



APS Basic Set Up

Learn how to set up a basic APS scenario in beas Manufacturing

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1. INTRODUCTION

To be competitive today, manufacturers need to do more with less, by reducing inventory and manufacturing costs without jeopardizing customer service.

Planning must focus on customer demand, fulfilment by the customer due date and synchronizing the flow of material and capacity accordingly.

Advanced Planning and Scheduling (APS) is the technology gateway to a more efficient use of production resources for both process and discrete manufacturers.

An APS software system enables planners to automate, optimize, and compare production plans and schedules that reflect actual resource capacity and material availability, synchronize across plants and work centers to accurately manage labor and inventory, and meet delivery dates and increase profitability.

APS tools differ from traditional planning and scheduling tools in that they are not bound to a strict mathematical formula, but rather can tradeoff between a number of factors to find the best solution from many alternatives. That ability to weight multiple factors and find an overall best solution is called optimization.

APS is especially well-suited to environments where simpler planning methods cannot adequately address complex trade-offs between competing priorities.

Planning of order-related production orders requires other planning parameters and information such as resource planning for storage-oriented work orders. This chapter will explain how to create different scenarios.

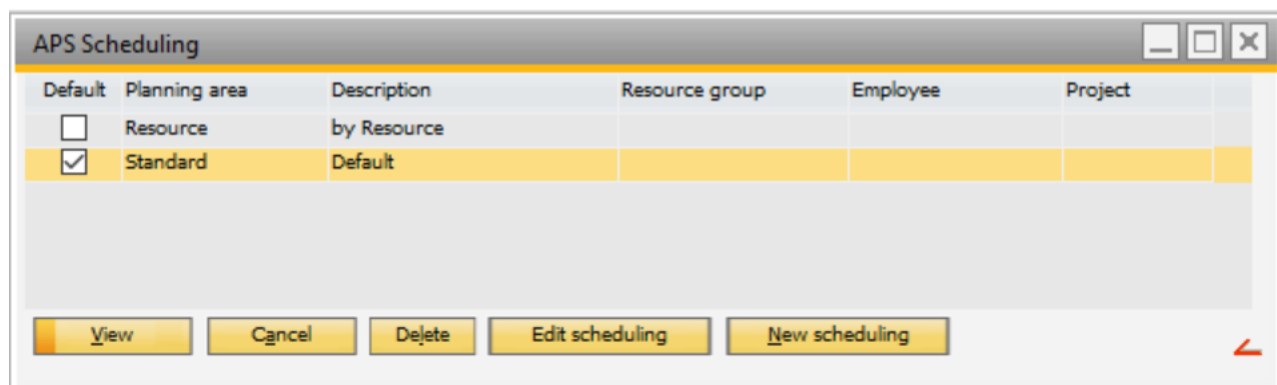
In this tutorial, we will learn how to set up an APS scenario, understanding the main fields in its master data for production planning and scheduling.

2. PROCESS

The production planning is achieved by using APS scenarios. Two pre-configured planning scenarios are available by default:

- *Standard*: A scenario for planning, specifically order-oriented
- *Resource*: A scenario for planning according to resources or stock-oriented

PATH: Production > Capacity Planning > APS



For each scenario, there is a customizable scheduling screen, different calculation types and a graphical view available, which can be configured individually in the settings. Depending on your production organization, the user can set up different scenarios to fully meet your production planning requirements.

We would like to explain this with a two-step production process.

The semi-finished products are produced mechanically and added to the stock (stock-related). The finished products are assembled order-related.

The final products are usually assembled to meet the delivery date from the sales order. The work orders for this production step are created directly from the sales order. Work orders for semi-finished products are created from the Material Requirement Planning, or MRP. There, multiple quantities for a specific requirement date or period can be summarized and work orders (stock orders) can be created.

The planning for the two production areas (machine processing and final assembly) are usually done by different employees who are considering different criteria. Planning and dispatching of work orders for the final assembly is done backwards from the delivery date. Information such as customer name, product and delivery date are relevant here. Planning and dispatching of work orders for machine processing is done forwards from a specified start date. Here, the focus is that the work orders are dispatched considering criteria like material availability and resource limits to get the best possible setup optimization.

With the APS, the user has the possibility to configure these individual requirements in different scenarios and use them for production planning.

In beas, there is a "Standard" scenario, which is set as *Default* that can be customized and also, own scenarios can be created.

View: Button used to open the work order list from the APS scenario selected. For more information about this screen, please refer to the APS tutorial.

Cancel: Button used to close the current screen from the APS scenarios list.

Delete: Button used to delete the selected (highlighted) APS scenario.

Edit Scheduling: Button used to edit the selected (highlighted) APS scenario. This button will open the APS scenario setup screen.

New Scheduling: Button used to create an APS scenario. This button will open the APS scenario setup screen.

When the new screen is opened, beas displays the APS scenario setup screen which contains 4 tabs: Master Data, Resources, Views and Calculation Type.

At the bottom of this screen, there are buttons for specific actions:

Add: Button used to add the new defined APS scenario. The user will click it once it is completely defined according to the business needs.

Cancel: Button used to close the screen without saving the information.

Delete: Button used to delete the current APS scenario.

Default: Button used to set as default the current APS scenario.

2.1. Master Data Tab

This tab includes the specific information for the APS execution: the name for the scenario, the work orders to be scheduled and special sorting.

The screenshot shows the 'APS Scheduling Standard' dialog box with the 'Master Data' tab selected. The dialog has a title bar with standard window controls. Below the title bar are four tabs: 'Master Data', 'Resources', 'Views', and 'Calculation type'. The 'Master Data' tab is active and contains the following fields:

- Scheduling:** A text field containing 'Standard'.
- Description:** A text field containing 'Default'.
- Work Orders:**
 - Start Date:** 'Today +' followed by an empty text box and 'Calendar days'.
 - Delivery Date:** 'Today +' followed by '60' in a text box and 'Calendar days'.
 - Project:** A dropdown menu.
 - Priority:** A text box with a help icon.
 - Production type:** A text box containing 'Make to stock', 'Sales Order' with a help icon.
 - Branch:** A text box with a help icon.
 - Employee:** A text box with a help icon.
 - Item Material Group:** A text box with a help icon.
 - Item Properties:** A text box with a help icon.
 - Item Group:** A text box with a help icon.
 - Filter SQL:** A text box.
 - Hide active:** A checkbox.
 - Hide printed:** A checkbox.
 - Hide locked:** A checkbox.
 - Planned Work Orders:** A dropdown menu containing 'All'.
- Sorting:**
 - Name:** A text box.
 - SQL-Order-Statement for table BEAS_FTHAUPT, BEAS_FTPOS, OITM:** A dropdown menu.
 - Two empty text boxes below the dropdown.

At the bottom of the dialog are four buttons: 'OK', 'Cancel', 'Delete', and 'Default'.

Scheduling: Field used to define a unique name for the APS scenario.

Description: Field used to add a description for the APS scenario.

The following fields are used for filtering based on work orders:

Work Orders			
Start Date	Today +	<input type="text"/>	Calendar days
Delivery Date	Today +	60	Calendar days
Project	<input type="text"/>		
Priority	<input type="text"/>		
Production type	Make to stock', 'Sales Order'		
Branch	<input type="text"/>		
Employee	<input type="text"/>		
Item Material Group	<input type="text"/>		
Item Properties	<input type="text"/>		
Item Group	<input type="text"/>		
Filter SQL	<input type="text"/>		
Hide active	<input type="checkbox"/>		
Hide printed	<input type="checkbox"/>		
Hide locked	<input type="checkbox"/>		
Planned Work Orders	All		

Start Date Today +: Field used to set a time range, based on the start date, to be considered when filtering the work orders to be included in the APS execution.

Example: enter 30 days to display all work orders where the start date is in the range from today + 30 days.

Delivery Date Today +: Field used to set a time range, based on the delivery date, to be considered when filtering the work orders to be included in the APS execution. This is used for order-related planning.

Example: enter 60 days to display all work orders where the delivery date is in the range from today + 60 days.

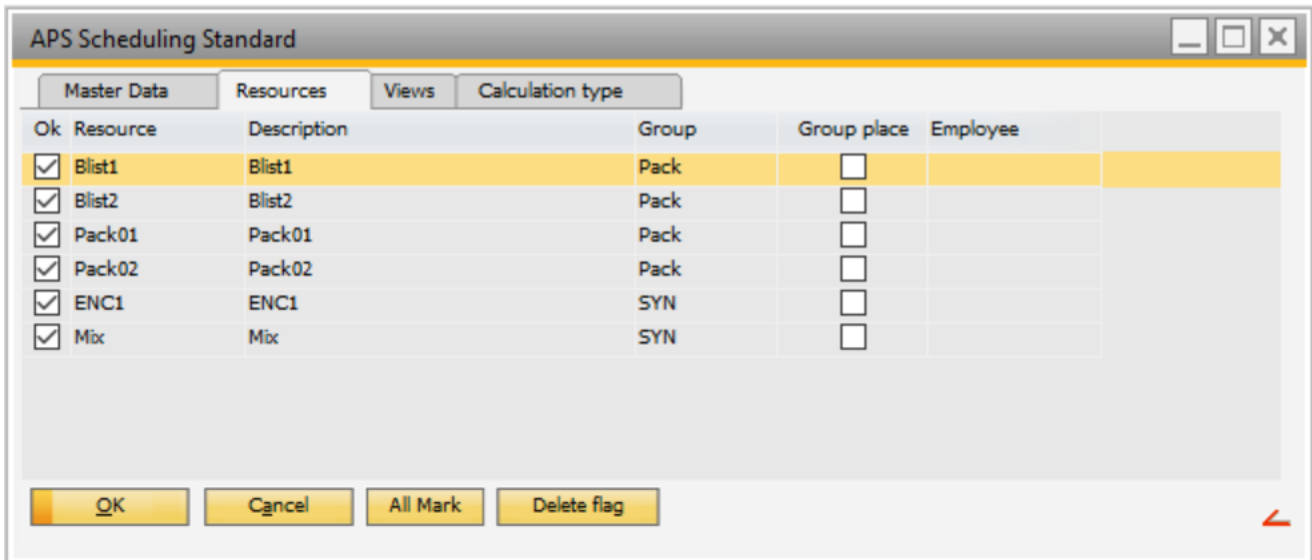
Production Type: Field used to set existing production types defined in beas, and filter to consider only those work orders which are specific production types.

Planned Work Orders: Field used to set which work orders are taken into account in the APS execution.

- *Hide Planned:* Does not consider planned work orders
- *All:* Considers all work orders
- *Only Planned:* Considers only planned work orders

2.2. Resources Tab

This tab lists the existing resources in beas that can be included in the APS execution.



Ok: Field used to select the resources to be included in the APS execution. By default, all resources are marked. The user can unmark manually the resources to not be part of the APS. Also, the user can select all resources by pressing the button **All Mark** and unselect all resources by pressing the button **Delete Flag**.

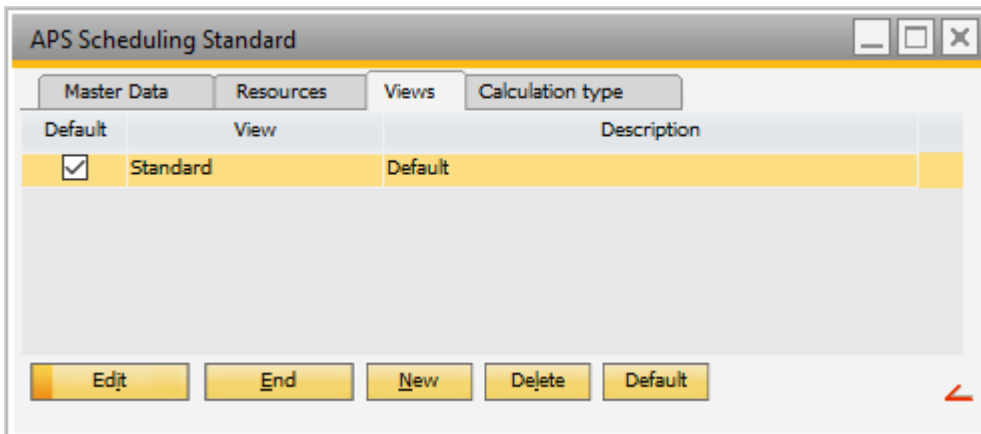
Resource: Field used to display the resource name created in beas.

Description: Field used to display the resource description.

Group: Field used to display the group where the resource is assigned, if applicable.

2.3. Views Tab

This tab defines general parameters for the graphical view. This screen shows a list of the existing views. Here, the user can manage them.

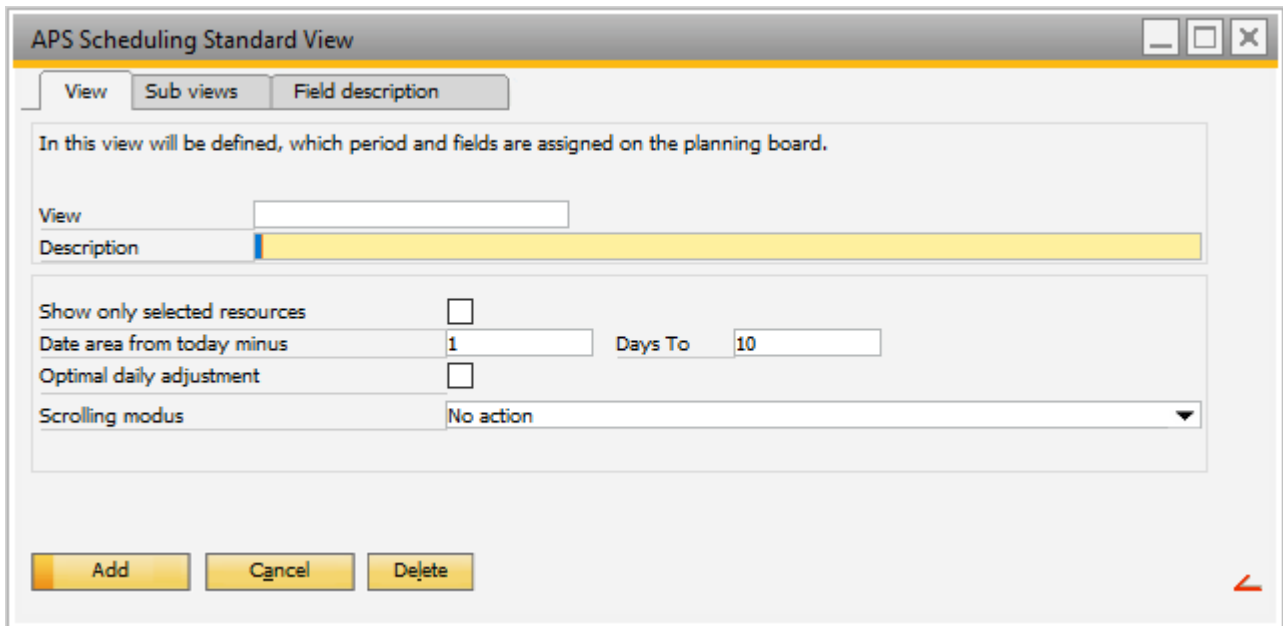


Edit: Button used to edit the selected view.

Delete: Button used to delete the selected view.

Default: Button used to set a selected row as default.

New: Button used to create a view. Once the user clicks on this button, beas opens a new screen.



The screen is divided in three tabs: View, Sub views and Field description.

The View tab contains:

View: Field used to add a name for the view to be created.

Description: Field used to add a description for the view.

Date Area from Today Minus / Days To: Field used to define the time range in which the work orders are going to be displayed.

Example: If the user enters from "1" to "30", all work orders are displayed from 1 day in the past to 30 days in the future.

Scrolling Modus: Field used to determine the behavior when the user moves an operation in the graphical view. The following options are available:

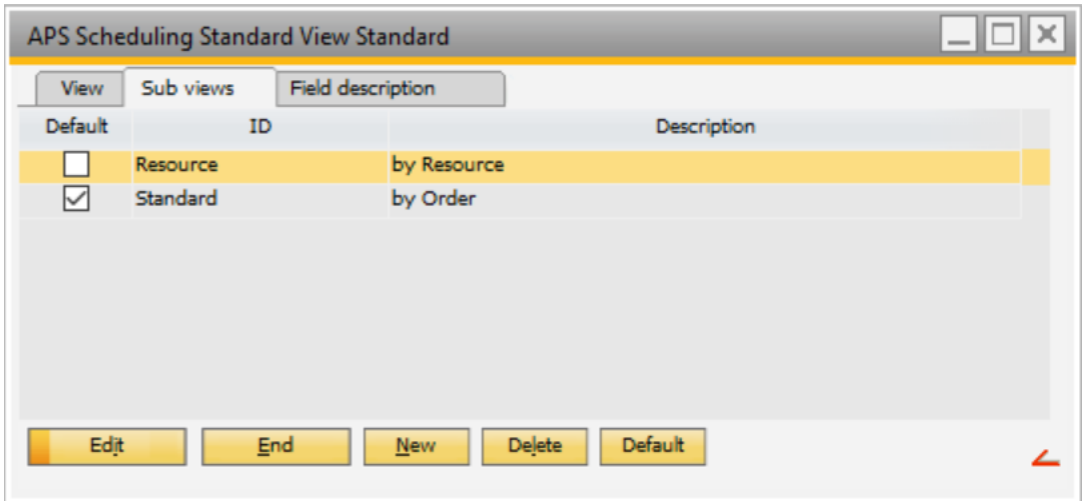
No Action – The operation is only moved

Mark – The operation is moved and marked

Dispatch – The operation is moved and dispatched without considering resource limits

Dispatch with Resource Limits – The operation is moved and dispatched, considering resource limits

Fix, Dispatch and Hold Together – The operation is moved, dispatched and fixed. Fixed means that this operation is not moved again by a new APS calculation. If the operation has to be calculated again, the fixation must be first removed.



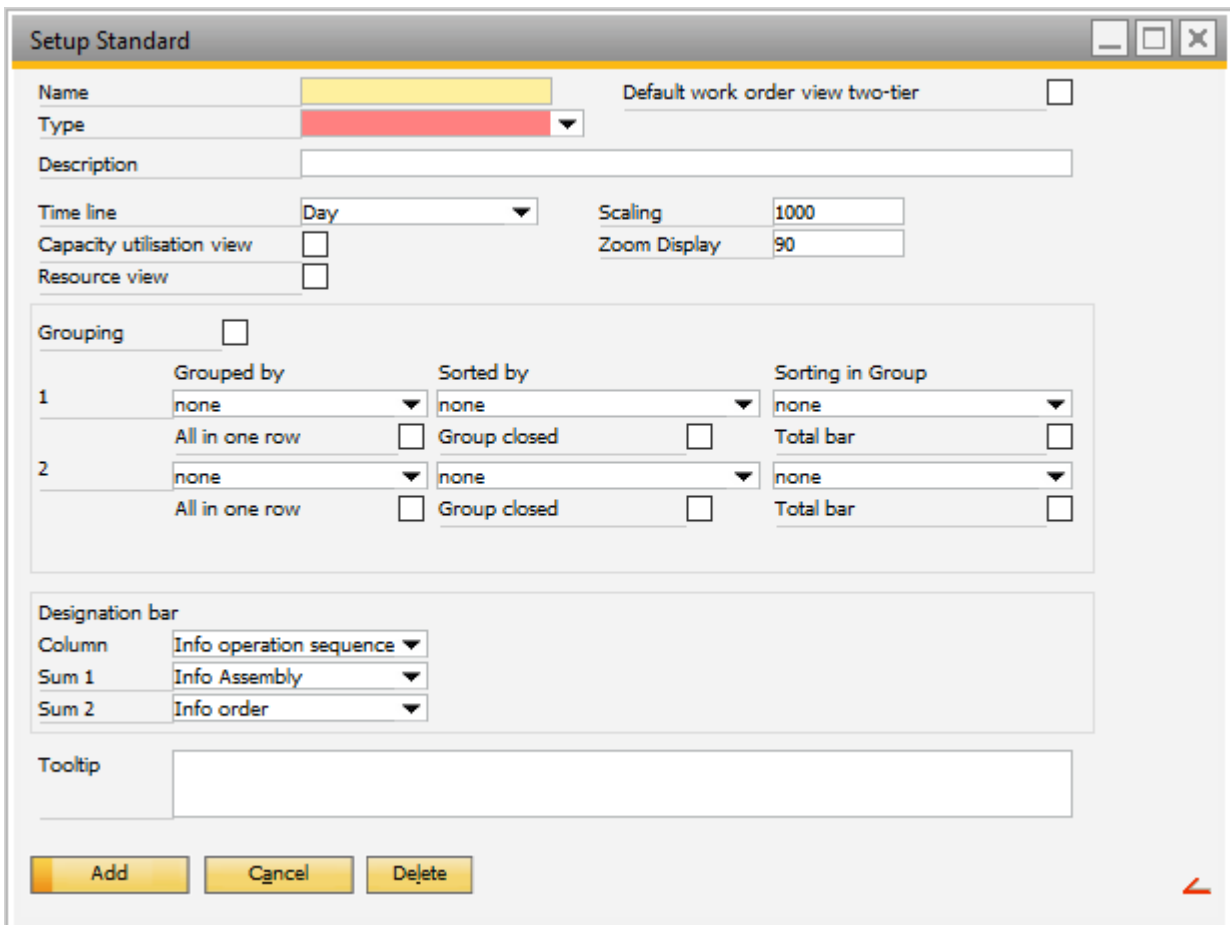
The graphical view is configured here and defines which information is displayed. The *Sub views* tab contains a list of existing sub views, if applicable, where the user can manage them:

Edit: Button used to edit the selected sub view.

Delete: Button used to delete the selected sub view.

Default: Button used to set a selected sub view as default.

New: Button used to create a sub view. Once the user clicks on this button, beas opens a new screen.



Name: Field used to set a name for the sub view to be created.

Type: Field used to define whether the view is "Resource" or "Order" type.

Description: Field used to add a description for this sub view.

IMPORTANT: The text in the description is displayed later in the selection list in the graphical view. As a recommendation, do not select a long description, as the selection list can only display a limited number of characters.

Time Line: Field used to determine whether the graphical view is in hours, days or years. By default, beas sets this with the value "Day".

Grouping: Field used to structure the view. The user can use the total bars and adjust the rows to suit the requirements. By using this functionality, the user defines which information should be displayed for each level and the sorting within the group.

IMPORTANT: In beas, level 1 is grouped by work order document and level 2 by work order position.

Group by (1 & 2): Field used to define according to which information the work order is to be grouped (grouping 1). The same can be defined for grouping 2.

All in One Row (1 & 2): Field used to set if the operations should be displayed individually or in a group. If this function is activated for Group 2, the operations on the left are no longer displayed individually. All operations of a work order position are displayed within this work order position line.

Example 1: All in one row is not activated

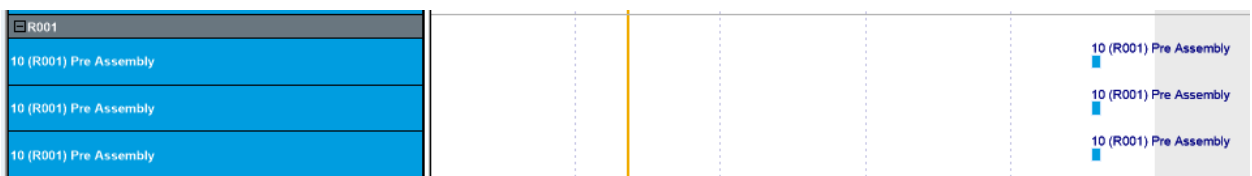


Example 1: All in one row is activated



If the user only has one work order position, Group 2 can be deactivated, and beas will display all operations for a work order in one line. The operations on the left are no longer displayed.

Example 2: All in one row is not activated



Example 2: All in one row is activated



R001	10 (R001) Pre Assembly	10 (R001) Pre Assembly	10 (R001) Pre Assembly
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Sorted by (1 & 2): Field used to set the variable by which to sort the information and structure the view according to the grouping 1 & 2.

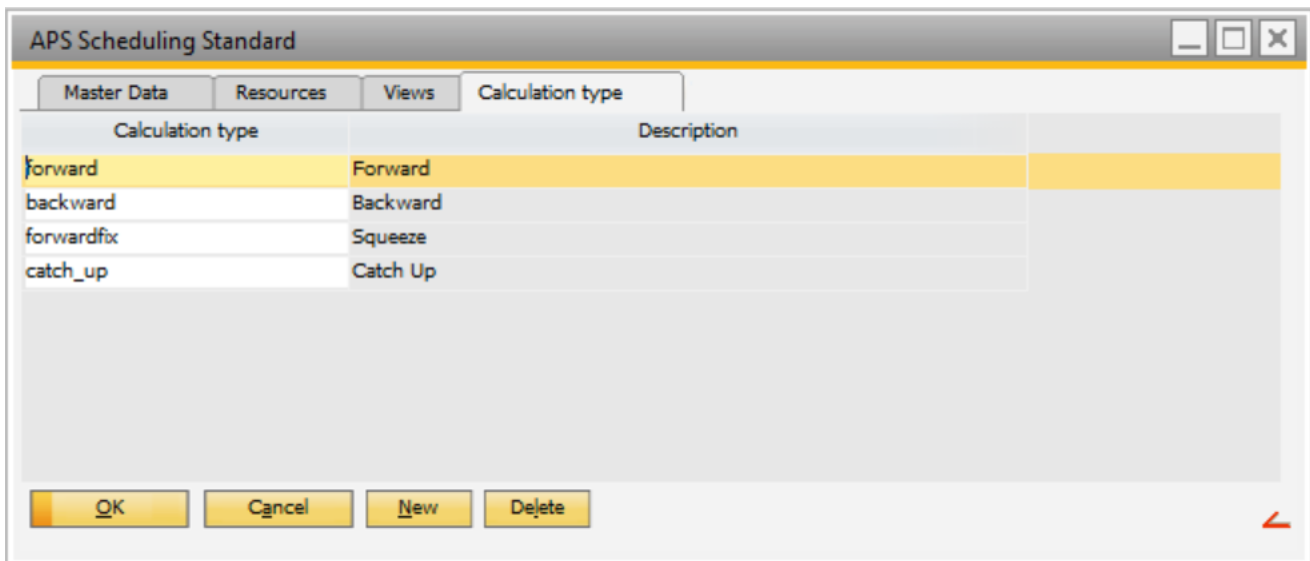
Group Closed (1 & 2): Field used to define whether Grouping 1, by work order, should be expanded or closed. The same applies to Grouping 2, which is by work order position.

Sorting in Group (1 & 2): Field used to set the variable to sort in group the information and structure the view.

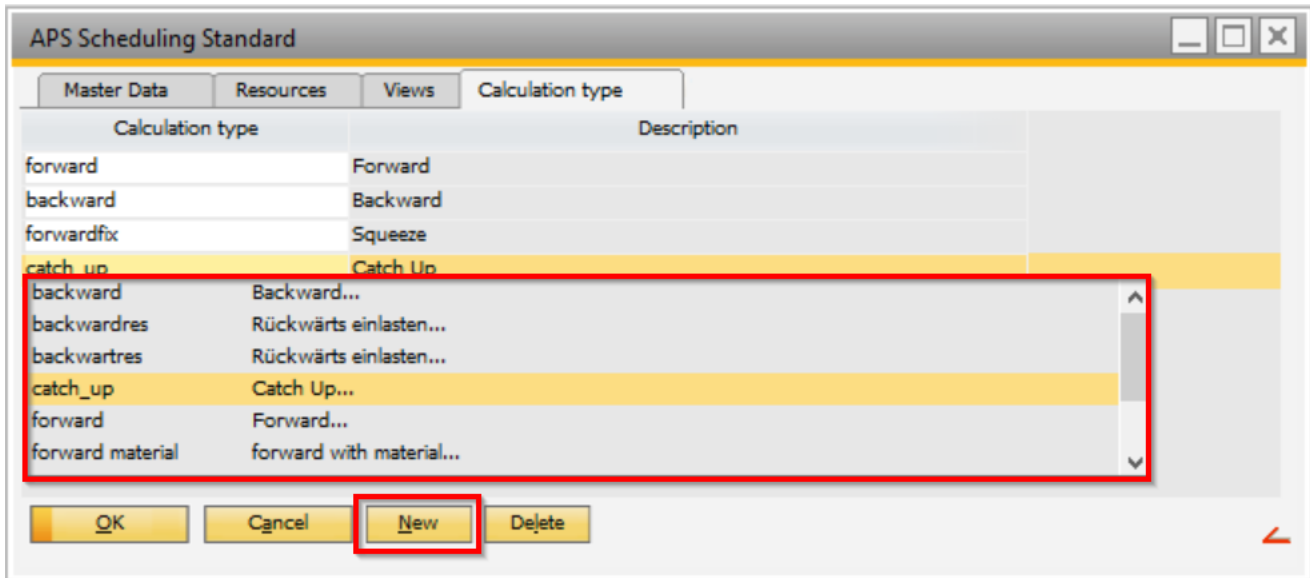
Total Bar (1 & 2): Field used to activate the sum bar at the group levels 1 & 2.

2.4. Calculation Type Tab

In this tab, the user can assign different calculation types to be used in the APS. These types must be defined in previous steps. For more information about the calculation type setup, please refer to the *Calculation Type* tutorial.



Calculation Type: Column used to assign the calculation types defined in beas that can be used in the APS execution. The user can assign one calculation type by pressing the *New* button and right clicking in the column *Calculation Type* in the blank position. A list is displayed with all existing types.



Description: Field used to display the description for the selected calculation type. This is filled once the *Calculation Type* is selected.

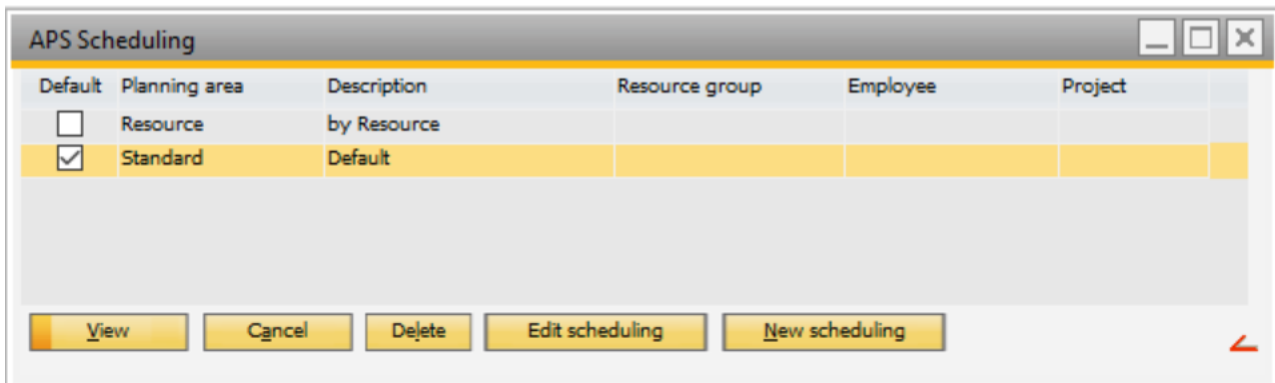
Delete: Button used to delete the selected calculation type from the ones assigned to the APS scenario.

3. FIELD GUIDE

The production planning is achieved by using APS scenarios. Two pre-configured planning scenarios are available by default:

- *Standard:* A scenario for planning, specifically order-oriented
- *Resource:* A scenario for planning by resources or stock-oriented

PATH: Production > Capacity Planning > APS



In beas, there is a "Standard" scenario, which is set as *Default*, that can be customized and also, own scenarios can be created.

View: Button used to open the work order list from the APS scenario selected. For more information about this screen, please refer to *APS tutorial*.

Cancel: Button used to close the current screen from the APS scenarios list.

Delete: Button used to delete the selected (highlighted) APS scenario.

Edit Scheduling: Button used to edit the selected (highlighted) APS scenario. This button will open the APS scenario setup screen.

New Scheduling: Button used to create an APS scenario. This button will open the APS scenario setup screen.

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At the bottom of this screen, there are buttons for specific actions:

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Cancel: Button used to close the screen without saving the information.

Delete: Button used to delete the current APS scenario.

Default: Button used to set as default the current APS scenario.

3.1. Master Data Tab

This tab includes the specific information for the APS execution: the name of the scenario, the work orders to be scheduled and special sorting.

APS Scheduling Standard

Master Data Resources Views Calculation type

Scheduling Standard

Description Default

Work Orders

Start Date Today + Calendar days

Delivery Date Today + 60 Calendar days

Project

Priority

Production type 'Make to stock', 'Sales Order'

Branch

Employee

Item Material Group

Item Properties

Item Group

Filter SQL

Hide active

Hide printed

Hide locked

Planned Work Orders All

Sorting

Name SQL-Order-Statement for table BEAS_FTHAUPT,BEAS_FTPOS,OITM

OK Cancel Delete Default

Scheduling: Field used to define a unique name for the APS scenario.

Description: Field used to add a description for the APS scenario.

The following fields are used for filtering based on work orders:

Work Orders			
Start Date	Today +	<input type="text"/>	Calendar days
Delivery Date	Today +	60	Calendar days
Project	<input type="text"/>		
Priority	<input type="text"/>		
Production type	"Make to stock", "Sales Order"		
Branch	<input type="text"/>		
Employee	<input type="text"/>		
Item Material Group	<input type="text"/>		
Item Properties	<input type="text"/>		
Item Group	<input type="text"/>		
Filter SQL	<input type="text"/>		
Hide active	<input type="checkbox"/>		
Hide printed	<input type="checkbox"/>		
Hide locked	<input type="checkbox"/>		
Planned Work Orders	All		

Start Date Today +: Field used to set a time range, based on the start date, to be considered when filtering the work orders to be included in the APS execution. For more information, please refer to the field *Start Date Today +* in the *Process* section.

Delivery Date Today +: Field used to set a time range, based on the delivery date, to be considered when filtering the work orders to be included in the APS execution. For more information, please refer to the field *Delivery Date Today +* in the *Process* section.

Project: Field used to set an existing project and filter to consider only work orders linked to this specific project.

Priority: Field used to set existing priorities, defined in SAP, and filter to consider only work orders linked to these specific priorities.

Production Type: Field used to set existing production types, defined in beas, and filter to consider only work orders which are the specific production types.

Branch: Field used to set existing branches, defined in SAP, and filter to consider only work orders of items which are linked to these specific branches.

Employee: Field used to filter the work orders to be displayed by the resources assigned to the specific employee. For more information, please refer to the *Resources* tutorial.

Item Material Group: Field used to set existing item material groups and filter to consider only work orders of items which are linked to these specific item material groups.

Item Properties: Field used to set existing item properties and filter to consider only work orders of items which are linked to these specific item properties.

Item Group: Field used to set existing item groups and filter to consider only work orders of items which are linked to these specific item groups.

Example: For example, if the user has created an item group called "Finished Products" in SAP, it can be selected here. Then, the APS scheduling screen will only display work orders with items that are assigned to this item group.

Filter SQL: Field used to define a specific filter created by the user using SQL statements, if the criteria for filtering is not sufficient. The code entered will be inserted behind "WHERE" and before "ORDER BY". This filter will use the following tables:

- Work Order: BEAS_FTHAUPT
- Work Order Position: BEAS_FTPOS
- Item: OITM

Example: if the user wants to include the filter: only item whose item number start with A, the code should be: `substring("OITM"."ItemCode",1,1)='A'`

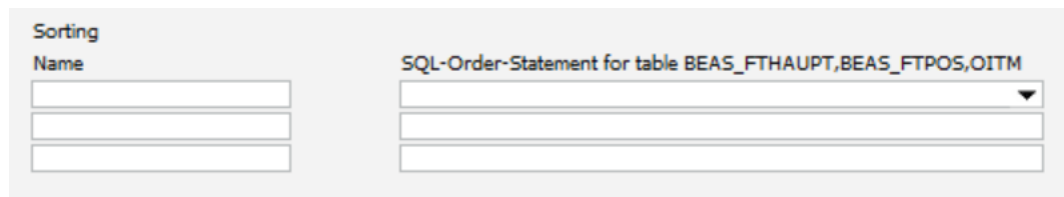
Hide Active: Field used, when enabled, to not display the work orders that are currently in process or active.

Hide Printed: Field used, when enabled, to not display the work orders that are printed.

Hide Locked: Field used, when enabled, to not display the work orders that are currently blocked.

Planned Work Orders: Field used to set which work orders are taken into account in the APS execution. For more information, please refer to the field *Planned Work Orders* in the *Process* section.

The following fields are used for sorting based on SQL statements:



Name: Field used to define a name for the sorting to be included.

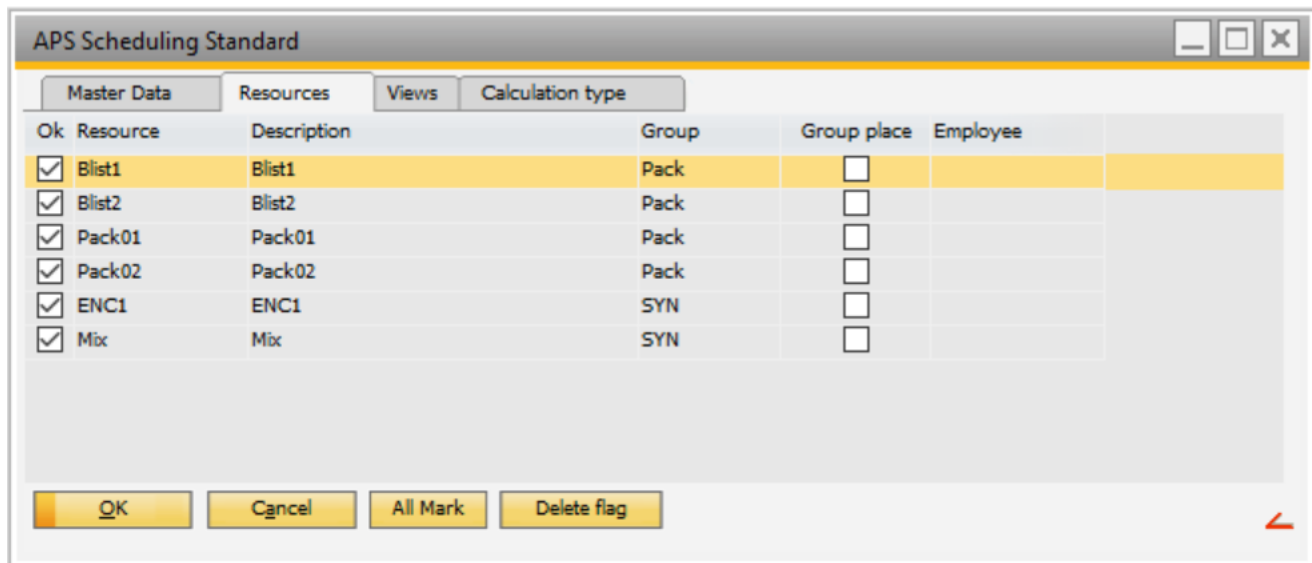
SQL-Order-Statement for table BEAS_FTHAUPT, BEAS_FTPOS, OITM: Field used to sort the work order list from the APS scenario, according to specific rules. The available options are:

- *Manual Sorting* – Work orders can be sorted using drag & drop per scenario
- *Planned Start* – Work orders can be sorted by start time of the manufacturing assembly (BEAS_FTPOS.STARTZEIT)
- *Delivery Date* – Work orders can be sorted by delivery date of the assembly (BEAS_FTPOS.LIEFERDATUM)
- *Document Number* – Work orders can be sorted by document number and assembly position number
- *Project* – Work orders can be sorted by project number and start time of the manufacturing assembly
- *Customer* – Work orders can be sorted by customer number and start time of the manufacturing assembly
- *Item* – Work orders can be sorted by item (assembly) and start time of the manufacturing assembly
- *Priority* – Work orders can be sorted by priority ID (BEAS_FTPOS.ABGKZ)

IMPORTANT: No syntax check by beas. If an invalid value is entered, this leads to error when opening the planning list. The entered sorting templates are displayed in planning view at the end of the templates list.

3.2. Resources Tab

This tab lists the existing resources in beas that can be included in the APS execution.



Ok: Field used to select the resources to be included in the APS execution. For more information, please refer to the field *Ok* in the *Process* section.

Resource: Field used to display the resource name created in beas.

Description: Field used to display the resource description.

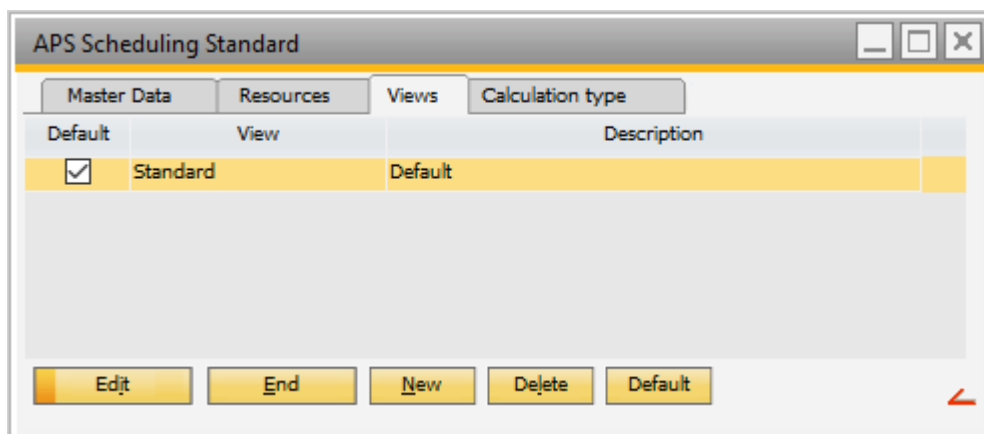
Group: Field used to display the group where the resource is assigned, if applicable.

Group Place: Field used to display if the resource is a resource group. For more information about this, please refer to *Resources* tutorial.

Employee: Field used to display the employee responsible for this resource.

3.3. Views Tab

This tab defines general parameters for the graphical view. This screen shows a list of the existing views. Here, the user can manage them.

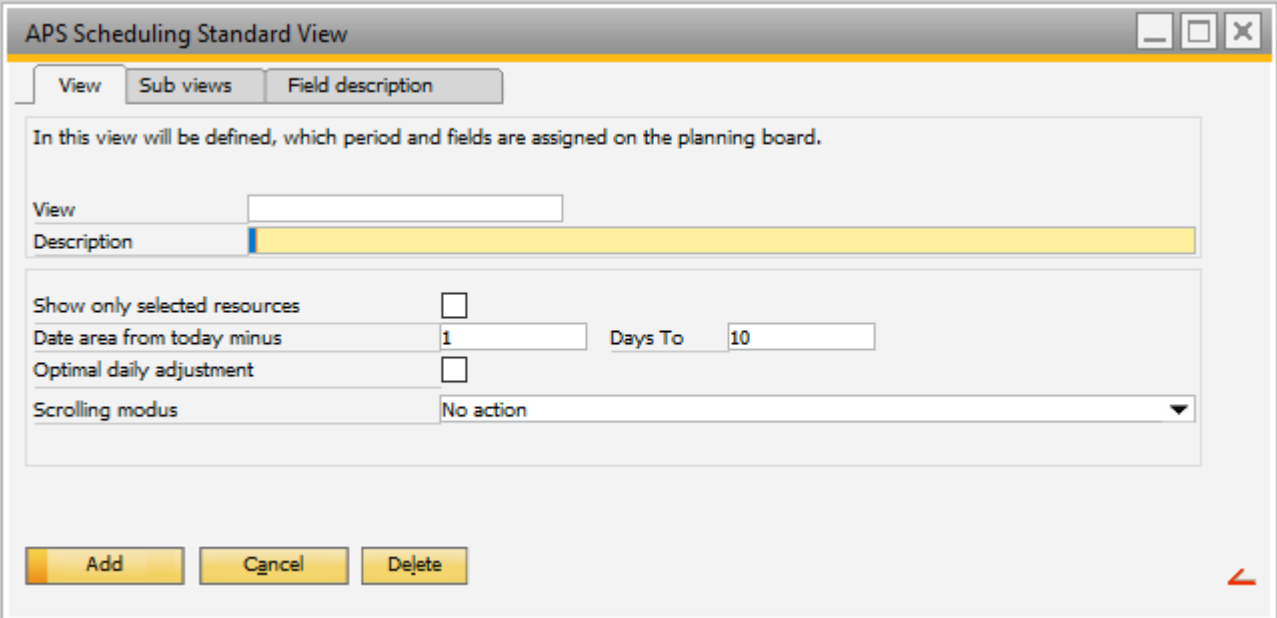


Edit: Button used to edit the selected view.

Delete: Button used to delete the selected view.

Default: Button used to set a selected row as default.

New: Button used to create a view. Once the user clicks on this button, a new screen opens.



The screenshot shows a dialog box titled "APS Scheduling Standard View" with three tabs: "View", "Sub views", and "Field description". The "View" tab is active. The dialog contains the following fields and controls:

- A text input field for "View".
- A text input field for "Description".
- A checkbox for "Show only selected resources".
- A numeric input field for "Date area from today minus" with the value "1".
- A numeric input field for "Days To" with the value "10".
- A checkbox for "Optimal daily adjustment".
- A dropdown menu for "Scrolling modus" with the selected option "No action".
- Three buttons at the bottom: "Add", "Cancel", and "Delete".

The screen is divided into three tabs: View, Sub views, and Field description.

The View tab contains:

View: Field used to add a name for the view to be created.

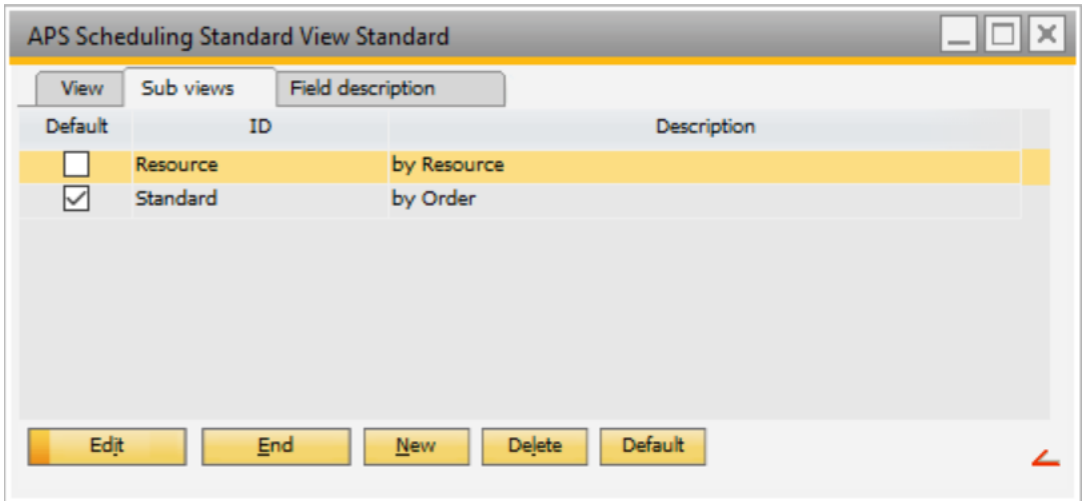
Description: Field used to add a description for the view.

Show Only Selected Resources: Field used to define whether all available resources in the work order should be displayed or only those selected in the tab *Resources*. In order-related planning, the user will usually want to display all resources that are in the work order. In resource-oriented planning, the user will usually want to consider a particular machine or machine group.

Date Area from Today Minus / Days To: Field used to define the time range in which the work orders are going to be displayed. For more information, please refer to the field *Date Area from Today Minus / Days To* in the *Process* section.

Optimal Daily Adjustment: Field used to determine whether the day view should be scaled automatically or not. In most cases, it is better not to use this parameter and to define a fixed value.

Scrolling Modus: Field used to determine the behavior when the user moves an operation in the graphical view. For more information, please refer to the field *Scrolling Modus* in the *Process* section.



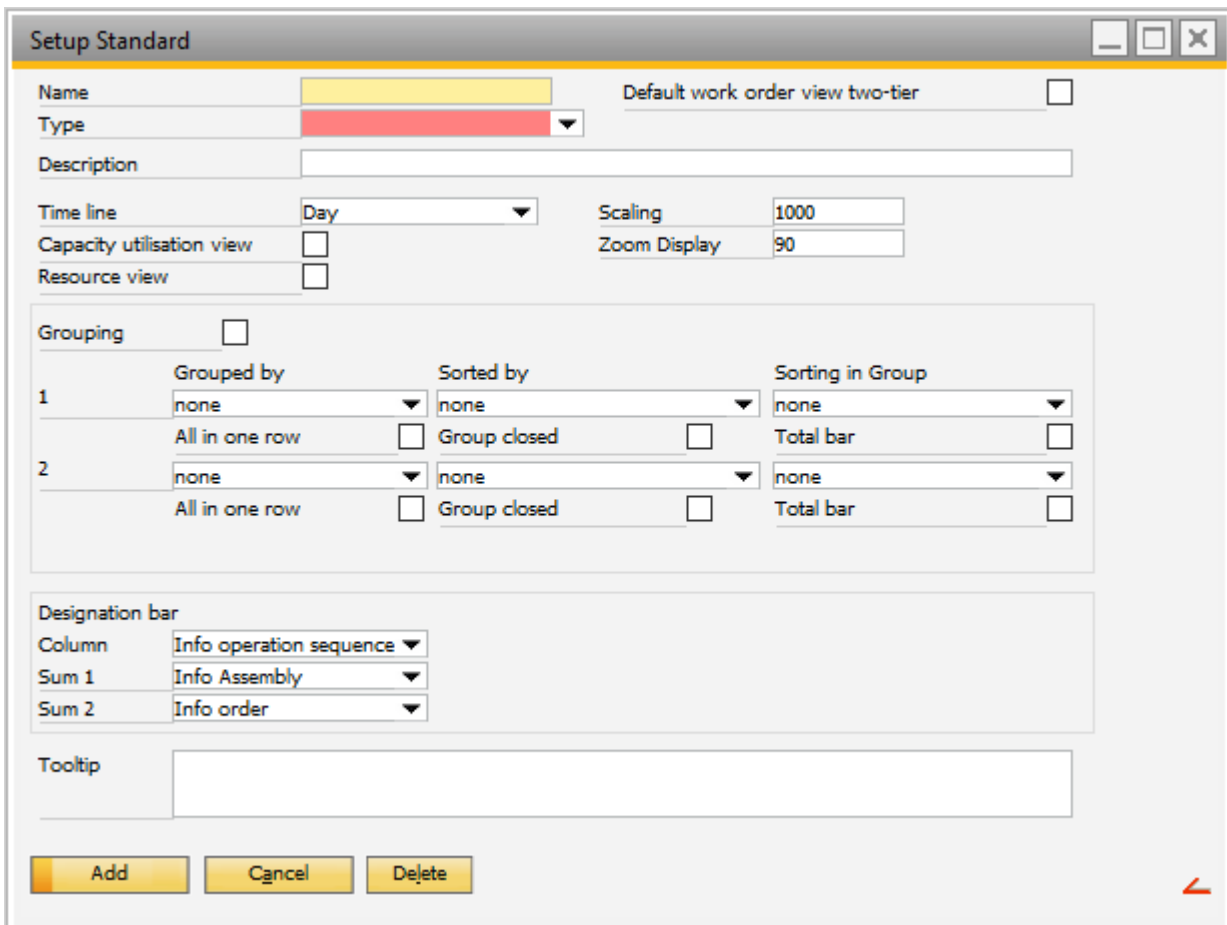
The graphical view is configured here and defines which information is displayed. The *Sub views* tab contains a list of existing sub views, if applicable, where the user can manage them:

Edit: Button used to edit the selected sub view.

Delete: Button used to delete the selected sub view.

Default: Button used to set a selected sub view as default.

New: Button used to create a sub view. Once the user clicks on this button, beas opens a new screen.



Name: Field used to set a name for the sub view to be created.

Type: Field used to define whether the view is "Resource" or "Order" type.

Description: Field used to add a description for this sub view. For more information, please refer to the field *Description* in the *Process* section.

Default Work Order View Two-tier: Field used to set the standard sub-view as default instead of the one defined in the grouping area. If this field is enabled, all previous information saved in grouping area will be replaced by the standard sub-view parameters.

Before setting this parameter:

The screenshot shows the 'Setup Standard' dialog box. The 'Name' field is 'Resource', 'Type' is 'Resource', and 'Description' is 'by Resource'. The 'Default work order view two-tier' checkbox is unchecked. The 'Grouping' section is expanded, showing two rows of configuration:

	Grouped by	Sorted by	Sorting in Group
1	Resource	Name Resource	Work Order Document no
	All in one row	Group closed	Total bar
2	none	none	none
	All in one row	Group closed	Total bar

After setting this parameter:

The screenshot shows the 'Setup Standard' dialog box after the 'Default work order view two-tier' checkbox is checked. The 'Name' field is 'Resource', 'Type' is 'Resource', and 'Description' is 'by Resource'. The 'Grouping' section is expanded, showing two rows of configuration:

	Grouped by	Sorted by	Sorting in Group
1	Info order	Work Order Document no	Assembly Position
	All in one row	Group closed	Total bar
2	Info Assembly	Assembly Position	operation sequence Internal f
	All in one row	Group closed	Total bar

Time Line: Field used to determine whether the graphical view is in hours, days or years. For more information, please refer to the field *Time Line* in the *Process* section.

Capacity Utilization View: Field used to display graphically the utilization of the resources in addition to the graphical display of work orders in the Gantt view.

Resource View: Field used to display graphically the reservation of the resources in addition to the graphical display of work orders in the Gantt view.

IMPORTANT: Since the available space is limited, the user should only activate what is really needed.

Scaling: Field used to set the scaling factor based in time units. This factor is taken into account in the timeline scaling (Time units per mm. = 1000 by default).

Zoom Display: Field used to set the zoom factor for display. By default, beas sets this with the value "90".

Grouping: Field used to structure the view. For more information, please refer to the field *Grouping* in the *Process* section.

Group by (1 & 2): Field used to define according to which information the work order is to be grouped (grouping 1). For more information, please refer to the field *Grouping by (1 & 2)* in the *Process* section.

All in One Row (1 & 2): Field used to set if the operations should be displayed individually or in a group. For more information, please refer to the field *All in One Row (1 & 2)* in the *Process* section.

Sorted by (1 & 2): Field used to set the variable to sort the information and structure the view according to the grouping 1 & 2.

Group Closed (1 & 2): Field used to define whether Grouping 1, by work order, should be expanded or closed. For more information, please refer to the field *Group Closed (1 & 2)* in the *Process* section.

Sorting in Group (1 & 2): Field used to set the variable to sort in group the information and to structure the view.

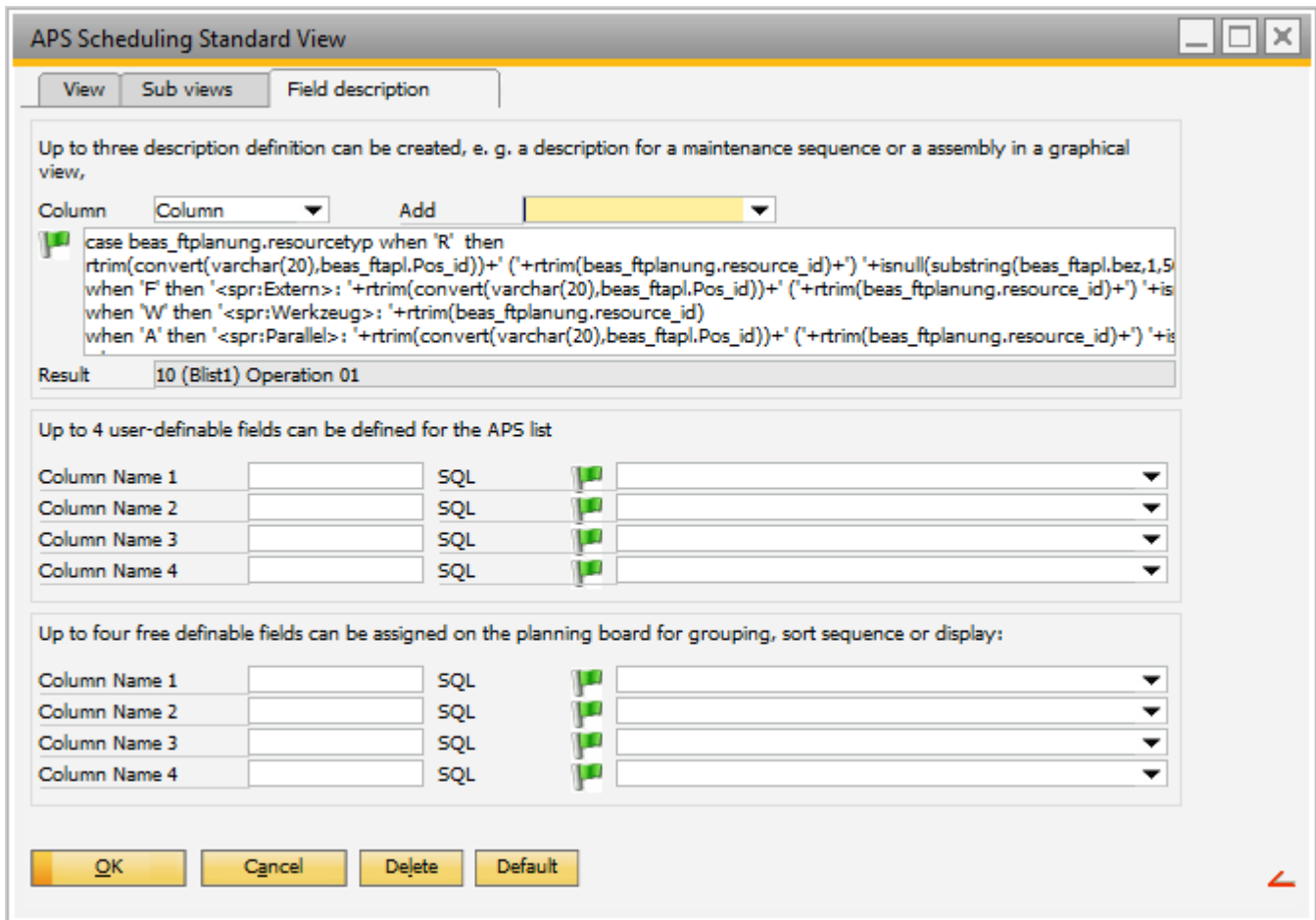
Total Bar (1 & 2): Field used to activate the sum bar at the group levels 1 & 2.

Column: Field used to determine which information is displayed on the bar operation. By default, beas sets this with the value "Info Operation Sequence".

Sum 1: Field used to determine which information is displayed on the total bar of level 1. By default, beas sets this with the value "Info Assembly".

Sum 2: Field used to determine which information is displayed on the total bar of level 2. By default, beas sets this with the value "Info Order".

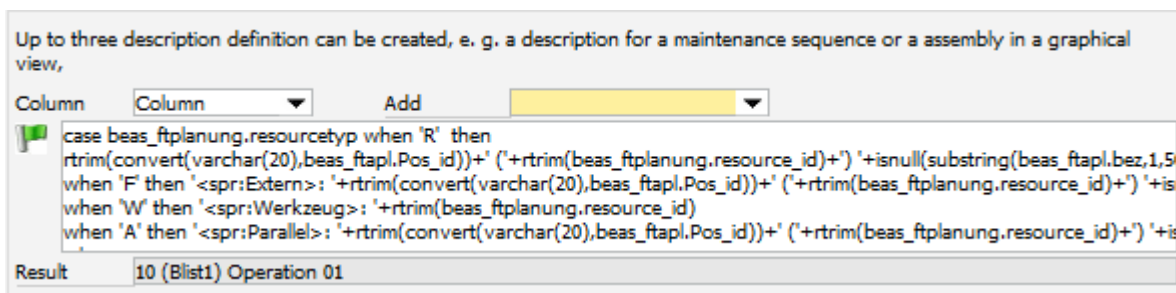
Tooltip: Field used to define what is displayed when the user hovers the mouse over the operation bar. This field allows an SQL statement that determines and displays the necessary information.



The *Field Description* tab defines the information that should be displayed for the labeling of the groups (Blue lines).





Example: the operation line displays the operation number, *Sum1* the work order position number and *Sum2* the work order number.

With the SQL Editor, the user can change the displayed information and display individual descriptions.







To use specific columns in the APS planning window, 4 virtual columns are available. The user can assign a column name and choose a data field from the selection list. If the desired information is not available, the user can input their own data using a SQL statement.

Up to 4 user-definable fields can be defined for the APS list

Column Name 1	<input type="text"/>	SQL		<input type="text"/>	▼
Column Name 2	<input type="text"/>	SQL		<input type="text"/>	▼
Column Name 3	<input type="text"/>	SQL		<input type="text"/>	▼
Column Name 4	<input type="text"/>	SQL		<input type="text"/>	▼

For the sub views, the user can define 4 additional SQL statements that are then available in the selection list for labeling the Operation, Sum 1 and Sum 2 bars.

Up to four free definable fields can be assigned on the planning board for grouping, sort sequence or display:

Column Name 1	<input type="text"/>	SQL		<input type="text"/>	▼
Column Name 2	<input type="text"/>	SQL		<input type="text"/>	▼
Column Name 3	<input type="text"/>	SQL		<input type="text"/>	▼
Column Name 4	<input type="text"/>	SQL		<input type="text"/>	▼

3.4. Calculation Type Tab

In this tab, the user can assign different calculation types to be used in the APS. These types must be defined in previous steps. For more information, please refer to the tab *Calculation Type* in the *Process* section.