

KIS.ME

Keep it simple. Manage everything.

KIS.MANAGER

User manual

Version 1.2, 09/2021

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1 General introduction

1.1 Use

The innovative KIS.ME system is designed for highly efficient control and monitoring of production and logistics sequences which

- ➔ could not be captured using previous technology
- ➔ were excluded from the automation system
- ➔ could not be optimized in automated sequences

This smart solution now makes previously isolated process sequences measurable and transparent. The system is also easy for you to

- ➔ integrate
- ➔ configure
- ➔ modify
- ➔ expand
- ➔ maintain

The KIS.ME system consist of a cloud-based web platform and devices which communicate with the platform. These are referred to as KIS.MANAGER and KIS.Devices.

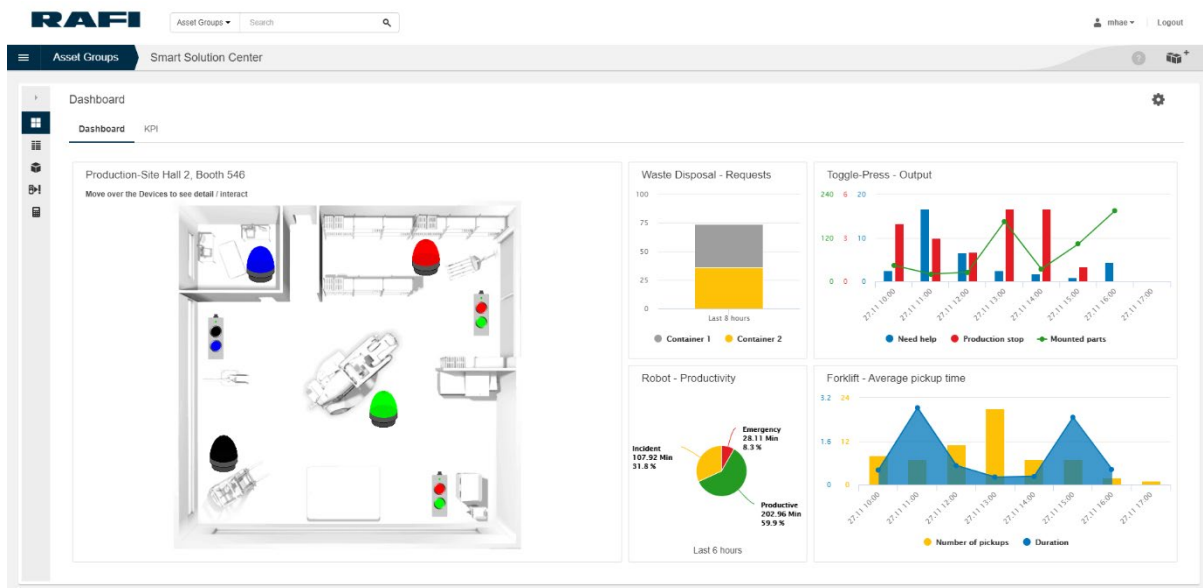


KIS.BOX: pushbutton box with 4 GPIOs



KIS.LIGHT: signal lamp with 4 GPIOs

KIS.MANAGER:

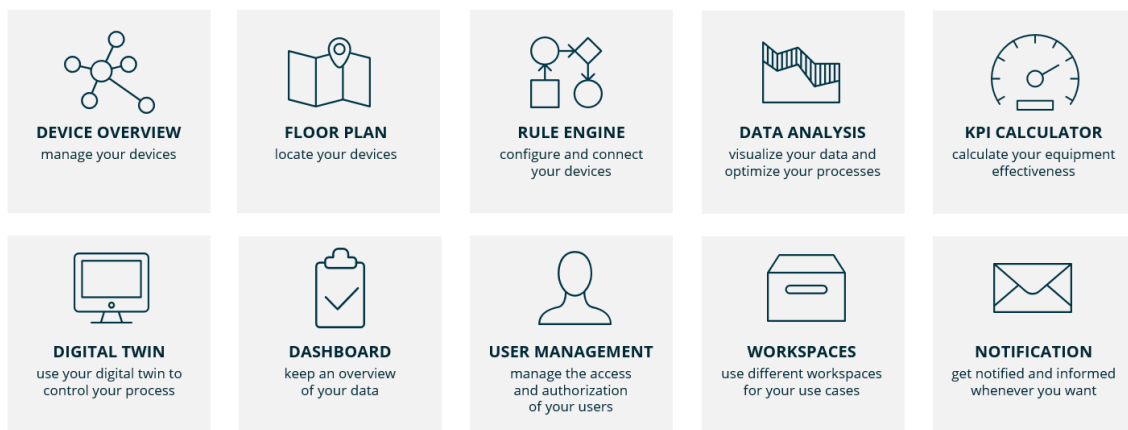


KIS.Devices have a WLAN interface and can be installed at remote locations in your plant. They communicate with KIS.MANAGER, which performs these functions:

- ➔ administration
- ➔ control
- ➔ logical linking
- ➔ monitoring
- ➔ evaluation

This means for example that you can simply and flexibly capture data from manual work processes which was previously not available, generally improve the information flow, or map, control and evaluate intralogistics processes.

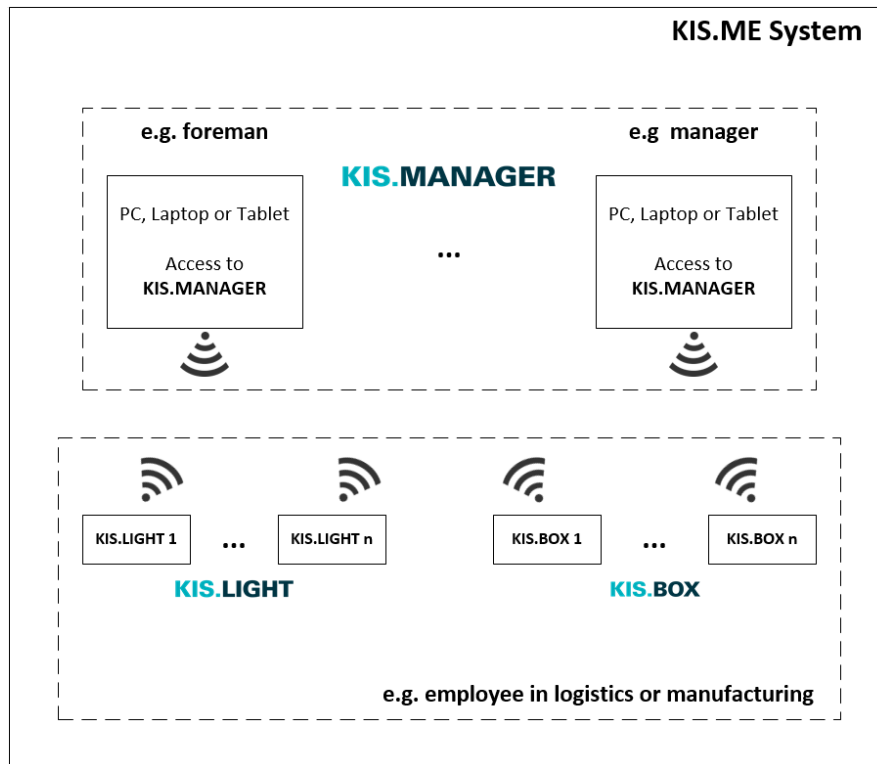
Functional overview of KIS.MANAGER:



1.2 Components of the KIS.ME system

The system concept is based on the following components:

- ➔ Web platform (KIS.MANAGER)
- ➔ Communication devices (KIS.Devices)



You use the web platform (KIS.MANAGER) to set up and monitor the functions of the KIS.Devices. The KIS.MANAGER has multi-user capability. This allows different applications to be configured separately by different people.

The devices (KIS.Devices) are installed in situ in the production shop/office/warehouse etc. They are used by the employees there, and carry out the functions configured via the KIS.MANAGER.

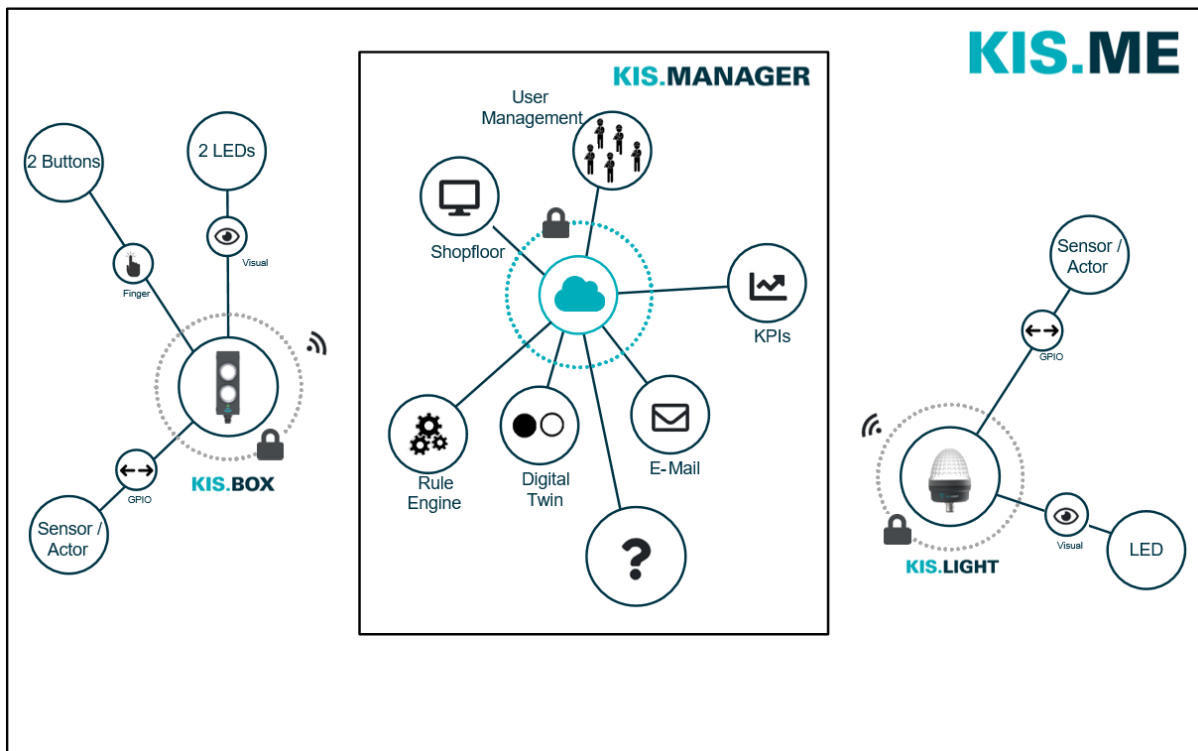
Operation of the system requires:

- PC, laptop or tablet for access to the web platform KIS.MANAGER
- KIS.BOX device unit(s) (the number depends on the system configuration)
- KIS.LIGHT device unit(s) (the number depends on the system configuration)
- WLAN infrastructure with WPA or WPA2 encryption at the location where the devices are used

1.3 Function description

Here is a brief overview of the functions of KIS.MANAGER

- ➔ User management: users can be created, managed and assigned rights
- ➔ Digital twin: every KIS.Device is replicated as a digital twin in the KIS.MANAGER dashboard. The digital twin can be used to control and monitor the physical device
- ➔ Floorplan: SVG graphics can be uploaded and digital twins placed on them. This allows a complete overview, e.g. of a production area
- ➔ Rule engine: functions of KIS.Devices are logically linked together in a digital control cabinet
- ➔ KPIs: every device condition can be utilized for the calculation of key figures. Clear presentation of KPIs on dashboards
- ➔ E-mail: when configurable events occur, a notification can be sent by e-mail



1.4 Scope of delivery

This manual explains how to use KIS.MANAGER. For operation, you need a PC, laptop or tablet. Since KIS.MANAGER is a web platform, you do not need any local software on data media or via downloads. Simply register to start using the system.

Register in KIS.MANAGER via:



<https://www.kisme.com>

1.5 Symbols used



Function-relevant note / information – compliance mandatory



Important note / important information



Tips for easier operation

1.6 Terminology

KIS.MANAGER	-	Web platform
KIS.BOX	-	Communication pushbutton box
KIS.LIGHT	-	Communication signal lamp
KIS.Device	-	General term for KIS.BOX, KIS.LIGHT, etc.
Asset	-	Synonym for KIS.Device (cloud language)
Asset group	-	Structural combination of assets (cloud language)
User	-	User of KIS.MANAGER
User group	-	Membership confers roles and rights
Onboarding	-	Connection of KIS.Devices to KIS.MANAGER
Digital twin	-	KIS.Device replicated in the KIS.MANAGER dashboard
Rule engine	-	Assignment of device interactions
Dashboard	-	Overview page for assets and asset groups
Widget	-	Dashboard application (e.g. KPI, floorplan ...)
Datapoints	-	Exchanged value between KIS.Device and KIS.MANAGER
KPI	-	Key Performance Indicator
Single-value chart	-	Diagram for presentation of a single value
Single-period chart	-	Bar chart for presenting multiple single values
Pie chart	-	Circular diagram for presenting multiple single values
Aggregated chart	-	Combined bar / line / area diagram
Single-value column	-	Bar chart with warning levels
Update OTA	-	Update over-the-air
Desired properties	-	Desired firmware status of KIS.Device
Reported properties	-	Current firmware status of KIS.Device
Floorplan	-	Widget for presenting a building plan for example

2 KIS.MANAGER registration and user management

2.1 First registration in KIS.MANAGER

Simply open the registration page for KIS.MANAGER online at:




<https://www.kisme.com/>

Create an account for your company here:

CREATE YOUR FREE COMPANY ACCOUNT

To do this, enter your company name. This is also your account name in KIS.MANAGER. Each account name can only be assigned once. By creating the company account, you are automatically the administrator of this company account. You can manage further users of your company independently in KIS.MANAGER.

 company name*

REGISTER

The details required include an e-mail address and the name of your company.

Once you have registered, you receive a confirmation e-mail to the address you stated with a request to enter a password.

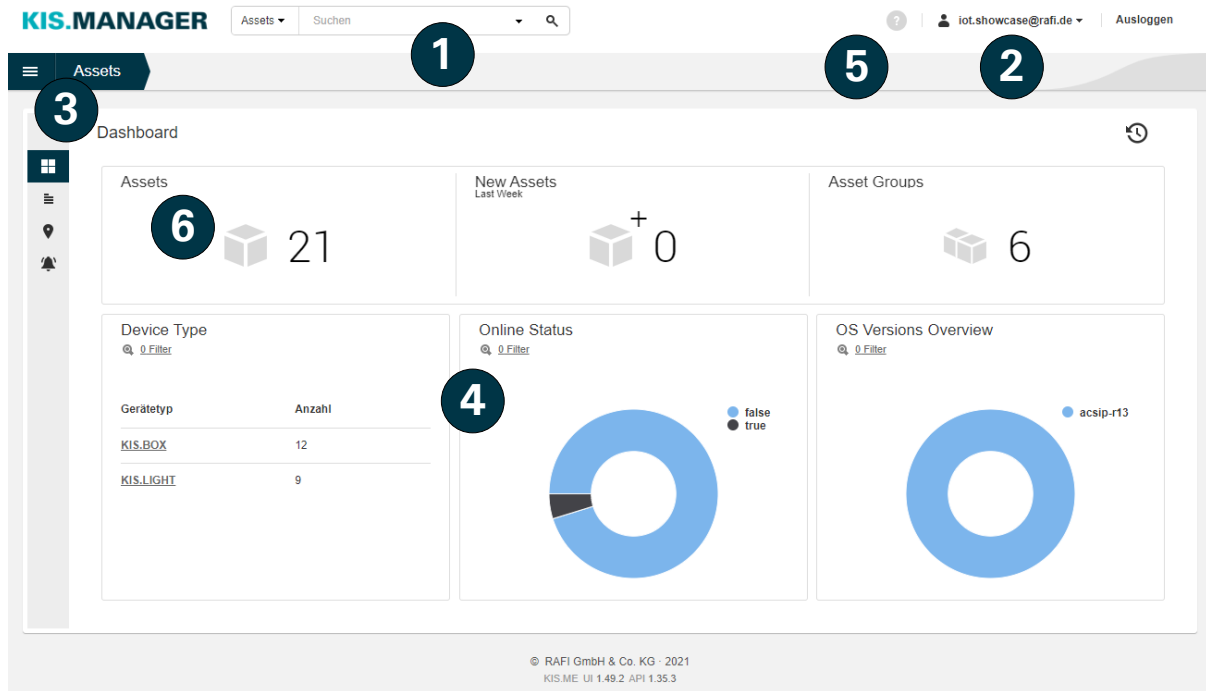
The user (your employee) must set up a personal user account and a company account in KIS.MANAGER. The user account is automatically assigned the “Admin” role (see Chapter 2.3).



No obligations for payment are incurred on initial registration. First, a time-limited trial account is set up. To use KIS.MANAGER long term, you need to contact RAFI.

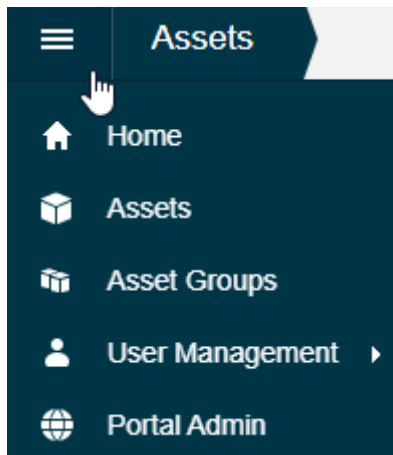
2.2 Basic structure of KIS.MANAGER

After successfully logging in to KIS.MANAGER, the user arrives at their set homepage – unless defined otherwise by the user, the homepage is a global dashboard with various general items of information.



- 1 Search field
- 2 Logged-in user
- 3 Main menu or navigation bar
- 4 Asset information (number, status, firmware versions, etc.)
- 5 Help center
- 6 Link to the overview of KIS.Devices

In KIS.MANAGER, a fundamental distinction is made between assets and asset groups. Using the navigation bar in KIS.MANAGER, it is possible to reach an overview of the assets or asset groups:




2.2.1 Definition of asset

In KIS.MANAGER, an asset is the general term for devices such as the KIS.BOX, KIS.LIGHT etc. After purchase and successful onboarding, the assets are connected with KIS.MANAGER and appear as a list entry (see screenshot). The “Connection” column shows whether the asset is currently connected via WLAN and internet to KIS.MANAGER.

Assets 9 Assets			
Asset Name	Connection	Asset Groups	Type
KIS.BOX Entsorgung	Online	KIS.ME Center	Gateway
KIS.BOX Hubwagen	Online	KIS.ME Center	Gateway
KIS.BOX Presse	Online	KIS.ME Center	Gateway
KIS.BOX Testplatz	Online	KIS.ME Center	Gateway
KIS.LIGHT Hubwagen	Online	KIS.ME Center	Gateway
KIS.LIGHT Meisterbüro	Online	KIS.ME Center	Gateway
KIS.LIGHT Roboter	Online	KIS.ME Center	Gateway
KIS.LIGHT Stapler	Online	KIS.ME Center	Gateway
KIS.LIGHT Testplatz	Online	KIS.ME Center	Gateway

2.2.2 Definition of asset group (workspace)

An asset group combines multiple assets into a structural and functional unit. If, in practice, for each application area of KIS.ME a separate asset group is selected, then it is ideal to use the KIS.MANAGER. An asset can belong to multiple asset groups.

The listing of the asset groups shown can be accessed via the menu bar .

Asset Groups 3 Asset Groups		
Asset Group ▲	Definition	Customer Name
KIS.ME Center	Workspace	RAFI Berg
Workspace 4	Workspace	RAFI Berg
Workspace 5	Workspace	RAFI Berg

« < Page 1 of 1 > » :

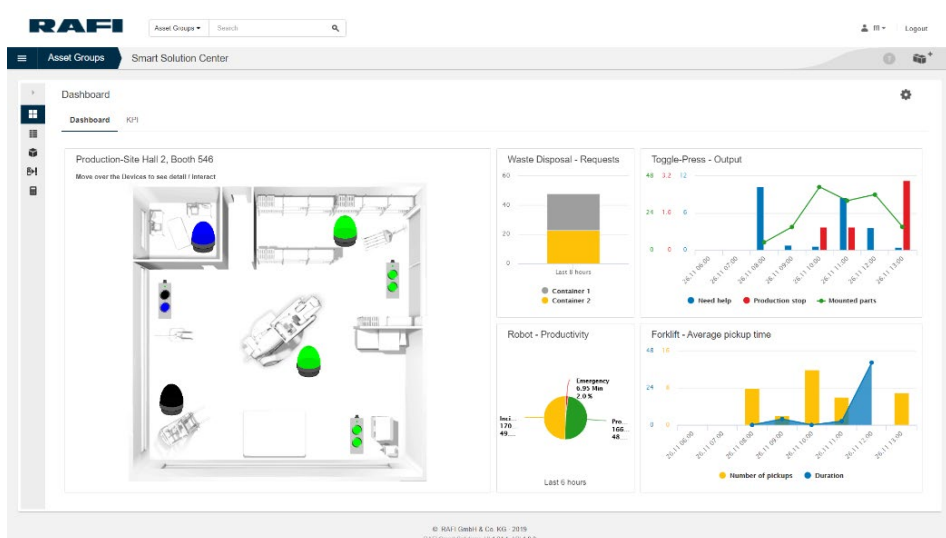
2.2.3 Definition of user groups

Membership of user groups defines the roles/rights of a user and determines which asset groups will be visible to them.

2.2.4 Definition of widget

Widgets are used on the dashboards of assets or asset groups. They are configurable applications, for example to show KPIs, digital twins or a floorplan. You can choose the size and position of widgets.

As shown in the example, you can insert multiple widgets into a dashboard to create the best possible overview.



2.3 Rights management

The user rights are configured in KIS.MANAGER via user groups. Membership of a user group assigns the role of the user and determines which asset groups (workspaces) will be visible to the user.

2.3.1 Roles

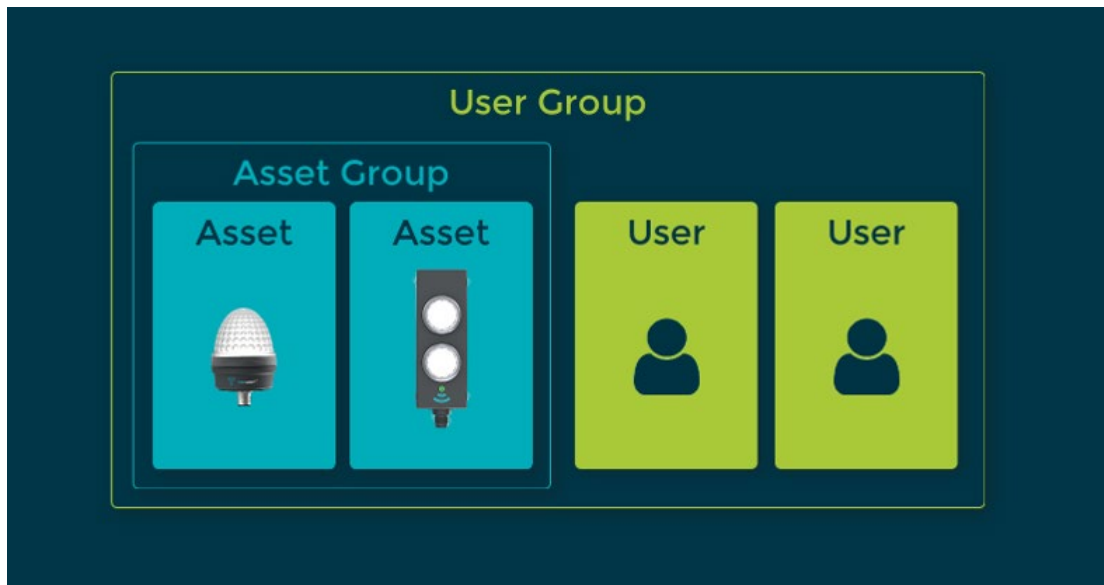
Role management distinguishes between four function-specific roles. Each role has certain rights assigned to it.

Role	Rights
Admin User with rights for system administration	<ul style="list-style-type: none"> • Create/administer/delete users • Create/administer assets • Create/administer/delete dashboards • View/administer/control digital twins • Create/administer/delete KPIs • Create/administer/delete e-mail templates • Create/administer/delete rules in the rule engine • Access to all asset groups
Installer Person who sets up an application	<ul style="list-style-type: none"> • Administer assets • Create/administer/delete dashboards • View/administer/control digital twins • Create/administer/delete KPIs • Create/administer/delete rules in the rule engine • Access to released asset groups
Operator User of an application	<ul style="list-style-type: none"> • View/control dashboards • View/control digital twins • View KPIs • View rules in the rule engine • Access to released asset groups
Observer Observer of the overall system	<ul style="list-style-type: none"> • View dashboards • View digital twins • View KPIs • View rules in the rule engine • Access to all asset groups

2.3.2 Relationship between user groups and asset groups

In addition to role management, membership of user groups determines which asset groups (workspaces) will be visible to a user.

- ➔ Each asset group belongs to a user group with the same name. When a user is added to this user group, the associated asset group becomes visible to them.



This allows the admin to assign the necessary asset groups to the users in a targeted manner. The admin can also withdraw the display of the asset groups again.

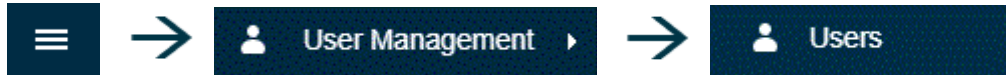
This viewing limitation extends to the assets. A user only sees assets which belong to an asset group for which they have viewing rights.

2.4 User management



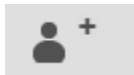
For managing users, the “Admin” role is required in KIS.MANAGER.

User management is accessed via the navigation bar



2.4.1 Creating new users

In user management, additional users from the company can be added so they can use KIS.MANAGER. To do this, select this icon:



1. First enter the e-mail address of the employee to be added. All other fields in the “Master data” tab can be left on the default values.
2. The rights and display authorizations of the new user are defined in the “User groups” tab.



Click on “Assign user groups” to open a window which shows the user groups which can be selected.

Create User

Master Data

User Groups

E-mail *

Locale *

en-US

Time Zone *

Europe/Berlin

Full Name

Initial state

Terms Acceptance Pending

Active

Last Login

-

* required

Save

Cancel

The user must be assigned to a user group

Benutzergruppen zuweisen

Filter

	Benutzergruppe	Kundenname	Beschreibung
<input type="checkbox"/>	Admin	User-Manual	A highly privileged user to manage the system (e.g. creating users, assigning devices to workspaces, etc.)
<input checked="" type="checkbox"/>	Installer	User-Manual	A user who is responsible for a certain group of devices or for a certain workspace (e.g. creation of dashboards and shop floors, creation of rules and KPIs, etc.)
<input type="checkbox"/>	Observer	User-Manual	A read-only user
<input type="checkbox"/>	Operator	User-Manual	A user with reduced rights capable of controlling only the digital twin within a particular workspace
<input checked="" type="checkbox"/>	Workspace 1	User-Manual	

Seite 1 von 2

2 Benutzergruppen zuweisen
Abbrechen

You can make multiple selections to set the role and the display authorizations of the new user (for an explanation of the roles, see 2.3.1)



Every user must be assigned exactly one of the following roles:

- ➔ Admin
- ➔ Installer
- ➔ Operator
- ➔ Observer

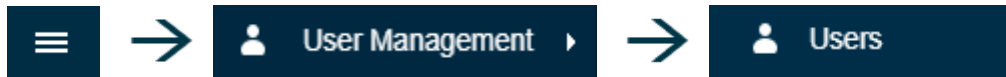


Each user can be authorized for one or more asset groups (workspaces)

Example shown: The user is assigned the “Installer” role and gains access to the “Workspace 1” asset group

3. Once the assignment of the user to the required user groups has been completed, the **Save** button is activated. Create the new user by clicking the button. They then receive an e-mail which invites them to create a personal password and to use the KIS.MANAGER.

2.4.2 Administration of existing users



A list of the existing users is shown in the display window.

If a user is selected in the list, a detail view is displayed:

Data Sheet

Masterdata

E-mail

kisme.showcase@rafi.de

Locale

en-US

Time Zone

Europe/Berlin

Full Name

kisme.showcase@rafi.de

State

Active

Last Login

-

User Groups

4

Filter


▼

🔍

User Group ▲	Description
Installer	A user who is responsible for a certain group of devices or for a certain workspace (e.g. creation of dashboards and shop floors, creation of rules and KPIs, etc.)
Workspace 1	Workspace 1
Workspace 2	Workspace 2
Workspace 3	Workspace 3

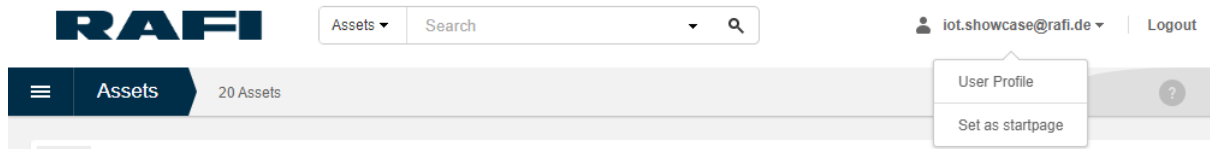
You can edit data by clicking on the  symbol.

Here the important aspect is the option for changing the role and display authorizations of the user groups → see Chapter 2.3


In edit mode, delete a user by clicking the  button.

2.4.3 Managing your own user account

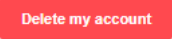
Every user can manage their own user account as follows:



Clicking the link opens an overview of your own user profile.

Click on the  symbol to change the following:

- E-mail address
- Password
- Language settings

Click on  to delete your own account.

2.5 WLAN access and onboarding of assets in KIS.MANAGER

Integrating assets in KIS.MANAGER is termed “onboarding”. During onboarding, the device is equipped with the necessary WLAN access data and also assigned to the account.



Onboarding KIS.DEVICES requires the “Admin” role. Onboarding can have an effect on contractual content (see framework contract).



Each KIS.Device is supplied with a quick-start guide. It provides detailed instructions for onboarding.

2.5.1 Prerequisites for onboarding

An employee requires the following for onboarding:

- KIS.Device
- M12-to-USB cable
- Computer/tablet with browser and USB port
- Company account and “Admin” role in KIS.MANAGER
- WLAN access details (WPA-PSK or WPA2-PSK)

Onboarding is done via the following website:



<https://www.kisme.com/de/#onboarding>

This opens the following screen:

HOW TO START WITH KIS.ME

CREATE A NEW ACCOUNT

Register to KIS.MANAGER and create a new company account. You can add new users within your account.

REGISTER

GENERATE WIFI ACCESS FILE

Create an onboarding file with your WiFi credentials to connect the KIS.DEVICES to your WiFi network. Just copy the file to your devices

ONBOARDING

LOGINTO KIS.MANAGER

Login with your created user account and start optimizing your processes.

LOGIN

2.5.2 Onboarding step-by-step

- 1** Connect KIS.Device with PC / tablet
 - ➔ Connect KIS.DEVICE with the PC via a M12-to-USB cable
 - ➔ The status LED runs through the following states:
 - RED - Booting
 - YELLOW - Offline
 - ➔ The KIS.Device is identified as a USB mass storage device on the PC / tablet and can be selected via the explorer
- 2** Authentication and input of WLAN access data
 - ➔ On the website <https://www.kisme.com>, select the “Onboarding” link
 - ➔ Input your personal login data
 - E-mail / password combination as per KIS.MANAGER
 - ➔ Enter SSID, password and encryption type for WLAN
 - ➔ Enter country code
 - ➔ Click on “Save” to generate the “onboarding.zip” file, which contains the encrypted WLAN access details
 - ➔ After saving, the file is located in the download directory of the computer
- 3** Place the “onboarding.zip” file on the KIS.Device
 - ➔ Copy the complete “onboarding.zip” file to the KIS.Device, which is shown in the explorer as a USB mass storage device
- 4** File processing
 - ➔ Once the file is placed on the KIS.Device, its status LED starts to flash YELLOW after a short waiting time – the file is being processed
 - ➔ As soon as the status LED returns to constant YELLOW, file processing is completed

5 Completion of onboarding

➔ If the WLAN network to be used is in range, onboarding is completed, running through the following LED status conditions

- YELLOW - Offline
- MAGENTA - WLAN connection created
- BLUE - Online
- GREEN - Successfully connected to KIS.MANAGER

➔ During the next login to KIS.MANAGER, the new asset is displayed in the asset overview and can be used.



Usually the KIS.Device carries out a firmware update a few minutes after going online for the first time → status LED flashes turquoise

While a firmware update is being carried out, do not disconnect the device from the power supply! Otherwise, the firmware may be damaged irreparably.

2.5.3 Changing WLAN access details on KIS.Devices

The WLAN access details on KIS.Devices can be modified at any time. To change the access details, proceed according to Chapter 2.5.2.

The difference is that the KIS.Device is already integrated into KIS.MANAGER. However, this does not change if the “onboarding.zip” file with different WLAN access details is written to the device.

2.5.4 Error handling

The status LED of the KIS.Devices allows connection diagnostics between the KIS.Device and KIS.MANAGER:

Condition of the status LED	Meaning
RED	Device is booting
YELLOW	Device is booted, no WiFi connection, or WiFi connection lost
MAGENTA	Device is connected with WiFi, but MQTT Port Check, Certificate Check or NTP Time-Sync Check errors occurred (see flashing states).
BLUE	Device is connected with WiFi, MQTT Port Check and Certificate Check were successful. However no connection to KIS.MANAGER, or connection to KIS.MANAGER lost
GREEN	Device is connected to KIS.MANAGER
Flashing TURQUOISE	Update in progress
Flashing in status MAGENTA with 2 Hz	MQTT Port Check failed Possible reasons: <ul style="list-style-type: none"> ➔ No internet connection ➔ Incorrect firewall configuration (outgoing port 8883 blocked)
Flashing in status MAGENTA with 1 Hz	NTP Time-Sync Check failed Possible reasons: <ul style="list-style-type: none"> ➔ No internet connection ➔ Incorrect firewall configuration (outgoing port 123 blocked)
Flashing in status MAGENTA with 0.5 Hz	Certificate Check failed

3 KIS.MANAGER – Basic functions

3.1 Asset: management and functions of KIS.Devices

The term asset is used to refer to a physical device. An asset for example is a KIS.BOX or a KIS.LIGHT which has completed the onboarding process.

Chapter goal: basic administration of an asset in KIS.MANAGER

Navigation:

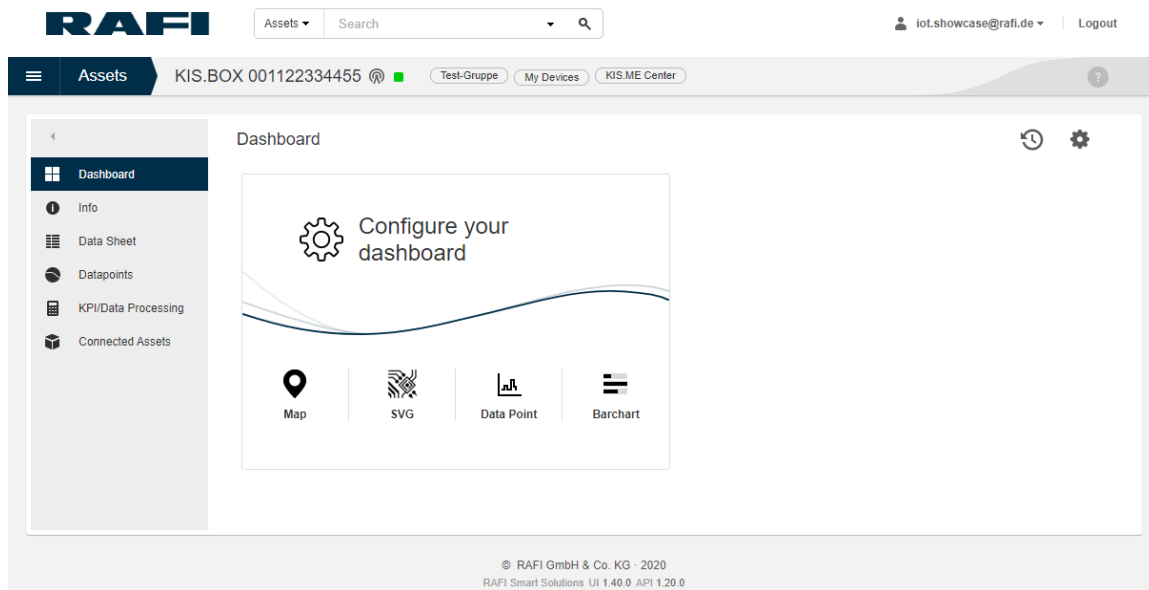


Select an asset from the asset overview:

Asset Name	Connection	Asset Groups	Type	URN	Last Update
KIS.BOX 001122334455	Online	KIS.ME Center	Gateway	urn:rafi:sbox:001f7db14660	06/26/2020 08:23:54 (+02:00)
KIS.BOX Entsorgung (A)	Online	KIS.ME Center	Gateway	urn:rafi:sbox:9c65f92ab1df	06/24/2020 00:11:55 (+02:00)
KIS.BOX Hubwagen (A)	Online	KIS.ME Center	Gateway	urn:rafi:sbox:9c65f92ab193	06/23/2020 18:22:45 (+02:00)
KIS.BOX Presse (A)	Offline	KIS.ME Center	Gateway	urn:rafi:sbox:9c65f92ab1cf	06/24/2020 13:26:46 (+02:00)
KIS.BOX Testplatz (A)	Online	KIS.ME Center	Gateway	urn:rafi:sbox:9c65f92ab1d3	06/25/2020 11:48:18 (+02:00)
KIS.LIGHT Hubwagen (A)	Online	KIS.ME Center	Gateway	urn:rafi:slight:9c65f92ab208	06/23/2020 21:55:46 (+02:00)
KIS.LIGHT Meisterbüro (A)	Online	KIS.ME Center	Gateway	urn:rafi:slight:9c65f92ab1ea	06/23/2020 15:45:34 (+02:00)
KIS.LIGHT Roboter (A)	Online	KIS.ME Center	Gateway	urn:rafi:slight:9c65f92ab1f4	06/25/2020 16:28:19 (+02:00)
KIS.LIGHT Stapler (A)	Online	KIS.ME Center	Gateway	urn:rafi:slight:9c65f92ab1f2	06/23/2020 21:48:52 (+02:00)
KIS.LIGHT Testplatz	Online	KIS.ME Center	Gateway	urn:rafi:slight:001f7db14511	06/26/2020 08:45:32 (+02:00)

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RAFI Smart Solutions UI 1.40.0 API 1.20.0

Once you have selected an asset, a menu bar appears on the left-hand edge of the screen. For every symbol, you can open a short description in a drop-down window.



3.1.1 Manage an asset – dashboard

Preconditions: “Admin” or “Installer” role



The purpose of the asset dashboard is to:

- ➔ Present the necessary information from a KIS.Device
- ➔ Visualize datapoint developments
- ➔ Use the digital twin
- ➔ Present KPIs

Small applications (widgets) are configured and integrated to do this.

3.1.1.1 Widgets



The following widgets are available on the asset dashboard for simple configuration:

Widget-Typ auswählen		
1 Digital Twin	2 Info	3 42 °C Datenpunkt/Prope... Letzter Wert
4 Datenpunkt Chart	5 Datenblatt	6 KPI 42° Kpi Single Value
6 Kpi Aggregated Chart	6 Kpi Single Value Column	6 Kpi Pie Chart
6 Kpi Single Period Chart		

1 Digital Twin

2 General asset information

3 Datapoint values

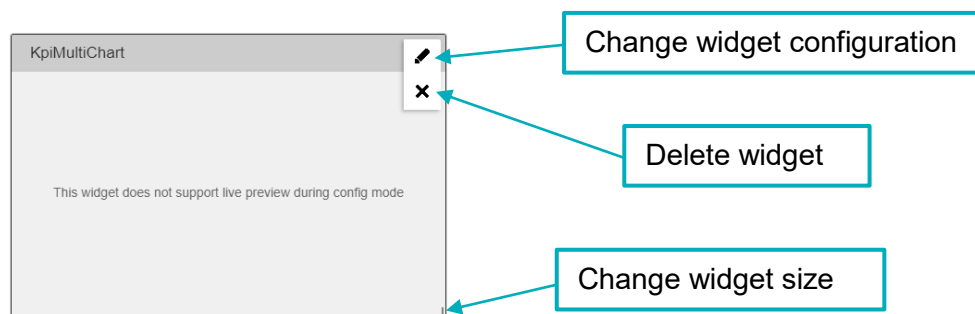
4 Datapoint profiles

5 General asset properties

6 Key figure diagrams

Where configuration options are available, the user is first directed to a configuration menu after selecting a widget. For details, see Chapter 4.

If there are no configuration options, the widget is placed directly on the dashboard where you can modify it:



Click on **Save** to save the changes in the dashboard.

3.1.1.2 Adjust dashboard presentation

To show the widgets in the best possible size, you can divide the dashboard into coarser or finer grids:



Use the drop-down field to select between 4 (coarse grid) to 8 (fine grid).

Number of Columns
 6
 Auto adjust layout
☒

Click on **Save** to save the changes in the dashboard.

3.1.1.3 Insert additional dashboard

You can create multiple dashboards for each KIS.Device:



Click on **Save** to save the changes in the dashboard.

3.1.1.4 Duplicate dashboard

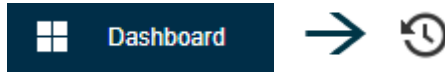
Dashboards can be duplicated. You can select whether it is inserted as an additional tab or transferred to another asset.



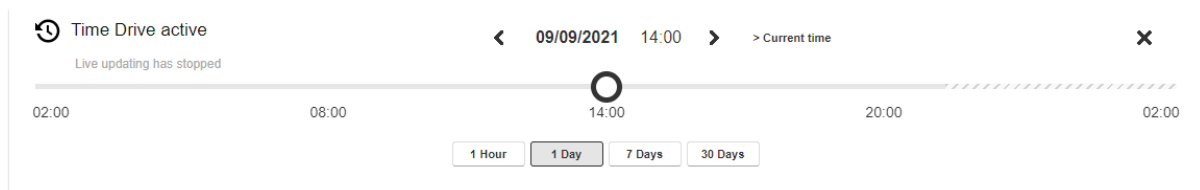
There are widgets (datapoint information, key figures, ...) which are different from asset to asset or from KIS.Device to KIS.Device. When duplicating, a message is output if the source does not match the target.

3.1.1.5 Using Time Drive

You can use the Time Drive function to view the status of a dashboard and its widgets at a previous point in time:



Use the time bar to select the desired point in time:

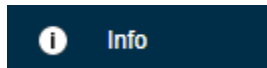


When you deactivate Time Drive again, the dashboard reverts back to live data.



Not all widgets support Time Drive. If this is the case, when activating the Time Drive function a message alerts the user.

3.1.2 Asset – information on hardware, software, network, certificate



The “Info” menu option provides useful information on the selected asset:

Device Information

Hardware	Network
Type	KIS.BOX
Part Number	504060192020001
Serial Number	A000R0000000
Data Matrix Code	000000000000
MAC	9C:65:F9:2A:B1:8F
Hardware Revision	0
WiFi SSID	RAFI_IOT
WiFi Signal Strength	-45 dBm
WiFi Channel	11 (2462 MHz)
IP Address	10.113.17.53
Subnet	255.255.255.0
Gateway	10.113.17.1

Software	Firmware Update
OS Version	acsip-r9
Application Version	r29
uC Firmware Version	1.3
Bootloader Version	U-Boot 1.1.3 for AI7688H-64MB (Feb 16 2017 - 08:19:34)
OpenSSL Version	OpenSSL 1.1.1g 21 Apr 2020
Desired Properties	
Job Id	cbc37534-00eb-4677-a83b-b8dba32ebcf8
Reported Properties	
Job Id	cbc37534-00eb-4677-a83b-b8dba32ebcf8
Bundle Id	48ed84b3-4366-4c73-80bc-50a820de8db5
Bundle Version Id	9033e47c-0114-4ebe-8076-2d5c301fa23e
Update Status	SUCCESS
Sequence Number	1604415624312

Certificate
Certificate expires at
Jun 30 08:38:06 2024 GMT

Among others details, the signal strength value of the WiFi connection is shown in KIS.MANAGER. This value allows you to assess whether the signal strength at the device location permits stable operation.

The table contains standardized signal level values:

Signal	-30 dBm	-50 dBm	-60 dBm	-70 dBm	-80 dBm
Quality	Excellent	Very good	Good	Adequate	Inadequate

3.1.3 Asset – changing the description

Preconditions: “Admin” or “Installer” role



In the “Data Sheet” menu option, you can change the name of an asset, among other things.

3.1.3.1 Changing an asset name



In the “Master Data” tab, under “Asset Name”, you can change the name of the KIS.Device as required. This change has no functional effects, and is permanent.

Save your changes with .

3.1.3.2 Changing assignment to asset groups (workspaces)



The Asset Groups tab shows which asset groups the KIS.Device belongs to. You can assign additional asset groups or remove devices from asset groups.



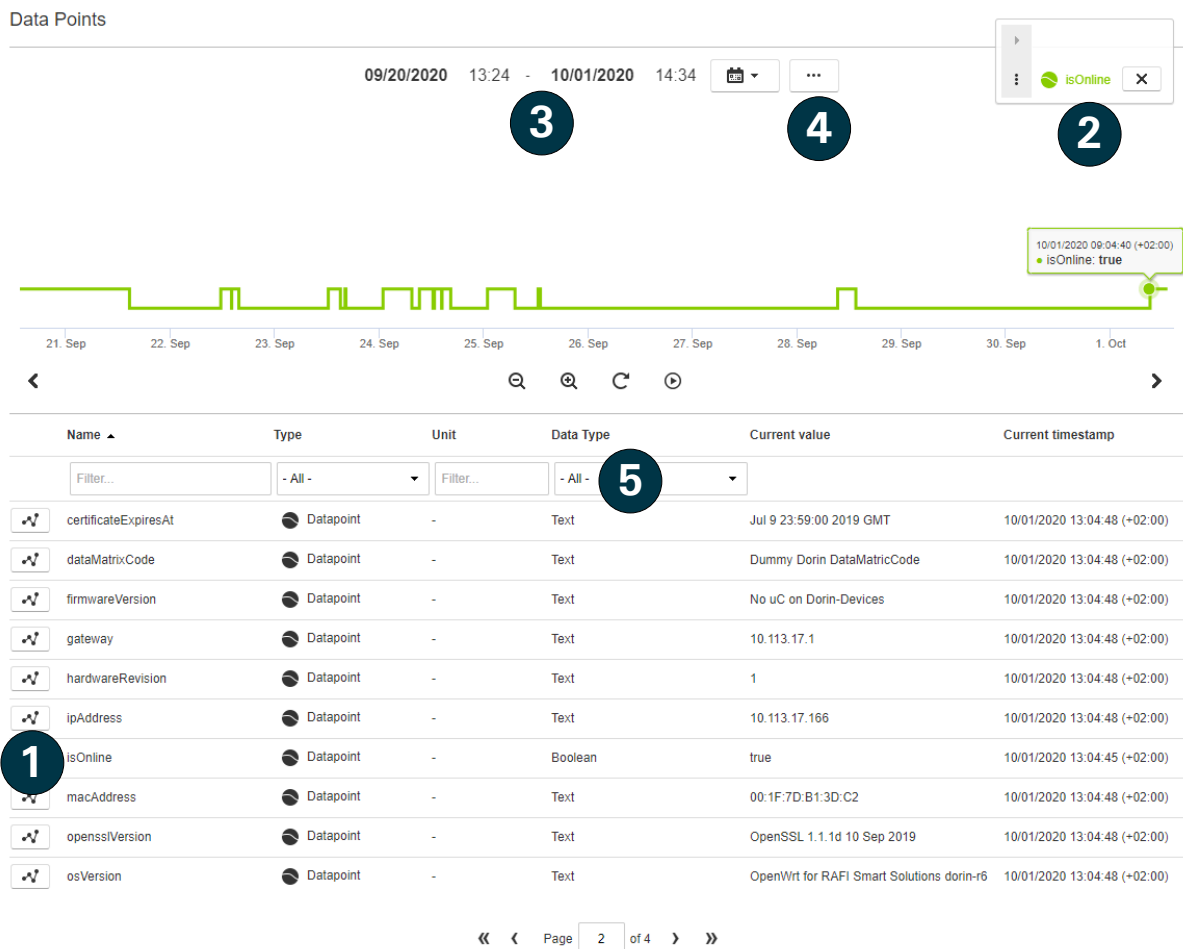
If you remove a KIS.Device from an asset group, this may have functional and structural effects (see Chapter 3.2.3). Before removing, check whether the asset is used in the rule engine or in a widget.

Save your changes with .

3.1.4 Asset - evaluation of the communicated datapoints



An overview is displayed in the “Datapoints” menu option showing which datapoints are exchanged between the KIS.Device and KIS.MANAGER. The changing of the datapoints over time can be displayed and exported.

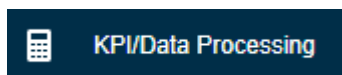


- 1 Display of datapoint change over time
- 2 List of displayed datapoints
- 3 Setting of the display or export period
- 4 Export of the datapoints shown in the period of time as a CSV file

- 5** KPI calculations are based on the datapoints of an asset (described in 3.1.5). Datapoints with the data type “Long”, “Boolean” or “Double” are available for evaluations.

3.1.5 Assets – calculating key figures

Preconditions: “Admin” or “Installer” role



In the “KPI/Data Processing” menu option, you can use calculations which allow key figures to be generated from the data interchange of the KIS.Devices.

Typical examples of key figures are:

- ➔ First-pass yield
- ➔ Downtimes and reasons
- ➔ Productivity
- ➔ Quantity per time unit
- ➔ Meantime-to-repair

Typical datapoints which can be evaluated for the KIS.Devices are:

- ➔ Button states
- ➔ LED states
- ➔ GPIO states
- ➔ Online states

Since this is a core function of the KIS.MANAGER, a whole chapter is devoted to the topic under **Fehler! Verweisquelle konnte nicht gefunden werden..**

3.2 Asset group – workspace management and functions

The asset group combines multiple assets into a structural and functional unit. An asset can belong to multiple asset groups. The assignment of an asset to an asset group is a precondition for many product functions.

Objective of the chapter: basic administration of an asset group in KIS.MANAGER

Navigation:



Select an asset group (workspace) from the list:

KIS.MANAGER Asset Groups ▾ Suchen ▾ 🔍 ? iot.showcase@rafi.de ▾ Ausloggen

Asset Groups 6 Asset Groups ?

Asset Group ▾	Definition	Kundenname	Pfad
Andon-Board Halle 1	Workspace	RAFI Vertriebsschulung Test	RAFI Berg > Andon-Board Halle 1
Andon-Board Halle 2	Workspace	RAFI Vertriebsschulung Test	RAFI Berg > Andon-Board Halle 2
Anforderung Entsorgung	Workspace	RAFI Vertriebsschulung Test	RAFI Berg > Anforderung Entsorgung
Nutzungsgrad Maschinen Halle 4	Workspace	RAFI Vertriebsschulung Test	RAFI Berg > Nutzungsgrad Maschinen Halle 4
RAFI Berg	Inventory	RAFI Vertriebsschulung Test	RAFI Berg
Stillstands-Alarmierung Prüfgeräte	Workspace	RAFI Vertriebsschulung Test	RAFI Berg > Stillstands-Alarmierung Prüfgeräte

« < Seite 1 von 1 > » ⋮



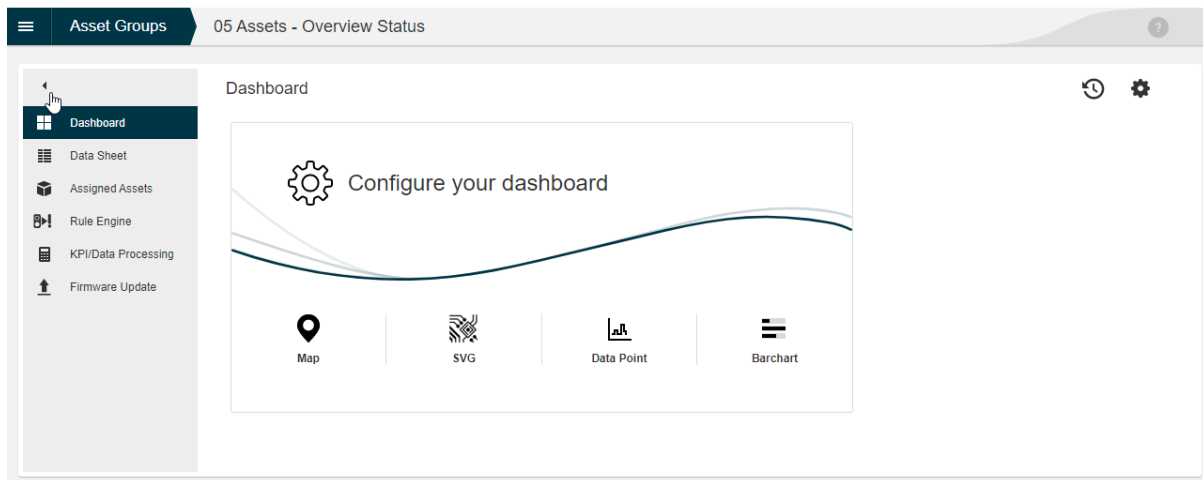
The list of asset groups may contain a different number of entries depending on the user. The reason for this is the different rights (see Chapter 2.3.2)



One asset group is different from the others. The asset group with the definition “Inventory” is superordinate to the others and fundamentally contains all assets after onboarding.

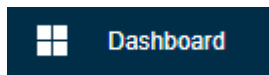
Once you have selected an asset group, a menu bar appears on the left hand edge of the screen.

For every symbol, you can open a short description in a drop-down window.



3.2.1 Asset group – using dashboard widgets

Preconditions: “Admin” or “Installer” role



The dashboard allows information required for a specific asset group to be presented in an easily viewed way, for example using a floorplan or displaying KPIs. To do so, small applications, so-called widgets, are configured and integrated.

This chapter explains the basics of how widgets are used. The functions of the widgets themselves are explained in more detail in Chapter 4.

3.2.1.1 Widgets



The following widgets are available on the asset dashboard for simple configuration:

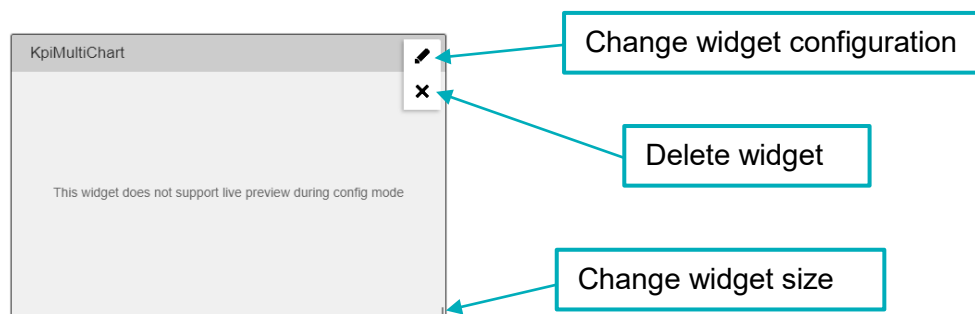
Widget-Typ auswählen

1 Floorplan A group floorplan	2 42 °C Datenpunkt/Prope... Letzer Wert	3 Datenpunkt Chart
4 Datenblatt	5 Aggregation	6 KPI 42° Kpi Single Value
6 Kpi Aggregated Chart	6 Kpi Single Value Column	6 Kpi Pie Chart
6 Kpi Single Period Chart		

- 1** Floorplan
- 2** Datapoint values
- 3** Datapoint profiles
- 4** Asset Group Characteristics
- 5** Datapoint aggregation
- 6** Key figure diagrams

Where configuration options are available, the user is first directed to a configuration menu after selecting a widget. For details, see Chapter 4.

If there are no configuration options, the widget is placed directly on the dashboard where you can modify it:



Click on **Save** to save the changes in the dashboard.

3.2.1.2 Adjust dashboard presentation

To show the widgets in the best possible size, you can divide the dashboard into coarser or finer grids:



Use the drop-down field to select between 4 (coarse grid) to 8 (fine grid).

Number of Columns
 6
 Auto adjust layout
☒

Click on **Save** to save the changes in the dashboard.

3.2.1.3 Insert additional dashboard

You can create multiple dashboards for each KIS.Device:



Click on **Save** to save the changes in the dashboard.

3.2.1.4 Duplicate dashboard

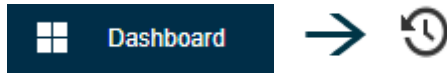
Dashboards can be duplicated. You can select whether it is inserted as an additional tab or transferred to another asset group.



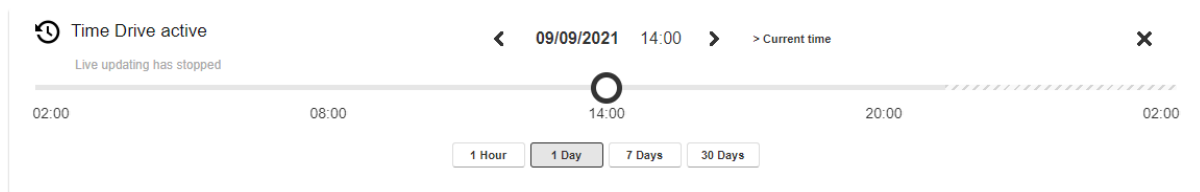
There are widgets (datapoint information, key figures, ...) which are different from asset to asset or from KIS.Device to KIS.Device. When duplicating, a message is output if the source does not match the target.

3.2.1.5 Using Time Drive

You can use the Time Drive function to view the status of a dashboard and its widgets at a previous point in time:



Use the time bar to select the desired point in time:



When you deactivate Time Drive again, the dashboard reverts back to live data.



Not all widgets support Time Drive. If this is the case, when activating the Time Drive function a message alerts the user.

3.2.2 Asset group – changing the description

Preconditions: “Admin” or “Installer” role



You can change the description of an asset group in the Data Sheet menu option.

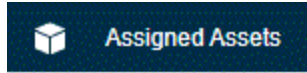


In the “Name” field, you can change the description of the asset group to any name required. This change has no functional effects, and is permanent.

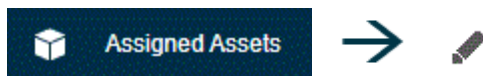
Save your changes with .

3.2.3 Asset group – assignment of KIS.Devices

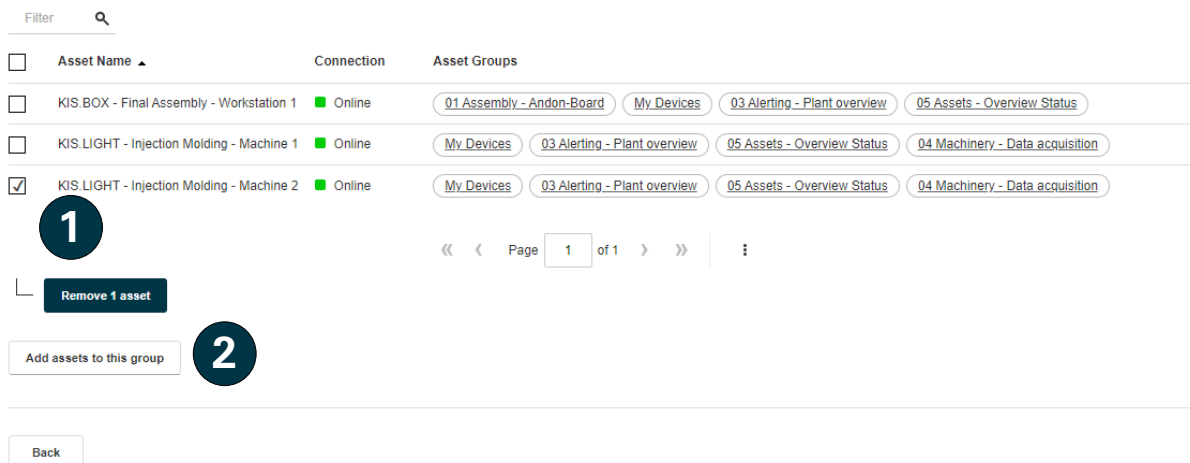
Preconditions: “Admin” role



This menu option is used to define which assets belong to this asset group. Since this gives rise to significant consequences, changes can only be made here by a user with the “Admin” role.



A list opens containing the assets which belong to the asset group. If no assets have been added yet, the list is empty:

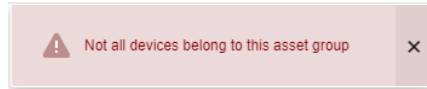


1 Select asset and remove from the asset group

2 Add additional asset to the asset group



Before removing an asset, check the rule engine of the affected asset group. When checking, see whether this asset is still used in a rule. If it is used, the rule involved will still run as it did before the asset was removed. However, no changes to the rule will be possible any more as long as it contains the asset. If you try to save a change, the following error message will appear:



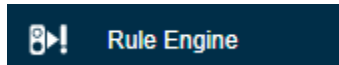
Before removing an asset, check the shop floor widgets of the affected asset group. When checking, see whether the asset is still used in a floorplan. After it is removed from the asset group, you will no longer be able to select it via the floorplan widget and it may be shown with the following symbol for example:



Removing and adding assets from/to an asset group can have an effect on users with the roles “Installer” and “Operator”. These users are authorized specifically for certain asset groups and can only access the assets they contain. If assets are added or removed, their access rights to these assets are removed or added accordingly.

3.2.4 Asset group – rule engine

Preconditions: “Admin” or “Installer” role

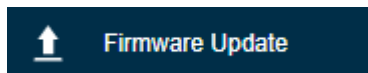


The “Rule engine” is the control center of the KIS.MANAGER. Here, rules are created which create functional links between the KIS.Devices. The interactions set here trigger actual responses on the physical devices.

The use of the rule engine is described in Chapter 4.3

3.2.5 Asset group – firmware update

Preconditions: “Admin” role



Firmware updates for the KIS.Devices are provided by RAFI and can be scheduled specifically here.

The scheduling of firmware updates is described in Chapter 5.2.



While a firmware update is in progress (status LED of the KIS.Device flashes turquoise), a KIS.Device must not be disconnected from the power supply. Otherwise, the firmware may be damaged irreparably.

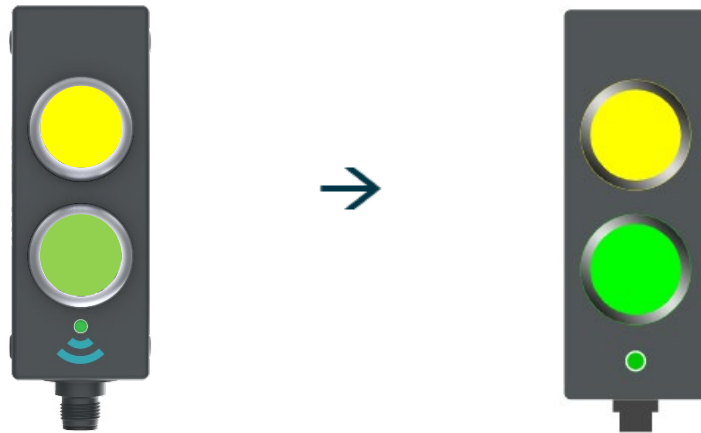
4 KIS.MANAGER – using product functions

4.1 Setup and use of a digital twin

4.1.1 Definition of digital twin

A digital twin is the digital portrayal of a physical device. The portrayal is shown on the asset dashboard of KIS.MANAGER. The digital twin reflects the states and functions of the physical device.

Example KIS.BOX



Example KIS.LIGHT



4.1.2 Integration of the digital twin widget

Navigation:

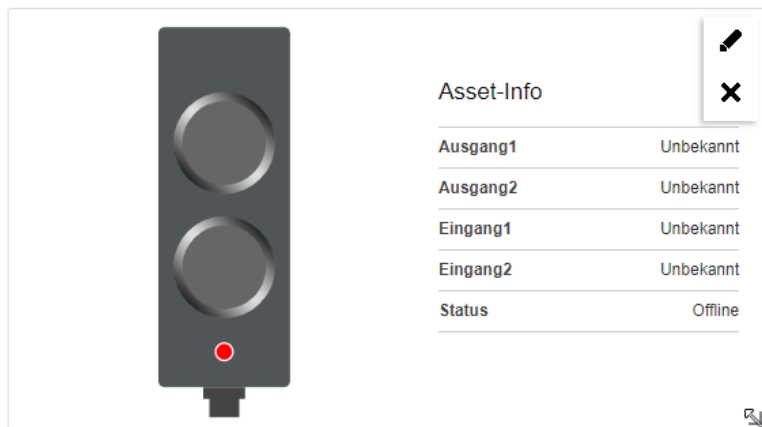


Insert widget:



The widget is inserted and its presentation can still be changed.

To do so, click the marked spot in the bottom right corner of the widget and hold and drag until the widget occupies the desired size on the dashboard.



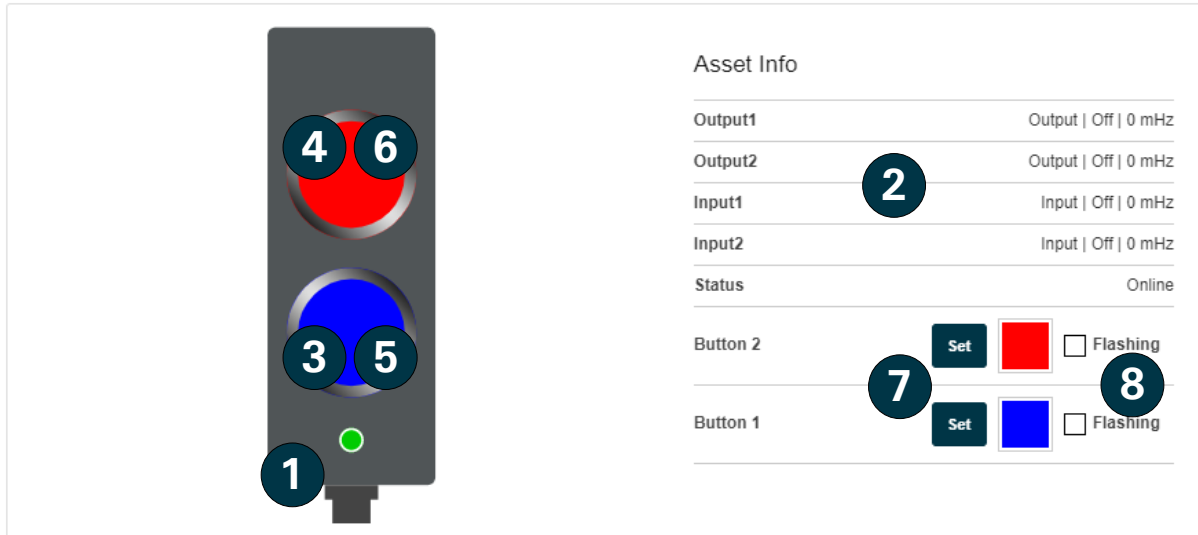
Save the changes in the dashboard with **Save**, then you can use the digital twin.

4.1.3 Using the digital twin widget

The example of a KIS.BOX is used to show what functions and information the digital twin offers.





The device must be online to allow you to use the digital twin. This is indicated by the green status LED on the device and on the digital twin.



Information provided:

- 1 Status LED KIS.BOX
- 2 Status of the inputs and outputs
- 3 Color state LED Button 1
- 4 Color state LED Button 2

Possible actions:

- 5 Click on button 1 → Response the same as clicking on physical button
- 6 Click on button 2 → Response the same as clicking on physical button
- 7 Set color state of LED manually → Select color and confirm via 
- 8 Set LED flashing in the selected color manually → Select checkbox and confirm with 

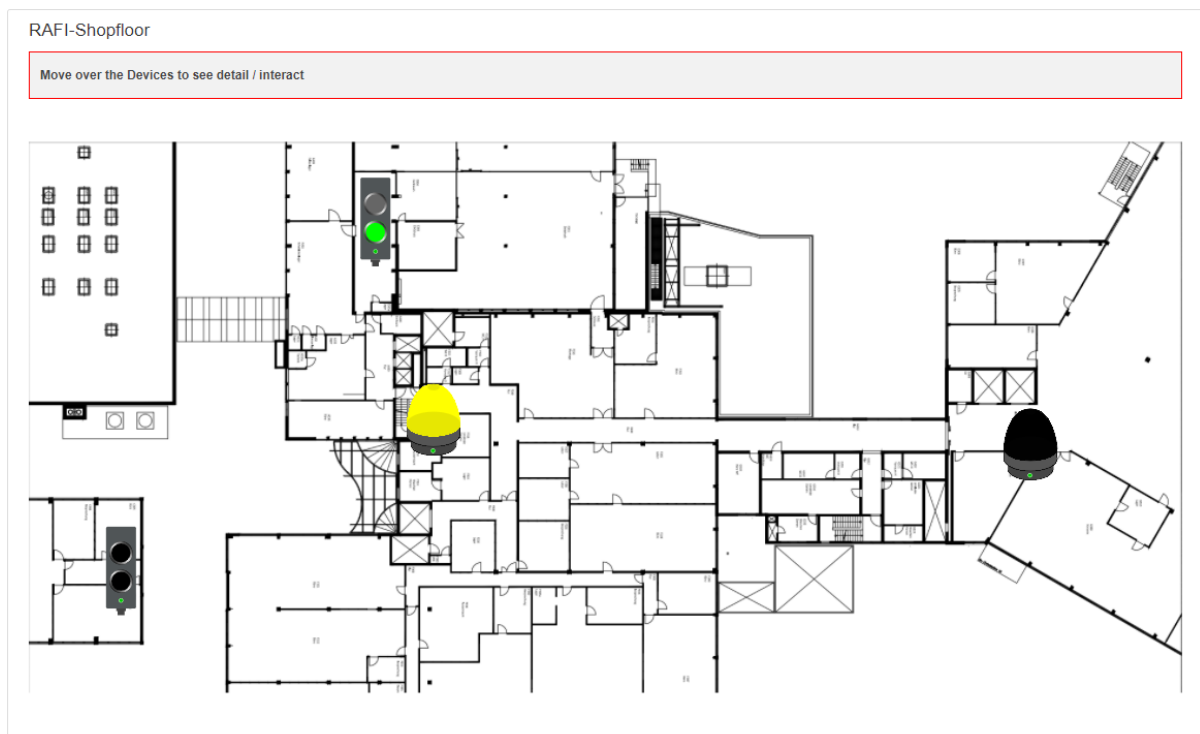
4.2 Set up and use a floorplan

4.2.1 Definition of floorplan

“Floorplan” is a widget used to integrate SVG graphics in KIS.MANAGER. You can use it to place digital twins on the graphics.

You can use this widget on the dashboard of an asset group.

Example: you upload the layout of a production hall as a graphic and place the digital twins on it. In KIS.MANAGER, the user receives an overview of the states of the KIS.Devices in the company and can operate the digital twins on the floorplan (see Chapter 4.1.3)



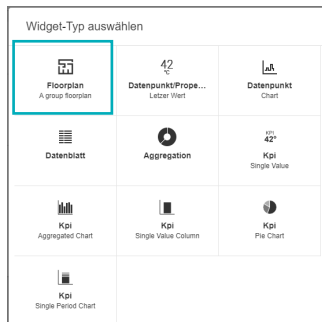
Instead of a production hall layout, any other SVG graphic can be integrated. The file size must not exceed 1 MB.

4.2.2 Configuration of the floorplan widget

Navigation:



Insert widget:



The configuration menu of the widget appears:

Change Settings

Headline

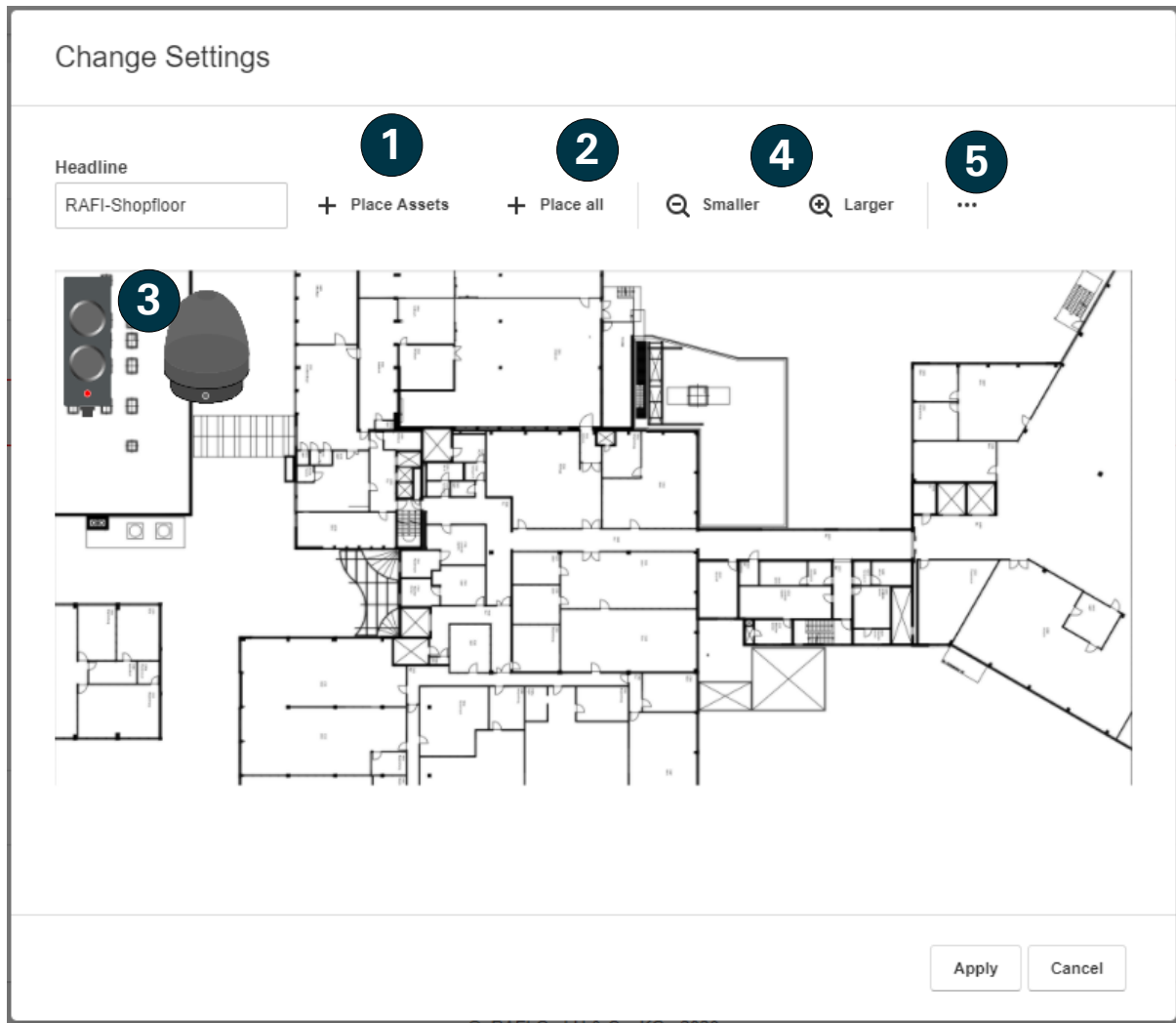
2

Drop file here, or click to browse ...

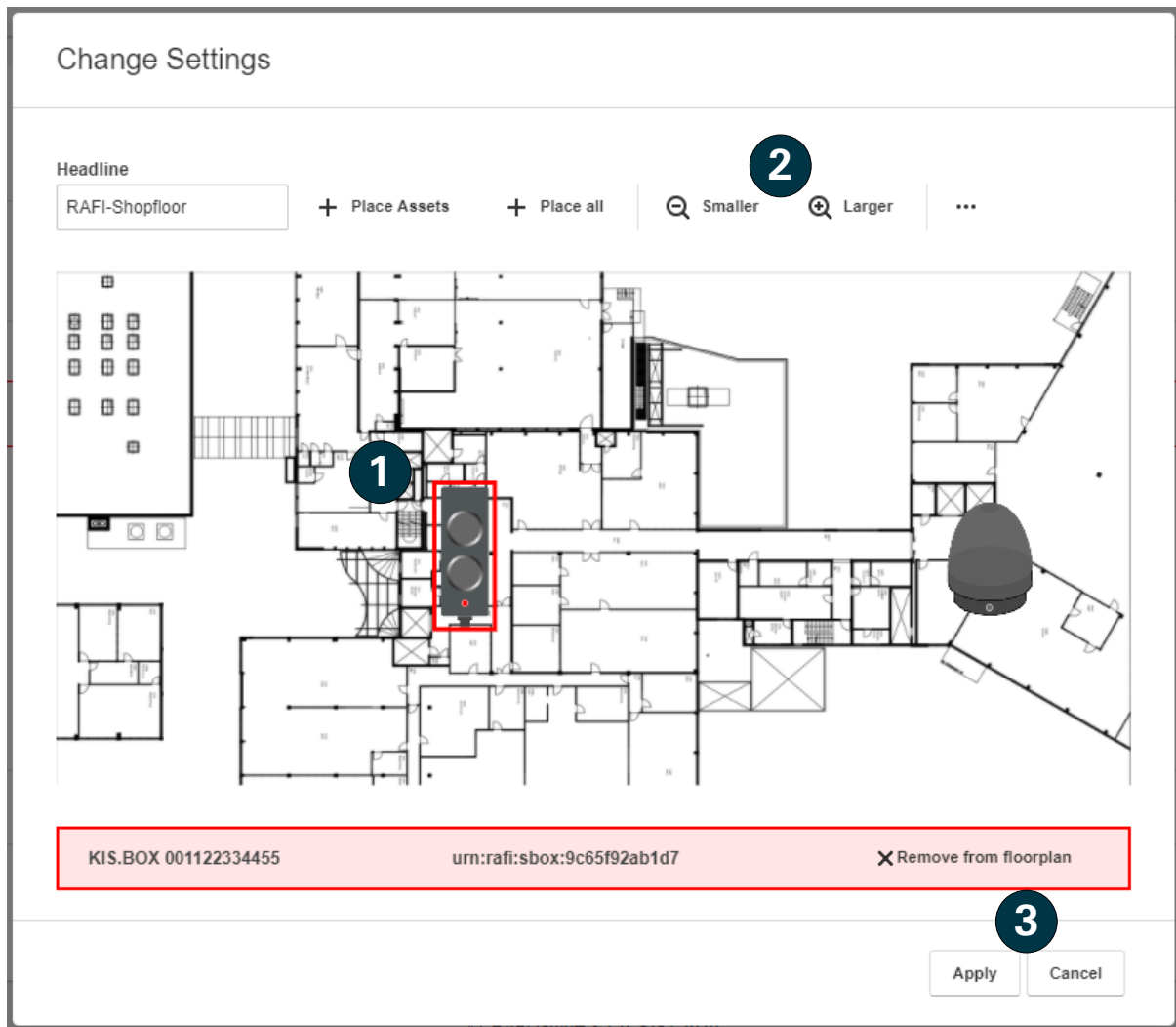
1 Enter widget title

2 Place SVG file via drag-and-drop

i An SVG graphic can only be incorporated with a file size of up to 1 MB.



- 1 Place selected assets on the floorplan
- 2 Place all assets of the asset group on the floorplan
- 3 Previously placed assets are initially shown in the top left corner
- 4 Adjust the asset size to suit the floorplan size
- 5 Remove assets from the floorplan or upload new floorplan

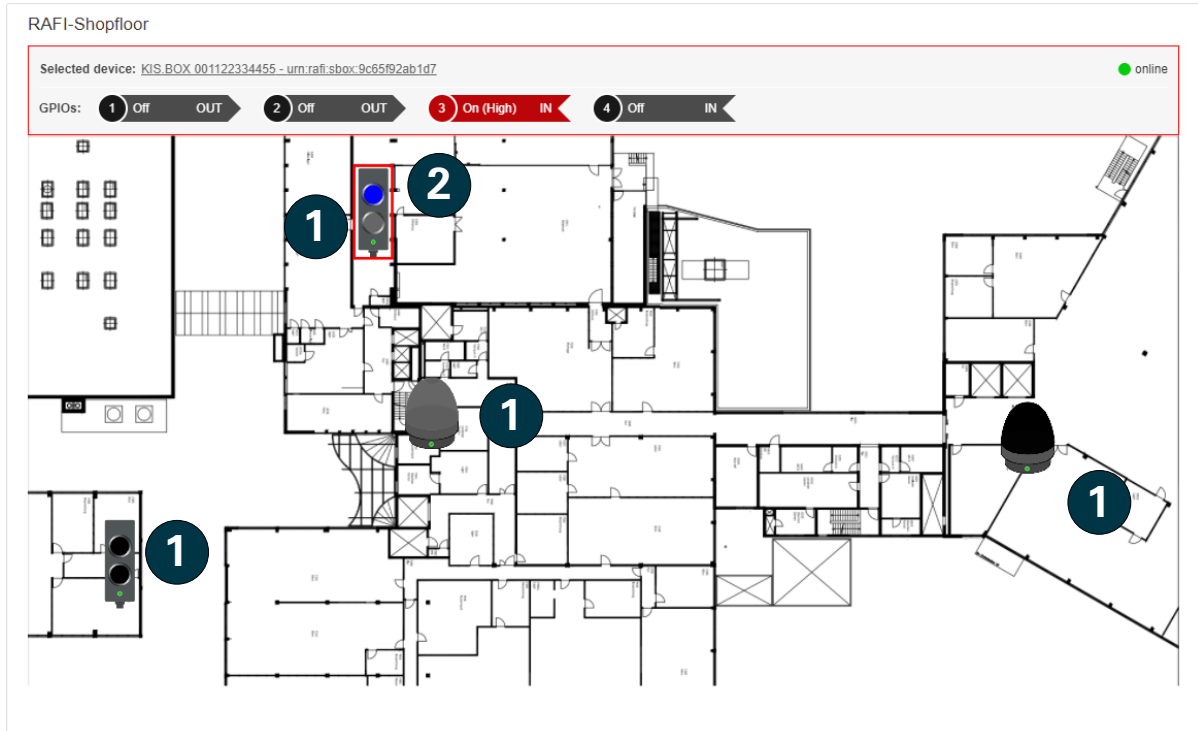


- 1 You can place assets freely on the shop floor plan using drag-and-drop
- 2 Adjust the asset size to suit the floorplan size
- 3 Finalize or cancel the floorplan configuration

Finally, you can change the width and height of the presentation of the widget on the dashboard (see Chapter 3.1.1). Finish editing the dashboard with Save.
You can retrospectively adjust the widget configuration.

4.2.3 Operation of the floorplan widget

In KIS.MANAGER, multiple digital twins can be operated at the same time via the floorplan widget, or their status detected directly.



- 1 Digital twin of a placed KIS.Device (for functions, see Chapter 4.1)
- 2 If you move your mouse over the digital twin, you can see more detailed information

4.2.4 Conversion of SVG graphics for floorplan widget

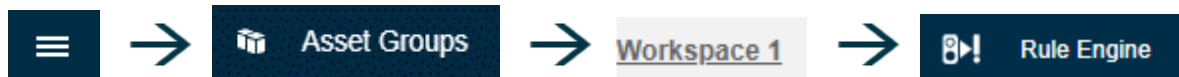
An SVG graphic (scalable vector graphic) offers significant advantages over other graphic formats in terms of scalability without losing quality. You can produce an SVG graphic very easily by converting a PDF, JPG, PNG, etc. Suitable tools are available directly online or for download.

Here are two examples of converters:



- ➔ inkscape - <https://inkscape.org/de/>
- ➔ convertio - <https://convertio.co/de/svg-umwandeln/>

4.3 Creation and editing of rules in the rule engine

Navigation:

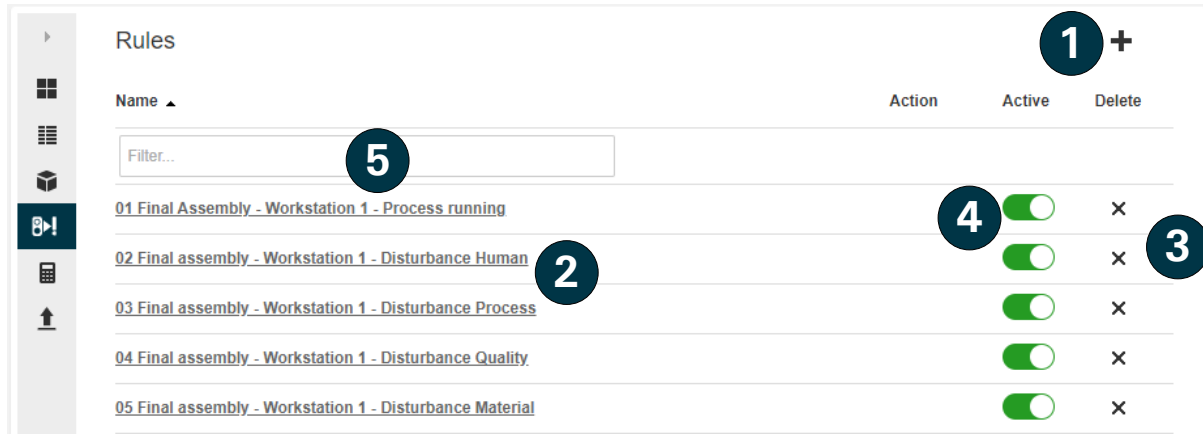


The “Rule engine” is the control center of the KIS.MANAGER. Here, rules are created which create functional links between the KIS.Devices. The interactions set here trigger actual responses on the physical devices.

-  The rules are based on datapoints which are exchanged between KIS.Device and KIS.MANAGER (see Chapter
-  KIS.Devices (assets) must belong to the same asset group to be able to interact in the rule engine

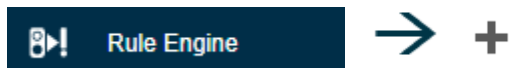
4.3.1 Overview of rules

The Rule Engine menu option shows a list of the rules of an asset group. If no rules have been created yet, the list will be empty:



- 1 Create new rules
- 2 Select existing rules to view or edit them
- 3 Delete existing rules
- 4 Activate / deactivate existing rules
- 5 Filter according to rule descriptions

4.3.2 Create new rules



A rule in KIS.MANAGER always follows the following format:

The screenshot shows the 'Rule Engine' interface. On the left is a sidebar with icons for different views. The main area contains a form for creating a new rule. The form has four main sections, each with a numbered circle indicating a mandatory step:

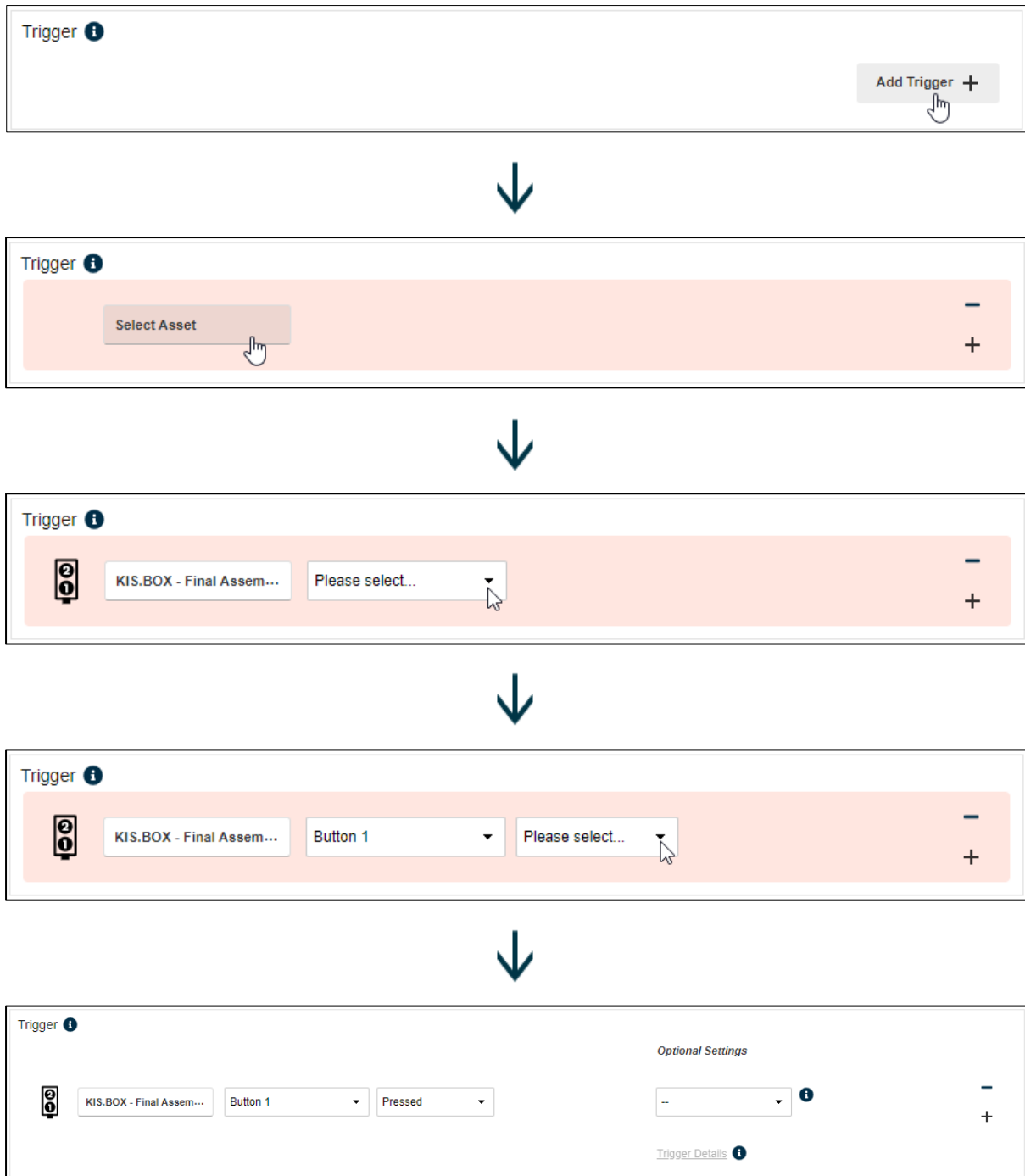
- 1** **Name:** A text input field for the rule's name.
- 2** **Trigger**: A section for defining the trigger, with an 'Add Trigger +' button.
- 3** **Conditions**: A section for defining conditions, with an 'Add Condition +' button.
- 4** **Actions**: A section for defining actions, with an 'Add Action +' button.

At the top right, there is an 'Active:' toggle switch. At the bottom, there are 'Save' and 'Cancel' buttons.

- 1** **MANDATORY:** Allocate name for the rule
- 2** **MANDATORY:** Determine which trigger should trigger the execution of the rule
- 3** **OPTIONAL:** Determine which conditions must be fulfilled so that the rule is executed
- 4** **MANDATORY:** Define which action should be carried out when the trigger occurs and the conditions apply

Only once all MANDATORY steps are filled in correctly is the **Save** button activated and available to click.

4.3.3 Create a rule; explained using the example of a trigger



4.3.4 Rule explained using an example

Example 1:

If the GPIO 1 of the “KIS.LIGHT robot” changes to the status Low, a check is made to see whether the LED color of the “KIS.LIGHT robot” is yellow. If this is the case, the LED color of the “KIS.LIGHT robot” is set to green.

The screenshot shows the RAFI rule configuration interface. At the top right, there is an 'Active' toggle switch. The main configuration area is divided into three sections: Trigger, Conditions, and Actions. Each section has a list of rules with expand/collapse icons (+/-). Numbered callouts are placed over the interface as follows:

- 1**: Points to the 'Name' field at the top left, which contains 'Roboter - Störung aufgehoben'.
- 2**: Points to the 'KIS.LIGHT Roboter' asset selection in the Trigger section.
- 3**: Points to the 'GPIO' dropdown menu in the Trigger section.
- 4**: Points to the 'GPIO 1' dropdown menu in the Trigger section.
- 5**: Points to the 'Low' status selection in the Trigger section.
- 6**: Points to the 'EQUAL' comparison operator in the Conditions section.

Below the configuration sections are 'Save' and 'Cancel' buttons.

- 1** Rule designation
- 2** Selection of an asset from the asset group
- 3** Selection of an asset datapoint via dropdown menu
- 4** Which value should the datapoint assume
- 5** Deletion of the row
- 6** Selection between EQUAL and NOT

Example 2:

If the LED color of the “KIS.LIGHT robot” changes to green OR Button 1 of the “KIS.BOX press” is pressed, a check is made to see whether the button color of Button 2 of the “KIS.BOX press” is NOT blue AND the LED color of the “KIS.LIGHT supervisor office” is either red OR yellow.

If the conditions are fulfilled, the “KIS.LIGHT supervisor office” is switched off AND an e-mail is sent to max.mustermann@rafi.de with the content of a template still to be selected. The rule can only be saved once there are no more rows with a red background.

Name: Active: ☒

Trigger

	KIS.LIGHT Roboter	LED	LED color	 	<input type="checkbox"/> Flashing	1	x	OR
	KIS.BOX Presse	Button 1	Pressed					

Conditions

	KIS.BOX Presse	Button 2	Button 2 Color	NOT	 	<input type="checkbox"/> Flashing	2	x	AND
	KIS.LIGHT Meisterbüro	LED	LED color	EQUAL	 	<input type="checkbox"/> Flashing			
	KIS.LIGHT Meisterbüro	LED	LED color	EQUAL	 	<input type="checkbox"/> Flashing	x	+	OR
							x	+	

Actions

	KIS.LIGHT Meisterbüro	Set LED	LED color	 	<input type="checkbox"/> Flashing	3	x
	<input type="text" value="max.mustermann@rafi.de"/>		<input type="text" value="Please select template"/>				
							+

Save Cancel

- 1 Triggers are always linked with OR
- 2 Conditions can be linked/nested with AND or OR
- 3 Actions are always linked with AND

4.3.5 Counter-controlled and time-controlled triggers

Three “Optional settings” are available for the triggers:

- Trigger directly activates when an event occurs
- Trigger activates when a set number of events is exceeded
- Trigger activates if a set condition is present for a defined period



If no selection is made in the optional settings, the trigger activates directly on occurrence of an event.

4.3.5.1 Counter-controlled triggers

A counter-controlled trigger is generally set when a rule is defined, by using the “Optional settings” drop-down field:

The diagram illustrates the configuration of a counter-controlled trigger in two steps, separated by a downward arrow.

Top Configuration:

- Name:** Example
- Active:** ☒
- Trigger:**
 - Icon:
 - Condition: KIS.BOX - Final Assem...
 - Input/Output: Input/Output
 - Input: Input1
 - Action: On (High)
- Optional Settings:**
 - Dropdown menu: --
 - Dropdown options: After x times, After x minutes, After x hours

Bottom Configuration:

- Name:** Example
- Active:** ☒
- Trigger:**
 - Icon:
 - Condition: KIS.BOX - Final Assem...
 - Input/Output: Input/Output
 - Input: Input1
 - Action: On (High)
- Optional Settings:**
 - Dropdown menu: After x times
 - Value: 5
- Trigger Details:** [Trigger Details](#)

In this example the trigger is activated if Input1 has adopted the condition “High” five times. When the threshold is reached, the counter starts again from the beginning.



If the threshold value is reached, but the conditions of the rule are not fulfilled, no action is triggered and the counter is still reset to 0.

As soon as the rule is completed and saved, the counter process begins.

Now the “Trigger details” link in the editing view or list view of the rules can also be selected:

Trigger Details for "Example"

1 Trigger Value: 5
Current Count: 1
Last reset at: 09/09/2021 15:00:01 (+02:00)
Last reset by: System User

2

3 Reset

Close

- 1 Threshold value and current counter status
- 2 Reset info on whether executed last time manually or via the system
- 3 Manually reset counter to 0

4.3.5.2 Time-controlled triggers

A time-controlled trigger is generally set when a rule is defined, by using the “Optional settings” drop-down field:

Optional Settings

After x times
After x minutes
After x hours



Optional Settings

After x minutes 15

Trigger Details

4.4 Set up e-mail notifications

In the KIS.MANAGER it is possible to create e-mail templates which are sent when certain events occur. In this way information can be distributed even if the addressee does not have a user account in KIS.MANAGER or is not currently logged in.

Checking the conditions for occurrence and sending e-mail templates is done by the KIS.MANAGER rule engine.

4.4.1 Create template for e-mail notification

Navigation:



When you click the link, an overview of the previously created templates is shown. If you want to edit or delete an existing template, select it in the overview list.

Notification Templates +

Name ▲	Type	Message	Subject	Authorised User Groups
<input type="text" value="Filter..."/>				<input type="text" value="Filter..."/>
Disturbance Human	E-mail	The employee working in line \${asset.name} has a problem.	Disturbance Human	Admin
Disturbance Material	E-mail	There is a problem regarding the material in line \${asset.name}	Disturbance Material	Admin
Disturbance Process	E-mail	There is a problem with the process in line \${asset.name}	Disturbance Process	Admin

When is selected, a screen opens for creation of the new e-mail template.

← Create Template

Name * 1

Type * ☒ E-mail

Languages

▸ default 2

+ Add locale...

Save Cancel

1 Assign name for the template

2 Open the “default” tab by clicking on the row

← Create Template

Name * Disturbance

Type * ☒ E-mail

Languages

▾ default

Subject * Disturbance \${asset.name} 1

+ Add variables... 3

Message * The machine \${asset.name} has a problem and must be repaired. \${event.timestamp?datetime} 2

+ Add locale...

Save Cancel

1 Enter subject

2 Enter message

3 If required: insert variable in subject or message (e.g. description of the asset which has triggered the message dispatch)

When the template is completed, click

After saving, the template still needs to be assigned to a user group for access rights. The following steps are required:

Authorize User Groups to access this template

Add User Groups

Filter
☒ Show only my groups

	User Group ▲	Customer Name	Description
<input checked="" type="checkbox"/>	Admin	Demo KIS.MANAGER	A highly privileged user to manage the system (e.g. creating users, assigning

Please select User Groups to authorise them to access and work with this template.

Save Cancel

- 1 First step: check the “Only show my groups” box
- 2 Second step: check the “Admin” user group box

Clicking on **Save** creates the template which then becomes available in the rule engine.

4.4.2 Setup of e-mail notification dispatch

The e-mail templates are sent via the rule engine. There the selection option “Send e-mail” can be selected in the “Actions” area:



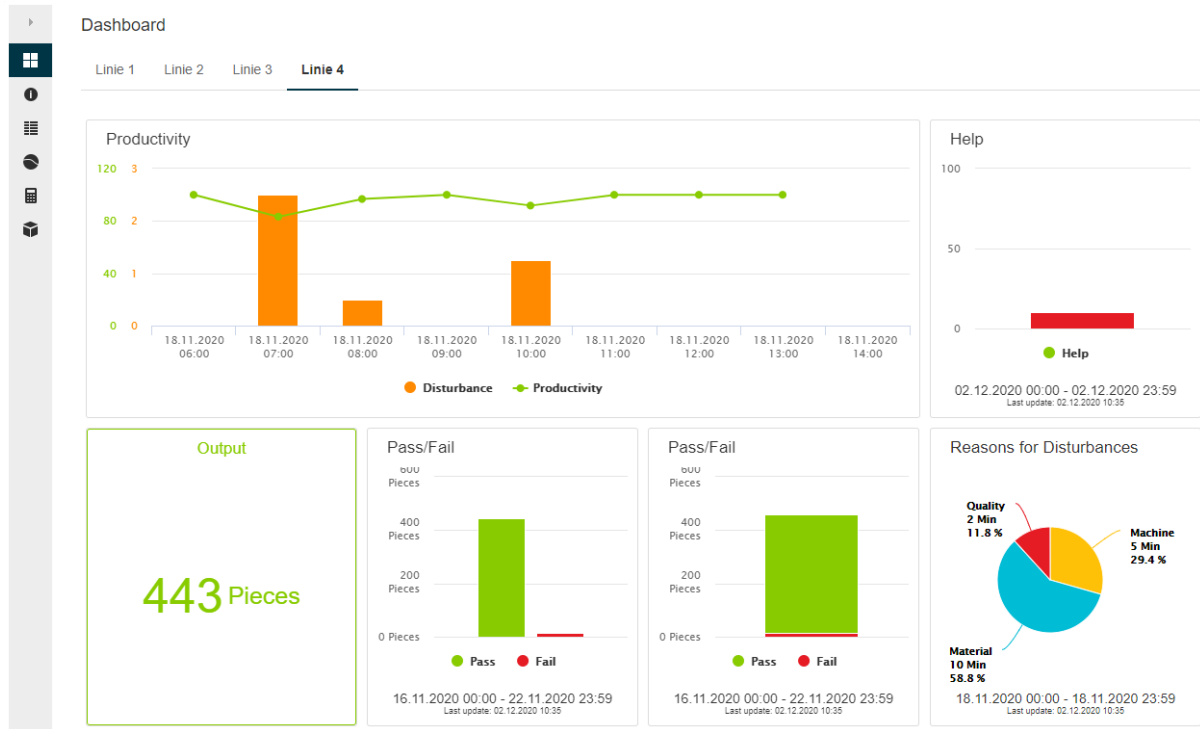
An address can now be entered and an e-mail template selected. If the rule is saved and triggered, the e-mail is sent. Multiple addressees can be notified at the same time within one rule.

4.5 Calculating and presenting key figures

Key figures are a key pillar for analyzing and evaluating processes. They provide the necessary transparency and allow targeted actions.

The KIS.MANAGER provides attractive options for this. The KIS.Devices (KIS.BOX, KIS.LIGHT, etc.) collect data locally, and the data is processed and presented in the KIS.MANAGER.

The result can look e.g. as follows:



Different widgets are available for presenting key figures on the various dashboards of the KIS.MANAGER.

The following manual explains the route from datapoint to key figure and also includes the comprehensive presentation options.

4.5.1 Datapoints

The datapoints form the input for every key figure calculation.

A datapoint is an exchanged value between KIS.Device and KIS.MANAGER. A distinction is made between:

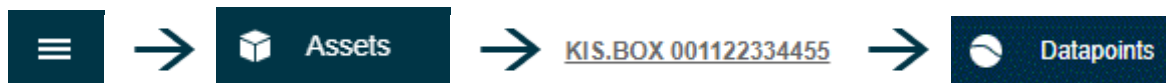
- ➔ Condition data (button pressed, LED color green, INPUT high,...)
- ➔ Metadata (firmware version, hardware version, WLAN signal strength,...)

The complete communication between KIS.Device and KIS.MANAGER also takes place via the datapoints.





















Condition data is relevant for calculating key figures. It transports the process information which is to be processed via the key figures.

4.5.1.1 Datapoints as the basis for key figures

For each KIS.Device, the KIS.MANAGER provides a complete overview regarding the datapoints exchanged:



Datenpunkte

Name	Type	Einheit	Datentyp	Aktueller Wert	Aktueller Zeitstempel
<input type="text" value="Filter..."/>	<div>- Alle -</div>	<input type="text" value="Filter..."/>	<div>- Alle -</div>		
 pin3Mode	 Datenpunkt	-	Text	input	27.06.2021 20:47:18 (+02:00)
 pin3Status	 Datenpunkt	-	Boolescher Wert	false	28.06.2021 10:08:59 (+02:00)
 pin4Frequency	 Datenpunkt	-	Long	0	28.06.2021 10:08:59 (+02:00)
 pin4Mode	 Datenpunkt	-	Text	input	27.06.2021 20:47:18 (+02:00)
 pin4Status	 Datenpunkt	-	Boolescher Wert	false	28.06.2021 10:08:59 (+02:00)
 serialNumber	 Datenpunkt	-	Text	A000R0000000	27.06.2021 20:47:15 (+02:00)
 subnet	 Datenpunkt	-	Text	255.255.255.0	27.06.2021 20:47:15 (+02:00)
 wifiChannel	 Datenpunkt	-	Text	6 (2437 MHz)	27.06.2021 20:47:15 (+02:00)
 wifiSignalStrength	 Datenpunkt	-	Text	-61 dBm	27.06.2021 20:47:15 (+02:00)
 wifiSsid	 Datenpunkt	-	Text	RAFI_IOT	27.06.2021 20:47:15 (+02:00)

«

«

Seite

4

von 4

»

»

Basically, you can evaluate the following types of datapoints:

- ➔ Double - Floating-point number (e.g.: 1.234)
- ➔ Long - Whole number (e.g.: 1)
- ➔ Boolean - Logical value (e.g.: true)

An overview of the datapoints which can be evaluated can be found in the appendix in Chapter 8.1

4.5.1.2 Datapoints as a labor-saving approach

The overview of the datapoints of an asset makes it easier to create KPIs and check whether the calculated result is plausible.

The overview provides the following options:

- ➔ Filtering according to datapoints which can be evaluated
- ➔ The current value of one/multiple datapoints can be viewed
- ➔ The profile over time of one/multiple datapoints can be viewed
- ➔ The historical values of one/multiple datapoints can be exported
- ➔ The history of a datapoint can be deleted (deletion period adjustable)

Before starting an evaluation, it makes sense to view the data stream which is supplied via the KIS.Device to the KIS.MANAGER.

In this example, a sensor is connected with Input 1 of a KIS.Device and another sensor with Input 2. If both datapoints input1Status and input2Status are selected in the datapoint overview, the time profile may look as follows:

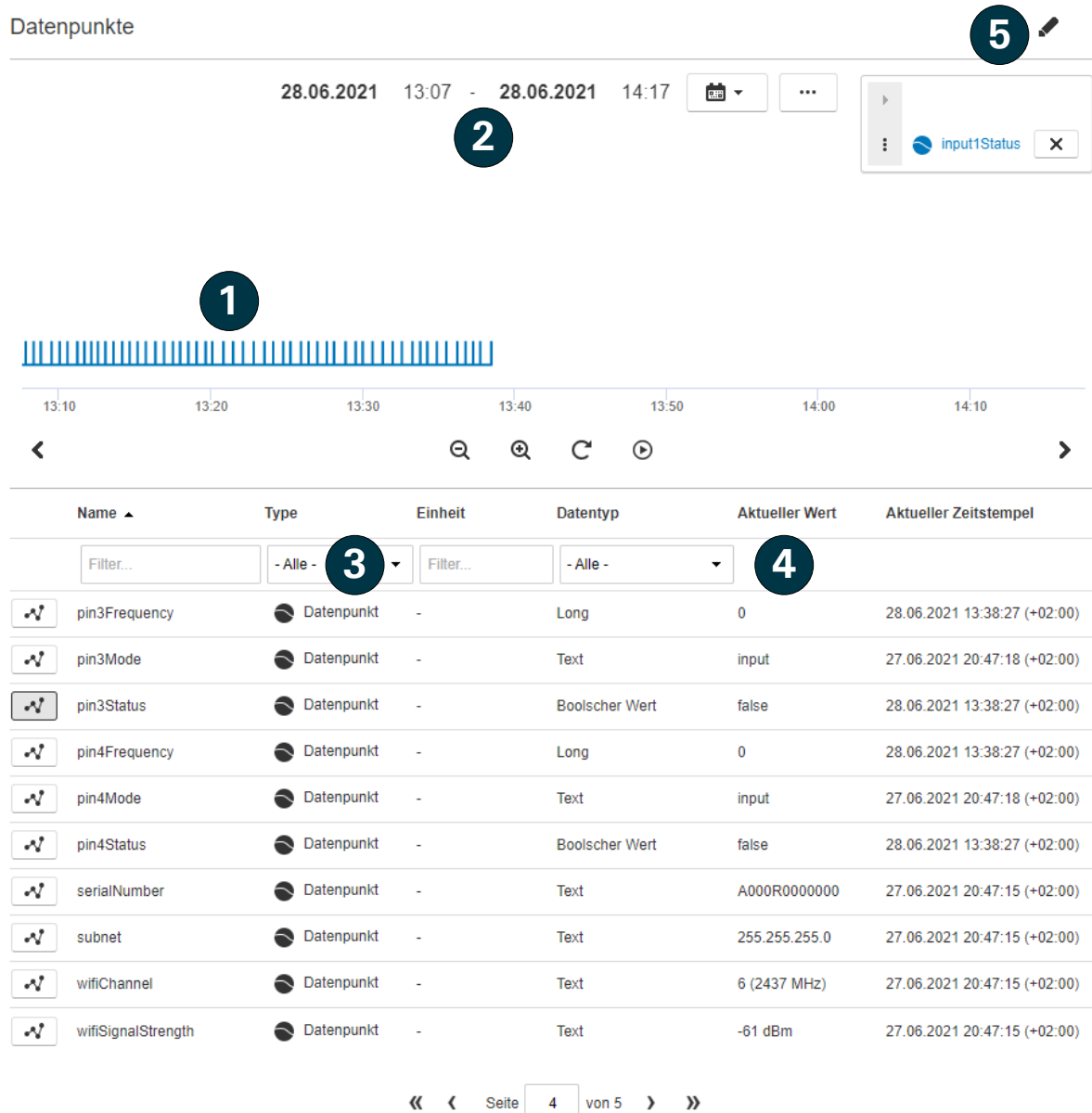


This view of the received raw data assists in checking the calculation result plausibility later on. It is also possible to see the data range of the raw data.



Fundamentally, it is important to know that datapoints are updated on an event-driven basis. This means a KIS.Device sends an update message when something has changed.

Datenpunkte



1 Time profile of a selected datapoint

2 Setting of the display or export period → Export via ...

3 Datapoint or calculated datapoint → see Chapter 4.5.5

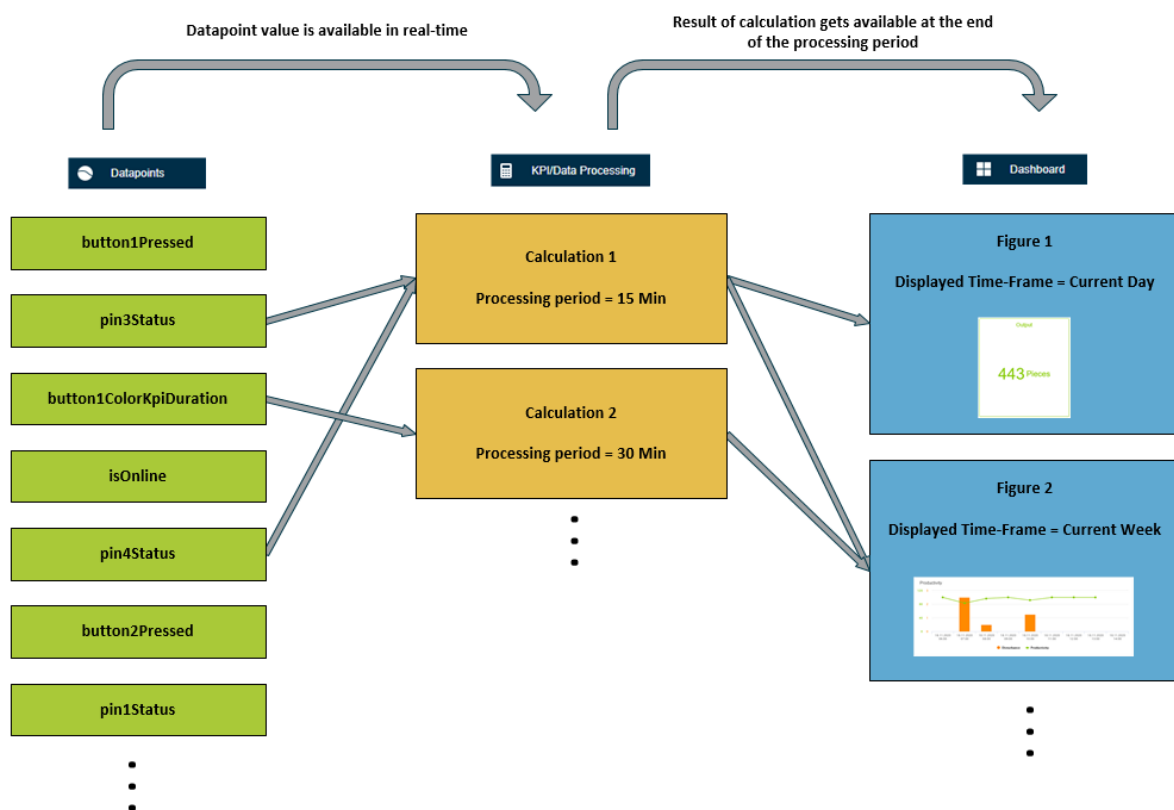
4 Current value of a datapoint

5 Delete datapoints or datapoint history

4.5.2 The route from datapoints to key figures

In order to calculate a key figure from one/multiple datapoint(s), there are three stages to run through:

- ➔ Raw values: these are extracted from the datapoints (see Chapter 4.5.1)
- ➔ Pre-processing: datapoints are converted into key figures using formulas (see Chapter 4.5.4)
- ➔ Presentation: calculation results are aggregated and displayed (see Chapter 4.5.7)



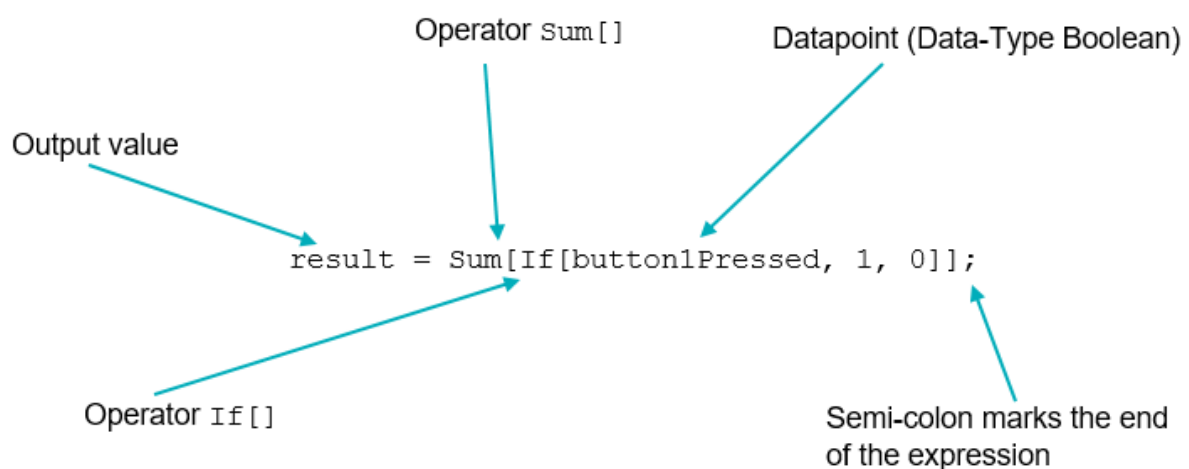
4.5.3 Fundamentals regarding the FLEX formula language

Flex provides an expression language for evaluating, aggregating and processing time-series data.

What this means in conjunction with the KIS.MANAGER:

Using the FLEX language, the continuously produced datapoint values can be compared, calculated, aggregated, and processed to produce the required key figure.

Example – Count how often button 1 has been pressed:



- The operator `If[]` provides a 1 each time the datapoint `button1Pressed` adopts the value "true" → Button pressed
- The operator `If[]` provides a 0 each time the datapoint `button1Pressed` adopts the value "false" → Button not pressed
- The operator `Sum[]` summates the results of the operator `If[]` over the set time period
- The value returned contains the results of the calculation, which can then be transferred for displaying



- Each row of a calculation is completed with a semicolon
- Spaces can be inserted anywhere without a problem
- The returned value can be named freely, with the exception of special characters

Fundamental options for datapoint calculation using KIS.MANAGER (detailed definition in the appendix at 8.3):

1. Numerical operations

+ , - , * , / , ^	Plus, minus, multiply, divide, power of
Round	Round to next whole number
Abs	Forms the value of the number

2. Logical operations

And	This value AND this value
Or	This value AND/OR this value
Xor	EITHER this value OR this value
Not	NOT this value

3. Data aggregation

Sum	Total
Mean	Average
Count	Condition counter
Max , Min	Maximum , minimum
First , Last	First or last value of a period
Stdev	Standard deviation
RisingEdge	Number of rising edges (digital value)
FallingEdge	Number of falling edges (digital value)

4. Comparative operations

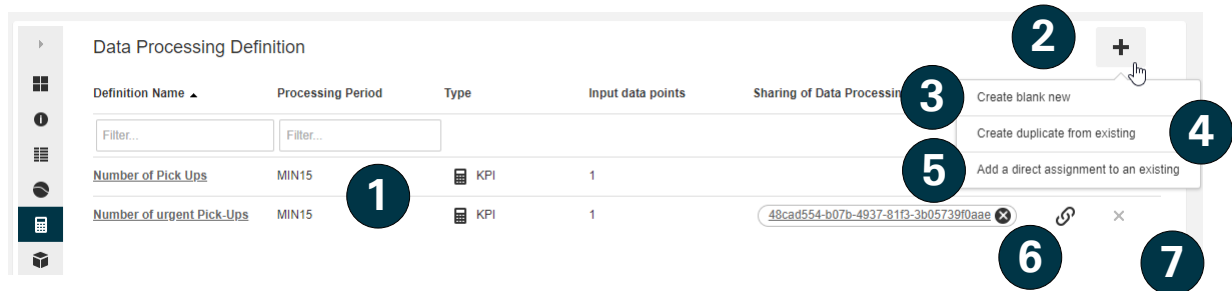
> , <	Greater than/less than
>= , <=	Greater than or equal to, less than or equal to
==	Equals
!=	Does not equal

5. Other operations

If	If, then, otherwise
Duration	Duration of a condition/state in milliseconds
Filter	Filter out implausible data
Counter	Difference between each value change

4.5.4 Calculation screen

The calculations can be created for each asset. The introduction to the calculation screens can be found at the following link:



- 1 List of calculations already set up
- 2 Clicking on **+** opens options to add calculations
- 3 Empty calculation screen opens
- 4 List of previously created calculations for all assets opens. If one of these calculations is selected, a (non-linked) DUPLICATE is created
 - ➔ For details, see Chapter 4.5.9
- 5 List of previously created calculations for all assets opens. If one of these calculations is selected, a LINK is created
 - ➔ For details, see Chapter 4.5.9
- 6 Sharing calculations ➔ The calculation can be shared with an asset group ➔ Each asset in the asset group is linked with the calculation
 - ➔ For details, see Chapter 4.5.9
- 7 Deleting calculations

4.5.5 Setting up a calculated datapoint

The “Calculated datapoint” function is provided to allow the conversion of existing datapoints or to provide them in another form.

Example: a datapoint is available as Boolean from the device and needs to be changed into a numerical value

4.5.5.1 Creating an example

Edit Data Processing Definition

Definition Name: **1**

Publish as ... **2**

- ☒ Calculated Datapoint
- ☐ KPI

Calculated Datapoints enable you to do **instant** (real-time) calculations on incoming Data (e.g. Converting Celsius to Fahrenheit). Calculated Datapoints will occur in your Datapoints App.

1. Input Datapoints: **1**

isOnline: **3**

+ Add Input Datapoint

Processing period: **4**

2. Output Calculation

1. `OnlineNumber = If[input_0, 5000, -2000];`

✓ Definition looks fine

Your output value: ☒ OnlineNumber [Preview output](#)

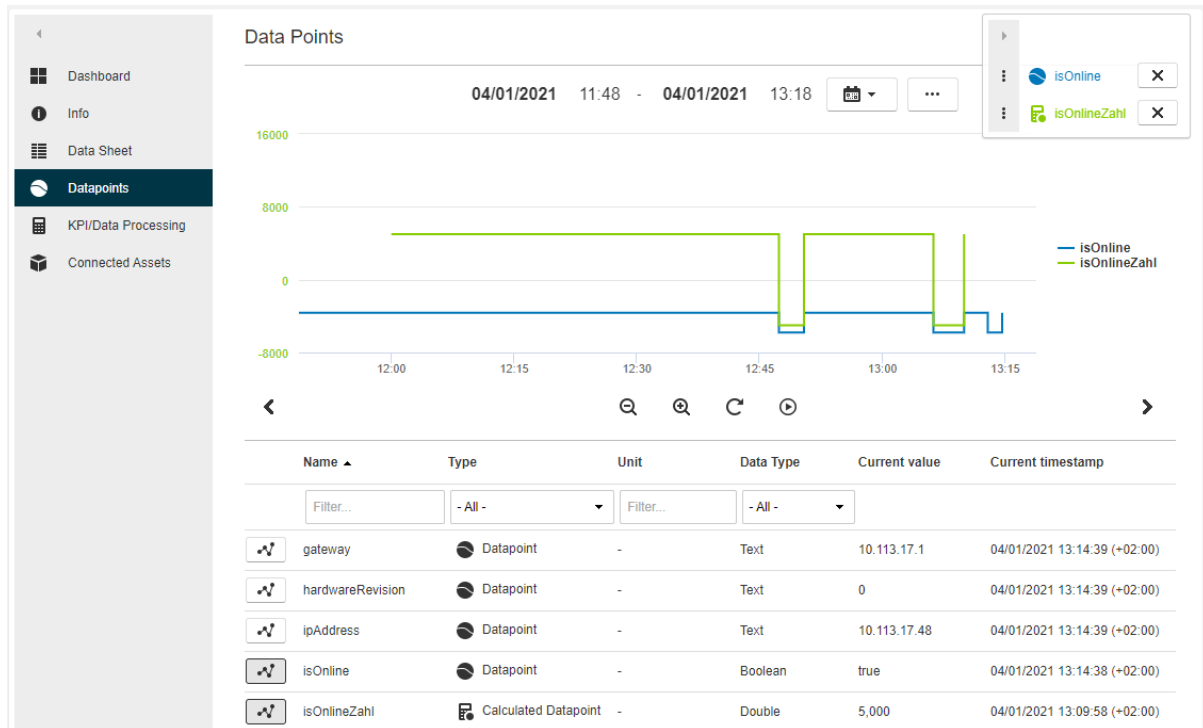
Helpers:

Save **Cancel**

- 1** The calculated datapoint appears under this name in the list of datapoints
- 2** Selection for “Calculated datapoint”
- 3** Select input datapoint
- 4** The calculation is always executed directly when the input datapoint changes → no aggregation period can be selected

4.5.5.2 View in the list and option for subsequent processing

As can be seen from the datapoint overview, the newly calculated datapoint “isOnlineNumber” has appeared in the list. This datapoint can now be displayed, exported, deleted or used in KPI calculations like any other datapoint.



4.5.6 Setting up key figure calculations

4.5.6.1 Differentiation to calculated datapoints

The major difference between calculated datapoints and KPIs is the time basis. Whilst calculated datapoints allow immediate conversion of a datapoint, KPIs are provided to be able to process data over a certain period.

Therefore, for KPIs so-called processing periods of 15 minutes, 30 minutes and 60 minutes are available. The processing period defines the cyclic interval at which a result is available. The result in turn is based on the datapoint values which have accumulated during the processing period.

A few example calculations can be viewed in the appendix in Chapter 8.4.

4.5.6.2 Creating an example

The screenshot shows the 'Edit Data Processing Definition' window. It includes a sidebar with navigation icons, a main configuration area, and a bottom section with 'Save' and 'Cancel' buttons. Numbered callouts are placed as follows:

- 1**: Points to the 'Publish as ...' section where 'KPI' is selected.
- 2**: Points to the 'Add Input Datapoint' button.
- 3**: Points to the 'Starting hour' dropdown menu.
- 4**: Points to the 'Initial Value' toggle switch.
- 5**: Points to the code editor containing the line `1 result = RisingEdge[input_0];`.
- 6**: Points to the 'Preview output' button.

- 1** Selection for KPI
- 2** Select input data point(s) which are required for the calculation
- 3** Define processing period and set the desired start time of the calculation
- 4** If an existing datapoint value from a previous period is to be ignored, then deactivate Initial Value
- 5** If the calculation covers multiple partial results → select return value explicitly
- 6** Using Output preview, check whether the calculation provides the desired result

4.5.6.3 Special features



If a calculation is saved and opened again later, then the starting point is set to the current date. If this is not wanted, it must be changed manually to reflect the correct starting point. If the screen was only opened for viewing and was closed without saving, then this adjustment is not required. The date which was set the first time the calculation was saved still applies



Although datapoints of the “Text” data type can be selected as an input datapoint, the formula language is not able to process their content. The datapoints with the data types “Boolean”, “Long” and “Double” can be processed



If the name of a calculation is modified and saved retrospectively, then the widgets which use the calculation must be reconfigured. Otherwise the following error is shown: “The KPI(s) with the name ‘xxx’ can not be loaded – please assure your configuration”

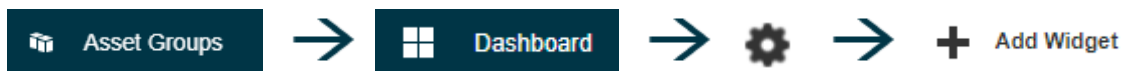
4.5.7 Presentation using dashboard widgets

Now that the KPIs have been calculated, they still need to be presented on the dashboards. The calculations are created separately for each asset. They are always available on their asset dashboards for presentation, but also on the dashboard of their asset group if the asset belongs to an asset group.

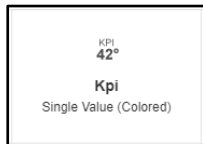
Navigation:



or:



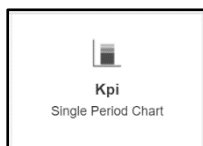
4.5.7.1 Single value



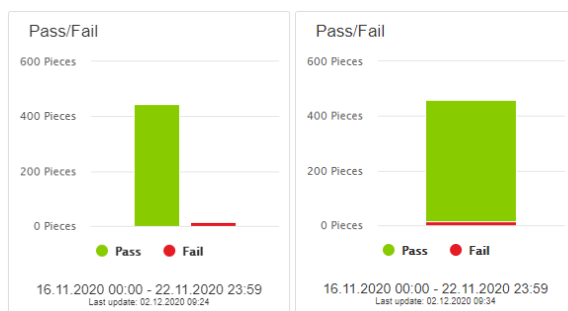
Presentation of a simple numerical value:



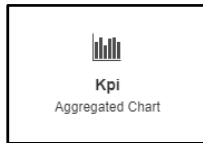
4.5.7.2 Single-period chart



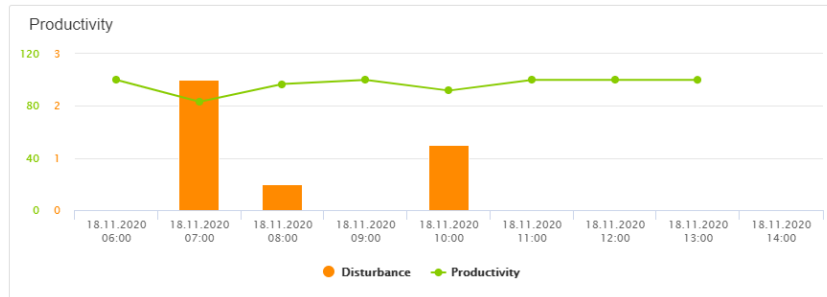
Presentation of a stacked bar chart:



4.5.7.3 Aggregated chart



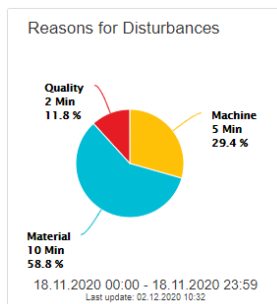
Combination of bar and line charts:



4.5.7.4 Pie chart



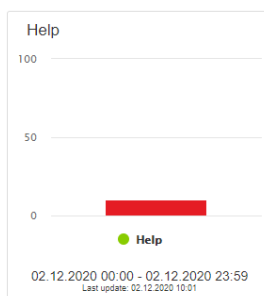
Presentation of a pie chart:



4.5.7.5 Single-value column



Presentation of a bar chart (threshold values for color changes are adjustable):



4.5.8 Configuration screen

Change Settings

Headline 1

Aggregation type 2

Unit

Stack KPIs 3

Stacked chart

Date Range 4

09/06/2021 00:00 - 09/13/2021 00:00

Working Shift 5

Mon Tue Wed Thu Fri Sat Sun

from 08:00 to 16:00

Add KPI 6

Apply

Cancel

- 1 Title freely selectable
- 2 Define aggregation type (for details see Chapter 4.5.8.2)
- 3 Show diagrams stacked or next to each other
- 4 Select presentation time period (for details see Chapter 4.5.8.1)
- 5 Refine presentation time period based on working shifts
- 6 Selection of the KPI calculation(s) to be presented via this widget

4.5.8.1 Presentation time period

The selected period of time determines whether the available calculation results flow into the presentation.

As shown in the graphic, you can choose between certain predefined time periods. This could be for example today, the last week, or the last month. If you select a period of time in the category “Last” or “Previous”, then it is also possible to decide how many past hours/days/weeks/months are taken into account:

The period of time selected is shown by the date information under the selection field. The period of time changes dynamically as time progresses (except for the “user-defined” time window).

The “Working Shift” slider allows working days and working times to be taken into account when specifying the period of time for the presentation.

In the example, only calculation results from Monday to Friday between 8 am and 4 pm in the current week are taken into account in the presentation.

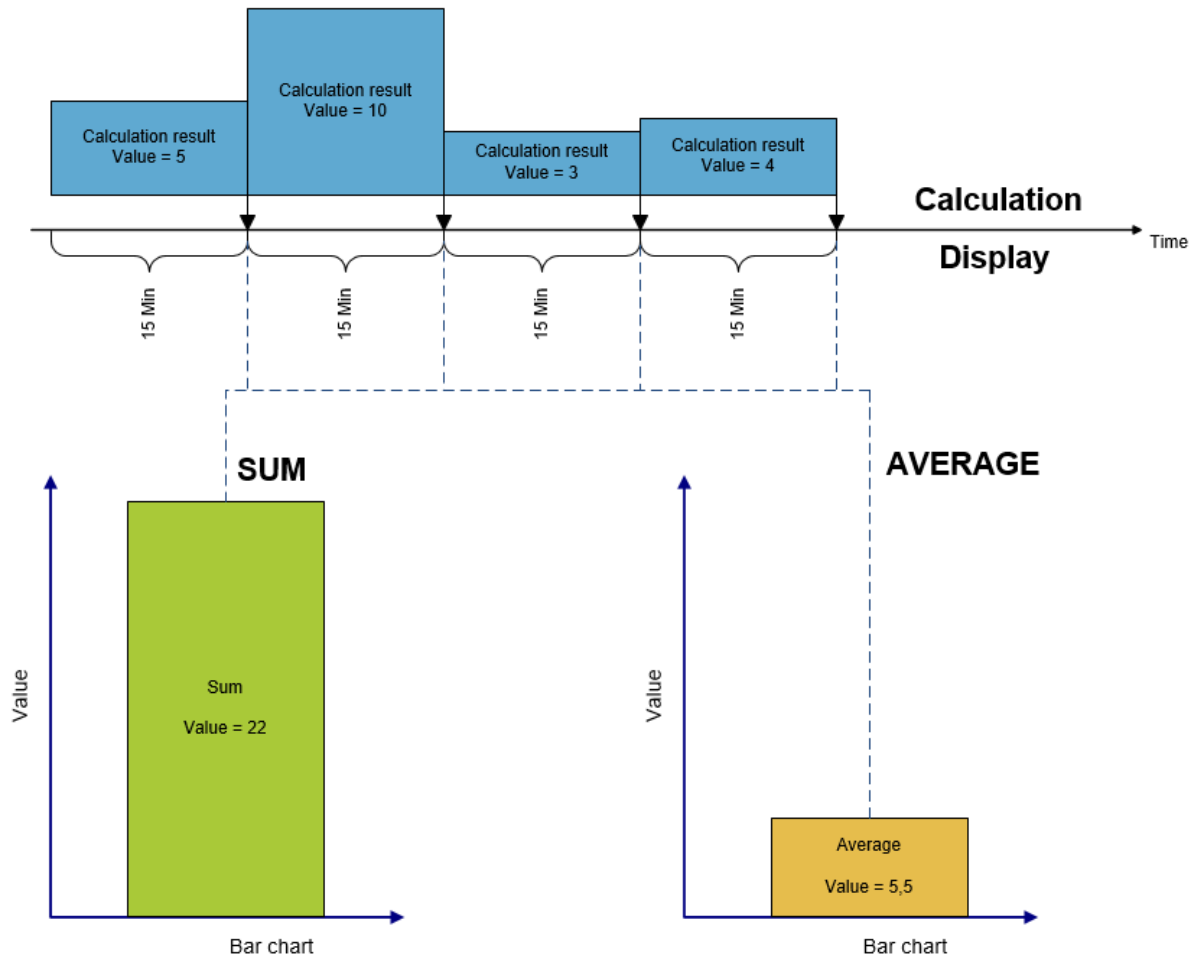
4.5.8.2 Aggregation

As described in Chapter 4.5.2, when calculating the KPIs, a pre-aggregation takes place over a time period of 15, 30, or 60 minutes. This is already defined when creating the KPI definition (calculation). On the other hand, for presentation, the specific time period was selected which is of interest for the user. Now the user must still decide how the calculation results are to be presented in this time period.

The following aggregation types are available:

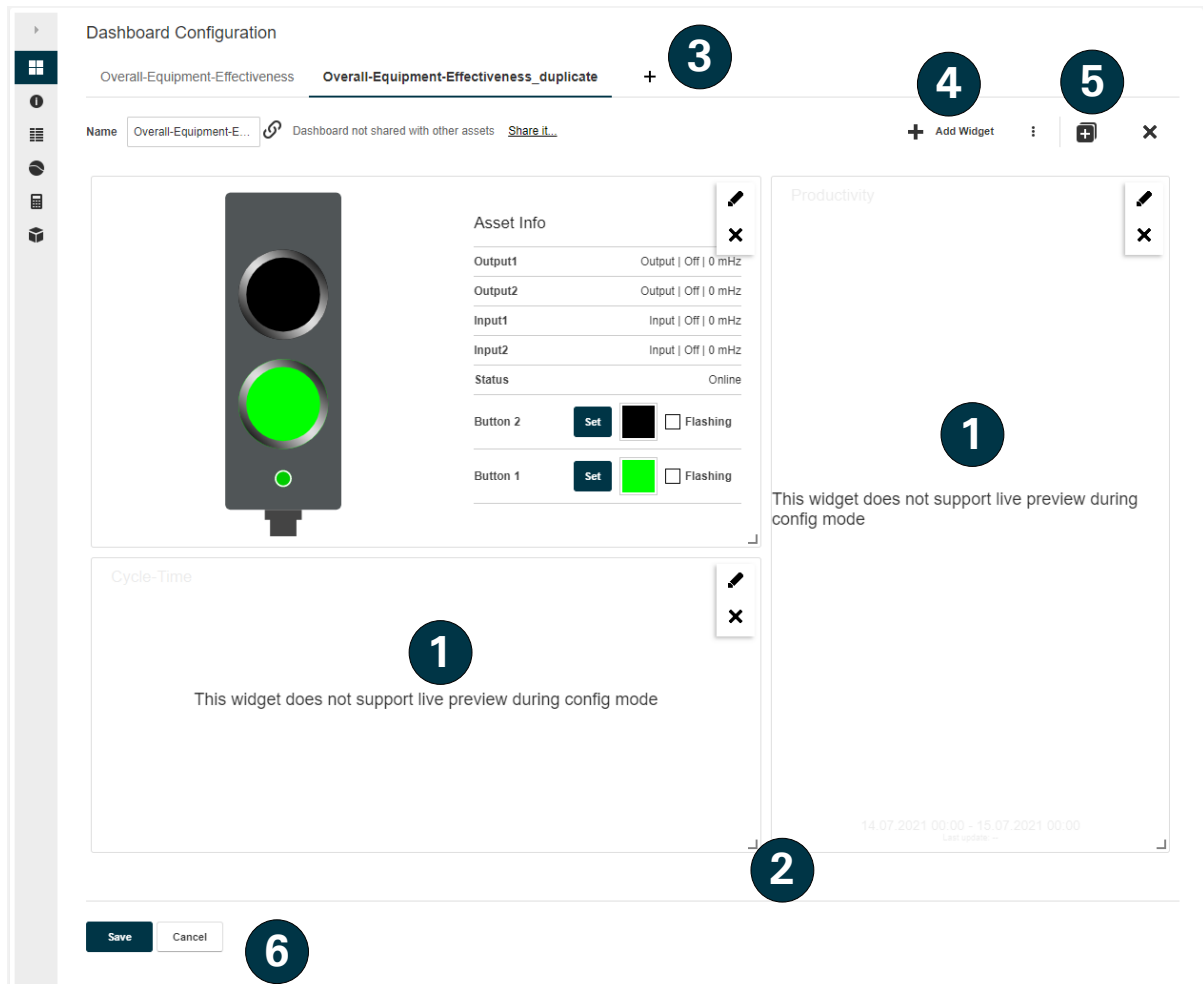
- ➔ SUM - Sum
- ➔ AVERAGE - Average
- ➔ MAX - Maximum
- ➔ MIN - Minimum

Example – presentation time period 1 hour with a calculation period of 15 minutes:



4.5.8.3 Setting up a dashboard

Once the KPI widget is configured, it is placed on the dashboard. Here there are still a few options for adjusting the presentation:

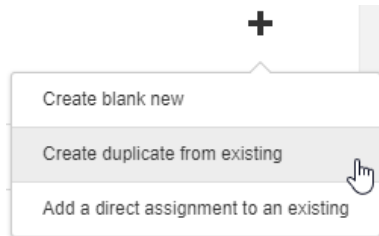


- 1 KPI widgets
- 2 Change the size of the widget by clicking and dragging
- 3 Add additional dashboard
- 4 Add additional widget
- 5 Duplicate dashboard
- 6 Save changes to dashboard

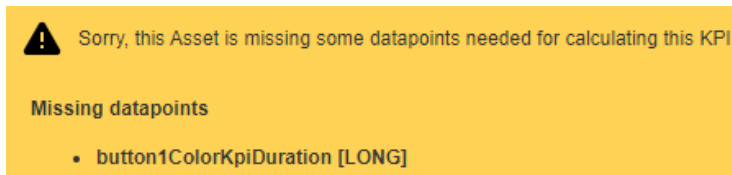
4.5.9 Practical tips Key figures

→ Duplicating calculations

If a calculation is to be used multiple times, then it does not need to be created from scratch every time. Existing calculations can be duplicated – including from one asset to another.

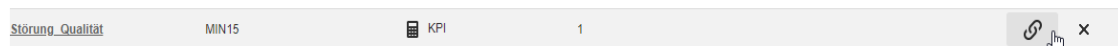


After selection, the duplicated calculation is marked with the designation `_duplicate`. If datapoints were used in the calculation which the target asset does not have, then the KIS.MANAGER highlights this with a warning:



→ Sharing calculations

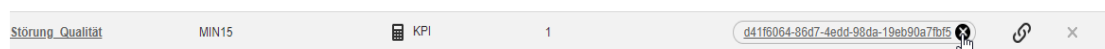
When calculations are duplicated, no dependency is created between the source and the target. However, when a calculation is shared, the calculation is shared and linked with a complete asset group:



The consequence of sharing is that the calculation appears in the calculation overview of each asset belonging to the asset group. It can also be opened there for editing. Since a link exists, a change has a global effect.

Even though the calculations are linked, this only relates to the formulas. The datapoints continue to be individual for each asset and a separate calculation result will be available for each asset as a result.

Sharing is ended again in the calculation overview:



→ Deleting datapoints

Datapoints can be deleted partially or fully. Partially means that the history in a selected time period is deleted.

Example scenarios of when deletion would be used:

- During commissioning, implausible datapoint values occurred, which should not be included in the analysis
- A calculated datapoint is no longer required and must be removed again from the list of datapoints



If a datapoint is deleted accidentally and it is important for device functions, then this does not affect the communication between the KIS.MANAGER and KIS.Device. The history of the datapoint is lost, however during the next message between the KIS.Device and KIS.MANAGER, the affected datapoint is added once more.

5 Update mechanisms

5.1 Feature update for KIS.MANAGER

As a cloud-based platform, KIS.MANAGER can be maintained and kept up to date from a central location. Updates are carried out by RAFI, you do not need to update manually. New features are provided in the same way. The user is informed about the availability of new features when logging in.

5.2 Firmware update for KIS.Devices

The KIS.MANAGER is used to roll out firmware updates to the KIS.Devices. Updates are provided by RAFI over-the-air, you do not need to install them yourself.



While a firmware update is being carried out (status LED of the device illuminates turquoise), do not disconnect the KIS.Device from the power supply. Otherwise, the firmware may be damaged irreparably.

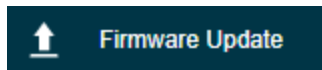
5.2.1 New firmware update available

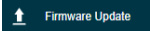
If a new firmware update is available, the admin user is notified by e-mail. This e-mail also includes the latest deadline for the implementation.

No specific implementation date is provided on purpose so that the customer can schedule the update time as needed on a license-specific basis.

KIS.MANAGER also shows whether a new firmware update is available.

5.2.2 Asset group – firmware update scheduling





If you select the  menu option for a specific asset group, you can see whether a firmware update is scheduled.

Update is scheduled:

Firmware Update

We have scheduled a firmware update for your devices to improve stability and performance.

Latest execution date	11/23/2020 00:00:00 (+01:00) 
Actual execution date	11/23/2020 00:00:00 (+01:00) 

Change actual execution date

Only assets in this workspace will be affected by a change of the actual execution date.

No update scheduled:


Firmware Update

Currently, there is no firmware update scheduled.

The customer-specific scheduling of an update is also carried out here:

Firmware Update

We have scheduled a firmware update for your devices to improve stability and performance.

Latest execution date	11/23/2020 00:00:00 (+01:00) 
Actual execution date	<input type="text" value="11/09/2020 14:30"/>

Save actual execution date

Cancel

Only assets in this workspace will be affected by a change of the actual execution date.

In this example, the update will be carried out on 2020/11/09 at 14:30. Scheduling can be set at 30-minute intervals.

The following applies when scheduling:

- The latest point in time for a firmware update is specified by RAFI
- General scheduling of a firmware update can be done in the asset group with the definition “Inventory” → all devices included
- Specific scheduling of a firmware update can be done for each asset group with the definition “Workspace” → specific number of devices included

The changes made to the firmware can be seen here:

<https://www.kisme.com/en/changelog>


5.2.3 Behavior of KIS.Device during firmware update



While a KIS.Device carries out an update, the status LED flashes turquoise (see Chapter 2.5.4).



While a firmware update is being carried out, do not disconnect the KIS.Device from the power supply! Otherwise, the firmware may be damaged irreparably!

The success of the update can be viewed per asset in the  Info menu option:

Firmware Update

Desired Properties	
Job Id	1 cbc37534-00eb-4677-a83b-b8dba32ebcf8
Reported Properties	
Job Id	2 cbc37534-00eb-4677-a83b-b8dba32ebcf8
Bundle Id	48ed84b3-4366-4c73-80bc-50a820de8db5
Bundle Version Id	9033e47c-0114-4ebe-8076-2d5c301fa23e
Update Status	3 SUCCESS
Sequence Number	1604415623857

- 1** Desired Properties = TARGET firmware status
- 2** Reported Properties = ACTUAL firmware status
- 3** Update Status: NONE / IN_PROGRESS / SUCCESS / SKIPPED / ERROR
 - SKIPPED: Update not required since firmware up to date
 - ERROR: Update failed, ERROR code for support questions in brackets behind the status message → e.g.: ERROR (Code 2)

6 Infrastructure and system requirements

6.1 Recommended WLAN infrastructure

KIS.Devices require a connection to the internet, no access to production or office networks. Therefore we recommend operating the KIS.Devices in a dedicated network.

6.2 Browser recommendation

Recommended browsers (in each case the latest version):

- Google Chrome
- Microsoft Edge
- Mozilla Firefox

No local software is required.

6.3 Terminal device recommendation

We recommend you use a desktop PC or a tablet to operate your KIS.MANAGER.

7 FAQs and support

7.1 FAQs

	Keyword	Question	Answer
A	Connection / cable	Which cables do I need	All devices have a standard M12 connection. Suitable cables are available from numerous suppliers (e.g. Murr Elektronik)
A	Assets (devices) display	Why are devices (assets) not visible for all users	Users are authorized for asset groups. The user is shown the assets which are in these asset groups
A	Number of devices	How many devices can be connected together	Fundamentally unlimited. The rule engine only has a limit on the number of arguments per rule
B	Installation	How can the devices be installed/fixed	See data sheet
B	Browser	Which browsers are supported	The following browsers are recommended: Chrome, Firefox, Edge
C	Cloud service providers	Which cloud service provider hosts the data	KIS.MANAGER is hosted at Microsoft Azure in Europe.
D	GDPR	Are data privacy regulations observed	See privacy declaration
E	E-mail dispatch	How can e-mails be sent	See Chapter 4.4
F	LED colors	Which colors can the KIS.BOX and the KIS.LIGHT be activated with	White, blue, green, red, turquoise, magenta, yellow. The predefined colors can be set in the digital twin on the dashboard or in the rule engine
F	Wireless approval	What approvals do the devices have	The devices comply with the European wireless standard (ETSI) and may therefore only be operated in Europe.
G	GPIOs	How can I switch the outputs	See data sheet
G	Devices (assets) display	Why are devices (assets) not visible for all users	Users are authorized for asset groups. The user is shown the assets which are in these asset groups
G	(External) devices	Can devices from other suppliers be integrated in KIS.MANAGER	Theoretically yes. Since certificates are used on the devices, the relevant device would need one. It is easier to use the GPIOs of the KIS.Devices and control other devices via these.
I	Inputs	How can I switch the inputs	See data sheet
I	Infrastructure	What infrastructure is necessary	WLAN network (see Chapter 6.1) and power supply (either 24V or 5V) required

K	Cable / connection	Which cables do I need	All devices have a standard M12 connection. Suitable cables are available from numerous suppliers (e.g. Murr Elektronik)
K	KPI key performance indicators	How can I calculate key figures	See Chapter 3.1.5 and 4.5
L	Licenses	What license levels are available	Trial, S, M, L. The relevant functional scopes are set out in the framework agreement
L	Latency	What is the latency	An efficient MQTT protocol is used to enable the shortest possible runtimes. However, the runtime depends on the integral system (KIS.Device->AccessPoint->Router->KIS.Manager-> and back)
L	Login	How can I log in	Initial registration via https://kisme.de Login via https://kismanager.rafi.de
L	Local operation	Is local operation (without cloud) possible	Planned
M	Assembly	How can the devices be installed/fixed	See data sheet
O	Outputs	How can I switch the outputs	See data sheet
P	Protocols	What protocols are used	MQTT over TLS
R	Response time	What influences the response time	An efficient MQTT protocol is used to enable the shortest possible runtimes. However, the runtime depends on the integral system (KIS.Device->AccessPoint->Router->KIS.Manager-> and back)
R	Rules	How can I create rules	See Chapter 3.2.4
S	Security	What security measures are provided	We follow the “security-by-design” approach. MQTT over TLS is used as the protocol. Certificates are also used for secure authentication. All devices can be updated. Only software packages signed by RAFI can be updated
S	SMS notification	Is an SMS notification possible	At present only e-mail notification is possible
S	Shop floor plan	How can I upload a shop floor plan	See Chapter 4.2

S	Power supply	What power supply is required	24V or 5V. For details, see data sheet
S	SAP	Is a connection to SAP or another ERP system possible	Datapoints are generally available in CSV format. However, you would need to implement a suitable specific interface
S	Shop floor plan	Why can the floorplan image not be uploaded	The file size of the SVG file must not exceed 1 MB
S	Language	Can KIS.MANAGER be changed to German	KIS.MANAGER is deliberately only available in English
T	Technical data	What is the technical data of the devices?	See data sheet
U	Updates	When and how are updates rolled out	See Chapter 5
U	Creating users	How can I create new users	See Chapter 2.4.1
W	WLAN credentials	Are my WLAN credentials secure	We do not store or transmit any WLAN credentials you enter on our homepage. These are only stored in an encrypted ZIP archive, so that they can be copied to the devices via USB. Various security measures have been implemented on the device to prevent access
W	WLAN encryption	Which WLAN encryption is supported	All devices support the WPA2-PSK encryption procedure. Here, only the SSID and password are required.
W	WLAN infrastructure	How can the devices be integrated within an existing infrastructure	See Chapter 6.1
W	WLAN access details	How do I get my WLAN access details onto a device	See Chapter 2.5
Z	Approval	What approvals do the devices have	The devices comply with the CE approval process and the European wireless standard (ETSI) and may therefore only be operated in Europe.
Z	Access details	How can I log in	Initial registration via https://kisme.de Login via https://kismanager.rafi.de

Z	Certificates	Can I also install own certificates on the devices (e.g. for WPA-Enterprise)	Theoretically yes, but this would need to be checked specifically
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7.2 Support

If you have any questions regarding KIS.ME, please contact the KIS.ME support team:

E-Mail: support.kisme@rafi-group.com

The support level and the guaranteed response time depend on your license level. You can find details in the appendices of the framework agreement.

8 Annex

8.1 Table with typical evaluations of datapoints

The following table lists which datapoint is typically used for which evaluation:

Datapoint	Evaluation	Data type	Special feature
button1Pressed button2Pressed	Number of button presses	Boolean	- Updates every 15 minutes
input1Status input2Status	Number of states at input Duration of states at input	Boolean	
output1Status output2Status	Number of states at output Duration of states at output	Boolean	
button1ColorKpi button2ColorKpi led1ColorKpi	Number of color states	Long	- Each color has a defined number (see 8.2) - Updates every 15 minutes (value: 99)*
button1ColorKpiDuration button2ColorKpiDuration led1ColorKpiDuration	Duration of color states	Long	- Each color has a defined number (see 8.2) - Updates every 15 minutes
isOnline	Duration of online states	Boolean	

*The datapoint values are updated every 15 minutes, even if no change has taken place. When counting color states, this can lead to incorrect results. For example, if the color state 0 (blue) is present for an extended period, then during each datapoint update it would be counted again. To avoid this, during the cyclic update the value 99 is entered instead of that of the color state. 99 means that the color state persists, however it does not trigger the KPI calculation again.

Important: this only applies for counting the color states and the datapoints listed in the table in the corresponding row.

8.2 Table for translating LED colors into numbers

To enable the use of colors in analyses, they have been assigned a numerical value. The table below shows which color belongs to which number:

Color	RGB-hex code	Number
	Example: values of the datapoint button1Color	Example: values of the datapoints button1ColorKpi and button1ColorKpiDuration
Blue	#0000FF	0
Turquoise	#00FFFF	1
Black	#000000	2
Green	#00FF00	3
Magenta	#FF00FF	4
Red	#FF0000	5
White	#FFFFFF	6
Yellow	#FFFF00	7

8.3 Operators in the FLEX language

1. Numerical operations

Function	Description	Example	Data type
Plus[] or +	Plus	result = Plus[Var1, Var2] result = Var1 + Var2	Double Long
Time[] or *	Times	result = Time[Var1, Var2] result = Var1 * Var2	Double Long
Power[] or ^	Power	result = Power[Var1, 2] result = Var1 ^ 2	Double Long
Round[]	Round to next whole number	result = Round[Var1]	Double Long
Abs[]	Value	result = Abs[Var1]	Double Long

2. Logical operations

Function	Description	Example	Data type
And[] or &&	And	result = And[Var1, Var2] result = Var1 && Var2	Boolean
Or[] or	And/or	result = Or[Var1, Var2] result = Var1 Var2	Boolean
Not[] or !	Not	result = Not[Var1] result = !Var1	Boolean
Xor[]	Either or	result = Xor[Var1, Var2]	Boolean

3. Comparative operations

Function	Description	Example	Data type
Greater[] or >	Greater than	res = Greater[Var1, Var2] res = Var1 > Var2	Double Long
Less[] or <	Less than	res = Less[Var1, Var2] res = Var1 < Var2	Double Long
Equal[] or ==	Equal to	res = Equal[Var1, Var2] res = Var1 == Var2	Double Long
Unequal[] or !	Not equal to	res = Unequal[Var1, Var2]	Double Long
GreaterEqual[] or >=	Greater than or equal to	res = GreaterEqual[Var1, Var2] res = Var1 >= Var2	Double Long
LessEqual[] or <=	Less than or equal to	res = LessEqual[Var1, Var2] result = Var1 <= Var2	Double Long

4. Data aggregation (over defined “processing period”)

Function	Description	Example	Data type
Sum[]	Sum of numerical values	result = Sum[Var1]	Double Long
Mean[]	Mean value of numerical values	result = Mean[Var1]	Double Long
Count[]	Number of data inputs	result = Count[Var1]	Boolean
Max[] or Min[]	Maximum / minimum of numerical values	result = Max[Var1] result = Min[Var1]	Double Long
First[] or Last[]	First / last value of a period	result = First[Var1] result = Last[Var1]	Double Long
Stdev[]	Standard deviation	result = Stdev[Var1]	Double Long
Percentil[]	Calculates the defined percentile	result = Percentil[Var1, 99]	Double Long
RisingEdge[]	Number of rising edges	result = RisingEdge[Var1]	Boolean
FallingEdge[]	Number of falling edges	result = FallingEdge[Var1]	Boolean

5. Intervals

Function	Description	Example	Data type
Start[]	Returns the start timestamp of a state	result = Start[Var1]	Double Boolean Long
End[]	Returns the end timestamp of a state	result = End[Var1]	Double Boolean Long
Duration[]	Returns the duration of a condition/state in milliseconds	result = Duration[Var1]	Double Boolean Long
Interval[]	Returns the duration of set processing period in milliseconds	result = Interval[]	-

6. Other functions

Function	Description	Example	Data type
Counter[]	Returns the difference between each value change	result = Counter[Var1]	Double Long
Filter[]	Filters out implausible data	result = Filter[Var1 > 10 && Var1 < 100]	Double Long
If[]	If, then, else – based on true value	result = If[Var1, 1, 0]	Boolean

8.4 Example KPI formulas

Designation	Datapoints	Formula	Description
DurationColor_KIS.BOX	button1ColorKpiDuration (as "led_button1")	Button1Blue = Round[Sum[If[led_button1 == 0, Duration[led_button1], 0]] / 60000];	Duration of color state in minutes (blue in this example)
DurationColor_KIS.LIGHT	led1ColorKpiDuration (as "led1")	LedBlue = Round[Sum[If[led1 == 0, Duration[led1], 0]] / 60000];	Duration of color state in minutes (blue in this example)
DurationOnline	isOnline (as "input_0")	DurationOnline = Round[Sum[If[input_0, Duration[input_0], 0]] / 60000];	Duration of online state in minutes
DurationOffline	isOnline (as "input_0")	DurationOffline = Round[Sum[If[Not[input_0], Duration[input_0], 0]] / 60000];	Duration of offline state in minutes
DurationOutput	output1Status (as "output1")	DurationOutput1 = Round[Sum[If[output1, Duration[output1], 0]] / 60000];	Duration of high state of a digital output
DurationInput	input1Status (as "input1")	DurationInput1 = Round[Sum[If[input1, Duration[input1], 0]] / 60000];	Duration of high state of a digital input
CountButtonColor_KIS.BOX	button1ColorKpi (as "led_button1")	Button1Blue = Sum[If[led_button1 == 0, 1, 0]];	Number of color states (blue in this example)
CountLedColor_KIS.LIGHT	led1ColorKpi (as "led1")	LedBlue = Sum[If[led1 == 0, 1, 0]];	Number of color states (blue in this example)
CountButtonPresses	button1Pressed (as "button1")	Button1Pressed = Sum[If[button1, 1, 0]];	Number of button presses

Designation	Datapoints	Formula	Description
CountOutputHigh	output1Status (as "output1")	Output1High = RisingEdge[output1];	Number of high states of a digital output
CountOutputLow	output1Status (as "output1")	Output1Low = FallingEdge[output1];	Number of off states of a digital output
CountInputHigh	input1Status (as "input1")	Input1High = RisingEdge[input1];	Number of high states of a digital input
CountInputLow	input1Status (as "input1")	Input1Low = FallingEdge[input1];	Number of off states of a digital input
Example_FirstPassYield	input1Status (as "passed")	NumberPassed = RisingEdge[passed]; NumberFailed = RisingEdge[failed]; Output = NumberPassed + NumberFailed; FirstPassYield = Round[100 / Output * NumberPassed]; FirstPassYieldCorrected = Filter[FirstPassYield > 0];	Pin 3 counts good parts
	input2Status (as "failed")		Pin 4 counts bad parts First-pass yield
Example_AverageCycleTime	input1Status (as "input1")	UpTimeInput1 = If[input1, Duration[input1], 0] / 1000; DownTimeInput1 = If[Not[input1], Duration[input1], 0] / 1000; CycleInput1 = Round[Mean[Filter[UpTimeInput1 > 0]] + Mean[Filter[DownTimeInput1 > 0]]];	Average cycle time between two rising edges
Example_Productivity	input1Status (as "input1")	LineCycle = RisingEdge[input1]; Productivity = Round[LineCycle / (Interval[] / 60000)];	Number of parts per time unit
Example_Output	input1Status (as "input1")	LineCycleInput1 = RisingEdge[input1];	Yield in pieces

9 Disclaimer

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