Shopfloor Terminal Configuration

Version 5.12

Manual

Content

1   About this document

This manual describes how to create Shopfloor Terminals, configure the displayed date and possible interactions.

Target group

We expect any user dealing with these configurations to have knowledge in the following subjects:

– Fundamental technical concepts of FORCE MES FLEX
This is required to configure the system based on templates and use cases.
– Advanced knowledge of the Shopfloor Terminal structure and configuration

You can acquire this knowledge in the following FORCAM Academy courses:

– FORCE BAA – Basic admin
– FORCE SFT – Advanced Shopfloor Terminal Configuration

⚠ Additional specific knowledge is required if you want to configure Background Activities. If you do not have that knowledge, contact our technical consultants.

ⓣ We recommend that you use our Academy: **https://forcam.com/academie/**
The FORCAM Academy provides the knowledge to effectively use the methods for digital transformation and the technologies for the Smart Factory.
Based on lean manufacturing and TPM methods, our institute team will guide you to initiate changes in the company and to use the technologies correctly.

ⓣ In our **Customer Area** you can find all manuals and product descriptions as well as additional information on your release.

2 Concept

The Shopfloor Terminal (SFT) is the central source of information for the production personnel and for reporting operating states. Runtime course and runtime protocol are displayed in real-time. The SFT runs in a browser environment. The layout and the displayed information can be fully configured in each screen.

Figure 1: Shopfloor Terminal: Root base page (example)

A Shopfloor Terminal consists of a template and a profile.

In the template a user interface of the terminal is configured. It consists of one or more base pages that display tables and a button bar for user interaction.

The profile provides configurations relating to the user: login data, time zone, entry form, etc.

Combination of templates and profiles allows for a specified use of a Shopfloor Terminal for specific personnel in a specific plant.

Figure 2: Configuration page for the Shopfloor Terminal

2.1 Activity steps

All buttons of the Shopfloor Terminal (right-hand edge of the screen in Figure 1) are freely configurable. Each button equates to one activity step, which can be linked with a certain action. Possible actions are e.g., the change state of an operation state, the display of logged-in personnel, the search of workplaces to operations (Ops) etc. Overall, more than 100 activity steps are available.

There are two kinds of activity steps:

- with dialog
- without dialog

Activity steps with dialog

Activity steps with dialog can be used in cases where a selection is to take place, a separate display is to be shown or an entry is to be made after a button has been pressed.

The activity step opens a dialog. The content of the dialog depends on the linked activity. It is possible, for example, to display data only or to have a dialog with selection options.
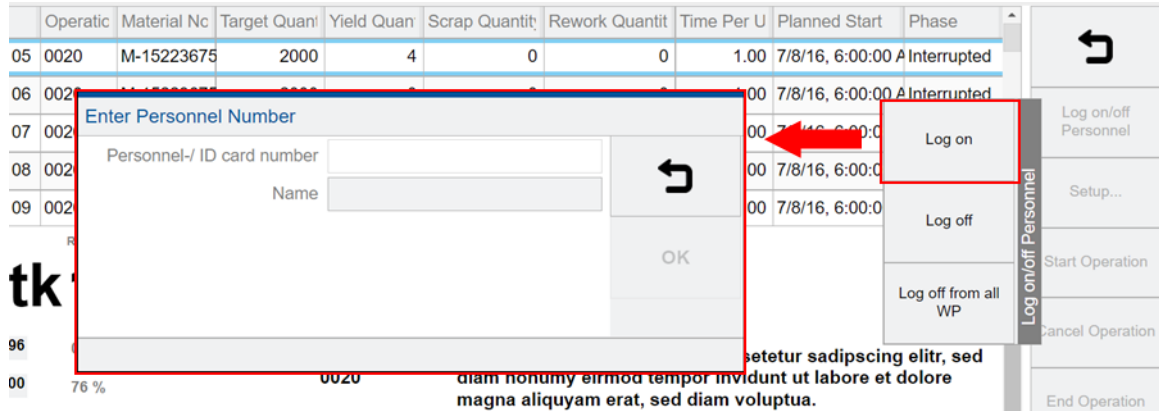
Figure 3: Input dialog after pressing a button

For an activity step with a dialog, the display and content format can be configured. If the dialog is displayed in table form, the table can be formatted as desired.

The button in the Shopfloor Terminal itself does not show whether the button triggers a dialog. The type of activity step can only be seen in the configuration. Activity steps with a dialog are marked with a corresponding icon (see Figure 4).
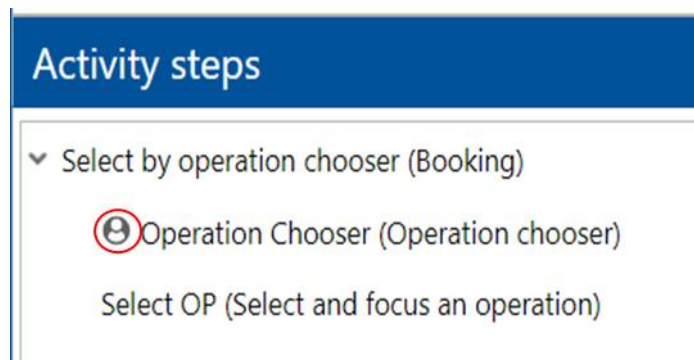
Figure 4: Identification of a dialog in an activity step

Activity steps without dialog

Activity steps without dialog carry out activities that do not require input or display a separate dialog. The result of pressing a button is thus the direct activity without an additional step.
E.g. filtering and sorting of orders or start / end the operation.
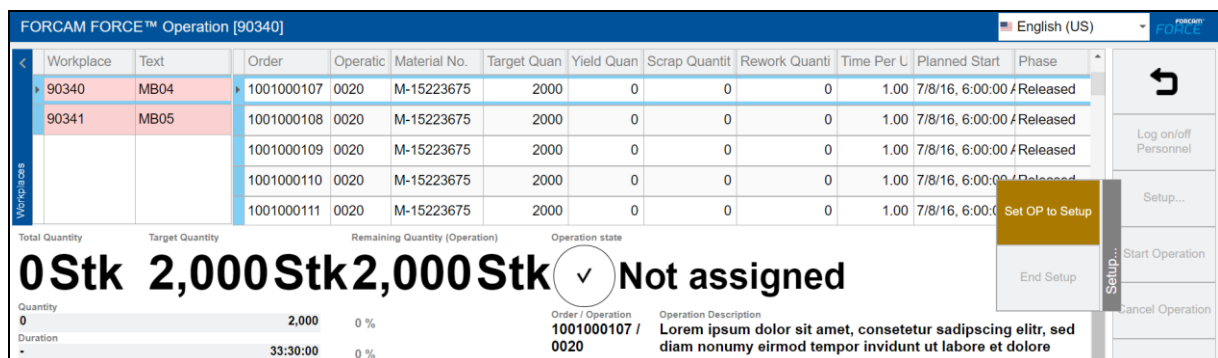
Figure 5: Example for button without the dialog

The result is a direct response to a button without a dialog:
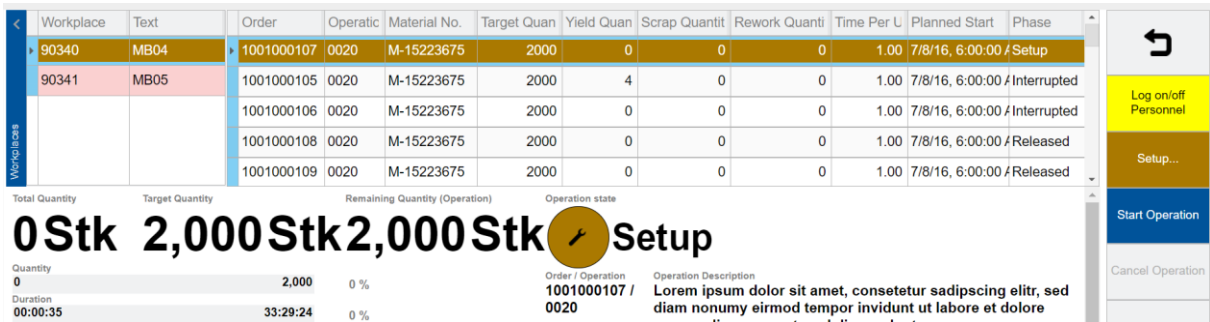
Figure 6: Starting the Setup phase after pressing the button

Since the activity step triggers a direct action as a result, this must be defined in the configuration. Depending on the desired activity, input and output parameters must be configured accordingly.

2.2 Parameters

Each activity step requires the configuration of input parameters and if applicable output parameters, to read and export the correct information or to execute a step, respectively. The configuration of input and output parameters is done via the dialog for the configuration of activity steps.
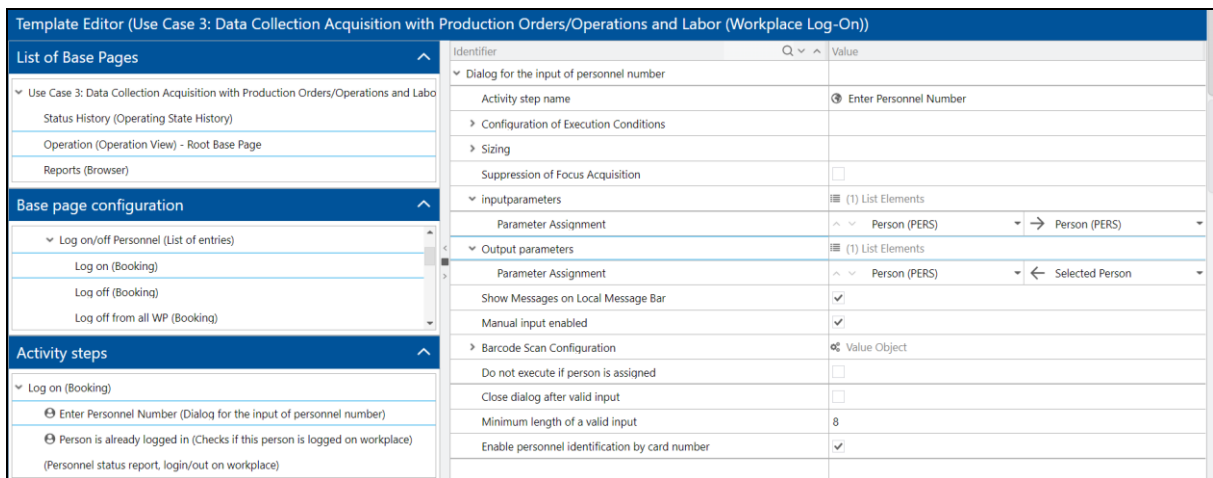
Figure 7: Dialog for the configuration of activity steps in the Shopfloor Terminal configuration

Parameters are each selected in two side-by-side drop-down menus (see Figure 8).

The left drop-down menu determines the domain of the activity. Here is defined, to which type the activity step relates. The following types are available:

- **OP** (operation)
- **WPL** (workplace)
- **PERS** (person)
- **UNKNOWN** (place holder for any type)

The right drop-down menu determines the actual parameter of the activity step. Depending on the selected domain, there are corresponding parameters available.

		Domain		Parameter	
Suppression of focus acquisition	☐				
∨ *Input parameters*	☰ (2) List Elements				
Parameter assignment	∧ ∨	Workplace (WPL)	▼ →	Workplace (WPL)	▼
Parameter assignment	∧ ∨	Person (PERS)	▼ →	Person (PERS)	▼

Figure 8: Selection of domain and parameter of activity steps

Domain and parameter must coincide textually. For example, if a workplace shall be determined as parameter, it must consequently be in the domain workplace.

If domain and parameter do not coincide textually, the line of the parameter assignment is marked in red (see Figure 9). Therefor the system check for conformity equals a consistency check.

Parameter assignment	∧ ∨	Person (PERS)	▼ →	Workplace (WPL)	▼
Parameter assignment	∧ ∨	Person (PERS)	▼ →	Person (PERS)	▼

Figure 9: Textual inconsistency of domain and parameter

2.2.1 Input parameter

Input parameters determine the data that an activity step requires to be processed. The function of input parameters is displayed in the following figure.
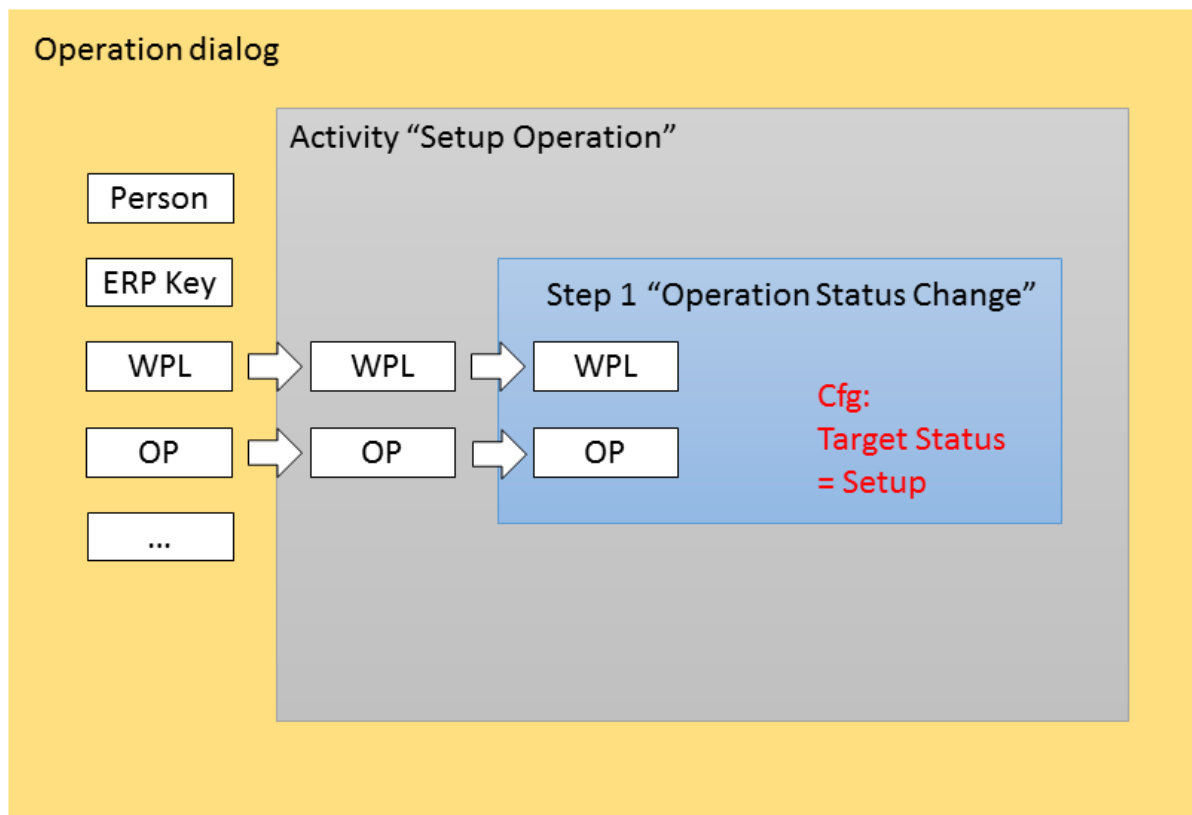
Figure 10: Function of input parameters

In this example, the button *Setup operation* is pressed in the Shopfloor Terminal. As a result, the system is to change the status of an operation to *Setup*. The button starts the activity *Setup*

operation. This activity executes the activity step *Operation phase change* with the target status *Setup*.

To change the operation status, the activity step requires data on the operation itself. Hence, the operation is the required parameter. An operation always refers to a workplace. Therefor the domain of the operation is the workplace. This results in *WPL* and *OP* being the input parameters for the activity step *Operation status change*.

2.2.2 Output parameter

Output parameters are not the indication of data that an activity step e.g., in the form of a display or a dialog export. They are parameters that are transferred internally to be used in further steps. The function of input parameters is displayed in the following figure.
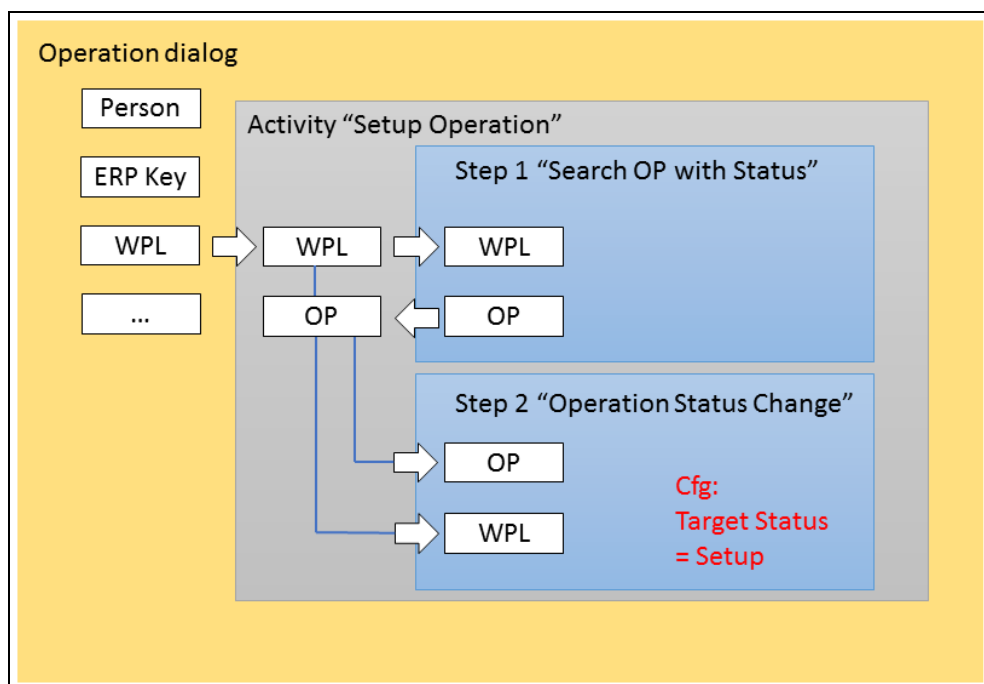
Figure 11: Function of output parameters

In this example, the button *Setup operation* is pressed in the Shopfloor Terminal. As a result, the system is to change the status of an operation to *Setup*. The button starts the activity *Setup operation*. This activity executes the activity step *Search OP with status*. The activity step exports data of operations with status. The next activity step *Operation status change* receives these data and changes the status of the corresponding operation to *Setup.*

The activity step *Search OP with status* searches for operations at workplaces. Therefore, the activity step requires data of workplaces as input parameter: *WPL*. The operations that the activity step detects are exported as output parameters: *OP*.
The activity step *Operation status change* shall change the status of the operation that was identified by the predeceasing activity step. The input parameters needed by this activity step are *OP*, which are provided by the predeceasing activity step as output parameters. In addition, *WPL* is used as domain, since an operation always refers to a workplace.

3   Creating templates

Figure 12: Shopfloor Terminal: Templates

Path: Configurations > Shopfloor Terminal

To create a new template:
1. Click on the **+** icon in the **Templates** area.
➔   A template previously selected is copied and the associated settings are adopted.
2. Enter the **Name** and **Description**.
3. Save.
4. Click on the pencil icon (Edit) in the column **Edit**.
➔   The display switches to the **Template Editor** (see Figure 13**Fehler! Verweisquelle konnte nicht gefunden werden.**).
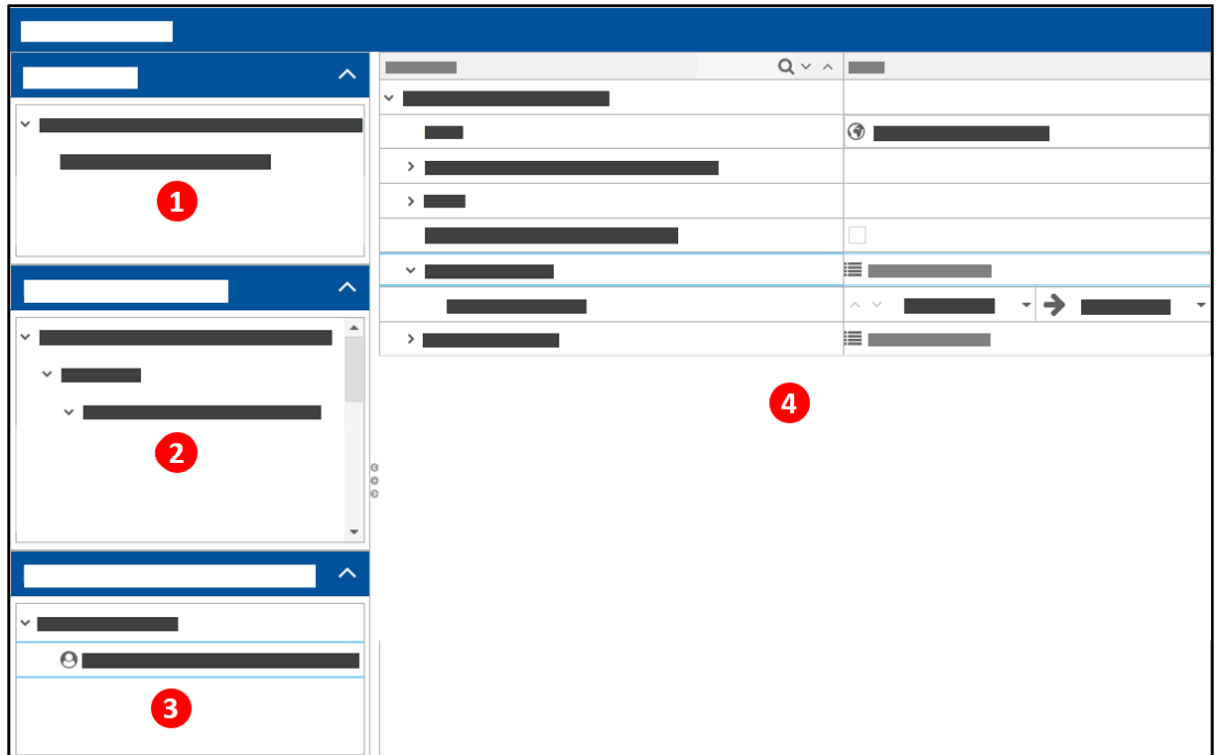
Figure 13: Template Editor

The template editor consists of the following areas:
(1) List of Base Pages:

List of all base pages in the template. There are 7 predefined page types overall. Each type has individual settings.
(2) Base page configuration:
Configuration of buttons and display areas of single base pages.
(3) Activity steps:
Configuration of activity steps of single buttons from the button bar of a base page.
(4) Editing area:
Any setting is displayed and executed here.

After a new template is created, the user must create and configure a base page.

3.1 Creating base pages

There are 7 predefined base pages overall. Each base page shows fields that are reasonable for it and therefore are predefined by default:

- Operation View:
  Displays workplaces and operations.
- Browser:
  Displays a report, a visualization, a HTML page, or switches to another base page.
- Machine Monitoring View:
  Display of workplaces with the current machine status for the configured timespan (e.g., shift)
- NC View:
  Display of NC packets to an OP
- Operating State History:
  Display of operation states with the option to transcode them. This is used for Machine Workplace and Manual Machine Workplace.
- Operating Production Status History:
  Display of operation states with the option to transcode them. This is used for "Manual Workplace".
- Tool Data Management:
  Display tools and their characteristics that can be requested and picked in cooperation with TDM Systems

One base page within a template will be the root base page.
The root base page is the one that is initially displayed when the SFT is opened.

Path: Configurations > Shopfloor Terminal

To create a new base page:
1. In the **Templates** area click on the pencil icon (Edit) in the column **Edit**.
→ The display switches to the Template Editor.
2. Right-click on the template name in the **List of Base Pages** area, then click on **Add Base Page** in the context menu.
3. Select the desired type of base page from the drop-down menu.
4. Enter the **Name** and **Description** and confirm.
→ The page appears in the **List of Base Pages** area and **Base page configuration** area with default settings.
5. Save.

To edit a base page:
1. In the **Templates** area klick on the pencil icon (Edit) in the column **Edit**.
   ➔ The display switches to the Template Editor.
2. Double click on a base page.
   Or
   Right-click on a base page, then click on **View/Edit** in the context menu.
3. Change the desired settings in the **Base page configuration** area.
4. Optional: Right-click on a base page, then click on **Root Base Page** in the context menu.
   ➔ The page appears after logging in in the Shopfloor Terminal.
5. Save.

The settings of a base page vary with the type. The available settings are described in the following chapters.

3.1.1 Operation View

The Operation View screen provides an overview of available workplaces and orders /operations as standard. Operation details are displayed in real time. Activity steps can be carried out via a button bar, e.g., to start operations or to book quantities.
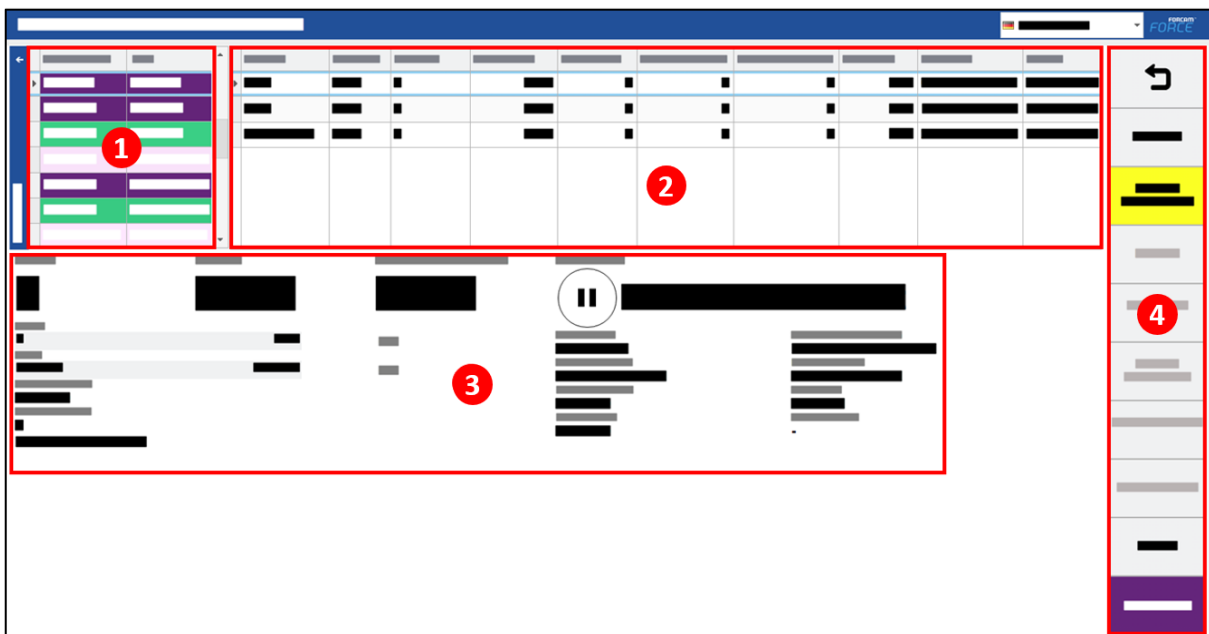
Figure 14: Operation View dialog

(1) Workplace table
(2) Operation Table
(3) Operation Details – Displays information of the selected operation by default (e.g., quantity, duration, status, etc.).
(4) Button Bar

Important setting of Operation View and their functions are listed below.

Setting	Function
Name	Name of the base page.
Description	Description of the base page.
Height Upper Table	Specification in %
Width of the workplace	Specification in %
Width of the Operation List	Specification in %
Automatic update cycle for complete base page [ms]	The two upper tables for workplace and operation are automatically updated cyclically after the specified time in milliseconds.
Automatic Update Cycle for Detail View [sec]	The display area for Operation details updates automatically regularly after the specified time in seconds.
Open workplace list initially	If the box is checked, the list of associated workplaces will be displayed every time this base page is opened.
Operation list sorting ascending order – Keep empty values at bottom	If the box is checked, the sorting is performed on table, the null values are arranged at the bottom of the table.
Full screen mode for detail view	If the box is checked, the detail view will be displayed in full screen mode when called.
Barcode Scan Configuration	Functionality described in chapter 3.4.2 "Barcode scan configuration".
Search operations on all terminal workplaces	If the box is checked, an operation is searched for in all workplaces, that are shown by a Shopfloor Terminal. Otherwise, an operation is only searched for in the currently selected workplace.
Terminal identification	It is required to identify from which terminal the action is performed. E.g.: A worker books a quantity from terminal A. The administration wants to know if this quantity was booked from terminal A, B or C.
	Use Terminal Identification	Configuration to enable the terminal identification
	File for Terminal Identification	Enter path of the file on the local client that contains additional identification to identify the terminal.
	Regular expression for terminal identification	Specify the regular expression with which the identification can be verified.
NC/DNC Configuration	
	Activate NC/DNC information acess	When the box is checked, if the PDM packet is resolved, it returns to true. Otherwise, it is false.

Table 1: Settings for Operation View screen

In the configuration of the Operation View, the layout of the tables for workplaces , operations and operation details can be determined in the center of the screen. Input and output parameters determine which data can be displayed and passed on.

Base page configuration settings for the Operation View are listed below.

Content		Description
Workplace table		
	Table Configuration	Functionality described in chapter 3.4.4.
	Input parameter	Selected Workplace of the base page → Selected Workplace
	Output parameter	Selected Workplace of the base page ← Selected Workplace
Operation Tabel		
	Table Configuration	Functionality described in chapter 3.4.4.
	Input parameter	The following settings are valid for most use cases. Deviations from this should be carefully considered. Selected Workplace of the base page → Workplace Bar Code String → Bar Code String
	Output parameter	The following settings are valid for most use cases. Deviations from this should be carefully considered. Selected Operation of the base page ← Operation
Operation Details		

	HTML Configuration	− **HTML operation template**:
		  To display the operation details dynamically and based on requirement, the operation details is configured with HTML and JAVA scripting.
		− **HTML Operation Block Template**:
		  This block template can be defined for Block operations separately. If the selected operation is part of block operations, the operation detail view is automatically switched to HTML for block operation. If the block template is not defined, the regular template HTML view will be rendered.
		− **Report configurations**

	Input parameter	The following settings are valid for most use cases. Deviations from this should be carefully considered. Selected Workplace of the base page → Workplace Selected Operation of the base page → Operation
	Output parameter	No configuration required.

Table 2: Operation View: Base page configuration settings

3.1.2 Browser

The browser screen can display any website. It is also possible to display reports, dashboards, or visualizations. Activity steps can be executed via a button bar, e.g., to call up certain reports from the Office module or to navigate to the customer-specific intranet.
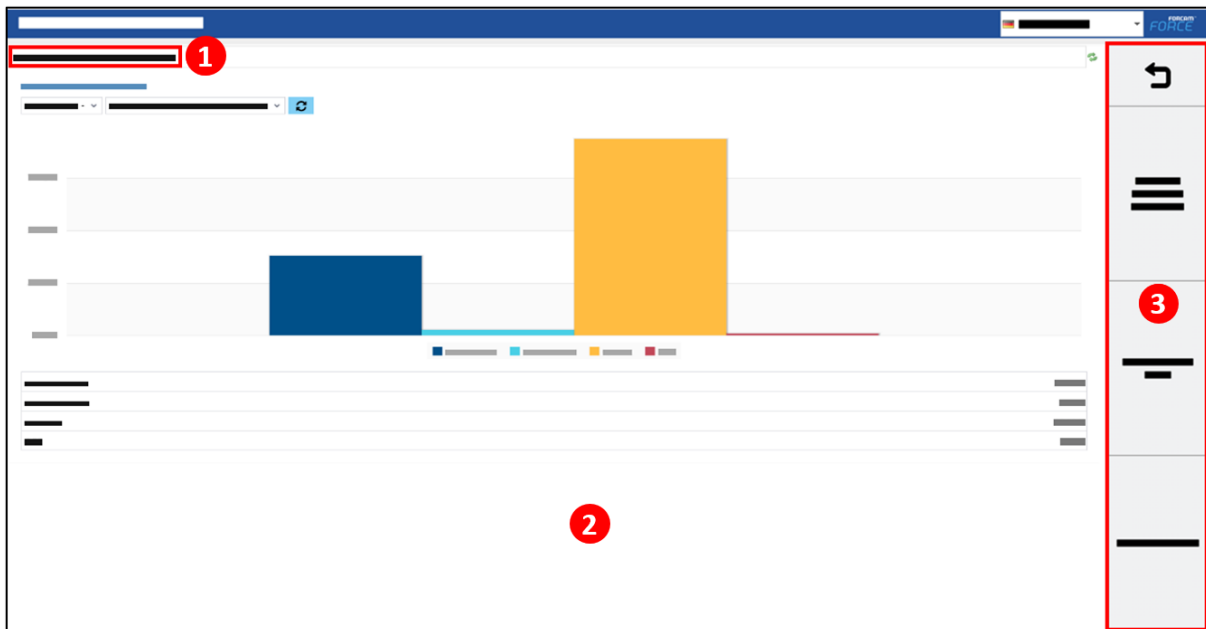
Figure 15: Browser dialog

  (1) URL bar – Only displayed if configured.
  (2) Representation Range – Displays the configured website, report, dashboard or visualization.
  (3) Button Bar – Each button on the bar can be freely configured. By default, pre-configured buttons forward to certain reports of the Office module.

In **Representation Range** you can configure the URL which you want to display in the browser.

Important setting for the **Representation Range** and their functions are listed below.

Setting	Function
Default URL	Enter a desired URL according to the following scheme: **https://www.forcam.com** ⚠ There must not be a space after a URL.
URL View in a Bar	If the box is checked, the configured URL is displayed in the bar.
URL editable	If the box is checked, you can edit the URL in the bar.
URL is given in encoded format	If the box is checked, the URL is displayed in encoded format.
URL parameter list	If you want to pass the parameter to the URL, e.g., calling report for selected workplace and selected shift, you can configure this parameter here.

3.1.3 Machine Monitoring View

The Machine Monitoring View provides an overview of workplaces with corresponding statuses. In the middle of the display area, reports can be displayed, but you can also display any websites. The lower table lists operating status for the selected workplace.
Activity steps can be executed via a button bar, e.g., to change the workplace status.
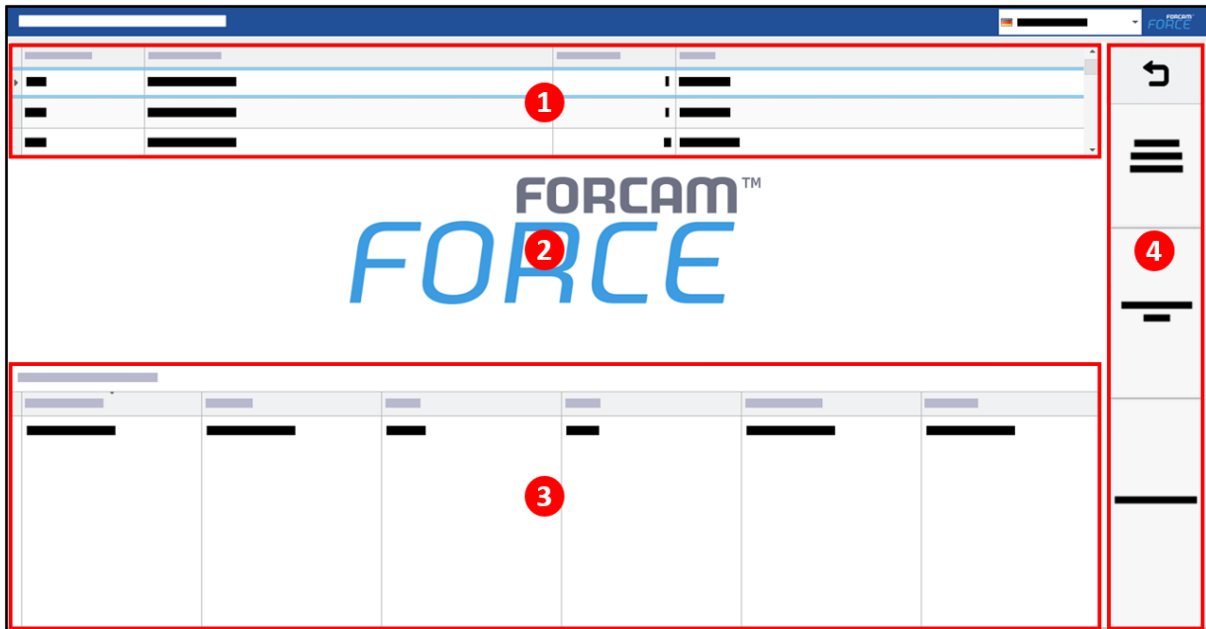
Figure 16: Machine Monitoring View dialog

  (1) Workplace table – Displays workplaces with corresponding status color.
  (2) Representation Range – Displays the configured website, report, dashboard or visualization.
  (3) Status Table – Displays the status history for the selected workplace.
  (4) Button Bar

Important setting for Machine Monitoring View and their functions are listed below.

Setting	Function
Name	Name of the base page.
Description	Description of the base page.
Height Upper Table	To define the page distribution to display workplace table, reporting area and status history summary.
Height of the display area	
Height Lower Table	
Automatic update cycle for complete base page [ms]	The two upper tables for Workplace and operation are automatically updated regularly after the specified time in milliseconds.
Time range unit	To display the workplace status in status history.
Time range value	

Table 3: Settings for Machine Monitoring View screen

Base page configuration settings for the Machine Monitoring View are listed below.

Content		Description
Workplace table		
	Table Configuration	Functionality described in chapter 3.4.4.
	Input parameter	The following settings are valid for most use cases. Deviations from this should be carefully considered. Workplace → Selected Workplace
	Output parameter	The following settings are valid for most use cases. Deviations from this should be carefully considered. Workplace ← Selected Workplace
Representation Range		

	Control Configuration	– **Default URL**:
		   Enter a desired URL according to the following scheme:
		   https://www.forcam.com
		⚠ There must not be a space after a URL.
		– **URL View in a Bar**:
		   If the box is checked, the configured URL is display in the bar.
		– **URL editable:**
		   If the box is checked, you can edit the URL in the bar.
		– **URL is given in encoded format**
		   If the box is checked, the URL is displayed in encoded format.
		– **URL Parameter list**:
		   If you want to pass the parameter to the URL, e.g., calling report for selected workplace and selected shift, you can configure this parameter here.

Status Table		
	Table Configuration	Functionality described in chapter 3.4.4.

Table 4: Machine Monitoring View: Base page configuration settings

3.1.4 NC View

The NC View displays data from the FORCE MES FLEX Document Control Module. Packets can be displayed with associated parameters such as packet status, creator and annotation. The lower table lists elements that are linked to the respective packet. A button bar can be used to carry out activities, e.g., to send files to a machine or to receive files from a machine.
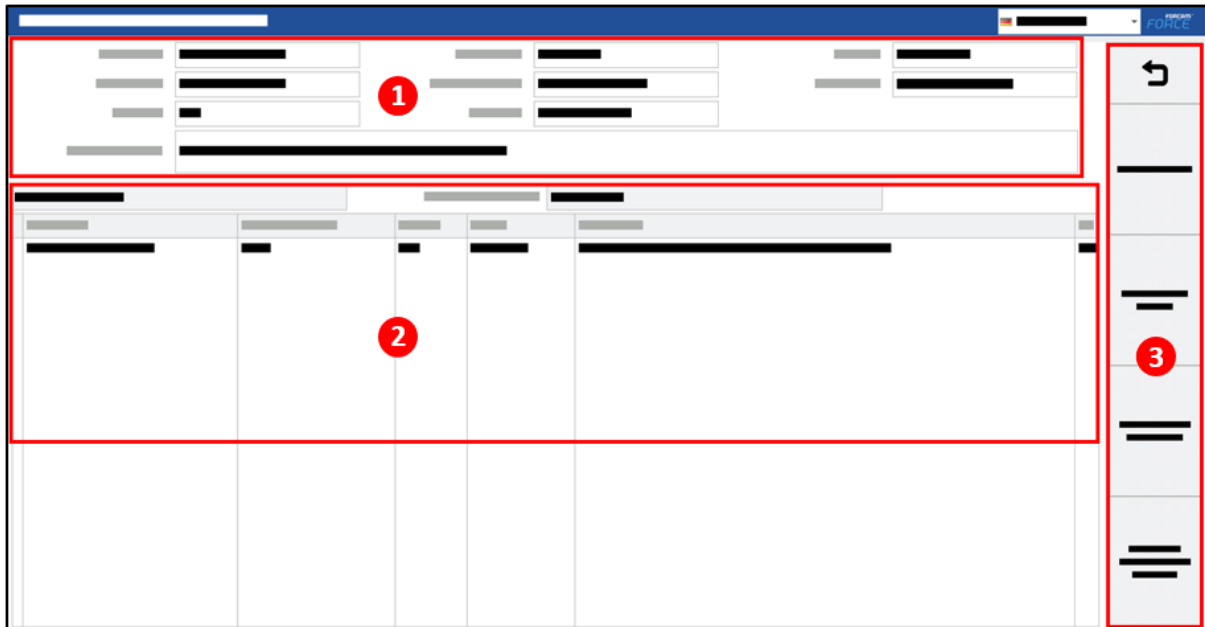
Figure 17: NC View dialog

(1) Packet table – Displays the packet details.
(2) NC Element table – Displays the list of elements in the table for the respective packet.
(3) Button Bar – Each button can be freely configured. By default, the buttons are preconfigured for NC use (Show file, Send to machine, Receive from machine, Send NC program with sequence).

Important setting for NC View and their functions are listed below.

Setting	Function
Name	The name of the mask.
Description	The description of the mask.
NC mode	– NC Line Cell-Oriented – NC Line With Repesentative WPL – Singel Workplace
Default transfer mode	– Manual – Max. version
Transfer mode changeable by user	If the box is checked, the transmission mode can be changed manually in the SFT.
Element Filter Assignment	Determines which filters are available for the element table. Filters can be added by double-clicking in the value column.
NC packet header area	Determines the appearance and the displayed data of the packet table. – **Number of columns** specifies how many columns the header elements are to be aligned in. – **Header Items** can be added, removed or sorted in the respective drop-down menu.
Packet search area	Determines the search options available.

Setting		Function
	Manual packet search	If the box is checked, manual packet search is enabled.
	Open packet search pane initially	If the box is checked, the packet search pane will be displayed every time this base page is opened.
	Pane hight	Specification in %
	Workplace table width	Specification in %
	Packet search fields	Determines the items that can be searched for. The order of **Search items** corresponds to the arrangement in the user interface. – **Number of columns** – **Search item**
	Workplace table	Functionality described in chapter 3.4.4. and 3.4.5

Table 5: Settings for NC View screen

The layout of the NC Element table can be determined in the **Base page configuration** area.
Base page configuration settings for the NC View are listed below.

Setting	Function
Table configuration	Functionality described in chapter 3.4.4.
Input parameters	The following settings are valid for most use cases. Deviations from this should be carefully considered. Selected workplace of the base page "NC View" (WPL) → workplace (WPL) Selected operation of the base page "NC View" (OP) → Operation (OP) Selected NC packet of the base page "NC View" (EVERY)] → NC packets [EVERY) Output supply map of the base page "NC View" (EVERY)] → Output Supply Map (EVERY) Selected NC element of the base page "NC View" (EVERY) → Selected NC element (EVERY)
Output parameter	The following settings are valid for most use cases. Deviations from this should be carefully considered. Selected NC packet of the base Page "NC View" (EVERY) ← NC packets (EVERY) Selected NC element of the base page "NC View" (EVERY) ← Selected NC element (EVERY) Output Supply Map of the base page "NC View" (EVERY) ← Output Supply Map (EVERY)

Table 6: NC View: Base page configuration settings

3.1.5 Operating State History

The operating state history lists operating states of a workplace for a specified period of time in a **Status Table**. The operating states are given in intervals. The table can be filtered: Short intervals or intervals that cannot be recoded can be hidden. Via a Button Bar, operating states can be changed or split.
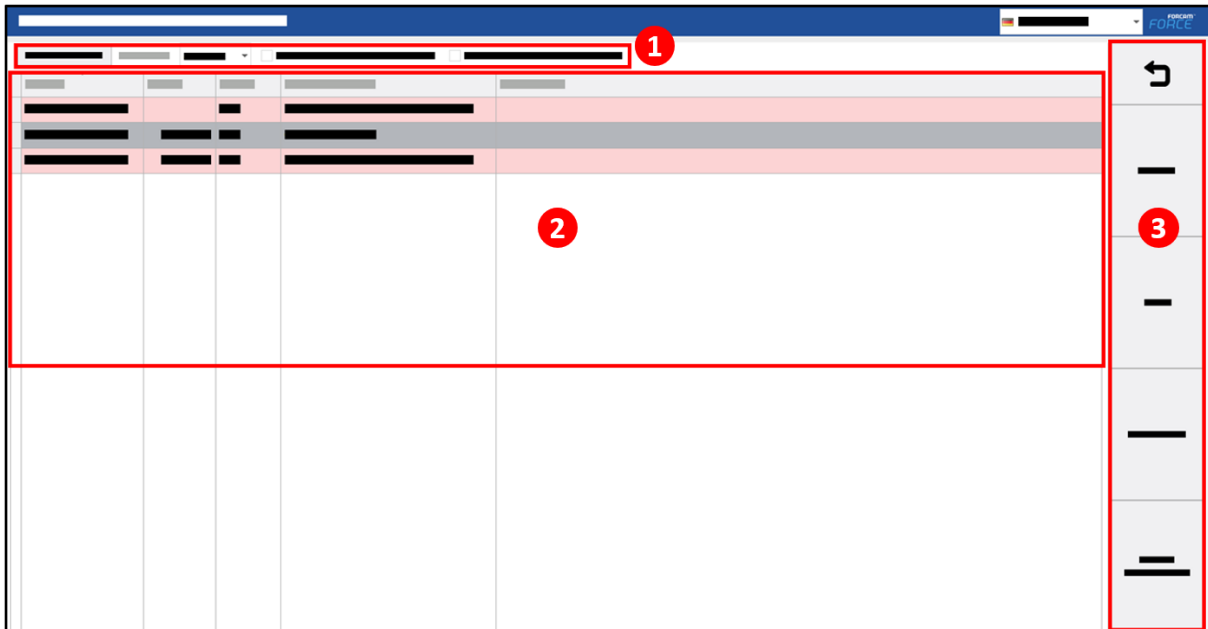
Figure 18: Operating State History dialog

(1) Filter of the Status Table – Determines the type of operating status to be displayed and the corresponding time period.
(2) Status Table – Displays the timeline of operating states.
(3) Button Bar – Each button can be freely configured. By default, the buttons for the status history are preconfigured (e.g., change operating status, split, show all or only unfounded).

Important setting for Operating State History and their functions are listed below.

Setting	Function
Name	The name of the base page.
Description	The description of the base page.
Modes for backward correction horizon	Determines until when operating states can be corrected retroactively. The value is set in the line Pre Shift Recode Count below. Definitions: – No Restriction – The possible recoding time range is the one which the user selects in time range of state history. – Fix time period [ms] – Iterate through the internal shift list and find the oldest shift in which the Pre Shift Recode Count is greater than the shift end. When the shift is found, the start time of the shift is taken as the backward correction horizon. – Fix number of shift – Number of shifts, 0 - last shift, 1 - second last shift, 2 - third last shift.

	− Last shift until x [ms] in a new shift – When Pre Shift Recode Count is inside the last shift and the user has selected at least 2 shifts, then minRecodableTime is the beginning of the last shift.
Pre Shift Recode Count	Determines the value of the time period previously (above) selected.
Standard status filter	Determines which type of malfunctions are to be displayed in the status table. − Display All – Shows the all the malfunctions. E.g., production setup, stoppages etc. − Display Malfunction – Shows only recodable malfunctions (stoppages) and does not show e.g., setup, production, breaks. − Display Unspecified – Shows only those states which are "Undefined stoppage".
Show Workplace Status Table	If the box is checked, another table with workplaces and corresponding statuses is displayed above the status table.
Max backward timestamp	Determines for which past shifts status details can be recoded. − -1: No restrictions. All assigned status details can be recoded. − 0: Only status details of the current shift can be recoded. − 1: Only status details of the current and the last shift can be recoded.
Standard Period of Time	Defines a period for which operating states are to be displayed. **Shift** is set by default.
Past-Time Selection	Assign the values which you want to see in time range drop-down filter available in the state history header. This time range filter is used to show the state history for the selected values. The values can be 1 day, 1 week, 2 shifts, 8 Hours etc.
Minimal status interval duration (sec) to show	Determines the duration of short intervals in seconds that are to be hidden by a check mark at **Hide short intervals**. For example: If 5 is entered states shorter than five second are hidden. -1 means no restriction.
Select all recodable intervals initially	If the box is checked, all operating states that can be recoded are selected when the page is initialized.
Only recodable intervals	If the box is checked, all operating states that can be recoded are selected when the page is initialized. The check box is checked in state history header.
Hide short intervals	If the box is checked, intervals defined (Minimal status interval duration (sec)to show) are hidden in the Status Table.
Display the sum duration of selected interval(s)	If the box is checked, the status bar shows the number of items (rows) selected and sums up the duration of all selected items.

Table 7: Settings for Operating State History screen

The layout of the Status Table can be determined in the **Base page configuration** area (see 3.4.7).

3.1.6 Operation Production Status History

The Operation Production Status History lists operating states of operation(s) for a specified period of time in a status table. The operating states of an operation are displayed for the selected operation and selected intervals.
The table can be filtered: Short intervals or intervals that cannot be recoded can be hidden. Via a button bar, operating states can be changed or split.
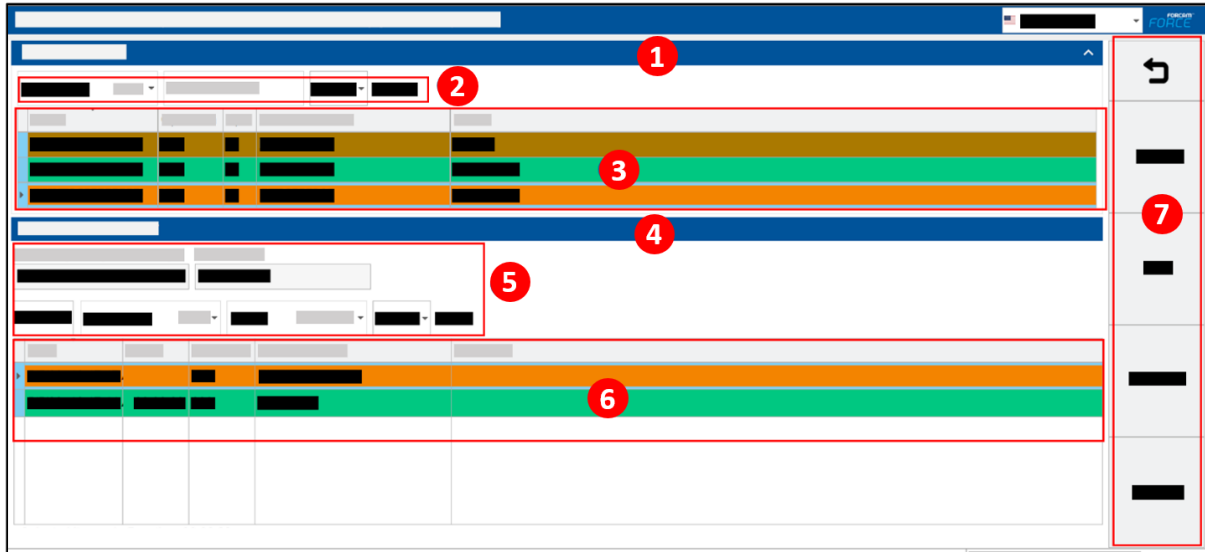
Figure 19: Operation Production Status History dialog

(1) Operation History – Displays the operation related filter and operations which are running or ran during the selected time range and for other configurations.
(2) Filter of Operation Status History Table – Determines the operation to be displayed for the corresponding time period.
(3) Operation Table – Display the operation details.
(4) Operation Status History Table – Shows the selected operation from Operation History area. Shows the operation related data and filter and operation status history for the selected time range and other configurations.
(5) Filter of the status table – Determines the type of operation operating statuses to be displayed for the selected operation from Operation history table and the corresponding time-period.
(6) Status table – Display operation operating status timeline
(7) Button Bar – Each button can be freely configured. By default, the buttons for the status history are preconfigured (change operating status, split, production, downtime).

Important setting for Operation Production Status History and their functions are listed below.

Setting	Function
Name	The name of the base page.
Description	The description of the base page.
Operation Area Height	Defines the height of the operation history area.
Operation Table Filter	To filter and display the operation data in operation table
	Time range filter	– Name – Defines the name of the filter. – Default Value – Defines default time range value to filter the operation data. – Available Past-time – Assigns the time range value. A user can select this value in the SFT to see the operation history over different time ranges.

Setting		Function
		– Modes for backward correction horizon – Determines until when operations can be corrected retroactively. The value is set in the line Pre Shift Recode Count below. Definitions:
		– No Restriction – The possible recoding time range is the one which a user selects in time range of status history.
		– Fix time period [ms] – Iterate through the internal shift list and find the oldest shift in which the "Pre shifts recode count" is greater than the shift end. When the shift is found, the start time of the shift is taken as the Backward Correction Horizon.
		– Fix number of shift – Number of shifts, 0 - last shift, 1 - second last shift, 2 - third last shift.
		– Last shift until x [ms] in a new shift – When "Pre shifts recode count" inside the last shift and user has selected at least 2 shifts then minRecodableTime is the beginn of the last shift
		– Pre Shift Recode Count – Determines the value of the time period previously (above) selected.
	Text Search Filter	A user can search the operation with the help of the configured attributes. – Name – Name displayed for search box. – Default Value – Default value for the search. – Attribute to Search Text – The user selects the appropriate attribute to a search text.
	Attribute Search Filter	With this configuration, it is possible to add multiple search filter as per the requirement. The configured filters will be displayed in group. – Name – Defines the filter group name. – Attribute Search Filter Configurations – To add a new Attribute Search Filter, click right in Value Column. Select Add new list element. A new Attribute Configuration is added below.
Attribute Search Filter		With this configuration, it is possible to add multiple search filter as per the requirement. The configured filters will be displayed in group.
	Name	Defines the filter group name.
	Attribute Configurations	To add a new Attribute Search Filter, click right in Value Column. Select Add new list element. A new Attribute Configuration is added below. – Attribute Name – Attribute To Search – The user selects an attribute from a drop-down menu.
Operation Status History Table Filter		Filters and displays the Operation Status History data in table
	Time Range Filter	– Name – Default Value – Time range value to filter the operation status history data.

Setting		Function

		– Available Past-times – Time range value, this value a user can select in the SFT to see the operation history over different time ranges.
		
		– Modes for backward correction horizon – Determines until when operating states can be corrected retroactively. Definitions:
		
		  – No Restriction – The possible recoding time range is the one which user select in time range of status history.
		
		  – Fix time period [ms] – Iterate through the internal shift list and find the oldest shift in which the Pre Shift Recode Count is greater than the shift end. When the shift is found, the start time of the shift is taken as the backward correction horizon.
		
		  – Fix number of shift – Number of shifts, 0 - last shift, 1 - second last shift, 2 - third last shift.
		
		  – Last shift until x [ms] in a new shift – When Pre Shift Recode Count is inside the last shift and the user has selected at least 2 shifts then minRecodableTime is the beginning of the last shift.
		
		– Pre Shift Recode Count – Determines the value of the time period previously (above) selected.

	Status filter	The status filter is configure to determine to show all status and/or all stoppages and/or all recodable status etc – Name – Default Value –Selects the default value to preset the operation production statuses. – Available Status Type – Assigns the status type to the status filter.

	Attribute Search Filter	With this configuration, it is possible to add multiple search filter as per the requirement. The configured filters will be displayed in groups.
		
		– Name
		
		– Attribute Search Filter Configurations
		
		  – Attribute Name
		
		  – Default Value
		
		  – Attribute To Search – Selects the attribute from a drop-down menu. At the moment only Hide Short Intervals is available.

Table 8: Settings for Operation Production Status History

The layout of the Operation Tabel and the Operation Status History Table can be determined in the **Base page configuration** area (see 3.4.7).

3.1.7 Tool Data Management

FORCE MES FLEX offers Tool Data Management in cooperation with TDM Systems. The interface with TDM offers the function of requesting tools via FORCE MES FLEX and having them to be

commissioned. TDM returns the actual status of the tool as a response. During commissioning, tools are assembled and measured and after completion, the status is reported as completed. In FORCE MES FLEX, commissioning can be requested in the Shopfloor Terminal as well as in the process management of the office platform.

In the Shopfloor Terminal, buttons are configured specifically for communication with the TDM interface. Tools can be requested for the selected operation and commissioning can be ordered. TDM then provides the status of the requested tool and indicates whether the tool can be commissioned. TDM can also display additional information, such as tool data, in a special dialog that is called up directly in the Shopfloor terminal. Tools can also be reordered here. Finally, TDM is automatically notified by the Shopfloor Terminal when the relevant operations are completed.
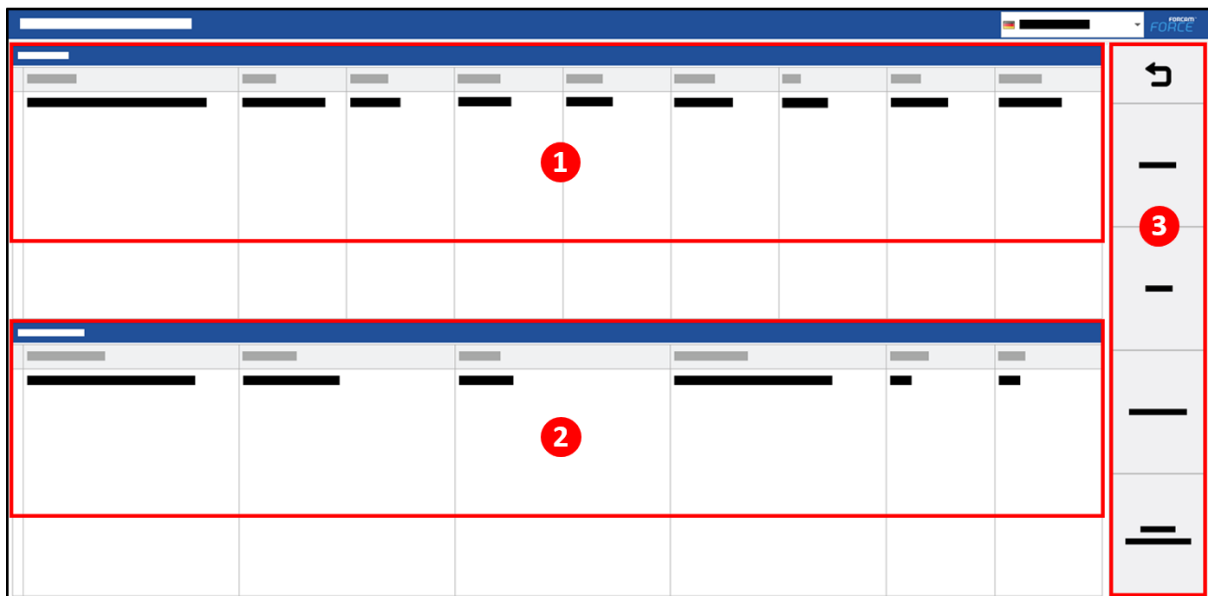
Figure 20: Toll Data Management dialog

- (1) Tools – Lists tools with data such as class, group, trigger, etc.
- (2) Tool Characteristics – Lists characteristics for a selected tool such as key, ID, unit, etc.
- (3) Button Bar

Important setting for Tool Data Management and their functions are listed below.

Mask type	Setting
Name	The name of the base page.
Description	The description of the base page.
Height of the tools grid	Determines the percentage size of the upper table for tool data.
Height of the characteristics grid	Determines the percentage size of the lower table for tool characteristics.

Table 9: Settings for Tool Data Management screen

3.2 Creating buttons

Buttons can be created for each base page. The buttons are displayed in the button bar (right sidebar) of the Shopfloor Terminal.
Initially a button does not have a function. Only after a command (activity step) was assigned, a button triggers function.
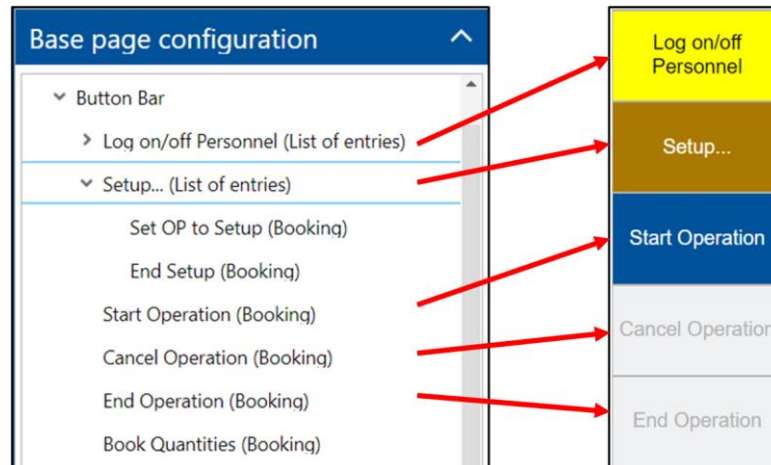
Figure 21: Configuration of a button bar and display in the SFT

To create a button:
1. Right-click on **Button Bar** in the **Base page configuration** area, then click on **Add Activity (First)** in the context menu.
2. Select an activity type from the drop-down menu of the subsequent dialog.
3. Enter the **Name** and confirm.
➔ Setting options for the button appear in the editing area.
4. Configure as desired.
5. Save.

3.3 Assigning activity steps

To assign an activity step to a button:
1. Select a button that shall get a function assigned in the **Base page configuration** area.
➔ The button is created as item in the **Activity steps** area.
2. Right-click on the item in the **Activity steps** area, then click on **Add Activity Step (First/Behind)** in the context menu.
3. Select the desired activity step from the drop-down menu of the subsequent dialog.
4. Enter a name of the activity step and confirm.
   The name is only used as internal identifier. The button name remains unchanged.
5. Configure activity step in the editing area as desired.
6. Save.

In our Academy courses, you will learn which activity step to use for your specific task.

ⓘ One button can have multiple activity steps assigned. Thereby buttons can be configured that execute multiple functions consecutively to solve a more complex task.

3.4 Frequently occurring configurations

This chapter describes common configuration items that are used in many tables and activity steps. However, the configuration may differ between tables and activity steps; some tables and activity steps may use additional parameters or parameters may be missing.

3.4.1 Execution conditions

Each button representing an activity step can have an execution condition. It pretests an activity step before execution according to a configured condition.

The following condition validators are available for configuring a condition:

- **Comparing value of parameter Map (String compare)**
  A parameter (e.g., workplace, terminal ID, etc.) is compared with a string value.
- **Comparing value count of a parameter map**
  A parameter is set against a count. This can be used, for example, to check the occurrence of a parameter.

Comparing value of parameter Map (String compare)

⌄ Configuration of Execution Conditions	
⌄ Additional Execute Conditions	☰ (1) List Elements
⌄ Validator	∧ ∨ ⚙ Comparing values of a parameter Map (String compare) ⌄
Parameter Key	⚙ Workplace (WPL) ⌄
Expected Value	90270
Execute if parameter key has not been set	☑
Convert parameter value into String	☐
Comparison value for conditional call	
Logical combination of conditions	AND Operation ⌄

Figure 22: Comparing value of a parameter Map (String compare)

The following table lists the configuration options of both condition validatiors. In addition, the parameters **Logical operation of condition** and **Comparison value for conditional call** are listed.

Setting	Explanation
Additional Execute Conditions	
Validator	**Comparing value of parameter Map (String compare)**
Parameter Key	Determines the parameter with which the value is to be compared.
Expected Value	Value (string) with which the parameter is to be compared. Example: If workplace is selected as the parameter and WPL100 is entered as the expected value, the execution condition checks whether the workplace has this identification. If so, the step is executed.
Execute if parameter key has not been set	If the box is checked, the step is executed even if no parameter key has been set.

Setting		Explanation
	Convert parameter value into String	If the box is checked, the value of the parameter is converted into a string.
Logical combination of the execution conditions		There are execution conditions within the system. They check the consistency of requests and commands in several places. For example, if the user searches for an operation number, the execution condition checks whether operations with numbers exist. The execution condition configured above can be executed simultaneously (AND) or instead of the execution condition (OR).
Comparison value for conditional call		If no comparison value or parameter value is found, the step is executed. Freely definable value.

Table 10: Execution condition settings: Comparing value of parameter Map (string compare)

Comparing value count of a parameter map

Figure 23: Comparing value count of a parameter map

Setting		Explanation
Additional Execute Conditions		
	Validator	**Comparing value count of a parameter map**
	Parameter Key	Determines the parameter with which the value is to be compared.
	Logical operator for expected value	This is numerical comparison and here you can define the logical expression. E.g., "==" for equal to, ">=" for greater than or equal, "!=" for not equal etc.
	Expected value count	Expected value with which the parameter is to be compared.
	Execute if parameter key has not been set	If a box is checked, the step is executed until the expected value (comparison value) or the value of the parameter is found.
Logical combination of the execution conditions		There are execution conditions within the system. They check the consistency of requests and commands in several places.

	For example, if the user searches for an operation number, the execution condition checks whether operations with numbers exist. The execution condition configured above can be executed simultaneously (AND) or instead of the execution condition (OR).
Comparison value for conditional call	If no comparison value or parameter value is found, the step is executed. Freely definable value.

Table 11: Execution condition settings: Comparing value count of a parameter map

The expected value can also be obtained from the check of a previous step. In this case, the previous step outputs a check value (usually true or false as in the Yes-No Decision step, for example). The execution condition can then be configured so that the step is not executed on false.
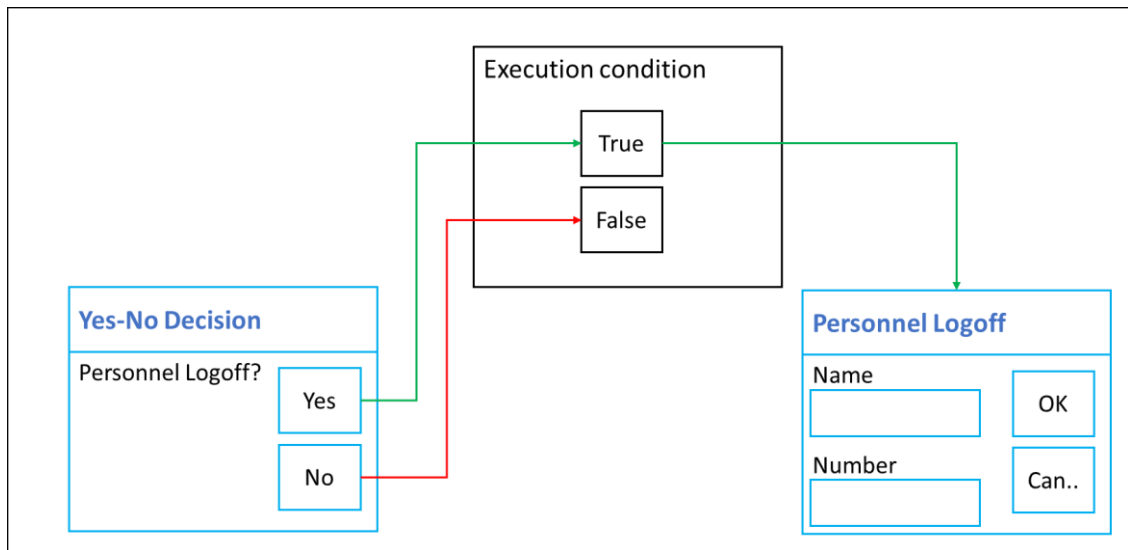
Figure 24: The "Log off person" step is not executed if the "Yes-No decision" step returns the value "false".

Example of a configuration of the execution condition with inclusion of the test result of a previous step.

Description	Value
Validator	Comparing values of a parameter Map (String compare)
Parameter key for the execution condition	Check Result (UNKNOWN)
Expected value for the execution condition	false
Execute if parameter key has not been set	Box is checked.
Convert parameter value into string	Box is not checked.
Logical combination of the execution conditions	AND Operator
Comparison value for conditional call	false

Table 12: Example of Execution condition configuration

3.4.2 Barcode scan configuration

In dialogs, entries are usually made manually using the keyboard. In some steps it is possible to read in values using a barcode scanner and transfer them directly to a dialog (e.g., when entering a personnel number).

In FORCE MES FLEX there are two types of barcode scan configurations. The configuration is available based on activity step needs e.g.,:

 – Basic barcode scan configuration:
 For example: The activity step *Dialog for the input of personnel number* has only one input field and therefore it has a simple barcode scan configuration.
 – Advanced barcode scan configuration:
 For example: In the activity step *Dialog for the pallet assignment* it is possible to search the operation based on many fields e.g., Order number, confirmation number, material number etc. from the operation table. Therefore an advanced barcode scan configuration is available.

3.4.2.1 Basic barcode scan configuration

Figure 25: Barcode scan configuration – value object

Important settings for basic barcode scan configuration and their functions are listed below.

Label	Description
Barcode scanning enabled	If the box is checked, barcodes can be read with a scanner.
Input focus remains in input field	If the box is checked, the focus remains in the input field during the scan of the barcode.
Valid pattern [RegEx]	Regular expression that determines which input pattern are allowed for scan input. Example: ([0-9]) for numbers between 0 and 9.
Search Pattern [RegEx]	Regular expression for cases where a scan input needs to be adjusted. Example: For a scan input of ten characters, only the last 5 characters are needed. The regular expression for this is ^.{5}(.{5}).
Replace pattern	Regular expression for cases where parts of a scan input need to be replaced. Example: Two zeros are to be prefixed to a scan input. The regular expression for this is 00$1.

Table 13: Basic barcode scan configuration

3.4.2.2 Advanced barcode scan configuration

This advanced configuration supports different Barcode Scan Configurations based on the need of the activity steps.

- **Single value scan**
  The operation is searched based on e.g., confirmation number. There is only one scan of one value.

- **Composed Scan Value**
  The operation is searched based on e.g., order number and operation number. There is only one scan necessary. This scan contains multiple information in a defined order.

- **Multiple Value Scan Sequential**
  The operation is searched based on e.g., order number and operation number. There are multiple scans necessary. Each scan contains a single information. Scanning has to be performed in a pre-defined order.

For further information on this barcode scan types see chapter 3.4.2.3, "Barcode scan types".

Figure 26: Barcode scan configuration with Single value scan

The following table explains the necessary configuration of the barcode scanner.

Label	Description
Barcode Scan Configuration	Select the barcode scan type to enable the barcode scan. - Composed Scan Value - Multiple Value Scan Sequential - Single value scan - Tigger of background activity
Input pattern of valid barcode scan	Regular expression for cases where a scan input needs to be adjusted. Example: For a scan input of ten characters, only the last 5 characters are needed. The regular expression for this is ^.{5}(.{5}).
Result dialog width	The width of the Operation Selector dialog.
Result dialog height	The height of the Operation Selector dialog.
Auto close search result dialog	If the box is checked, the Operation Selector dialog is to be auto closed after a row is selected.

Label	Description
Timer value for auto closing search result dialog [s]	If the Operation Selector dialog is to be auto closed after the configured time (in seconds). This auto close is treated as cancelling the selection process.
Multi result selection table	Configuration for operation grid of the Operation Selector dialog. − **No multi result table** → Default selection, no Operation Selector dialog is configured. The first matched row is selected. − **Multi result table** → During scan, if more than one result is found, the result is displayed in grid and the user has to select the one result. E.g., In operation view to search the operation, Operation table → Operation grid configuration.

Table 14: Advanced barcode scan configuration

3.4.2.3 Barcode scan types

The configuration defines four scan types, additional to the option to choose none of them.

When scanning barcodes, there is always a transmitter part and a receiver part. In the transmitter part you configure what information is send by the barcode. In the receiver part you configure how this incoming information is mapped to specific information within FORCE MES FLEX.

To configure the transmitter part:
1. In the **List of base pages** area double click on the desired base page of the type **Operation View.**
   Or
   In the **List of base pages** area click right on the desired base page of the type **Operation View** and select **View/Edit** in the context menu.
1. Select the desired barcode scan type in the line **Barcode scan configuration**.
2. Unfold the submenu in line **Barcode scan configuration** by clicking the arrow.
   a. Only for **Multiple value scan sequential**: In the line **Input pattern of valid barcode scans** click right in the column **Value** and select **Add new list element** in the context menu.
   b. Unfold the sub menu in line **Input pattern of valid barcode scans** by clicking in the arrow**.**
   c. Unfold the sub menu in line **Scan field configuration** by clicking the arrow.
   d. Repeat steps a to c for each input pattern.
3. Configure **Input pattern of valid barcode scan** as desired (see Table 14).

⚠ The amount and order of **scan field configuration** items corresponds to the items of scanned information.

To configure the receiver part:
1. In the **Base page configuration** area double click on the **Operation Table**.
   Or
   In the **Base page configuration** area click right on the **Operation Table** and select **View/Edit** int the context menu.
2. In the editing area unfold the **Table Configuration** by clicking on the arrow.
3. In the line **Barcode scan configuration** click right in the column **Value** and select Add new list element in the context menu.
4. Add as many elements, as in the transmitter part.

5. Configure **Scan field configuration** as desired.
   – **Exact barcode match**: Only exact matches are used for further processing.
   – **Reference to barcode search**: Selects the category to which the information is mapped.
   Repeat step 5 as often as necessary.

⚠ The amount and order of **scan field configuration** items corresponds to amount and order of items in the transmitter part.

Single value scan

Here just one regex scan pattern for one single scan can be configured in the transmitter part. This means that the scanned value will be used directly for e.g., selecting the matching operation in operation grid (one column). The receiver part needs to define the associated configuration for the one corresponding column from operation grid.

Multiple Value Scan Sequential

Multiple parts for scanning can be defined. There is a pop-up window shown to collect the scan parts. An empty pattern string means that every scan is valid. This can be used to add multiple barcode scans to select one line in a grid.
E.g., the operation number and the material number should be used. Then the transmitter part contains two regex scan patterns and the receiver part needs to define the associated configuration for the corresponding columns.
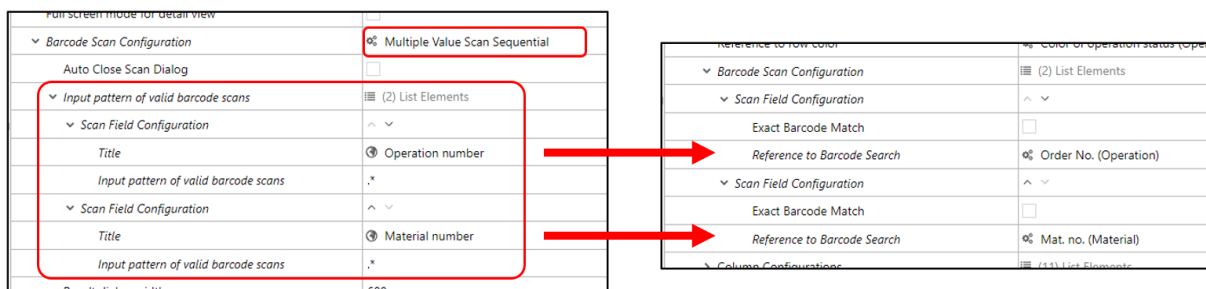

Figure 27: Barcode scan configuration with Multiple Value Scan Sequential

For *Multiple Value Scan Sequential*, when a user performs the first scan, the dialog (see Figure 28) is displayed. User then can scan the second value. The barcode scan values are displayed respectively.
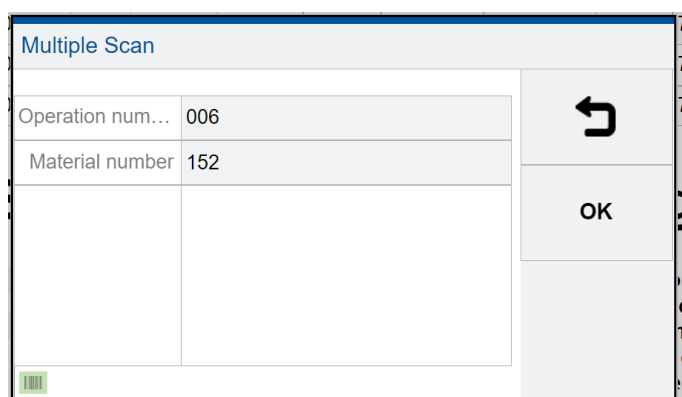

Figure 28: Barcode scan type – Multi Value Scan Sequential dialog

Composed Scan Value

Here the pattern must be grouped by () to define the parts. The behaviour of this type is similar to Multiple Value Scan Sequential. Instead of sequential scan and a displayed scan dialog, the scan is performed in groups.

For example: ([0-9]{10})-([a-z]{3})([0-9]{4}).
This means, that the user must define only one pattern in the transmitter part to scan only one value. But this value will be separated into multiple scan parts as defined in the group regex pattern.

This defines 3 Groups.
  – Group 1: "([0-9]{10})" – 10 characters [0-9]
  – Group 2: "([a-z]{3})" – 3 characters [a-z]
  – Group 3: "([0-9]{4})" – 4 characters from [0-9]

This will match any scanned value like e.g., 1234567890-abc4444.
The - between the groups will be ignored.

Trigger of background activities

This scan type has no included regex scan pattern or other attributes. It is just used to make clear, that there are configured background activities. The first Barcode Scan-type background activity which matches the scanned barcode will be performed.

⚠ Background activities must be activated after configuration. If not, they will not be performed.

3.4.3 Input parameters of a button

In an activity step, buttons can also have input and output parameters. An input parameter is always necessary in a button and depends on the function of the step. If a step affects a workplace, for example, the workplace must be selected as the input parameter. An output parameter is not usually necessary for buttons.

For example:
The activity step *Checks if person is logged on workplace* includes workplace and person as input parameters and checks whether a person is logged in to this workplace. In order to know which workplace is involved, the parent button in the Button Bar requires the input parameter *Selected workplace of the base page (WPL)*. If this parameter is selected in the button, the step refers to the workplace selected by the user in the base page.

Figure 29: Input parameters of a button that impacts a workplace

3.4.4 Table configuration

Many activity step dialogs contain tables that can be customized to a certain extent. Besides appearance and size, functions or modes can also be switched on or off.
Table configuration can be for operation, workplace, operation component etc.

The following table configuration properties summarizes all possible adjustments.

Label	Possible value	Description
Width	100%	Width of the table in %. 100% width cannot be exceeded.
Height	100%	Height of the table in %. 100% height cannot be exceeded.
Row Height [px]	Any value 24 (recommended value)	Table row height in pixels
Font size	− 12 − 14 − 16 − 18 − 20 − 24	Font size within the table
Number of visible lines	− 10 − 15 − 20 − 25 − 40 − 50	Determines the number of rows that are to be displayed in full in the table. All other rows are displayed below and can be scrolled to.
Show line marking		If box is checked, the row selector will be visible.
Allow column size change		If box is checked, the user can resize the columns.

Label	Possible value	Description
Allow sorting		If box is checked, the user can sort the columns.
Automatic scrolling and display to selected entry		If box is checked, when the page is initialized, the focus is automatically set to pre-selected row.
Time to force the display of selected entry [ms]		After the configured time, the focus will be reset to pre-selected operation.
Reference to row color	– CAQ Status Color – Color (Operation status) – Color (Tool Assembly Status) – Color (Utilization Status) – Color of operation status (Operation) – Phase Color (Operation Phase)	Select a status to display its color as the row color. The colors are assigned to status details in the Master Data module.

Table 15: Table configuration

3.4.4.1 Column configuration

Users can configure list of columns to table. Click on add / delete element at column configuration list to manage the columns.

The following column configuration properties to summarizes all possible adjustments.

Label	Description
Column Name	Name of the column. It can be defined in different languages
Column Width	Provided either in percentage (with % sign) or in pixel (without any unit).
Column Visibility	If box is checked, the column is visible in UI.
Column Attribute	Based on table type different column attributes are available. Based on selected attribute, the values will be displayed in the UI.
Reference to Color Column	Based on table type different column color attributes are available. Based on selected attributes, the color will be displayed in the UI.

Table 16: Column configuration

3.4.4.2 Column sorting configuration

Users can configure the list of columns by which the table will be sorted.

To add sorting criteria:
- ✓ Table Configuration in the opened.

1. Click right in the line **Sort Criteria** in the column **value**.
2. Click **Add new list element** in the context menu.
➔   New list element is added. The number of criteria is shown in paratheses.

The following configuration properties summarizes all possible adjustments.

Label	Description
Sort ascending	If the box is checked, the table column is sorted ascending for the selected sorting attribute.
Server-Side Sorting Criteria	The soring is performed at server side.
Client-side sorting criteria	Sorting is performed at client side.

Table 17: Column sorting configuration

3.4.5 Renderer configuration

The display of foreground and background color, time and date or numbers can be set under **Renderer configuration**.

Label	Possible values	Description
Foreground Color	− Coose color form palette − Hex code − RGB color values	Assigns the foreground color of the table and allows to change the color.
Background Color	− Coose color form palette − Hex code − RGB color values	Assigns the background color of the table and allows to change the color.
Time Format	− HH:mm − HH:mm:ss − HH:mm:ss z	Defines the time format as per requirement. HH:mm:ss Z (MESZ) - Zero time zone, as it is offset by 0 from the Coordinated Universal Time (UTC).
Date Format	− dd MMMM yyyy − dd-MMM-yyyy − dd/MM/yy	Different date formats can be configured. The selected format is supported in different languages. E.g., if the Date Format is set to *dd/MM/yy*. In English-US - 4/23/23 In English-GB – 23/04/23 In German – 23.07.22
Format definition for timestamp		If the timestamp format is defined, the terminal will overwrite the Time Format and Date Format defined above.
Format definition for numbers		When the value field is empty, system lookup the physical unit of the quantity and use the configured decimal places to display quantities. When the values is not empty, it behaves as configured in the column Value. − If the configuration is "0", only the integer part of the quantity will be displayed.

Label	Possible values	Description
		For example: If the quantity is 124.35, only 124 will be displayed (the decimal part is not displayed).
		− If the configuration is "00.00", the quantities are display with two decimal places. For example: 124.35 displayed as: 124.35 4.395 displayed as: 04.39
		⚠ If the format is given e.g., 00.00, system does not support the quantity format for different languages. It means the quantity will be displayed based configured format in e.g., English(GB) and German.
Use global decimal format		If the box is checked, the quantity will be displayed with "." And "," separator and also adjust the values for the different languages.
Remove leading characters of the order number	0	Removes the specified leading value from the order number display (only display purpose) For example: 0001021372 Value: "0": Remove all leading zeros. displayed as: 1021372
Format definition for quantities	− Value − Value with Unit	Only quantity with or quantity without physical unit will be displayed.
Format definition for the duration **Format definition**	− Industry Hours (hh:hh) − hh:mm − HH:mm:ss − HH:mm:ss,f − Industry minutes	Duration format

Table 18: Renderer configuration

3.4.6 Filter criteria

There are two configurations to filter the table data.

- Filter SQL filter criteria
- Filter attribute filter criteria

3.4.6.1 Filter SQL filter criteria

With this configuration, there are two ways to filter the data:

- By write an SQL query to filter the data
- By configuring the criterion

To filter by SQL query:

⚠ You can damage your data if you do not have the required knowledge of programming SQL queries. An incorrect SQL query can result in operations not being displayed. If in doubt, please contact FORCAM.

✓ Table Configuration is open.

1. Select **SQL** in the drop-down menu in the line **1. Filter SQL filter criteria**.

➔ New line **SQL Query** is added blow.
2. Double click on the pencil icon in the **SQL Query** line.
3. Enter the desired query code.
   Or
   Import the query code by clicking the Import icon and selecting the appropriate file.
4. Apply.
5. Save.
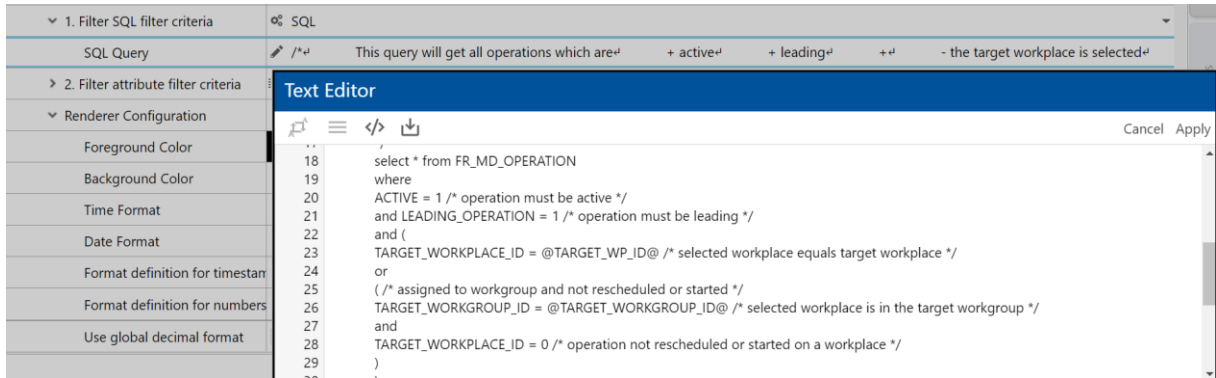
Figure 30: Filter SQL Filter by SQL query

To filter by configuring criteria:
✓ Table Configuration is open.
1. Select **Criterion** in the drop-down menu in the line **1. Filter SQL filter criteria**.
➔ New line **Additional Criterion** is added below.
2. Click right in the column **Value** in line **Additional Criterion**.
3. Select **Add new list element** in the context menu.
➔ A new line is added under **Additional Criterion**. Name and further configurations depend on the configurations in Table 19.
4. Configure as required.
5. Safe.

The following settings are possible with Criterion configuration.

Label	Possible values	Description
Expression	– Between expression – In Expression – Like expression – Logical Expression – Not Null expression – Not expression – Null expression – Simple Expression	With different expressions and configured values for this expression, the data will be filtered and display in table. Based on selected expression, the Property Name and value configuration will be taken into account to filter the data.
Property Name		The property name is the name of the SQL column to filer the data with SQL query.
Values **Upper Limit**		Values which needs to be filtered out.

Label	Possible values	Description
Lower limit		
Case Sensitive		If the box is checked, the query will be case sensitive.

Table 19: Configuration options of SQL filter by Criterion

3.4.6.2 Filter attribute filter criteria

With this configuration, users can filter the table data based on available attributes.

To filter by attribute filter criteria:
- ✓ Table Configuration is open.
1. Click right in the **Value** column in **2. Filter attribute filter criteria** line.
2. Select **Add new list element** in the context menu.
- ➜ A new line is added under **Additional Criterion**. Name and further configurations depend on the configurations in Table 20.
3. Configure as required.
4. Safe.

The following settings are possible with **Filter attribute filter criteria** configuration.

Label	Possible values	Description
Expression	− In Expression − Like expression − Logical Expression − Not expression − Not in Expression − Simple expression with constant − Simple expression with values	Expressions are conditions by which values are filtered. With different expressions and configured values for this expression, the data will be filtered and display in table. Based on selected expression, the Value Name (attribute name) and Value configuration will be taken into account. For further configuration options see Table 21.
Value Name		A list of value names is provided in the drop-down menu.
Value		Based on selected Value Name, users have to select the data type via a drop-down menu on the right side of the line Value. Then define the values to filter the data. For example: If the Value Name is "Operation phase code", a possible configuration is: Type – Long array (in multiple values to be filtered) Values – 2,7

Table 20: Configuration options of sorting by attribute filter

The following settings are possible for the selected Expression and values within **Filter attribute filter criteria** configuration.

Label		Description
In Expression		Checks if a Value is contained within the parameter defined in Value Name. The values must match completely. For example: In the Value is 20 for Value Name *Operation No* the result will be: 20; not: 0020, 2010 etc.
	Value Name	A list of value names is provided in the drop-down menu.
	Value	Based on selected Value Name, users have to select the data type via a drop-down menu on the right side of the line Value. This defines the values to filter the data.
Like expression		Checks if the Value is contained within the pattern defined in Value Name. For example: If the Value is *20* for Value Name *Operation No* results could be: 0020, 2010 etc.
	Value Name	
	Value	
Logical expression		Connects to two expressions by a logical operator (AND / OR). For example to filter data for a particular operation phase AND certain materials.
	Left Expression	Selection of the first expression involved within the operation. Further configurations are involved, according to the selected expression.

	Logical Operator	− Conjunction: AND operator
		  Displays data if left and right expression are satisfied.
		− Disjunction: OR operator
		  Displays data if only left or only right expressions are satisfied.

	Right Expression	Selection of the second expression involved within the operation. Further configurations are involved, according to the selected expression.
Not Expression		Negates the configured expression. If you select *Like expression* the result will be <u>*Not Like expression*</u>.
	Negated Expression	Selection of the expression to be negated.
Not In Expression		Checks if the Value is <u>not</u> contained within the parameter defined in Value Name. Only data that do not contain the Value will be displayed. For example: If the Value is 2, the result will be: 1, 3, 4 … 11,13 etc.
	Value Name	
	Value	
Simple value with constant		Filters data by Value Name, logical operator and specified Value. For example, to display operation data with a target quantity greater than 20.
	Value Name	
	Logical Operator	Selection of a logical operator by which the Value Name and Value are connected.
	Value	

Label		Description
Simple value with Value		Filters Data by one Value Name, logical operator and another Value Name. For example, to display data where the target quantity is lower that the Yield quantity.
	Value Name	
	Logical Operator	Selection of a logical operator by which the Value Name and Value are connected.
	Value Name	

Table 21: Configuration options for expressions in filter criteria

During configuring the **Value Name** and **Value**, the data type must be taken care by the configurator.

3.4.7 Repetitive configuration items

When configuring activity steps there are several recurring setting options.

Label	Description
When cancelling continue reporting procedure	If a button has several steps configured in succession, they are executed one after the other in a message sequence. If the box is checked, all further steps of the button will continue to be executed if the step is cancelled (e.g., by a cancel button in a dialog). Otherwise, the further message sequence is cancelled, and the subsequent steps are no longer executed. E.g., activity step: *Personnel status report, login/out on workplace*
Close dialog after valid input	Activity steps open dialogs that expect a certain input (e.g., input of a personnel number). If the box is checked, the dialog is automatically closed after a valid entry. Otherwise, an error occurs and the dialog remains open.
Dialog text	Some activity steps call up dialogs with a freely definable text (e.g., yes-no decision). The dialog text may be a maximum of 250 characters long and may contain special characters.
Show empty list	Some activity steps call up dialogs that display certain data in a table. If the box is checked, the dialog shows an empty list if no data is available. Otherwise, no list is displayed.
Manual input enabled	Some activity steps activate the dialogs that allow a direct entry. If the box is checked, the entry can be typed in manually. Otherwise, it must be scanned in. E.g., activity step: *Dialog for input personnel number*
Show messages on local message bar	Dialogs have their own status bar at the bottom. If the box is checked, messages such as warnings etc. are displayed directly in the status bar of the dialog. Otherwise, they are displayed in the status bar of the SFT (lower left edge of the screen).
Name of confirm/cancel button	Dialogs in the SFT usually have at least one button (e.g., OK or Cancel). In some activity steps with a dialog, names can be freely assigned to these buttons.
Result value if closed with "yes"/"no"	Some activity steps output a result value after a check or determination. The result value can be after positive (e.g., confirmation) or after a negative result (e.g., cancel or in case of error). The result value is any value returned after a check result (e.g., when checking for login and the person is not logged in). The wait can be passed on to the next step in order to execute the following functions based on it.

Label	Description
Shortcut … (different options available)	Some dialogs offer shortcut keys for their buttons (e.g., for OK, Back, etc.). An F-key can be selected from a drop-down menu as a shortcut key.
Suppression of the focus takeover	It is possible to connect the SFT with parallel running customer programs. If the box is checked, after closing a dialog in the SFT, the main screen is not focused (marked) but the program.
Timer value for auto closing search result dialog [s]	Specifies the time after which the dialog is to be closed automatically.

Table 22: Recurring settings in activity step configuration

3.5 Configuring background activities

⚠ Additional specific knowledge is required if you want to configure background activities. To find out more about the necessary requirements see chapter 1.

The SFT does have the concept of terminals and templates. With login at a certain terminal the associated template is loaded. This template contains the configuration, including e.g., the configured activities for each base page. There are two possibilities to trigger activities:

- Interactively:
  Primarily activities are triggered by the user when pressing a button in the Button Bar of the SFT.
- Via background activities (BA):
  Those can be triggered without any user interaction, either via CRON (time scheduled) or received event. An event can be triggered by an external source, for instance the DACQ.

A BA is always assigned to a Terminal (to be more precise, a concrete base page within the Template). This means, it is only active respectively „alive", when the appropriate Template and base page is chosen, i.e. a user is logged-in. If no Terminal is active (no user logged-in), no BA is active.

3.5.1 Global server-side activities (Headless SFT)

It is required to execute activities independent from any active Terminal resp. if a user is logged in or not. Use-case e.g., is some automated processing/booking controlled or triggered per DACQ or Trace.

Those activities, analogous to BA triggerable via CRON and events, do not belong to any Terminal at all. They are always available and scheduled by a new service within the FFWorker server.

These global server-side activities are configurable in a new separate configuration section within the existing SFT-Configurator. In principle the configuration conforms to the existing configuration of BA (Terminal based). The same activity step library is used. Of course, only dark activity steps, i.e. without an UI, are utilizable resp. available here. Each configured activity can explicitly be enabled or disabled.

4   Creating profiles

Most settings are optional. Only the profile name is mandatory. Some settings are predefined.

Path: Configurations > Shopfloor Terminal

To create a profile:
1. Click on the **+** icon in the **Profiles** area.
➔   A profile previously selected is copied and the associated settings are adopted. If no profile is selected, the first profile in the list is copied and the associated settings are adopted.
2. Enter **Name** and **Description** and configure the associated settings (see Table 23).
3. Save.

The following settings for profiles are available.

Setting	Explanation
Language	Language in which the SFT shall be displayed. The languages German, English (US/GB), Spanish and Chinese are currently supported.
Time Zone	Time zone in which the SFT shall be displayed.
Login With Password	A password is needed to access the SFT. The password is set in the **Terminals** area.
Direct Call	Call of the SFT with this profile without authentication.
F-Keys	Each button can get an F-key assigned, except for F1. The F1-key is permanently linked with the back function.
Touch Input	In case of a manual entry in the SFT, a touch input field appears. It is recommended to activate this function when using devices with a touchscreen.
Terminal Info Messages	Enables messaging from workbench to SFTs. Messages can be sent to a single SFT or all the SFTs from workbench.
Server Time Zone	If the box is checked, server time zone is used for the SFT.
Keep Alive	Test signal that is sent in configurable time intervals (sec.) to the SFT to check if it is active.
Keep alive interval [sec]	Time interval in seconds for the keep alive signal.
Serial Receiver	Enables FORCE MES FLEX to read external receivers of the type serial.
Serial Port	Name of the serial port (COM2 is predefined)
UDP Receiver	Minimal, connectionless network protocol that belongs to the transport layer of the internet protocol family. If the box is checked, UDP enables applications to transmit datagrams in IP-based computer networks.
UDP Port	Port of the UDP receiver (18.999 is predefined)
Bounce Time of the Barcode Input [ms]	Specifies the time that must pass between two valid scans. This helps to avoid errors caused by accidental double scannig.

Setting	Explanation
Terminal Client Configuration	Old scanning devices can add prefixes and/or postfixes to scanned codes. Here, users specify the prefixes and/or postfixes to be truncated from the received code.
Printer Name	Name of the used printer. A printer can be used e.g., for the activity step: *Printing of a document*.
Client Directory	Directory of the client machine where download / upload can be performed.
Scaling Factor	Scaling the terminal view. The possible range is between 1.0 and 2.0 (including both 1.0 and 2.0).
Reconnect Count Before Failure	The SFT tries to reconnect the service in case of connection failure after the set time. The value is set in seconds.
Connect Failure Msg	A message is displayed on the SFT when the connection has failed.
Automatic Reload After Failure	If the box is checked, the SFT tries to reconnect the service in case of connection failure.
CSC required?	If the box is checked, the client-side connector is required.
Stop Client-Side Connector	If the box is checked, the client side connector will be exited when the SFT is logged out.
Overhead Cost Login Mode	Determines if a person is allowed to login on Workplace and Overhead cost (Both) or only to either Workplace or Overhead cost (Exclusive) in the SFT.
Disable server events	If the box is checked, server events can be received at the SFT.

Table 23: Profile settings for the SFT

5 Configuring terminals

A terminal always consists of a template and a profile. These must be created and saved before they can be used for a terminal.

Figure 31: Terminal configuration

To configure a terminal:
1. Click on the **+** icon in the **Terminals** area.
   ➔ A terminal previously selected is copied and the associated settings are adopted. If no terminal is selected, a new terminal without any settings will be added.
2. Enter the terminal name.
   The name appears in the login screen with the terminal selection.
3. Create passwords.
   Only necessary if the option with a mandatory password has been activated in the profile.
4. Select a profile from the drop-down menu in the column **Profile**.
5. Select a template from the drop-down menu in the column **Template**.
6. Click left in the field in the column **Workplaces** and select one or more workplaces and confirm. The number in parenthesis indicates how many workplaces are assigned to the terminal.
7. Provide the **Location identifier** value.
8. Save.

Location identifier – When the production order / overhead cost center (OCC) is processed from SFT, the respective value is also sent to ERP.

6   Shopfloor Terminal Group

Path: Configuration > Shopfloor Terminal Group

Terminals can be assigned to groups (even simultaneously) in the Shopfloor Terminal Group configuration. This enables to cluster different production areas and the terminals.

Terminal groups		
Name	**Description**	**Terminals**
▶ ⊕ Manual Workplace Use Cases Terminal Group	⊕ Manual Workplace Use Cases Terminal Group	⬀ (2) Terminals
⊕ Reference Derivation Terminal Group	⊕ Reference Derivation Terminal Group	⬀ (6) Terminals
⊕ Time Attendance Use Cases Terminal Group	⊕ Time Attendance Use Cases Terminal Group	⬀ (2) Terminals
⊕ Use Cases Terminal Group	⊕ Use Cases Terminal Group	⬀ (11) Terminals

Figure 32: Shopfloor terminal group userinterface

Creating new terminal groups:
1. Click the **+** icon.
   ➔ An empty row is added.
2. Enter the Terminal group **Name** and **Description**.
3. Assign the terminal(s) to the Terminal group by clicking into the column **Terminals**.
   ➔ The dialog Terminal selection is opened.
4. Select the desired terminals from the Available column and add them to the selected column by clicking the arrow icon. (The single arrow moves the selected terminals. The double arrow moves all terminals.)
5. Confirm.
6. Save.

To use the terminal group:
1. Click on the computer icon (Copy terminal group URL to clipboard)
   ➔ The URL is generated.
2. Use this URL in the browser.

ⓘ   In terminal list, only assigned terminals are display in terminal drop-down menu.

7 Appendix

7.1 Terms and Abbreviations

Content	Description
BA	Background activity
CSC	Client-side connector
Machine Workplace	Describes a workplace where signals are usually supplied automatically by a machine. All operations that are processed at this workplace at any one time have the same operation state.
Manual Workplace	Describes a workplace on which several operations with different operation states can be processed.
Manual Machine Workplace	Describes a workplace where signals are not automatically supplied by the machine. A worker must assign an operation state to an operation via the Shopfloor Terminal or another input option. All operations that are processed at this workplace at any one time have the same operation state.
OP	Operation
PDM	Production Data Management
SFT	Shopfloor Terminal
TDM (Systems)	Tool Data Management Systems
UDP	User Datagram Protocol
UI	User interface
UTC	Universal Time Coordinated
WPL	Workplace

7.2 Execution conditions – list of available variables

Name	Description	Type	Example
Workplace			
workplace	Object reference workplace	ObjectReferenceDTO	WORKPLACE$624555
workplace$objectReference	Object reference workplace	ObjectReferenceDTO	WORKPLACE$624555
workplace$externalKey	Workplace name (external key)	WorkplaceExternalKeyDTO	1000-022-3000-760
workplace$state$code	Workplace status code	Long	1
workplace$derivedMnemonic	MNENOMIC of the operating status (if no vector => workplace status MNEMONIC, if vector present then MNEMONIC of the status reason on layer 1)	String	1
workplace$phase$code	Workplace phase code	Long	2
workplace$machines	Machines	ObjectReferenceDTO[]	[MACHINE$624551]
workplaceIsOccupied	Completely occupied (true if at least one leading operation is in active phase)	Boolean	True
workplace$companyCode	ERP key company code	String	022
workplace$client	ERP key client	String	1000
workplace$plant	ERP key plant	String	3000
workplace$systemId	ERP key system ID	String	100

Name	Description	Type	Example
workplace$genericStatusCodeValue	Workplace maintenance status code	Long	2
Operation			
operationIsNextOperation	Leading op of a wp with earliest target start (planned start) with an inactive phase and ERP-Status = "EIGP".	Boolean	
operationWasSetupBefore	Operation was already in production or setup phase?	Boolean	True / False
operationWasProductionBefore	Operation was already in production phase?	Boolean	True / False
Operation	Object reference	ObjectReferenceDTO	OPERATION$629294
operation$objectReference	Object reference	ObjectReferenceDTO	OPERATION$629294
operation$externalKey	External key	OperationExternalKeyDTO	1000-022-3000-405191-0-0070-0
operation$operationNumber	Operation number	String	0010
operation$orderNumber	Order number	String	403015
operation$blockNumber	Block number	String	405191
operation$confirmationNumber	Confirmation number	String	4051910070
operation$material$number	Material number	String	722550710-01
operation$orderType	Order type	String	45P3
operation$phase$code	Operation phase code	Long	1
operation$planEnd	Planned end	Date	UTC 1335940346288, 2012-05-02 08:32:26:288

Name	Description	Type	Example
operation$plannedstart	Planned start	Date	UTC 1335219292285, 2012-04-24 00:14:52:285
operation$state$code	Operation status code	Long	1
operation$strokeCounter	Stroke counter status	Long	384
operation$targetEnd	Target end	Date	UTC 1336400854712, 2012-05-07 16:27:34:712
operation$targetStart	Target start	Date	UTC 1335191254712, 2012-04-23 16:27:34:712
operation$targetQuantity	Target quantity	QuantityDTO	225.0 Pcs
operation$targetQuantity.getValue()	Target quantity	Double	225.0
operation$targetQuantity.getUnit()	Target quantity	String	Pcs
operation$targetWorkplace$externalKey	Target workplace	String	1000-022-3000-760
operation$bookedYieldQuantity	Booked yield quantity	QuantityDTO	100.0 Pcs
operation$bookedYieldQuantity.getValue()	Booked yield quantity	Double	100.0
operation$bookedYieldQuantity.getUnit()	Booked yield quantity	String	Pcs
operation$bookedScrapQuantity	Booked scrap quantity	QuantityDTO	100.0 Pcs
operation$bookedScrapQuantity.getValue()	Booked scrap quantity	Double	100.0
operation$bookedScrapQuantity.getUnit()	Booked scrap quantity	String	Pcs
operation$bookedReworkQuantity	Booked rework quantity	QuantityDTO	100.0 Pcs

Name	Description	Type	Example
operation$bookedReworkQuantity.getValue()	Booked rework quantity	Double	100.0
operation$bookedReworkQuantity.getUnit()	Booked rework quantity	String	Pcs
operation$tempQuantity	Temp quantity	QuantityDTO	100.0 Pcs
operation$tempQuantity.getValue()	Temp quantity	Double	100.0
operation$tempQuantity.getUnit()	Temp quantity	String	Pcs
operation$erpStatus	ERP status of operation	String	TABG
Order			
operation$order$externalKey	External key	OrderExternalKeyDTO	1000-022-3000-405191-0
operation$order$targetEnd	Target end	Date	UTC 1336400854712, 2012-05-07 16:27:34:712
operation$order$targetStart	Target start	Date	UTC 1335191254712, 2012-04-23 16:27:34:712
operation$order$targetQuantity	Target quantity	QuantityDTO	225.0 Pcs
isToolRequestPossible	Tool readiness for this operation available or possible?	Boolean	True / False
NC packets and elements			
isNCAware	NC awareness. Is one or more NC packet available (in the parameter map) Corresponding NC packets of the selected operation for the Operation View. For the NC View relating to the specified/shown NC packets.	Boolean	True / False

Name	Description	Type	Example
allNCElementsOfValidType	Are all NC elements available (in the parameter map) of valid NC types according to the current DNC configuration? Available in/by NC View. **Note**: Only applicable for single workplace shown, i.e. in case of NC line (multiple workplace) only for the visible one.	Boolean	True / False
singleNCElementSelected	Is the exact one NC element available (in the parameter map), regardless of valid NC type or not? Available in/by NC View. **Note**: Only applicable for single workplace shown, i.e. in case of NC line (multiple workplace) only for the visible one.	Boolean	True / False
selectedNCElementsOfValidTypeInManualMode	If not all the line workplaces are configured with NC packets (or there are no active operations for a workplace in cell-oriented mode), this condition is used for activating a button (transmit NC elements or machine sequence step) in MANUAL mode, when there is at least one element selected in a valid workplace tab. Note: Normally this is not allowed, as we expect all the workplace tabs to have a selected element for further processing.	Boolean	True / False
onlyRecipes	Are all selected or derived elements recipes?	Boolean	True / False
containsRecipe	Does selected or derived element contain at least one recipe?	Boolean	True / False
Clamping			
clampingIsSelected	Whether clamping is selected or not	Boolean	True / False

Name	Description	Type	Example
clamping$actualActive	Whether selected clamping is active or not	Boolean	True / False >> should only be queried after checking if clamping is selected: (clampingIsSelected ? (clamping$actualActive == false) : true)
Machine			
machine$machineSignalBlocked	Is machine signal blocked?	Boolean	True / False

7.3 Enabling Functions

Apart from enabling parameters, a button can also be enabled via methods. If a static method is used, it must be qualified with the full class path. Full qualification is not required for the following class:

- com.forcam.na.ffworker.webtouch.basepage.ActivityEnablerMethods
- org.apache.commons.lang3.StringUtils
- org.apache.commons.lang3.ArrayUtils
- org.apache.commons.collections.CollectionUtils

A specific class "ActivityEnablerMethods" exists, which contains static methods and provides additional checks which can be used for enabling buttons. This method can be called directly with the class name - no full qualified class is needed. The following checks are available:

Method signature	Description	Return type
isToolAvailableFor(ObjectReferenceDTO workplaceDTO)	Is one or more tools available for the specified workplace?	Boolean

```
&& ( (operation$phase$code == 1) ) && ( (operation$orderType.equals("45P5")) )))
 || ((( (operation$phase$code == 3) ) && ( (operation$orderType.equals("45P1") || operation$orderType.equals("45P3")) )))
 || ((( (operation$phase$code == 3) ) && ( (operation$orderType.equals("45P2") || operation$orderType.equals("45P4")) )))
 || ((( (operation$phase$code == 6) ) && ( (operation$orderType.equals("45P2") || operation$orderType.equals("45P4")) ))))
```

7.4.1.2 Continue "Production"

To continue the production state of an operation the button "Continue" must be enabled (when operation has status "stoppage"). The execution condition for this must be as follows: The operation phase is "in processing" and the operation status code is "stoppage".

```
operation$phase$code == 4 && operation$state$code == 2
```

7.4.1.3 Stroke factor correction

If you want to edit the stroke correction, the following condition must be true.

```
((workplace != null)
&& ((( (operation$orderType.equals("45P1") || operation$orderType.equals("45P3")) ) || ( (operation$orderType.equals("45P2") ||
operation$orderType.equals("45P4")) )))
&& (!( (operation$phase$code == 1) )) && (operation$strokeCounter > 0))
```

7.4.1.4 Workplace Name Start with

```
workplace$externalKey.getName().startsWith("123")
```

7.4.2 Enabling by method

Check if the workplace status is recodable:
```
ActivityEnablerMethods.isActualWorkplaceTLERecodable(PKEY_OperationView_myWorkplaceId[0])
```

Check if the current "Humidity" value for "Factory Hall 1" is within the range of 40 & 45:
```
ActivityEnablerMethods.isCurrentProcessValueInRange("Humidity", "Factory Hall 1", 40, 45)
```

Check if the current "Pressure" for selected workplace is within the range of 1100 & 1200:
```
ActivityEnablerMethods.isCurrentProcessValueInRange("Pressure", PKEY_OperationView_myWorkplaceId[0], 1100, 1200)
```

7.4.3 Arbitrary snippets

Check if the workplace object reference is empty or not:
```
StringUtils.isNotEmpty(workplace$objectReference.toString())
```

Enable the button when workplace hibernate id is equal to 266155:
```
workplace$objectReference.getId() == 266155
```

Enable the button when order number is equal to 266155:
```
operation$orderNumber.equals("1001000101")
```

Accessing static methods of Fully Qualified classes:
```
com.forcam.na.ffworker.util.ColorUtil.parseHtmlColor("#FF0000").equals(java.awt.Color.RED)
StringUtils.isNotEmpty("ggg")
```

Access to base page parameter map:
```
PKEY_OperationView_myWorkplaceId[0].getId() > 4711
```