OrangeApps

myHMI

Customized HMI via XML

Version 1.2

User Manual

Date: 07’th July 2021, Version 1.7

OrangeApps GmbH
Arnikaweg 1
87471 Durach
Germany
www.orangeapps.de

Documentation validity

Document version	software version		released by	Date
	from	to		
1.7	1.2		Mayer	01/27/2021

History of document versions

Version	Date	Author	Reason for change / Comment
1.0	09/22/2016	Christian Mayer	First release
1.1	02/20/2018	Christian Mayer	Implementation of the control “Picture”
1.2	03/06/2018	Christian Mayer	Small changes in documentation
1.3	03/13/2018	Christian Mayer	Chap. 5.5 reworked
1.4	11/23/2018	Christian Mayer	AreYouSure Element removed from Button
1.5	09/26/2019	Christian Mayer	Implemented chapter 7.2 myHMI-Designer
1.6	09/07/2020	Christian Mayer	Implemented chapter 8 KRL functions and variables
1.7	0707/20211	Christian Mayer	Control SwitchIO Installation as KOP via WoV

Contents

1 Initiation

1.1 Target group

This documentation is intended for users with the following skills:

- Knowledge of the software structure of the KUKA robot system

1.2 Representation of information

These Notes contain helpful tips or special information on the current topic.

1.3 Terminology used

Term	Description
HMI	The Human-Machine Interface (HMI) is an interface that a person communicates via a machine.
KSS	KUKA System Software
SmartPad	Robot control terminal
SmartHMI	User interface of KRC4 robot control
KOP	KUKA Option Package
WoV	KUKA WorkVisual

2 Overview

2.1 Product Description

With myHMI, user-specific HMIs can be displayed on the SmartPad. These are used to display and manipulate all KRL variables known on the robot system. The intention is to display BOOL, INT, REAL, ENUM and CHAR variables using graphical elements such as text boxes, switches, LEDs, dropdown and image controls.

Every HMI is specified by a xml-file which contains the specific entries. The xml-file can be edited with a standard text editor. A plugin interprets the entries in the XML file, and represents the elements in tabular form on an HMI. The user thus does not require any knowledge of programming of plugins and HMIs.

Any number of XML files and therefore any number of HMIs can be generated. Each HMI is called up via a menu entry in the main menu of the robot. You can choose between half or full size display. The HMI fits seamlessly into the robot system. All standard menu and control elements remain fully operable. For easy creation of the menu entries, a comfortable menu assistant is available.

To enable a thematic separation within an HMI, the content can be distributed to a maximum of 5 tabs pages. Each tab can display 32 items.

Each element can be dynamically linked to a user level.

The entire HMI supports multiple languages, so that a dynamic language switching is possible.

Changed values by the operator are recorded in the logbook KUKA. (Diagnosis/Logbook).

For the creation of the menu entries of each HMI there’s a menu assistant available. Thus, no knowledge of the menu creation is necessary.

2.2 Characteristics

- HMI for display and manipulation of KRL variables
- Displayed content is defined using XML
- Content is thematically presented with tabs
- The controls are displayed in tabular form with up to 3 columns
- Controls: switch, button, text box, number box, LED, drop-down list, Slider, Progress bar, Headline, Label and Image
- Input fields can be enabled by specifying optional dependencies (user group, submit and program status, drives enable, operating mode, etc.)
- Dynamic display of images
- Image files can be stored both locally and on a network drive
- Contents can be presented in several languages using KXR files
- User input is stored in the logbook
- The number of displayed HMI's is theoretically unlimited
- Up to 5 tabs can be defined on each HMI
- Up to 32 units can be defined for each tab
- Each HMI is opened from the main menu
- The menu entries can be created with a menu assistant

- the software can easily be installed using the KUKA standard installation procedure
- **New feature since 1.2: open and close of HMI directly from KRL, auto start on controller startup and depending on changing operation mode and user level**
- **Installation via WorkVisual**

2.3 Scope of delivery

The software is delivered as technology package for installation directly on the robot (additional software). This includes all the necessary components for installation and operation:

- Plugin
- User documentation for the installation and operation of the software
- Plugin menu assistant

To help users get started, the setup package contains a sample HMI with the following files:

- DemoMyHMI.xml→ contains examples of using tabs and controls
- DemoMyHMI.kxr→ Example of creating a speech database for multilingualism

2.4 Application area / environment

The software runs on all KUKA robots with KSS8.3.23 or higher without CPC protection.

Information about the use of the software on older machines is available from info@orangeapps.de.

3 Installation

Since version V1.2.5 the software is delivered as a KUKA Option Package (KOP).

The installation is done either via WorkVisual or via the *additional software* option which is located in the main menu under *start-up*.

If older versions than 1.2.5 are installed on the robot, the software must be uninstalled before the installation of the KOP. All menu entries for calling up user-defined HMIs must also be deleted using the menu wizard.

3.1 System Requirements for running

Minimum Requirements Software

- KUKA System Software 8.3.23
- When installing via WorkVisual: WorkVisual 5.x or higher

If the technology is to be installed on KRC4 robots with KSS version older than 8.3.23, this version is available from us. Please contact us.

If the software KUKA.CPC is used on the robot, a software certificate is needed to install the plugin.
In this case, please get into contact with our customer service (email to info@orangeapps.de) before purchasing this product.

3.1.1 Installation via Work Visual

3.1.1.1 Install or update MyHMI

The KOP is installed like a normal KUKA option package and must be installed via the option package management in WoV. It is then available as a catalog element.

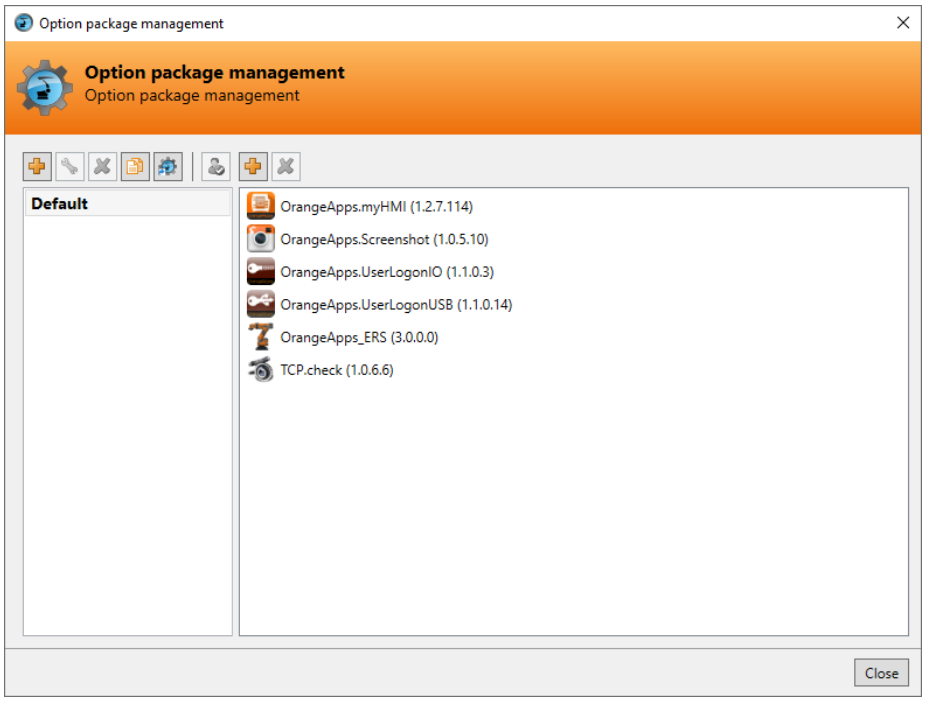


Figure 3-1: Option package management

The option package is then added to the project in WoV and automatically installed on the robot controller when the project is transferred.

In the event of an update, the previous version of the option package must first be uninstalled in WoV. All associated data should be archived before an update.

Overview of steps to install via WoV

- Install the option package in WoV as a catalog element
- Drag project from robot
- Insert option
- Register on the robot as an expert and transfer the project

Requirement

- At least user group Expert
- Operating mode T1 or T2
- No program is selected
- Network connection to the robot controller
- The KOP file of the software

Method

1. **Only for an update**: Uninstall the previous version of the MyHMI option package in WorkVisual.
2. Install the MyHMI option package in WorkVisual.
3. Load the project from the robot controller.
4. Add the MyHMI option package to the project.
5. Deploy the project from WorkVisual to the robot controller and activate it.
6. The request for confirmation ***Do you want to activate the project […]?*** is displayed on the smartHMI. When activated, the active project is overwritten. If no relevant project is overwritten: Confirm the query with Yes.
7. An overview with the changes and a request for confirmation is displayed on the smartHMI. Answer this with ***Yes***. The option package is installed and the robot controller performs a restart.

Information on processes in WorkVisual can be found in the WorkVisual documentation.

LOG file

A LOG file is created under C:\KRC\ROBOTER\LOG.

Entry in the main menu

Configuraton → MyHMI

Entry in the information window

After a successful installation, an entry "OrangeApps.MyHMI" is displayed under ***Help→info→Options***.

Changed robot system files

-

3.1.1.2 Uninstall MyHMI

All related data should be archived prior to deinstallation.

Overview of steps to uninstall via WoV

- Drag project from robot
- Remove option

- Register on the robot as an expert and transfer the project

Requirement

- At least user group Expert
- Operating mode T1 or T2
- No program is selected.
- Network connection to the robot controller
- The option package is available as a KOP file.

Method

1. Load the project from the robot controller.
2. Add the MyHMI option package to the project.
3. Transfer the project from WorkVisual to the robot controller and activate it.
4. The request for confirmation ***Do you want to activate the project […]?*** is displayed on the smartHMI. When activated, the active project is overwritten. If no relevant project is overwritten: Confirm the query with Yes.
5. An overview with the changes and a request for confirmation is displayed on the smartHMI. Answer this with ***Yes***. The option package is uninstalled and the robot controller performs a restart.

Information for processes in WorkVisual can be found in the WorkVisual documentation.

LOG file

A LOG file is created under C: \ KRC \ ROBOTER \ LOG.

3.1.2 Installation via smartHMI

3.1.2.1 Install or update MyHMI

Requirement

- At least user group Expert
- Operating mode T1 or T2
- No program selected
- USB stick with the option package (KOP file)
- KSS 8.3 or higher

Method

Installation takes place via commissioning → ***Additional software*** in the main menu.

1. Copy the KOP file either to a USB stick or directly to a drive of the target system (e.g. d:\).
2. When installing from a USB stick, connect it to the control PC or the smartPad.
3. In the main menu select ***Startup*** → **Additional software**.
4. Click the button ***New Software***
5. You will receive a list of software available for installation. If there is no entry OrangeApps.MyHMI in the list, click on ***Refresh***. If the entry is now displayed, continue with step 8.
6. If the entry is not displayed, the drive from which the software is to be installed must first be configured. To do this, choose ***Configuration***. In a new window you can now select the path under which the OrangeApps.MyHMI option package can be found.
7. In the area ***Installation paths for options***, highlight an empty cell and choose ***Path Selection***. The existing drives are displayed. Select the drive where the OrangeApps.MyHMI option is available and save your selection with ***Save***. The window closes. An entry ***OrangeApps.MyHMI*** should now appear in the list. If this is not the case, press ***Update*** and / or repeat steps 7 and 8.
8. Highlight the OrangeApps.MyHMI entry and press ***Install***. Confirm the installation instructions with ***OK***
9. The request for confirmation ***Do you want to activate the project […]?*** is displayed on the smartHMI. When activated, the active project is overwritten. If no relevant project is overwritten: Confirm the query with Yes.
10. An overview with the changes and a request for confirmation is displayed on the smartHMI. Answer this with ***Yes***. The option package is installed and the robot controller performs a restart.
11. If applicable, remove the USB stick.

LOG file

A LOG file is created under C:\KRC\ROBOTER\LOG.

Entry in the main menu

Configuration → MyHMI

Entry in the information window

After a successful installation, an entry "OrangeApps.MyHMI" is displayed under ***Help→info→Options***.

Changed robot system files

-

3.1.2.2 Uninstall MyHMI

Requirement

- At least user group Expert
- Operating mode T1 or T2
- No program selected

Method

The deinstallation takes place via ***Startup → Additional software*** in the main menu.

1. In the main menu choose ***Startup*** → **Additional software**.
2. Mark OrangeApps.MyHMI and press **Uninstall**.
3. The request for confirmation ***Do you want to activate the project […]?*** is displayed on the smartHMI. When activated, the active project is overwritten. If no relevant project is overwritten: Confirm the query with Yes.
4. An overview with the changes and a request for confirmation is displayed on the smartHMI. Answer this with ***Yes***. The option package is installed and the robot controller performs a restart.

LOG file

A LOG file is created under C: \ KRC \ ROBOTER \ LOG.

3.2 Installed files

To operate the software, the following files are installed:

File	Files	Function
C:\KRC\TP\OrangeApps.myHMI\SmartHmi	OrangeApps.myHMI.dll SmartHMI.exe.myHMI.config OrangeApps.myHMIViewService.dll SmartHMI.exe.myHMIViewService.config	Plugin myHMI
	OrangeApps.myHMIMenuConfigurator.dll SmartHMI.exe.myHMIMenuConfigurator.config	Plugin menu assistant
C:\KRC\TP\OrangeApps.myHMI\kxr	myHMI.kxr myHMIMenuConfigurator.kxr	Language database for

		myHMI and menu assistant
R1\TP\myHMI	myHMI_user.dat myHMI_lib.src and .dat	Functions and variables for opening/close HMI's from within KRL, on startup and depending on user level and operation mode

These files are installed for the sample HMI:

File	Files	Function
C:\KRC\DATA	DemoMyHMI.kxr	language database for demo HMI
C:\KRC\USER\MYHMI	DemoMyHMI.xml	HMI
C:\KRC\USER\MYHMI	Several Picture files	

The sample HMI can fully operate and can be used as a basis for further HMI's.

4 Licensing

myHMI is subject to licensing. Licensing is done by a license file. Visit our website www.orangeapps.de for more information on licensing.

Reference

- A license is required for each robot
- Trial licenses are free of charge and limited in time.
- Date manipulations of the system are detected, myHMI automatically disables the license

Trial licenses can be obtained directly at www.orangeapps.de. Runtime licenses are given after receipt of the license fee.

4.1 Robot License

To obtain a valid license, you will need the serial number of the robot. These can be found on the nameplate of the robot or in the control software in the Help menu → ***Info*** → ***Robot*** → ***Serial number.***

4.2 License for KUKA OfficePC/OfficeLite

For OfficeLite and OfficePC no license is required.

4.3 Installing a License

Method 1

- Plug a USB stick, containing the license file, to a USB port of the controller or SmartPad.
- Alternatively, copy the license file to the d: drive of the robot
- When opening an HMI, the license will be copied automatically into the license folder and then be enabled. Note: A run-time license in the license folder will not be overwritten by a trial license
- Remove the USB stick

Method 2

- Copy the obtained license in the folder c:\KRC\TP\myHMI\Lic

5 Elements of an HMI

The HMI to be displayed is fully defined in an XML file and later interpreted by myHMI.

The xml-file must be stored in the folder C:\KRC\User\myHMI.

On the robot system as many HMI can be created and displayed. Each HMI needs the following files (the placeholder *HMI_Name* stands for the name of the HMI).

- *HMI_Name*.xml
- (optional) *HMI_Name*.kxr

Definitions in the xml-file:

- The number and order of tabs
- Number and sequence of controls
- Grouping of control
- Properties of the controls
- Headline of the display window

Definitions in the kxr-file:

- translations

When called from the main menu the xml-file is interpreted and the HMI is displayed accordingly. The controls are arranged in columns on the tabs, according to the order in the XML file. Depending on your needs, a one-, two- or three-column display can be chosen.

The (optional) use of a kxr translation file enables the automatic translation of texts accordingly to the language set in the HMI.

Tabulated summary

File	Description	Location
HMI_Name.xml	Description of the displayed content through predefined tabs and controls	any location → e.g. .: C:\KRC\USER\myHMI
HMI_Name.kxr	(Optional) for multilingual text and caption content	C:\KRC\Data
SmartHMI.exe.User.config	Menu call of the HMI from the KUKA main menu. Created by the menu assistant	C:\KRC\User

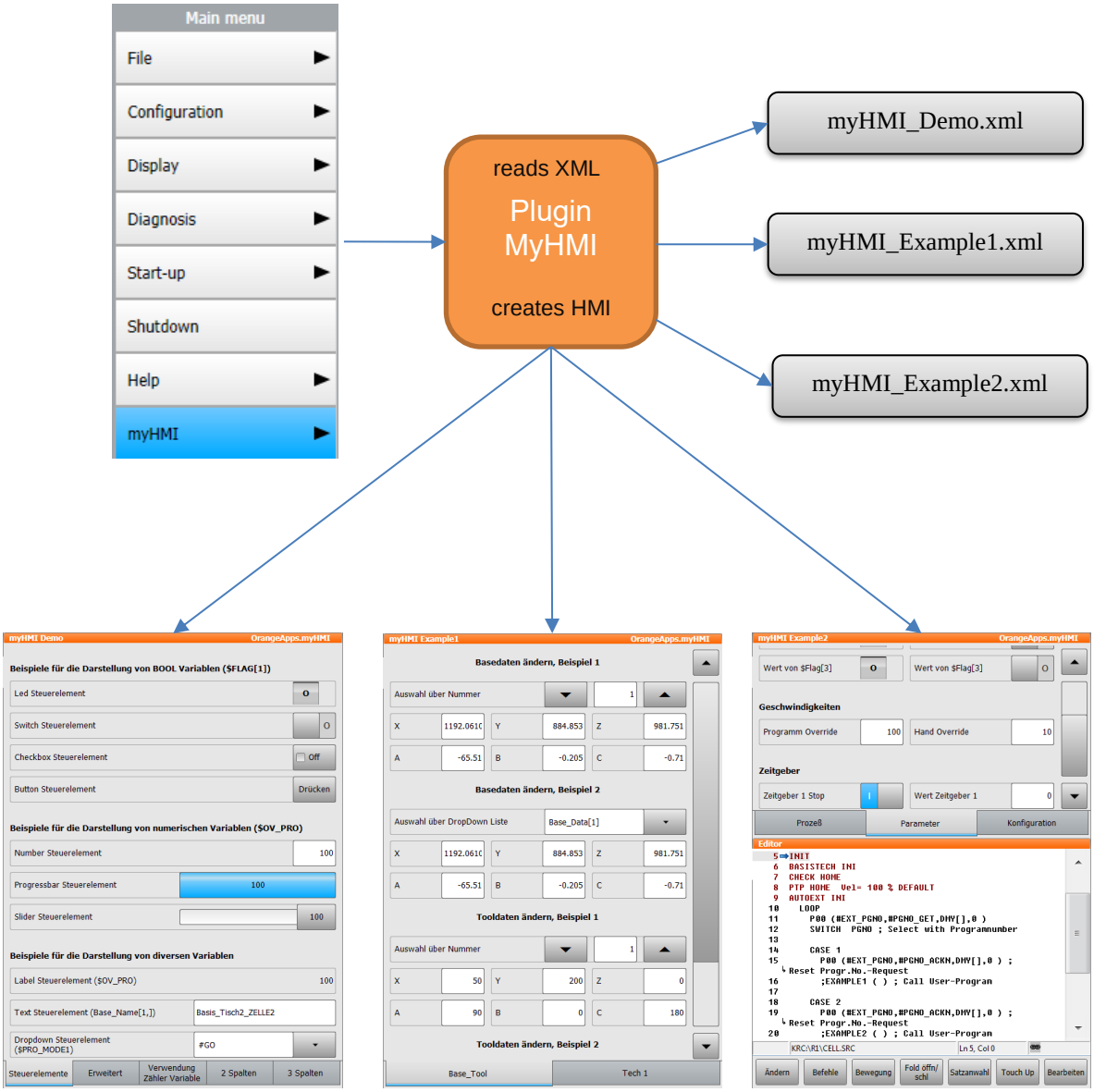
HMI_Name= Placeholder for the name of the HMI, freely selectable

“Notepad ++” is recommended for creating and editing XML files. On the one hand, the XML content is clearly legible in terms of color and, on the other hand, basic XML errors are recognized by the XML parser contained in Notepad ++ when the file is saved.

In order to present an updated XML file in myHMI, it is sufficient to close the display window of the HMI and re-open. Changes in a KXR language file require a restart of SmartHMI, or alternatively a cold start of the robot controller.

5.1 Schematic representation of the functional principle

After calling an HMI from the main menu the plugin interprets the corresponding XML file and creates the respective HMI.



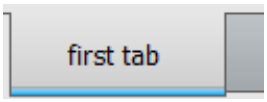
5.2 Group controls on tab pages

The groups are used for thematic separation of content and displayed in the HMI as tabs. You must specify at least one group. Up to five groups can be specified.

Example XML

```
<Configuration Text="HMI title" modules="myFirstHMI">
<Group Text="first tab">
  , , ,
</Group>
</Configuration>
```

Example Display



If only one tab is defined within an XML file in the HMI no tab is displayed.

5.3 Controls

Controls are defined by the node <Control …>.

To display and manipulate KRL variables different controls are available. These controls are linked in the XML file with the KRL variables. The appearance and behavior can be influenced by various arguments. In the simplest case, a control requires the arguments type, text and KrlVar. The following description of the controls shows the minimum necessary arguments. Further arguments for each control are discussed in Chapter 0.

To define controls within a tab page, the text must be within the node <Group ….> … </Group>

```
<Group Text="...">
<Control Type="Number"  Text="Path Velocity" KrlVar="$Vel.CP"/>
  , , ,
</Group>
```

5.3.1 Notation in the XML file

The notation in the XML file is based on the common formatting rules for XML files.

A control is normally specified within the node < Control .../>. The type of control is indicated by the argument ***Type***. The indication of allocation to the individual arguments is written within quotation marks (").

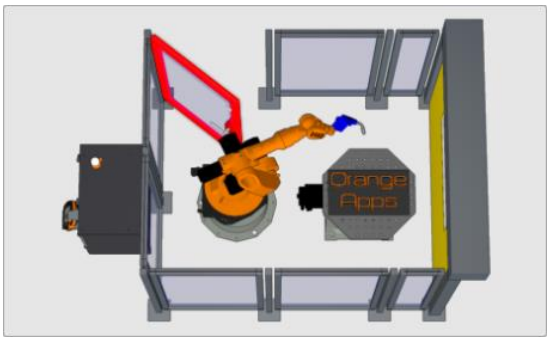
Example of a control of type "Number" to display INT or REAL variables

```
<Control type="Number" text="line speed" KrlVar="$Vel.CP"/>
```

5.3.2 Overview available Controls

The following controls are available:

- Picture



- Number

- LED

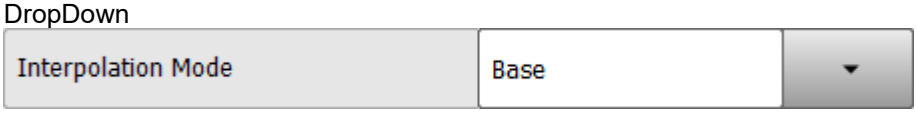
- Switch

- **SwitchIO (new in V1.2)**

- Checkbox

- Button

- DropDown



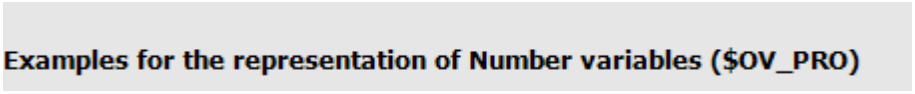
- Text

- Label

- Progressbar

- Slider

- Headline



All controls can optionally be influenced by a variety of arguments in function and appearance

5.3.3 Display size of the controls

Except for the "Picture" control, all controls are displayed at a height of 40 pixels.

5.3.4 Control "Number"

Is used to represent INT or REAL variables. The control automatically determines the variable type (INT or REAL) and sets the appropriate keyboard type for input values.

Example 1

Entry in the XML file

```
<Control type="Number" text="Path velocity" KrlVar="$Vel.CP"
```

Example 2

Entry in the XML file

```
<Control type="Number" Text="Velocity" KrlVar="$OV_PRO" VisibleLevel="0"
EditLevel="20" Min="0" Max="100" Step="10"/>
```

The specification of the minimum and maximum value can also be made via a KRL variable.

```
<Control type="Number" Text="Velocity" KrlVar="$OV_PRO" VisibleLevel="0"
EditLevel="20" Min="iMinValue" Max="iMaxValue" Step="10"/>
```

5.3.5 Control "LED"

Is used to represent Boolean variables.

Example

Example entry in the XML file

```
<Control type="Led" Text="Motor Drehtisch 1" KrlVar="$Flag[1]"
```

By specifying the argument "Negate", the LED display will be negated.

5.3.6 Control "switch"

Represents the state Boolean variables and toggles the value between TRUE and FALSE.

Function: Switch, Maintained

Example

Entry in the XML file

```
<Control type="Switch" Text="Flag 1" KrlVar="$FLAG[1]"
```

By specifying the argument "Negate" the function of the switch are negated.

5.3.7 Control "switchIO"

Represents the status of Boolean variables and toggles their value between TRUE and FALSE. The LED shows the state of the switch. LED off = switch 0, LED on = switch 1

Function: Switch, Maintained

Example

Entry in the XML file

```
<Control type="Switch" Text="Flag 1" KrlVar="$FLAG[1]"
```

By specifying the argument "Negate" the function of the switch are negated.

5.3.8 Control "checkbox"

Represents the state Boolean variables and toggles the value between TRUE and FALSE.

Function: Switch, Maintained

Example

Entry in the XML file

```
<Control type="checkbox" Text="Checkbox Steuerelement" KrlVar="$Flag[1]"/>
```

By specifying the argument "Negate" the function of the switch are negated.

5.3.9 Control "button"

Sets the value of a Boolean variable to TRUE or FALSE.

Function: Button, without detent

Default value when operating: TRUE

Example

Entry in the XML file

```
<Control type="button" Text="Button control" TextButton="Press"
KrlVar="$Flag[1]"/>
```

By specifying the argument "Negate" the function of the button will be negated.

5.3.10 Control "DropDown"

Is used for displaying and manipulating variables of type ENUM.

Example

Entry in the XML file

```
<Control Type="dropdown" Text="Interpolations Mode" KrlVar "$IPO_MODE">
     <DropDownItem text="Base" value="#Base"/>
     <DropDownItem text="Tool" Value="#TCP"/>
</Control>
```

The entries in the drop-down menu are made via the element "DropDownItem" and its arguments "Value" and "Text" (optional).

Arguments of the element "DropdownItem"

Argument	Description
Text	Text displayed in the dropdown menu (optional)
Value	Value is assigned to each of the connected KRL variable

In addition, ENUM variables, also KRL variable of type CHAR, INT, REAL, BOOL can be linked with this control. It must be ensured then that the available values in the dropdown are compatible with the target KRL variable.

5.3.11 Control "Text"

Is used to represent and manipulate CHAR variables.

Example

Entry in the XML file

```
<Control type="text" Text="Text control (Base_Name[1,])"
KrlVar="base_name[1,]"/>
```

5.3.12 Control "Label"

Is used to represent any variable types.

Example

Entry in the XML file

```
<Control type="label" Text="Label Control ($OV_PRO)" KrlVar="$OV_PRO"
Format="0 \%"/>
```

5.3.13 Control "Progressbar"

Is used to represent INT or REAL variables

Example

Entry in the XML file

```
<Control type="progressbar" Text="Progressbar control" KrlVar="$OV_PRO"
min="0" max="100"/>
```

The specification of the minimum and maximum value can also be made via a KRL variable.

```
<Control type="progressbar" Text="Progressbar control " KrlVar="$OV_PRO"
Min="iMinValue" Max="iMaxValue"/>
```

5.3.14 Control "Slider"

Is used to display and manipulation of INT or REAL variables.

Example

Entry in the XML file

```
<Control type="Slider" Text="Slider control" KrlVar="$OV_PRO" min="0"
max="100"/>
```

The relative position of the slider by means of supplying the arguments "Min" and "Max". These are default 0 and 100. The value of the KRL variable always Located within these limits, the disclosure of "Min" and "Max" is not necessary. Does the KRL variable values outside the range of values of "Min" and "Max", the background bar is shown in red.

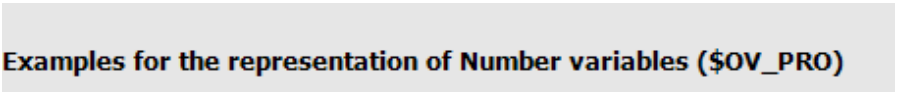
The specification of the minimum and maximum value can also be made via a KRL variable.

```
<Control type=" Slider " Text=" Slider control" KrlVar="$OV_PRO"
Min="iMinValue" Max="iMaxValue"/>
```

5.3.15 Control "Headline"

Used to display captions and headings

Example



Entry in the XML file

```
<Control type="headline" Text="Example for the representation of Number
variables ($OV_PRO)"/>
```

5.3.16 Control “Picture”

The "Picture" control is used for the static and dynamic display of graphics. For dynamic representation, the specification of a KRL variable and a wildcard is required.

It is also possible to superimpose individual images into an overall image. To do this, the KRL variable must be a structure.

The location of image files can be both local and on a network drive (file sharing must be considered).

5.3.16.1 Supported graphic formats

Supported formats are:

- BMP
- GIF
- JPEG
- PNG
- TIFF

If an incorrect graphic format is used, an error message will be displayed.

5.3.16.2 Display size of the graphics

The pictures are shown by default (without optional size argument) in original size. The size can be scaled using the optional "Width" argument.

All other controls are displayed by default at a height of 40 pixels.

5.3.16.3 Arguments of the control “Picture”

Different arguments can affect the look and feel of the control.

5.3.16.3.1 Argument “Path” - Path to the graphic file

The argument "Path" specifies the name of the graphic files to be loaded. This path can be specified both absolutely and relative. If relative, the reference folder is c:\KRC\User\myHMI.

Absolute indication:

```
<Control Type="Picture" Text="myHMI is powered by OrangeApps"
Path="C:\KRC\User\myHMI\myPics\logo_orangeapps.png" Border="False"/>
```

relative indication:

```
<Control Type="Picture" Text="myHMI is powered by OrangeApps"
Path="myPics\logo_orangeapps.png" Border="False"/>
```

5.3.16.3.2 Argument „KrlVar“ (optional) – KRL-variable for dynamic representation

By specifying a KRL variable and the wildcard {0}, the name of the graphic to be displayed can be dynamically generated.

```
<Control Type="Picture" Text="Power Laser enabled" Path="D:\IO_{0}.png"
KrlVar="$IN[1]"/>
```

The value of the KRL variable is monitored, read out and converted into a string. The placeholder is replaced by the string and thus the file name is specified.

5.3.16.3.3 Argument „Width“ (optional) – Display size of graphics

Without the specification of the element "Width", the graphic is displayed in its original size. The element "Width" scales the graphic in width. The height adjustment is done according to the original aspect ratio. The specification of "Width" is in pixels.

Example:

```
<Control Type="Picture" Text="Power Laser enabled" Path="D:\IO_{0}.png"
KrlVar="$IN[1]" Width="80"/>
```

Suppose the original size of the graphic is 50x80 pixels. Width is specified as 80

→ The scale factor is 1.6. The picture is displayed with 80x128 pixels.

5.3.16.3.4 Argument „Border“ (optional) – Frame pictures

The argument "Border" determines if a frame should be drawn around the graphic. Border = "True" draws a border, False does not draw the border. The default is "TRUE"

Example:

```
<Control Type="Picture" Path="D:\IO_{0}.png" KrlVar="$IN[1]" Width="80"
Border="FALSE"/>
```

5.3.16.3.5 Argument „Alignment“ (optional) – Align graphics

The argument "Alignment" can be used to change the orientation of the graphic between left, center, and right. Without specifying "Alignment", the graphics are aligned on the right edge.

Example:

```
<Control Type="Picture" Path="C:\KRC\User\myHMI\myPics\logo_orangeapps.png"
Alignment="Left"/>
```

5.3.16.3.6 Argument „Text“ (optional) – Display text

With the argument "Text" additional text can be displayed. This text can also be displayed in multiple languages (see chapter "Multilingualism").

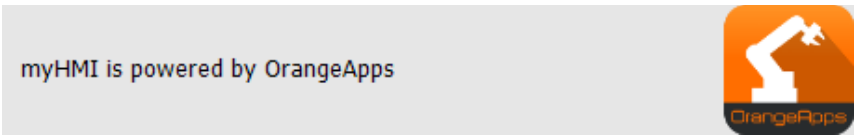
Example:

```
<Control Type="Picture" Text="Power Laser enabled" Path="D:\IO_{0}.png"
KrlVar="$IN[1]" Width="80" Border="FALSE"/>
```

5.3.16.4 Static representation

For static display, always the same picture displayed.

Example



Entry in the xml-file

```
<Control Type="Picture" Text="myHMI is powered by OrangeApps"
Path="Pics\logo_orangeapps.png" Border="False"/>
```

5.3.16.5 Dynamical representation

For the dynamic display of graphics, the path to the graphic file is assembled from the specification in the element "Path" and the value of a KRL variable. In the file name, the placeholder {0} must be used. The value of the variable is interpreted as a string and built into the file name in the place of the wildcard {0}. If the value of the KRL variable changes, the displayed graphic changes automatically.

Example dynamic representation

Entry in the xml-file

```
<Control Type="Picture" Text="Power Laser enabled" Path="D:\IO_{0}.png"
KrlVar="$IN[1]"/>
```

➔ Graphic to load:

Value of the variable $IN[1]	Graphic to load
FALSE	D:\IO_FALSE.PNG
TRUE	D:\IO_TRUE.PNG

5.3.16.6 Dynamic overlay of single graphics to an overall graphic

Similar to dynamic rendering, the placeholder {0} in the Path element is used to superimpose images. To display superimposed images in an overall image, a KRL variable of type "structure" is required. myHMI determines all structure elements and their values in succession, puts them together into a string and replaces the placeholder in the file name with the respective string according to the following principle:

First graphic: String from Path + Name of the 1st structure element + Value of the 1st structure element

Second graphic: String from Path + name of the 2nd structure element + value of the 2nd structure element

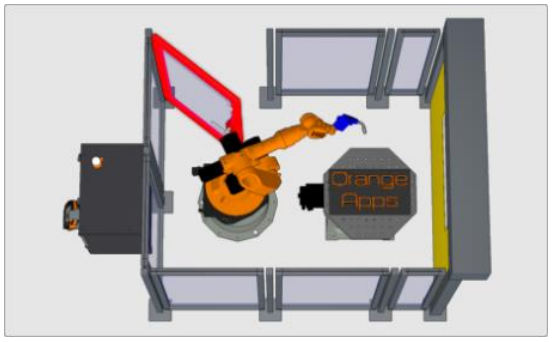
etc.

last graphic: String from Path + Name of the last structure element + Value of the nth structure element

There are as many graphics been displayed as there are structure elements. The order of the image overlay is determined by the order of the definition of the structure elements.

The name of the structure variable and its elements can be freely selected. Not allowed is structure in structure.
If the value of the KRL variable changes, the displayed overall graphic changes automatically.

Example with overlay, the structure variable is called "myHMIPicDemo" with the Boolean elements Gate, Background, Door, Turntable and Robot



The overall graphic consists of five different graphics

.

Entry in the xml-file (Assumption: The graphics are stored in the folder D:\myHMI\Pics)

```
<Control Type="Picture" Path="D:\myHMI\Pics\myHMI_{0}.png"
KrlVar="myHMIPicDemo"/>
```

The variable myHMIPicDemo is a structure with the following Boolean elements:

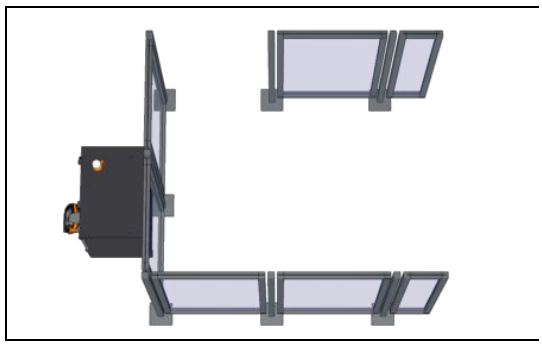
```
GLOBAL STRUC strPicDemo BOOL Gate,BackGround,Door,TurnTable,Robot

DECL GLOBAL strPicDemo myHMIPicDemo={Gate TRUE,BackGround TRUE,Door
TRUE,TurnTable FALSE,Robot FALSE}
```

How do the names of the graphics result?

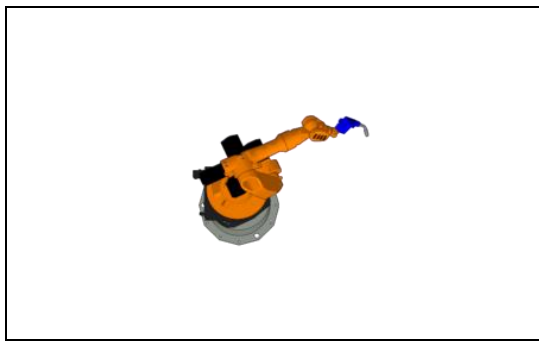
1. myHMI searches for the elements of the variable myHMIDemo. These are Gate, Background, Door, TurnTable and Robot
2. myHMI determines the current values of the elements
3. myHMI composes the name of each element and its value into a string, e.g. GateTrue
4. The placeholder {0] in the path D:\myHMI\Pics\myHMI_{0}.png is replaced by the determined string, e.g. D:\myHMI\Pics\myHMI_GateTrue.png
5. This image will now be displayed

myHMI performs these steps for each structure element. The order of the elements in the definition of the structure determines the order of the image display.

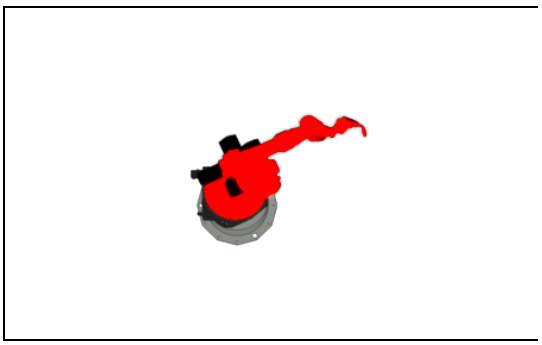
The folder D:\myHMI\Pics contains the following graphics:



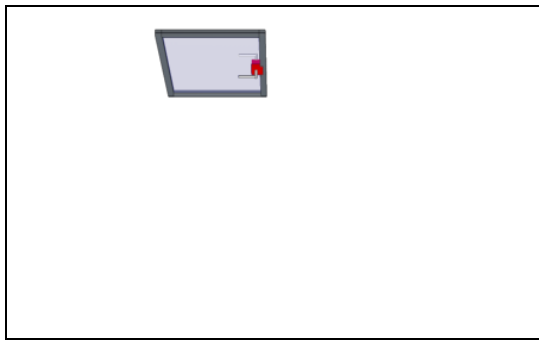
myHMI_BackgroundTrue.png



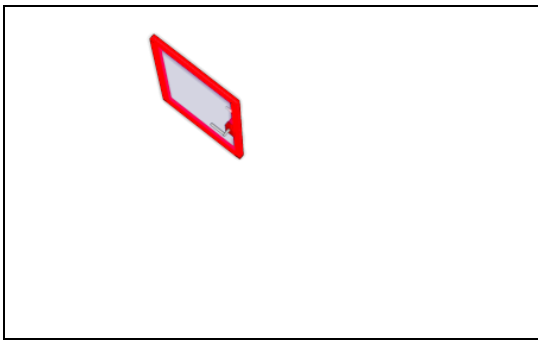
myHMI_RobotTrue.png



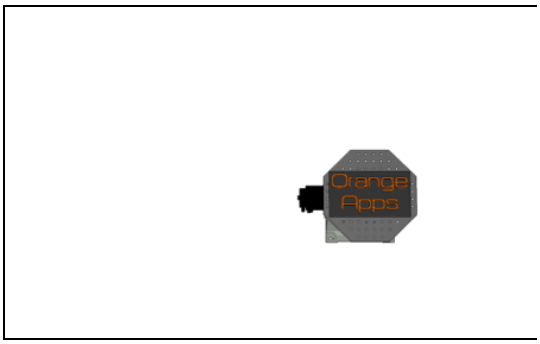
myHMI_RobotFalse.png



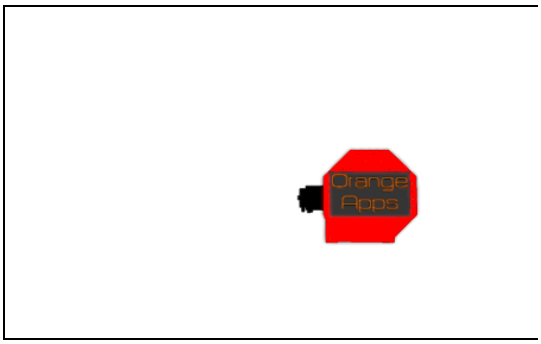
myHMI_DoorTrue.png



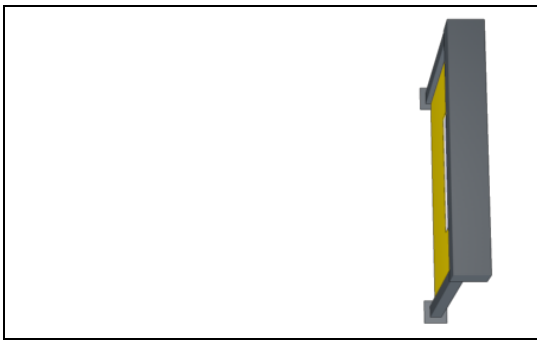
myHMI_DoorFalse.png



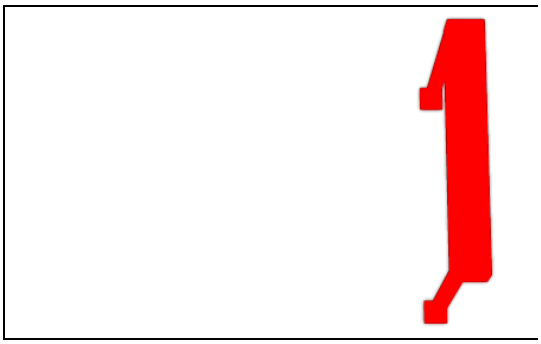
myHMI_TurnTableTrue.png



myHMI_TurnTableFalse.png



myHMI_GateTrue.png



myHMI_GateFalse.png

Example

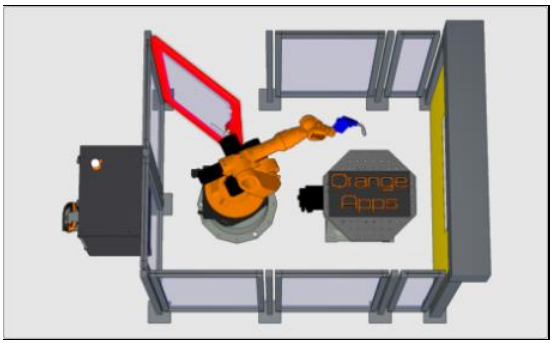
At the following values

```
DECL GLOBAL strPicDemo myHMIPicDemo={Gate TRUE,BackGround TRUE,Door
FALSE,TurnTable TRUE,Robot TRUE}
```

these graphics will be displayed:

Element	Value	Graphics to be loaded
Gate	TRUE	D:\myHMI\Pics\myHMI_GateTrue.png
Background	TRUE	D:\myHMI\Pics\myHMI_BackgroundTrue.png
Door	FALSE	D:\myHMI\Pics\myHMI_DoorFalse.png
TurnTable	TRUE	D:\myHMI\Pics\myHMI_TurnTableTrue.png
Robot	TRUE	D:\myHMI\Pics\myHMI_RobotTrue.png

Result:



If more graphics are to be displayed, only the structure needs to be expanded accordingly and the respective graphics added to the folder D:\myHMI\Pics.

Beispiel

With overlay. The structure variable is called „myCellView“ and has the elements Gate, Background, Door, Turntable und Robot (all of type Integer)

Entry in the xml-file (Assumption: The pictures a stored in C:\KRC\User\myHMI\Pics)

```
<Control Type="Picture" Path="Pics\{0}.png" KrlVar="myCellView"/>
```

At the following values

```
DECL GLOBAL strCellView myCellView={Gate 0,BackGround 1,Door 2,TurnTable
1,Robot 3}
```

(the values of the variables were assumed as examples)

these graphics will be displayed:

Element	Value	Graphic to be loaded
Gate	0	C:\KRC\User\myHMI\Pics\Gate0.png
Background	1	C:\KRC\User\myHMI\Pics\Background1.png
Door	2	C:\KRC\User\myHMI\Pics\Door2.png
TurnTable	1	C:\KRC\User\myHMI\Pics\TurnTable1.png
Robot	3	C:\KRC\User\myHMI\Pics\Robot3.png

We are happy to assist you in creating attractive graphics for your HMI. Just contact us at info@orangeapps.de.

5.3.17 Overview of all available arguments

For each control are further arguments are available. These arguments effect the appearance and behavior of each control.

Description of all possible arguments

Argument	Description	Optional	Default value
Alignment	Control Label: Sets the caption text left, center, right) Control Picture: Aligns the graphic (left, center, right)	Yes	Label: left Picture: right
AreYouSure	True=Confirmation on value change (dialogue)	Yes	False
Border	Controls if a frame shall be drawn around a graphic (with frame=True)	Yes	TRUE
Color0	Color of the LED in the control state False Possible values: Grey, Green, Red, Yellow	Yes	Gray
Color1	LED color of the control “Led” at the TRUE state Possible values: Grey, Green, Red, Yellow	Yes	Green
ColSpan	Number of columns spanned by the element	Yes	1
Description	When clicking on the control additional description text is displayed	Yes	
Format	Formatting of INT and REAL values	Yes	
KrlVar	Linked KRL variable	No	
Max	Maximum allowed value	Yes	
Min	Minimum allowed value	Yes	
ModeOP	Operation mode from which the element is editable	Yes	31
Module	Module / KXR file for multilingual content	Yes	value from *group*
NeedDrivesReady	Editability of the element is dependent on the state of the drives	Yes	False
NeedSafetySwitch	Editability of the element is dependent of the state of the enabling switch	Yes	False
Negate	Invert a Boolean variable	Yes	False
Path	Specifies the name and path of a graphic	No	

ProState0	Editability of the element is dependent of the state of the submit interpreter	Yes	63
ProState1	Editability of the element is dependent of the state of the program interpreter dependent	yes	63
Step	Increment for up / down button	Yes	
Text	Label text or key for the element	No	
Text0	Labeling of the control button "checkbox" at state False	Yes	From
Text1	Labeling of the control button "checkbox" state at True	Yes	An
TextButton	Labeling of the control "button"	Yes	
UserLevelEdit	User level from which the element is editable	Yes	0
User Level Visible	User level from which the element is visible	Yes	0
Value	Value of an entry in control "DropDown". The selected value is given to the variable of the argument "KrlVar".	No	
Width	Specifies the width of a graphic (pixel). The height is scaled proportionally	Yes	

Arguments / element array

Argument	<Configuration>	<Group>	Number	Led	Switch	SwitchIO	Checkbox	Button	Slider	Progressbar	Dropdown	Text	Label	Headline	Picture
Alignment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	O	O
AreYouSure	n/a	n/a	O	n/a	O	O	O	n/a	O	n/a	O	O	n/a	n/a	n/a
Border	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	O
Color 0/1	n/a	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Columns	n/a	O	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ColSpan	n/a	n/a	O	O	O	O	O	O	O	O	O	O	O	O	O
Description	n/a	n/a	O	O	O	O	O	O	O	O	O	O	O	n/a	n/a
Format	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	O	O	n/a	n/a	n/a	n/a	n/a
KrlVar	n/a	n/a	X	X	X	X	X	X	X	X	X	X	X	n/a	O
Max	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	O	O	n/a	n/a	n/a	n/a	n/a
Min	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	O	O	n/a	n/a	n/a	n/a	n/a
ModeOP	n/a	n/a	O	n/a	O	O	O	O	O	n/a	O	O	n/a	n/a	n/a
Module	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
NeedDrivesReady	n/a	n/a	O	n/a	O	O	O	O	O	n/a	O	O	n/a	n/a	n/a
NeedSafetySwitch	n/a	n/a	O	n/a	O	O	O	O	O	n/a	O	O	n/a	n/a	n/a
Negate	n/a	n/a	n/a	O	O	O	O	O	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Path	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	X
ProState0	n/a	n/a	O	n/a	O	O	O	O	O	n/a	O	O	n/a	n/a	n/a
ProState1	n/a	n/a	O	n/a	O	O	O	O	O	n/a	O	O	n/a	n/a	n/a
Step	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	n/a
Text	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O
Text0/1	n/a	n/a	n/a	n/a	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TextButton	n/a	n/a	n/a	n/a	n/a	n/a	n/a	O	n/a	n/a	n/a	n/a	n/a	n/a	n/a
UserLevelEdit	n/a	n/a	O	n/a	O	O	O	O	O	n/a	O	O	n/a	n/a	n/a
UserLevelVisible	n/a	n/a	O	O	O	O	O	O	O	O	O	O	O	O	O

Value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	X	n/a	n/a	n/a	n/a
Width	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	O

X: Specification mandatory | O: Optional specification | n/a:not available

5.3.17.1 Argument "Alignment" for control Headline

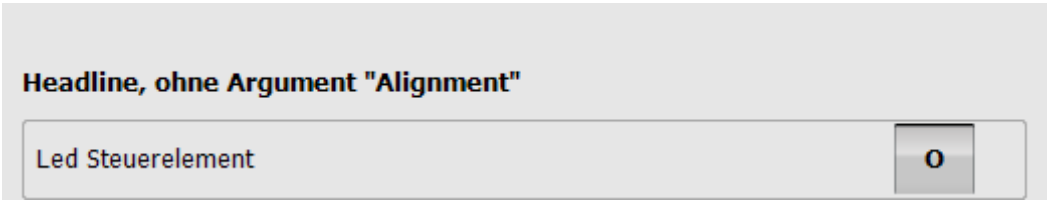
By specifying the argument "alignment" the text within the control "Headline" can be individually aligned.

Format: **String**

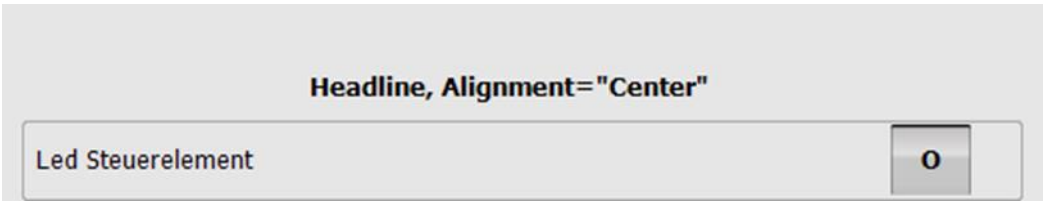
Allowed values

Value	Orientation of the argument "Text"	Default
Left	left	Control Headline
Center	center	-
Right	right	Control Picture

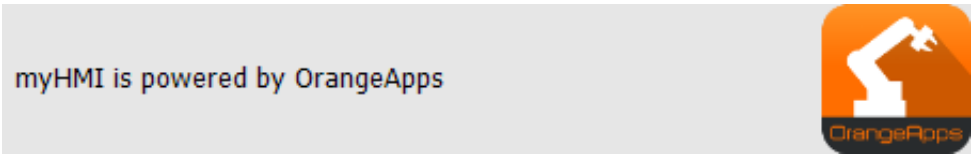
Example Headline without argument “Alignment”



Example Headline with Alignment="Center"



Example Graphic without argument „Alignment“



5.3.17.2 Argument "AreYouSure"

If the argument is "AreYouSure" is TRUE, a message dialog is displayed with the question of whether the change is to be performed.

Format: **BOOL**

Allowed values:

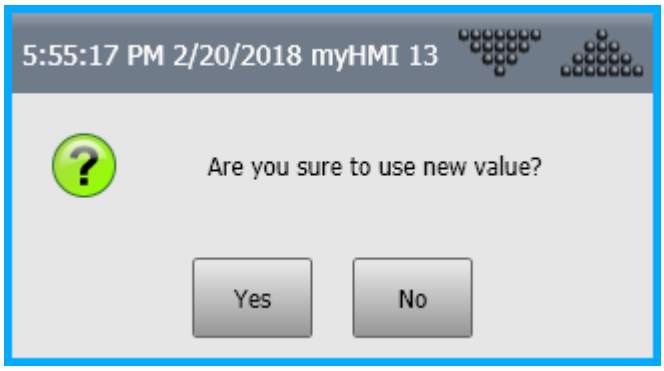
Value	Impact
TRUE	Dialog message appears
FALSE	Dialog message does not appear

Default value: False

Multi language support: yes

Example

```
<Control Type="Switch" Text="Switch Control" KrlVar "$Flag[1]"
AreYouSure="True"/>
```



YES: value change is adopted
No: value change is discarded

5.3.17.3 Argument "Border"

Determines whether an image with or without a frame is displayed.

Format: **BOOL**

Allowed values:

Value	Impact
TRUE	Frame is displayed
FALSE	Frame is not displayed

Default: **TRUE**

Example

```
<Control Type="Picture" Text="LasPowEnabled" Path="PicsDemo\led_{0}.png"
KrlVar="$Flag[1]" ColSpan="2" Border="FALSE"/>

<Control Type="Picture" Text="LasPowEnabled" Path="PicsDemo\IO_{0}.png"
KrlVar="$Flag[1]" Width="50" ColSpan="2" />

<Control Type="Picture" Text="LasPowEnabled" Path="PicsDemo\Smile{0}.png"
KrlVar="$Flag[1]" Width="50" ColSpan="2" Border="FALSE"/>
```

Only the second control draws a border.

5.3.17.4 Argument "Color0 / Color1"

The argument "Color0 / Color1" sets the color of the control "LED" in the states False and True.

Color0 sets the color of the state False. Color1 sets the color of the state True.

Allowed values:

Value	Impact
Gray	Control is shown in gray
Green	Control is shown in green
Red	Control is shown in red
Yellow	Control is shown in yellow

Defaults: Color0=gray, color=green 1

Example Color0="yellow" Color1="red"

```
      <Control type="Led" Text="Led control" KrlVar="$Flag[1]"
Color0="Yellow" Color1="Red"/>
```

State of the variable=False

State of the variable=TRUE

5.3.17.5 Argument "ColSpan"

The argument "ColSpan" specifies the number of columns to which a control extends. It interacts with the argument "Columns". "Columns" specifies the number of columns in a tab. The argument "ColSpan" is evaluated only if "Columns" has a value greater than 1. If "ColSpan" is not specified, a control extends on one column.

Format: **INT**

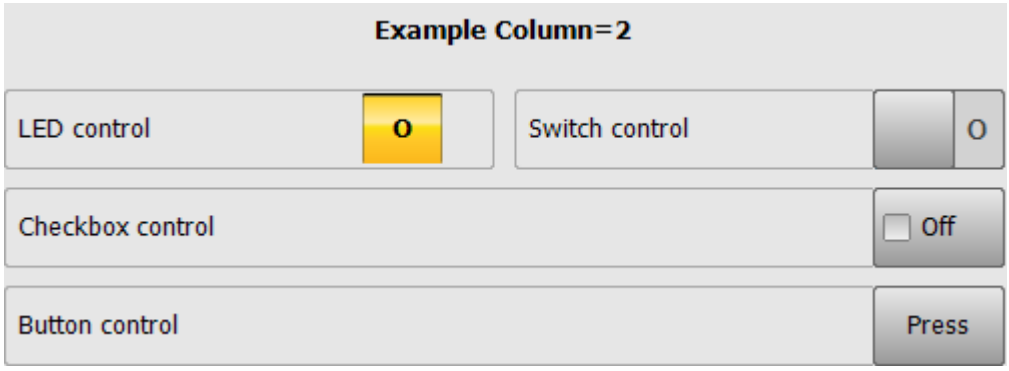
Allowed values

Value	Impact
1	Control spans one column
2	Control spans two columns
3	Control spans three columns

Default value: 1

Example Columns="2"

```
<Control Type="Headline" Text="Example Column=2" ColSpan="2"
Alignment="MiddleCenter" />
<Control Type="Led" Text="Led control" KrlVar="$Flag[1]" Color0="Yellow"
Color1="Red"/>
<Control Type="Switch" Text="Switch control" KrlVar="$Flag[1]"/>
<Control Type="Checkbox" Text="Checkbox control" KrlVar="$Flag[1]"
ColSpan="2"/>
<Control Type="Button" Text="Button" TextButton="Press" KrlVar="$Flag[1]"
ColSpan="2"/>
```



Explanation

<GROUP>: Column ="2" specifies the number of columns of the **entire** tab to 2.

HEADLINE: ColSpan ="2" spans the control over 2 columns

LED: ColSpan is not specified, the control is one column wide

SWITCH: ColSpan is not specified, the control is one column wide

CHECKBOX: ColSpan ="2" spans the control over 2 columns

BUTTON: ColSpan ="2" spans the control over 2 columns

5.3.17.6 Argument "Description"

Specifies an additional descriptive text for a control. Tap on the text of the control opens the control and the description text is visible. If a description is available text for a control an arrow down icon is displayed.

Format: **string**

Allowed characters: **Key string or a speech database**

Multi language support: **yes**

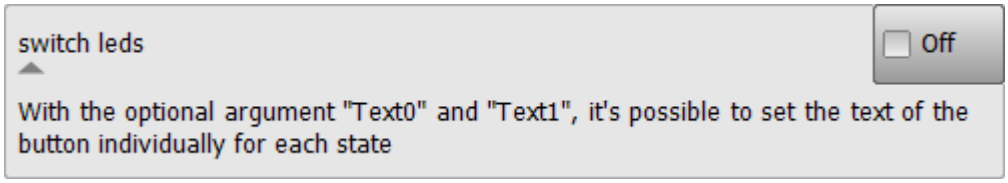
For each string of the argument "Description" an entry in a speech database is searched. If no entry is found, the specified string is displayed.

Example 1 without database key

```
<Control Type="Checkbox" Text="switch leds" Description="With the optional
argument "Text0" and "Text1", it's possible to set the text of the button
individually for each state" KrlVar="$Flag[1]" Text0="Off" Text1="On"/>
```

Control collapsed:

Control opened:



Example 2 with database Key

XML:

```
<Control Type="Checkbox" Text="Checkbox_Switch"
Description="Desc_Checkbox_Switch" KrlVar="$Flag[1]" Text0="Off"
Text1="On"/>
```

Kxr file:

```
<uiText key="DescCheckBox">
   <text xml:lang="de-DEV"> Mit dem optionalen Argument "Text0" und "Text1"
kann die Schaltfläche für den jeweiligen Zustand beschriftet werden </text>
   <text xml:lang="en-DEV">By using the optional argument "Text0" and
"Text1" it's possible to parametrize the caption of the button </text>
   <text xml:lang="it-DEV">…
   </text>
</uiText>
```

➔ For the HMI language "English", "German" and "Italian" the respective translation text from the kxr file is used. For all other languages, the English text is used.

5.3.17.7 Argument "Format"

By specifying a number format string, the displayed value is formatted accordingly to the schematic of the country.

Suitable for control: Label, Slider, Progressbar, Number (with restrictions)

Numeric Format Strings

Format-specifier	Name	Description	Examples
"0"	Zero placeholder	Replaces the zero with the corresponding digit if one is present; otherwise, zero appears in the result string.	1234.5678 ("00000") -> 01235 0.45678 ("0.00", en-US) -> 0.46 0.45678 ("0.00", fr-FR) -> 0,46
"#"	Digit placeholder	Replaces the "#" symbol with the corresponding digit if one is present; otherwise, no digit appears in the result string.	1234.5678 ("#####") -> 1235 0.45678 ("#.##", en-US) -> .46 0.45678 ("#.##", fr-FR) -> ,46
"."	Decimal point	Determines the location of the decimal separator in the result string.	0.45678 ("0.00", en-US) -> 0.46 0.45678 ("0.00", fr-FR) -> 0,46

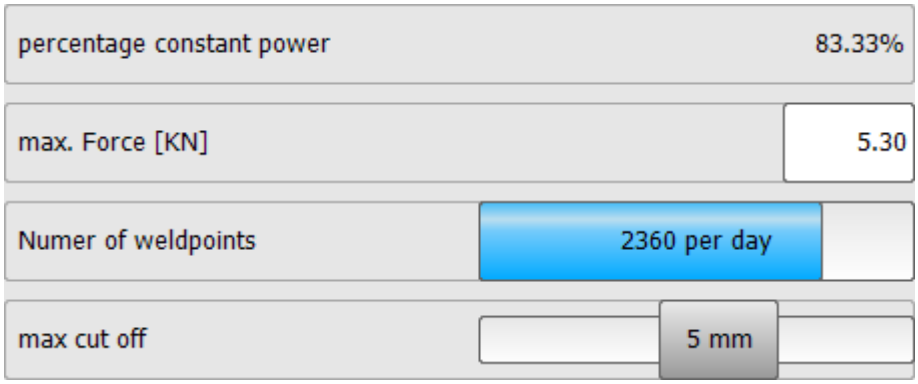
","	Group separator and number scaling	Serves as both a group separator and a number scaling specifier. As a group separator, it inserts a localized group separator character between each group. As a number scaling specifier, it divides a number by 1000 for each comma specified.	Group separator specifier: 2147483647 ("##,#", en-US) -> 2,147,483,647 2147483647 ("##,#", es-ES) -> 2.147.483.647 Scaling specifier: 2147483647 ("#,#,,", en-US) -> 2,147 2147483647 ("#,#,,", es-ES) -> 2.147
"%"	Percentage placeholder	Multiplies a number by 100 and inserts a localized percentage symbol in the result string.	0.3697 ("%#0.00", en-US) -> %36.97 0.3697 ("%#0.00", el-GR) -> %36,97 0.3697 ("##.0 %", en-US) -> 37.0 % 0.3697 ("##.0 %", el-GR) -> 37,0 %
"‰"	Per thousand placeholder	Multiplies a number by 1000 and inserts a localized per thousand symbol in the result string.	0.03697 ("#0.00‰", en-US) -> 36.97‰ 0.03697 ("#0.00‰", ru-RU) -> 36,97‰
"E0" "E+0" "E-0" "e0" "e+0" "e-0"	Exponential notation	If followed by at least one 0 (zero), formats the result using exponential notation. The case of "E" or "e" indicates the case of the exponent symbol in the result string. The number of zeros following the "E" or "e" character determines the minimum number of digits in the exponent. A plus sign (+) indicates that a sign character always precedes the exponent. A minus sign (-) indicates that a sign character precedes only negative exponents.	987654 ("#0.0e0") -> 98.8e4 1503.92311 ("0.0##e+00") -> 1.504e+03 1.8901385E-16 ("0.0e+00") -> 1.9e-16
\	Escape character	Causes the next character to be interpreted as a literal rather than as a custom format specifier.	987654 ("\###00\#") -> #987654#
'string' "string"	Literal string delimiter	Indicates that the enclosed characters should be copied to the result string unchanged.	68 ("# ' degrees'") -> 68 degrees 68 ("#' degrees'") -> 68 degrees
;	Section separator	Defines sections with separate format strings for positive, negative, and zero numbers.	12.345 ("#0.0#;(#0.0#);-\0-") -> 12.35 0 ("#0.0#;(#0.0#);-\0-") -> -0- -12.345 ("#0.0#;(#0.0#);-\0-") -> (12.35)

			12.345 ("#0.0#;(#0.0#)") -> 12.35 0 ("#0.0#;(#0.0#)") -> 0.0 -12.345 ("#0.0#;(#0.0#)") -> (12.35)

Examples

```
<Control Type="Label" Text="Label1" KrlVar="rPercentCurrent"
Format="#.##%"/>
<Control Type="Number" Text="maxForce" KrlVar="rMaxForce" Format="#.00"
Module="Gunkxr"/>
<Control Type="Progressbar" Text="nbrPoints" KrlVar="iNumPoints" Format="#
'per day'" Min="0" Max="3000"/>
<Control Type="Slider" Text="prgBarGunParam" KrlVar="iMaxCutOff " Format="#
'mm'" Min="1" Max="10"/>
```

Representation



Limitations of use in control "Number"

Within the control "Number" only the format strings "#" and "0" may be used.

5.3.17.8 Argument "KrlVar"

KRL variable whose value is to be displayed in the control. Permitted are local and global variables, nested values and use wildcards.

5.3.17.8.1 Indication of global and local variables

The controls can be bound to global or local variables.

Global variables

Global variables are specified **without** naming the module in which they declared.

Example

```
KrlVar="$OV_PRO"
```

Local variables

Local variables are specified **with** naming the module in which they declared.

Example, Variable "MyVariable" declared in R1\Program\User\MyDatFile.dat

```
KrlVar="/R1/MyDatFile.dat/MyVariable"
```

→ The folder of the module must not be named.

5.3.17.8.2 Nested variables

Variables can be nested. When the HMI opens, the terms are completely dissolved from the inside and the value of all variables included is monitored. If there's a change of the value of an internal variable the complete expression is recalculated.

Example

```
<Control Text="Base Data" type="text" KrlVar "Base_Data[myArray
[/R1/MyDatFile.dat/MyVariable]].X"/>
```

- First, the value of the local variable "/R1/MyDatFile.dat/MyVariable" is determined → e.g. "5"
- Now the value of the array "myArray [5]" is this determined → e.g. "2"
- Finally, the value of Base_Data[2] .X is determined and displayed

5.3.17.8.3 Internal variables as placeholders for counter

To create even more flexible HMI's, it is possible to represent the KRL-arrays with the help of two or more control elements. In this case, one control performs the function of a counter. This serves to select the array index and each further control is used to display the actual value. Per page 32 internal variables can be used.

Counters are indicated by a placeholder "%1", "%2", "%3" ... - %32" in the argument "KrlVar".

If the value of the counter changes, all associated controls are updated automatically.

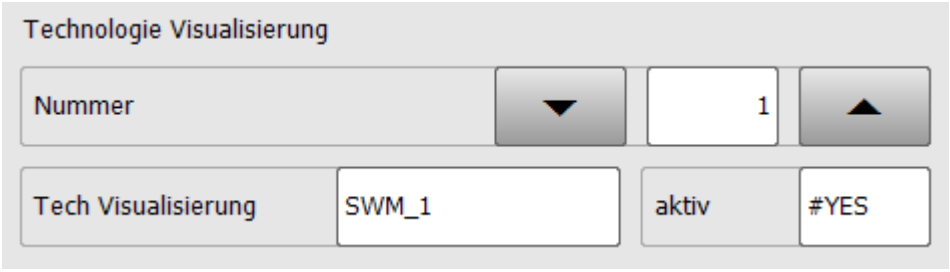
Example

```
<Control Type="Headline" Text="Technologie Visualisierung"/>
<Control Type="Number" Text="Nummer" KrlVar="%1" Step="1" Min="1" Max="10"/>
<Control Type="Text" Text="Tech Visualisierung"
KrlVar="Tech_Visu[%1].Techshortcut[]"/>
<Control Type="Text" Text="aktiv" KrlVar="Tech_Visu[%1].IsActive"/>
```

Declaration of the variable used in the example:

```
DECL Technologie Tech_Visu[10]
TechVisu[1]={TechShortcut[] "SWM_1", IsActive #Yes}
```

Display in HMI:



5.3.17.9 The arguments "Min" and "Max"

The specification of the arguments "Min" and "Max" has different meanings depending on the control where it is used.

Format: **INT**

Allowed values: **10^{-31} to 10 + 31**

The following controls support the specification of these arguments:

- Control "Number"
- Control "Progressbar"
- Control "Slider"

The values of Min and Max can be given by KRL-variables.

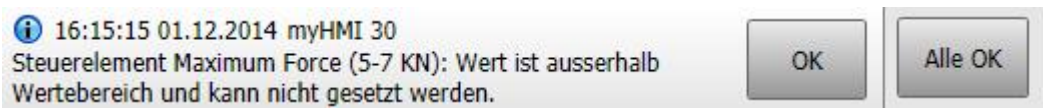
5.3.17.9.1 Use in control "Number"

The control "Number" supports a check of the value given by the operator when the arguments "Min" and "Max" specify the lower and upper bounds for the input value. If the input value is out of bounds, the number field is shown in red and the saving of the input value is not possible.

Example

```
<Control type="Number" text="Maximum Force (5-7kN)" KrlVar="max_Force"
min="5" Max="7" ColSpan="2"/>
```

In the message window, a message will appear:



5.3.17.9.2 Use in the controls "Slider" and "progress bar"

In both controls the arguments "Min" and "Max" is used to properly display the controls.

At the control "Slider" the background is shown in red if the value is out of bounds.

Example

```
<Control type="Slider" Text="Maximum Force (5-7kN)" KrlVar="max_Force"
min="5" Max="7" ColSpan="2"/>
```

5.3.17.10 Argument "Module"

Specifies the name of the speech database for automatic language switching again.

Format: **string**

Allowable values: name of the language database (*.kxr)

The plugin supports the use of kxr files for multilingualism. For all the arguments of type "string" a key in a speech database can be specified. If a key is found for the actual language of the HMI, the translated text is shown. If no key is found in the database, the specified text is displayed.

Example:

```
<= Control Type="Number" text="maxForce" KrlVar "xHome1.a1"
Module="Servogun" ColSpan="2"/>
```

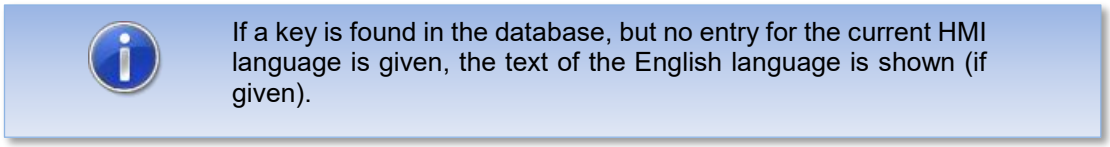
Entry in the file Servogun.kxr

```
    <uiText key="maxForce">
      <text xml:lang="de-DEV">maximale Zangenkraft (5-7 kN)</text>
      <text xml:lang="en-DEV">maximum gun force (5-7 kN)</text>
    </uiText>
```

HMI language is German:

HMI language is English:

The switching between the language is done automatically.



The argument "Module" can be used in the element:

- <Configuration>

- <Group>
- <Control>

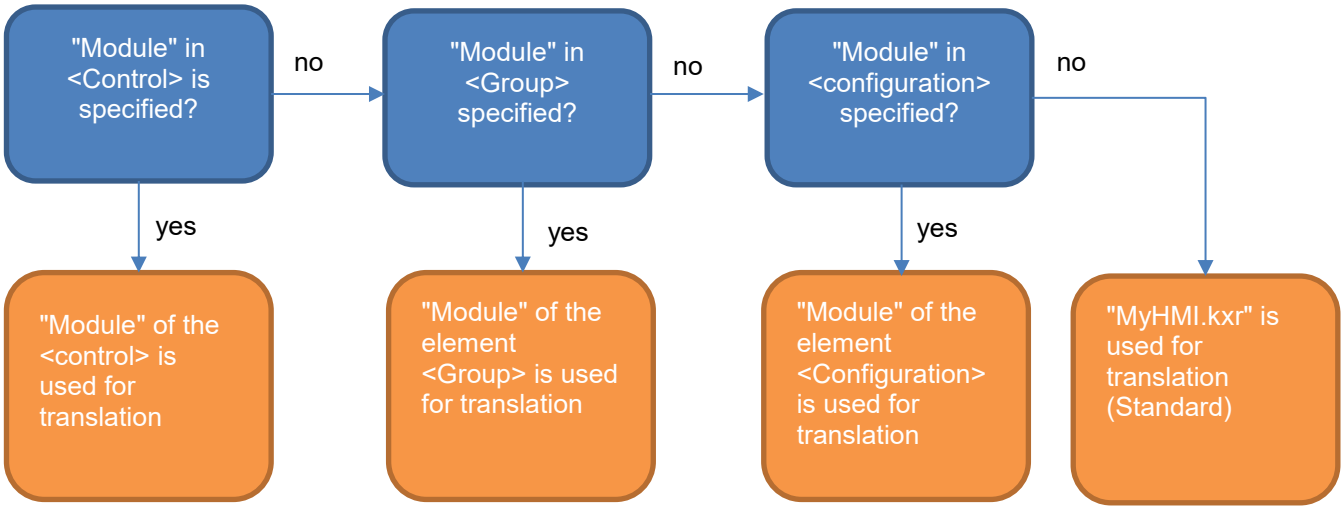
Usage and validity

Usage in	Validity
<Control>	Applies for that control
<Group>	Applies to all elements within this group
<Configuration>	Applies to all elements of all groups

Explanation for usage

If a database is specified for a control this will be used. If no database is specified, the database of the <Group> is used. Is there also no database is specified, the database of the element <Configuration> used. Is there also no database specified, the database "myHMI.kxr" is used by default.

Schematic representation



5.3.17.11 Argument "Mode_OP" → Operation Mode

Defines the state of the operation mode ($Mode_op") from which a control is editable.

Format: **INT**

Allowed values:

Designation	Value	Examples
Invalid	16	Default value=31

Ext	8	• Control is always active Example value=3 • Control active when operation mode is "T1" or "T2" Example value=12 • Control only active when operation mode is "Auto" or "Ext"
Aut	4	
T1	2	
T2	1	

5.3.17.12 Argument "NeedDrivesOk" → Drives

Defines the state of the drives for the control being editable.

Value of the argument	Impact
True	Control is only active when the drives are switched on
False or not specified	Control is active

5.3.17.13 Argument "Negate"

Negates the display of a Boolean variable.

Format: **BOOL**

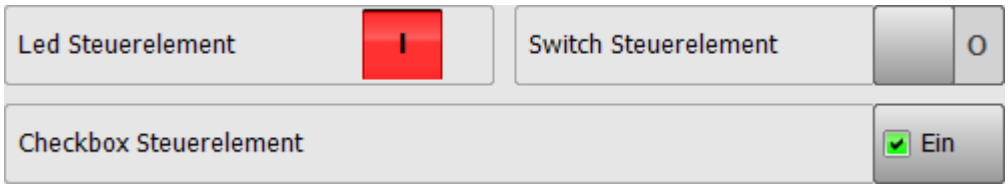
Allowed values

Value	Impact
True	The indication of the state of the variable is negated
False	The indication of the state of the variable is not negated

Example

```
<Control Type="Led" Text="Led Control" KrlVar="$FLAG[1]" Negate="TRUE"
Color0="Yellow" Color1="Red" Mode_OP="#EX"/>
<Control Type="Switch" Text="Switch Control" KrlVar="$Flag[1]"/>
<Control Type="Checkbox" Text="Checkbox Control" KrlVar="$Flag[1]"
Negate="TRUE" ColSpan="2"/>
```

Display at $Flag[1]=False



5.3.17.14 Argument "Path"

Sets the filename and path to the graphic file to be loaded by the Picture control.

The file name can contain the placeholder {0}. This is then replaced by the value of a KRL variable to be specified.

Example

```
<Control Type="Picture" Text="Power Laser enabled" Path="D:\IO_{0}.png"
KrlVar="$IN[1]"/>
```

➔ The value of $IN[1] replaces as a string the placeholder {0} in the filename.

5.3.17.15 Argument "ProState0" → Submit interpreter

Defines the state of the submit interpreter for the control being editable.

Designation	Value	Examples
Active	32	Default=63 • Control is always active Example-value=32 • Control is only active when the Submit is running Sample Value=2 • Control is only active if the submit is deselected
End	16	
Reset	8	
Stop	4	
Free	2	
Unknown	1	

Example

```
<Control Type="Switch" Text="Switch Control" KrlVar="$FLAG[1]"
Color0="Yellow" Color1="Red" ProState="6"/>
```

→ Control editable when the submit interpreter is stopped or deselected.

5.3.17.16 Argument "ProState1" → Program interpreter

Defines the state of the program interpreter for the control being editable.

Designation	Value	Examples
Active	32	Default=63 • Control is always active Example-value=30 • Control is only active if the program pointer is at the end, or if the selected program has been reset or if the selected program has been stopped or select a program is • → the control is inactive if a program is running
End	16	
Reset	8	
Stop	4	
Free	2	
Unknown	1	

5.3.17.17 Argument "Step"

This sets the step size of the Up/Down buttons of the control "Number". Only if the argument "Step" is specified, the Up/Down buttons are displayed.

Format: **REAL**

Allowed values: **10^{-31} to 10 + 31**

Example

```
<Control Type="Number" Text="Maximum Force (5-7 KN)" KrlVar=" max_Force"
Min="5" Max="5" Step="0.1" ColSpan="2"/>
```

Representation

Each time the Up/Down buttons are pressed, the value of the variable "max_Force" is in/decreased by 0.1

With integer variables, no real values for Step can be used!

5.3.17.18 Argument "Text"

Is used for the label text of a control.

Format: **string**

Allowed characters: **Key string or a speech database**

Multi language support: **yes**

For each string in "text" an entry in the speech database is searched. If no entry is found, the specified string is displayed. The database used is specified with the argument "Module". See section 0.

5.3.17.19 Argument "Text0" and "Text1"

These arguments are used to label the button text of the control "checkbox" at state FALSE and TRUE.

Format: **string**

Allowed characters: **Key string or a speech database**

Multi language support: **yes**

For each string in "Text0" and "Text1" an entry in the speech database is searched. If no entry is found, the specified string is displayed. The database used is specified with the argument "Module". See section 0.

Usage

Argument	Impact	Default value if the argument is not specified
Text0	Specifies the label of the button when the state of the associated variable is False	Off
Text1	Specifies the label of the button when the state of the associated variable is True	On

5.3.17.20 Argument "TextButton"

Used for the labeling of the button text of the control "button".

Format: **string**

Allowed characters: **Key string or a speech database**

Multi language support: **yes**

Default value: **-**

For each string in "TextButton" an entry in the speech database is searched. If no entry is found, the specified string is displayed. The database used is specified with the argument "Module". See section 5.3.17.10.

Example

```
<Control Type="Button" Text="Button Steuerelement" TextButton="Push"
KrlVar="$Flag[1]" ColSpan="2"/>
```

5.3.17.21 Argument "UserLevelEdit"

Defines from which user level a tab or a control is editable.

Format: **INT**

Default value: **10**

Usage and validity

Usage in	Validity
<Control>	Applies for that control
<Group>	Applies to all elements within this group

Example

```
<Control Type="Switch" Text="Checkbox" KrlVar="$Flag[1]" UserLevelEdit="20"
AreYouSure="True" />
```

Representation for standard users

Representation for user 'expert'

5.3.17.22 Argument "UserLevelVisible "

Defines from which user level a tab or a control is visible.

Format: **INT**

Default value: **10**

5.3.17.23 User levels KRC4

On the KRC4 following user levels are used:

User	Level
Operator	10
Expert	20
Safety maintenance	27
Sicherheitsinbetriebnehmer	29
Administrator	30

5.3.17.24 Element "DropDownItem" of the control "DropDown"

Used to add elements to a dropdown control. Within this argument the arguments "Value" and "Text" will be used.

5.3.17.24.1 Argument "Value"

Specifies the value which is given to the associated variable in the argument "KrlVar".

Format: **depending on the type of the variable of the element "KrlVar"**

Default value: **-**

Optional: **no**

5.3.17.24.2 Argument "Text"

Describes the entry in the drop-down control. If "text" is not specified, the entry is set according to the entry in the argument "Value".

Format: **Key string or a speech database**

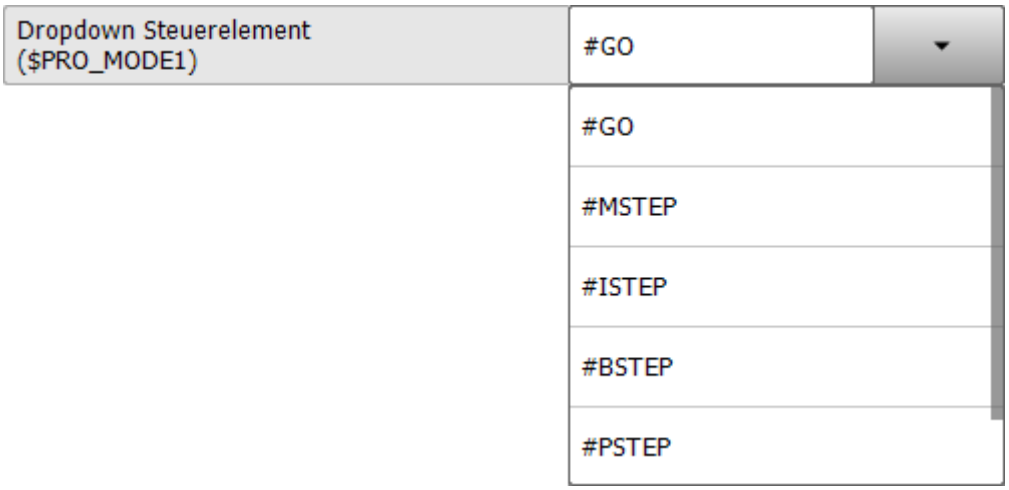
Default value: **-**

Optional: **yes**

Multi language support: **yes**

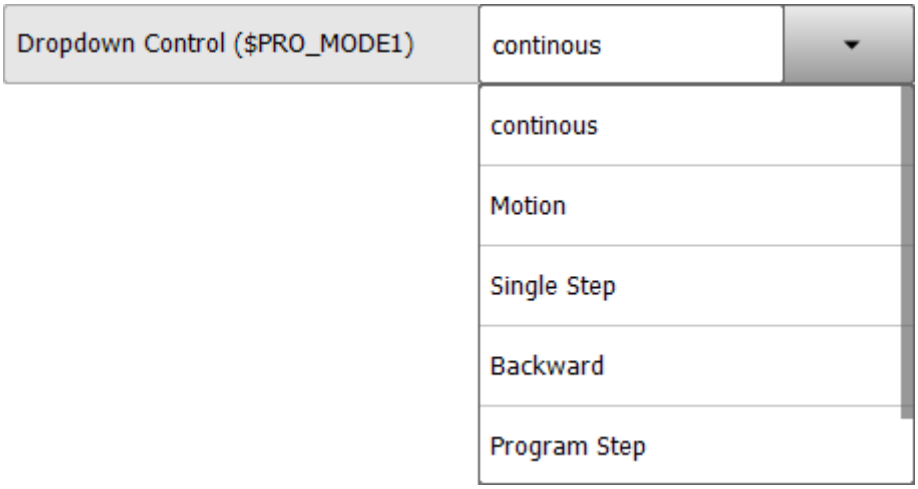
Example 1 "Text" not specified

```
<Control Type="Dropdown" Text="Dropdown Steuerelement ($PRO_MODE1)"
KrlVar="$PRO_MODE1">
      <DropDownItem Value="#GO"/>
      <DropDownItem Value="#MSTEP"/>
      <DropDownItem Value="#ISTEP"/>
      <DropDownItem Value="#BSTEP"/>
      <DropDownItem Value="#PSTEP"/>
      <DropDownItem Value="#CSTEP"/>
</Control>
```



Example 2, "Text" specified

```
<Control Type="Dropdown" Text="Dropdown Control ($PRO_MODE1)"
KrlVar="$PRO_MODE1">
         <DropDownItem Value="#GO" Text="Go"/>
         <DropDownItem Value="#MSTEP" Text="Motion"/>
         <DropDownItem Value="#ISTEP" Text="Single Step"/>
         <DropDownItem Value="#BSTEP" Text="Backward"/>
         <DropDownItem Value="#PSTEP" Text="Program Step" />
         <DropDownItem Value="#CSTEP" Text="Continuous Step"/>
</Control>
```



All text is defined as a "key" in the kxr file and is translated.

5.3.17.25 Argument "Width”

Sets the width of the graphic for the Picture control. The height of the graphic is scaled according to the proportions of the original graphic.

Format: **INT (Pixel)**

Default: **-**

Example:

```
<Control Type="Picture" Text="Power Laser enabled" Path="D:\IO_{0}.png"
KrlVar="$IN[1]" Width="80"/>
```

➔ The graphic is scaled to the width of 80 pixels.

5.4 Layout

The controls are arranged in columns and tabs accordingly to their order within the XML file.

The following restrictions apply:

- maximum five tabs per HMI
- maximum 32 controls **with associated KRL variables** each tab

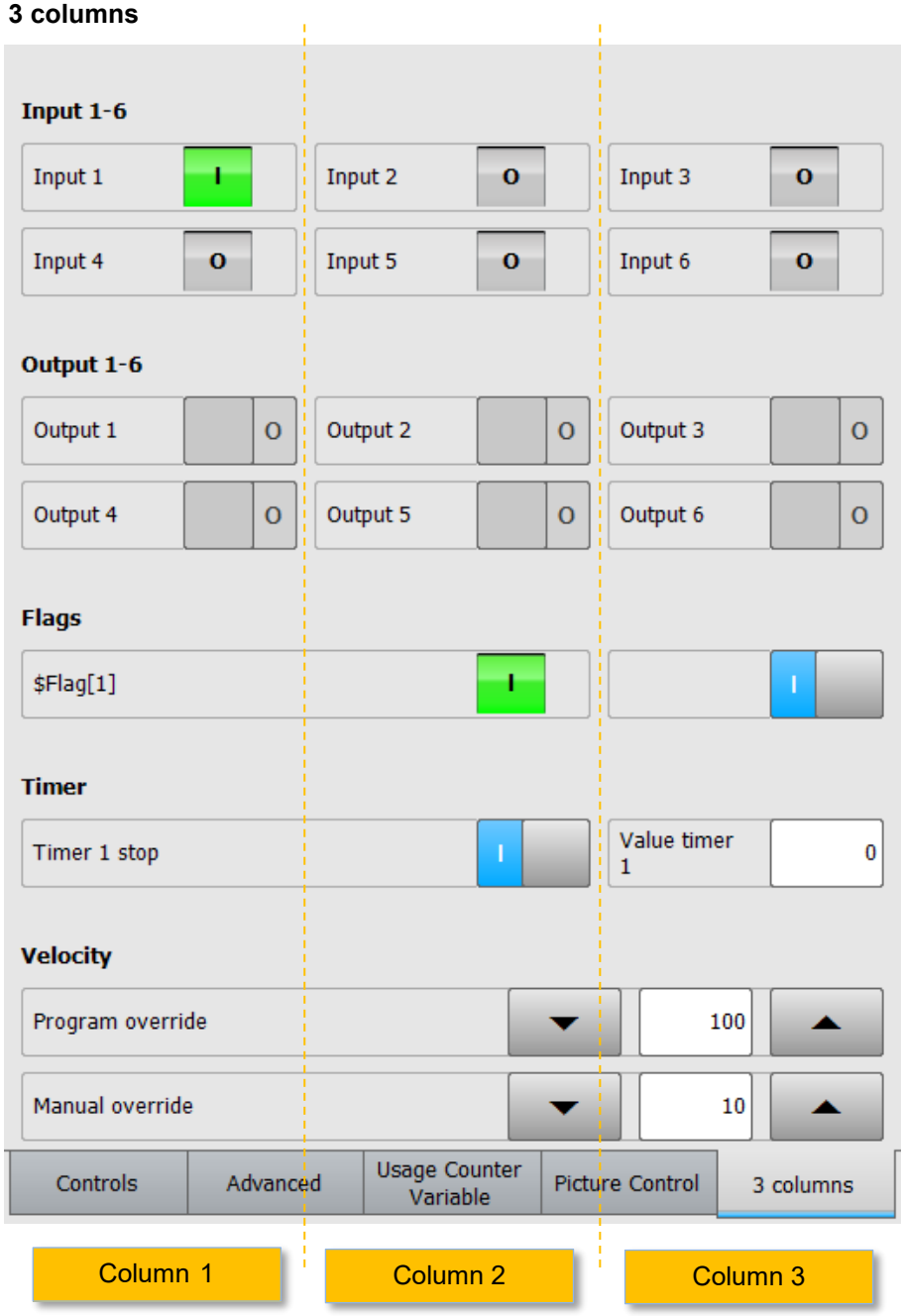
To improve the clarity and usability, the layout of each tab can be divided into up to three columns. For this purpose, in the element <Group> the argument "Columns" is used. Depending on the value of "Columns" the controls are arranged side by side in columns. By the argument "ColSpan" the controls can be stretched over multiple columns.

Example for three columns

```
<Group Text="3 Spalten" Columns="3">
  <Control Type="Headline" Text="Eingaenge" ColSpan="3"/>
  <Control Type="Led" Text="Eingang 1" KrlVar="$IN[1]"/>
  <Control Type="Led" Text="Eingang 2" KrlVar="$IN[2]"/>
  <Control Type="Led" Text="Eingang 3" KrlVar="$IN[3]"/>
  <Control Type="Led" Text="Eingang 4" KrlVar="$IN[4]"/>
  <Control Type="Led" Text="Eingang 5" KrlVar="$IN[5]"/>
  <Control Type="Led" Text="Eingang 6" KrlVar="$IN[6]"/>
  <Control Type="Label" Text="Ausgaenge" ColSpan="3"/>
  <Control Type="Switch" Text="Ausgang 1" KrlVar="$OUT[1]"
NeedSafetySwitch="TRUE"/>
  <Control Type="Switch" Text="Ausgang 2" KrlVar="$OUT[2]"
NeedSafetySwitch="TRUE"/>
  <Control Type="Switch" Text="Ausgang 3" KrlVar="$OUT[3]"
NeedSafetySwitch="TRUE"/>
  <Control Type="Switch" Text="Ausgang 4" KrlVar="$OUT[4]"
NeedSafetySwitch="TRUE"/>
  <Control Type="Switch" Text="Ausgang 5" KrlVar="$OUT[5]"
NeedSafetySwitch="TRUE"/>
  <Control Type="Switch" Text="Ausgang 6" KrlVar="$OUT[6]"
NeedSafetySwitch="TRUE"/>
  <Control Type="Headline" Text="Flags" ColSpan="3"/>
  <Control Type="Led" Text="Wert von $Flag[1]" KrlVar="$FLAG[1]"
ColSpan="2"/>
  <Control Type="Switch" Text="" KrlVar="$Flag[1]"/>
  <Control Type="Headline" Text="Zeitgeber" ColSpan="3"/>
  <Control Type="Switch" Text="Zeitgeber 1 Stop" KrlVar="$Timer_Stop[1]"
ColSpan="2"/>
  <Control Type="Number" Text="Wert Zeitgeber 1" KrlVar="$Timer[1]"/>
  <Control Type="Headline" Text="Geschwindigkeiten" ColSpan="3"/>
  <Control Type="Number" Text="Programm Override" KrlVar="$OV_PRO" Min="0"
Max="100"   Step="10" ColSpan="3"/>
```

```
<Control Type="Number" Text="Hand Override" KrlVar="$OV_JOG" Min="0"
Max="100" Step="10" ColSpan="3"/>
</Group>
```

HMI with 3 columns



5.5 Multilingualism

For the multilingual presentation of the texts a translation file (kxr) is necessary. The specification which translation file shall be used is made by the argument "Module".

If the name of the translation file is the same as the name of the xml file, you can do without the argument "Module". By default, myHMI tries to access the kxr file of the same name.

The following requirements must be met.:

- There must be a translation file (* .kxr) with corresponding "Keys" be present in the folder C:\KRC \Data. The kxr-file must have the encoding “UTF-8”.
- In the XML file the argument "Module" must refer to this kxr file (HINT: specify the name without extension)
- The translatable text must be specified in the XML file as a "Key".
- It is possible to specify different kxr-files in the argument "Module".

Example 1: All texts of the control "Button" shall be translated into the languages German and English.

Procedure:

1. Create a new KXR file or copy an existing. The name is arbitrary.

   Here: DemoMyHMI.kxr
2. Within the control "Button" specify the name of the kxr-file in the argument "Module" (only the name without the extension ".kxr")
3. Specify a "key" in the argument "text"
4. Specify a key for the argument "ButtonText" and, if used, for the argument "Description"
5. Adjust the entries in the kxr-file
6. Restart the SmartHMI or the robot in order to introduce the kxr-file to the robot system

XML file:

```
<Control Type="Button" Text="txtTextBtn" TextButton="txtPushBtn"
Description="descrBtn" Module="DemoMyHMI" KrlVar="$Flag[1]" ColSpan="2"/>
```

KXR file:

```
<?XML version="1.0" encoding="utf-8"?>
<resources xmlns="http://www.kuka.com/schemas/kxr/2009">
  <module name="DemoMyHMI">
    <uiText key="txtTextBtn">
      <text xml:lang="de-DEV">Greifer schliessen</text>
      <text xml:lang="en-DEV">close gripper</text>
    </uiText>
    <uiText key="txtPushBtn">
      <text xml:lang="de-DEV">Schliessen</text>
      <text xml:lang="en-DEV">Close</text>
    </uiText>
    <uiText key="descrBtn">
      <text xml:lang="de-DEV">Beispiel Mehrsprachigkeit</text>
      <text xml:lang="en-DEV">Example multi lingualismn</text>
    </uiText>
  </module>
```

```
</resources>
```

Example 2: All texts of the HMI should be translated into the languages German and English.

Method:

1. Create a new KXR file or copy an existing one. The name is freely selectable. Here: Demo.kxr

2. In the "Configuration" element, specify the name of the KXR file by the "Module" argument (only the name without the ".kxr" extension)

3. Specify a "key" for the controls in the "Text" argument (string)

XML-Datei:

```
<Configuration Text="Demotext" Module="Demo">
```

KXR-Datei:

```
<?XML version="1.0" encoding="utf-8"?>
<resources xmlns="http://www.kuka.com/schemas/kxr/2009">
  <module name="Demo">
    <uiText key="Demotext">
      <text xml:lang="de-DEV">Text für Demo in deutsch</text>
      <text xml:lang="en-DEV">text for demo in english</text>
    </uiText>
    <uiText key="txtTextBtn">
      <text xml:lang="de-DEV">Greifer schliessen</text>
      <text xml:lang="en-DEV">close gripper</text>
    </uiText>
    <uiText key="txtPushBtn">
      <text xml:lang="de-DEV">Schliessen</text>
      <text xml:lang="en-DEV">Close</text>
    </uiText>
    <uiText key="descrBtn">
      <text xml:lang="de-DEV">Beispiel Mehrsprachigkeit</text>
      <text xml:lang="en-DEV">Example multi lingualismn</text>
    </uiText>
  </module>
</resources>
```

Description of entries in the kxr file:

Element / argument	Description
<Module name>	Here, enter the name of KXR file. This entry must be identical to the item in the argument "Module" in the Button control
Key	Corresponding with the entries of the arguments "Text", "Description" and "TextButton" in the control
<Text xml: lang="**de**-DEV">	German translation
<Text xml: lang="**en**-DEV">	English translation

Available Languages

Elements	Language	Elements	Language
cs	Czech	pl	Polish
da	Danish	pt	Portuguese
de	German	ro	Romanian
en	English	sk	Slovak
es	Spanish	sl	Slovenian
el	Greek	sv	Swedish
fi	Finnish	tr	Turkish
fr	French	ru	Russian
it	Italian	ko	Korean
hu	Hungarian	zh	Chinese
nl	Dutch	ja	Japanese

If a key is found in the database, but no entry for the current HMI language is given, the text of the English language is shown (if given).

If no key is found in the database, the entry in the arguments is displayed.

For the use of the argument "Module" visit chapter 5.5.

The kxr-file must have the encoding “UTF-8”. We recommend to use Notepad++ as editor.

Changes in a KXR language file require a restart of the SmartHMI or, alternatively, a cold start of the robot controller.

6 Demo HMI

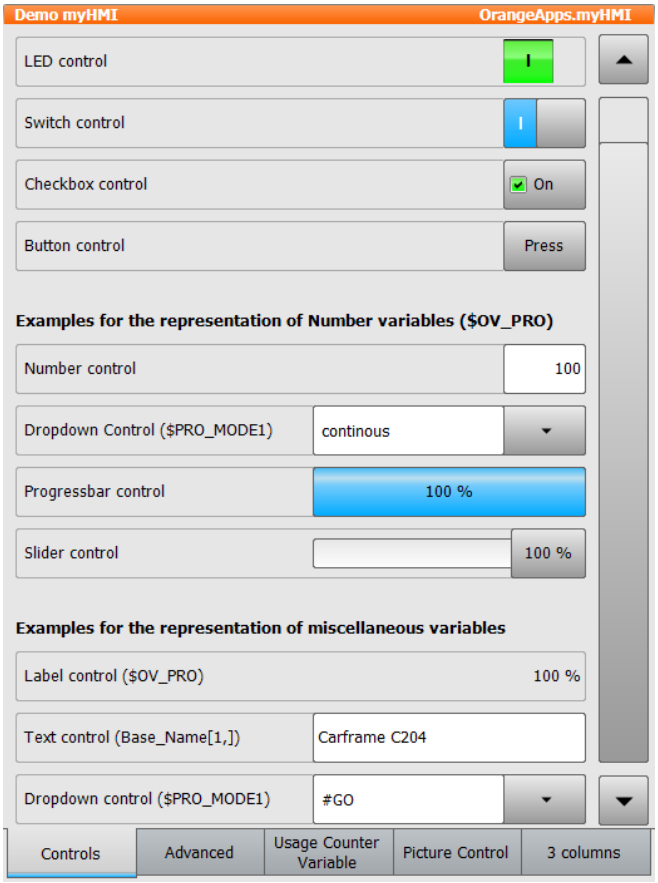
The setup comes with an HMI that shows how myHMI works and can serve as a template for new HMIs.

To view the demo on the robot, the following steps must be performed:

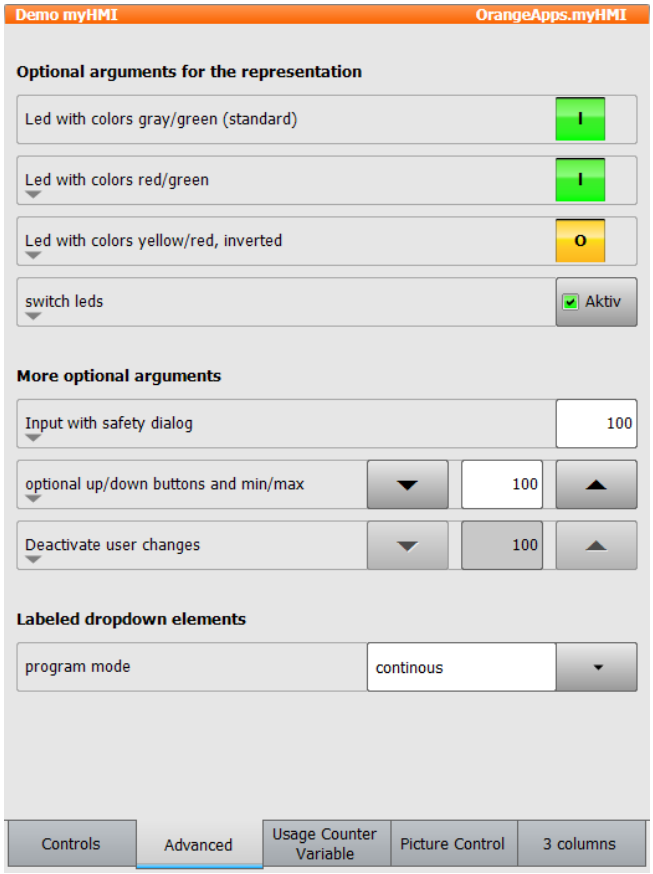
- •Create a menu entry with the menu assistant. The HMI is defined in the "C: \ KRC \ USER \ DemoMyHMI.xml" file.
- Install the KRL module "myHMIDemo" (e.g. under R1 \ Programs). The module can be copied from the folder "C: \ KRC \ USER \ myHMI".

6.1 Screenshots

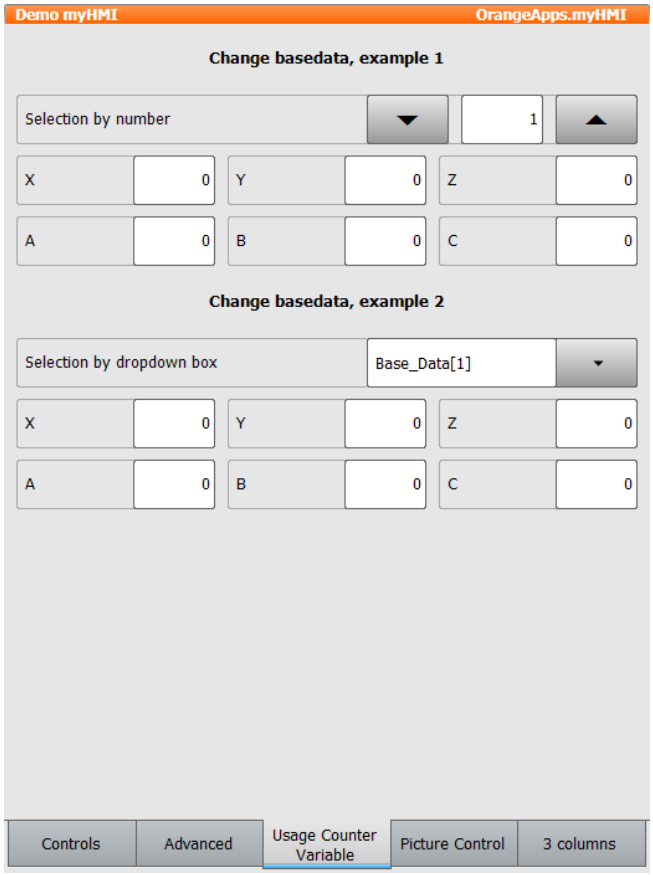
Tab „Controls“



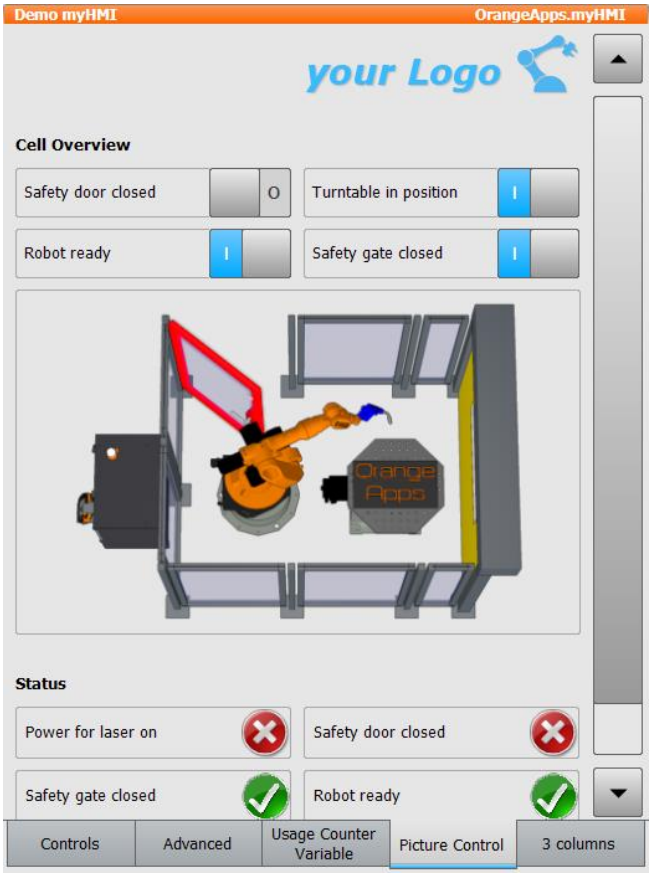
Tab „Advanced“



Tab „Usage Counter variable“



Tab „Picture Control“

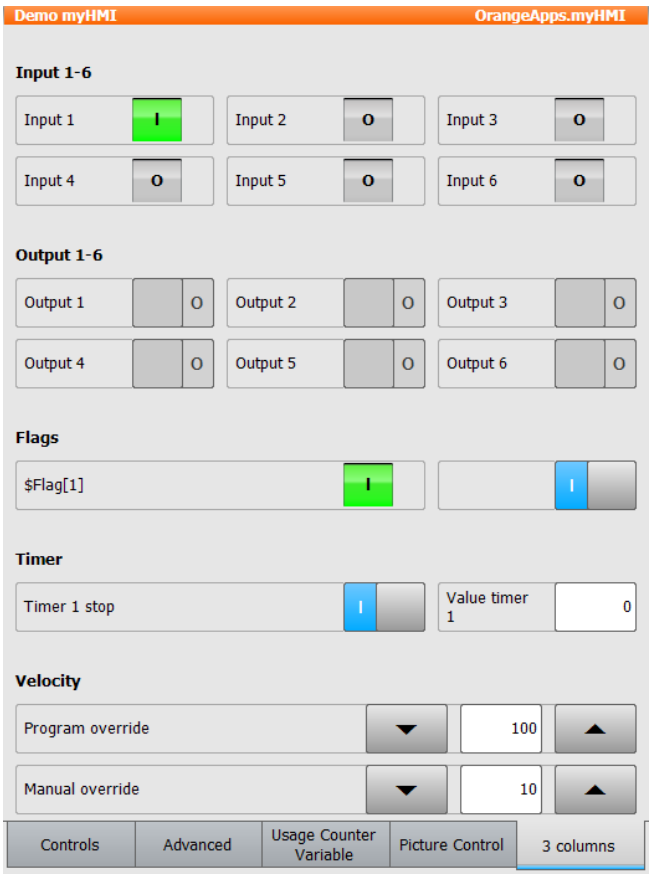


This tab demonstrates the dynamic representation of images and the superimposed rendering of images into an overall image, depending on the state of a KRL variable. As a result, variable-controlled different states can be displayed.

The switches can be used to display different system states.

In the folder "Program" is an executable demo program "myHMIDemo" which illustrates this dynamic image representation from a robot program.

Tab „3 Columns“



7 Create your own HMI

The following files are required:

- *Name_of_HMI*.xml → definition of the HMI
- (optional) *Name_of_KXR*.kxr → language database for translation

7.1 Create XML

To create an xml-file, it is advisable to copy an existing file, for example, Demo.xml. The created xml must be stored in **C:\KRC\USER\myHMI**.

To process the xml-file an appropriate editor such as should Notepad ++ should be used.

7.1.1 Create backbone

The basic structure of the XML file is the element <Configuration>. It describes the main node and includes all sub-nodes. By arguments a text for the heading of the HMI and a module for translations can be specified. If a translation file is specified, this file will be used for all items (if no other module is specified in the controls or groups).

```
<Configuration Text="myFirstHMI" Module="myFirstHMI">
. . .
</Configuration>
```

Arguments

Argument	Description	Optional	Default value
Text	Label text or key for the heading	X	
Module	Module / KXR file for multilingual content	X	

7.1.1.1 Define Groups/Tabs

The groups are used for thematic separation of content and displayed on the surface as tabs. You must specify at least one group, and up to five groups can be specified.

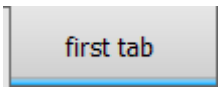
Arguments

Argument	Description	Optional	Default value
Text	Label text or key for the tab		
Modules	Module / KXR file for multilingual content	X	Value from <Configuration>
Columns	Number of columns 1-3	X	1

Example XML

```
<Configuration Text="myFirstHMI" Module="myFirstHMI">
<Group Text="first tab" Columns=”2” >
  . . .
</Group>
</Configuration>
```

Example Display

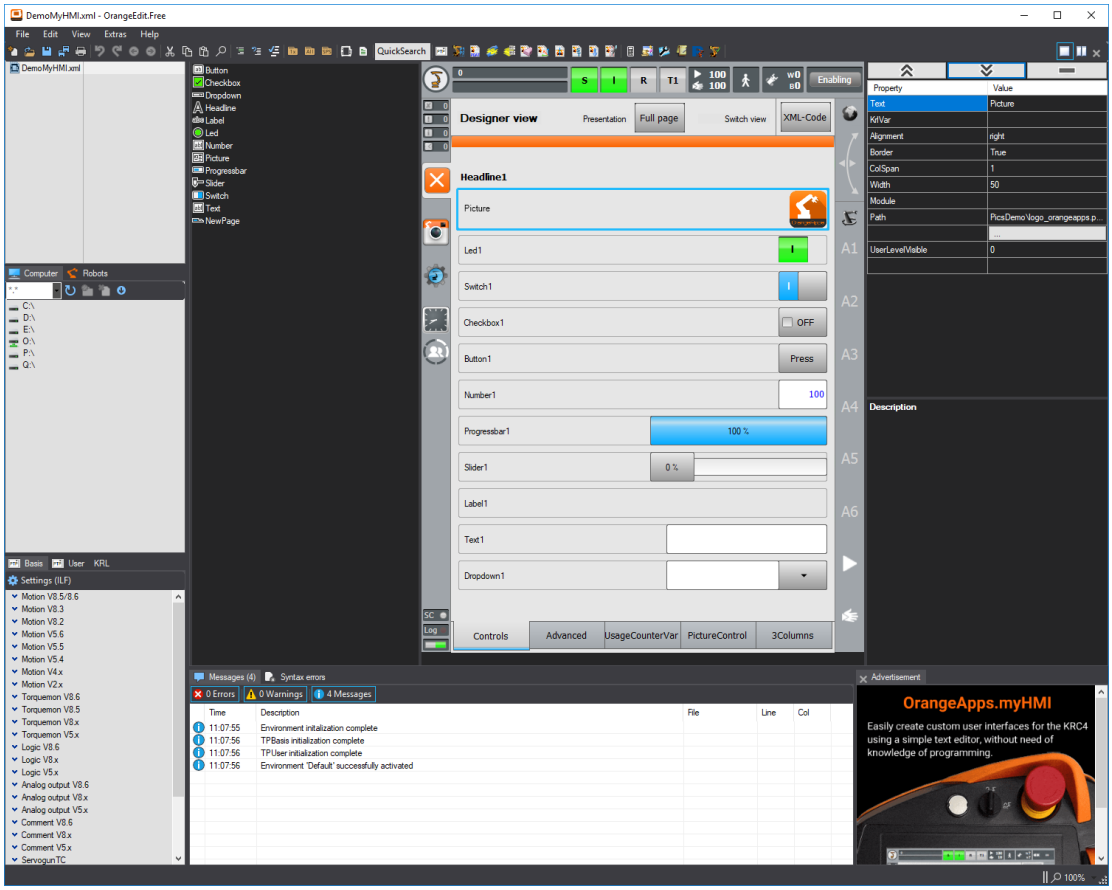


7.1.2 Definition of controls

The controls in the xml-file are defined as described in Section 5.3.

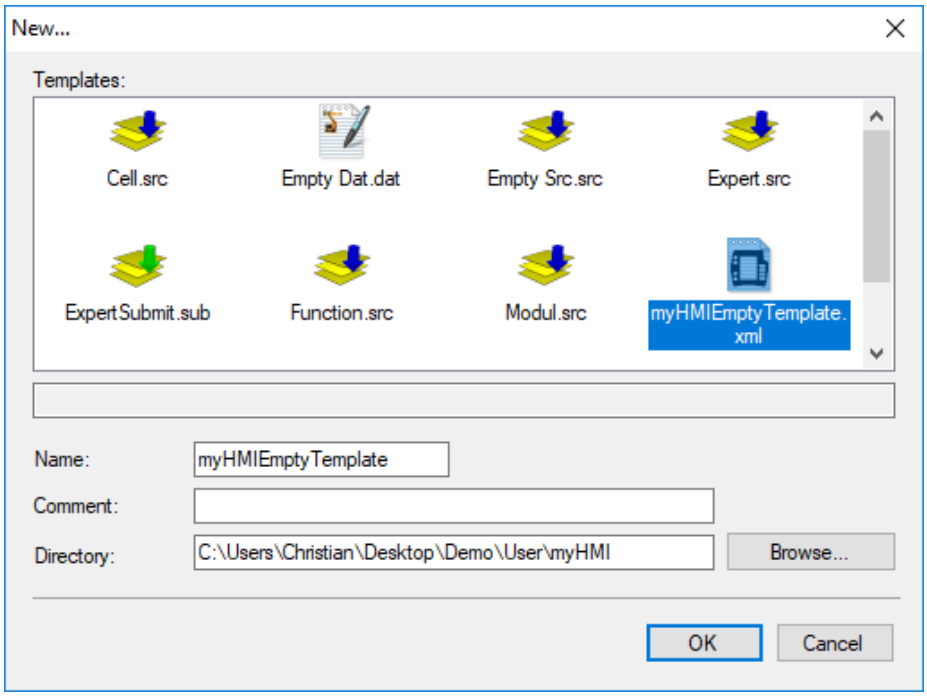
7.2 myHMI-Designer in OrangeEdit

The software „OrangeEdit“ (http://orangeapps.de/?lng=en&page=apps%2Forangeedit) has a build-in designer to easily create HMI’s by drag & drop.



7.2.1 Create a new HMI

An empty template for a new HMI can be opened by using the menu button ***File – New.***

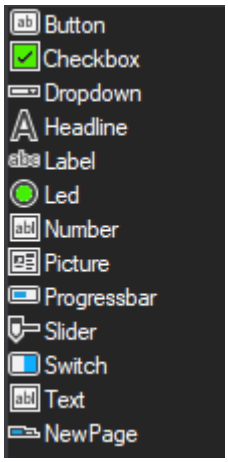


7.2.2 Open an existing HMI

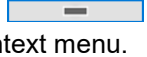
An existing HMI can be opened by using the menu button ***File – Open.***

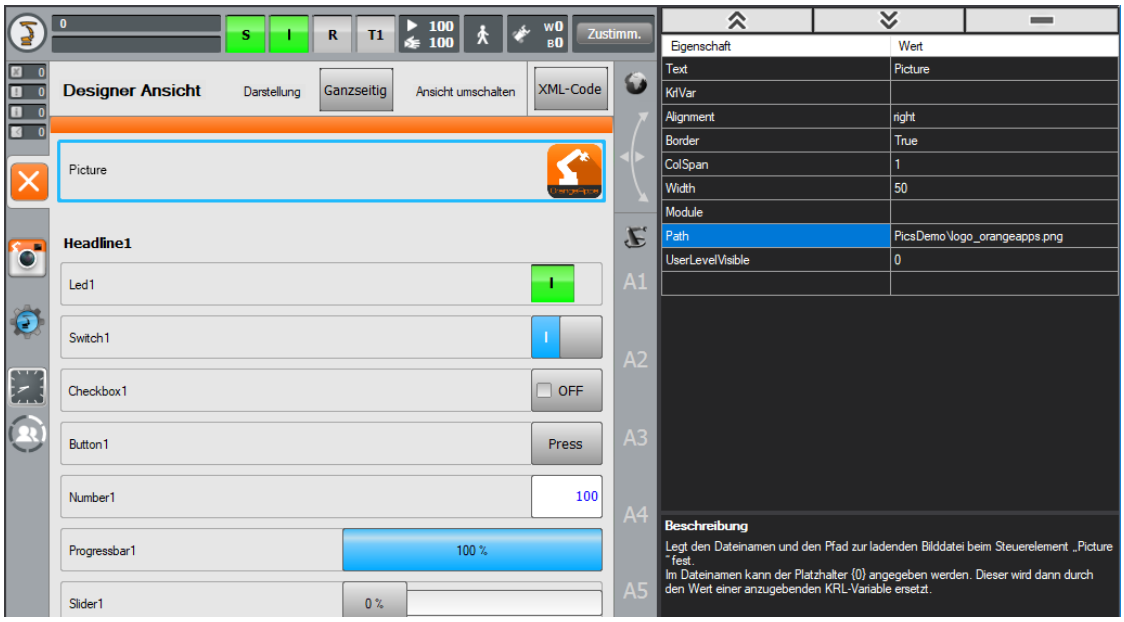
7.2.3 Toolbar

The toolbar contains all currently available controls. All available controls are available in the toolbar. Use drag and drop to place a control on the HMI.



7.2.4 Editing properties of a control

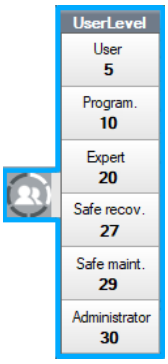
A mouse click selects a control for editing. All properties of the selected control are then shown in the property window. There they can be processed accordingly. The up and down buttons  move the control on the surface. The button  removes the control. Moving and deleting of a control is also possible via the context menu.



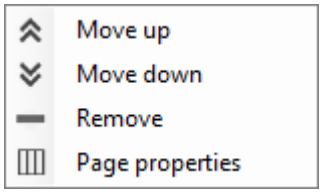
7.2.5 Designer window

In the designer window there are various buttons as well as a context menu available via the right mouse button.

Buttons

Buttons	Description
	Toggles the display of the HMI between half and full view
	Shows the xml code for the current HMI. The currently selected control element is highlighted.
	Create a screenshot of the current interface and open a save dialog
	Opens a menu for the simulation of the currently valid user level. After selecting a user level, the appearance of the control on the interface is updated. 

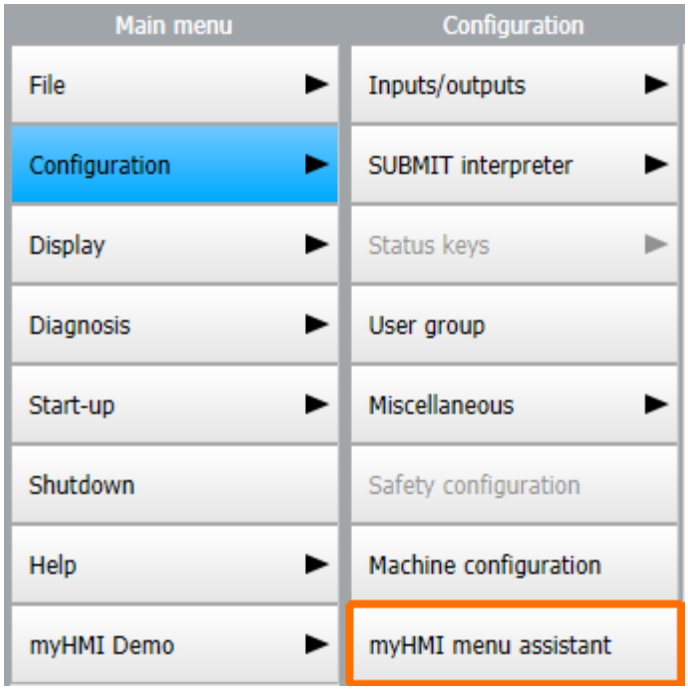
Context menu (right mouse click)



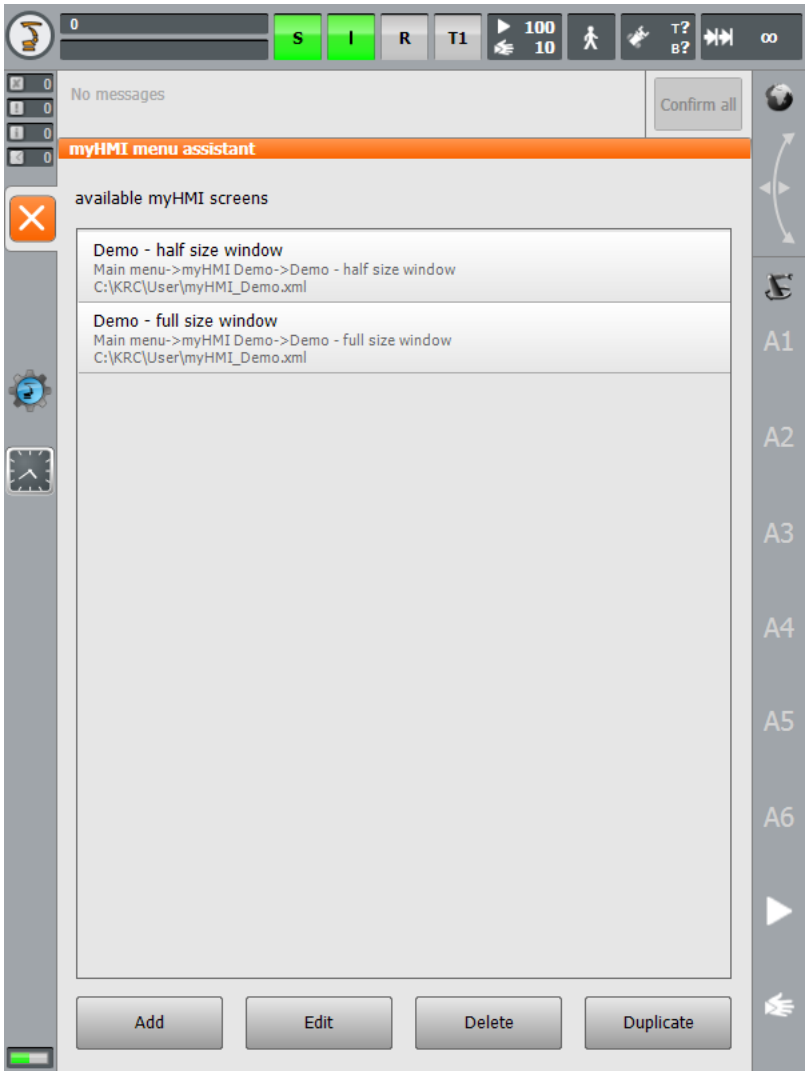
7.3 Menu assistant – create menu entry in the KUKA main menu

In order to open an HMI from the main menu, a menu entry must be defined. This is done in the file SmartHMI.User.config. In order to ease the entry a menu assistant is available. The assistant can be started from ***Configuration → myHMI menu assistant.*** The required user level to start the assistant is ***administrator.***

Starting the assistant



In the main window of the assistant all available HMI are listed. New entries can be added, existing ones can be edited, duplicated or deleted.

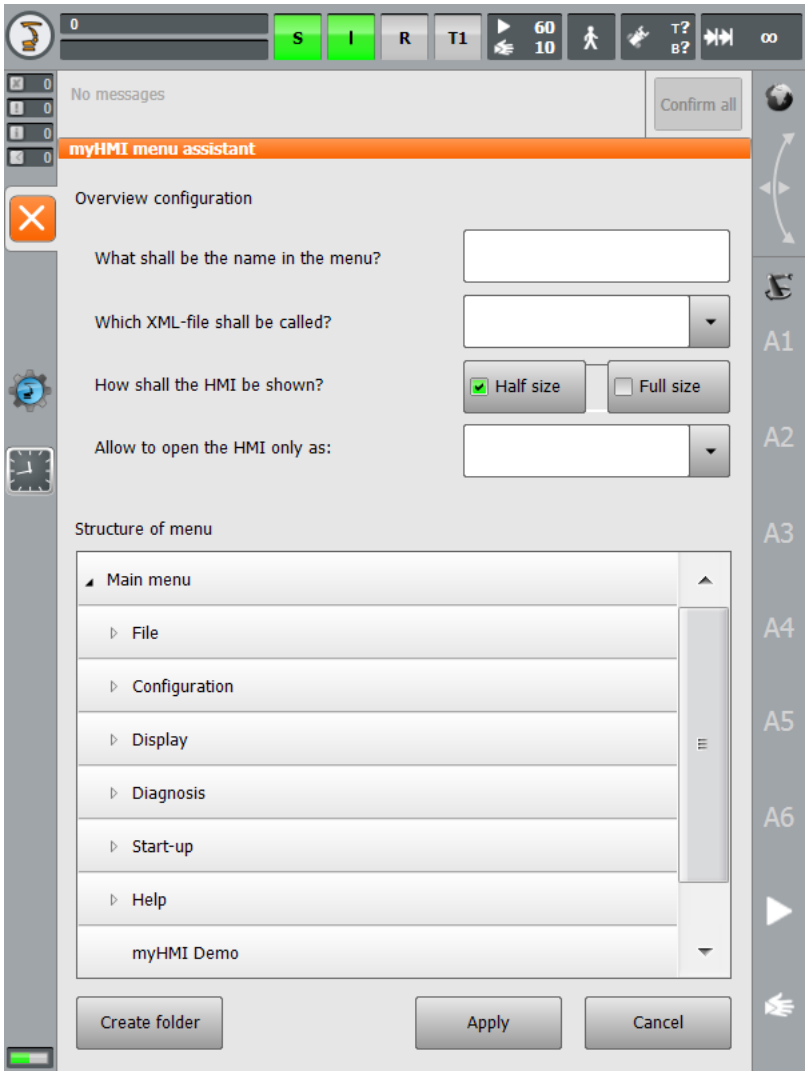


Description of the buttons

Button	Description
Add	A new entry can be added
Edit	An entry can be edited
Delete	An entry will be deleted
Duplicate	An entry can be duplicated

7.3.1 Add or edit an entry

In the following window, an entry can be added or edited.



The placement in the main menu of an entry can be selected in the listing of the menu structure.

Description of the elements

Element	Description
How shall be the name in the menu?	Name of the entry in the main menu
Which xml-file shall be called?	Name of the xml-File. In the dropdown all in C:\KRC\USER\MYHMI available xml-files will be listed
How shall the HMI be displayed?	The HMI can be displayed in full or half size window
Allow to open the HMI only as:	The opening of the HMI can be limited according to the user level. The levels are: User, Expert, Safety maintenance, Safety recovery and administrator. If no level is selected the HMI can be opened by everyone.

Description of the buttons

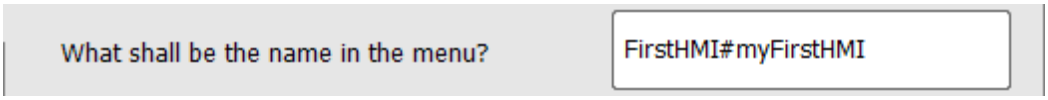
Button	Description
Create folder	At any location in the main menu, a subfolder is created
Apply	The settings will be saved
Cancel	The settings will be discarded

7.3.1.1 Multilingualism of the name of the menu item

The menu entry can be translated by using a language database and a key. The syntax is:

Name of the database **#** *Key*

Example entry: FirstHMI#myFirstHMI



➔ The name of the kxr-file in C:\KRC\Data is: FirstHMI.kxr
➔ The key for the translation in that file is: myFirstHMI

If the name of the kxr-file is identical to the name of the xml-file, the indication of the name of the language base can be omitted. The menu assistant automatically creates the entry of the key in the database.

When saving the entry, the existing of the kxr-file will be checked and the following steps will be executed:

1. If the file is not available it will be created and the keys will be added with predefined translations in the language of the HI and a second language (English or German)
2. If the file is available the existing of the keys is checked. If a key doesn't exist it will be added like under 1. Described.

Text in firstHMI.kxr:

```
<?xml version="1.0" encoding="utf-8"?>
<resources xmlns="http://www.kuka.com/schemas/kxr/2009">
  <module name="FirstHMI">
    <uiText key="myFirstHMI">
      <text xml:lang="de-DEV">meine erste HMI</text>
      <text xml:lang="en-DEV">my first HMI</text>
    </uiText>
  </module>
</resources>
```

Please see chapter 5 for the meaning of the single elements.

7.4 Example – Creating an HMI called „myFirstHmi“

The following example shows the creation of an HMI with the following properties:

- Name of the xml: myHMI_myFirstHMI.xml
- Entry of the HMI in the main menu: Display → Folder – my first HMI → my first HMI
- User level to open the HMI: Expert
- Window size: full size
- Number of registers: 2
- All text items and the menu entry shall be translated in English and German.

Method:

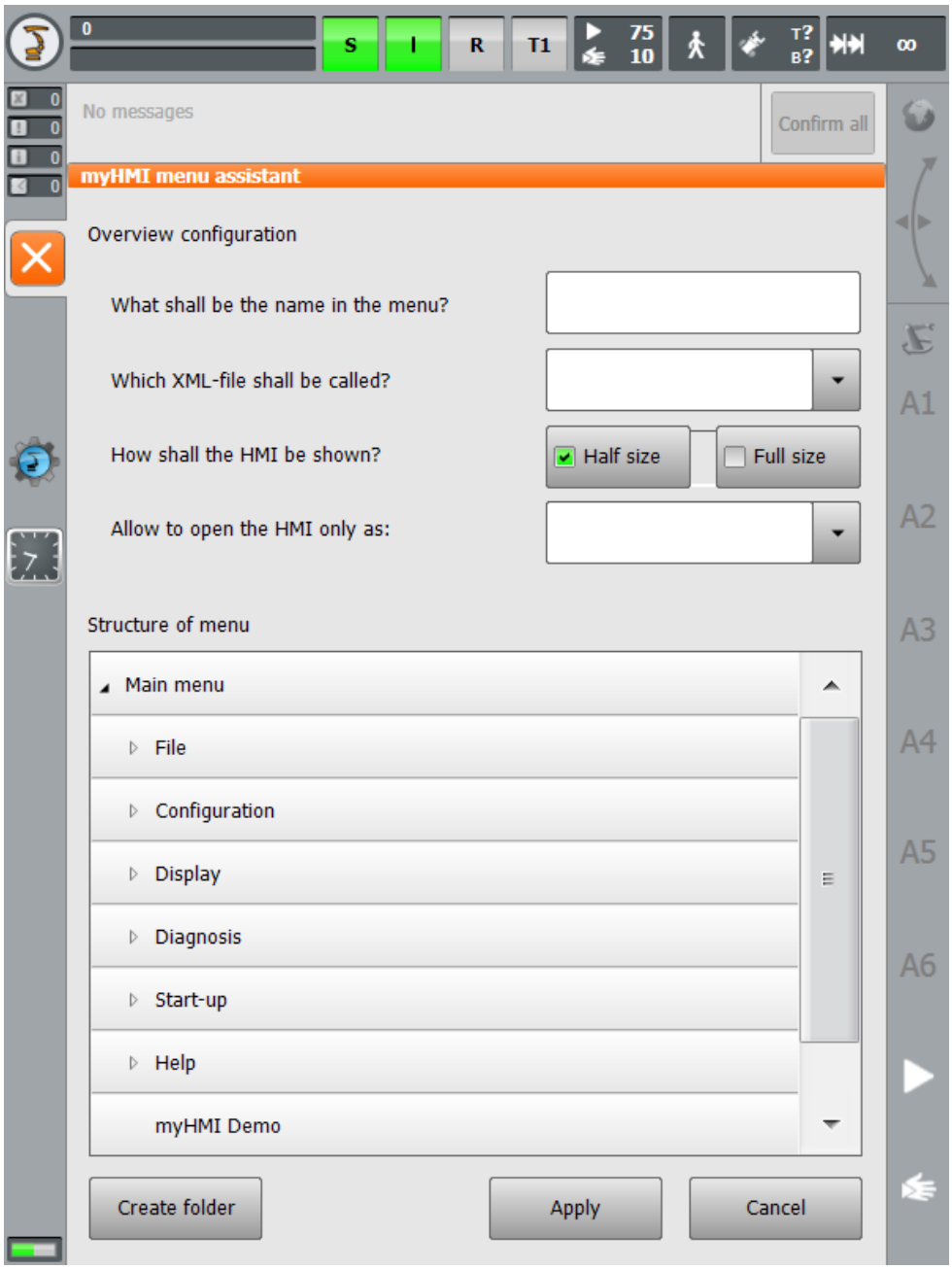
- Copy DemoMyHMI.xml to myHMI_myFirstHMI.xml
- Modify the xml-file to your needs according to chapter 5
- Open the menu assistant and add the entry → when saving the language database will be created automatically (if not available) in C:\KRC\Data
- Edit the language database
- Restart the robot with cold start in order implement the language database to the robot

7.4.1 Xml-file for the HMI, "myFirstHMI.xml"

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<Configuration Text="Headline">
     <Group text="Steuerelemente">
           <Control Type="Headline" Text="Headline1"/>
           <Control Type="Led" Text="Led1" KrlVar="$Flag[1]"/>
           <Control Type="Switch" Text="Switch1" KrlVar="$Flag[1]"/>
           <Control Type="Checkbox" Text="Checkbox1" KrlVar="$Flag[1]"/>
           <Control Type="Button" Text="Button1" TextButton="Press"
KrlVar="$Flag[1]"/>
           <Control Type="Headline" Text="Headline2"/>
           <Control Type="Number" Text="Number1" KrlVar="$OV_PRO"/>
           <Control Type="Progressbar" Text="Progressbar1" KrlVar="$OV_PRO"
Format="0 \%" Min="0" Max="100"/>
           <Control Type="Slider" Text="Slider1" KrlVar="$OV_PRO" Format="0
\%" Min="0" Max="100"/>
           <Control Type="Headline" Text="Headline3"/>
           <Control Type="Label" Text="Label1" KrlVar="$OV_PRO" Format="0
\%"/>
           <Control Type="Text" Text="Text1" KrlVar="BASE_NAME[1,]"/>
           <Control Type="Dropdown" Text="Dropdown1" KrlVar="$PRO_MODE1">
                 <DropDownItem Value="#GO" Text="Go"/>
                 <DropDownItem Value="#MSTEP" Text="MStep"/>
                 <DropDownItem Value="#ISTEP" Text="IStep"/>
           </Control>
     </Group>
     <Group Text="3Spalten" Columns="3">
           <Control Type="Headline" Text="Headline4" ColSpan="3"/>
           <Control Type="Led" Text="Eingang1" KrlVar="$FLAG[1]"/>
           <Control Type="Led" Text="Eingang2" KrlVar="$FLAG[2]"/>
           <Control Type="Led" Text="Eingang3" KrlVar="$FLAG[3]"/>
           <Control Type="Led" Text="Eingang4" KrlVar="$FLAG[4]"/>
           <Control Type="Led" Text="Eingang5" KrlVar="$FLAG[5]"/>
           <Control Type="Led" Text="Eingang6" KrlVar="$FLAG[6]"/>
     </Group>
</Configuration>
```

7.4.2 Menu assistant

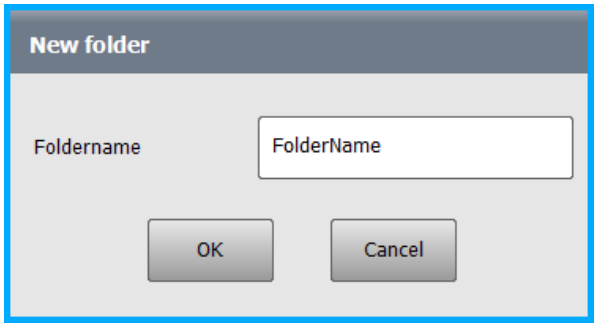
Log in as ***administrator*** and open the menu assistant in the main menu by clicking ***Configuration→ myHMI menu assistant.*** Choose ***Add*** and create the entries.



1. Create the folder for the menu entry in the main menu

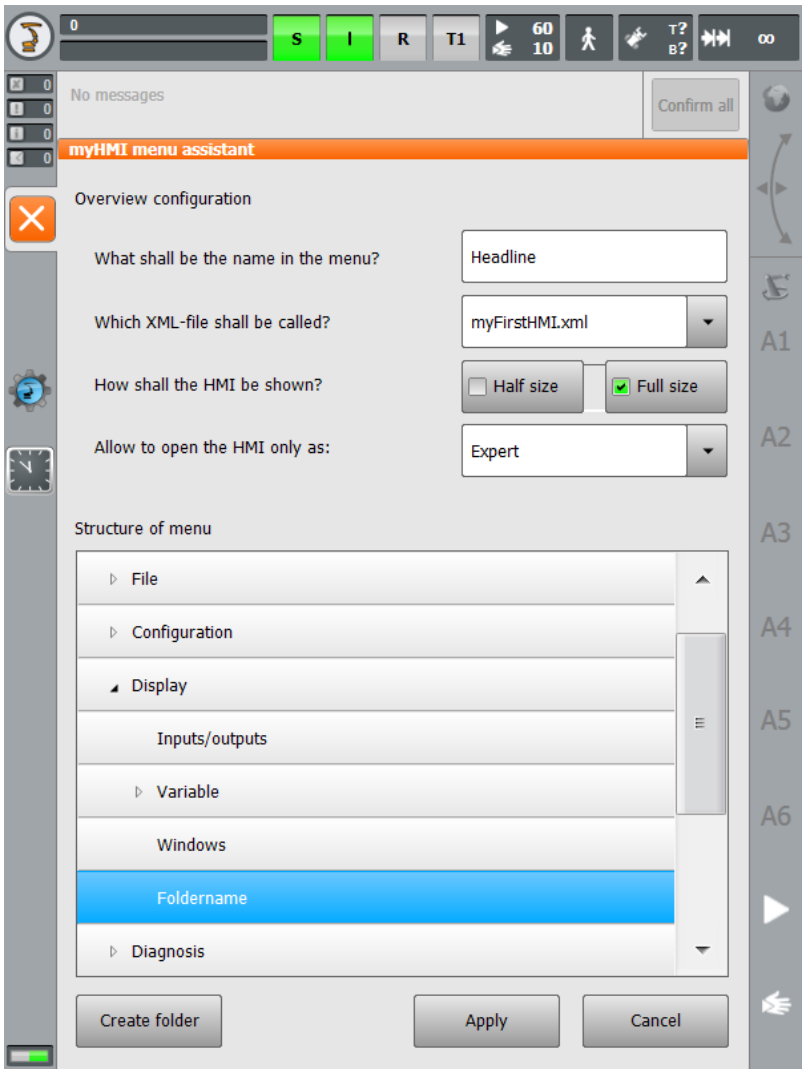
Open the folder ***Display*** and click ***Create folder.***

Enter the key for the language database in the text field (e.g. “Foldername“):



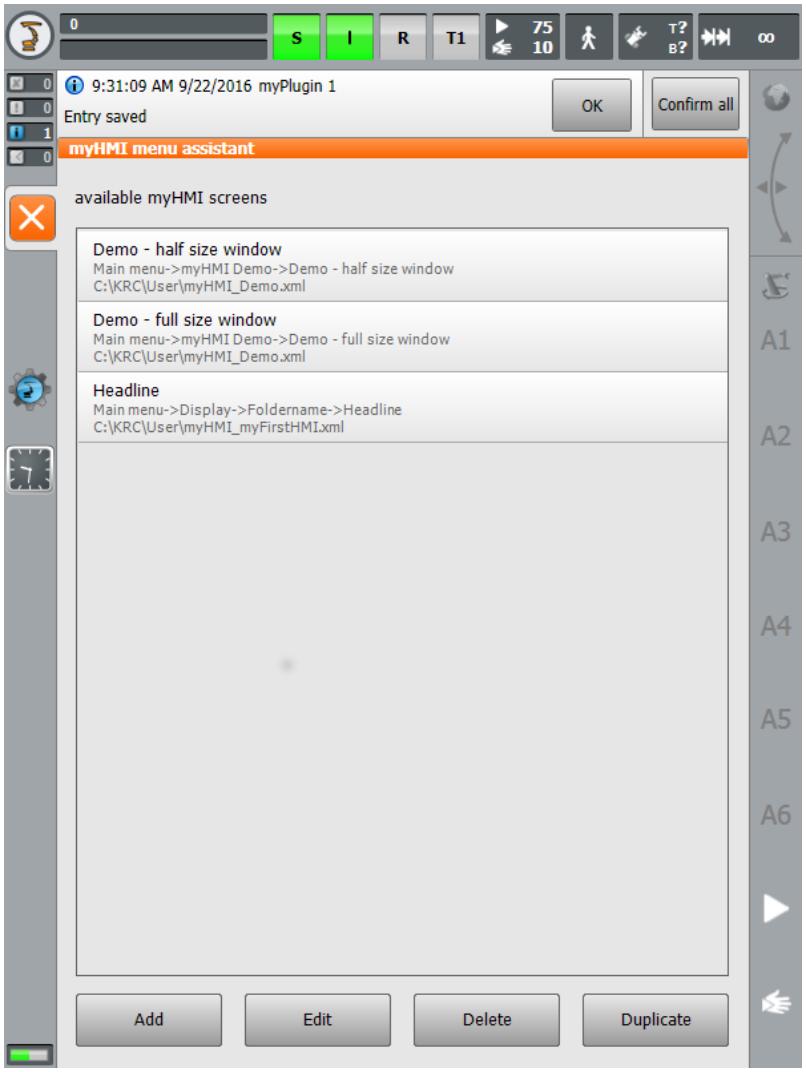
2. Create all entries

Enter the key for the name of the HMI in the main menu in the text field (e.g. „Headline“).



Save the entry with ***Apply***.

→



The specified language database “myFirstHMI.kxr” has been created automatically with the given keys ***Headline*** and ***Foldername*** and can now be edited.

3. Edit "myFirstHMI.kxr"

   Before editing:

```
<?xml version="1.0" encoding="utf-8"?>
<resources xmlns="http://www.kuka.com/schemas/kxr/2009">
  <module name="myFirstHMI">
    <uiText key="Headline">
      <text xml:lang="de-DEV">Headline_de</text>
      <text xml:lang="en-DEV">Headline_en</text>
    </uiText>
    <uiText key="Foldername">
      <text xml:lang="de-DEV">Foldername_de</text>
      <text xml:lang="en-DEV">Foldername_de</text>
    </uiText>    </module>
</resources>
```

→ after editing:

```
<?xml version="1.0" encoding="utf-8"?>
```

```
<resources xmlns="http://www.kuka.com/schemas/kxr/2009">
  <module name="myFirstHMI">
    <uiText key="Headline">
      <text xml:lang="de-DEV">meine erste HMI</text>
      <text xml:lang="en-DEV">my first HMI</text>
    </uiText>
    <uiText key="Foldername">
      <text xml:lang="de-DEV">Ordner meine erste HMI</text>
      <text xml:lang="en-DEV">Folder my first HMI</text>
    </uiText>    </module>
</resources>
```

The translations for the HMI will also be added to this file.

→

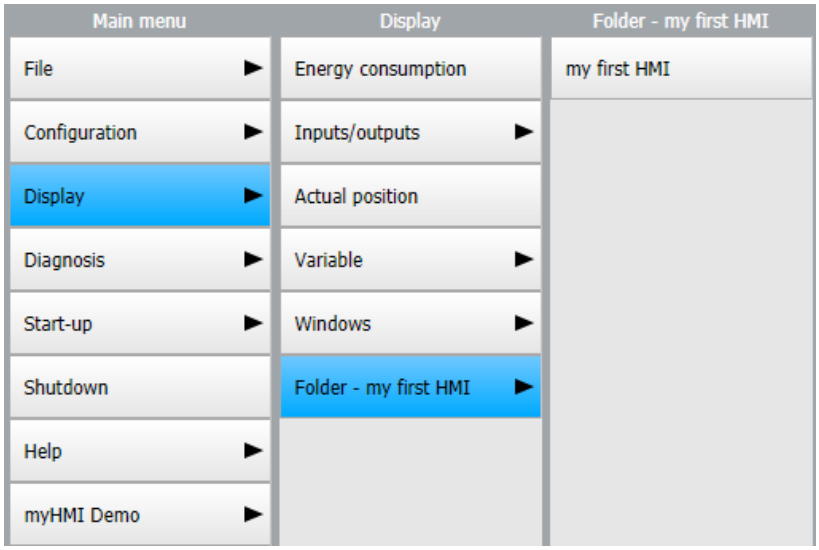
```
<?xml version="1.0" encoding="utf-8"?>
<resources xmlns="http://www.kuka.com/schemas/kxr/2009">
   <module name="myFirstHMI">
      <uiText key="Headline">
         <text xml:lang="de-DEV">meine erste HMI</text>
         <text xml:lang="en-DEV">my first HMI</text>
      </uiText>
      <uiText key="Foldername">
         <text xml:lang="de-DEV">Ordner - meine erste HMI</text>
         <text xml:lang="en-DEV">Folder - my first HMI</text>
      </uiText>
      <uiText key="Headline1">
         <text xml:lang="de-DEV">Beispiele für die Darstellung von BOOL
Variablen ($FLAG[1])</text>
         <text xml:lang="en-DEV">Examples for the representation of BOOL
variables ($Flag[1])</text>
      </uiText>
      <uiText key="Steuerelemente">
         <text xml:lang="de-DEV">Steuerelemente</text>
         <text xml:lang="en-DEV">Controls</text>
      </uiText>
      <uiText key="LED1">
         <text xml:lang="de-DEV">LED Steuerelement</text>
         <text xml:lang="en-DEV">LED control</text>
      </uiText>
      <uiText key="Switch1">
         <text xml:lang="de-DEV">Switch Steuerelement</text>
         <text xml:lang="en-DEV">Switch control</text>
      </uiText>
      <uiText key="CheckBox1">
         <text xml:lang="de-DEV">Checkbox Steuerelement</text>
         <text xml:lang="en-DEV">Checkbox control</text>
      </uiText>
      <uiText key="Button1">
         <text xml:lang="de-DEV">Button Steuerelement</text>
         <text xml:lang="en-DEV">Button control</text>
      </uiText>
      <uiText key="Press">
         <text xml:lang="de-DEV">Drücken</text>
         <text xml:lang="en-DEV">Press</text>
      </uiText>
      <uiText key="Headline2">
         <text xml:lang="de-DEV">Beispiele für die Darstellung von
numerischen Variablen ($OV_PRO)</text>
         <text xml:lang="en-DEV">Examples for the representation of Number
variables ($OV_PRO)</text>
      </uiText>
      <uiText key="Number1">
         <text xml:lang="de-DEV">Number Steuerelement</text>
         <text xml:lang="en-DEV">Number control</text>
      </uiText>
      <uiText key="Progressbar1">
```

```
         <text xml:lang="de-DEV">Progressbar Steuerelement</text>
         <text xml:lang="en-DEV">Progressbar control</text>
      </uiText>
      <uiText key="Slider1">
         <text xml:lang="de-DEV">Slider Steuerelement</text>
         <text xml:lang="en-DEV">Slider control</text>
      </uiText>
      <uiText key="Headline3">
         <text xml:lang="de-DEV">Beispiele für die Darstellung von diversen
Variablen</text>
         <text xml:lang="en-DEV">Examples for the representation of
miscellaneous variables</text>
      </uiText>
      <uiText key="Label1">
         <text xml:lang="de-DEV">Label Steuerelement ($OV_PRO)</text>
         <text xml:lang="en-DEV">Label control ($OV_PRO)</text>
      </uiText>
      <uiText key="Text1">
         <text xml:lang="de-DEV">Text Steuerelement (Base_Name[1,])</text>
         <text xml:lang="en-DEV">Text control (Base_Name[1,])</text>
      </uiText>
      <uiText key="Dropdown1">
         <text xml:lang="de-DEV">Dropdown Steuerelement ($PRO_MODE1</text>
         <text xml:lang="en-DEV">Dropdown control ($PRO_MODE1)</text>
      </uiText>
      <uiText key="Go">
         <text xml:lang="de-DEV">kontinuierlich</text>
         <text xml:lang="en-DEV">continous</text>
      </uiText>
      <uiText key="MStep">
         <text xml:lang="de-DEV">Bewegung</text>
         <text xml:lang="en-DEV">motion</text>
      </uiText>
      <uiText key="IStep">
         <text xml:lang="de-DEV">Einzelschritt</text>
         <text xml:lang="en-DEV">single step</text>
      </uiText>
      <uiText key="3Spalten">
         <text xml:lang="de-DEV">Darstellung in 3 Spalten</text>
         <text xml:lang="en-DEV">Representation in 3 columns</text>
      </uiText>
      <uiText key="Headline4">
         <text xml:lang="de-DEV">Eingänge 1-6</text>
         <text xml:lang="en-DEV">Input 1-6</text>
      </uiText>
      <uiText key="Eingang1">
         <text xml:lang="de-DEV">Eingang 1</text>
         <text xml:lang="en-DEV">Input 1</text>
      </uiText>
      <uiText key="Eingang2">
         <text xml:lang="de-DEV">Eingang 2</text>
         <text xml:lang="en-DEV">Input 2</text>
      </uiText>
      <uiText key="Eingang3">
         <text xml:lang="de-DEV">Eingang 3</text>
         <text xml:lang="en-DEV">Input 3</text>
      </uiText>
      <uiText key="Eingang4">
         <text xml:lang="de-DEV">Eingang 4</text>
         <text xml:lang="en-DEV">Input 4</text>
      </uiText>
      <uiText key="Eingang5">
         <text xml:lang="de-DEV">Eingang 5</text>
         <text xml:lang="en-DEV">Input 5</text>
      </uiText>
      <uiText key="Eingang6">
         <text xml:lang="de-DEV">Eingang 6</text>
         <text xml:lang="en-DEV">Input 6</text>
      </uiText>
   </module>
```

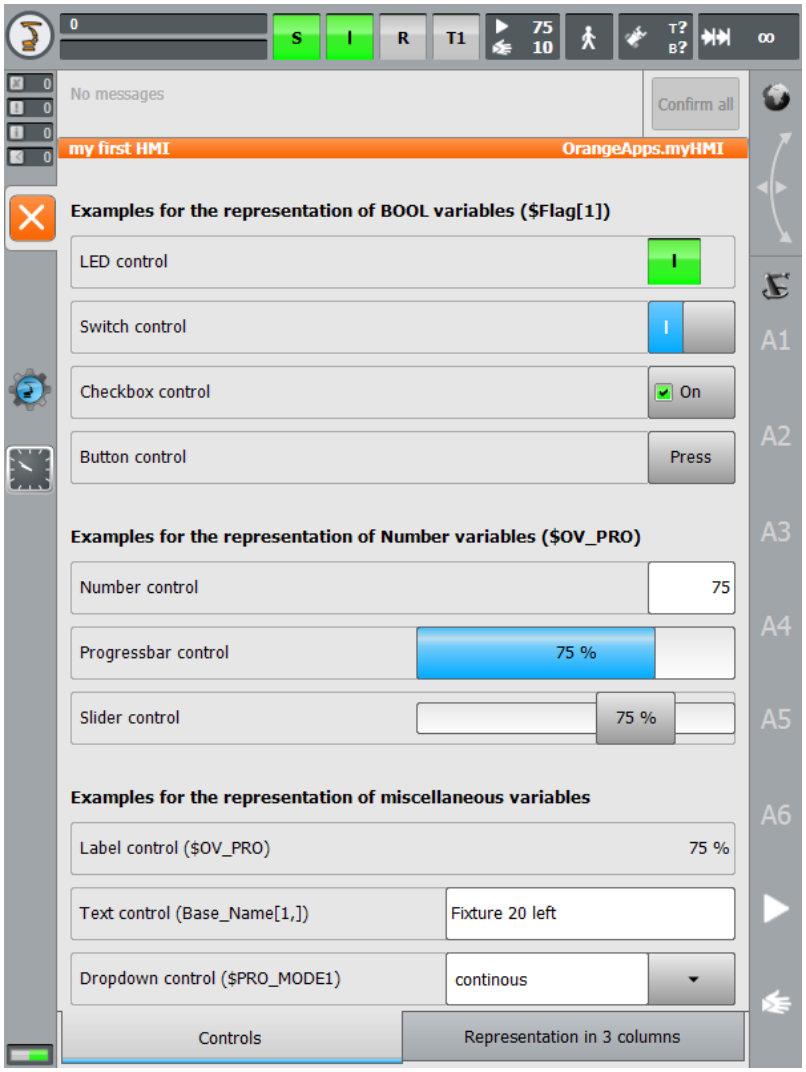
```
</resources>
```

In order for the entries in the language database to take effect the robot has to be restarted with a Cold start.

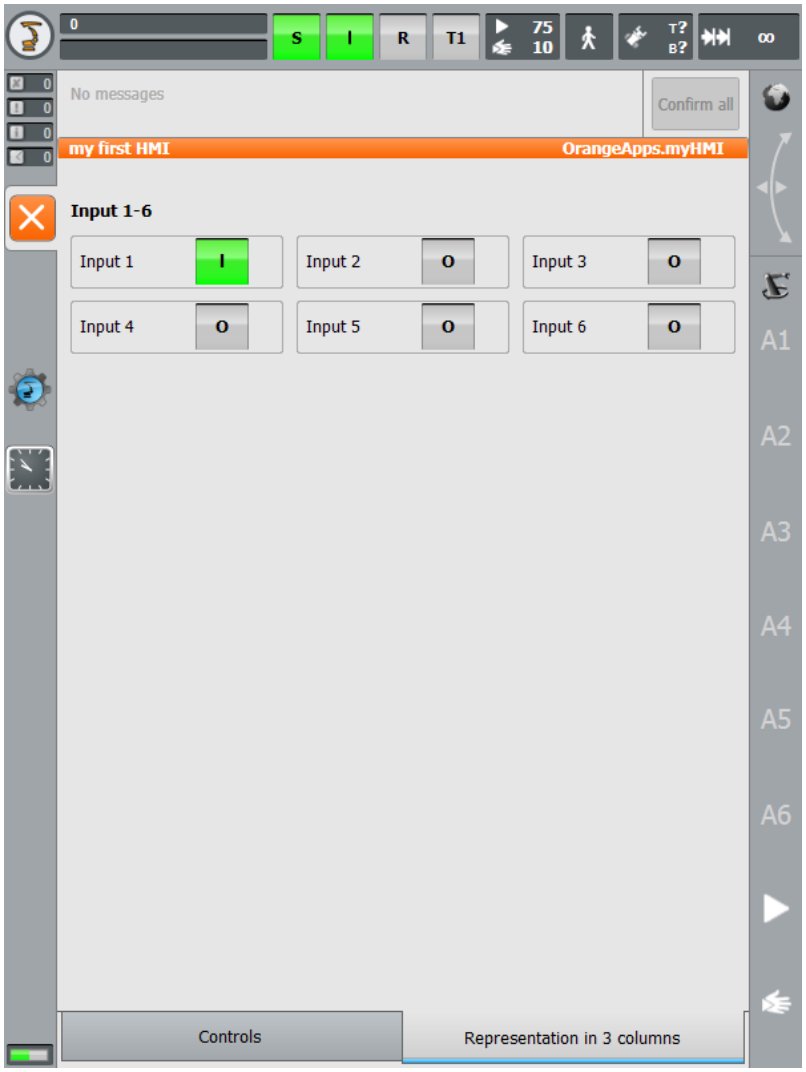
Menu entry in the main menu



HMI – register 1



HMI – register 2



8 Open and close HMI’s automatically

HMI's can be specifically opened and closed from KRL modules. In addition, HMIs can be displayed after the controller has started up and when the operating mode or user changes.

8.1 KRL functions for open and close HMI’s

8.1.1 Function MyHmiOpen

Opens an HMI from within KRL.

function call

MyHMIOpen(char **name of HMI**, enum **ViewMode**, int **Tabnumber**)

parameter

- View [char], path to the MyHMI.xml file e.g. "MyHmiDemo.xml"
- ViewMode [enum], "#Half" for half-page window, "#Full" for whole page (optional, Default = # Full)
- Tab [int], tab of the HMI which shall be displayed (optional, default = 1)

example

```
MyHmiOpen ("myHmiDemo.xml", # Full, 2)
```

Opens the HMI in full-screen interface showing tab 2

8.1.2 Function MyHmiClose

Closes an HMI from within KRL.

function call

MyHMIClose(char **name of HMI**)

parameter

- View [char], path to the MyHMI.xml file, e.g. "MyHmiDemo.xml" (optional, default =*)

example

```
MyHmiClose ("myHmiDemo.xml")
```

Closes the "myHmiDemo.xml" HMI

example

```
MyHmiClose ()
```

Closes all open HMI’s

8.1.3 function MyHmiIsOpen

Returns whether an HMI is open

function call

MyHmiIsOpen(char **name of HMI**)

return value

TRUE or FALSE, TRUE=HMI is open

parameter

- View [char], path to the MyHMI.xml file, e.g. "MyHmiDemo.xml" (optional, default=*)

example

```
IF MyHmiIsOpen ("myHmiDemo.xml") THEN
 ; HMI is open
ELSE
 ; HMI is not open
ENDIF
```

Returns whether the "myHmiDemo.xml" HMI is open

8.2 KRL variables for the conditional opening of HMI's

The following variables can be used to open HMI under certain conditions. The variables are declared in "R1\TP\myHMI_User.dat".

8.2.1 Open surface after startup (auto start)

Using the following variable an HMI can be opened after the controller has started (auto start).

Variable

OpenOnStartup(char **name of HMI**, enum **ViewMode**, int **Tabnumber**)

parameter

- View [char], path to the MyHMI.xml file e.g. "MyHmiDemo.xml"
- ViewMode [enum], "#Half" for half-page window, "#Full" for whole page (optional, Default = # Full)
- Tab [int], tab of the HMI which shall be displayed (optional, default = 1)

example

Auto start deactivated because no HMI (XML file) was specified

```
DECL myHmi_S OpenOnStartup={View [] "",ViewMode #Full,Tab 0}
```

example

Auto start active. After startup, the "myHmiDemo.xml" HMI opens in full size showing tab 3

```
DECL myHmi_S OpenOnStartup={View [] "myHmiDemo.xml",ViewMode #Full,Tab 3}
```

8.2.2 Open user interface when changing operating modes and / or changing users

Using the variable **OpenOnCondition**, an HMI can be opened after changing the user or operating mode.

The specification of the operating modes and the user level is optional and takes place as character variables. The values are specified separated by commas.

OpenOnCondition is a variable with 10 fields (OpenOnCondition [10]). This means that up to 10 different conditions can be configured. The first applicable condition is recognized and the corresponding HMI is opened.

Variable

OpenOnCondition[array number] = (char **name of HMI,** enum **ViewMode**, int **Tabnumber,** char **ModeOps**, char **UserModes**)

parameter

- View [char], path to the MyHMI.xml file e.g. "MyHmiDemo.xml"
- ViewMode [enum], "#Half" for half-page window, "#Full" for whole page (optional: Default = # Full)
- Tab [int], tab of the HMI which shall be displayed (optional: default = 1)
- ModeOps [char], operation modes T1, T2, AUT, EXT (optional: Default= *)
- UserModes [char], user levels 5,10,15,20,29,30 (optional: Default= *)

example

"MyHmiDemo" is opened every time the user or operating mode changes

```
OpenOnCondition [1]={View [] "myHmiDemo.xml",ViewMode #Full,Tab 0,ModeOps []
"",UserModes [] ""}
```

example

"MyHmiDemo" is only opened in full screen showing tab 2 if the "EXT" or "AUT" operating mode and user level 5 or 10 are active

```
OpenOnCondition [1]={View [] "myHmiDemo.xml",ViewMode #Full,Tab 2,ModeOps []
"EXT, AUT",UserModes [] "5.10"}
```

Operating modes

- T1 – test 1
- T2 – test 2
- AUT – automatic
- EXT – External

User level

- 5 – standard
- 10 – operator
- 20 – Expert
- 27 – Security Maintenance Personnel
- 29 – Safety commissioner
- 30 – administrator

9 Appendix

9.1 Messages from myHMI

Message	Description
Error in XML file	A general error occurred while reading the file
No Groups defined in XML file	There are no groups in the XML file configures
Error in XML file, group x	In the group x is a generic error in the XML description
Error in XML file control x	When control x is a generic error in the XML description
Error XML file, a control has no title	A control in the XML file has no "title" attribute
Defined error XML file for the control variable x is not KRL	The control element x in the XML file has no "KrlVar" attribute
Defined error XML file for control x is not a type (int, real)	The control element x in the XML file has a valid "Type" attribute
Control x, y variable does not exist	The KRL variable y does not exist
Control x, general error	The control x caused a general exception
Control x, value could not be set	The value entered could not be written to the KRL variable
Error loading the image file. Format not supported.	The graphic file has a wrong file format.
Error loading image file	During loading the graphic file an unknown error occurred.

9.2 License messages

Message	Description
Dialog message: License for the product myHMI invalid or expired. Contact your system integrator.	The license file is invalid, for example, wrong serial number, or a term expiring license has expired. A new license file fixes the problem.
Dialog message: No license for the product myHMI available. Contact your system integrator.	There is no license file on the system. A new license file fixes the problem.
Status message: X days left to expire license	Appears in time limited licenses if remaining period is <15 days.
Status message: No license file for robot X available	No license file for the robot with the serial number X (X=serial number).

	A new license file fixes the problem.
Status message: License for robot X invalid or expired	No valid license for the robot with the serial number X (X=serial number). A new license file fixes the problem.
Info message: Date has been manipulated license has been reset!	When using a run-length limited license is detected that the date of the robotic system was changed. The license is valid. A new license file fixes the problem.