PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

mvHighlight
mapp View sample project

Date: Apr 4, 2018

Project Number: AT-xx-xxxxxx

I Versions

Version	Date	Comment	Edited by
1.0	Sep 29, 2016	First Edition	
1.1	Jan 27, 2017	Updates to version 1.02	
1.2	Feb 20, 2017	Updates to version 1.03	
1.3	Mar 09, 2017	Added T30 visu	
1.4	Aug 08, 2017	Added Smartphone visu, Updatest to version 5.1 Individual hardware configurations (since version 5.0)	
1.5	Feb 20, 2018	Updates to version 5.2	
1.6	Apr 04, 2018	Updates to version 5.3 Split bindings and eventbindings related to a content	

Table 1: Versions

II Distribution

Name	Company, Department	Amount	Remarks

Table 2: Distribution

III Safety Notices

Safety notices in this document are organized as follows:

Safety notice	Description
Danger!	Disregarding the safety regulations and guidelines can be life-threatening.
Warning!	Disregarding the safety regulations and guidelines can result in severe injury or heavy damage to material.
Caution!	Disregarding the safety regulations and guidelines can result in injury or damage to material.
Information:	Important information used to prevent errors.

Table 3: Safety notices

IV Table of Contents

1 Introduction

This documentation explains the functions and implementation of the mapp View project mvHighlight. The project can be transferred to the Automation Runtime simulation ARsim and will show different use cases. The structure of the mapp View visualization in the Logical and Configuration View is based on the different use cases.

Browser URL
http://localhost:81/index.html?visuId=mvHighlight

1.1 Overview of functions and use cases

Login procedure from the start page of the visualization
Widget overview – simple, composed, graphical and system Widgets
Table Widget – displays data in a table
Documentation – showing a PDF document
User Limits – role dependent limits for Input Widgets
Rights and Roles – role dependent restrictions for visibility and / or operability
Client information – system variables for client / session specific informations
Web Viewer – implementation of the web based Automation Runtime “System Diagnostics”
Events and action – modal and modeless dialogs, use case for a MessageBox
Video Player – showing a video
Unit system – displays an engineering unit of a OPC UA node in different display units
Embedded visualization – shows how a second visualization can be shown in an area of a page
Variable lists – shows an individual value out of a list of OPC UA nodes
Day / night Theme –implementation of a day / night view
Styles - shows the possible usages for styles
Expressions – use case for calculations in the visualization – result used for visibility / operability
Key actions – implementation of key actions in a visualization
Chart – implementation of a different kind of charts (OnlineChart, LineChart, PieChart, BarChart,…)
Dash board – implementation of FavoriteWatch
Profile generator – implementation of ProfileGenerator
Use cases – implementation of different use cases
Animation – implementation of Paper widget use cases

2 General description

This capture describes each Page of the mvHighlight project.

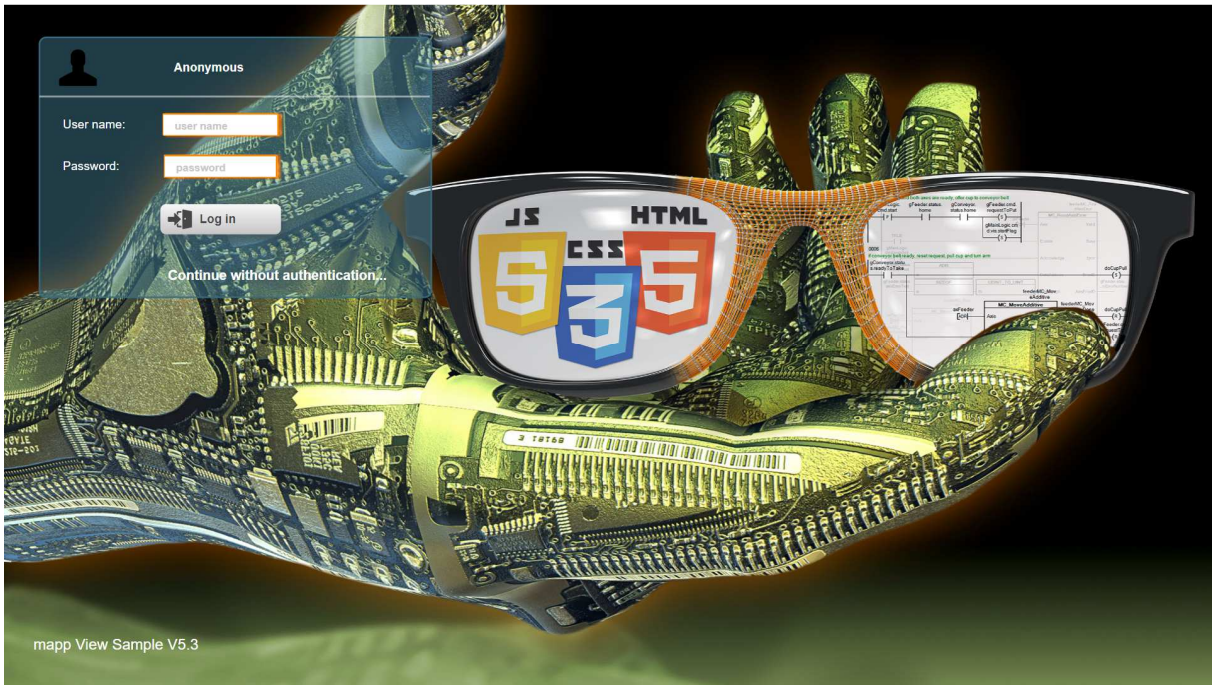
Depending on the hardware configuration, different visualizations can be used:

Configuration	Visualizations	Browser URL:
ARsim	mvHighlight	http://localhost:81/index.html?visuId=mvhighlight
	mvService	http://localhost:81/index.html?visuId=mvService
	mvT50wide	http://IpAddress:81/index.html?visuId=mvT50wide
	mvT50high	http://IpAddress:81/index.html?visuId=mvT50high
	mvSmartPhone	http://IpAddress:81/index.html?visuId=mvSmartPhone
APC2100_HD	mvHighlight	http://localhost:81/index.html?visuId=mvhighlight
	mvService	http://localhost:81/index.html?visuId=mvService
X20CP1585_T50	mvT50wide	http://IpAddress:81/index.html?visuId=mvT50wide
	mvT50high	http://IpAddress:81/index.html?visuId=mvT50high
X20CP1381_T30	mvT30wide	http://IpAddress:81/index.html?visuId=mvT30wide

IpAddress must match to the PC´s IP address

2.1 MainPage

The **MainPage** is used as a start page in the visualization.
For the presentation no authentication is necessary – “Continue without authentication..:” will navigate to the **NavigationPage**.



Use case	description
User login	In case of different users working on a machine each user must login to receive rights defined in his role **Available user names / passwords** User: kirk – password: 7777 User: spock – password: 0000
Anonymous login	Allows an operator to use the HMI without authentication (presentation mode)

2.2 NavigationPage

From the **NavigationPage** the user can navigate to all pages in the HMI.

Use case	description
Show / hide apps	In the **FlyOut** widget the user can change the visibility of NavigationButton widgets on the screen. The FlyOut widget is placed in a Content only used on the NavigationPage. SessionVariables are used for visability state FlyOut: ToggleButton changes the visability state – binding to session variables NavigationButton: visible binding to session variables
Logout	Allows an operator to logout from the visualization. The MainPage is shown after logout to provide a possible login for the next user.
Related files	MainVisu/Pages/NavigationPage/ContentNavigation.content MainVisuBindings/ContentNavigation.binding MainVisuEvents/ContentNavigation.eventbinding

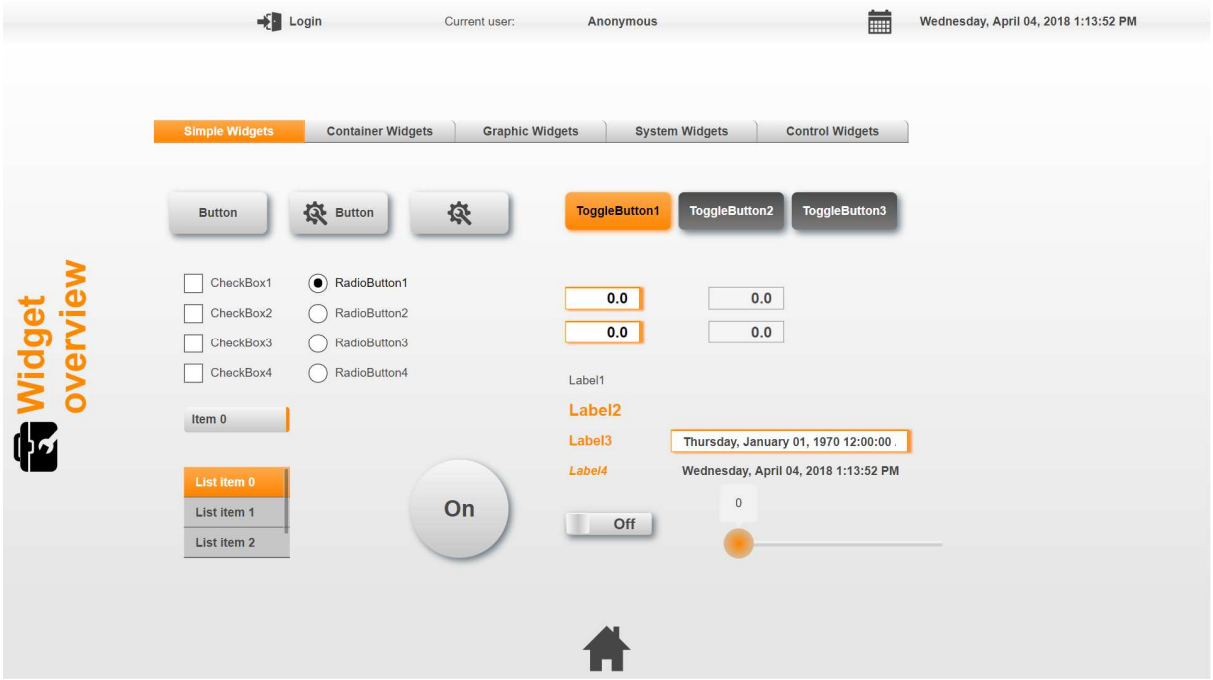
3 Functionality

This capture describes the functions of each page.

3.1 WidgetOverviewPage

The **WidgetOverviewPage** shows a selection of widgets on different tabs of a TabControl widget.

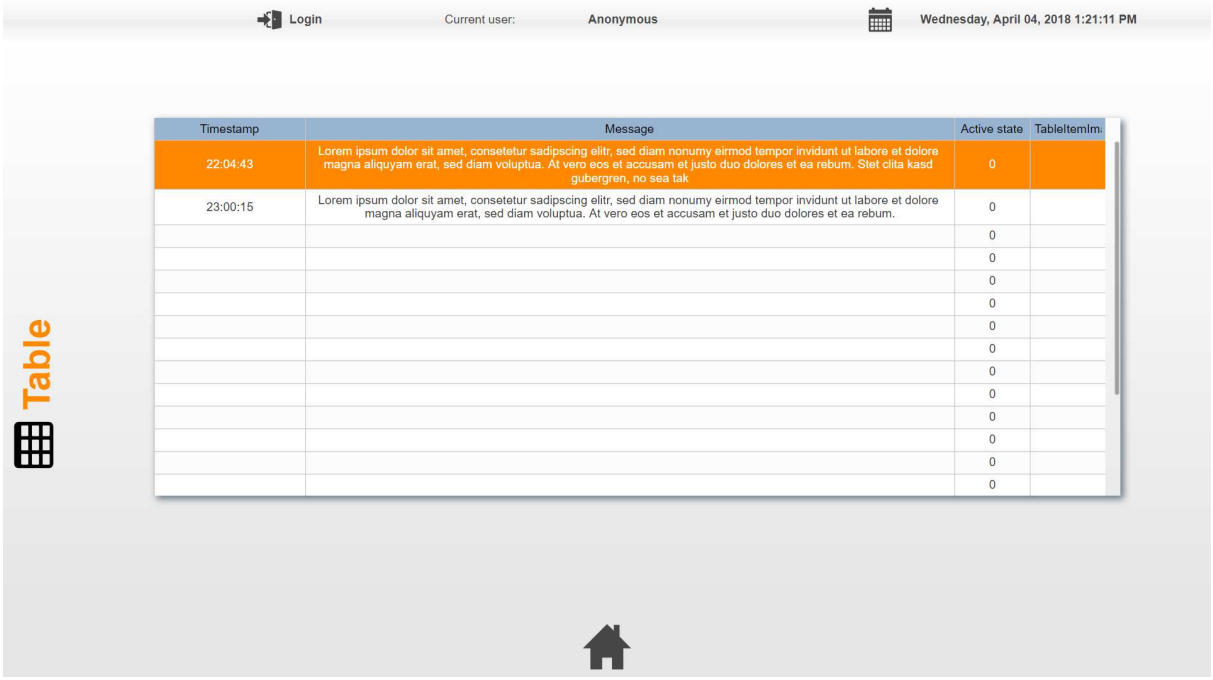
Simple Widgets: a selection of simple widgets
Container Widgets: GroupBox with absolute and relative positioning
Graphic Widgets: Gauges, Slider and Image widgets
System Widgets: widgets for system functions
Control Widgets: Different Slider widgets bound to a RadialGauge widget



Use case	description
GroupBox absolute /relative	Show the difference between absolute and relative positioning Hide Button A: Absolute positioning: widgets positions remain in the left GroupBox Relative positioning: widgets in document flow will be shifted when a widget gets invisible
Enable / Visible behavior	Each child widget in a GroupBox will inherit the enable or visible state of the parent
Brease-Brease binding	The visible and enable behavior is done by an brease-brease binding between a CheckBox and a GroupBox / ButtonA widget No additional variables are required
Related files	MainVisu/Pages/WidgetOverviewPage/ContentWidgets.content MainVisuBindings/ ContentWidgets.binding

3.2 Table

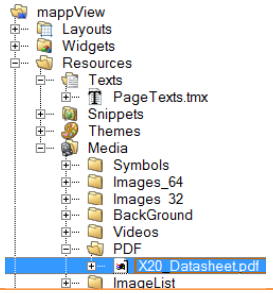
The **TablePage** shows the usage of a Table and its TableItem / TableItemImageList child widgets.



Use case	description
Table / TableItem	A Table widget is used as a container for one or more TableItem widget(s)
Related files	MainVisu/Pages/TablePage/ ContentTablePage.content MainVisuBindings/ContentTablePage.binding Sources/Table

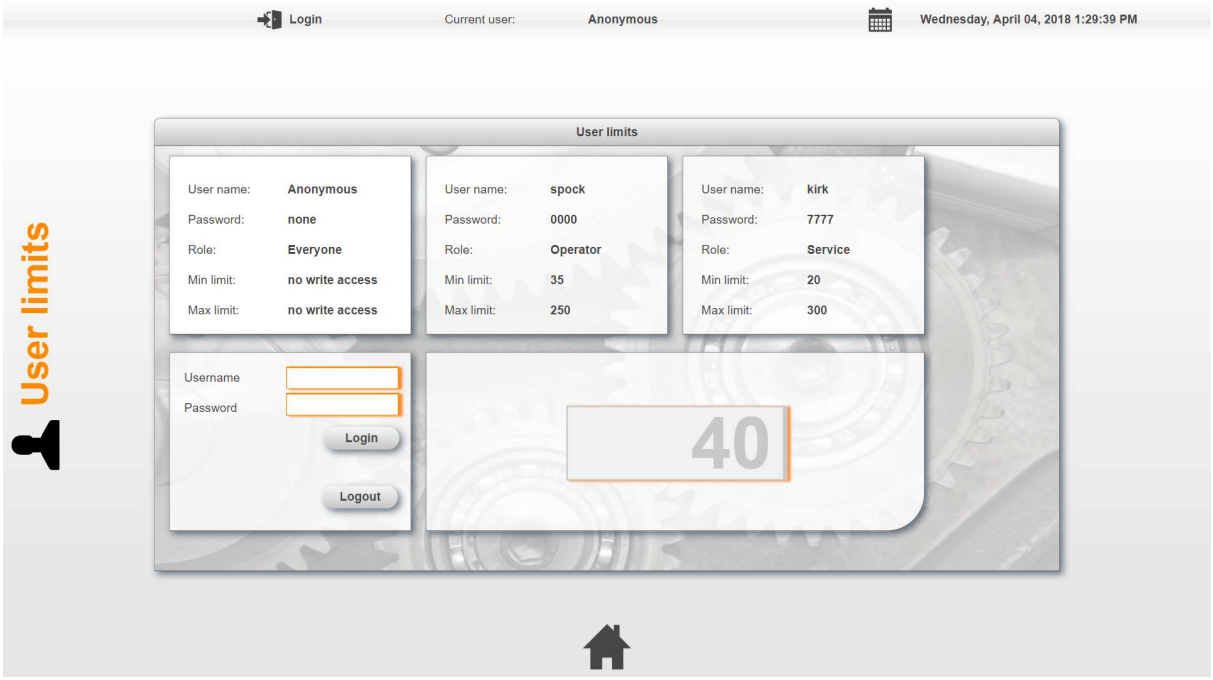
3.3 DocuPage

The **DocuPage** shows how to embed PDF documents the HMI.

Use case	description
User documentation in the HMI	Documents are available in the project structure in Automation Studio 
Related files	MainVisu/Pages/DocuPage/ ContentDocuPage.content

3.4 UserLimitPage

The UserLimitPage shows the configuration of role dependent limits (EU range) for OPC UA variables.

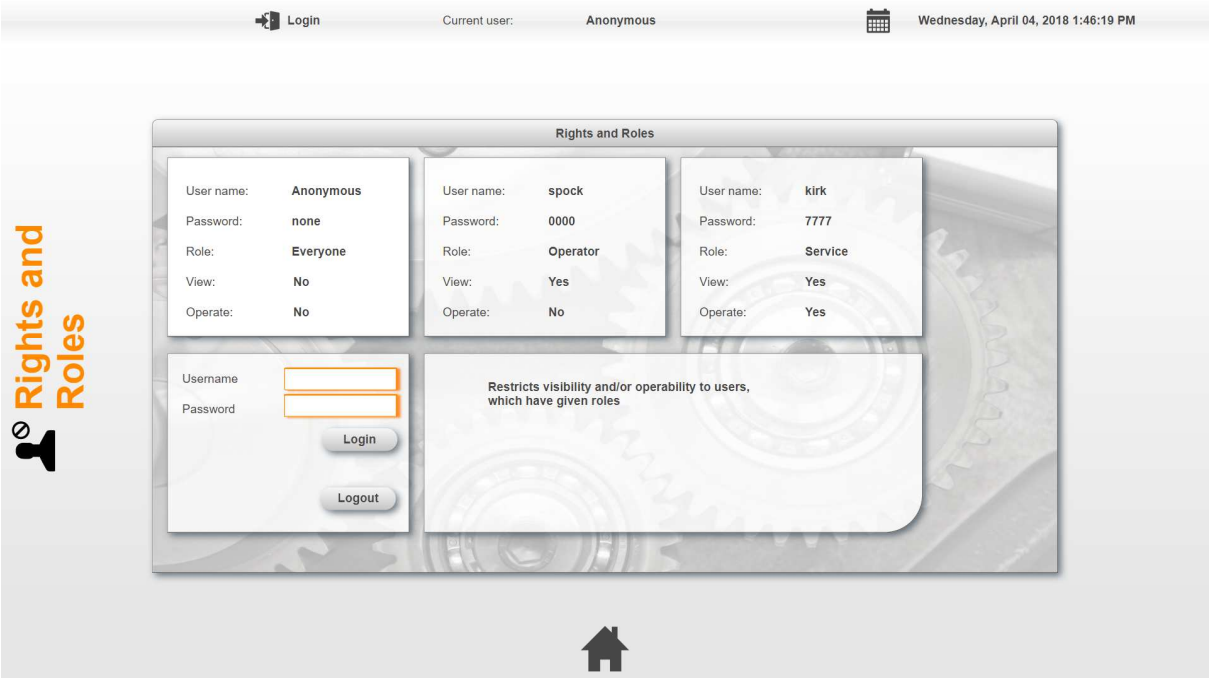


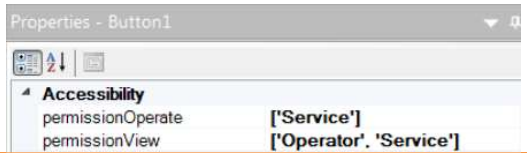
Use case	description
Login for different roles	After successful login with the corresponding user name and password each role has different low and high limits – inherited from the bound OPC UA variable
Related files	MainVisu/Pages/UserLimitPage/ContentUserLimit.content MainVisuBindings/ContentUserLimit.binding Sources/Simulation

Name	Value	Value	Value	Value
userLimitValue				
Enable	True			
Audit Events	Off			
Authorization				
Inherit From Parent	Inherit None			
Rights / Roles	Service	Everyone	Operator	
Visible	☑	☑	☑	
Browse	☑	☑	☑	
Subscribe	☑	☑	☑	
Read	☑	☑	☑	
Write	☑	☐	☑	
EU Range Violation				
EU Range Violation	Accept			
Authorization				
EU Range	<Default>	Everyone	Service	Operator
Low	0	35	20	35
High	500	250	300	250
Authorization				

3.5 RightsRolePage

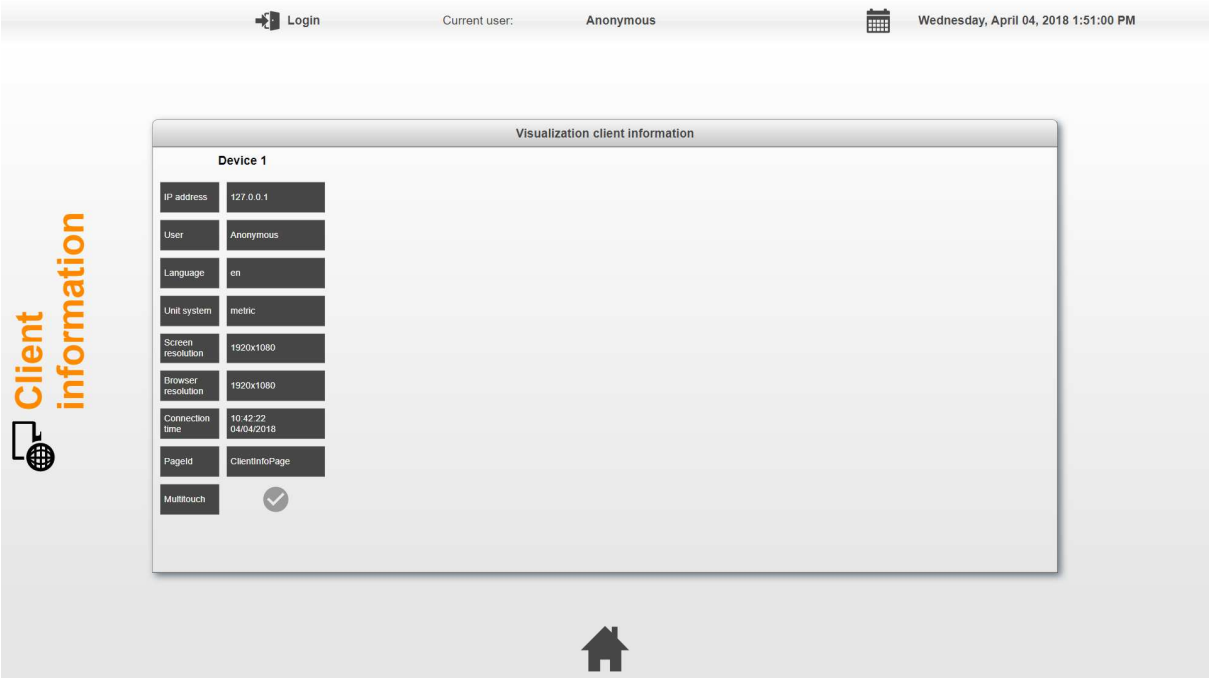
The **RightsRolePage** explains the widget configuration to restrict the visibility and / or operability to users which have given roles.

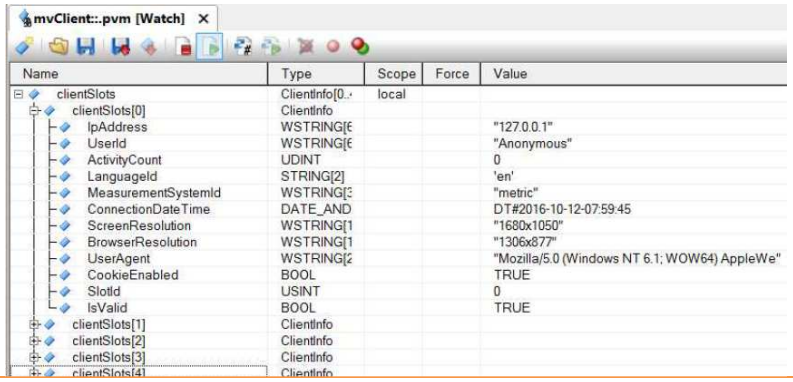


Use case	description
Login for different roles	After successful login with the corresponding user name and password each role has different rights to see and / or operate with a widget 
Related files	MainVisu/Pages/RightsRolePage/ContentRightsRoles.content

3.6 ClientInfoPage

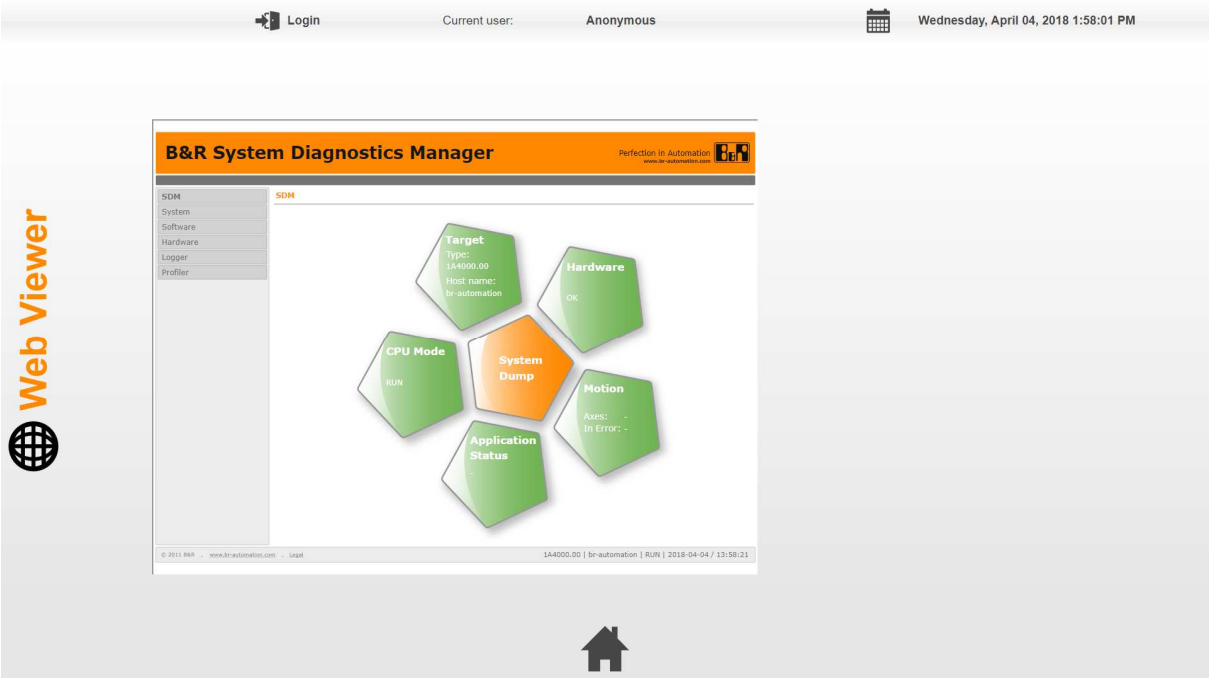
The **ClientInfoPage** shows mapp View system variables which are available in the HMI and / or on the PLC.



Use case	description
Multi client	When a second session (browser – Incognito window !) is opened, the information of each connected client is available in the PLC 
Related files	MainVisu/Pages/ClientInfoPage/ContentClientInfo.content MainVisuBindings/gSystemInfo.binding MainVisuBindings/ ContentClientInfo.binding Sources/mvClient

3.7 WebViewerPage

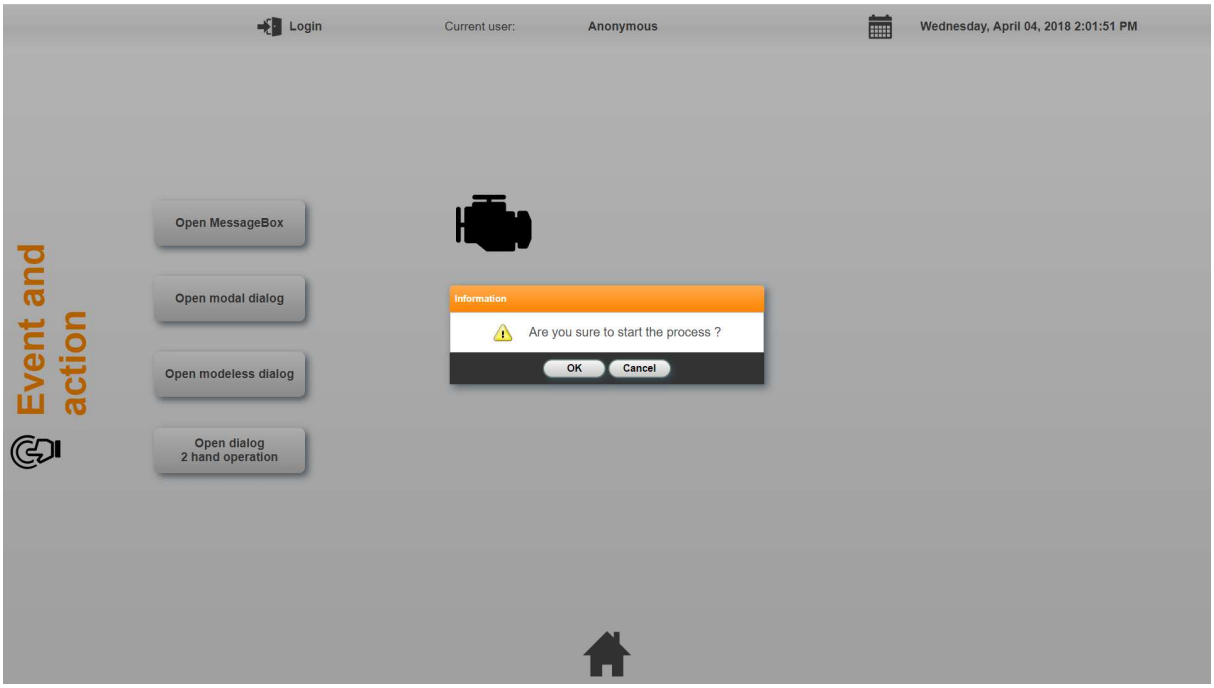
The **WebViewerPage** shows the implementation of the Automation Runtime System Diagnostics Manager (SDM) using the WebViewer widget.



Use case	description
Service information	Show the SDM in the HMI
Related files	MainVisu/Pages/WebViewerPage/ WebViewerPage.content

3.8 EventPage

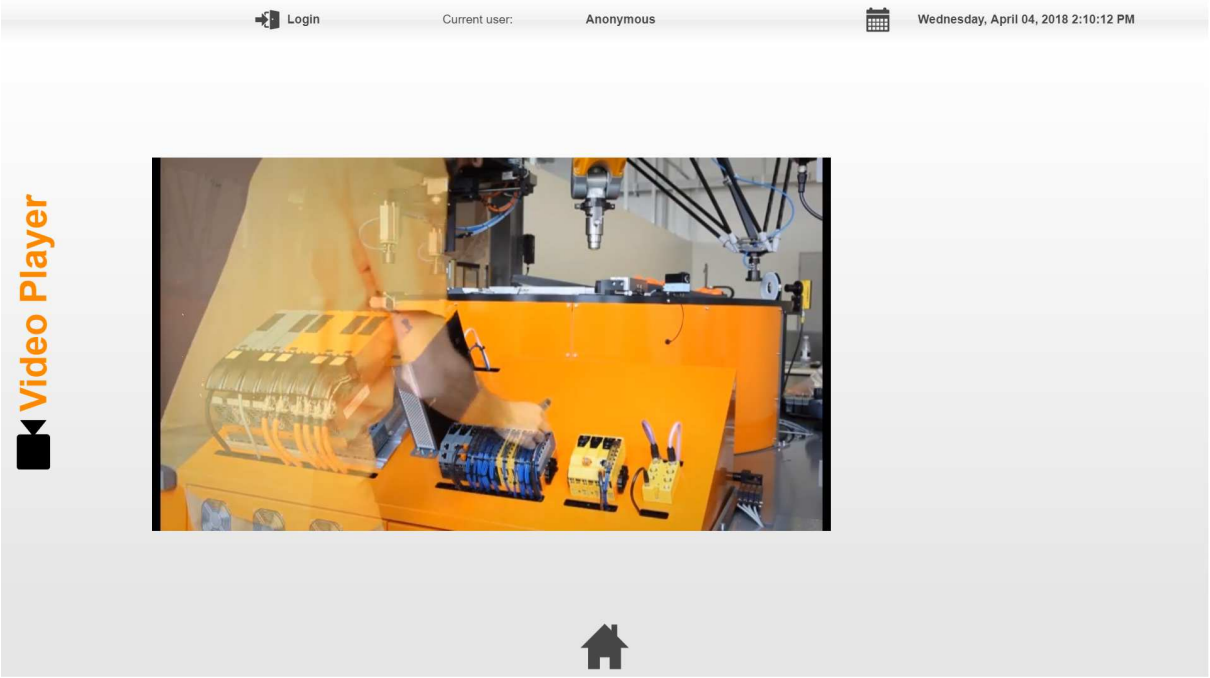
The **EventPages** shows how to open dialogs or show a system MessageBox.

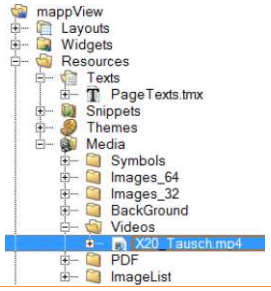


Use case	description
MessageBox	A button click opens a Message box Depending on the clicked button type inside the message box an action can be called in the <ResultHandler>
Modal dialog	A button click opens a modal dialog It shows that the content below can not be operated during the dialog is opened
Modeless dialog	A button click opens a modeless dialog It shows that the content below can be operated during the dialog is opened The dialog stays open also when changing the page
2 hand operation	A button MouseDown event opens a dialog, a MouseUp event closes the dialog It is possible to click a button in the open dialog on a multitouch display
Related files	MainVisu/Pages/EventPage/ ContentEventPage.content MainVisuBindings/ ContentEventPage.binding MainVisuEvents/ ContentEventPage.eventbinding

3.9 MediaPage

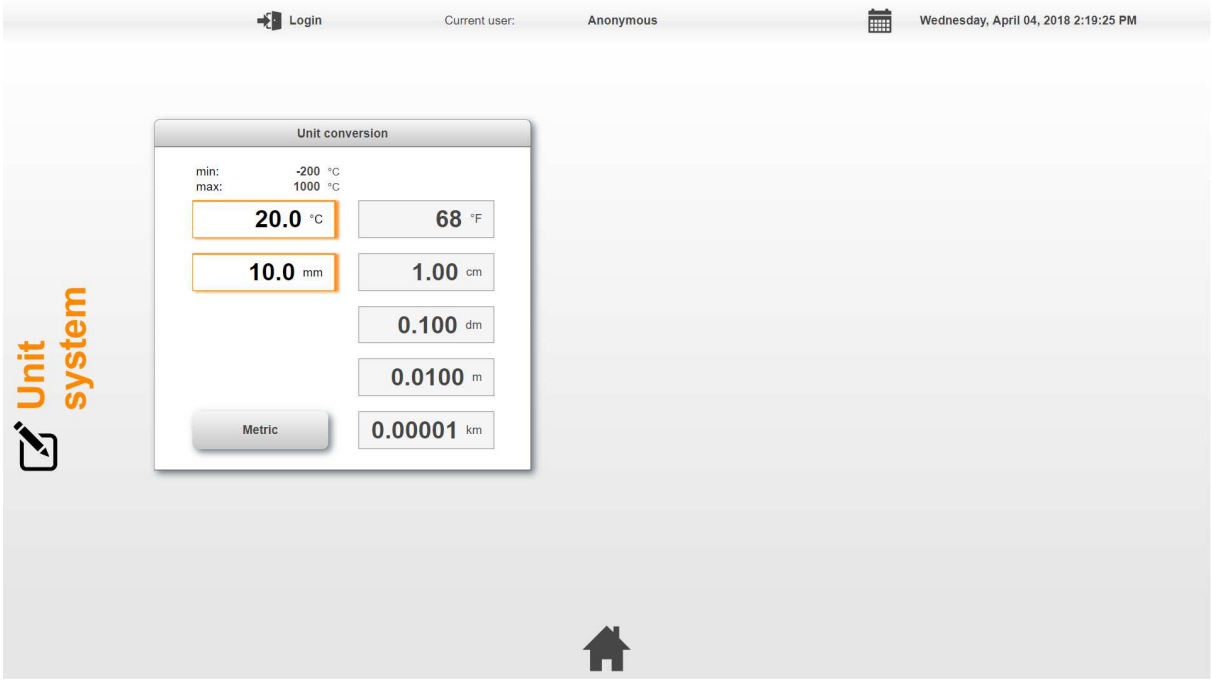
The **MediaPage** shows an operator help in form of a playable video.



Use case	description
Service information	Media files are available in the project structure in Automation Studio 
Related files	MainVisu/Pages/MediaPage/ ContentMediaPage.content

3.10 UnitsPage

The **UnitsPage** shows how OPC UA variables with a defined Engineering Unit can be used by a node binding in widgets with different format / unit configuration based on the selected measurement system.

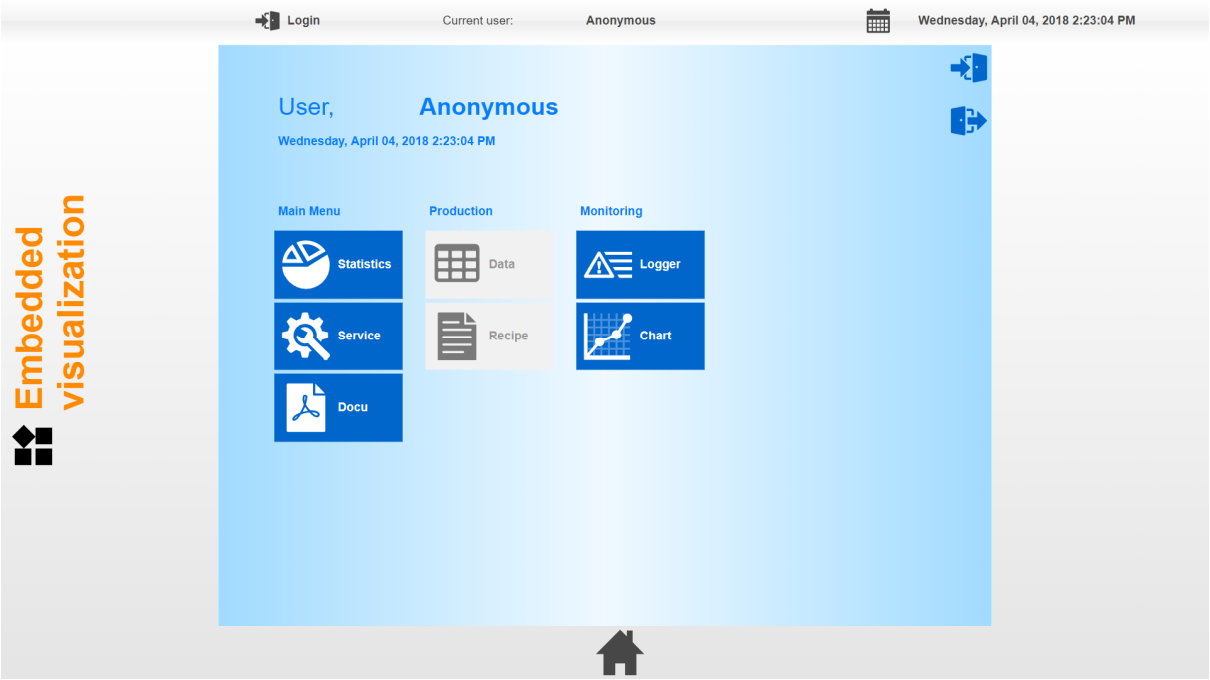


Use case	description
Measurement system	Select a measurement system to show the effect on NumericOutput widgets
Related files	MainVisu/Pages/UnitsPage/ ContentUnitsPage.content MainVisuBindings/ContentUnitsPage.binding Source/Simulation

3.11 EmbVisuPage

The **EmbVisuPage** shows how to embed a second visualization in a page by an assignment of the visualization (Service.vis) in an area.

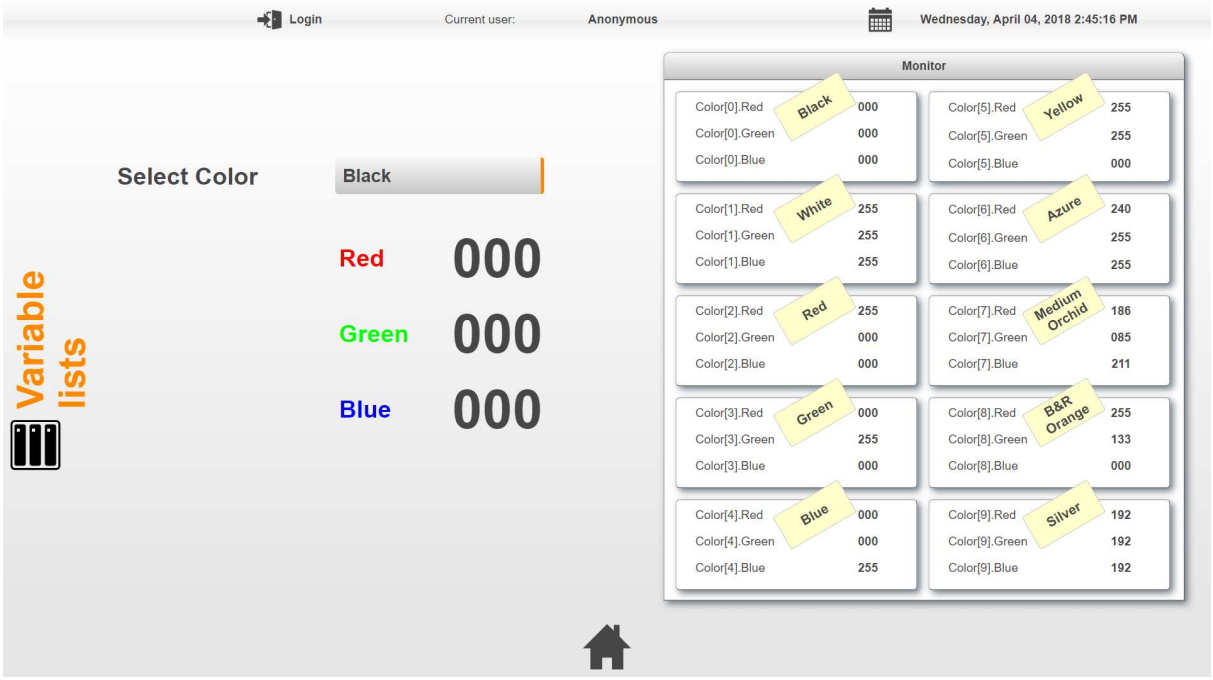
This visualization can be opened in a second browser session (incognito) with following URL:
http://localhost:81/index.html?visuId=mvService



Use case	description
Embedded visualization **Multi client operation**	Opening a second browser in an incognito window allows individual user login and navigation in the pages.
Related files	MainVisu/Pages/EmbVisuPage/ ContentEmbVisuPage.content

3.12 VarListPage

The **VarListPage** explains how to point to a defined variable depending on a certain selection.

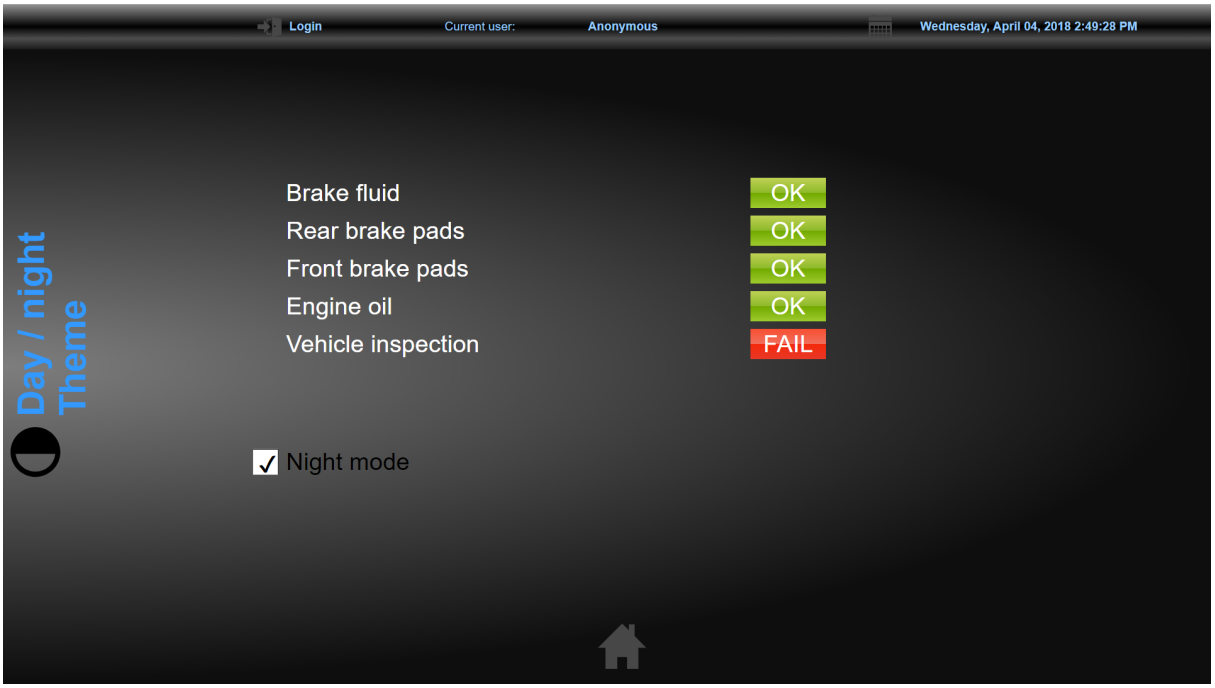


Use case	description
Select item	The selection is done by the selectedIndex value of the DropDownBox widget This value is used as a selector to a list of variables
Related files	MainVisu/Pages/VarListPage/ ContentVarList.content MainVisuBindings/ContentVarList.binding Source/VarList

```
<Binding mode="oneWay">
    <Source xsi:type="listElement">
        <Selector xsi:type="brease" widgetRefId="DropDownBox1" contentRefId="VarListContent" attribute="selectedIndex" />
        <be:List xsi:type="be:opcUa" attribute="value">
            <bt:Element index="0" refId="::Lists:Color[0].Red" />
            <bt:Element index="1" refId="::Lists:Color[1].Red" />
            <bt:Element index="2" refId="::Lists:Color[2].Red" />
            <bt:Element index="3" refId="::Lists:Color[3].Red" />
            <bt:Element index="4" refId="::Lists:Color[4].Red" />
            <bt:Element index="5" refId="::Lists:Color[5].Red" />
            <bt:Element index="6" refId="::Lists:Color[6].Red" />
            <bt:Element index="7" refId="::Lists:Color[7].Red" />
            <bt:Element index="8" refId="::Lists:Color[8].Red" />
            <bt:Element index="9" refId="::Lists:Color[9].Red" />
        </be:List>
    </Source>
    <Target xsi:type="brease" widgetRefId="NumericOutput1" contentRefId="VarListContent" attribute="value"/>
</Binding>
```

3.13 ThemePage

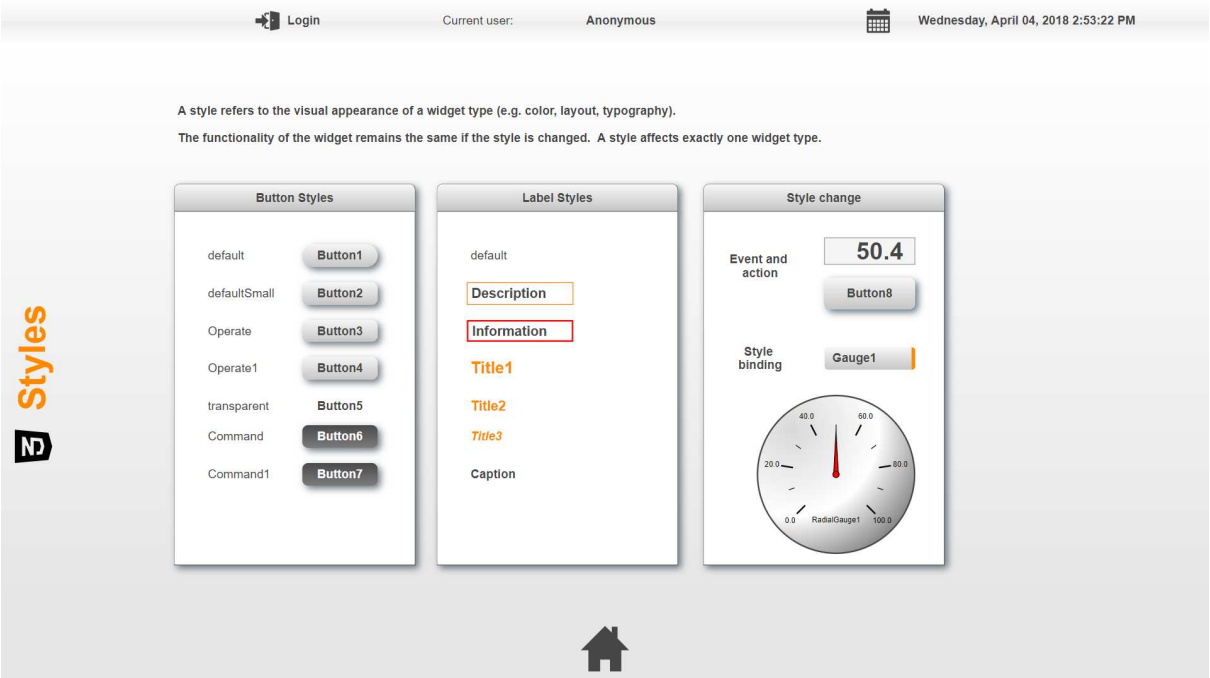
The **ThemePage** shows how to change a Theme in the HMI – e.g. day or night view.



Use case	description
Day / Night view	Two Themes are referenced in the visualization. Each style for the corresponding widgets must exist in both themes
Related files	MainVisu/Pages/ThemePage/ ContentThemePage.content MainVisuEvents/ContentThemePage.eventbinding

3.14 StylePage

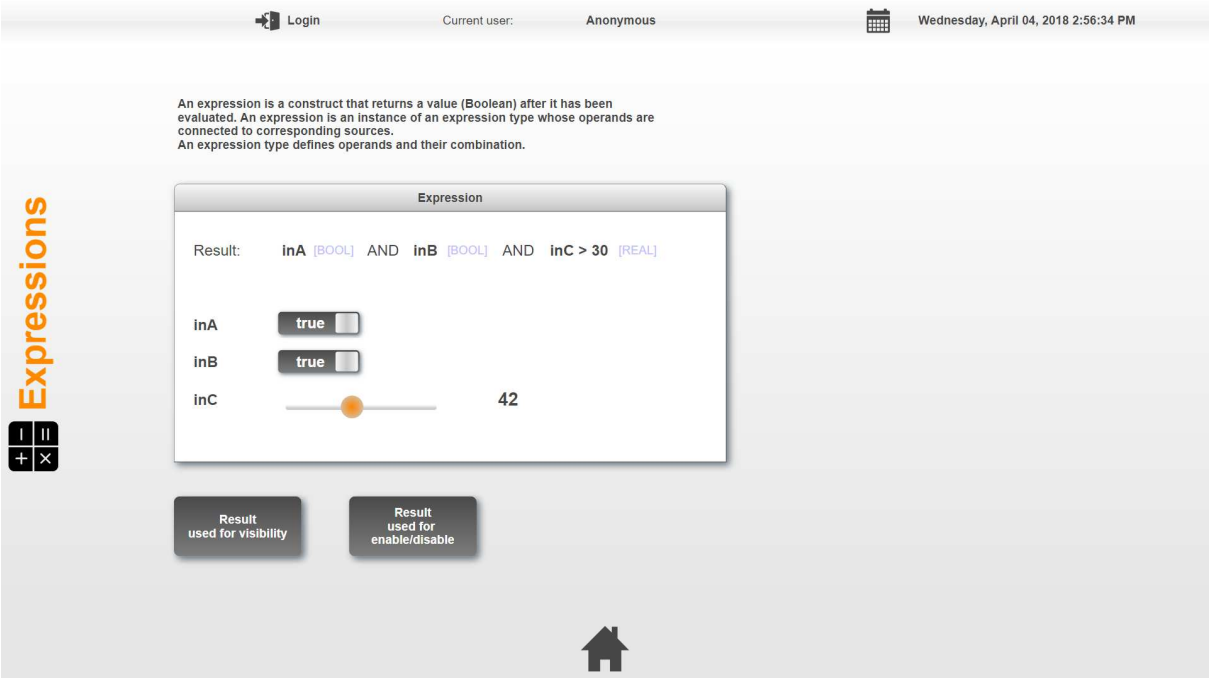
The **StylePage** shows the available Styles for different widget types from the BuRTheme1. It also explains how to change a style of a widget during runtime depending on process states (e.g. error).



Use case	description
Widget styles	Press a button and explain the difference for operation and command styles Operation: operations inside the visualization Command: interaction to PLC variables
Related files	MainVisu/Pages/StylePage/ ContentStylePage.content MainVisuBindings/ContentStylePage.binding MainVisuEvents/ContentStylePage.eventbinding

3.15 ExpressionPage

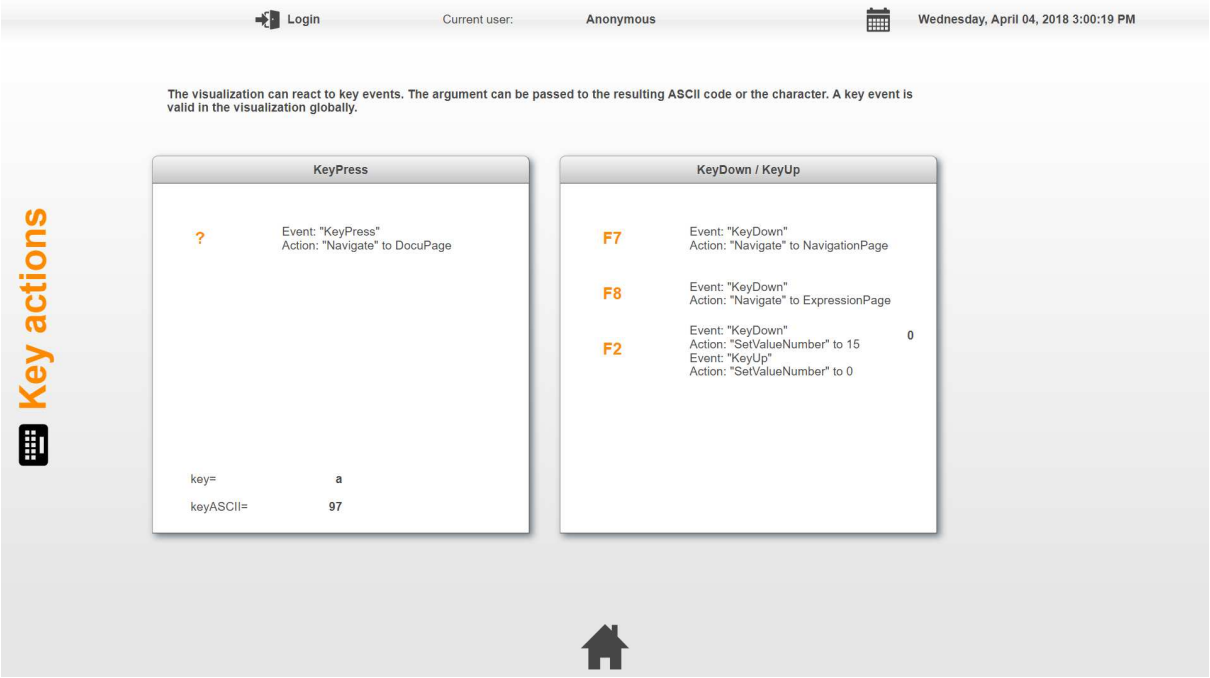
The **ExpressionPage** explains the usage of expressions. The result of an operation can be used e.g. for visible or enable binding on widgets.



Use case	description
Visible / Enable binding	The result of an operation is used to affect the visibility or operability of Widgets Result = true: Widget is enabled or shown Result = false: Widget is disabled or hided
Related files	MainVisu/Pages/ExpressionPage/ ContentExpressions.content MainVisu/Expressions/ Expression.expression MainVisu/Expressions/ expression.expressiontype MainVisuBindings/ContentExpressions.binding

3.16 KeyboardPage

The **KeyboardPage** shows how to react on keyboard events.



Use case	description
Keyboard events	Shows how hardware keys (e.g. PS2 keyboard) can be used in the HMI
Related files	MainVisu/Pages/KeyboardPage/ ContentKeyboard.content MainVisuEvents/ContentKeyboard.eventbinding

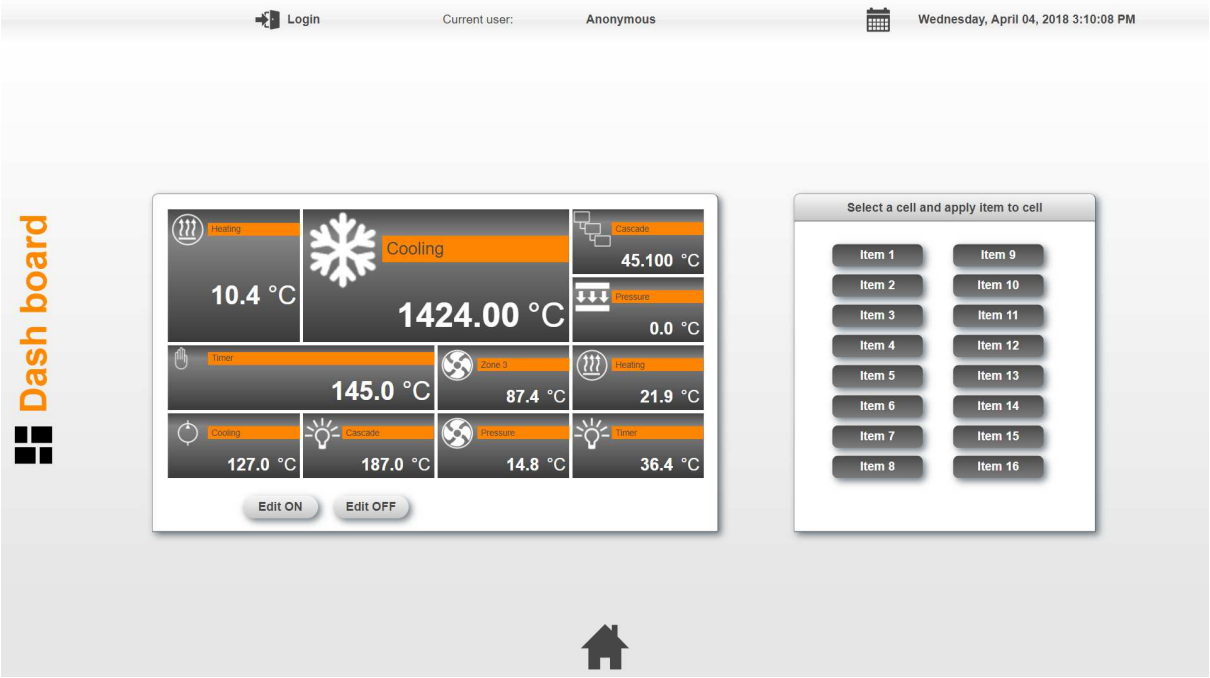
3.17 ChartPage

The **ChartPage** shows different chart types.

Use case	description
Online Chart	Shows the implementation of an OnlineChart widget Sliders on the right side allows a value change of 2 graphs
Bar Chart	Shows the implementation of an BarChart widget Sliders on the right side allows a value change of 2 bars
Line Chart	Shows the implementation of a LineChart widget which shows an array of data
Pie Chart	Shows the implementation of a PieChart widget Sliders on the right side allows a value change of 2 items
Stacked Bar Chart	Shows the implementation of a StackedBarChart widget Sliders on the right side allows the value change of 2 bars
Related files	MainVisu/Pages/ChartPage/ ContentChartPage.content MainVisuBindings/ContentChartPage.binding MainVisuEvents/ContentChartPage.eventbinding Sources/Chart

3.18 FavoriteWatchPage

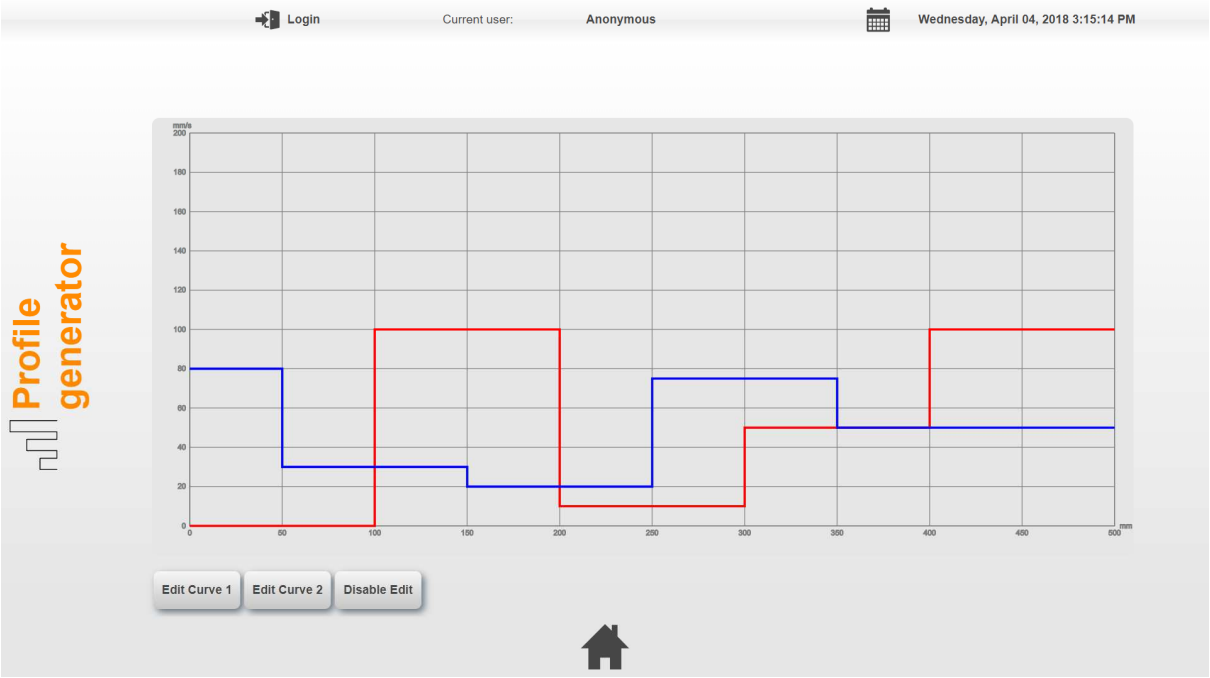
The **FavoriteWatchPage** shows the implementation of a dash board using the FavoriteWatch widget.



Use case	description
Dash board	Shows how a FavoriteWatch is configured The FavoriteWatch widget is a configurable grid, which can change the arrangement, size and the value to be displayed at runtime
Related files	MainVisu/Pages/FavoriteWatchPage/ ContentFavoriteWatch.content MainVisuBindings/ ContentFavoriteWatch.binding MainVisuEvents/ ContentFavoriteWatch.eventbinding Sources/ ProfileGen

3.19 ProfileGenPage

The **ProfileGenPage** shows the ProfileGenerator implementation.



Use case	description
Profile generator	Shows how a Profile generator is configured It allows a manipulation of profiles and their values directly in the HMI, e.g. change the motion profile of an axis.
Related files	MainVisu/Pages/ProfileGenPage/ ContentProfileGen.content MainVisuBindings/ ContentProfileGen.binding MainVisuEvents/ ContentProfileGen.eventbinding Sources/ ProfileGen

3.20 UseCasePage

The **UseCasePage** shows different use cases for a mapp View HMI.

The related contents are loaded during runtime and not referenced in the page.

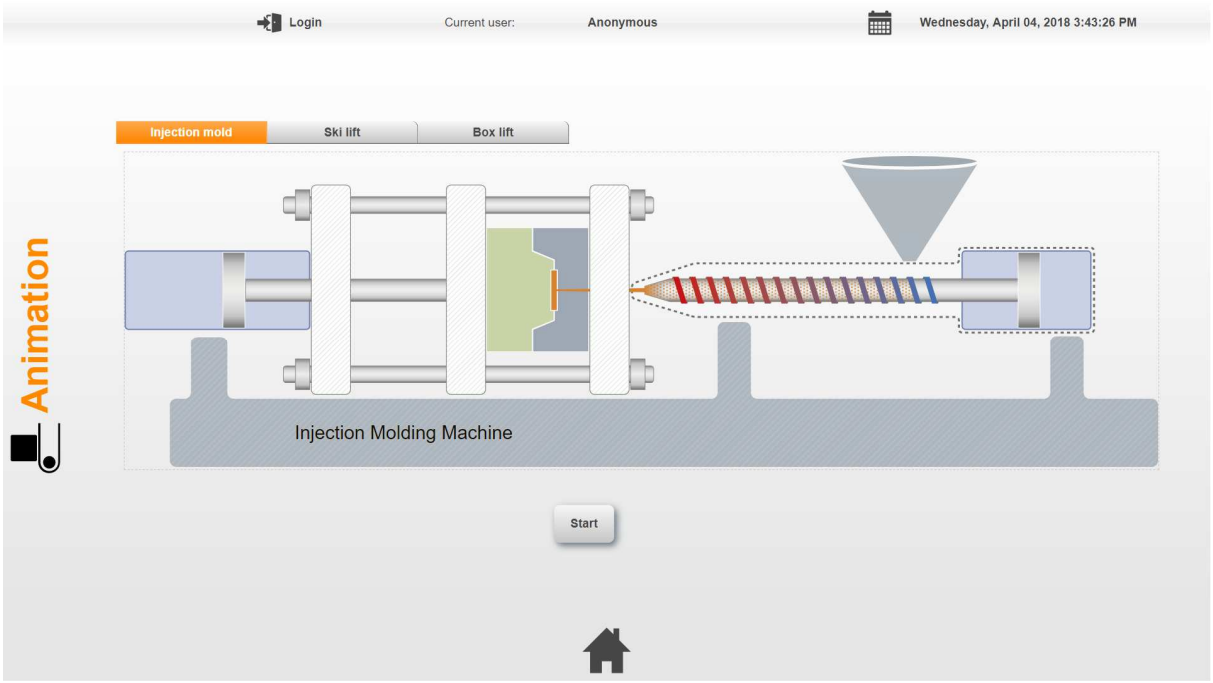
Use case	description
Configuration based loading of contents	A selection in the TextPicker widget loads contents at runtime depending on the selectedIndex value This method is used to load contents depending e.g. on different machine configurations in a HMI
Dynamic units (UseCase1)	This use case shows how units can be managed in a text key The units are configured in an IndexText snippet The Textkey selected via the DropDownBox is bound to a session variable, which in turn is bound to the unit Property of the NumericOutput widget
Menu with dialogs (UseCase2)	Shows how to implement a dynamic menu using absolute positioned dialogs
Large content (UseCase3)	Shows how a large content is referenced to a smaller area Scroll bars allow to move the content in the area
Cursor time difference (UseCase4)	Shows how to calculate the time difference between two measuring cursors
Cursor index difference (UseCase5)	Shows how to calculate the index difference between two measuring cursors
2 step confirmation (UseCase6)	Show how to implement a 2 step confirmation using session variables as a buffer of entered values
SVG animation (UseCase7)	Shows the usage of SVG images and how to animate them using the Paper widget
Logarithmic chart (UseCase8)	Shows the implementation of a logarithmic chart using the Paper widget

Related files	MainVisu/Pages/UseCasePage/ ContentUseCase1.content MainVisu/Pages/UseCasePage/ ContentUseCase2.content MainVisu/Pages/UseCasePage/ ContentUseCase3.content MainVisu/Pages/UseCasePage/ ContentUseCase4.content MainVisu/Pages/UseCasePage/ ContentUseCase5.content MainVisu/Pages/UseCasePage/ ContentUseCase6.content MainVisu/Pages/UseCasePage/ ContentUseCase7.content MainVisu/Pages/UseCasePage/ ContentUseCase8.content MainVisuBindings/ ContentUseCase1.binding MainVisuBindings/ ContentUseCase3.binding MainVisuBindings/ ContentUseCase4.binding MainVisuBindings/ ContentUseCase5.binding MainVisuBindings/ ContentUseCase6.binding MainVisuBindings/ ContentUseCase7.binding MainVisuBindings/ ContentUseCase8.binding MainVisuEvents/ ContentUseCaseBase.eventbinding MainVisuEvents/ ContentUseCase2.eventbinding MainVisuEvents/ ContentUseCase3.eventbinding MainVisuEvents/ ContentUseCase6.eventbinding Sources/ UseCase Sources/LogarithmicChart

3.21 AnimationPage

The **AnimationPage** shows different use cases for the Paper widget.

A 1TGMPPAPER.20-01 license is required for the Paper Widget.



Use case	description
Animation of SVG images	This use case describes how the paper widget can be used for dynamic SVG images. It also shows how to interact with SVG elements.
Related files	MainVisu/Pages/AnimationPage/ ContentAnimationPage.content MainVisuBindings/ ContentAnimationPage.binding MainVisuEvents/ ContentAnimationPage.eventbinding Sources/ Paper