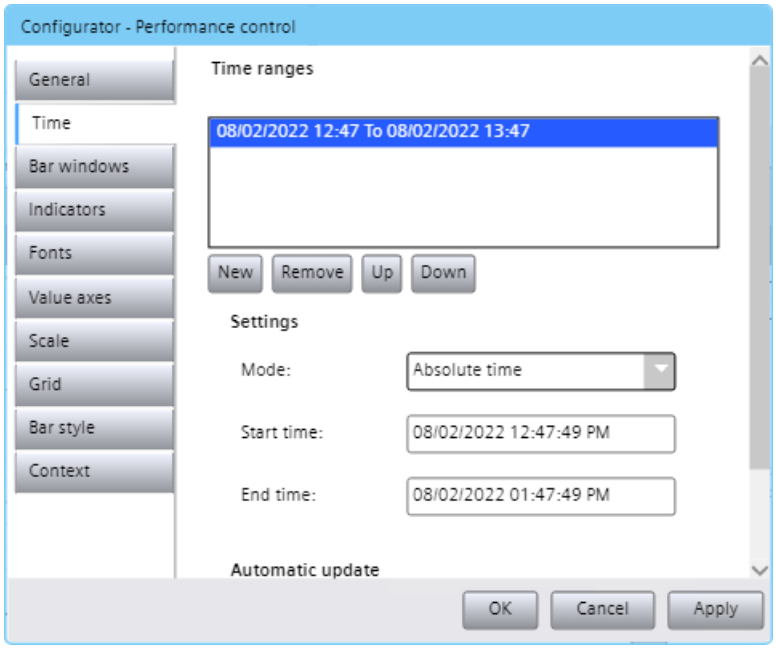
Configuring general settings



Property	Type	Description
Settings		
Fit bars to window	Boolean value	Specifies whether the height of the bar is scaled to the window size.
Design		

Property	Type	Description
Display chart	Boolean value	Specifies whether the chart is visible. • Default setting: True
Opacity	Number	Specifies the degree of transparency for the chart. • 1: Not transparent (default value) • 0.5: 50% transparent • 0: Completely transparent
Background color	Color	Specifies the background color in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.
Foreground color	Color	Specifies the foreground color. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.

Configuring the time



Property	Type	Description
Time ranges		Specifies the time ranges for the calculation. You have the option of defining multiple time ranges. The data for the time ranges defined here are displayed next to each other in the control. • "New": Creates a time range from the settings. Select a defined time range to change the settings for this range.
Settings		

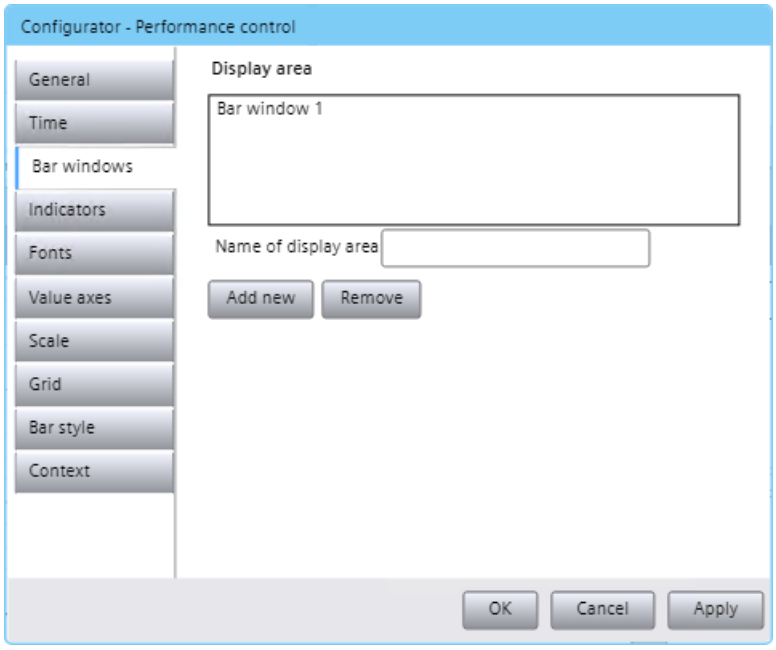
Property	Type	Description
Mode	Selection	Defines the mode for calculating the time: • Absolute time: You define a fixed start time and a fixed end time for a time range. • Relative time: You define a duration. The time range is displayed for the duration relative to the current time, e.g. last hour until now.
Start time	Number	Specifies the standard starting time for the calculation. Only available in "Absolute time" mode.
End time	Number	Specifies the standard end time for the calculation. Only available in "Absolute time" mode.
Relative time	Number	Specifies the period starting with the current time. Only available in "Relative time" mode.
Unit of measurement	Selection	Specifies the duration of the calculation in hours, days or weeks. If you select "Fiscal week", only the work days defined in the calendar settings are taken into account. You can find more information at Use time range of a calendar for evaluation (Page 110). Only available in "Relative time" mode.
Automatic update		
Refresh rate	Number	Specifies the refresh rate in minutes. Default value: 1 minute When you enter the value 0, the automatic update is disabled.

Note

If the user-defined time range is in the future, no results of the KPI calculation are displayed in the control.

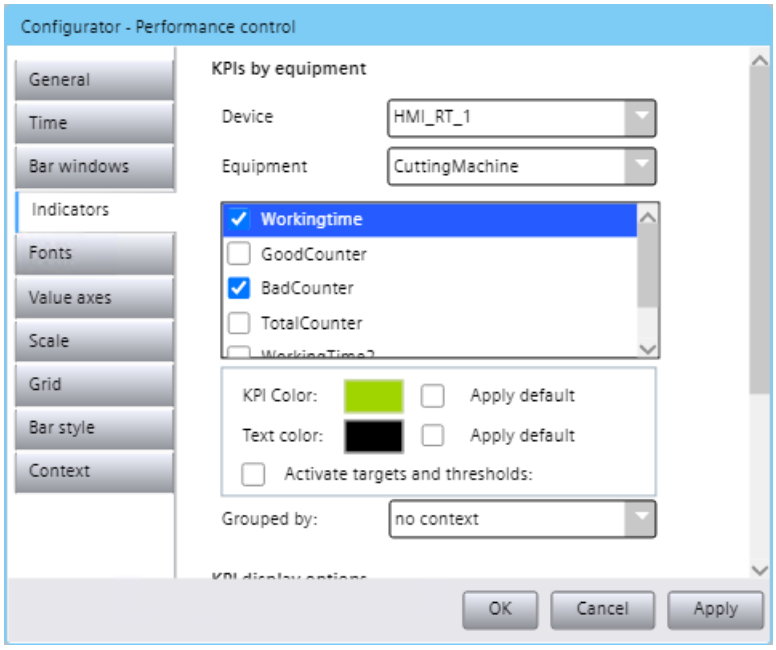
Configuring a bar window

With a user-defined bar window, you create an additional display area in the control. The display is split proportionally to the number of bar windows. The individual diagrams are shown one above the other.



Property	Type	Description
Display area		
	String	Shows the user-defined bar window.
Name of display area	String	Specifies a unique name for the bar window. • Add Create a new bar window. • Remove Remove a configured bar window.

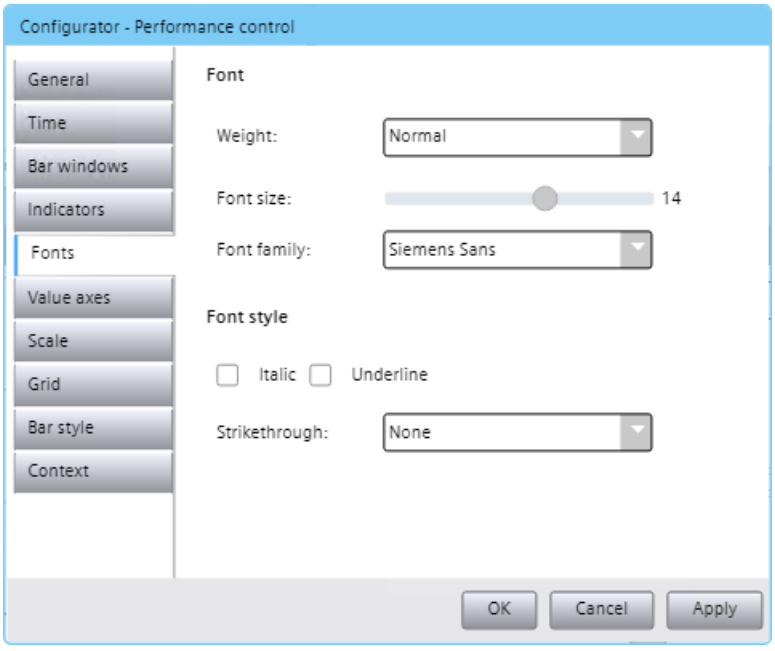
Configuring indicators



Property	Type	Description
KPIs by equipment		
Device	Selection	Specifies for which device the following selection of equipment and KPIs is displayed in the settings. Switching is only possible between devices for which collaboration is set up. You can find more information at Setting up Collaboration for Performance Insight controls (Page 100).
Equipment	Selection	Specifies which equipment and KPIs thereof are visualized in the control. • Select the KPI of the equipment you would like to visualize. • Select the display color and the text color for the corresponding KPI or activate the use of the standard color.
Grouped by	Selection	Specifies the context for the display.
KPI color: Apply default	Boolean value	Specifies whether the default color is used to display the KPI. The color can be set individually using the color icon.
Text color: Apply default	Boolean value	Specifies whether the default color is used to display the text. The color can be set individually using the color icon.
Activate targets and thresholds	Boolean value	Specifies whether the targets and thresholds are displayed in the control.
KPI display options		
Automatic decimal format	Boolean value	Specifies whether the decimal format is set automatically.
Decimal places	Number	Specifies the number of decimal places between 0 and 10. Default value: 2

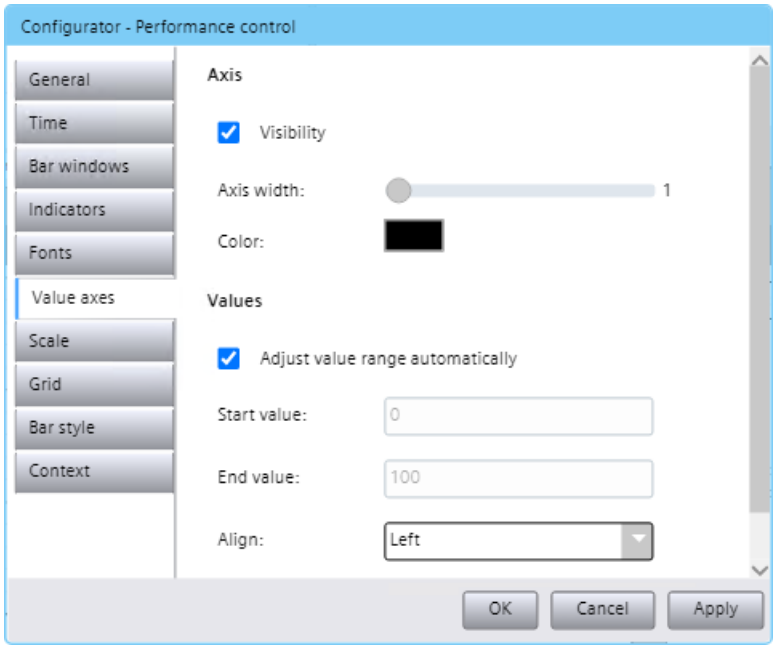
Property	Type	Description
Sorted by	Selection	Defines the order in which the KPIs are displayed.
Counter calculation without interpolation at boundaries	Boolean value	The calculation of a counter is based on the logged data in the specified time range. Only data that is completely within the specified time range is used to calculate the counter. If the option "Counter calculation without interpolation at boundaries" is disabled, the data at the start time and at the end time of the time range will be interpolated.

Configuring fonts



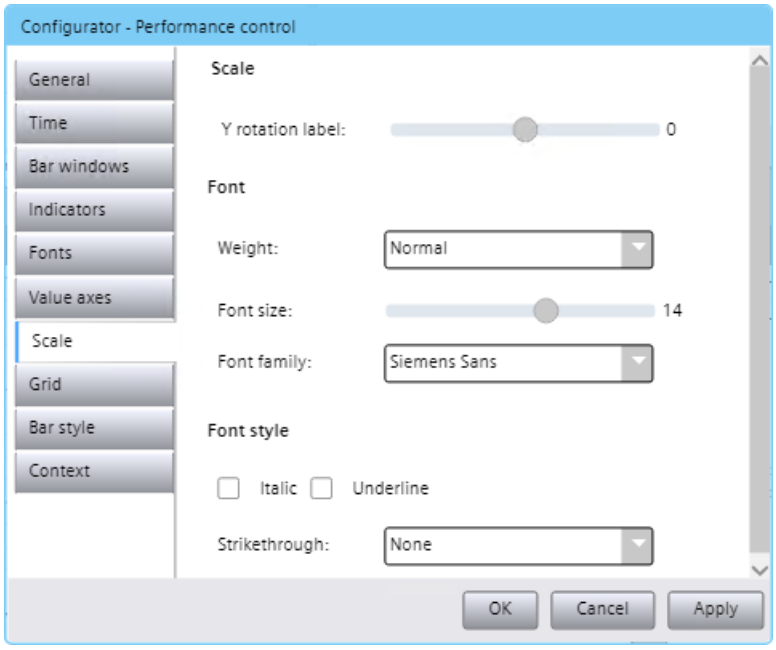
Property	Type	Description
Font		
Width	Selection	Specifies the font weight of the displayed texts.
Font size	Number	Slider, specifies the font size in the range between 5 pt and 20 pt.
Font family	Selection	Specifies the font family.
Font style		
Italic	Boolean value	Specifies whether the texts in the control are displayed in italics.
Underline	Boolean value	Specifies whether the texts in the control are displayed underlined.
Strikethrough	Selection	Specifies whether the texts in the control are displayed struck-out. The following values are available: • None: The texts are not displayed struck-out. • Single: The texts are displayed struck-out with one horizontal line.

Configuring value axes



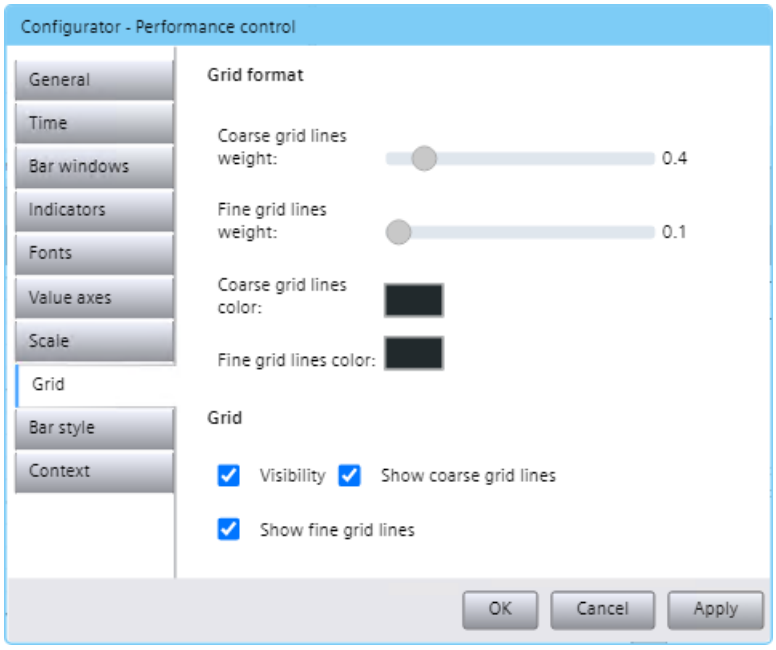
Property	Type	Description
Axis		
Visibility	Boolean value	Specifies whether the axes are displayed in the control.
Axis width	Number	Specifies the width of the axis. The permissible value range is between 1 and 10.
Color	Color	Specifies the axis color.
Values		
Automatically adapt value range	Boolean value	Specifies whether automatic scaling is activated.
Start value	Number	Specifies the minimum value for the axis. Only configurable when automatic scaling is disabled.
End value	Number	Specifies the maximum value for the axis. Only configurable when automatic scaling is disabled.
Align	Selection	Specifies the alignment of the axis: • Left • Right
Show labels	Boolean value	Specifies whether the labels of the value axes are displayed.

Configuring a scale



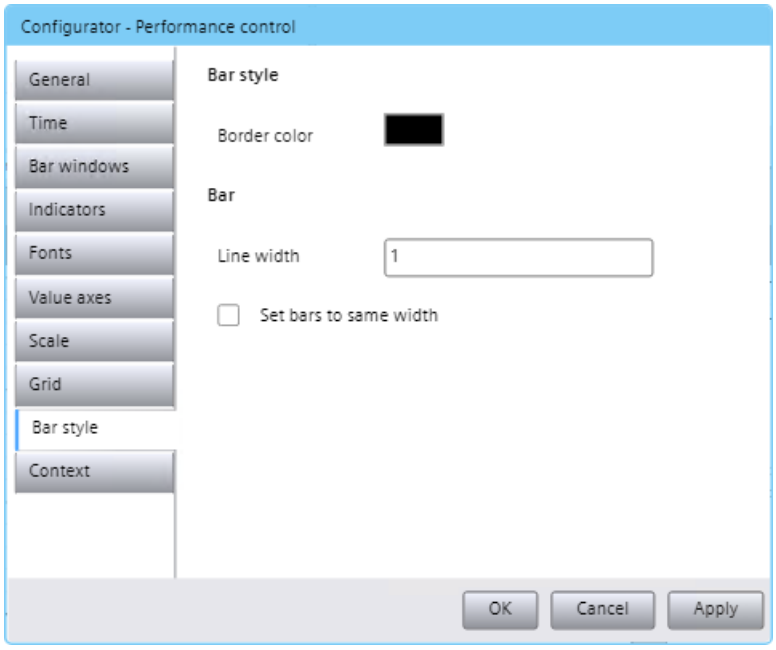
Property	Type	Description
Scale		
Y rotation label	Number	Specifies the rotation of the label on position Y. Default value: 0.
Font		
Width	Selection	Specifies the font weight of the displayed texts.
Font size	Number	Specifies the font size in the range between 5 and 20 pt.
Font family	Selection	Specifies the font family. • Arial (default) • Times New Roman • SimSun (required for Chinese) • Siemens Sans
Font style		
Italic	Boolean value	Specifies whether the label of the scale is displayed in italics in the control.
Underline	Boolean value	Specifies whether the label of the scale is displayed underlined in the control.
Strikethrough	Selection	Specifies whether the label of the scale is displayed struck-out in the control. The following values are available: • None: The text is not displayed struck-out. • Single: The text is displayed struck-out with one horizontal line.

Configuring the grid



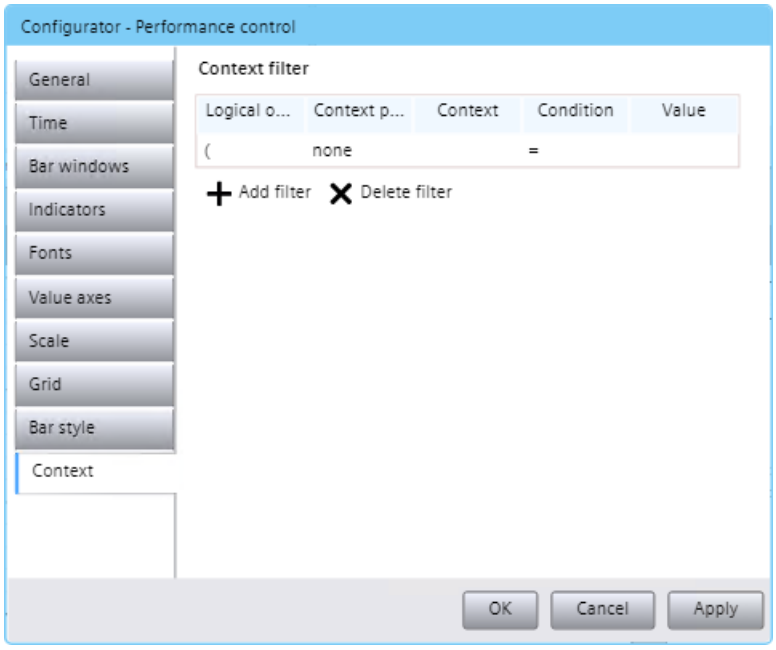
Property	Type	Description
Grid format		
Coarse grid lines weight	Number	Specifies the width of the coarse grid lines in the control. • Permitted value range: 0.1 ... 3 • Default setting: 0.4
Fine grid lines weight	Number	Specifies the width of the fine grid lines in the control. • Permitted value range: 0.1 ... 3 • Default setting: 0.1
Coarse grid lines color	Color	Specifies the color of the coarse grid lines in the control.
Fine grid lines color	Color	Specifies the color of the fine grid lines in the control.
Grid		
Visibility	Boolean value	Specifies whether the grid is displayed in the control.
Show coarse grid lines	Boolean value	Specifies whether coarse grid lines are displayed in the control.
Show fine grid lines	Boolean value	Specifies whether fine grid lines are displayed in the control.

Configuring a bar type



Property	Type	Description
Bar style		
Border color	Color	Specifies the border color of the bar.
Bar		
Line width	Number	Specifies the line width of the bar.
Set bars to same width	Boolean value	Specifies whether the width of the displayed bars is aligned.

Context configuration



Property	Type	Description
Context filter		
Logical operator	Selection	Specifies the logical operator for linking the filter rules: • (•) • AND • OR
Context provider	Selection	Specifies the tool on which the filter rule is based: • Calendar • User-defined
Context	Selection	Specifies the context: • ShiftID For the "Calendar" context provider
Condition	Selection	Specifies the condition for the filter rule: • = • < Only available for "Calendar" context provider • <= Only available for "Calendar" context provider • > Only available for "Calendar" context provider • >= Only available for "Calendar" context provider
Value	Number	Specifies the value for the condition.

Note

Context restrictions

Only numeric contexts are supported.

See also

Operating the Performance control (Page 148)

Configuring the performance control (Page 92)

9.9 Performance analyzer

9.9.1 Operating the Performance Analyzer

Use

The "Performance analyzer" control allows a comprehensive analysis according to different aspects.

In the Performance analyzer, you choose between four tabs:

- Trend graphic
  Graphic display of the indicators of equipment.
- Data table
  Data display and data correction of the indicators of equipment.
- Recalculation
  Listing of manually changed KPIs.
- Downtime analysis
  Graphical display of the logged machine states.

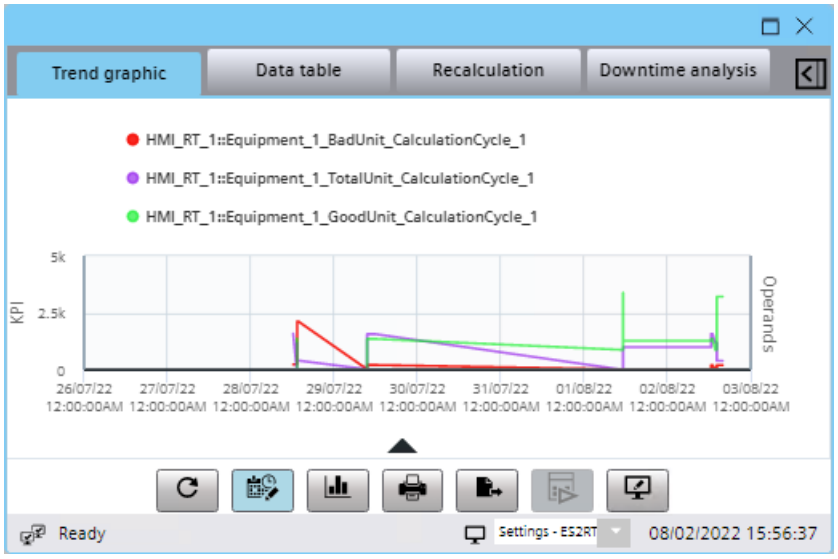
"Trend graphic" tab

Visualization is in the form of a function display. You can define the following elements for visualization using "Settings":

- Displayed time range
- Displayed indicators of the type
  - KPI
  - Counter
  - Numeric operand
- Displayed calculation cycles

You can find more information at Configuring Performance analyzer in runtime (Page 167).

When displaying KPIs using calculation cycles, targets and thresholds can be displayed. These values can depend dynamically on the KPI or be constant.



Note

When you hover the mouse cursor over the respective value, the following information is displayed as a tooltip:

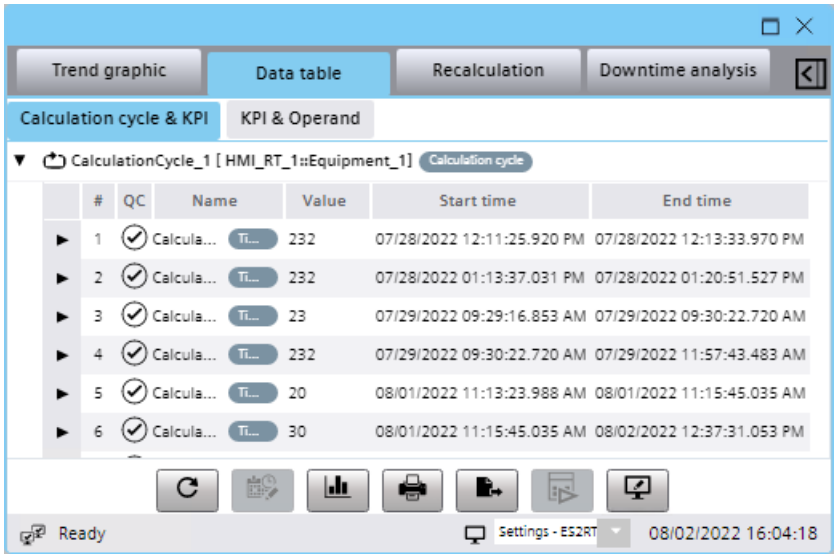
- Name of indicator and associated plant object
- Type of indicator
- Value of indicator
- Time stamp

"Data table" tab

You can use the data table to evaluate and correct logged data.

The data table contains the "Calculation cycle & KPI" and "KPI & operand" tabs.
The "Calculation cycle & KPI" tab shows the time windows of the calculation cycles and the KPIs to which they are assigned.
The "KPI & operand" tab shows the logged KPIs and corresponding operands.

You can find more information at Evaluating data (Page 173).



You have the following options for correcting the data via the "Entity editor" under "Settings":

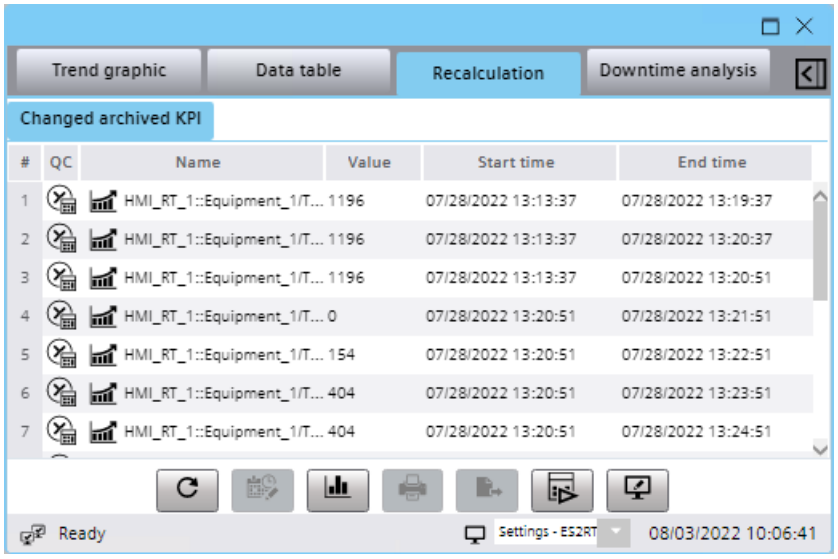
- Inserting missing operands (Page 186)
- Correcting operands (Page 182)
- Deleting logged operands (Page 188)
- Modifying logged machine states (Page 189)
- Modifying logged calculation cycles (Page 180)
- Pausing and restarting active calculation cycle (Page 181)

Note

When processing is currently being performed by another Performance Analyzer control, for example, processing is currently not possible. As soon as the processing is completed, you will be informed in the information bar. Once you have updated the view in the control, you can make your changes.

"Recalculation" tab

The "Recalculation" tab lists logged KPIs whose values were changed manually. You can use this tab to start or interrupt recalculations. You can find more information at Running recalculation immediately (Page 190).

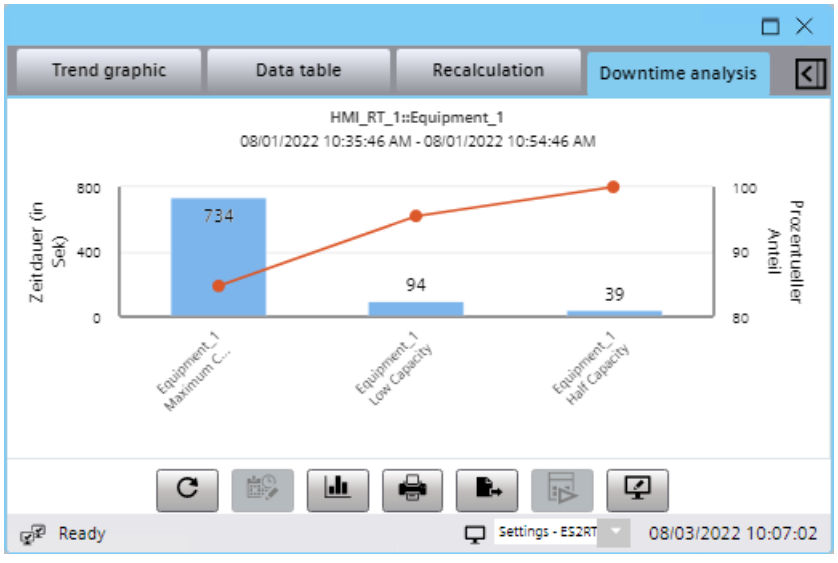


The status bar displays status messages of the recalculation.

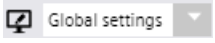
"Downtime analysis" tab

In the "Downtime analysis" tab, logged machine states, reasons and reason groups are displayed as a bar chart or Pareto diagram.

You can find more information at Inserting missing operands (Page 186).



Operator controls

	Button	Function
	Settings	Shows or hides the settings for the control.
	Calculation cycles display	Opens a display showing the calculation cycles and their length. Only available in the "Trend graphic" tab. Only available if at least one calculation cycle is configured as an indicator. You can find more information at Configuring Performance analyzer in runtime (Page 167).
	Data request to the server	Updates the data.
	Automatic data refresh	Refreshes the displayed data automatically in a configured cycle. Default value: 10 seconds
	Only show data	Hides the buttons of the toolbar. To display the buttons again, double-click in the display area of the control.
	Print	Prints the output.
	Export	Exports the output of the displayed data to a CSV file.
 	Recalculation / Stop recalculation	Recalculate relevant KPIs. Stops the recalculation. The button is only enabled in the "Recalculation" tab.
	User profile settings	Saves the current configuration globally so that the display is consistent for all users. To reset the configuration to the settings from the engineering system, select "RESET" in the dialog. Requirement: The user rights allow an operation.
	Switch configuration	Selection list for the configuration to switch between the global settings and the default settings that were defined in the engineering system. Requirement: The user rights allow an operation.

Styles

The "Performance analyzer" control supports the pre-defined styles of the HMI device.

You change the style of an HMI device in the engineering system in the runtime settings of the HMI device.

Alternatively, configure a script in the engineering system to change the style, for example, to a button, and change the style in runtime after downloading.

See also

Time categories and machine states (Page 35)

9.9.2 Configuring Performance analyzer in runtime

Introduction

You configure the graphic output of the entities and the displayed data of the data table in runtime in the control under "Settings" in the "Time" and "Indicators" tabs. The "Entity editor" tab is used to correct the data. You can find more information at Correcting incorrect data (Page 178).

To show the settings, click:

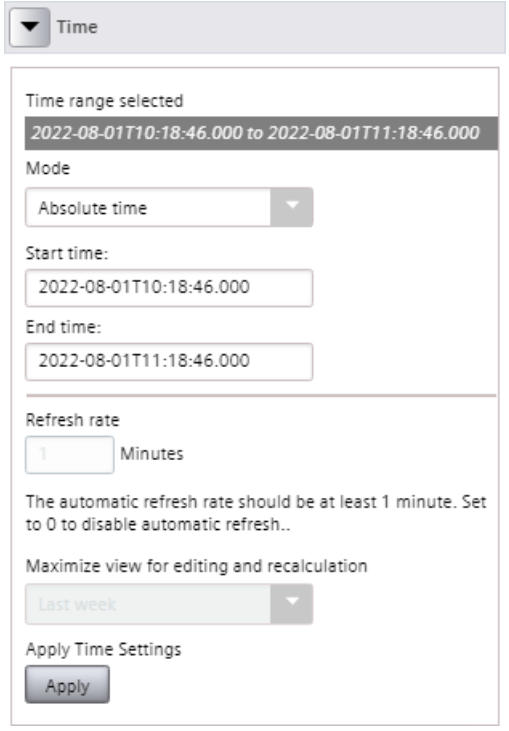
A message is output if you have selected a combination of settings that cannot be displayed. For example, the end time of the visualization cannot be before the start time.

General buttons

Cancel	Closes the configuration dialog without applying the changes.
Apply	Applies the changes. The configuration dialog remains open. The changes are immediately visualized.

Select time range

The selection of the time range is available in all tabs of the control. Select the time range whose data is to be displayed.



Property	Type	Description
Select time range		Displays the defined time range.
Mode	Selection	Defines the mode for calculating the time: • Absolute time: You define a fixed start time and a fixed end time for a time range. • Relative time: You define a duration. The time range is displayed for the duration relative to the current time, e.g. last hour until now.
Start time	Number	Specifies the standard starting time for the calculation. Only available in "Absolute time" mode.
End time	Number	Specifies the standard end time for the calculation. Only available in "Absolute time" mode.
Relative time	Number	Specifies the period starting with the current time. Only available in "Relative time" mode.
Unit of measurement	Selection	Specifies the duration of the calculation in hours, days or weeks. Only available in "Relative time" mode.
Refresh rate	Number	Specifies the refresh rate in minutes. Default value: 1 minute When you enter the value 0, the automatic update is disabled.
Maximize view for editing and recalculation	Selection	Maximizes the editing and recalculation view.

Note

If the user-defined time range is in the future, no results of the KPI calculation are displayed in the control.

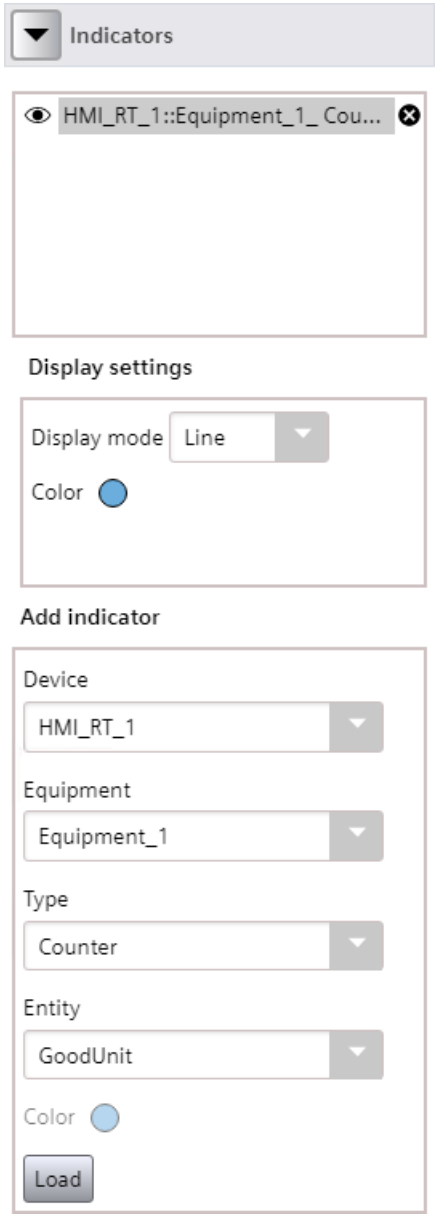
See also

Use time range of a calendar for evaluation (Page 110)

Setting up Collaboration for Performance Insight controls (Page 100)

9.9.2.1 Configuring a trend graphic and data table

Select the indicators that are to be displayed in the trend graphic and click on "Load". Calculation cycles, counters, KPIs and numeric operands are considered indicators.



Editing display settings

The upper area of the settings is used to edit already loaded indicators.

Select an indicator from the list of all loaded indicators to open the area.

Property	Type	Description
Indicators		List of all loaded indicators. The indicator can be deleted with the "x" character at the end of the indicator name. The indicator can be made visible or hidden with the "eye icon" in front of the indicator name.
Display settings		
Show limit value	Boolean value	Determines whether the limit is displayed. Only available if the selected indicator is a calculation cycle or KPI.
Show target	Boolean value	Determines whether the target value is displayed. Only available if the selected indicator is a calculation cycle or KPI.
Display mode	Selection	Defines the display mode of the indicator: • Line • Bar • Step
Color	Color selection	Specifies a color for the indicator that differs from the specified value.

Adding indicators

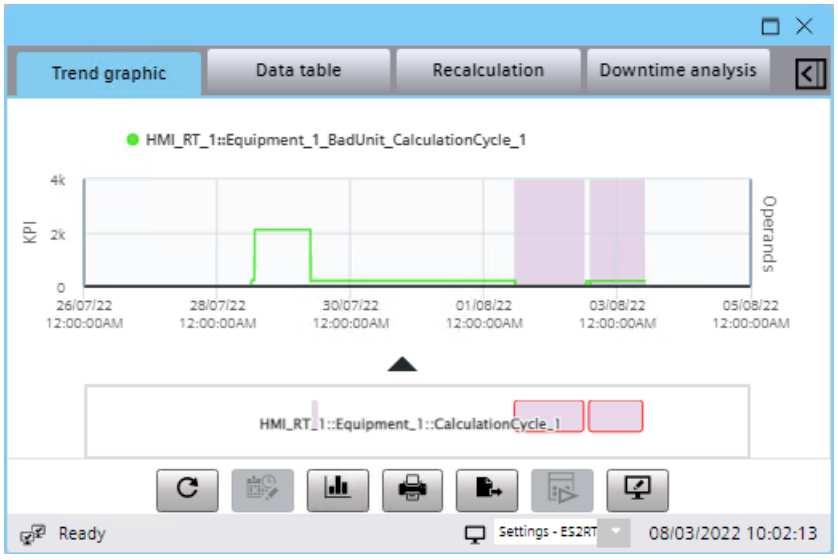
Add more indicators in the lower area of the settings.

Property	Type	Description
Add indicator		
Device	Selection	Sets the HMI device whose equipment is displayed for selection.
Equipment	Selection	Specifies the equipment (plant object) for which indicators are visualized. If you activate indicators of different plant objects, these are shown in the chart next to each other.
Type	Selection	Determines the type of indicator: • Calculation cycle • Counter • KPI calculation cycle • Numeric operand
Entity	Selection	Defines the calculation cycle, counter, KPI (including calculation cycle) or numeric operand whose values are displayed.
Color	Color selection	Specifies a color for the indicator that differs from the specified value.

Displaying calculation cycles

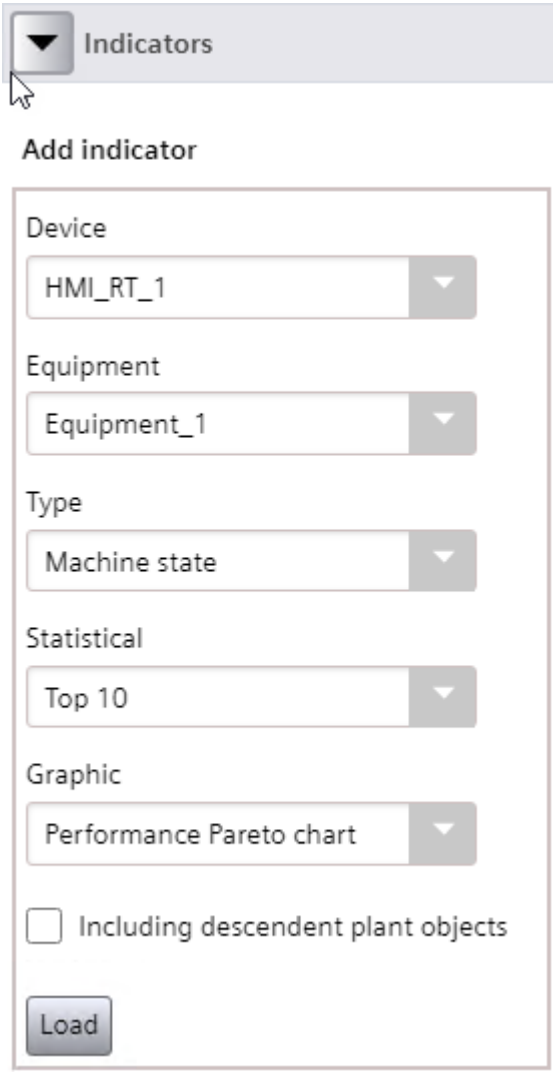
To show the calculation cycles in the trend graphic, click below the graph on:

This button is only available if at least one calculation cycle is selected for display in the settings of the Performance Analyzer. Select a calculation cycle to highlight the corresponding time range in the graph:


Trend graphic
Data table
Recalculation
Downtime analysis
HMI_RT_1::Equipment_1_BadUnit_CalculationCycle_1
KPI
4k
2k
0
Operands
26/07/22 12:00:00AM
28/07/22 12:00:00AM
30/07/22 12:00:00AM
01/08/22 12:00:00AM
03/08/22 12:00:00AM
05/08/22 12:00:00AM
HMI_RT_1::Equipment_1::CalculationCycle_1
Ready
Settings - ES2RT
08/03/2022 10:02:13

9.9.2.2 Configuring downtime analysis

In the "Downtime analysis" tab, select the indicators to be displayed for the downtime analysis and click "Load". Machine states, reason groups and reasons are considered indicators.



Adding indicators

Property	Type	Description
Indicators		List of all loaded indicators. The indicator can be deleted with the "x" character at the end of the indicator name. The indicator can be made visible or hidden with the "eye icon" in front of the indicator name.
Add indicator		
Device	Selection	Sets the HMI device whose equipment is displayed for selection.

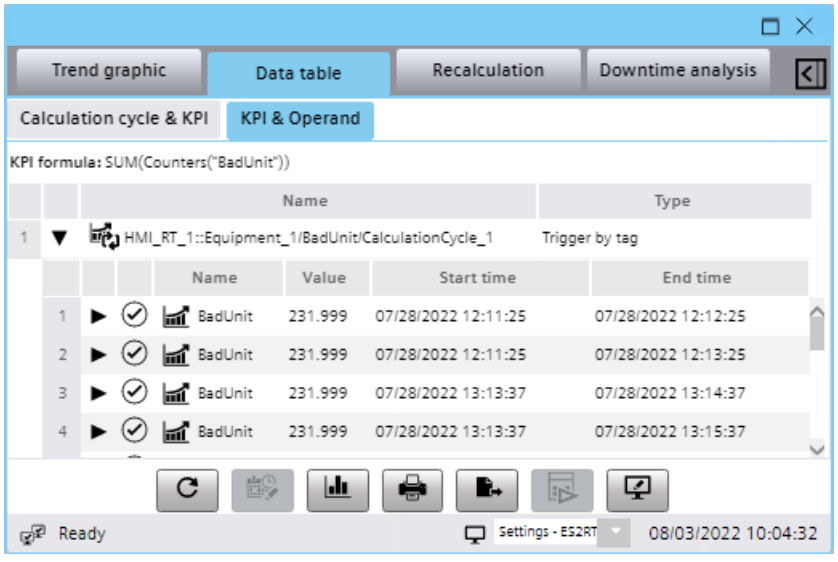
Property	Type	Description
Equipment	Selection	Specifies the equipment (plant object) for which indicators are visualized. If you activate indicators of different plant objects, these are shown in the chart next to each other.
Type	Selection	Determines the type of indicator: • Machine state • Reason • Reason group
Statistical	Selection	Defines how many of the most frequent machine states are displayed: • TOP 10 • TOP 5
Graphic	Selection	Defines how the machine states are displayed: • Performance Pareto chart • Bar chart
Including descendant plant objects	Boolean value	Defines whether descendant plant objects are included in the analysis.

9.9.3 Evaluating data

Introduction

Depending on your configuration, the data is displayed in the data table. You can use the tab to choose between the display sorted by calculation cycles & KPI or by KPI & operand.

You can find more information in the section Configuring Performance analyzer in runtime (Page 167).



The data table has several levels. The levels can be expanded and collapsed with the following icons.

Icon	Name	Description
▶	Expand	Expands a level.
▼	Collapse	Collapses a level.

Note

When you display the data table, the "Automatic update" function is deactivated.

Quality code

In addition to the elements, the quality code, if available, is displayed as follows:

Icon	Quality code
	192, Good (Cascade)
	960, Good Cascade And Corrected Value 9152, Good Cascade And Corrected Value And Source Time Bit Flag Set
	8896, Good Cascade And Manuel Input And Source Time Bit Flag Set
	Uncertain
	Bad
	768, Bad And Unusable Value

9.9.3.1 Evaluating data by calculation cycles and KPI

Layer 1 – Calculation cycle

The calculation cycles are displayed on layer 1 with the following properties:

Property	Description
Icon	
Name	The name is derived from the configuration: "<name of calculation cycle> [<name of HMI device>::<name of plant object>]".

Layer 2 - Time slice

Layer 2 displays the time periods with the following properties:

Property	Description
No.	Row index
Quality code	Quality code of the associated calculation cycle
Name	Name of the logged calculation cycle
Value	Value
Start time	Start time of the calculation cycle
End time	End time of the calculation cycle

Layer 3 – KPI

On layer 3, the KPIs are displayed with the following properties:

Property	Description
No.	Row index
Quality code	Quality code of the associated tag
Name	Name of the KPI
Value	Input value of the operand
Start time	The time stamp of the KPI starting with the value. (Raw data time stamp of the assigned tag.)
End time	The time stamp of the KPI that ends with the value. (The assigned tag has a new value.)

The KPIs are sorted alphabetically by name. If multiple KPIs have the same name, they are sorted by their start time.

9.9.3.2 Evaluating data by KPI and operand

The KPI formula relevant for the selected entry is displayed above the data table.

Layer 1 - Setup and KPIs with calculation cycle

The equipment with or without calculation cycle is displayed on level 1 with the following properties:

Equipment

Property	Description
No.	Row index
Icon	
Name	The name is derived from the configuration: "<Name of HMI device>::<Name of plant object>"
Type	Empty

KPIs with calculation cycle

Property	Description
No.	Row index
Icon	
Name	The name is derived from the configuration: "<Name of the HMI device>::<Name of the plant object>/<Name of the KPI>/<Name of the calculation cycle>".
Type	Trigger type of the calculation cycle: • Tag • Context

The associated KPI formula is displayed below the "Data table" tab.

Layer 2 - KPI (only for KPIs with calculation cycle)

On level 2, the KPIs are displayed with the following properties:

Property	Description
No.	Row index
Quality code	Quality code of the calculated KPI
Icon	
Name	Name of the logged KPI
Value	Calculated result of the KPI
Start time	Start time of the calculated KPI (default setting: hidden)
End time	End time of the calculated KPI

Level 3 - Grouping

A grouping of the following elements is displayed on level 3:

- Incremental counters
- Incremental counters with limits
- Manual counters
- Numerical operands
- Machine states

Level 4 - Numeric operand, counters, machine state

Numeric operand

On level 4, the "Numeric operands" of the KPIs are displayed with the following properties:

Property	Description
No.	Row index
Quality code	Quality code of the associated tag
Icon	

Property	Description
Name	Name of the operand
Value	Input value of the operand
Start time	The time stamp of the numeric operand that starts with the value. (Raw data time stamp of the assigned tag.)
End time	The time stamp of the operand that ends with the value. (The assigned tag has a new value.)

The operands are sorted alphabetically by their name. If multiple operands have the same name, the operands are sorted according to their start time.

Counter

The "Counter" operands of the KPIs with the following properties are displayed on the level:

Property	Description
No.	Row index
Quality code	Quality code of the associated tag
Icon	
Name	Name of the operand
Value	Input value of the operand
Delta value	The calculated value of the calculation. (Only available for incremental counters and incremental counters with limits.)
Start time	Relevant start time of the operand
End time	Relevant end time of the operand

The operands are sorted alphabetically by their name. If multiple operands have the same name, the operands are sorted according to their start time.

Machine state

The machine states of the KPIs with the following properties are displayed on this level:

Property	Description
No.	Row index
Quality code	Quality code of the associated tag
Icon	
Name	Name of the machine state
Type	Data type of the machine state: • Bit-based • Value-based
Value	Duration of the machine state in seconds
Start time	Start time of the machine state
End time	End time of the machine state

In the table, all machine states of a plant object that are within the selected time range of the logged KPI are displayed. When a machine state is busy the end time is displayed as empty.

The machine states are automatically sorted according to the start time.

9.9.4 Correcting incorrect data

You have the following options to correct errors in the database:

- Insert missing operands
- Change logged operands
- Delete logged operands
- Change logged machine states
- Insert missing calculation cycles
- Change logged calculation cycles
- Delete logged calculation cycles
- Stop and restart active calculation cycle

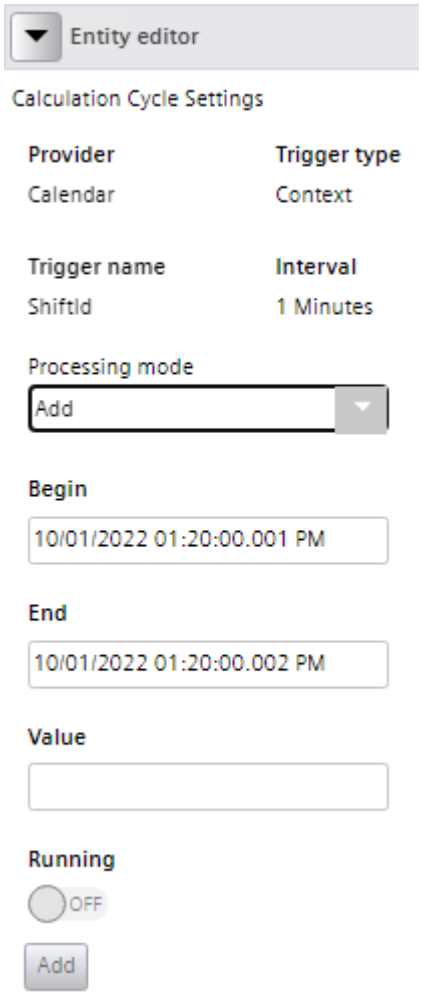
The associated KPIs are selected as incorrect and can then be recalculated.

9.9.4.1 Correcting calculation cycles

Entity editor in the "Calculation cycle & KPI" tab

Use the entity editor to make corrections to the logged calculation cycles. You can insert missing calculation cycles, correct the start and end time, and delete calculation cycles.

Running calculation cycles are not considered logged and cannot be modified. However, there is an option to stop and restart them.



Property	Type	Description
Provider	String	Specifies who released the trigger, e.g. calendar. Only available for calculation cycles of the type "Context".
Trigger type	String	Specifies the type of trigger for the selected calculation cycle.
Trigger name	String	Specifies the name of the trigger for the selected calculation cycle.
Value	Number	Specifies the value of the KPI. Not available in the editing mode "Paste".
Interval	Number	Specifies the interval of the calculation cycle.
Editing mode	Selection	Specifies the editing mode. • Modify time slice • Delete • Paste
Start	Date selection	Specifies the start time of the calculation cycle. Not editable if the editing mode "Delete" is selected.
End	Date selection	Specifies the end time of the calculation cycle. Not editable if the editing mode "Delete" is selected.

Property	Type	Description
Value	Number	Specifies the value of the KPI. Only available in the editing mode "Paste".
Running	Switch	Specifies whether the calculation cycle is active or has been paused. Only editable if the calculation cycle is not yet finished.

Inserting missing calculation cycles

Procedure

1. Select a logged calculation cycle in the data table.
2. Expand the "Entity editor".
3. Select the editing mode "Paste".
4. Enter the values for the time range of the calculation cycle under "Start" and "End".
   The calculation cycle must not overlap with other calculation cycles.
5. Enter the value of the KPI under "Value".
6. Click "Paste".

Result

The calculation cycle has been inserted. The quality code is automatically set to "8896, Good Cascade And Manuel Input And Source Time Bit Flag Set".

To update the KPI, perform a recalculation of the KPI.

Modifying logged calculation cycles

Procedure

1. Select a logged calculation cycle in the data table.
2. Expand the "Entity editor".
3. Select the editing mode: "Modify time slice".
4. Enter new values under "Start" and "End:".
   The calculation cycle must not overlap with other calculation cycles.
5. Click "Change".

Result

The calculation cycle has been changed.

To update the KPI, perform a recalculation of the KPI.

Deleting logged calculation cycles

Procedure

1. Select the desired calculation cycle.
2. Expand the Entity editor.
3. Select the editing mode "Delete".
4. Click "Delete".

Result

The calculation cycle has been deleted from the data table.

To update the KPI, perform a recalculation of the KPI.

Pausing and restarting active calculation cycle

Introduction

You have the option of interrupting calculation cycles and restarting them manually.

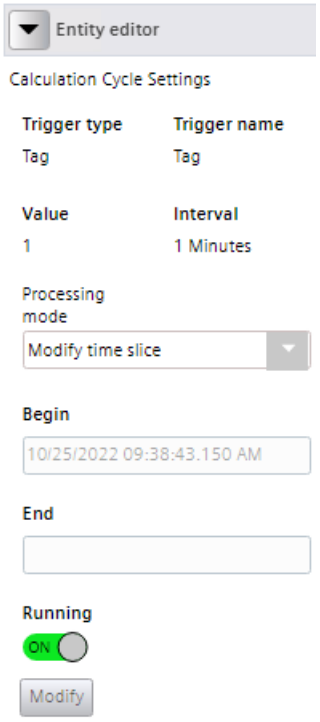
The "Entity editor" is available for this in the "Data table" tab.

The following properties are displayed in the Entity editor:

Property	Description
Trigger type	Type of trigger for the selected calculation cycle
Trigger name	Name of the trigger for the selected calculation cycle
Value	Value of the KPI
Interval	Interval of the selected calculation cycle
Start time	Start time of the selected calculation cycle
End time	End time of the selected calculation cycle
Running	Specifies whether the calculation cycle is active or has been paused

Procedure

1. Select the active calculation cycle in the data table.
2. Expand the "Entity editor".



3. Click on the green "Running" button.
   The calculation cycle is suspended. The button turns gray and shows "OFF".
4. Click the button again to restart the calculation cycle.
   The calculation cycle is restarted. The button turns green and shows "ON".

Result

The calculation of the KPI is suspended for the duration of the calculation cycle interrupt. The value of the KPI remains constant during this time.

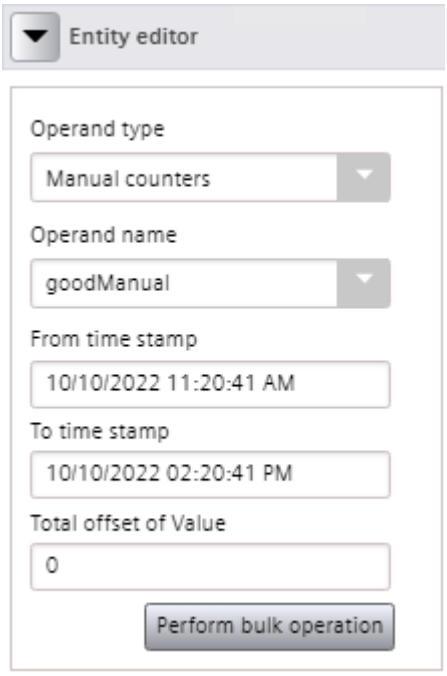
9.9.4.2 Correcting operands

Entity editor in the KPI & operand tab

You make corrections to the logged operands in the Entity editor. You have the option to insert missing operands, to change and to delete logged operands.

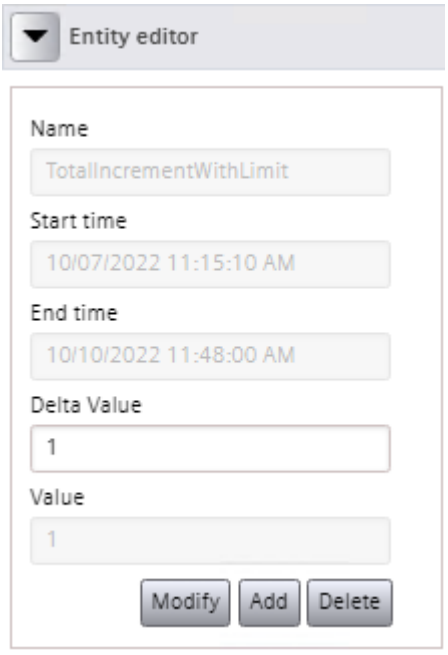
The display depends on the selected data type.

Equipment



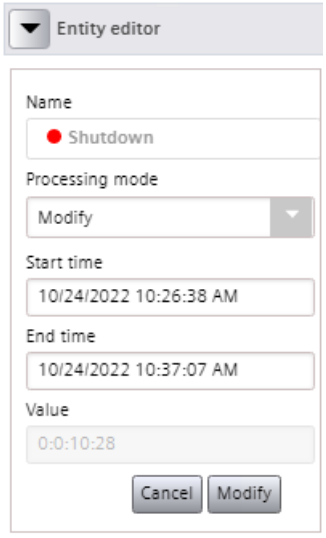
Property	Type	Description
Operand type	Selection	Specifies the type of the operand that is to be changed. • Manual counter • Incremental counter • Incremental counter with limits
Operand name	Selection	Specifies the name of the operand that is to be changed.
From time stamp	Time selection	Specifies the start time of the time range whose values are to be changed.
To time stamp	Time selection	Specifies the end time of the time range whose values are to be changed.
Total offset of delta value	Input	The entered value is distributed over the number of operands that are in the specified time period. Example: There are 10 operands in the entered time range. You enter the value 10. As a result, the "value" or "delta value" increases by 1 for each of these operands.

KPI



Property	Type	Description
Name	String	Specifies the name of the selected KPI.
Start time	String	Specifies the start time of the selected KPI.
End time	Time selection	Specifies the end time of the KPI. Only editable in "Paste" mode.
Delta value	Number	Specifies the delta value at which the KPI is to be changed. Only available for operands of the type "Incremental counters" or "Incremental counters with Limits".
Value	Number	Specifies the value of the KPI.
Quality code	Number	Specifies the quality code of the KPI. Only effective in "Paste" mode.

Machine state



Property	Type	Description
Name	String	Specifies the name of the selected machine state.
Editing mode	Selection	• Change Changes the start and end time of the machine state. • Change machine state Specifies a different machine state. • Split Splits the machine states into two machine states. • Merge with previous machine state The selected machine state is merged with the previous machine state. • Merge with next machine state The selected machine state is merged with the next machine state.
Change machine state	Selection	Specifies the new machine state. Only available in the editing mode "Change machine state".
Start time	Time selection	Specifies the start time of the selected machine state.
End time	Time selection	Specifies the end time of the selected machine state.
Value	Number	Specifies the duration of the machine state in seconds.
Merged machine state	Selection	Specifies the machine state that the merged machine state will have. Only available in "Merge with previous machine state" and "Merge with next machine state" mode.
Split machine state 1	Selection	Specifies the machine state for the first section. Only available in "Split" mode.
Split machine state 2	Selection	Specifies the machine state for the second section. Only available in "Split" mode.
Split at	Time selection	Specifies the point in time at which the machine state is split. Only available in "Split" mode.

Inserting missing operands

Procedure

1. Select the desired operand.
2. Expand the Entity editor.
3. Click "Paste".
4. If necessary, change the end time.
5. If available, select Paste mode.
6. Enter the corrected value under "Value" or "Delta value".
7. Click "Apply".

Result

The operand is inserted behind the previously selected operand in the data table. The quality code is automatically changed to "8896, Good Cascade And Manuel Input And Source Time Bit Flag Set".

If a delta value has been inserted, the "Value" column is empty.

If a value was inserted, the "Delta value" column of the inserted operand and its successor is automatically calculated for operands of the type "Incremental counter" or "Incremental counter with limits".

To update the KPI, perform a recalculation of the KPI.

Note

Overlapping of the start time or the end time

If the start time or end time overlap with another operand, the time is automatically corrected by the system. The quality code is automatically changed to "9152, Good Cascade And Corrected Value And Source Time Bit Flag Set".

In the associated KPI, the quality code is automatically changed to "768, Bad And Unusable Value". Then carry out a recalculation of the KPI.

Modifying logged operands

Introduction

You have the following options to correct the values of the operands in the data table in the Entity editor:

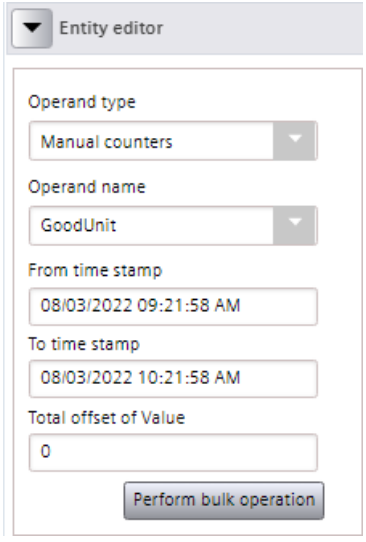
- Bulk operation
  The value of several operands is changed. This option is only available for operands of the type "manual counter", "incremental counter" and "incremental counter with limits".
- Simple change
  The value of a single operand is changed. This option is available for all operands.

Depending on the selected element in the data table, you can make a mass change or a simple change:

Data table	Level	Selected element	Possible change
KPI & Operand	Level 1	Equipment or KPI with calculation cycle	Bulk operation
KPI & Operand	Layer 2 (only for KPIs with calculation cycle)	Logged KPI	Bulk operation
KPI & Operand	Level 4	Manual counters / Incremental counters / Incremental counters with limits	Simple change

Performing a mass change

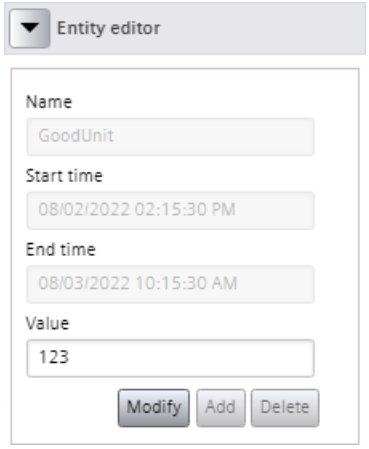
1. Select an equipment unit or a logged KPI in the "KPI & Operand" data table.
2. Expand the "Entity editor".



3. Select the corresponding operand type under "Operand type".
4. Select the operand name and the time.
5. Enter the desired value under "Total offset of Value".
6. Click "Perform mass change".

Performing a single change

1. Select the incorrect logged operand in the data table "KPI & Operand".
2. Expand the "Entity editor".



3. Enter a new value under "Value."
4. Click "Change".

Result

The value of the operand(s) is changed. The quality code is automatically changed to "960, Good Cascade And Corrected Value".

To update the KPI, perform a recalculation of the KPI.

Deleting logged operands

Procedure

1. Select the desired operand.
2. Expand the Entity editor.
3. Click "Delete".

Result

The operand has been deleted from the data table. The start time or end time of the following or preceding operand is adjusted by the system so that there is no gap. The quality code is automatically changed to "9152, Good Cascade And Corrected Value And Source Time Bit Flag Set".

In the associated KPI, the quality code is automatically changed to "768, Bad And Unusable Value". To update the KPI, perform a recalculation of the KPI (Page 190).

Modifying logged machine states

Introduction

You can change, split or merge machine states.

Changing the time window of the machine state

1. Select the desired machine state.
2. Expand the Entity editor.
3. In "Editing mode", select the entry "Change".
4. Under "Start time", change the start time of the machine state.
5. Under "End time", change the end time of the machine state.
6. Click "Change".

Change machine state

1. Select the desired machine state.
2. Expand the Entity editor.
3. Under "Editing mode", select the entry "Change machine state".
4. Select the new state under "Change machine state".
5. Click "Modify state".

Split machine state

1. Select the desired machine state.
2. Expand the Entity editor.
3. Under "Editing mode", select the entry "Split".
4. Select the first new machine state under "Split machine state 1".
5. Select the second new machine state under "Split machine state 2".
6. Under "Split at" select the point in time at which the machine state is to be split.
7. Click "Split".

Merge machine state

1. Select the desired machine state.
2. Expand the Entity editor.
3. Under "Editing mode" select the entry "Merge with previous machine state" or "Merge with next machine state".

4. Select the machine state for the merged machine state under "Merged machine state".
5. Click "Merge".

Result

The changed machine states are visible in the data table. The quality code is automatically changed to "960, Good Cascade And Corrected Value".

In the associated KPI, the quality code is automatically changed to "768, Bad And Unusable Value". To update the KPI, perform a recalculation of the KPI (Page 190).

Note

Undefined machine state

When changing a machine state creates a gap between two machine states, this is displayed as "undefined machine state" in the data table. This machine state can be merged with another machine state.

9.9.4.3 Recalculating logged KPIs

Entity editor in the Recalculation tab

Use the Entity editor to plan the recalculation of KPIs over a specific time period in the future.

You can deactivate or activate, delete or change planned recalculations.

Property	Type	Description
Name	String	Specifies the display name for the planned recalculation.
Start time	Time selection	Specifies the start time of the planned recalculation.
End time	Time selection	Specifies the end time of the planned recalculation.

Running recalculation immediately

Introduction

After making changes on the database, the quality code of the associated KPI is displayed with the value "768, Bad And Unusable Value". To correct this error in the system, recalculate the KPIs.

Note

Maximum time window

The "Performance analyzer" control supports recalculations for a maximum of the last 7 days.

Note

Counter calculation without interpolation at boundaries

A counter is calculated using the data in the specified time range. At the start and end time of this time range, the data is not interpolated.

Note

When you change KPI-relevant data in engineering and load it into runtime, you cannot recalculate the affected logged KPIs in the data table.

Procedure

1. Open the "Recalculation" tab.
2. (Optional) To recalculate a single time slice, select the appropriate entry.
3. Click "Start recalculation".

The "Recalculation" button changes to "Stop recalculation". You can stop the recalculation at any time by clicking the "Stop recalculation" button. This does not reset calculations that have already been carried out.
The currently recalculated KPIs are displayed in the information bar.
When all KPIs have been recalculated, the "Stop recalculation" button changes to "Recalculation".

Note

No additional recalculations and corrections while the recalculation is running

It is not possible to start another recalculation while a recalculation is running.

Corrections to operands and machine states are not possible while a recalculation is running.

Result

The KPIs are recalculated based on the changed data. The quality code of the new data is "960, Good Cascade And Corrected Value" for data whose calculation cycle has been corrected, or otherwise "192, Good (Cascade)".

Planning recalculation

Introduction

After making changes on the database, the quality code of the associated KPI is displayed with the value "768, Bad And Unusable Value". To correct this error in the system, recalculate the KPIs.

Note

Maximum time window

The "Performance analyzer" control supports recalculations for a maximum of the last 7 days.

Note

Counter calculation without interpolation at boundaries

A counter is calculated using the data in the specified time range. At the start and end time of this time range, the data is not interpolated.

Note

When you change KPI-relevant data in engineering and load it into runtime, you cannot recalculate the affected logged KPIs in the data table.

Add recalculation

1. Open the "Recalculation" tab.
2. Open the Entity editor.
3. Click on the button "+".

4. Give the planned recalculation a name and set the start and end time.
   The start time must be greater than the current system time.
5. Click "Apply".
   The recalculation is started automatically when the set time window is terminated.

Editing a planned recalculation

1. Open the "Recalculation" tab.
2. Open the Entity editor.
3. Click the "..." button next to the planned recalculation.

4. Select "Change".
5. Change the properties of the recalculation and click "Apply".
   The changes are applied.

Note

No additional recalculations and corrections while the recalculation is running

It is not possible to start another recalculation while a recalculation is running.

Corrections to operands and machine states are not possible while a recalculation is running.

Deleting a planned recalculation

1. Open the "Recalculation" tab.
2. Open the Entity editor.
3. Click the "..." button next to the planned recalculation.
4. Select "Delete".
   The planned recalculation is deleted.

Result

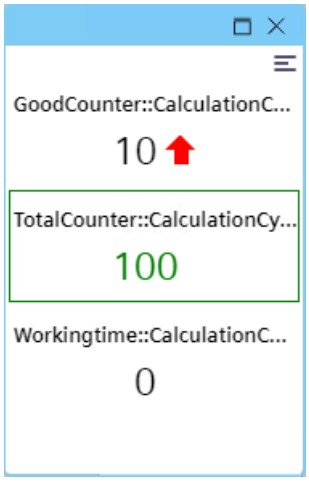
The KPIs are recalculated over the set time window based on the changed data. The quality code of the new data is "960, Good Cascade And Corrected Value" for data whose calculation cycle has been corrected, or otherwise "192, Good (Cascade)".
To suspend a calculation script, select "Deactivate" in the menu of the planned recalculation. You can enable the calculation script again afterwards.

9.10 Dashboard element

9.10.1 Operating a dashboard element

Use

The "Dashboard element" control shows the current value of KPIs.

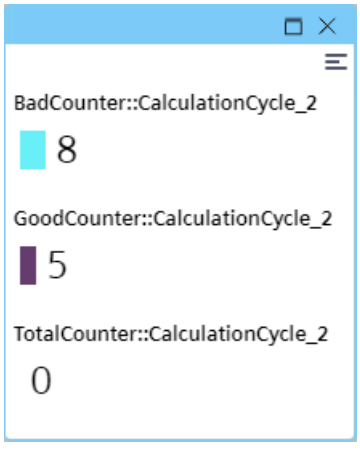


The color of the bars is taken from the configured color of the respective KPI. The default values are used when no color is configured.

Display modes

The dashboard element can be displayed in two modes:

- Value
- Bar



The text color of the KPI value is changeable:

- KPI value is greater than target value: Green
- KPI value less than target value and greater than low limit 1: Black
- KPI value less than low limit 1 and greater than low limit 2: Orange
- KPI value less than low limit 2: Red

Operator controls

Button	Name	Function
☰	Menu	Opens the menu of the control: • Open settings (Page 195) • Save current configuration globally • Restoring a default configuration Requirement: The configuration of the control allows operator control.

Styles

The "Dashboard element" control supports the pre-defined styles of the HMI device.

You change the style of an HMI device in the engineering system in the runtime settings of the HMI device.

Alternatively, configure a script in the engineering system to change the style, for example, to a button, and change the style in runtime after downloading.

9.10.2 Configuring a dashboard element in runtime

Introduction

You configure the graphic output of the KPIs in runtime in the configuration dialog of the control.

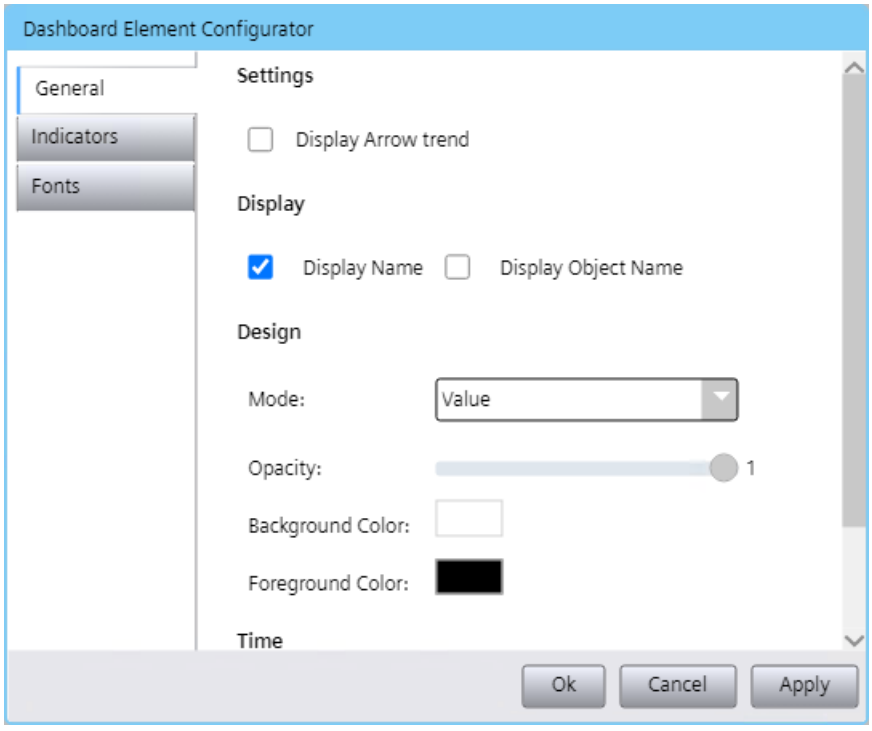
To open the configuration dialog, click ☰ and select "Settings".

A message is output if you have selected a combination of settings that cannot be displayed. For example, the end time of the visualization cannot be before the start time.

General buttons

OK	Applies the settings and closes the configuration dialog.
Cancel	Closes the configuration dialog without applying the changes.
Apply	Applies the changes. The configuration dialog remains open. The changes are immediately visualized.

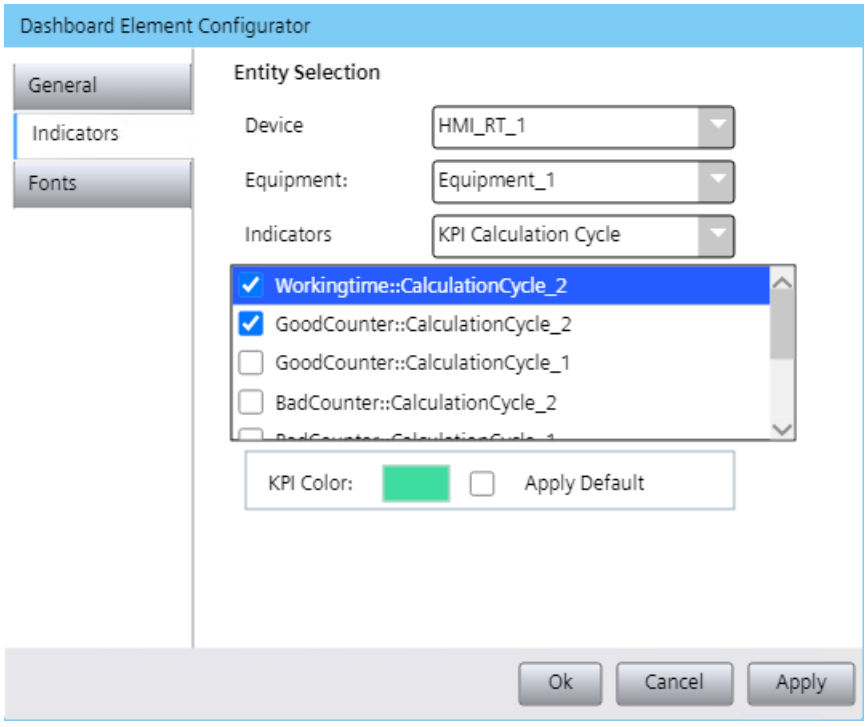
Configuring general settings



Property	Type	Description
Settings		
Show trend arrow	Boolean value	Specifies whether an arrow is displayed indicating whether the value of the KPI has increased: • Default setting: False The arrow is green if the KPI value is greater than the low limits and red if it is less.
Display		
Show names	Boolean value	Activates the display of the name of the KPI.
Show object names	Boolean value	Activates the display of the full object name of the KPI in the following format: <Device>/<Equipment>/<KPI name>
Design		
Mode	Selection	Specifies the display mode. • Value • Bar
Opacity	Number	Specifies the degree of transparency for the control. • 1: Not transparent (default value) • 0.5: 50% transparent • 0: Completely transparent
Background color	Color	Specifies the background color of the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.

Property	Type	Description
Foreground color	Color	Specifies the foreground color, for example, the font color for values in the control. Select the appropriate color in the color dialog or enter the hexadecimal code of the color.
Time		
Refresh rate (minutes)	Number	Specifies the refresh rate of the KPIs.

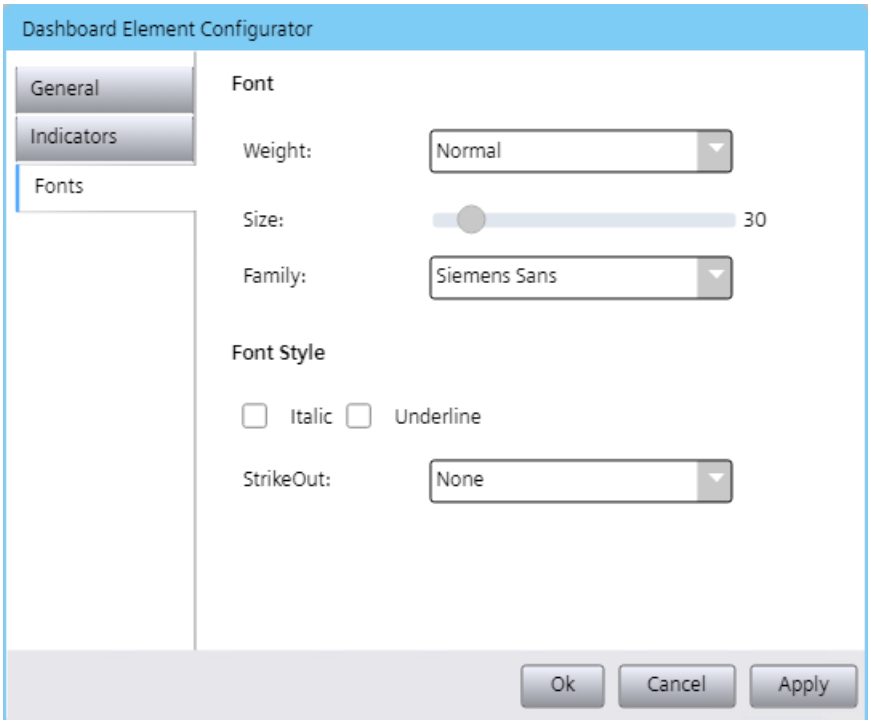
Configuring indicators



Property	Type	Description
Equipment selection		
Device	Selection	Specifies for which device the following selection of equipment and KPIs is displayed in the settings. Switching is only possible between devices for which collaboration is set up. You can find more information at Setting up Collaboration for Performance Insight controls (Page 100).
Equipment	Selection	Specifies which equipment and KPIs thereof are visualized in the control. • Select the KPIs of the equipment you want to visualize. • Select the display color and the text color for the corresponding KPI or activate the use of the standard color.

Property	Type	Description
Indicators	Selection	Specifies the type of KPIs displayed for the selection. • KPI calculation cycle • Counter • Numeric operand • Machine state
KPI color	Color selection	Specifies the color for the display of the KPI.
KPI color: Apply default	Boolean value	Specifies whether the default color is used to display the KPI. The color can be set individually using the color icon.

Configuring fonts



Property	Type	Description
Font		
Width	Selection	Specifies the font weight of the displayed texts.
Font size	Number	Slider, specifies the font size in the range between 5 pt and 20 pt.
Font family	Selection	Specifies the font family.
Font style		
Italic	Boolean value	Specifies whether the texts in the control are displayed in italics.
Underline	Boolean value	Specifies whether the texts in the control are displayed underlined.
Strikethrough	Selection	Specifies whether the texts in the control are displayed struck-out. The following values are available: • None: The texts are not displayed struck-out. • Single: The texts are displayed struck-out with one horizontal line.

Examples 10

10.1 Frequently used KPIs, microstops and scripts

Here you will find examples of calculating the KPIs that are used frequently in various plants.

Although KPIs are defined and calculated for a specific plant, there are standard KPIs that are frequently used in various plants.

An example shows how you use microstops to calculate KPI. In the last example, scripts are used to design controls.

You can find the following examples:

- How long has the machine been in a certain state? (Page 199)
- How is the quality of the production during a specific period? (Page 200)
- How was the availability of a machine? (Page 200)
- How often did unplanned standstills occur with my machine? (Page 201)
- How can I calculate the overall equipment effectiveness (OEE) of my machine for a specific period? (Page 202)
- How can I use microstops? (Page 202)
- How can I use scripts in Performance Insight? (Page 206)

See also

Configure global KPIs (Page 42)

10.2 How long has the machine been in a certain state?

Introduction

You have the option of using a KPI to calculate the time for which a machine was in a specific state, e.g. working.

Requirement

- The machine state "State_1" is created.
- The "InWork" KPI has been created.

Procedure

Enter the following KPI formula in the "KPI formula" editor and adapt the name of the machine state if necessary:

```
SUM(MachineStates("MachineState_1").Duration)
```

10.3 How is the quality of the production during a specific period?

Introduction

You have the option to calculate how many good parts were produced during a specific period in the plant. For this purpose, you require an operand for the overall number of produced parts and an operand that transfers the number of defective parts.

Requirement

- The counter "TotalParts" for the total number of parts is created.
- The "RejectedParts" counter for the rejected parts has been created.
- The "Quality" KPI has been created.

Procedure

Enter the following KPI formula in the "KPI formula" editor and adapt the operand names if necessary:

```
(1 - SUM(Counters("RejectParts"))/SUM(Counters("TotalParts"))) * 100
```

See also

How can I calculate the overall equipment effectiveness (OEE) of my machine for a specific period? (Page 202)

10.4 How was the availability of a machine?

Introduction

In this example, you calculate the availability of a machine in a given period. The availability of a machine is calculated from the ratio between the actual manufacturing time and the planned busy time.

Requirement

- The time category "ActualProductionTime" for the production time is created.
- The time category "PlannedBusyTime" for the planned busy time has been created.
- The "Availability" KPI has been created.

Procedure

Enter the following KPI formula in the "KPI formula" editor and adapt the names of the time categories if necessary:

```
SUM(TimeCategories("ActualProductionTime").Duration) /
SUM(TimeCategories("PlannedBusyTime").Duration.Planned)
```

See also

How can I calculate the overall equipment effectiveness (OEE) of my machine for a specific period? (Page 202)

10.5 How often did unplanned standstills occur with my machine?

Introduction

In this example, you calculate how often unplanned standstills occurred at the machine in a given period.

Requirement

- The time category "UnplannedDowntime" or the machine state "UnplannedDowntime" is created.
- The "UnplannedDowntimeAll" KPI has been created.

Procedure

Enter the following KPI formula in the "KPI formula" editor and adapt the name of the time category if necessary.

```
SUM(TimeCategories("UnplannedDowntime").Occurrences)
```

Alternatively, create the "UnplannedDowntime" state for your machine in a time category and calculate its occurrences.

```
SUM(MachineStates("UnplannedDowntime").Occurrences)
```

10.6 How can I calculate the overall equipment effectiveness (OEE) of my machine for a specific period?

Introduction

In this example, you calculate the overall effectiveness of your machine or plant. The overall effectiveness is calculated from the availability of the machine (Page 200), the average performance and the number of good parts (Page 200) produced in the given period.

Requirement

- The "Availabilty" KPI has been configured.
- The "Effectiveness" KPI has been configured.
- The "Quality" KPI has been configured.
- The "OEE" KPI has been created.

Procedure

Enter the following KPI formula in the "KPI formula" editor and adapt the operand names if necessary:

```
KPIs("Availability") * KPIs("Effectiveness") * KPIs("Quality")
```

See also

How is the quality of the production during a specific period? (Page 200)

How was the availability of a machine? (Page 200)

10.7 How can I use microstops?

Introduction

In order to better understand the availability of the plant, you can include short downtimes of plant objects in the calculation of KPIs, and display them.

To do this, define a machine state as a stop state.

In the following example, calculate the plant availability with the machine states "Operating", "Tailback", and "Idle". The machine state "Tailback" is defined as a stop state. From the three machine states, calculate the "Availability" KPI in three variants:

- With microstops
- Without microstops
- Only microstops

An overview of when a plant object was in a specific state, and for how long, can be found in the "Performance Gantt chart" control.

In this control, you have the option of displaying either machine states with microstops, or only microstops.

Requirement

- A plant object type is defined.
- An interface tag "MachineState" is configured at the plant object type.
- A logging tag has been configured for the "MachineState" interface tag.
- The HMI device is assigned in the plant view.
- The plant object type is used in the plant view.
- A time category is configured in the time model.
- A screen is configured.

Procedure

Creating machine states

1. Open the "Time model" editor.
2. Create an "Operating" machine state.
3. Create a "Tailback" machine state.
4. Create an "Idle" machine state.
5. Select the "Tailback" machine state.
6. Open the Inspector window under "Properties > General > General".
7. Set the check mark in the "Stop state" area.

Configuring KPIs

1. Open the "Performance indicators" editor.
2. Create the "Availability_WithMicroStops" KPI.
3. Open the Inspector window under "Properties > General > KPI formula".
4. Configure the "`SUM(MachineStates("Operating").Duration/(MachineStates("Operating").Duration+MachineStates("Tailback").Duration+MachineStates("Idle"). Duration))`" formula.
   Use drag and drop to use the machine states in the "KPI formula" editor.
5. Create the "Availability_WithoutMicroStops" KPI.
6. Open the Inspector window under "Properties > General > KPI formula".
7. Configure the "`SUM(MachineStates("Operating").Duration/(MachineStates("Operating").Duration+MachineStates("Tailback").Duration.WithoutMicroStops+MachineStates("Idle"). Duration))`" formula.
8. Create the "Availability_OnlyMicroStops" KPI.
9. Open the Inspector window under "Properties > General > KPI formula".

10. Configure the "`SUM(MachineStates("Operating").Duration/ (MachineStates("Operating").Duration+MachineStates("Tailback").Duration.OnlyMicroStops+MachineStates("Idle"). Duration))`" formula.
11. In the Inspector window, under "Properties > General > General", assign different colors for the display of the KPIs.

Using KPIs and connecting machine states

1. Open the plant object type.
2. Switch to the "Performance indicators > KPIs" tab.
3. Select the KPIs in the "Performance indicators" task card.
4. Drag the KPIs to the workspace area.
5. Switch to the "Performance indicators > Machine states" tab.
6. Select the "Operating" machine state.
7. Define the configured interface tag "MachineState" as source tag in the inspector window under "Properties > General > General".
8. Set the value "10" for both the low limit and the high limit.
9. Select the "Tailback" machine state.
10. Set the value "15" for both the low limit and the high limit in the Inspector window under "Properties > General > General".
11. Select the "Idle" machine state.
12. Set the value "0" for both the low limit and the high limit in the Inspector window under "Properties > General > General".
13. Switch to the "Performance indicators > Settings" tab.
14. Set the value "1" for the microstop time.
15. Set minutes as the microstop unit.

Configuring the layout

1. Open the configured screen.
2. Add an I/O field.
3. Use the interface tag "MachineState" of the plant object to make the I/O field dynamic in the Inspector window under "Properties > Properties > General > Process value".
4. Add the "Performance Gantt chart" control.
5. Create an element for the equipment in the Inspector window under "Properties > Properties > Miscellaneous > Interface > SelectedEquipment".
6. Expand the created element.
7. Select the plant object in the "Static value" column.
   The plant object is assigned to the "Performance Gantt chart" control.

8. Create a time range under "Properties > Properties > Miscellaneous > Interface > Selected time":
   - Time mode: Relative time
   - From: Current time
   - To > Offset: 2
9. Add the "Performance pie chart" control.
10. Create three elements in the Inspector window under "Properties > Properties > General > Interface > Selected KPIs".
11. In the "Static value" column, select a KPI for each item created.
    The KPIs are assigned to the "Performance pie chart" control.
12. Create a time range under "Properties > Properties > Miscellaneous > Interface > Selected time":
    - Time mode: Relative time
    - From: Current time
    - To > Offset: 2
13. Compile and download the project.
14. Enter a value for a machine state in the I/O field.
15. Update both controls in runtime.

Result

The machine state is displayed in the "Performance Gantt chart" control. You have the option of filtering machine states:

- With microstops
- Only microstops

The configured KPIs are shown in a pie chart.

See also

Downtimes (Page 26)

Configuring machine states (Page 36)

Configuring machine state at the plant object type (Page 40)

10.8 How can I use scripts in Performance Insight?

Introduction

You can use scripts in Performance Insight to design the control. Scripts let you edit both the displayed data and the display of the control. You can define, for example, the following:

- KPIs and operands
- Time ranges
- Colors and lines
- Display order
- Size
- Display modes

In the example, the following actions are configured using scripts on buttons:

- Adding KPI
- Removing KPI
- Specifying time range in the "Start / end time" mode

Requirement

- An HMI device "HMI_RT_1" is configured and assigned to the plant view.
- One "KPI_1" KPI has been configured.
- An "Engine" plant object type is configured.
- The KPI is used in the plant object type.
- The plant object type is used in a plant view.
  The resulting plant object is called "Engine_1".
- A screen is configured.
- A control of the "Performance control" type with the name "Performance Control_1" is configured on the screen.
- A "Show_KPI_1" button has been configured.
- A "Hide_KPI_1" button has been configured.
- A "Start_End_Time" button has been configured.
- A "From" I/O field has been created.
- A "To" I/O field has been created.
- An HMI tag "From" of the data type "DateTime" is defined.
- An HMI tag "To" of the data type "DateTime" is configured.

Procedure

1. Select the "Show_KPI_1" button in the configured screen.
2. Select the event "Click left mouse button" under "Properties > Events" in the Inspector window.
3. Convert the function list to a script.
4. Insert the "Show_KPI_1" sample code.
5. Repeat steps 1 to 4 for the "Hide_KPI_1" button and the "Hide_KPI_1" sample code.
6. Select the I/O field "From" in the configured screen.
7. Use the "From" HMI tag to make the "From" I/O field dynamic in the Inspector window under "Properties > Properties > Process value".
8. Select the I/O field "To" in the configured screen.
9. Use the "From" HMI tag to make the "To" I/O field dynamic in the Inspector window under "Properties > Properties > Process value".
10. Repeat steps 1 to 4 for the "Start-End_Time" button and the "Start-End_Time" sample code.
11. Compile and load it in runtime.
12. Trigger the event "Click left mouse button" on the buttons.

Result

Show_KPI_1

The "KPI_1" is displayed in the performance control.

Hide_KPI_1

The "KPI_1" is removed from the performance control.

Start_End_Time

- The mode for the time ranges is changed in "Start / end time".
- The time range adapts to the entries in the I/O fields.

Sample code

Show_KPI_1

```
export function Button_1_OnTapped(item, x, y, modifiers, trigger) {
  var performanceControl = Screen.Items("Performance control_1");
  performanceControl.AddKpi("HMI_RT_1::PO1.Kpi_1");
}
```

Hide_KPI_1

```
export function Button_1_OnTapped(item, x, y, modifiers, trigger) {
  var performanceControl = Screen.Items("Performance control_1");
  performanceControl.RemoveKpi("HMI_RT_1::PO1.Kpi_1");
}
```

Start_End_Time

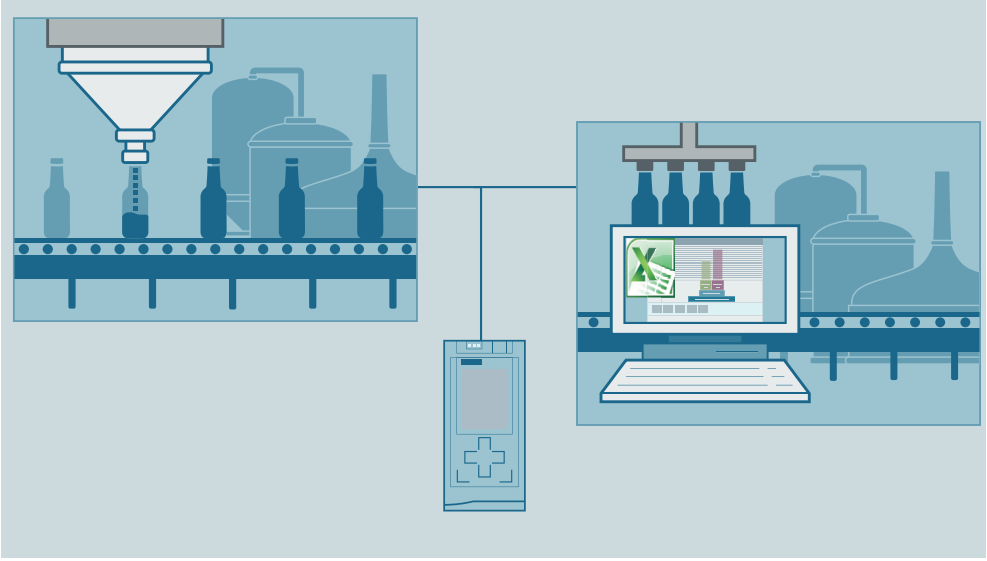
```
export function Start_End_Time_OnTapped(item, x, y, modifiers, trigger) {
   var From1 = Tags("From").Read();
  var To1 = Tags("To").Read();
  Screen.Items("Performance
control_1").Properties.SelectedTime[0].From.Mode = "Start / End Time";
  Screen.Items("Performance control_1").Properties.SelectedTime[0].To.Mode
= "Start / End Time";
  Screen.Items("Performance
control_1").Properties.SelectedTime[0].From.Time = From1;
  Screen.Items("Performance control_1").Properties.SelectedTime[0].To.Time
= To1;
}
```

Local reporting for Performance Insight 11

11.1 Basics

11.1.1 Introduction

When the Performance Insight option package is installed, you can generate production reports for KPIs, operands, logged KPIs and machine states in the form of Excel reports with WinCC Unified Reporting in Runtime. You can then continue to edit the data in Excel or save the report as PDF and distribute or log it.



11.1.2 Requirements

To create production reports with Performance Insight, the Excel add-in must be installed. In addition, you must be familiar with the operation of WinCC Unified Reporting. The documentation for this can be found in the TIA Portal Help under "Creating production logs".

Basic information on report templates

Information on creating report templates is available in the TIA Portal help, in the "Creating templates for production reports" section.

This information is also available in the Excel add-in. For this purpose, click the "?" icon in the "WinCC Unified Reporting" tab.

Basic information on production reports in runtime

Information on creating production logs in runtime is available in the TIA Portal help in the section "Working with production logs in runtime".

11.2 Procedure

Requirement

- The Performance Insight option package is installed.
- Position the "Reports" control in a screen of a WinCC Unified device.
- The same requirements apply to the use of Reporting with the WinCC Unified basic installation.

Run sequence

1. Define a report template for your jobs in the Excel add-in.
2. Define a trigger for the production reports in the "Reports" control.

11.3 Defining report template

Introduction

You define report templates in the Excel add-in.

Requirement

- Microsoft Excel is open and the "WinCC Unified" tab is visible.
- The server on which an active runtime project with PFI configuration is running is selected in the "WinCC Unified" tab under "Connections".
- The list of options retrieved from the server includes "Performance Insight".

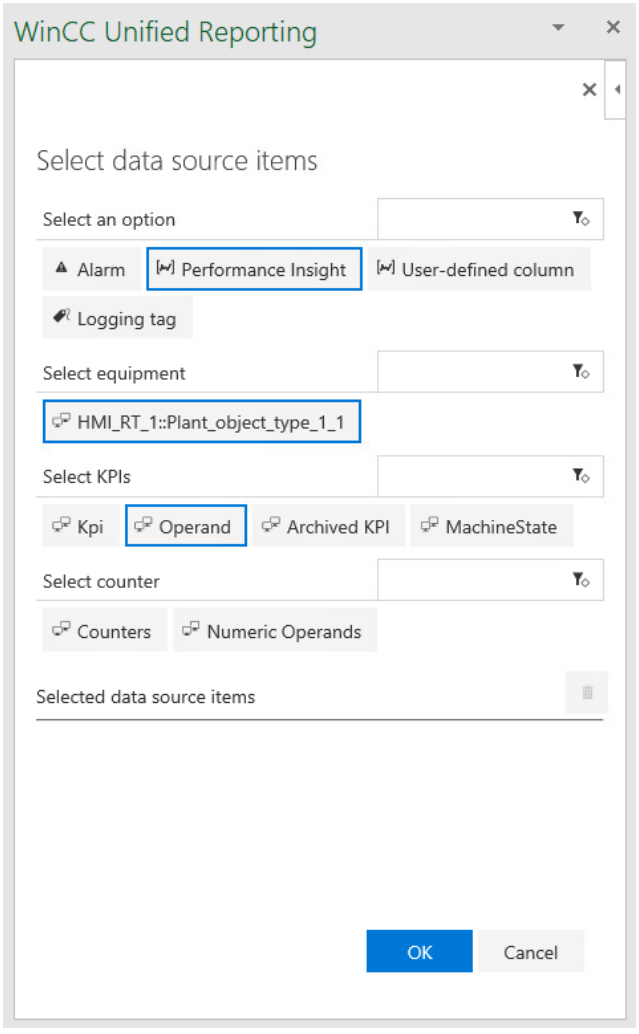
Defining a time series segment

1. In the "WinCC Unified" tab, click on "Segments".
   The list of segments is loaded.
2. Select "New segment".
   The selection menu opens.
3. Select "New time series segment".
   A new time series segment is created.
4. Assign a name.

5. Specify the storage location, on which table and in which cell the time series segment should start.
6. Confirm with "OK".

Adding a data source item

1. Click on the created time series segment.
2. Click the "+" icon.
   The menu for selecting a data source item opens.



3. Select the "Performance Insight" option.
4. Select an equipment.

5. Select a type under "Select KPIs":
   - KPI
   - Operand
     Select between counter or numerical operand.
   - Logged KPI
     Logged KPIs are KPIs that have been logged by a calculation cycle.
   - Machine state

   You are offered all data source items of the equipment that have this type.
6. Select one or more KPIs, operands, archived KPIs or machine states.
   The elements are added to the "Selected data source items" list.

   Note
   Available selection elements

   Elements of type Reason group, Reason and Top-10-Downtime will be available in V18 Update 1.

   Note
   Filtering the selection

   You can use filters to limit the selection on each level. Enter a string next to the filter symbol, for example, to filter for KPIs with the partial string "min".

   While you are typing, Reporting filters the offered KPIs, machine states, and operands.

   Note
   Changing the selection

   After you have added a KPI, operand, archived KPI or machine state, you can change the option, equipment, or type and add more data source items.

   For example: To output KPIs of various items of equipment in a table, select a different item of equipment.
7. Select the desired data source items.
   The selected data source items receive a check mark.
8. To deselect a data source item, click the data source item again.
9. Click "Delete" to delete selected data source items.
10. Confirm your entries with "OK".
    The template is generated.
11. Save the report template.

Adjusting columns

1. Select the "Edit" button of the data source item.
2. Select the desired columns.
3. Make your changes.
4. Confirm your entries with "OK".
   The template is updated.

Testing the template

Test your template by clicking on ▶ located next to the time series segments.

Result

The added KPIs, operands, archived KPIs and machine states are inserted under the segment for the defined period.

KPIs are recalculated for the respective period. Logged KPIs, in contrast, are KPIs that have been logged with defined calculation cycles. Archived values are also used for operands and machine states.

If you do not want the indicator to use the default configuration, create a configuration in the next step.

11.4 Create or edit configurations for KPIs, machine states, or operands

You can only create configurations for KPIs, machine states, and operands that are used in time series segments.

Requirement

- The "WinCC Unified" tab is visible in Excel.

Creating a configuration

1. Click on "Segments" in the "Configuration" group.
   The list of segments is loaded.
2. Click "Data source item segment configuration".
3. Click "Segment".
4. Select a template.
5. Set the configuration settings.
6. Confirm your entries with "OK".
7. Assign the newly created configuration to a data source item.

Editing a configuration

1. Click on "Segments" in the "Configuration" group.
   The list of segments is loaded.
2. Click "Data source item segment configuration".
3. Select a configuration.
4. Edit the configuration settings.
5. Confirm your entries with "OK".

The changes are applied the next time you read in the runtime data.

Settings for KPIs, archived KPIs, machine states and operands

Setting	Description
Name	Enter the name of the configuration.
Calculation mode	Select which data is to be written if there is no current value.
Interval	For KPIs and machine states: Select how often the value is read. For operands and archived KPIs: Read-only
Show quality code	Select whether the quality code is output with the value.
Show target values and limits	Select whether target values and limits are to be output with the value. Only available for KPIs.
Show microstop and limit	Select whether microstops and limits are to be output with the value. Only available for machine states.
Grouping	Select the context and associated context value according to which the KPIs are grouped. Only available for KPIs.

Calculation modes for machine states and operands

Calculation mode	Description
Keep last value	If no data is available, the last value is used. With this mode, you can also use values with an invalid quality code.
Interpolate	The values are interpolated linearly for the specified time period. With this mode, you can only use values with a valid quality code.
Raw	The actual value available for the specified time period. If no data is available, no value is output. Only available for counters.

Calculation modes for KPIs

Only the calculation mode "KPI" is available.

11.5 Creating a report job and downloading a report

Introduction

Before you create a production report, create a report job in the "Reports" control and define a trigger. If necessary, download the production report as an XLSX file or PDF file.

Requirement

- A report template with a time series segment has been created in Excel.
- The "Reports" control is being used in runtime.

Creating a report job and defining triggers

1. Select the "Job parameters" tab in the "Reports" control.
2. Under "Templates", select the "Add new" button.
   A selection dialog opens.
3. Select the report template previously created in the Excel add-in.
4. Select "Open".
   The report template is added.
5. Under "Trigger", select the "Add new" button.
6. Define a trigger.
7. Add a report job in the "Report jobs" area.
8. Define the template for the report job.
9. Define the trigger for the report job.

Note

Generating reports

The execution of a report job generates a report. Report jobs are executed automatically when the trigger defined in their job parameters is initiated. You also have the option to execute report jobs manually.

Downloading a report

1. A new entry has been created in the "Reports" control under "Reports".
2. Select the file format.
3. Click "Export".
   The file is downloaded to the download directory of the browser.
4. To display the report, open the file.

11.6 Example: Evaluating machine state in Excel

Introduction

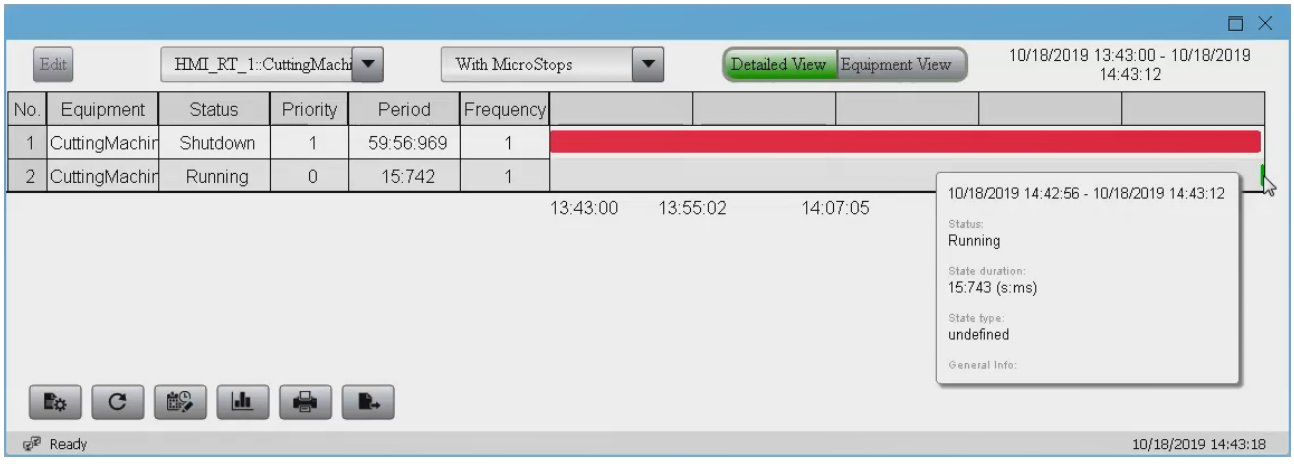
In this example, the machine state is queried while runtime is active and output in an Excel spreadsheet as a report.

Requirement

- Machine states are configured in the project that is running on the connected runtime server.
- The "Performance Insight" option is activated in the connection settings in the Excel add-in.
- The "WinCC Unified" tab is visible in Excel.
- There is at least one segment.

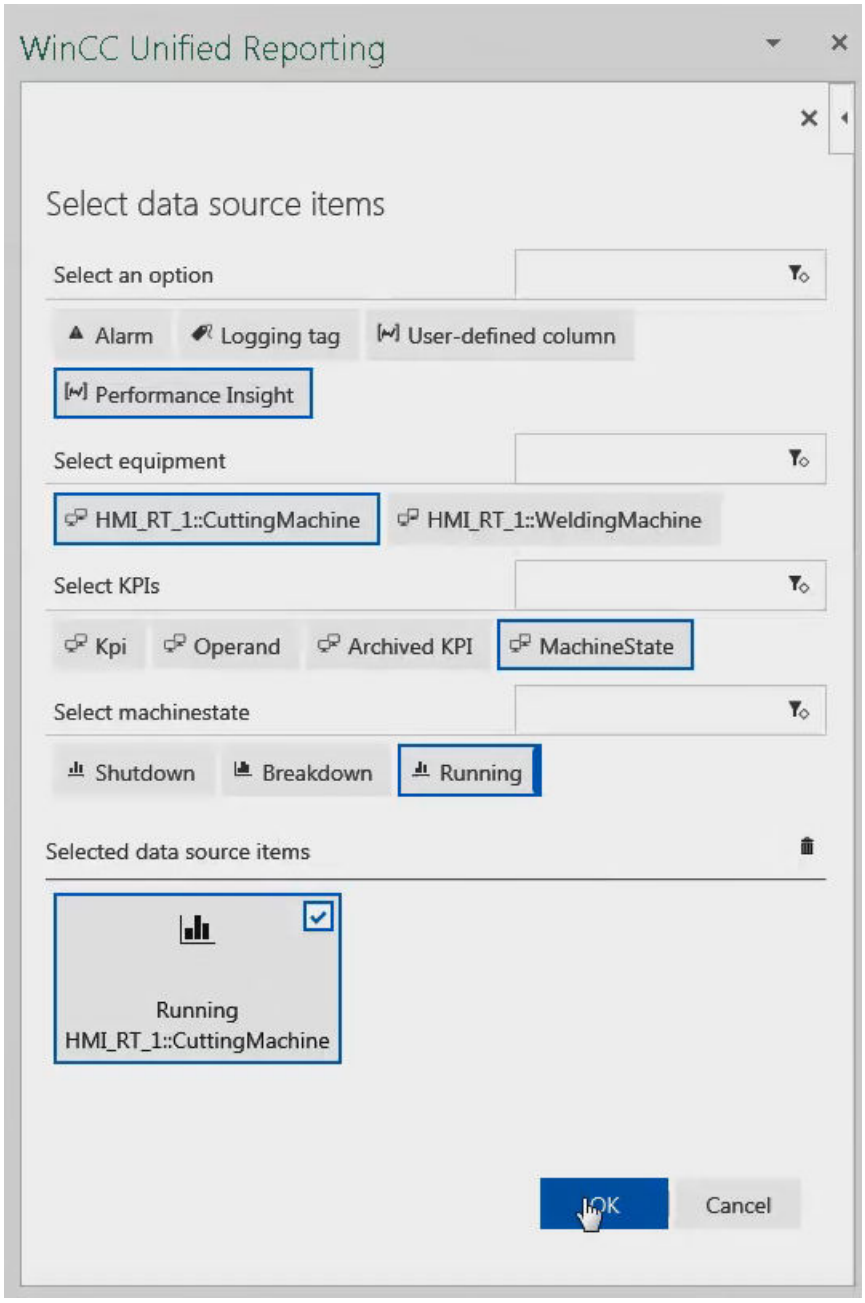
Machine state in runtime

A project with the "CuttingMachine" equipment is running in runtime. Before, the equipment was in the "Shutdown" machine state. The "CuttingMachine" equipment is now started and is in the "Running" state.



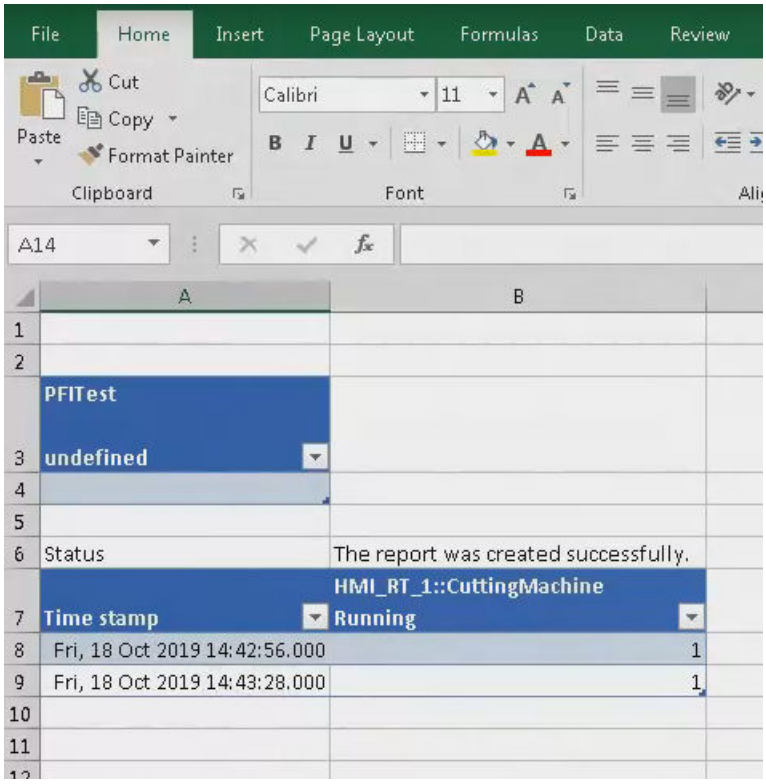
Creating a report for machine state

In addition to the time segment, the following settings are necessary to evaluate the machine state in the Excel add-in:



Result

The "Running" machine state is output for the "CuttingMachine" equipment in the defined period as a report.



A value of 1 means that the equipment is in the "Running" machine state.

If the value of 0 is output, the equipment is not in the "Running" machine state.