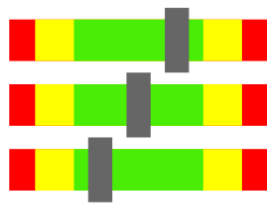# CUSTOMIZER
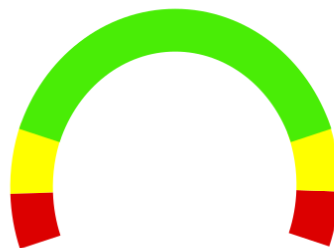# Installation and User Manual

© Kanardia d.o.o.

April 2021

Revision 2.0

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A lot of useful and recent information can be also found on the Internet.

See `http://www.kanardia.eu` for more details.

Copyright

Credits

This document was written using TeX Live (LaTeX) based document creation system using Kile running on Linux operating system. Most of the figures were drawn using Inkscape. Photos and scanned material was processed using Gimp (GNU Image Manipulation Program).

All document sources are freely available on request under the licence mentioned above and can be obtained by email. Please send requests to info@kanardia.eu.

Revision History

The following table shows the revision history of this document.

Rev.	Date	Description
1.0	March 2020	Initial release
1.1	April 2020	Third Party Software section
1.2	May 2020	Minor fixes
2.0	April 2021	Revision for Customizer v2.0

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1   Introduction

Customizer offers a quick way to customize your Instruments' display. This manual describes the installation process, instructions for use and connection to your device.

Customizer is used in combination with BLU and KANJA. They are necessary for data transfer from the PC on which you are running Customizer to your Kanardia instrument.

1.1   General Description

Customizer is a desktop application for our instruments'[1] display customization. It lets the user choose what information you wish to display and how you wish to display it. It is simple and intuitive to use.

Customizer features more than 40 engine functions and a dozen different graphical elements for function values display. You can choose the units you prefer, customize value limits and set alarm warnings. And most importantly, your display layout is completely up to you.

1.2   Supported Instruments

The following table shows supported instruments.

Instrument	Since version
Digi I	1.0.0
Indu Round Indicators	1.0.0

Table 1: Currently supported instruments

---

[1] Instruments available for customization can be found in Table 1.

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2   Installation

Customizer is supported for Linux, macOS and Windows.

2.1   Download

Go to `https://www.kanardia.eu/support/firmware/` and find your operating system. Click the link to download the application to your computer.

2.2   Installation

2.2.1   Linux

1. Unzip the archive

2. Move the `Customizer.AppImage` file to your Desktop or to another folder of your choice

3. `Right-Click` on the Customizer icon, select Properties

4. Open the Permissions tab

5. Make sure that 'Is executable' checkbox is checked
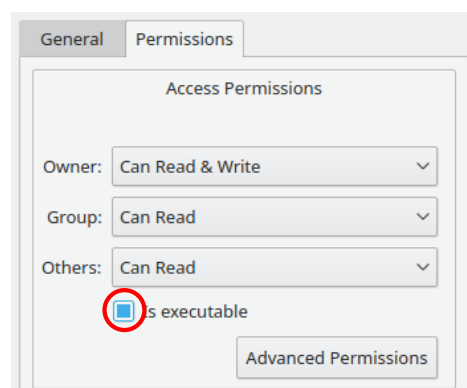
6. Select `OK` to close the window

No other installation steps are required. Double click (or single, depending on your OS settings) to run.

2.2.2   MacOS

1. Unzip the archive

2. Open the `Installer.dmg` file. You will find the Customizer app and a link to the Applications folder inside

3. Drag Customizer to Applications folder
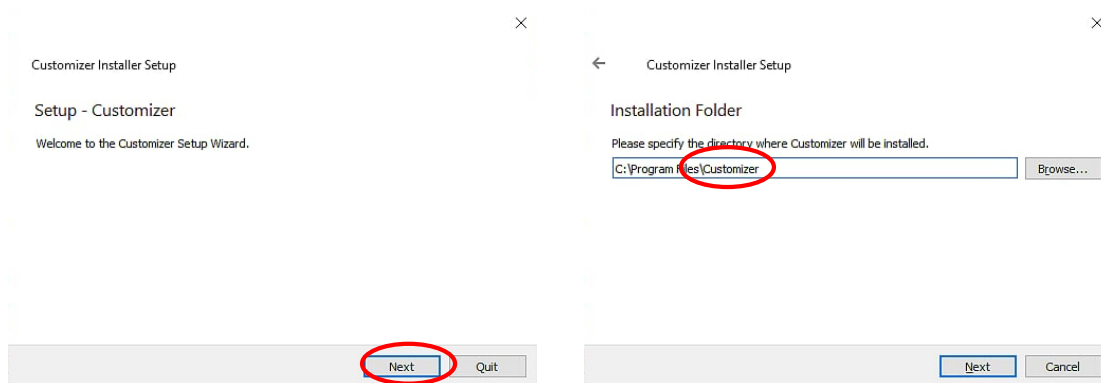
4. Close the installer and eject it

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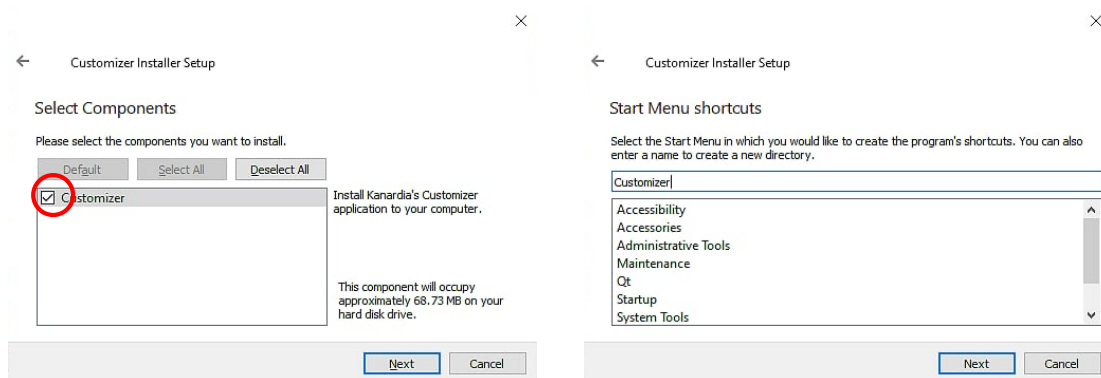
5. Open Launchpad, find Customizer and run it
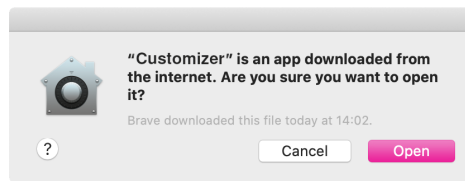
6. If a dialog pops-up, asking for permission to run, click `Open`
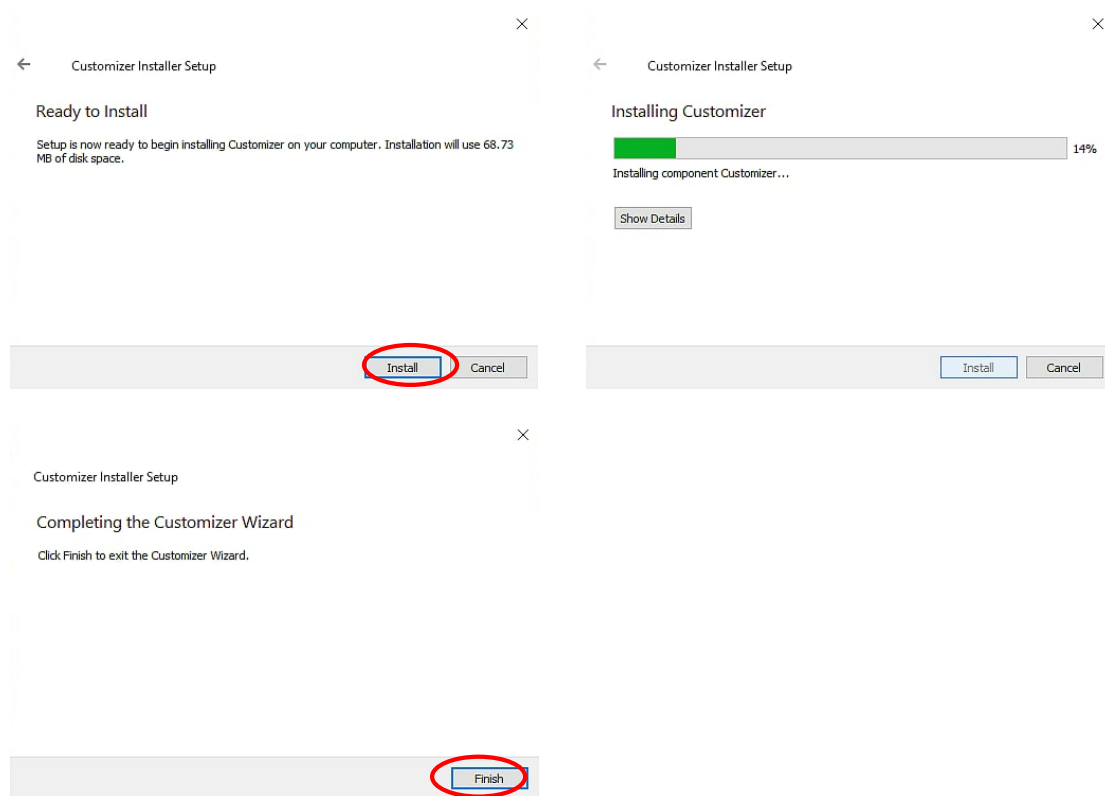
2.2.3   Windows

1. Unzip the archive

2. Run the `CustomizerInstaller.exe`

3. Select the location where you want the application's data to be installed

4. Select all components and a shortcut location

5. Click `Install` and wait for the installation to complete

6. Click `Finish`

After completing the installation, find Customizer in the Start menu or on your Desktop.

In case that Windows Defender prevents you from running the application. Follow these simple steps:
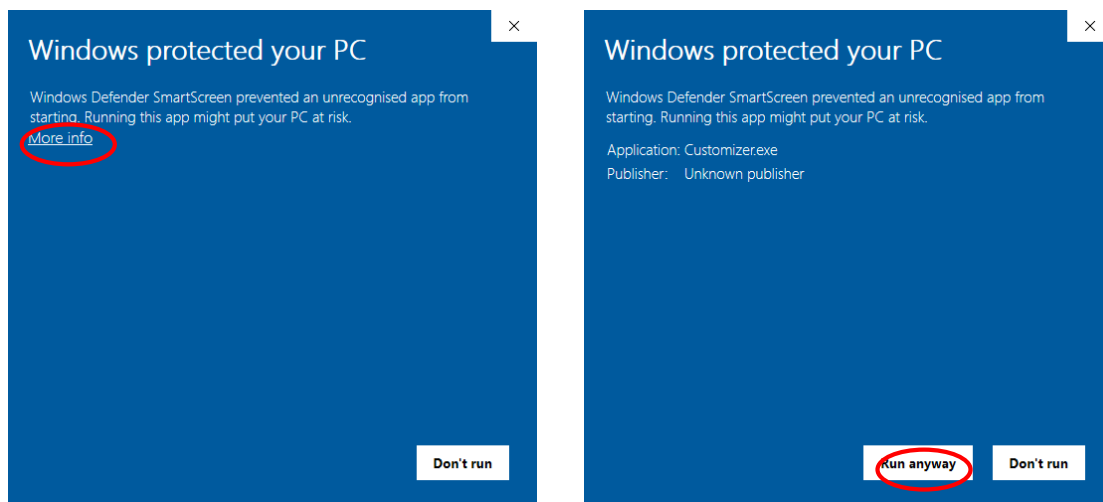
2.3   Uninstall

2.3.1   Linux

Delete Customizer.AppImage:

1. `Left-click` on the application icon to select it

2. Press the `DEL` key on your keyboard

or

1. `Right-click` on the application icon

2. Select `Move to Trash` option

2.3.2   MacOS

1. Open `Finder`

2. Find the `Applications` subfolder

3. Select Customizer

4. Press the `(CMD + ) Backspace` key on your keyboard

2.3.3   Windows

1. Open `Control Panel`

2. Under section `Programs` click `Uninstall a program`

3. Find Customizer on the list

4. Select it and click `Uninstall`

5. Select 'Remove all components'.
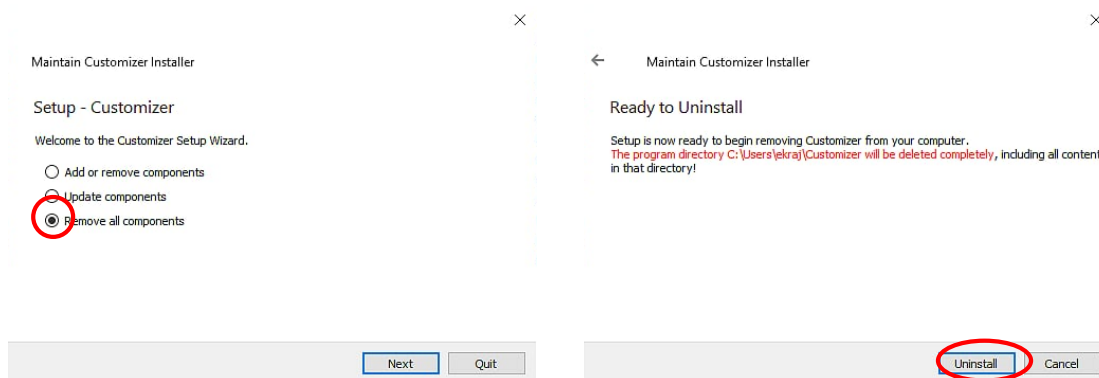
6. To confirm, click `Uninstall`

2.4   Support

For help, feedback or in case of application errors, please contact: `support@kanardia.eu`

3 Tools & Features

3.1 Toolbar

Figure 1 illustrates the application toolbar with available actions. Action explanations follow.

Figure 1: Customizer toolbar

3.1.1 New

`New` creates a new project. In the dialog that opens, input the name of the project. Then, select the instrument you wish to customize and that instrument's model. Click `OK` to confirm your choices. A blank project is opened and ready for you to start customizing.
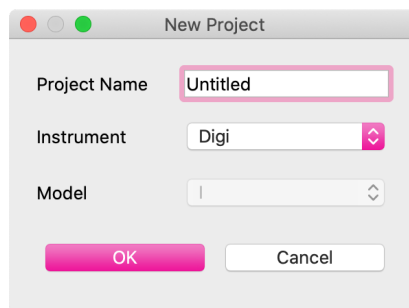

Figure 2: New Project dialog

3.1.2 Open

`Open` opens an existing customizer layout file. In the dialog that opens, find a project you wish to import and click `Open`. All project files should have a `.iml` extension.

3.1.3 Save & Save As

Save your project information to an external file. When prompted by the dialog, input the file name and location. Click `Save`.
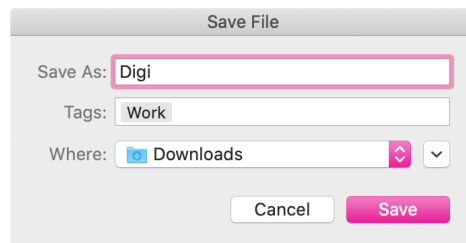

Figure 3: Save Project dialog

Program information is formatted and written into a `YourFileName.iml` file. This file can then be used to modify your instrument display or it can be opened by Customizer again.

3.1.4   Zoom Options

There are three options for scaling the screen. `Zoom-In`, `Zoom-Out` and `Default-Zoom`. These functionalities are available for ease of use in the Customizer application and will not affect scaling on your actual device.

3.1.5   Unit Settings

Figure 4 illustrates a dialog with unit preferences.

- `SAVE` saves selected units to the current project. Next time you open this same project, these same units will be loaded.

- `SAVE DEFAULTS` sets selected units for the whole application. Every time you create a new project, these units will be used as default.

- `LOAD DEFAULTS` overwrites the current options and loads the units you last saved as defaults.

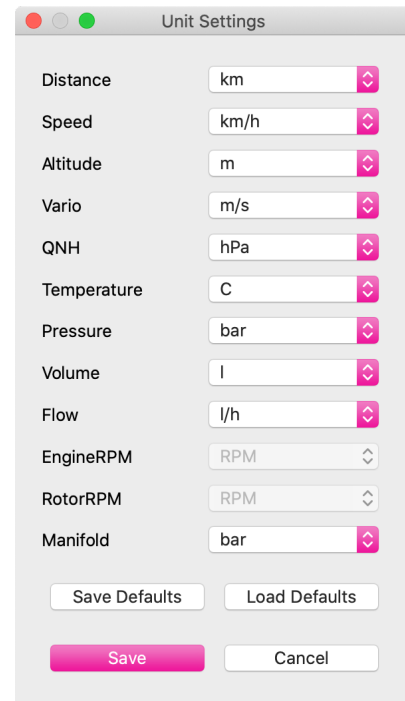Element property values are converted according to your unit selection.

3.1.6   Screenshot

Takes a screenshot of your project screen. A file dialog is opened. Choose the name of the screenshot and the file format. The default format is `.png`, but you can choose another image format.

Figure 4: Unit Settings dialog

3.1.7   Engines

A dropdown menu with a list of commonly used aircraft engines can be found in the toolbar. Each engine has its own characteristics, which can be useful when editing layout element's properties. Read more about engine defaults in section 4.2.1.

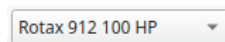Figure 5: Engine selection

3.1.8   Clear

`Clear` removes all the elements from the *Design Area* but does not close the project. This action is reversible with the `Undo` action.

3.1.9   Close

`Close` closes the current project.

3.1.10 About

You can find your current Customizer software version in the About dialog.
Also listed are:

- Contact information,

- publisher and

- help.

3.2 Layout

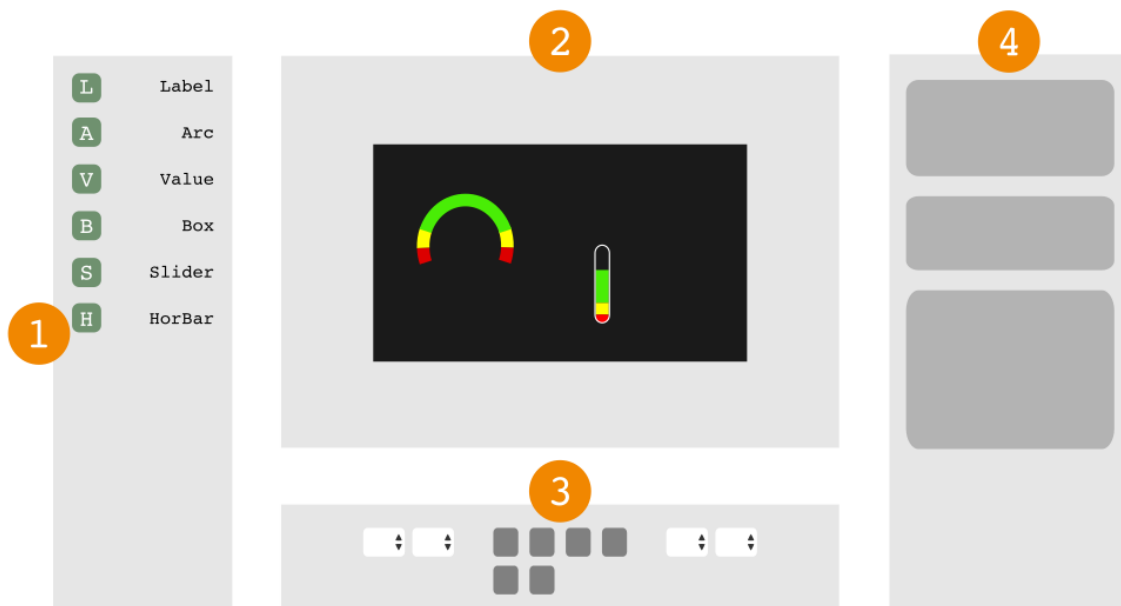Figure 6 illustrates a general application layout.

Figure 6: General layout of the application

① Element Lists   ② Design Area   ④ Properties

③ Tools

3.2.1 Element Lists

Element List lists of all elements for your selected instrument and model. Elements are a graphic representation of a function value displayed on the instrument's screen.

To add a new element to your project, drag it from the list to the *Design Area*. Drop it whererever you want. Alternatively, double-click an element and it will be added to the center of the screen.

More details about specific elements can be found under each instrument's self-titled section of this document.

3.2.2 Design Area

A black screen is centered in the *Design Area* and is a representation of your device's display. Overlaying the screen is the instrument's scale or mask. On the real Kanardia instrument, its scale or its mask might obscure a small part of the screen. This information is useful when positioning the elements.

Elements can be added to the screen from the *Element List*.

Working with the elements in the *Design Area*:

- **Selection**

  `Left-Click` an element in the *Design Area* to select it. Select multiple elements with a combination of `CTRL`[2] and `Left-Click` or with `mouse-drag` selection. To select all elements in the *Design Area* use the shortcut `CTRL`[2]+ `A`. Selected elements are identified with a dashed border.

- **Boundaries**

  Elements not fully positioned inside the screen are colored red. Out-of-bounds elements will not be displayed on your device, but can be saved as part of your project.

- **Positioning**

  Selected elements can be moved around in various ways:

    - Mouse drag
    - Keyboard arrows press (moved by 1 px)
    - `CTRL`[2]+ keyboard arrows press (moved by 10 px)
    - Position from *Tools*
    - Align & Center from *Tools*

- **Deletion**

  To remove selected element(s) from the *Design Area* use `DELETE` or `BACKSPACE` keys on your keyboard.

- **Duplication**

  The keyboard combination `CTRL`[2]+ `D` duplicates selected elements, including their properties.

- **Grouping & Ungrouping**

  The keyboard combination `CTRL`[2]+ `G` groups selected elements into one entity. This action can be useful when working on element positioning. The combination `CTRL`[2]+ `SHIFT` + `G` ungroups the selected group - returns grouped elements to seperate entities.

- **Undo & Redo**

  To undo any element changes use `CTRL`[2]+ `Z`. Then use `CTRL`[2]+ `SHIFT` + `Z` to redo them.[3]

- **Copy & Paste Properties**

  With a `right-click` on an element, a context menu appears.

    - *Copy Properties* option copies and saves chosen elements' properties.
    - *Paste Properties* overwrites current properties with the ones saved when last clicking on *Copy Properties*. If there exist no saved properties, *Paste Properties* is disabled. If element types differ, only properties common to both are pasted.

- **Zoom**[4]

  Zoom can be achieved with a combination of `CTRL` key & `mouse wheel` or touchpad pinch for MacOS users. Another option is to use zoom actions from the toolbar.

---

[2] On macOS keyboards use the `CMD` key instead.
[3] Key sequence may vary depending on your OS.

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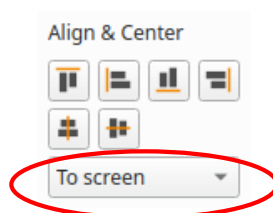
3.2.3   Tools

- **Position**

  Set element's coordinates. The point (x,y) represents the top left corner of the element. (0,0) is the top left corner of the instrument's screen.

- **Size**

  Displays element's size in pixels, formatted as (width x height).

- **Align & Center**

  Repositions selected elements depending on the selection from the dropdown menu.

  - *To screen* option: Aligning and centering selected elements relative to the screen's geometry (coordinates and size). E.g. pressing 'Align Top' will align selected elements to screen's top edge.
  - *To selection* option: Aligning and centering selected elements relative to eachother's geometries (coordinates and sizes). E.g. pressing 'Align Top' will align all selected element's top edges.

  All alignment options are illustrated in Table 2.

Align Top	Align Bottom	Align Left	Align Right
Vertical Center	Horizontal Center		

  Table 2: Alignment options

- **Distribute**

  Distribution is possible for three or more selected elements. It rearranges selection so that vertical or horizontal gaps between subsequent elements are all equal. Distribution options are illustrated in Table 3.

- **Grid[4] & Snapping**

  Grid is a visual helper for the user. Choose how many vertical and how many horizontal lines you wish to see. Maximum number of grid lines depends on the screen size of the instrument. Check or uncheck the *Show grid* checkbox to toggle grid's visibility.

---

[4] For customizing purposes only, it has no effect on your instrument's actual display

Table 3: Distribution options

Check the *Snap to grid* checkbox to turn on the snapping functionality. Snapping works when only one element is selected (including groups). After dragging and releasing the element, if any of its borders is close enough to any of the grid lines, the element positon will change to align that border to the closest grid line.

3.2.4   Properties

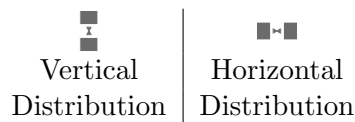`Properties tab` presents sets of editable properties for the selected element. Properties allow you to modify the element's behaviour.

When more than one element is selected, properties are shown only if all selected elements are of the same TYPE. (E.g. - 3 Arcs)

Modifiying a property value when multiple items are selected, updates this property for the whole selection. If a property value differs for any of the selected elements, `*VARIOUS*` keyword is shown as a placeholder.

Here is a list with some generic properties and explanations of their functionalities.

- **FUNCTION** sets the element's main function. For example: RPM, fuel pressure, oil temperature, CHT, ...

- **TEST VALUE** is a placeholder numeric input for the selected function value.[4] It uses units set in the Unit Settings dialog.

- **LABEL** plain text input.

- **FONT SIZE** modifies the size of the label or the value.

Other properties are element specific and will be explained in more detail in the next sections.

Property Validation

Some of the properties are additionally validated by the application. An orange banner is shown at the right bottom corner of the Customizer window.

Figure 7: Validation banner example

Messages in the banner list element's invalid properties and explanations of the problems. An example banner is illustrated in Figure 7.

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! An exclamation mark drawn on top of the element indicates a validation problem.

To hide the banner and the exclamation mark, resolve the mentioned problems.

Validation messages are of informative nature and will be ignored when saving your project.

4 Digi I

Digi I is an engine information system. With Customizer you can modify its graphic elements and their layout.

The next sections describe every Digi element, its properties and how to customize them.

4.1 Elements

Digi's elements are simple graphical displays of different engine function values.

Elements can be defined and modified with the properties available from the properties tab on the right hand side of the application. Read about each element's properties below.

Label

Label

Label is a short text with a 15 character upper limit. No special characters are allowed.

- LABEL displays a short text.

- FONT SIZE options vary from *tiny* to *normal.*

Value

13.5ᴠ

Value is a simple way to display a function value with its unit.

- TEST VALUE displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument).

- FUNCTION sets the element's main functionality. Its units can be changed in the Units Settings dialog. Note that whether or not a function available from Customizer will work on Digi depends on your CAN connections.

- Five FONT SIZE options ranging from *tiny* to *huge.*

- ALIGNMENT modifies text alignment (more in section 4.2.6).

- ALARM LOW sets the type of warning to be displayed when function value enters the low range. Read more on alarms in section 4.2.5.

- ALARM HIGH sets the type of warning to be displayed when function value enters the high range. Read more on alarms in section 4.2.5.

- Color ranges are set with color limits - YELLOW LOW, YELLOW HIGH, GREEN LOW and GREEN HIGH. For more information on how to correctly set the color limits refer to section 4.2.

This element has no visual color representations, yet still has the option to set the color limits as the latter influence alarm behaviour.
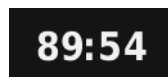
Time

89:54

Time element is a simple way to display time-related function values.

- TEST VALUE displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument).

- Time element is used to display various time FUNCTIONS: *engine total time, flight time, flight total time* and *power total time*. Note that whether or not a function available from Customizer will work on Digi depends on your CAN connections.

- Five FONT SIZE options ranging from *tiny* to *huge*.

- ALIGNMENT modifies text alignment (more in section 4.2.6).

Box

Carb. tmp.
15 °C

Box combines properties of both **Label** and **Value** in a single element.

- TEST VALUE displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument).

- FUNCTION sets the element's main functionality. Its units can be changed in the Units Settings dialog. Note that whether or not a function available from Customizer will work on Digi depends on your CAN connections.

- LABEL displays a short text.

- ALARM LOW sets the type of warning to be displayed when function value enters the low range. Read more on alarms in section 4.2.5.

- ALARM HIGH sets the type of warning to be displayed when function value enters the high range. Read more on alarms in section 4.2.5.

- Color ranges are set with color limits - YELLOW LOW, YELLOW HIGH, GREEN LOW and GREEN HIGH. For more information on how to correctly set the color limits refer to section 4.2.

This element has no visual color representations, yet still has the option to set the color limits as the latter influence alarm behaviour.

Throttle Box & Throttle Value

Throttle elements display throttle position value expressed in percent. Note that Customizer displays the value as a ratio 0.00 ∼ 1.00, but Digi displays it in percent.

- Test Value displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument).

- Five Font Size options ranging from *tiny* to *huge*. Available for **Throttle Value**.

- **Throttle Value** has the Alignment property. Alignment modifies text alignment (more in section 4.2.6).

- Label displays a short text. Label is editable for **Throttle Box**.

- Throttle elements support two different Engine Types - *Rotax 915 iS* and *Rotax 912 iS*.

Arc
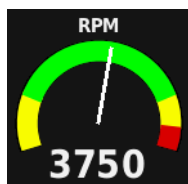
Arc combines a graphic display of the function value - an arc and a needle, together with its numeric value.

- Test Value displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument). Also, it influences the needle's angle.

- Function sets the element's main functionality. Its units can be changed in the `Units Settings` dialog. Note that whether or not a function available from Customizer will work on Digi depends on your `CAN` connections.

- Label displays a short text.

- Alarm Low sets the type of warning to be displayed when function value enters the low range. Read more on alarms in section 4.2.5.

- Alarm High sets the type of warning to be displayed when function value enters the high range. Read more on alarms in section 4.2.5.

- Color ranges are set with color limits - Yellow Low, Yellow High, Green Low and Green High. For more information on how to correctly set the color limits refer to section 4.2.

- Properties Low End and High End set different sequences of color ranges. The former for the left half of the element and the latter for the right half.

Arc indicator's (needle) angle is an interpolation of the Test Value and the color limits for the chosen color ranges. For more information about colors, limits and alarms refer to section4.2.

Horizontal Bar

Horizontal bar combines a graphic display of the function value - a bar and an indicator, together with its numeric value.

- Test Value displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument).

- Function sets the element's main functionality. Its units can be changed in the `Units Settings` dialog. Note that whether or not a function available from Customizer will work on Digi depends on your `CAN` connections.

- Label displays a short text.

- Alarm Low sets the type of warning to be displayed when function value enters the low range. Read more on alarms in section 4.2.5.

- Alarm High sets the type of warning to be displayed when function value enters the high range. Read more on alarms in section 4.2.5.

- Color ranges are set with color limits - Yellow Low, Yellow High, Green Low and Green High. For more information on how to correctly set the color limits refer to section 4.2.

- Properties Low End and High End set different sequences of color ranges. The former for the left half of the element and the latter for the right half.

Bar indicator's position is an interpolation of the Test Value and the color limits for the chosen color ranges. For more information about colors, limits and alarms refer to section4.2.

Carburetor Bar

Carburetor Bar is a graphic element displaying *Carburetor Temperature*. It features a Green-Yellow-Green colored bar. Color limits for Carburetor Bar are distributed differently to the ones in the **Horizontal Bar** so please refer to section 4.2.3 for a more detailed color limit setting instruction.

- TEST VALUE displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument). The value is displayed next to the bar.

- LABEL displays a short text.

- Color ranges are set with color limits - YELLOW LOW, YELLOW HIGH, GREEN LOW and GREEN HIGH. For more information on how to correctly set the color limits refer to section 4.2.

Bar indicator's position is an interpolation of the TEST VALUE and the color limits for the chosen color ranges. For more information about colors, limits and alarms refer to section 4.2.

As opposed to **Horizontal Bar**, Carburetor Bar does not have any ALARM properties. When function output (TEST VALUE in Customizer) enters the yellow range, the displayed value turns yellow.

Compact Bar

Compact Bar is an element displaying EGT or CHT values. It is composed of multiple bars and displays the minimum and maximum function values.

- TEST VALUE displays a numeric value (this is a place holder for the actual value you will see when using Kanardia instrument).

- Choose between *CHT* and *EGT* FUNCTIONS.

- LABEL displays a short text.

- ALARM LOW sets the type of warning to be displayed when function value enters the low range. Read more on alarms in section 4.2.5.

- ALARM HIGH sets the type of warning to be displayed when function value enters the high range. Read more on alarms in section 4.2.5.

- Property COUNT sets the number of bars with options from *2* to *6*. If COUNT is set to 4 or more, the element displays two values. The one on top shows the maximum of all bar values and the other one shows the minimum. The Customizer application displays TEST VALUE for both.[4]

- Properties LOW END and HIGH END set different sequences of color ranges. The former for the left half of the element and the latter for the right half.

- Color ranges are set with color limits - YELLOW LOW, YELLOW HIGH, GREEN LOW and GREEN HIGH. For more information on how to correctly set the color limits refer to section 4.2.

Indicator's position is an interpolation of the TEST VALUE and the color limits for the chosen color ranges. For more information about colors, limits and alarms refer to section 4.2.

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Fuel Bar

Fuel bar elements display the current fuel level value relative to tank's capacity.

- TEST VALUE modifies indicator's position relative to other properties.

- Fuel Bar has two FUNCTION options - *Fuel Level* and *Fuel Level 2*.

- CAPACITY sets the tank's maximum capacity.

- ALARM LOW sets a warning type for when the indicator enters the yellow zone.

- YELLOW LOW and GREEN LOW set the limits for Fuel Bar's color ranges. For more information on how to correctly set the color limits refer to Figure 18 in section 4.2.

The triangular indicator's position is an interpolation of the TEST VALUE relative to the given GREEN LOW, YELLOW LOW and CAPACITY values.

Figure 8: Fuel Bar

Horizontal & Vertical Sliders
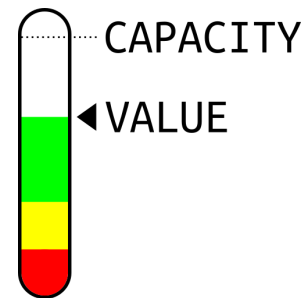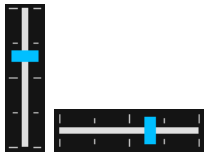

- TEST VALUE modifies indicator's position.

- Sliders are elements displaying *Pitch Trim, Throttle, Flaps* or *Roll Trim* position FUNCTIONS expressed in ranges -1 to 1 or 0 to 1.
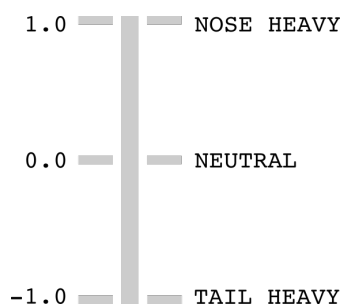

Figure 9: Pitch

The Slider's values are expressed in ratios as evident in Figures 9, 11 and 10.

The Sliders do not have any color, limit or alarm properties.

Notice *Roll* and *Pitch trim* functions ratio distribution is different to the one of *Throttle* and *Flaps*. The former span from -1.0 to 1.0 and the latter from 0.0 to 1.0.

Pictured are recommended slider types for different functions and their value interpretations.

For Digi display compatibility the **Horizontal Slider** has a 5px offset to the screen's left edge and **Vertical Slider** has a 5px offset to the screen's top edge.
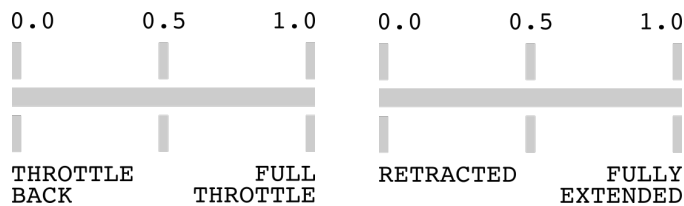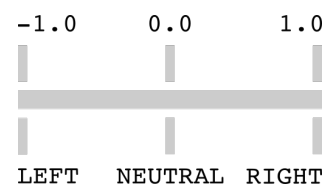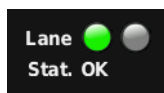
Figure 10: Throttle and Flaps


Figure 11: Roll trim

Engine Status

As suggested by its name, Engine Status element displays the engine's status information.

- Choose the ENGINE TYPE for which you want to display its engine status information - *Rotax 915 iS*, *Rotax 912 iS* or *UL Power*

  Rotax 915 iS & **Rotax 912 iS**

1. *Lane* The lights represent Lane A (left) and Lane B (right). A green light indicates the lane is active and a gray light indicates it is inactive.

2. *Stat.* stands for "Status". A short message describes the current status.
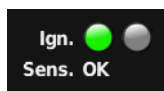
  UL Power

1. *Ign.* stands for "Ignition". The left light represents Ignition 1, and the right one Ignition 2. When the light turns green it indicates the corresponding ignition is active, whereas the gray light indicates it is inactive.

2. *Sens.* stands for "Sensor". A short message describes the current sensor status.

4.2   Properties

This section describes element properties. Related properties are grouped into subsections. Each subsections first lists the related properties, then lists the elements that use these properties and lastly describes the properties in more detail.

4.2.1   Engine Defaults

[*Get Engine Defaults*]

○ Value	○ Horizontal Bar	○ Horizontal Slider
○ Time	○ Carburetor Bar	○ Vertical Slider
○ Box	○ Compact Bar	○ Throttle Box
○ Arc	○ Fuel Bar	○ Throttle Value

Engine defaults offer you a quick way to initialize selected elements' properties. The defaults are an unofficial collection of data for some of the more common engines.

Acquired defaults depend on:

- element's FUNCTION (set from `Properties` tab) and

- selected ENGINE TYPE (set from `Toolbar`).

Note that some of FUNCTION - ENGINE TYPE combinations may not have any predefined values. In which case, a message 'No data found.' is displayed.

Figure 12: Message banner example

By pressing the `Get Engine Defaults` button, default values will overwrite the selected elements' current properties (if applicable). Updated properties can be any of the following:

- YELLOW LOW

- YELLOW HIGH

- GREEN LOW

- GREEN HIGH

- TEST VALUE

- LOW END

- HIGH END

4.2.2   Colors

[*Low End, High End*]

- ○ Arc

- ○ Horizontal Bar

- ○ Carburetor Bar[5]

- ○ Compact Bar

Color properties describe the element's appearance. We can think of it as a sequence of colors. The sequence is created by combining two properties – the LOW END and the HIGH END.
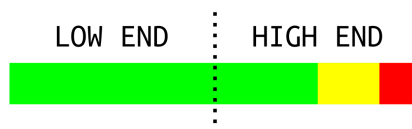
The following are color sequence options from the LOW END dropdown menu:

- Green

- Red-Green

- ▭▭ Yellow-Green

- ▭▭ Red-Yellow-Green

HIGH END has the same options, just mirrored. Combining both color sections gives you 16 possible color sequences.

Carburetor Bar element is a special case with only one color sequence option:

- ▭▭ Green-Yellow-Green

Color Sequences	Abbr.
Green	G
Red-Green	RG
Yellow-Green	YG
Red-Yellow-Green	RYG
Green-Yellow-Red	GYR
Green-Yellow	GY
Green-Red	GR
Green-Yellow-Green	GYG

Table 4: Color sequence abbreviations

4.2.3   Limits

[*Yellow Low, Yellow High, Green Low, Green High*]

- Value
- Box
- Arc
- Horizontal Bar
- Carburetor Bar
- Compact Bar
- Fuel Bar

Limits are values in function's units that tell us the boundaries of different color ranges. They do not change the graphics of the elements.[6] Limits influence behaviours of value indicators.

Generally, there are four color limits for each element (see Table 5). Rules for setting these values can depend on LOW END & HIGH END selections and/or element's type.

Some elements (e.g. Value and Box) do not have LOW END and HIGH END properties, and no visual color representations. They still have the option to set the limits as the latter influence alarm behaviour.

Color limits use units of the selected FUNCTION property. Unit changes can be made from the `Units Settings` section in the toolbar.

Limits are validated in relation to other properties. For more information on property validation, please refer to section 3.2.4

---

[6] Fuel Bar is an exception to this rule. See Figure 18 for more information.

Color Limits	Abbr.
Yellow Low	YL
Yellow High	YH
Green Low	GL
Green High	GH

Table 5: Color limits abbreviations

Limit Rules & Examples

Please note that for the following image examples, the left column illustrates color options for the Low End sequence and the right column for the High End sequence. Every image is a separate entity and the mirrored images do not necessarily have to be used in pairs. See tables 5 and 4 for the acronyms used in the following examples.

The lowest High End limit value should be greater than the highest Low End limit value.

Figure 13: RYG, GYR

For examples from Figure 13, set yellow and green limits for both ends. The values should abide by these rules: YL < GL and GH < YH.

Figure 14: YG, GY

For examples from Figure 14, set yellow and green limits for both ends. The values should abide by these rules: YL < GL and GH < YH.
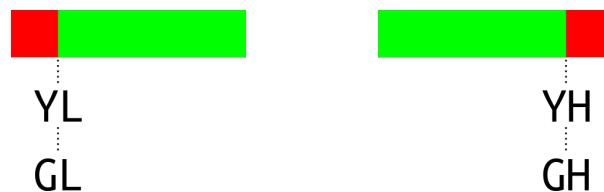
Figure 15: RG, GR

For examples from Figure 15, there is no yellow area so set both yellow and green limits as the same value. YL = GL and YH = GH.

Figure 16: G

For examples from Figure 16, the yellow limit values are ignored. Set green limits GL, GH.

Carburetor Bar

Figure 17: GYG

Example from Figure 17 is Carburetor Bar's special case. Values should be set as follows: GL < YL < YH < GH.
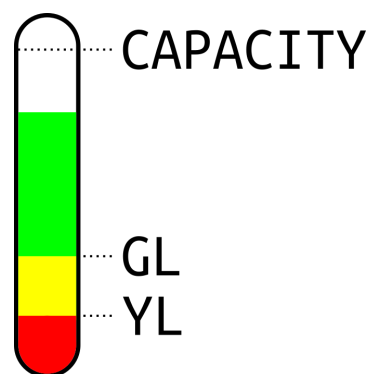
Fuel Bar

Figure 18: Fuel Bar limits

As illustrated in Figure 18, set limit values as YL ≤ GL < CAPACITY. Fuel Bar's color ratios change with limit changes. For red and green combination only, set YL = GL.

4.2.4   Test Value

TEST VALUE simulates the element's behaviour on the Digi display for the given value.

TEST VALUE uses units of the selected FUNCTION property. Unit changes can be made from the `Units Settings` section in the toolbar.

Test Value and Indicators

Elements such as Arc, Horizontal Bar, Compact Bar, Carburetor Bar and Fuel Bar graphically indicate the value's position as an interpolation of the value relative to the limit and color properties of the element.

Some basic element's indicators are:

- Arc - needle

- Bars, Sliders - rectangle indicator

- Fuel Bar - triangle indicator

Test Value and Color Ranges

Range	In general	Carburetor Bar
Red	$\mathbf{V} < $ YL or YH $ < \mathbf{V}$	/
Yellow	YL $ < \mathbf{V} < $ GL or GH $ < \mathbf{V} < $ YH	YL $ < \mathbf{V} < $ YH
Green	GL $ < \mathbf{V} < $ GH	$\mathbf{V} < $ YL or YH $ < \mathbf{V}$

Table 6: Range rules

Values can enter different color ranges: red, yellow or green. The element's color range sequence depends on their Low End and High End properties. For elements that do not have these properties, assume the basic RYG-GYR color distribution.

Value is said to have entered a range when it abides by the rules for that range. See general rules in Table 6. Read 'V' as (Test) Value.

Test Value and Alarms

Depending on the Alarm properties of the element, the value entering a certain range may trigger a warning. Read more in section 4.2.5.

4.2.5 Alarms

[*Alarm Low, Alarm High*]

- Value
- Box
- Arc
- Horizontal Bar
- Carburetor Bar
- Compact Bar
- Fuel Bar

Alarms are visual warnings that flash on screen when function values fall outside the green range.

Alarm Low handles alarm behaviour for values lesser than **GL** (Green Low) limit and Alarm High handles alarm behaviur for values greater than **GH** (Green High) limit. In other words they handle values entering yellow or red ranges for Low End and High End respectively.

There are three alarm options:

- **None** Alarm is disabled

- **Warning** Alarm is enabled

- **Active Engine Warning** Alarm is enabled only when the engine is active

If an alarm is disabled, no visual warnings will be displayed for values outside the green range on its respective End.

When an alarm is enabled (it is not *None*) then one of the following might be shown, depending on the range the value is in.

LOW Alarm Low enabled with value in the low end red range.[7]

HIGH Alarm High enabled with value in the high end red range.

90°C Values in yellow ranges of enabled alarms are colored yellow.

Alarm warnings are only displayed on Digi for the actual function values. Warnings are not shown in Customizer with Test Values.

4.2.6   Text Alignment

[*Alignment*]

     ○ Value   ○ Throttle Value   ○ Time

The width of the Value element depends on the width of its digits.

As the numeric value changes, the width of the element changes as well. If aligned incorrectly, a wider element can end up positioned partly off the screen. Using the Alignment property, you can avoid out-of-bounds problems.

Alignment works like an anchor. You can also think of it as a boundary that will not be crossed when the value gets resized.

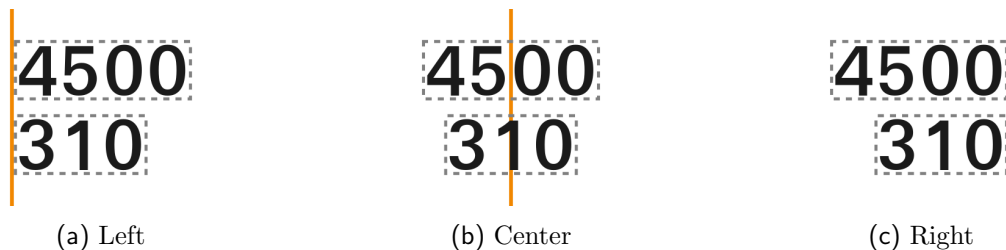(a) Left   (b) Center   (c) Right

Figure 19: Value alignments. Orange line represents the alignment anchor.

As illustrated in Figure 19, there are three alignment options:

- Left,

- Center and

- Right.

Observe the position changes of the Value element when resized from 4 digits to 3.

a) For left alignment, the *left border* is the anchor. Widening or narrowing happens on the right end.

b) For center alignment, the *horizontal center* of the element is the anchor. The resizing happends on both ends of the element.

c) For right alignment, the *right border* is the anchor. Widening or narrowing happens on the left end.

---

[7] Fuel Bar displays `LOW` warning from both red and yellow ranges (if enabled).

Example

In the following example, I will show you how to use text alignment on a Standard Indu Round Indicator.

Figure 20: Starting layout

Step 1 (Figure 20): First, I added some elements to the screen. In this case, I decided to have the Value element positioned to the right edge. The current value is `90 km/h` and the default text alignment is *Left*.

When the value changes, I do not want the element to either move off screen or to move away from the edge. To achieve that, I need to set the correct Alignment option.

Step 2 (Figure 21): I changed the Test Value to `100 km/h`, to see the behavior of the *Left* alignment.

The element got wider. Because the left border is the anchor, the right end widened. It is now hanging off of the screen. This is clearly not the way I want my display to look like.
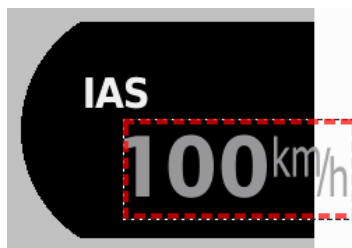

Figure 21: Incorrect alignment after value change

I go back to beginning and set the value to `90 km/h`. The display is the same as in the starting layout (Figure 20).

Figure 22: Correct alignment after value change

Step 3 (Figure 22): Let's see the behaviour, if I change the alignment to *Right*, then set the value to `100 km/h` again.

The position is correctly displayed. The element is still perfectly aligned to the right edge of the screen.

5 Indu

Our Indu Round Indicators come in two sizes: 57 mm and 80 mm. Because Indu 80 mm *Altimeter* has a unique mask shape, we have split model option into three categories:

1. **57** which contains every 57 mm Indu Round Indicator (including 57 mm Altimeter),

2. **Altimeter 80** which contains the 80 mm Altimeter and

3. **80** which contains all the other 80 mm Indu Round Indicators.
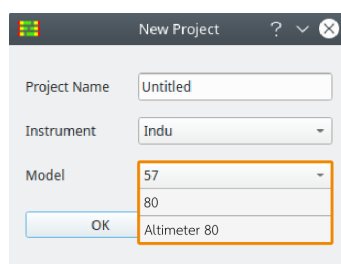
All of these categories have the same set of elements with the same set of properties. They differ in screen sizes and scales. The list of elements is a subset of Digi I's list. For more information on element functionalities please refer to Section 4.

5.1 Elements

Table 7 illustrates Indu elements, each with a short description. Images are not in scale. Element properties are described in more detail in Section 4.1.

Image	Name	Description
Label	**Label**	A short text.
110L	**Value**	Function value with a unit.
35:20	**Time**	Time values display.
55 %	**Throttle Value**	Value displaying Throttle Position.

Table 7: Indu elements

Value

Value element's behaviour and properties are described in Digi section of this document.

A `Fill with scale data` button is shown for Indu instruments' Value element. Pressing the button will map from Scale's properties to Value's function and limits. This option is useful for unifying the instrument's main function displays.

5.2   Scales

Customizer offers you the option to design a physical scale that will be printed and installed into your instrument during the manufacturing process.

If you wish to create your own Indu scale, you can do so from Customizer, then attach the Customizer file when placing your order with Kanardia. All scales will be carefully examined by our team before being sent to print.

If you do not wish to create your own scale or are only using Customizer to edit the instrument's screen, you can ignore the scale and uncheck the *Enable scale editing* option.

The following Indu instruments offer the option of a customizable scale:

- Indu Airspeed Indicator

- Indu Combo Indicator

- Indu Tachometer

The scale's size and shape depend on the Indu model selection. Other scale properties are customizable from the `Properties` tab.
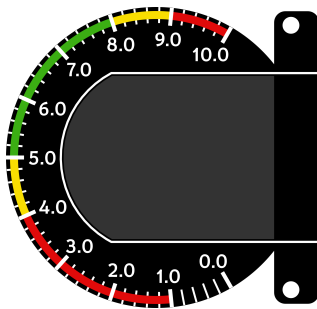

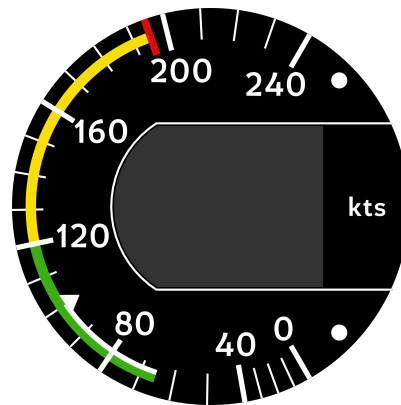Figure 23: Indu 57 generic RPM scale

Figure 24: Indu 80 generic IAS scale

5.2.1   Properties

Properties define the scale's appearance. You can modify its range, color sequence, labels, dash count ... Click on the scale to access its properties. They are shown in the `Properties` tab.

Needle

Needle sets the scale's type. Different needles have different properties and different drawing algorithms. Read more about each needle's properties in the following sections.

`Load defaults for selection` button resets scale properties to their defaultstate. The default state is a generic scale for the selected Needle.

Scale

In the scale properties section you can edit the scale's main properties: major and minor dashes arrangement, label values and formatting.
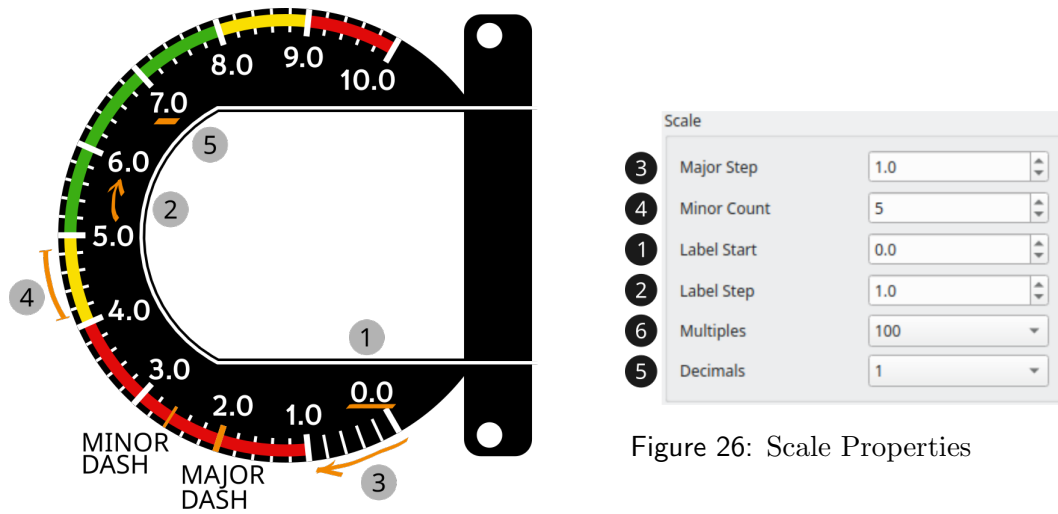

Figure 25: Indu Scale Properties Illustration

Figure 26: Scale Properties

① LABEL START Specifies the value of the first label on the scale.

② LABEL STEP Difference (step) between subsequent labels.

③ MAJOR STEP Sets the step of major dashes. Major dashes are thick and long dashes.

④ MINOR COUNT Specifies the number of partitions in between two subsequent major dashes. Minor dashes are thinner and shorter than major dashes.

⑤ DECIMALS Number of decimals displayed on the value labels.

⑥ MULTIPLES Describes the values set in *Scale Colors* section as multiples of the label values. Read more in section *Multiples*.

Multiples

Observe figures 26, 27 and 28. They illustrate a nice example of the MULTIPLES value usage.

The scale is limited with values START = 100 (lower limit) and RED = 1000 (upper limit). In the aforementioned figures, we wanted LABEL values to be in the 1-10 range and COLOR values in the 100s range. We achieved that by setting the MULTIPLES value to 100. This tells the scale that the label to color value ratio is 1:100.

If we wanted the LABEL values to display scale value exactly as it is (in the 100s range), we would change the LABEL STEP and MAJOR STEP to 100 and MULTIPLES to 1. This would give us label to color value ratio 1:1.

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Scale Colors

Scale Colors properties set the color sequence of the scale and define its range and limits.

Values set in this section should be multiples of the MULTIPLES value set in section `Scale`.

List of editable properties may vary depending on the selected NEEDLE function. Read more about different properties and their functions below.

- **Generic & Engine RPM**

  ① START Specifies the starting value of the colored arc.

  ② RED The end value of the lower red range.

  ③ YELLOW The end value of the lower yellow range.

  ④ GREEN The end value of the green range.

  ⑤ YELLOW The end value of the higher yellow range.

  ⑥ RED The end value of the higher red range.
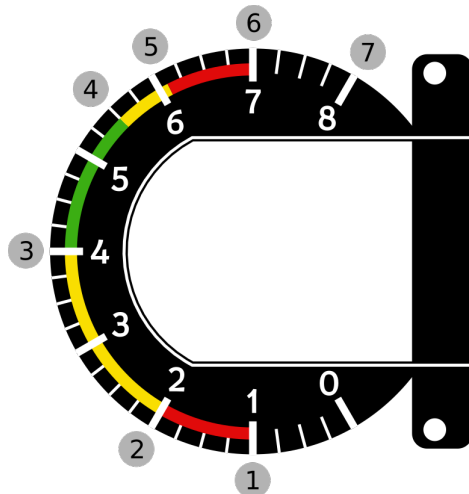
  ⑦ END The last value of the scale.

Figure 27: Generic Scale Properties Illustration

Figure 28: Generic   Scale
          Color Properties

  By clicking on the color button you can toggle between adding and removing that color to/from the scale.

  All values should be in ascending order.

- **IAS**

  ① START Specifies the starting value of the colored arc.

  ② YELLOW End value of the lower yellow range.

  ③ GREEN End value of the green range.

  ④ VNE TICK Value of the red tick, or equally end of the higher yellow range.

  ⑤ END End value of the scale.

  ⑥ WHITE START Starting value of the white range.

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⑦ WHITE END End value of the white range.

By clicking on the color button you can toggle between adding and removing that color to/from the scale. Figures 29 and 30 illustrate an example with the lower yellow range disabled.

Values from START to END should be in ascending order.

Set both WHITE START and WHITE END to zero to remove the white range.
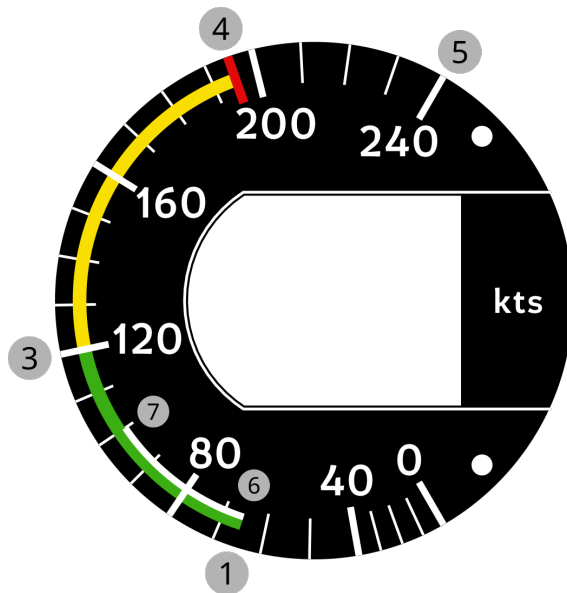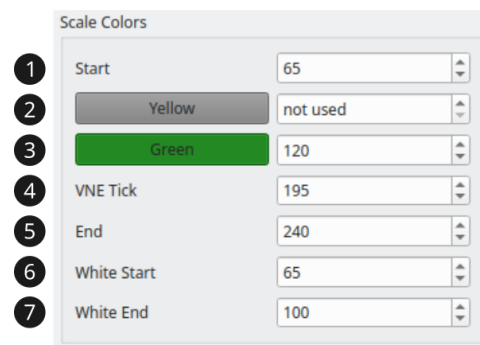

Figure 29: Indu IAS Scale Properties Illustration

Figure 30: IAS Scale Color Properties

Scale Markers

Scale Markers properties are available for *IAS* NEEDLE only.

- **Vy** A yellow dash marker.

- **Va** A cyan dash marker.

- **Vref** A yellow triangle marker.

- **Vfe** A white triangle marker.

VFE is shown at the end of the white range (if white range exists and VFE is checked). Other markers' values are editable and will be displayed on the scale according to their inputs.

6   Updating the Instrument

When you finish customizing your screen layout, it's time to update your instrument. This section describes how to do so.

What you'll need:

- *KANJA* Android application,

- *BLU*,

- Kanardia instrument[1],

- a USB cable (optional)

Figure 31 illustrates the three steps needed to update the instrument's screen. Detailed instructions follow bellow.
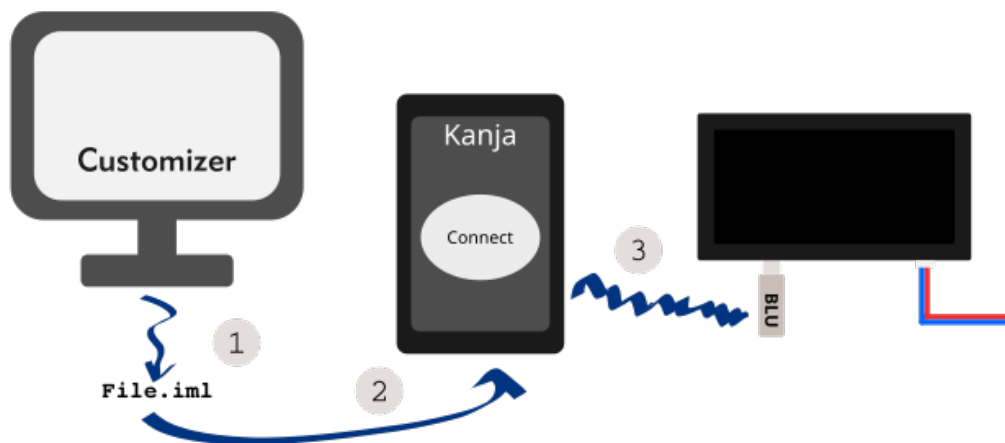

Figure 31: Data transfer steps

If this is your first time using Kanja, please refer to our Blu & Kanja User Manual for installation instructions and user guide. You can find the manual on our website `www.kanardia.eu` under `Digi->Manuals` or under `Support->Manuals`.

In the next steps we assume you have Kanja downloaded on your Android device and that it is updated to the latest version. Also, that your Kanardia instrument is powered on and has a BLU inserted into one of the ports.

1. Save your project. A `*.iml` file is created with all your data. We will be using `YourFileName.iml` as an example.

2. Transfer the `YourFileName.iml` file to your Android. A few options on how to do so:

   - **e-mail**   On your computer, write a new email with `YourFileName.iml` as an attachment. Send it to the email you are using on the Android device (it can be the same one you are using on your computer) or just save the email as a draft to access it later. On the Android device open the email and download the `YourFileName.iml` attachment. In most cases the file will be saved in the Downloads folder on your device.

- **cloud-sharing** Open your preferred cloud service (Google Drive, DropBox, iCloud, ...) with a browser or an application. Upload `YourFileName.iml` to it. Open that same cloud service on your Android device and download the file. In most cases the file will be saved in the Downloads folder on your device.

- **USB cable** Connect your Android device to your computer with the USB cable for file transfer. When prompted, open the folder containing your Android device files. Copy `YourFileName.iml` from the a directory on your computer to a directory on your Android. The fastest option is to find the Downloads directory on your device and copy the file there.

3. (a) Open Kanja and connect it to your Kanardia instrument that supports Customizer files.[1] Refer to the Blu & Kanja User Manual for help.

   (b) Under `Units` select the instrument.
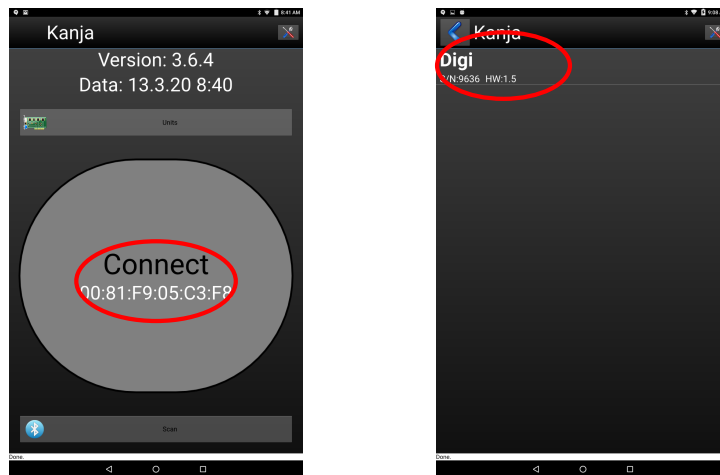
   (c) From the menu, open `Screen Custom`. Listed are the files saved in the Downloads folder on your device.

   (d) Select the file you wish to transfer to your instrument.
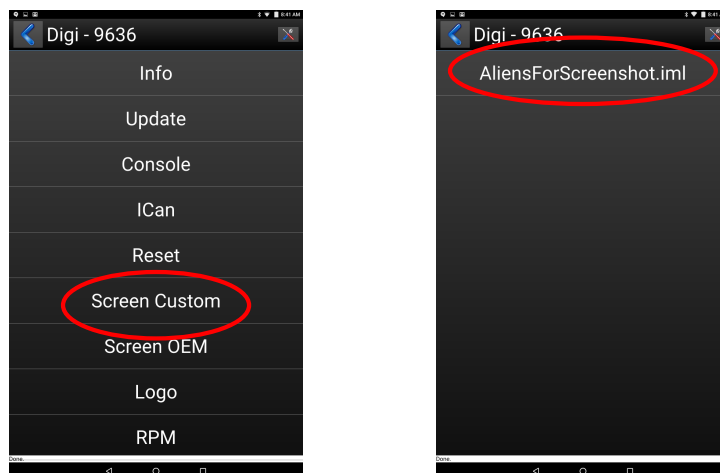
Finally, your instrument's screen should display the new layout you created using Customizer.

7   Tutorial

This section describes a step-by-step tutorial on how to use Customizer to create a new screen layout for Digi. A similar process is used for all Customizer supported instruments.

7.1   Starting Point

Let's say we have a Digi instrument and we want it to display Engine RPM information for our aircraft with a Rotax 915 iS engine. We will use Customizer to create and customize a layout displaying Engine RPM, then we will tranfer that layout to our Digi.

Start by running Customizer from your computer.

7.2   Creating a New Project

Select `New` from the toolbar to start a new project. This will open a dialog window prompting you to select the Kanardia instument for which you wish to create a screen layout and to input a name for your project. After confirming your choices the program will create a blank project configured for the selected instrument.

Application Layout

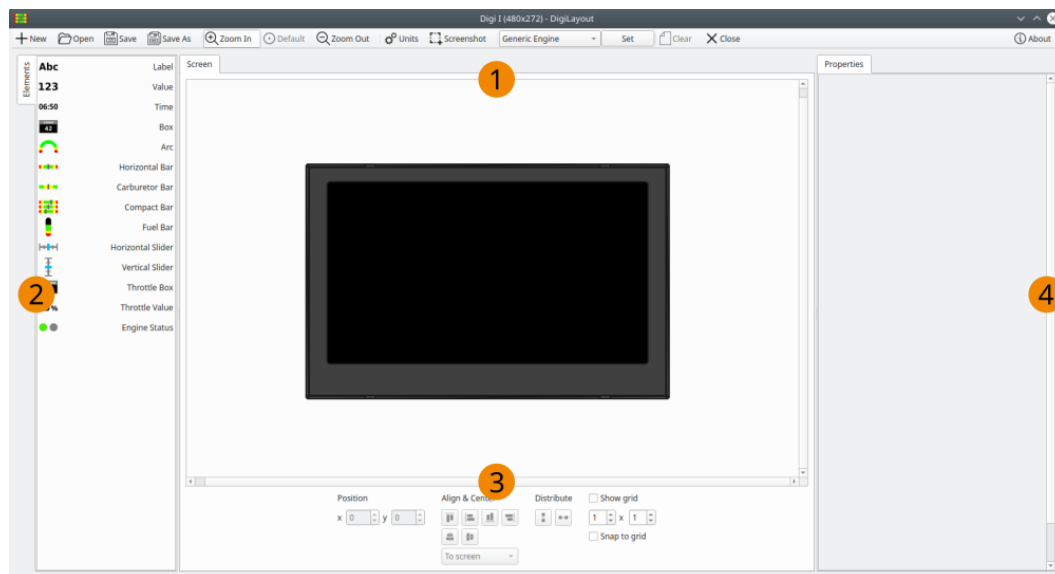Before we continue, let's get familiar with the application layout.

Figure 32: Application Layout

① At the center of your screen is the `Design area`. You can find a simulation of your instrument at its center. The black background serves as the base for your layout.

② On the left hand side you will see the `Element list` - a list of graphic elements. The elements are a graphic representation of function values. For example, to display the Engine RPM value, we would typically use the 'Arc' element.

③ At the bottom of the window you can find some `Tools` that are useful for precise element positioning.

④ On the right you will find the section where you will later edit and configure element `Properties`.

7.3   Editing the Screen Layout

Let's create a simple one-element Digi layout.

Figure 33: New Element on the Screen

Start by finding the 'Arc' element on the `Element list` and drag it to the center of the screen. You have added the first element that will be displayed on your Digi.

7.3.1   Editing Element Properties

Figure 34: Default Arc Properties

Now, let's configure the element's function and other properties so that it will work as we want it to. First make sure your Arc is selected - a dashed border will appear around it. Mouse-press on the element to select it, or mouse-press outside the element (on any empty space in `Design area`) to deselect it.

When one or more items of the same type are selected the `Properties` tab will be filled with a form for element configuration.

As you can see in the `Properties` tab (Figure 34), there are some arbitrary values set for all the available fields already. We will modify them to configure Arc to work and display values as we want it to.

Now, let's customize our Arc. First, we will set the most important value, which is the element's **function**. In the `Properties` tab, find the `Function` drop-down and select *Engine RPM* from it.

You can see the changes we made in Figure 35.

Now we have to configure other properties, mainly alarms and color limits. You can do this manually (by editing each property yourself) and/or by using the predefined values for your engine. We will do both:
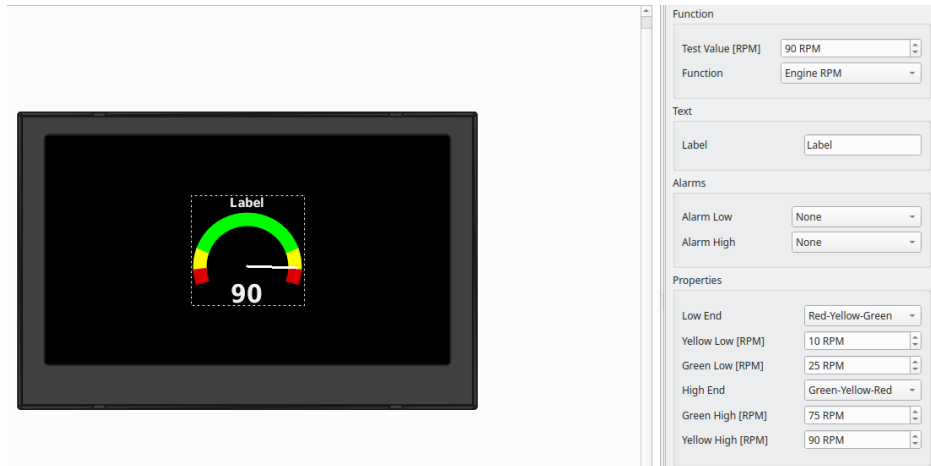

Figure 35: Application state after FUNCTION change.

1. Loading the predefined values

   First, let's set the engine for your aircraft. In the toolbar, there is an engine dropdown menu. Select the engine you are using, if it exists, or set it to 'Generic Engine' if no other option is fitting. For this example we are using *Rotax 915iS*.

   After selecting the engine and making sure Arc element is selected, press the `Load defaults for selection` at the bottom of the `Properties` tab. This will fill the properties with predefined values for the selected engine type. (If there are no predefined values available, nothing will change.) Observe the new properties and arc colors.
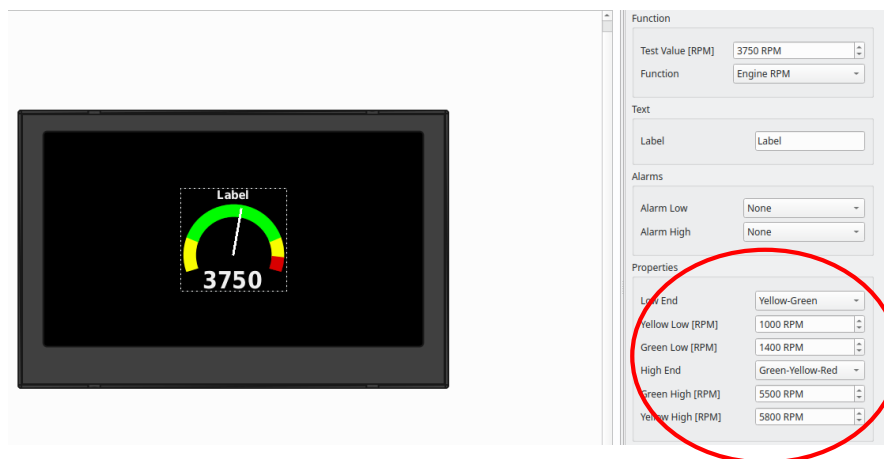

Figure 36: Application state after importing predefined values.

Low and High End properties configure arc colors. Yellow Low, Yellow High, Green Low and Green High properties configure color band limits. All of the aforementioned properties are explained in detail in Section 4.2.

Of course, you do not need to use the predefined settings, but this option can be useful as a starting point.

2. Manually editing properties

   Some of the properties may not have a predefined value (e.g. Label) or we may not wish to use the predefined value. We will edit these properties manually.

   In the `Label` text field we will input "RPM".

   Next, we will set the alarms. Let's say we want to display a warning when the engine RPM reaches the red zone. So let's set the `Alarm High` value to *Active Engine Warning*. This will display the warning only when the RPM values are in the red zone and the engine is active. On the other hand, we do not wish to display a warning for the low end RPM values, so let's leave `Alarm Low` as it is - *None*.

   See section 4.2.5 to read more about alarms.

The only Arc property we have not edited is `Test Value`. This property holds the mock value for the current element function. It is a placeholder for the real-time values Digi will display when connected to the aircraft engine via Daqu. This means that no matter the value you set, it will not actually influence Digi's behaviour. You can play around with the `Test Value` - observe the Arc's needle.
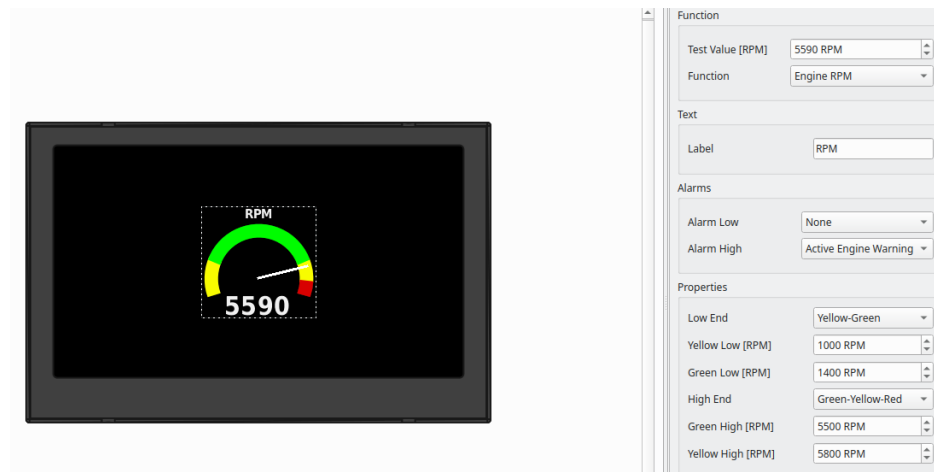

Figure 37: Application state after finishing editing element's properties.

We have finished editing our first element's properties.

7.3.2 Positioning the Element

There are several ways to set the element's position. Read more in paragraph about positioning from section 3.2.2.

Try dragging our Arc element around the `Design area`. Notice that when you move it outside the Digi screen simulation, it's border changes color to red (Figure 38). This signifies that the element's current position is invalid and it will not be displayed on Digi.

Because this Arc will be the only element in our tutorial layout, let's place it at the vertical and horizontal center of the Digi screen.
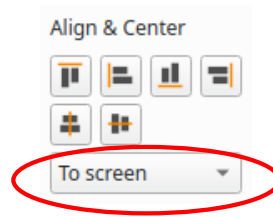
Make sure the element is selected. In the `Tools` section's second column labeled *Align & Center* find the dropdown menu and set the selection to *To screen*. This option ensures that when we use the *Align & Center* actions, they will move the selected element relative to the Digi screen's geometry (coordinates & size).

We can center the element in two steps:

- Center the element to screen's vertical axis by pressing the *Center Vertical* button. Observe the change from Figure 38 to Figure 39.
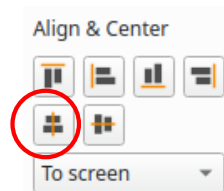
- Center it to screen's horizontal axis by pressing the *Center Horizontal* button. Observe the change from Figure 39 to Figure 40.
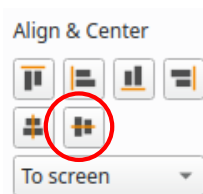
Figures 38, 39 and 40 illustrate the transition from element placed outside the screen to element placed at the vertical and horizontal centers.
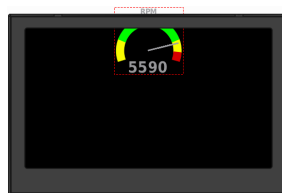

Figure 38: Invalid position

Figure 39: Vertical center

Figure 40: Center

Our simple Digi layout is finished.

7.4   Saving the Project

Click the `Save` button from the Toolbar. A dialog will open. Select a name for the file (we will use DigiLayout.iml) and location on yor computer, where you wish to save it. In this example we will save it on the Desktop for the ease of use. The next step is to transfer the file to Kanja.

7.5   Updating Digi with the New Layout

Updating Digi works via bluetooth connection. For that we will need a BLU plug and Kanja application (Android). If this is your first time connecting Kanja to Digi please refer to our *BLU and Kanja manual*.

Kanja is responsible for updating the Digi layout. In order for Kanja to update Digi with our custom layout we have to transfer our project file (DigiLayout.iml) to the device on which Kanja is installed.

7.5.1   Transfer the File to Kanja

There are several ways to transfer the file to Kanja. We will do it over a cable connection. For other options see Section 6, step 2.

In our case we have Kanja installed on a cellphone. Take the phone's charging cable which can also serve as a file transfer cable and insert the correct end into the charging port on the phone. The other end has a USB plug which we insert into a USB port on the computer with the saved DigiLayout.iml file.

On the computer, open the file explorer and navigate to the Desktop directory. Right-click the DigiLayout.iml file and select copy. Then, continue in the file explorer by navigating to the connected phone's directory. Inside that directory search for the Downloads folder. Paste the DigiLayout.iml file inside the Downloads directory.

The file is ready to be used by Kanja.

Please make sure to safely eject the device before removing the cable.

7.5.2   Update the Layout

For Kanja's download, installation and connection instructions please refer to our *BLU and Kanja manual*.

Before we begin, make sure Digi is powered on with BLU inserted. Open the Kanja application and connect to Digi via BLU (for connection instructions see BLU and Kanja manual). Under Units select your instrument (Digi). In the menu list select *Screen Custom*. Find the name of the file you created (DigiLayout.iml). Select it to update Digi's layout. See step 3 in Section 6 for more details.

You should notice the Digi screen layout get updated immediately.