

13.4 Navigating in the *ReaderStart* User Interface

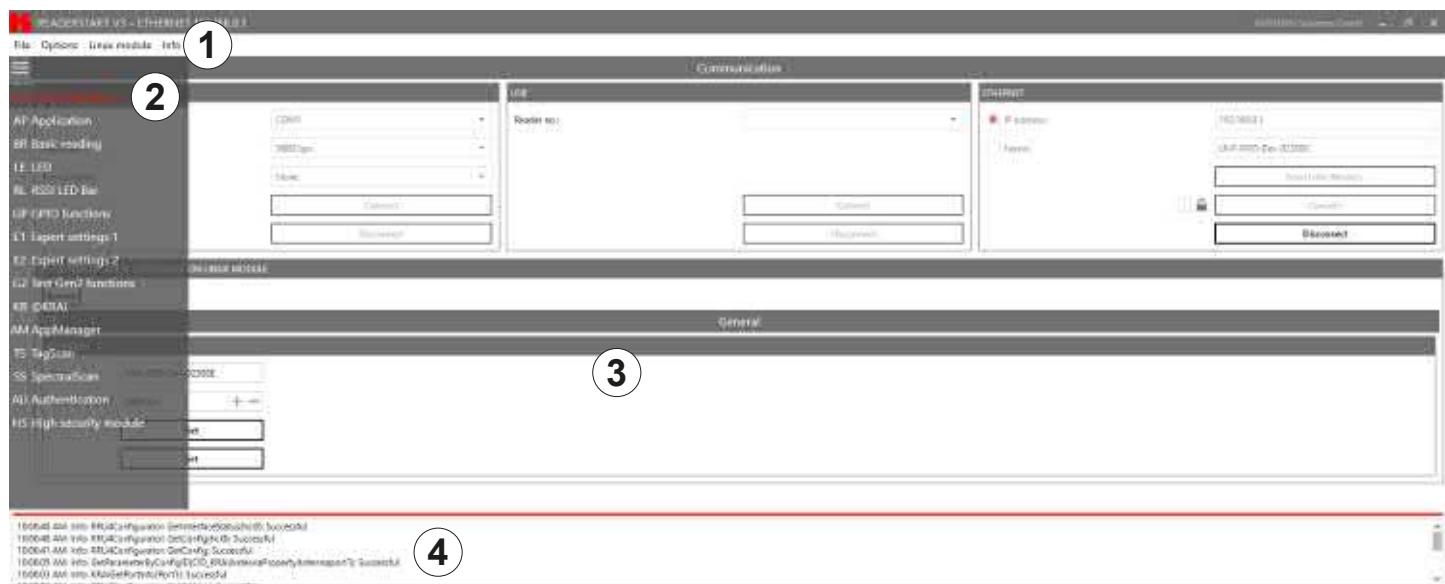


Fig. 23: *ReaderStart* user interface

The user interface of the *ReaderStart* consists of the following sections:

- menu bar (①); see *Menu Bar*, p. 52;
- settings and controls for the reader, divided into individual functional groups and situated under different tabs (②) and the contents of the tab (③), displayed in the central part of the screen; see *Operating the Reader Using the ReaderStart Software*, p. 67,
- status field containing messages from the reader and the program (④); see *Status Field*, p. 66

Tip

The contents of the tabs are considerably large and are, therefore, described in a separate chapter; see *Operating the Reader Using the ReaderStart Software*, p. 67.

13.4.1 Menu Bar

By means of the menu bar, it is possible to customise the programme to the user's requirements.

File

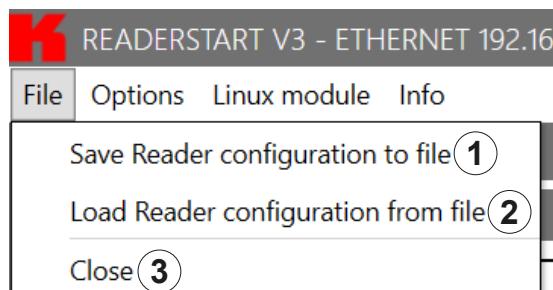


Fig. 24: Menu bar: file

①	Save reader configuration to file	saves reader configuration in an XML file
②	Load reader configuration from file	loads reader configuration from a previously saved XML file
③	Close	closes <i>File</i>

Saving Reader Configuration to File

There is a wide variety of parameters available for configuring the RF front end. It is possible to save the complete setting as a parameter set in an XML file under **File ▶ Save reader configuration to file** and to load it later.

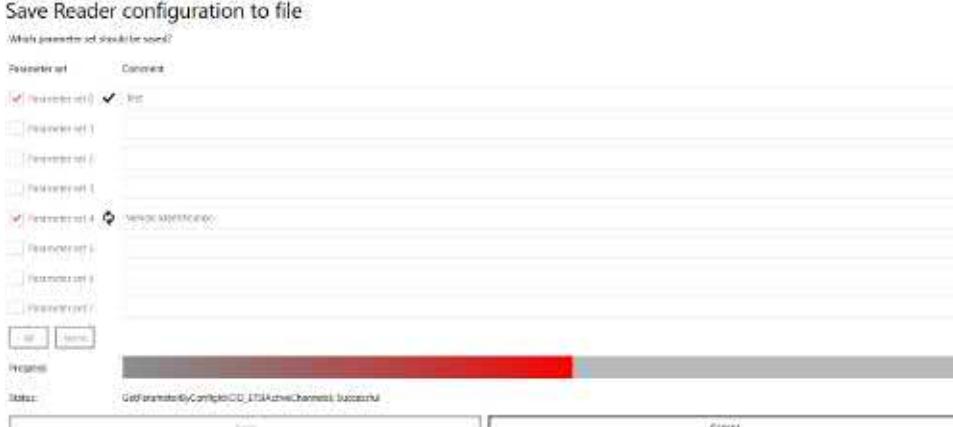
- Under **File**, click **Save reader configuration to file**.

⇒ The following window appears:



Fig. 25: File: save reader configuration to file

①	Parameter set	all available parameter sets from 0–7 ► Click the check box to select or unselect the parameter set. ⇒ The selected parameter set is marked with a tick. If the parameter is not selected, the check box is empty.
②	All	selects all parameter sets from 0–7
③	None	unselects all parameter sets from 0–7
④	Progress	shows the progress of the save operation by means of the progress bar; see also <i>Save</i> , p. 54

	<p>opens a pop-up window to select the directory in which the configuration file in the XML format will be saved and the file name for it</p> <p>To save reader configuration to file:</p> <ul style="list-style-type: none"> ✓ The parameter sets have been selected/unselected and described. <ol style="list-style-type: none"> 1. Click Save. <ul style="list-style-type: none"> ⇒ A dialogue appears. 2. Select the file name and the directory in which the configuration file will be saved. 3. Click OK. <ul style="list-style-type: none"> ⇒ The progress bar (④) shows the progress of the save operation: <p></p> <p>⇒ After the file has been saved, a pop-up message Save reader configuration to file Saving done appears.</p> <ol style="list-style-type: none"> 4. Click OK to close the pop-up message. <ul style="list-style-type: none"> ⇒ The software returns to the view shown in Fig. 25, p. 53. 5. Click the X at the top right-hand corner or press Escape on your PC keyboard to leave the dialogue. 	
⑥	Cancel	cancels the saving process

Loading Reader Configuration from File

- Under *File*, click *Load reader configuration from file*.
 ⇒ The following window appears:

Load Reader configuration from file

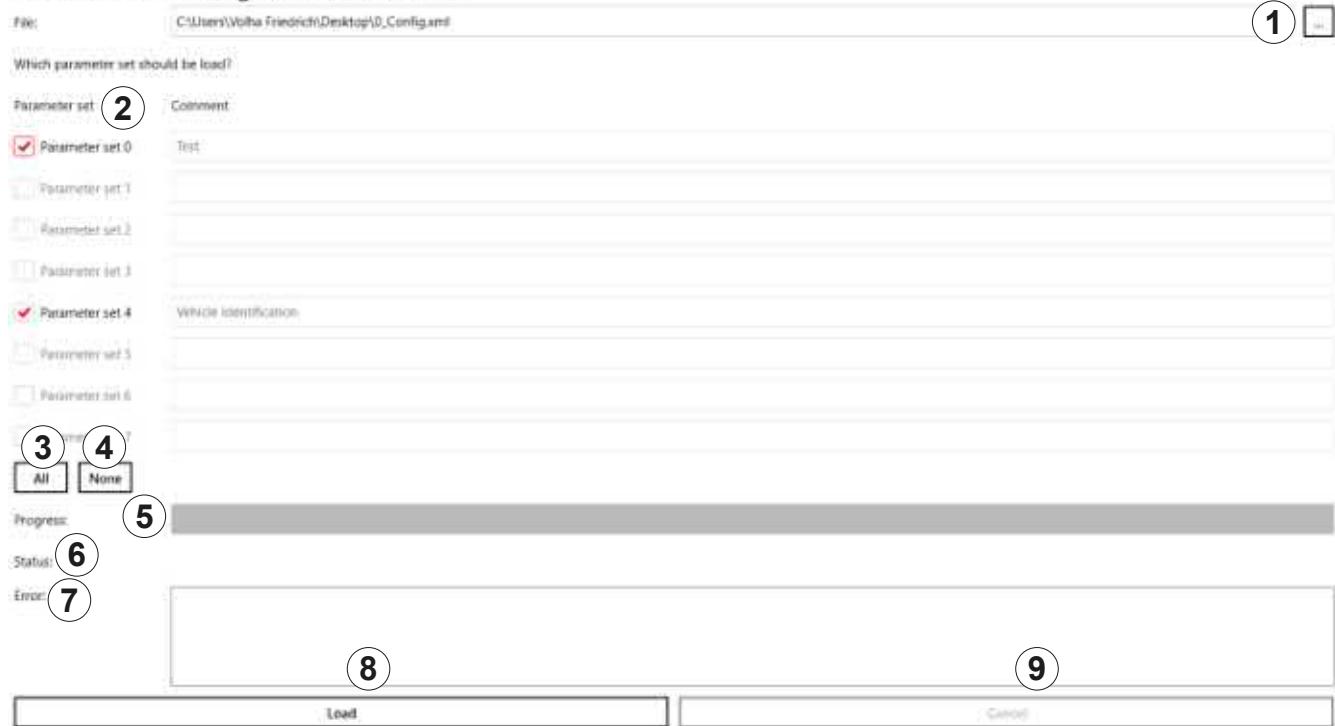


Fig. 26: File: load reader configuration from file

① File	<p>opens a dialogue to select the configuration file To load reader configuration to file:</p> <ol style="list-style-type: none"> 1. Click <i>File</i> (④ in Fig. 26). ⇒ A dialogue appears. 2. Select the directory and the configuration file from which the parameter sets will be loaded. 3. Click <i>Open</i>. ⇒ The parameter sets saved in the configuration file are loaded and are marked with a red tick. ⇒ The progress bar (⑤) shows the progress of the save operation.
② Parameter set	see <i>Parameter set</i> , p. 53
③ All	see <i>All</i> , p. 53
④ None	see <i>None</i> , p. 53
⑤ Progress	shows the progress of the load operation by means of the progress bar
⑥ Status	shows the status of the <code>SetParameterByConfigID</code> parameter
⑦ Error	shows errors in the <code>SetParameterByConfigID</code> parameter

		loads the selected parameter sets to the reader
⑧	<i>Load</i>	<p>✓ The parameter sets to be loaded have been selected/unselected.</p> <ol style="list-style-type: none"> 1. Click <i>Load</i>. <p>⇒ The progress bar (④) shows the progress of the save operation:</p>  <p>⇒ After the configuration has been loaded, a pop-up message <i>Load reader configuration from file Loading done</i> appears.</p> <ol style="list-style-type: none"> 2. Click <i>OK</i> to close the pop-up message. ⇒ The software returns to the view shown in Fig. 26, p. 55. 3. Click the <i>X</i> at the top right-hand corner or press <i>Escape</i> on your PC keyboard to leave the dialogue.
⑨	<i>Cancel</i>	cancels the loading process

Close

- Click *Close* to close the *ReaderStart*.

Options

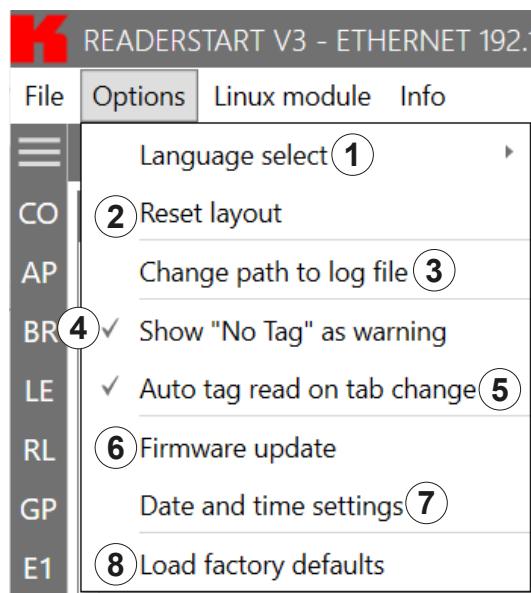


Fig. 27: Options

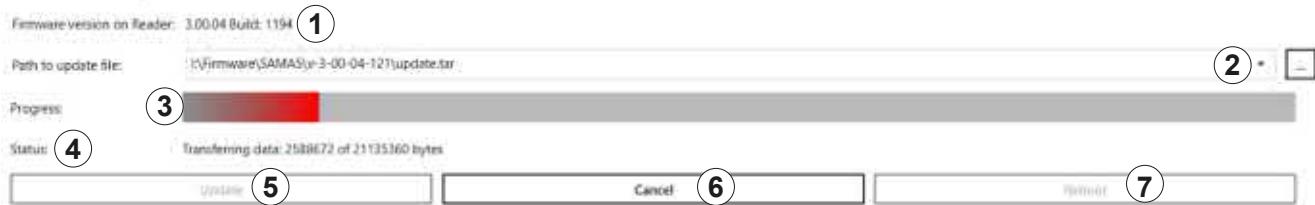
	<i>Language select</i>	selects the user interface language between <i>English/German/Spanish/French</i>
①	<i>Language select</i>	<ol style="list-style-type: none"> Click <i>Language select</i> (1) in Fig. 27). ⇒ The four languages are shown. The language applied in the user interface is marked with a tick. Click on the desired language. ⇒ A pop-up message appears: <i>Question. Please restart the programme to apply changes. Restart now?</i> Click <i>Yes</i> to restart the programme and change the language or Click <i>No</i> to cancel the changes. ⇒ If you have pressed <i>Yes</i>, the programme restarts and the language of the user interface has been changed.
②	<i>Reset layout</i>	resets the sequence of the tabs to default settings and reduces the size of the programme to the window size
③	<i>Change path to log file</i>	opens a dialogue to create a new folder/select a new directory to save logs
④	<i>Show "No Tag" as warning</i>	<p>activates or deactivates the warning (yellow) in the status field if no tag has been detected in the antenna field; see <i>Status Field</i>, p. 66</p> <p>If this parameter is not checked, the absence of the tag is shown as error (red) in the status field; see <i>Status Field</i>, p. 66</p>
⑤	<i>Auto tag read on tab change</i>	activates or deactivates reading tags after the tab change
⑥	<i>Firmware update</i>	updates the reader firmware; see <i>Updating Firmware</i> , p. 58
⑦	<i>Date and time settings</i>	sets date, time and time zone on the reader; see <i>Changing Date and Time Settings</i> , p. 59
⑧	<i>Load factory defaults</i>	loads factory default settings onto the reader; see <i>Loading Factory Default Settings</i> , p. 60

Updating Firmware

1. Click **Firmware update**.

⇒ A dialogue appears. ① shows the current firmware version.

Firmware update



2. Click on the box at **Path to update file** (②).

⇒ A dialogue opens to select the file with the current firmware.

3. Having selected the update file, click **Update** (⑤).

⇒ The reader firmware is being updated. The update progress is shown by means of the progress bar (③). The status (④) shows what the software is currently performing, e.g. *Preparing, Transferring data: 2588672 of 21135360 bytes, Flashing*.

Click **Cancel** (⑥) to stop the update process.

4. After the update has been completed, click **Reboot** (⑦) to restart the reader.

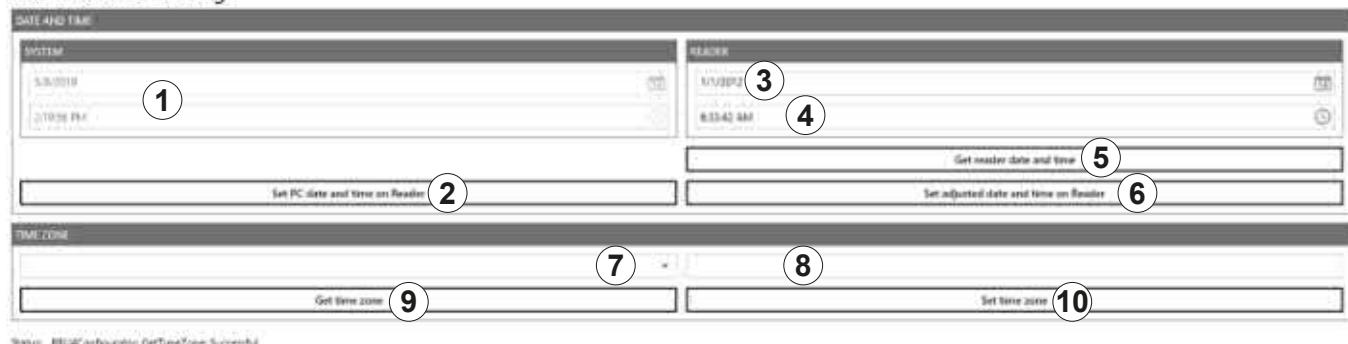
Changing Date and Time Settings

The reader has an integral clock which can deliver the time stamp for a tag operation. It is possible to set the clock using **Date and time settings** under **Options** in the menu bar. When this menu item is opened, it automatically reads the current date and time from the reader and compares this with the date and time from the host computer. The date and time of the host computer can now be loaded to the reader by pressing the **Set system date and time on Reader** button.

1. Click **Date and time settings**.

⇒ A dialogue appears. It automatically reads the current date and time from the reader (③ and ④) and compares them with the date and time from the host computer (①).

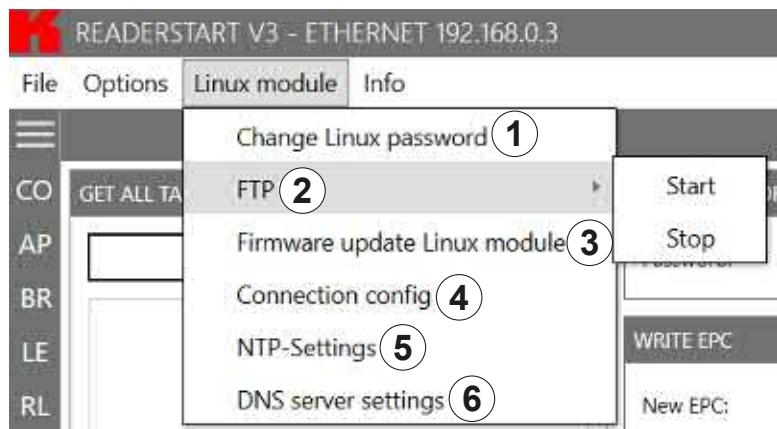
Date and time settings

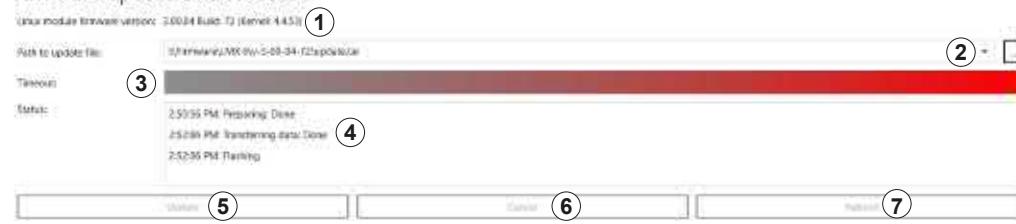


①	Date and time of the <i>ReaderStart</i> software	shows the date and time of the <i>ReaderStart</i> software; cannot be changed
②	Set PC date and time on reader	loads the system date and time shown in ① onto the reader
③	Current date of the reader	<p>shows the current date of the reader</p> <ol style="list-style-type: none"> To change the reader's date, either type the new date into the line or click on the calendar symbol in the line and select the date. Click Set adjusted date and time on reader.
④	Current time of the reader	<p>shows the current time of the reader</p> <ol style="list-style-type: none"> To change the reader's time, either type the new time into the line or click on the clock symbol in the line and select the time. Click Set adjusted date and time on reader.
⑤	Get reader date and time	reads the current date and time from the reader and displays them in ③ and ④
⑥	Set adjusted date and time on reader	sets the adjusted date and time on reader; see ③ and ④
⑦	Time zone selection	<p>selects the time zone</p> <ol style="list-style-type: none"> Click on the drop-down menu symbol (⑦). Select the continent and the city. ⇒ The time zone is displayed at (⑧).
⑧	Get time zone	reads the time zone currently set in the system
⑨	Set time zone	sets the time zone selected at ⑦

Loading Factory Default Settings

1. Click **Load factory defaults**.
⇒ A pop-up message appears: *Are you sure to load factory defaults?*
2. Click **Yes** to load factory default settings or
Click **No** to cancel the operation.

Linux Module

		changes the Linux password
①	<i>Change Linux password</i>	<p>1. To change the password, click <i>Change Linux password</i>. ⇒ The following pop-up window appears:</p>  <p>2. Type in the old password. 3. Type in the new password. 4. Confirm the new password. 5. Click <i>OK</i> to change the password or Click <i>Cancel</i> to stop the process.</p>
②	<i>FTP</i>	<p>Start starts FTP server</p> <p>Stop stops FTP server</p>
③	<i>Firmware update Linux module</i>	<p>updates Linux module firmware</p> <p>► Proceed as described in <i>Updating Firmware</i>, p. 58. Make sure to select the file to update the Linux module firmware at <i>Path to update file</i> (②).</p> 

		configures the secure connection and the backward compatibility
		Connection config
④	Connection config	<p>① ► Check <i>Allow only secure connection</i> so that all connections are secure.</p> <p>② activates or deactivates compatibility to Generation 2 KBRP</p> <p>③ reads the current secure connection and backward compatibility configuration</p> <p>④ sets the secure connection and backward compatibility configuration</p>
⑤	NTP settings	enters a preferred NTP ¹⁾ server; see <i>Changing NTP Settings, p. 61</i>
⑥	DNS server settings	changes DNS server settings; see <i>Changing DNS Server Settings, p. 62</i>

Changing NTP Settings

To simplify the time setting, it is possible to enter a preferred NTP server. This way, in a defined interval, the reader retrieves the information from the NTP server and gets the time from the network, thus setting the internal time settings of the reader.

► Click **NTP settings** (②).

⇒ The following dialogue opens.



①	NTP server	enters an NTP server address, e.g. 0.pool.ntp.org
②	Interval	sets the interval in the range 0–4204967295 s to synchronise the time with the NTP server
③	Time	shows the current date and time of the reader
④	Status	shows the status of the last performed operation in the NTP settings dialogue
⑤	Get NTP server	reads the NTP server settings currently set in the system
⑥	Set NTP server	sets the NTP server selected at ①
⑦	Get interval	reads the interval currently set in the system
⑧	Set interval	sets the interval selected at ②
⑨	Get time	gets the current time of the reader
⑩	Set time via NTP	manually synchronises the time with the NTP server

¹⁾ Network Time Protocol

Changing DNS Server Settings

- Click *DNS server settings* (②).
- ⇒ The following dialogue opens.



①	<i>DNS server 1</i>	enters the DNS server address
②	<i>DNS server 2</i>	enters the DNS server address
③	<i>DNS server 3</i>	enters the DNS server address
④	<i>Search</i>	contains the local domain name
⑤	<i>Status</i>	shows the status of the last performed operation in the <i>DNS server settings</i> dialogue
⑥	<i>Get DNS server</i>	reads the DNS server settings currently set in the system
⑦	<i>Set DNS server</i>	sets the DNS server

Info

This menu item provides information about the *ReaderStart* software and the reader.

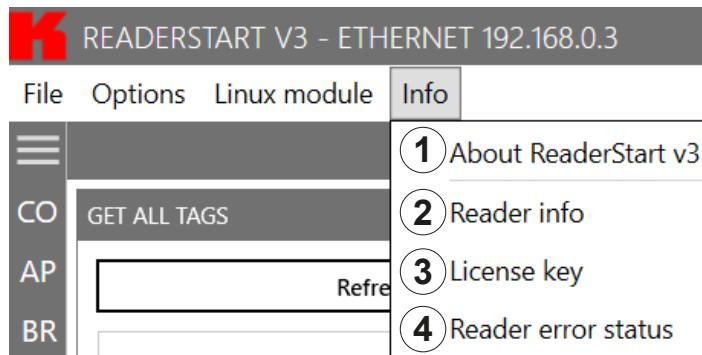


Fig. 28: Info

		shows the version number of the software and links to the licenses
①	<i>About Reader-Start v3</i>	 A screenshot of a dialog box titled "About ReaderStart v3". It contains the following text: <p>ReaderStart v3 Version: 102.002.001 Build details: 102.002.001 © KATHREIN Solution GmbH</p> The KATHREIN logo is visible to the right of the dialog.
②	<i>Reader info</i>	shows information about the reader; see <i>Showing Reader Information</i> , p. 64
③	<i>License key</i>	automatically reader the license key and show various factory-set reader parameters; see <i>Showing License Key Information</i> , p. 65
④	<i>Reader error status</i>	reads the error status of the reader and shows all errors that are outstanding in the status field

Showing Reader Information

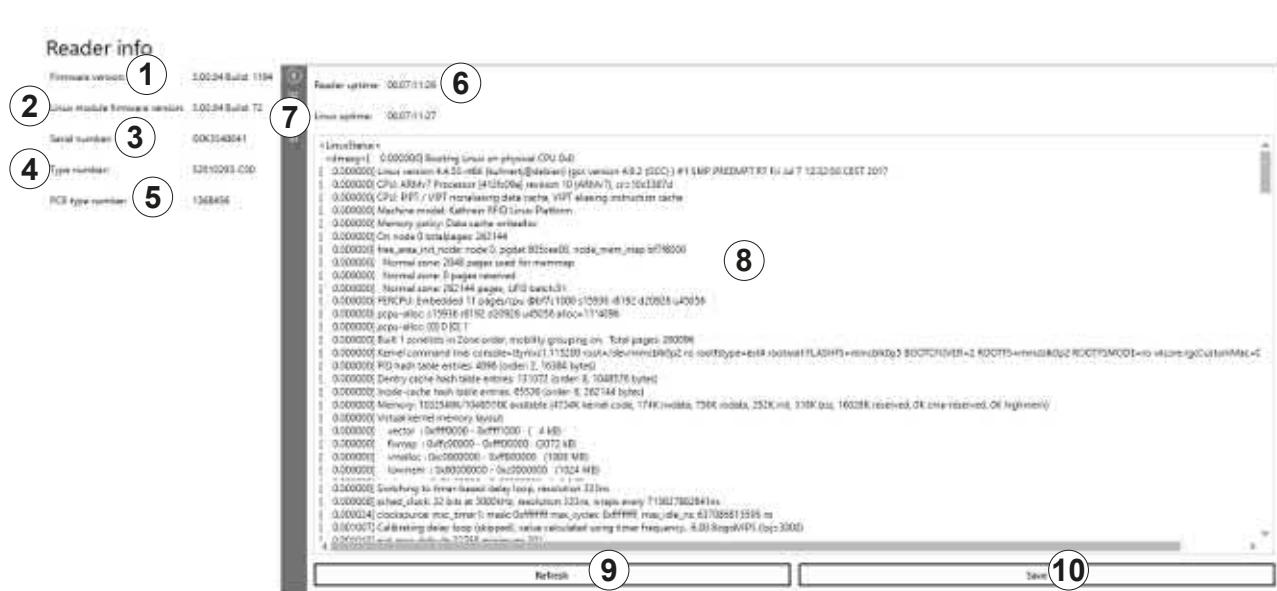


Fig. 29: Info: reader info

(1)	Firmware version	shows reader firmware version
(2)	Linux module firmware version	shows Linux module firmware version
(3)	Serial number	shows the reader's serial number
(4)	Type number	shows the reader's type number
(5)	CPU module	shows the CPU module number
(6)	Reader uptime	shows time during which the reader has been running
(7)	Linux uptime	shows time during which the Linux module has been running
(5)	Details	shows details about the reader
(9)	Refresh	updates the reader and Linux uptime
(10)	Save	saves the reader info in an XML file

Showing License Key Information

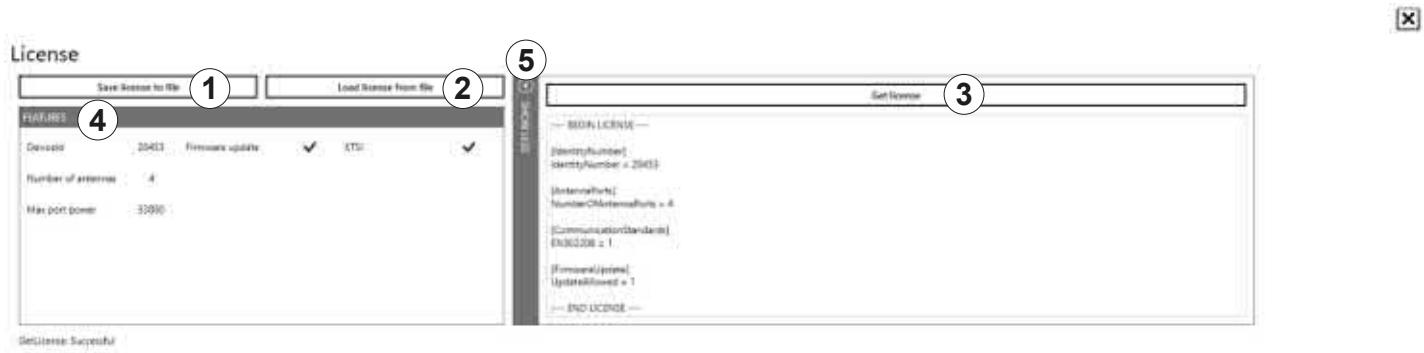


Fig. 30: Info: license key

①	Save license to file	saves the license key in a license file
②	Load license from file	loads a license key from a license file
③	Get license	shows the current license key details
④	Features	shows factory-set parameters of the reader
⑤	Show less/Show more	shows/hides the information shown in the right part of the screen under Get license



In certain cases, it is necessary to send the license key to KATHREIN Solutions GmbH.

1. To do so, click **Save license to file** (① in Fig. 30).
2. Select the file name and the destination directory.
3. Send the file to KATHREIN Solutions GmbH.

To send the file to KATHREIN Solutions GmbH:

1. Go to the support portal of the KATHREIN Solutions GmbH at <https://support.kathrein-solutions.com/>.
2. If you do not have an account yet, create an account.
3. After the successful registration, click **Ticket Tracking**.
4. Click **Add Ticket**.
⇒ A new mask appears in which you can describe your question and attach files.
5. Attach the file with the license key by clicking **Browse**.
6. Click **Save** to send the file to the KATHREIN Solutions GmbH support team.

13.4.2 Status Field

3 message types are defined, see the example below:

```

1:18:41 PM: Info: GetParameterByConfigID(CID_1|DColour|FD1): Successful
1:18:40 PM: Info: GetActiveParameterSet: Successful
1:13:18 PM: Warning: SyncGetEPGs: No tag
1:13:17 PM: Error: GetSelectFilterData(0): Non specific
1:13:17 PM: Info: GetActiveParameterSet: Successful
1:13:17 PM: Info: GetActiveParameterSet: Successful
    
```

Fig. 31: Status field

①	Info	shows which action has been recently performed
②	Warning	indicates possible problems in the structure and configuration
③	Error	indicates that the required action could not be executed

Every status message has a time stamp next to it. The status messages are arranged such that the most current one is always at the top of the list.

Tip

- ▶ To expand the status field section and see more status messages, click on the boundary line between the sections (red line in Fig. 31) and drag it upwards.
- ▶ To minimise the status field section, drag the line downwards.

The status field has a context menu which allows to deactivate warnings, information and errors in the status field. It is also possible to delete status messages.

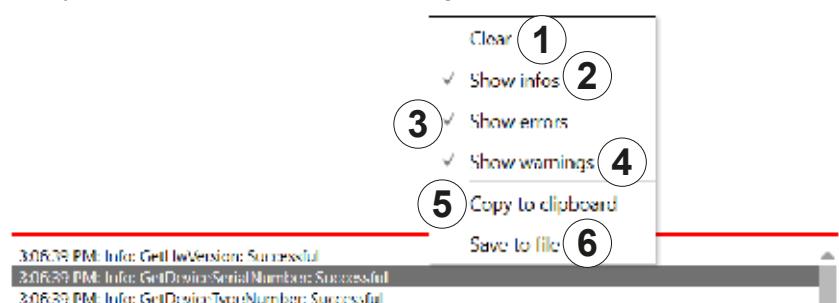


Fig. 32: Status field context menu

①	Clear	deletes all status messages
②	Show infos	shows/hides infos
③	Show errors	shows/hides errors
④	Show warnings	shows/hides warnings
⑤	Copy to clipboard	copies the status field entries to the Windows clipboard

		saves status messages in the txt. format
⑥	Save to file	<ol style="list-style-type: none"> Click Save to file. ⇒ A pop-up windows appears requiring to select the location of the file. Select the directory/folder. Click Save. ⇒ A pop-up message Saving done appears. Click OK to close the pop-up message.

14 Operating the Reader Using the *ReaderStart* Software

14.1 Communication

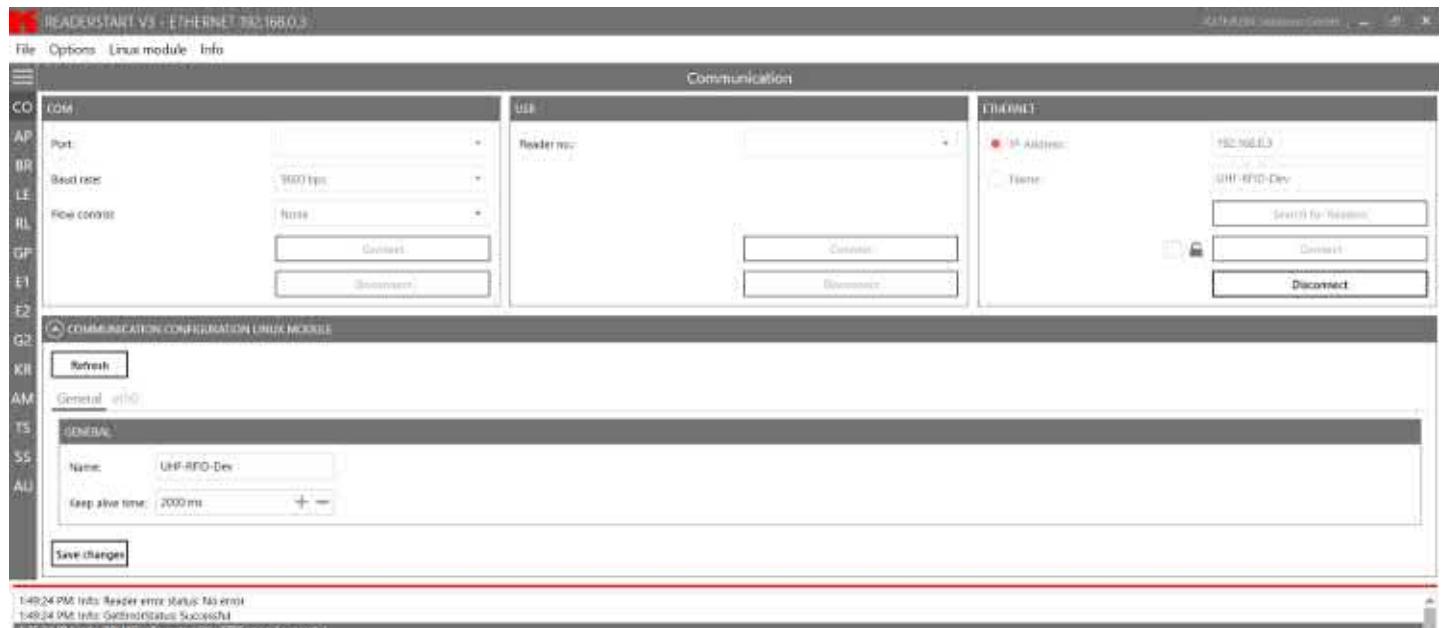


Fig. 33: Communication Tab

The communication tab groups together all the functions for establishing connections and configuring the Linux module. The various communication connections are grouped in 3 sections:

- **COM** for serial connections via the COM port (RS232/485/422); only available in the M-ARU-ETH-E6 reader (order number 52010198);
- **USB** for connections up to version USB 2.0; only available in the ERU-ETG-E4 (order number 52010190) and ERU-ETG-U4 reader (order number 52010191);
- **Ethernet** for connections via TCP/IP;
- **Communication Configuration Linux Module** section to change the Ethernet setting; see *Communication Configuration Linux Module*, p. 70

When the connection has been established, the program retrieves the information about the installed Linux module. It is possible to view and change the configuration information via the *Communication Configuration Linux Module*.

14.1.1 Ethernet Section

The Ethernet connection is established by linking the reader into an existing network or by directly connecting the reader and the control computer. To directly connect the reader to the PC, a cross-link cable is required, unless the LAN interface on the PC supports *auto-mdi-x*. Alternatively, it is possible to use two standard patch cables and a switch.

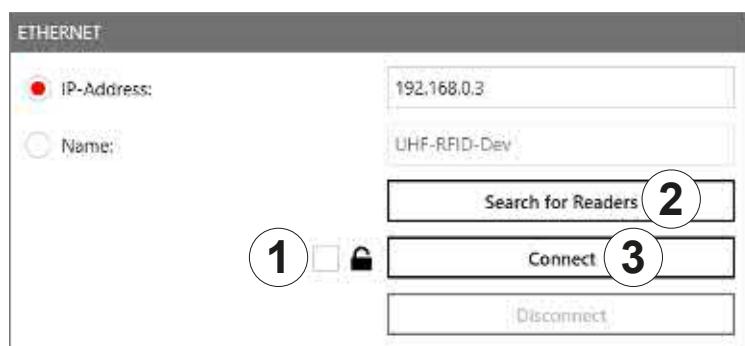


Fig. 34: Ethernet section

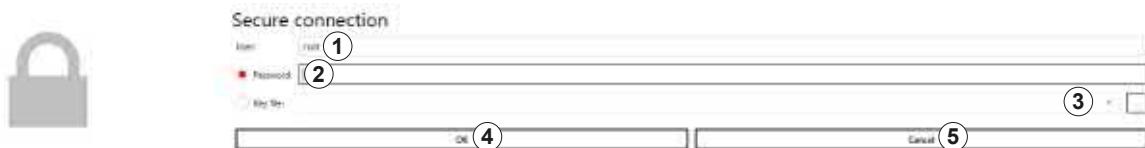
Establishing a Secure Connection

✓ The connection to the reader has not yet been established.

1. In the Ethernet section, click the box next to the lock symbol (① in Fig. 34).

2. Click **Search for Readers** (②) or **Connect** (③).

⇒ The following pop-up window appears:



3. Type in the user name at **User** (①). The default user name is *root*.

4. Enter the default password *UHF-RFID-Dev* at **Password** (②).

Tip You can change the password under *Linux module ▶ Connection config*; see *Linux Module*, p. 60.

5. If you want to use the key file instead, click the box at **Key file** (③).

⇒ A pop-up window to select the key file opens.

6. Select the key file.

7. Click **OK** to establish the secure connection.

⇒ It is possible to configure the secure connection under *Linux module ▶ Connection config*; see also *Linux Module*, p. 60.

Loading Factory Default Settings

When resetting the reader to factory default, the *ReaderStart* sends out a UDP broadcast cmd. It is only possible 30 seconds after power rebooting.



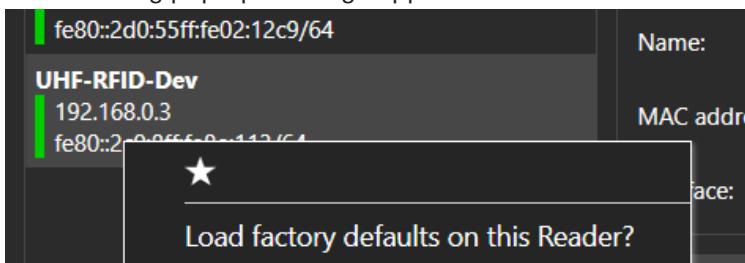
Note that this command also resets the Linux module settings, such as Linux password, network name, IP address, deactivates the auto start of the apps etc.

1. In the Ethernet section, click **Search for Readers**.

2. Select the reader onto which you would like to load the factory default settings.

3. Right-click on the reader.

⇒ The following pop-up message appears:



4. Click *Load factory defaults on this Reader*.

⇒ The pop-up message *Are you sure to load factory defaults on this reader* appears.

5. Click *Yes* to set the reader to the factory default settings.

Click *No* to cancel.

⇒ If you have clicked *Yes*, another pop-up window appears:



6. Click *Start*.

⇒ A pop-up message *Are you really sure to load factory defaults on this reader* appears.

7. Click *Yes* to set the reader to the factory default settings.

⇒ The status messages informing about the progress of the reset process are shown in the *Status* field of the pop-up window, see examples in the figure above.

8. After the factory default settings have been loaded onto the reader, click *Close*.

Selecting a Favourite Reader

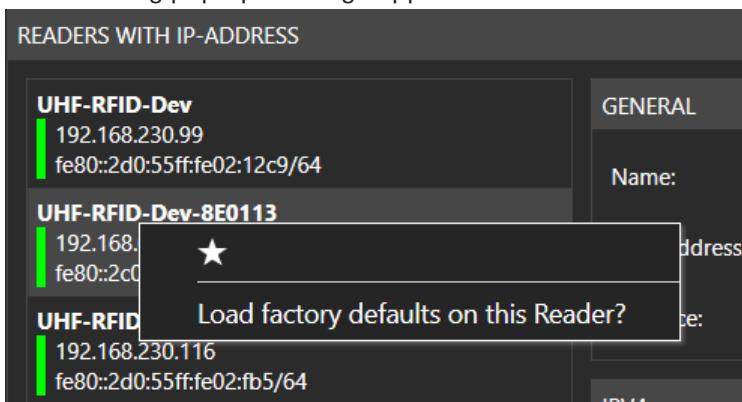
If there are many readers in the system and the user establishes connection to one reader more frequently than to the others, it is possible to select the preferred reader as a favourite reader, placing it at the top of the reader list.

1. In the Ethernet section, click *Search for Readers*.

2. Select the preferred reader.

3. Right-click on the reader.

⇒ The following pop-up message appears:



4. Click on the star.

⇒ The preferred reader is now placed at the top of the list, making it easier for the user to select it:



14.1.2 Communication Configuration Linux Module

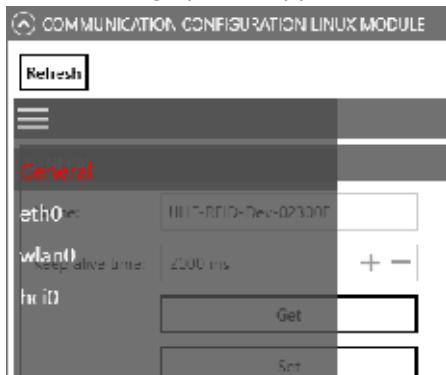


Communication Configuration Linux Module has different options, depending on the reader type.

Selecting a Linux Module Option

1. Click on the symbol.

⇒ The following options appear:



2. Click on one of the four options to change the settings.

General

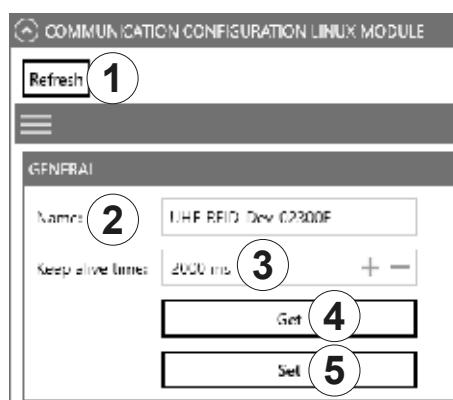


Fig. 35: Communication configuration Linux model: general

①	Refresh	reads the current settings of the communication configuration Linux module
②	Name	shows the host name of the reader which is logged onto the DNS server It is possible to address the reader using this name as an alternative to the IP address.
③	Keep alive time	specifies the intervals of time at which the reader sends a data packet to check whether the receiver is still available If the connection to the reader is broken, the reader shuts down the connection. If this parameter is deactivated (0 ms), the socket is shut down only when the reader is restarted.  If no keep-alive time is set, it may happen that the reader cannot take up any further connections because the existing connections have not been properly shut down, e.g. following a breakage in the wire. In this case, it is necessary to restart the reader. It is recommended to use the keep-alive time to check the connection between the reader and PC.
④	Get	reads the configured general settings
⑤	Set	saves new general settings

Ethernet

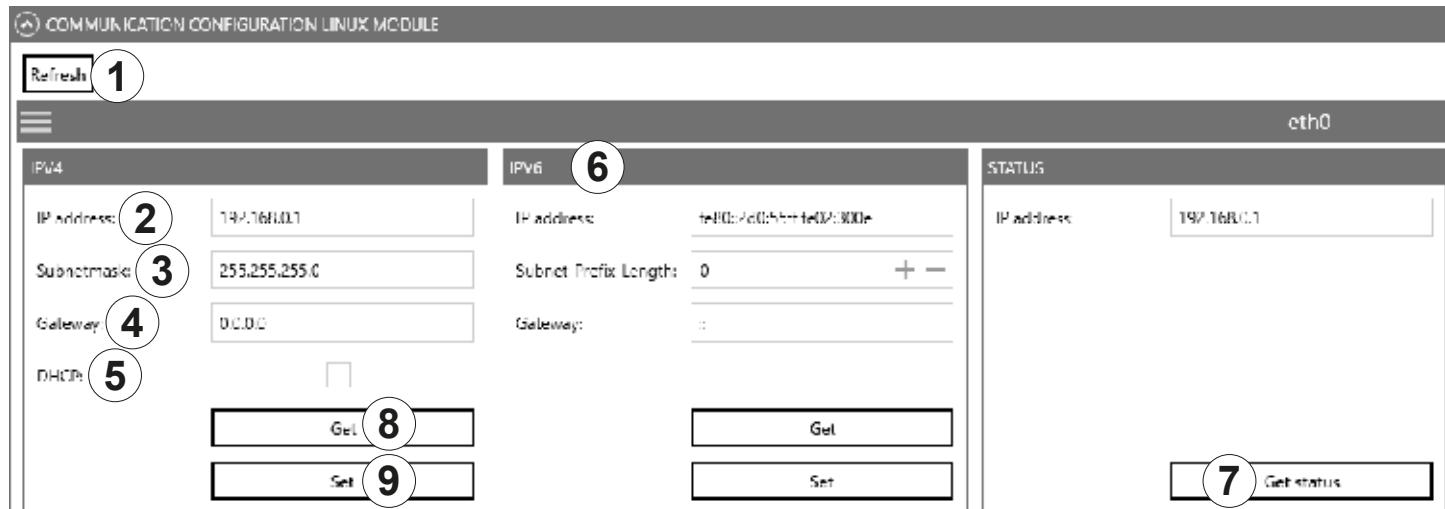


Fig. 36: Communication configuration Linux model: Ethernet

①	Refresh	reads the current settings of the communication configuration Linux module
②	IP address	manually issues the address Tip It is only possible to use this parameter if the DHCP (⑥) is deactivated.
③	Subnet mask	manually issues a network mask Tip It is only possible to use this parameter if the DHCP (⑥) is deactivated.
④	Gateway	enters the gateway
⑤	DHCP	activates/disactivates the automatic issuing of an IP address by a DHCP server; if the network has a configured DNS server, it is also possible to use the host name of the reader.
⑥	IPv6	enters the second IPv6 address (the first IPv6 address is the link local address)
⑦	Status	shows the current reader IP address (eth0)
⑧	Get	gets the current status
⑨	Set	saves changes



If the data relevant to the current connection (e.g. IP address) are changed, it may cause an error and the connection is lost.



If the interface has been configured incorrectly, it is not possible to establish a connection to the reader.

► Note the following default configuration settings:

Name	UHF-RFID-Dev
IP address	192.168.0.1
Subnet mask	255.255.255.0
Keep-alive time	2000 ms
DHCP	deactivated

Wi-Fi

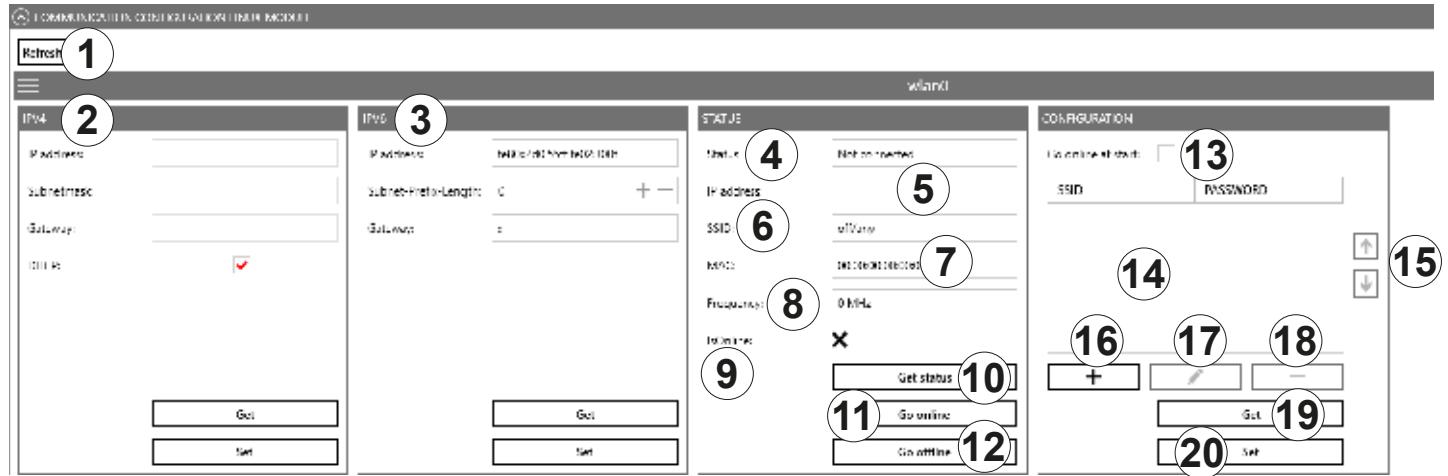


Fig. 37: Communication configuration Linux model: Wi-Fi

①	Refresh	reads the current settings of the communication configuration Linux module
②	IP4	see Fig. 36, p. 72
③	IP6	enters the second IPv6 address (the first IPv6 address is the link local address)
④	Status	shows the status of the Wi-Fi connection
⑤	IP address	shows the current IP address
⑥	SSID	shows the name of the access point
⑦	MAC	shows the MAC address of the access point
⑧	Frequency	shows the frequency of the Wi-Fi connection
⑨	IsOnline	shows whether the Wi-Fi module is online
⑩	Get status	reads the current status of the Wi-Fi module
⑪	Go online	establishes the Wi-Fi connection
⑫	Go offline	interrupts the Wi-Fi connection
⑬	Go online at start	activates or deactivates the Wi-Fi connection as soon as the reader starts
⑭		shows the list of the configured access points with SSID and password; the access points are shown in the priority order
⑮		changes the priority of the selected access point

Operating the Reader Using the ReaderStart Software

	<p>adds an access point</p>
⑯ +	<p>(a) enters the SSID of the access point (b) enters the password for the access point (c) opens the list with available access points (d) adds an access point (e) cancels the operation</p> <p>► Click <i>Scan</i> to open the list with available access points:</p>
	<p>(f) adds the SSID of the selected access point to ① (g) updates the list of available access points</p>
	<p>edits the selected access point</p>
⑰	<p>(a) changes the SSID of the access point (b) changes the password of the access point; only active when securely connected (c) opens the list with available access points (d) edits the access point (e) cancels the operation</p>
⑯ -	<p>deletes the selected access point</p>
⑯ Get	<p>reads the configured access points</p>
⑯ Set	<p>sets the access points; only active when securely connected</p>

Bluetooth

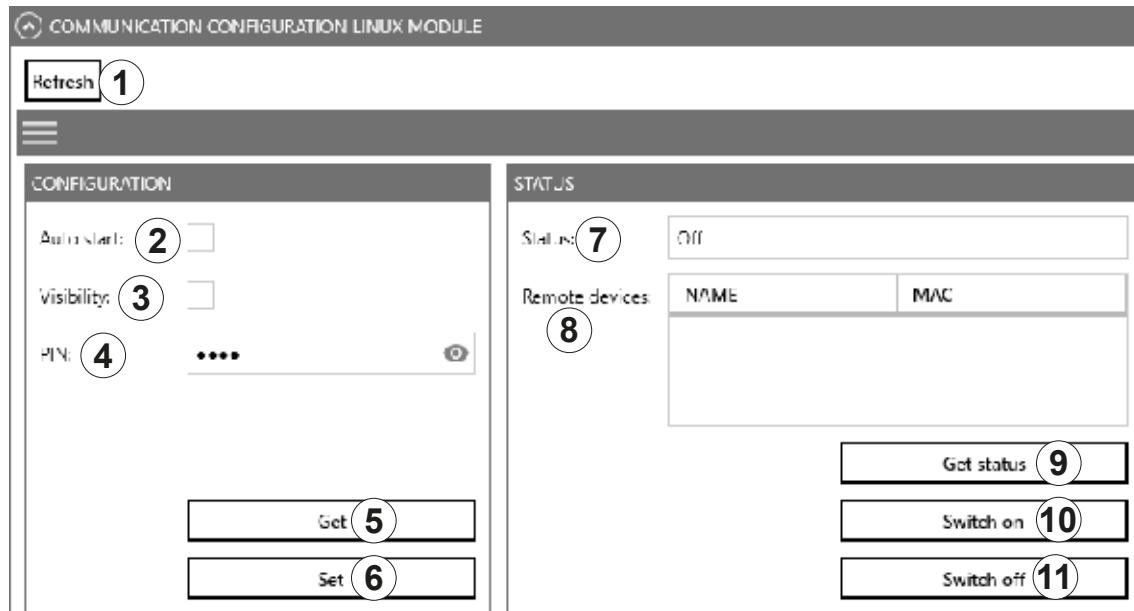


Fig. 38: Communication configuration Linux model: Bluetooth

①	Refresh	reads the current settings of the communication configuration Linux module
②	Auto start	activates or deactivates Bluetooth as soon as the reader starts
③	Visibility	activates or deactivates the Bluetooth visibility of the reader for other devices
④	PIN	sets the PIN for the Bluetooth connection; the default PIN is 4007
⑤	Get	reads the current Bluetooth configuration
⑥	Set	sets the configuration of the Bluetooth connection; only active when securely connected
⑦	Status	shows the status of the Bluetooth connection
⑧	Remote devices	shows the remote devices connected to the reader
⑨	Get status	shows the status of the Bluetooth connection
⑩	Switch on	activates the Bluetooth module
⑪	Switch off	deactivates the Bluetooth module

Mobile Communication Interface (2G/3G)

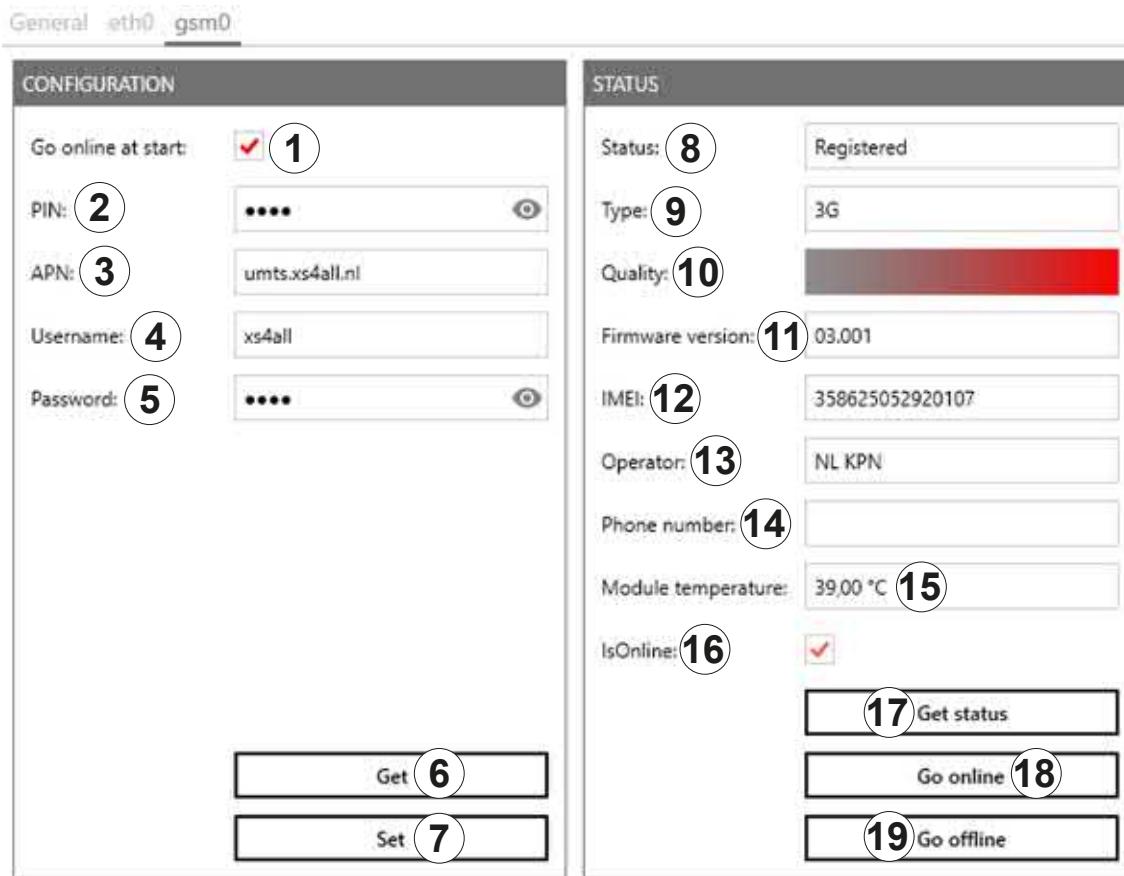


Fig. 39: Communication configuration Linux model: mobile communication interface (2G/3G)

(1)	<i>Go online at start</i>	activates or deactivates the GSM connection as soon as the reader starts
(2)	<i>PIN</i>	enters the PIN code for the SIM card
(3)	<i>APN</i>	enters the access point name from the provider
(4)	<i>User name</i>	enters the access point name from the provider
(5)	<i>Password</i>	enters the access point name from the provider
(6)	<i>Get</i>	reads the current configuration of the GSM module
(7)	<i>Set</i>	sets the configuration of the GSM module; only active when securely connected
(8)	<i>Status</i>	shows the status of the GSM connection
(9)	<i>Type</i>	shows the GSM connection type
(10)	<i>Quality</i>	shows the quality of the GSM connection
(11)	<i>Firmware version</i>	shows the firmware version of the GSM module
(12)	<i>IMEI</i>	shows the serial number of the GSM module
(13)	<i>Operator</i>	shows the operator of the GSM connection
(14)	<i>Phone number</i>	shows the phone number of the SIM card

⑯	<i>Module temperature</i>	shows the temperature of the GSM module
⑰	<i>IsOnline</i>	shows whether the GSM module is online
⑱	<i>Get status</i>	reads the current status of the GSM module
⑲	<i>Go online</i>	establishes the GSM connection
⑳	<i>Go offline</i>	interrupts the GSM connection

14.2 Application

The Application tab enables quick and easy configuration of the Kathrein RFID Reader for a selected application.

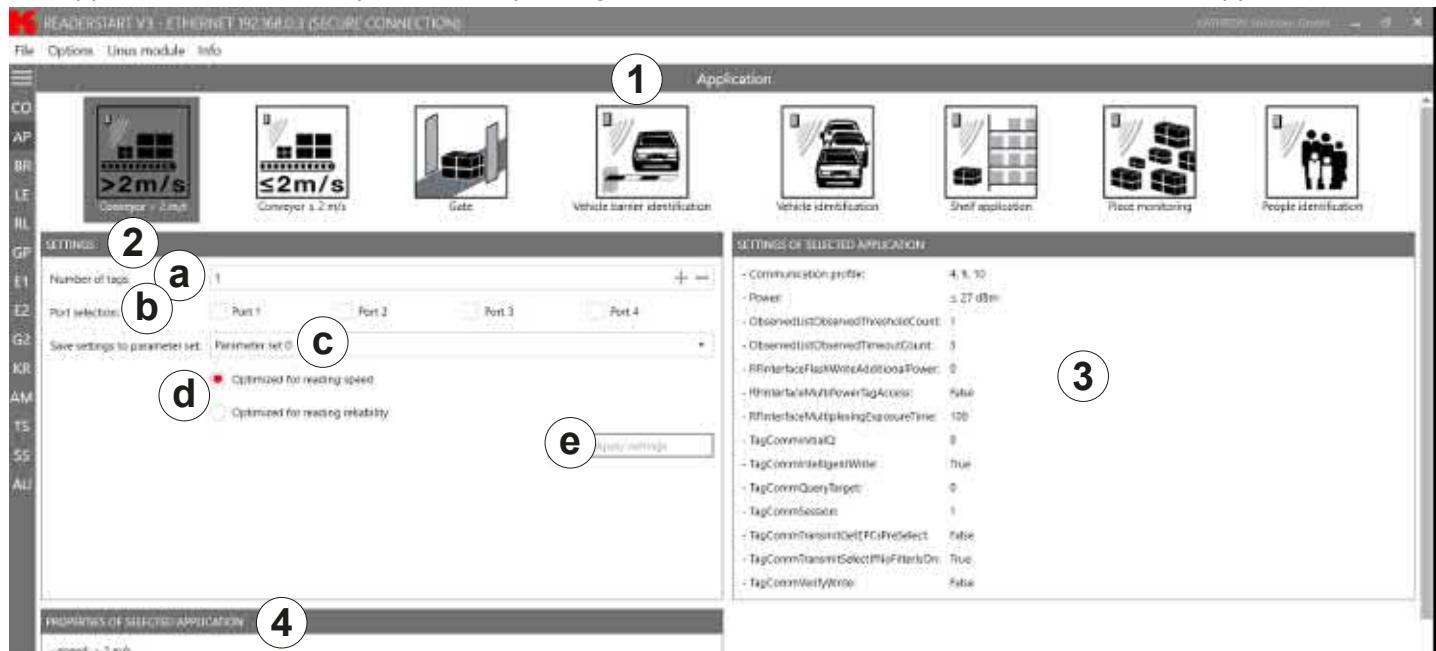


Fig. 40: Application Tab

① Application	<p>selects between the available applications represented visually by means of labelled pictograms</p> <ul style="list-style-type: none"> ▶ Click on a pictogram to select the application. ⇒ The selected pictogram is marked in a darker colour, in Fig. 40 it is Conveyor > 2 m/s.
----------------------	--

		changes setting of the selected application
(2)	<i>Settings</i>	<p>(a) number of the expected tags</p> <p>(b) ► Check Ports 1-4 to select the antenna port. It is possible to select one, several or all ports.</p> <p>(c) selects the parameter set in which the configuration is saved</p> <p>sets the values for max. reading speed or max. reading reliability</p> <p>► Click <i>Optimised for reading speed</i> or <i>Optimised for reading reliability</i>. ⇒ The values in <i>Settings of selected application</i> (③ in Fig. 40) change.</p> <p>When the max. read frequency is set (<i>Optimised for reading speed</i> is activated), the number of readings is maximised. In this case, the same tag can be read several times, because all tags will be reset in the inventory so that they will respond again. Because of reading the same tag multiple times, in a scenario of moving tags it could happen that not all the tags crossing the antenna field are read. The frequency of detection of the same tag is increased. In some cases, the time allowed for detecting the tags may be insufficient, so that some transponders are not detected.</p> <p>When the max. read reliability is set (<i>Optimised for reading reliability</i> is activated), tags that have already been read are not read again in the next inventory, provided they are still being supplied with power. This means that only the tags which have not yet been registered are detected. This way, the probability that all tags are read is increased.</p> <p>(d) saves the settings that have been made as the settings for the selected application in the selected parameter set. The programme resets the settings to the factory settings first, thus overwriting the previous configuration.</p> <p>If the settings have been reset, the <i>Apply settings</i> button briefly glows green and a success message is displayed in the <i>Status</i> field of the programme interface.</p> <p>(e) If case of a fault, the <i>Apply settings</i> button briefly glows orange to indicate a warning or red to indicate an error. If the fault has been caused by a missing entry, the field lacking the entry also glows red. A warning/error description is displayed in the <i>Status</i> field.</p> <p>After the settings have been loaded, it is possible to go to the <i>Basic reading</i> tab and to start the read process.</p>
(3)	<i>Settings of selected application</i>	shows the settings that have been made for the selected application in the selected parameter set
(4)	<i>Properties of selected application</i>	shows the properties of the selected application

Tip

The read rate is influenced by many parameters. In addition to the selected broadcasting profile with the respective data rates, there are also application-specific data, e.g. how many tags the reader should expect in the field. You can optimise these parameters using the *Expert settings 1* and *2*.

- If you are unsure whether the settings you have chosen are best suited for your application, contact KATHREIN Solutions support at <https://www.kathrein-solutions.com/support/overview>.

14.2.1 Available Applications

When the application is selected, the properties and the settings of the selected application are displayed in the respective fields.

The applications available for selection in version 3.00 of the *ReaderStart v3* are shortly described in the following chapters.

Conveyor belt > 2 m/s

- for detecting individual tags in the antenna field on a conveyor belt moving at more than 2 m/s
- the distance between the tags and the antenna must be only a few centimetres

Conveyor belt ≤ 2 m/s

- for detecting and describing individual tags in the antenna field on a conveyor belt moving at a speed less than or equal to 2 m/s
- the distance between the tags and the antenna must be only a few centimetres

Gate

- for detecting multiple tags in the antenna field as they pass through a gate

Vehicle Barrier Identification

- for detecting and describing individual tags in the antenna field which are not moving
- the distance between the tags and the antenna must be less than a few metres

Vehicle Identification

- for detecting and describing multiple tags in the antenna field which are moving at a speed of more than 14 m/s
- the distance between the tags and the antenna must be less than a few metres

Shelf Application

- for detecting and describing individual tags in the antenna field which are not moving
- the distance between the tags and the antenna must be less than 1 m

Place Monitoring

- for detecting and describing multiple tags in the antenna field which are not moving
- the distance between the tags and the antenna must be less than 1 m

Personal Identification

- for detecting multiple tags in the antenna field which are moving at a speed of not more than 3 m/s
- the distance between the tags and the antenna must be less than 1 m

14.3 Basic Reading

This tab is divided into two parts, the left part contains a table with information about the read tags (Ⓐ in the figure below), the right part (Ⓑ) shows the statistics as well as options to control the reading process, described in the chapters to follow.

The appearance and disappearance of a tag is shown in colour for better visual effect. When a tag appears in the field, the row is represented by the green tag information, when it disappears, the row is red.

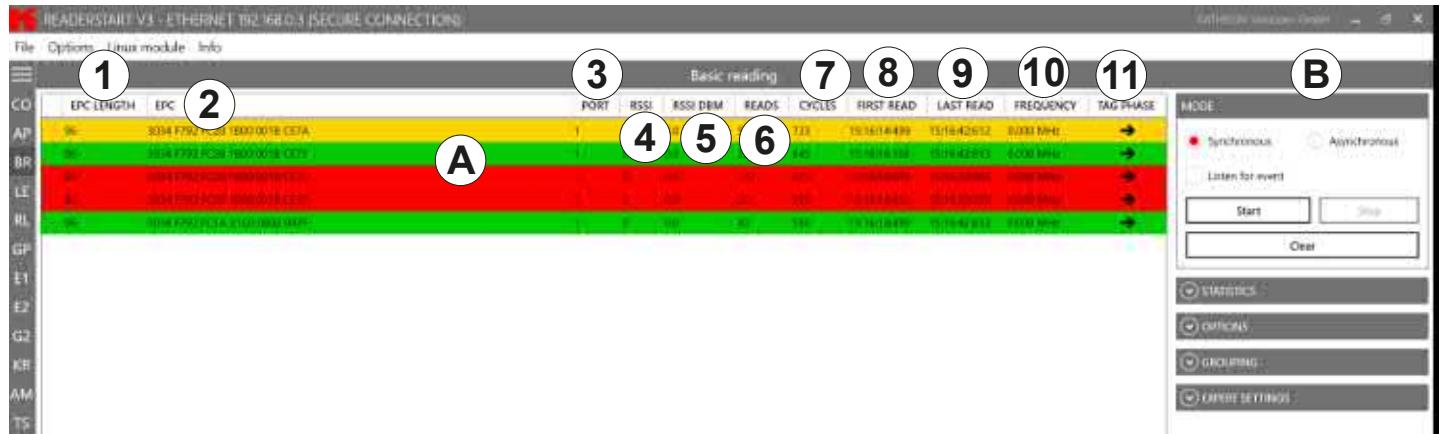


Fig. 41: Basic reading

①	EPC length	indicates the length in bits of the EPC; valid lengths 0–496
②	EPC	EPC of the tag in the hexadecimal representation
③	Port	antenna port at which the tag is read; valid values 1–4
④	RSSI	unitless (shown as having no units) signal strength of the tag response
⑤	RSSI DBM	shows the RSSI value in dBm
⑥	Reads	shows how many times this tag has been read successfully
⑦	Cycles	indicates how often an inventory has been started
⑧	First read	timestamp of the first tag reading
⑨	Last read	timestamp of the last tag reading
⑩	Frequency	shows the used transmission frequency
⑪	Tag phase	<p>shows the tag phase in form of a rotating pointer This parameter is used to distinguish between stationary and moving transponders. If the transponder is moving away from the antenna, the pointer rotates counterclockwise, and clockwise, if the transponder is moving towards the antenna. The movement speed is directly proportional to the rotational speed of the pointer. In a full rotation of 360°, the transponder travels a distance of 17 cm.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p>! Note that the reader has to change the transmission frequency every 4 seconds, causing a phase jump.</p> </div> <p>The tag phase is also shown in the TagScan monitor; see <i>TagScan</i>, p. 112</p>

14.3.1 Mode

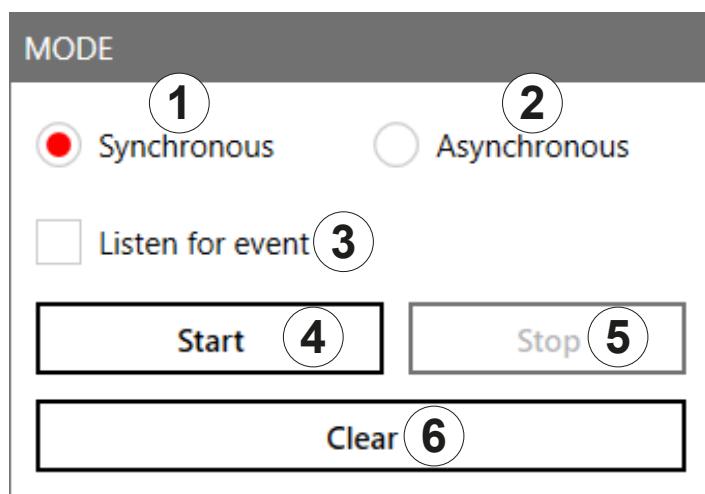


Fig. 42: Basic reading: mode

		allows the facility to switch the carrier off during the idle times, saving power
①	<i>Synchronous</i>	<p>This mode is intended for applications in which the requirements for timing are not very demanding. The inventory of the tags is performed across all the antennas that are configured. Once all the tags in the field have been read on the last antenna, data are sent to the PC. The PC automatically retriggers the inventory of the tags.</p>
②	<i>Asynchronous</i>	<p>is intended for applications for which maximum performance is required</p> <p>The reader starts the inventory as quickly as possible, and at the end of an inventory it does not deliver every tag that was read to the PC, but only those that have recently appeared in the field or left it. This way, the time required for communication between the reader and the client is minimised.</p> <p>The timing of when a tag was reliably read in the field and when the tag no longer appears in the field can be defined more precisely using parameters.</p> <ul style="list-style-type: none"> ▶ For more details of the <code>ObservedThresholdCnt</code> and <code>ObservedTimeoutCnt</code> parameters, refer to the <i>Configurational manual reader</i>.
③	<i>Listen for event</i>	<p>deactivates or activates waiting for the result of the command executed by an external trigger and shows the result in ④ in Fig. 30</p> <p>When deactivated, there is no waiting process and it is possible to start the reading process at any time.</p>
④	<i>Start</i>	starts the reading
⑤	<i>Stop</i>	stops the reading
⑥	<i>Clear</i>	deletes the reading results from the table on the left (④ in Fig. 41, p. 81)

14.3.2 Starting and Stopping the Reading

- ✓ All the settings have been applied and the mode selected.
- ▶ Click *Start* (④ in Fig. 42) to start the reading.
- ▶ Click *Stop* (⑤) to stop the reading.
- ▶ Click *Clear* (⑥) to remove all tag entries from the table (④ in Fig. 41, p. 81).

14.3.3 Statistics

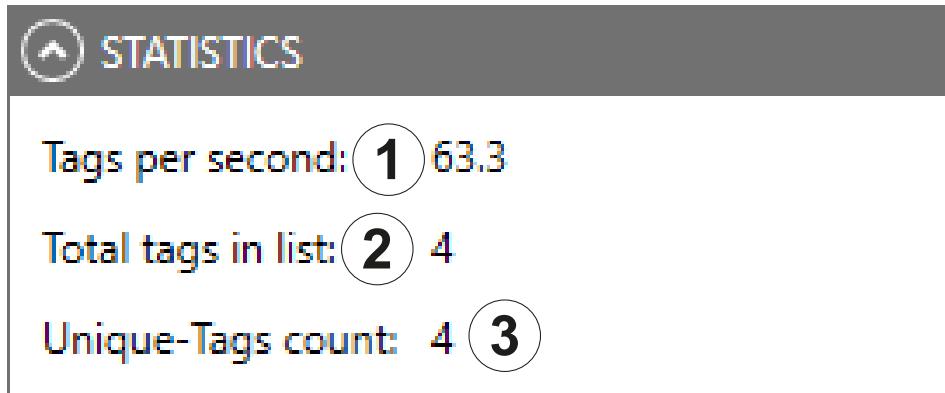


Fig. 43: Basic reading: statistics

①	<i>Tags per second</i>	displays the current reading performance
②	<i>Total tags in list</i>	shows the total number of tags in the list
③	<i>Unique Tags count</i>	shows the number of unique tags detected in the inventory

14.3.4 Options

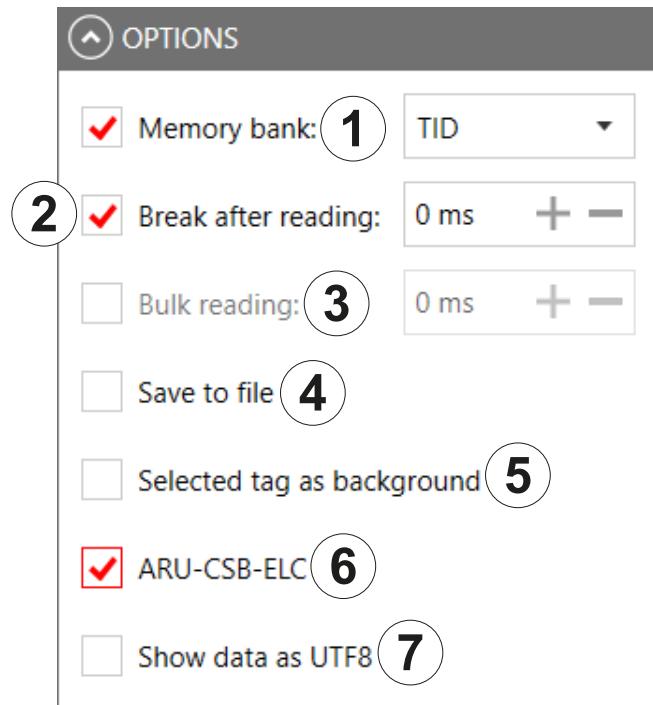


Fig. 44: Basic reading: options

①	Memory bank	selects between <i>RFU</i> , <i>EPC</i> , <i>TID</i> and <i>User</i> memory banks ► Click on the arrow to open a drop-down list to select a memory bank. ► Click <i>Save to file</i> (④) to store the values <i>RFU</i> , <i>EPC</i> , <i>TID</i> and <i>User</i> in a CSV file.
②	Break after reading	specifies the duration of the break between two inventories in milliseconds During the break, the carrier can be deactivated. ► For more information about switching off the carrier, refer to <i>Configuration Manual for Kathrein RFID UHF Readers</i> .
③	Bulk reading	sets the time in milliseconds after which the result lists of an inventory is sent to the PC To keep the time between inventories as short as possible in the synchronous mode, data transmission between the inventories can be dispensed with. That means that the reader saves all the tags that it finds in the field in its internal RAM and sends them to the PC after the time set in <i>Bulk reading</i> .
④	Save to file	saves the data displayed at (Ⓐ in Fig. 41, p. 81) ► Click <i>Change path to log file</i> to select or change the location where the information is saved. ► Right-click on <i>Save to file</i> to open or delete the file.
⑤	Selected tag as background	changes the basic reading interface background to the colour of the selected tag row
⑥	ARU-CSB-ELC	activates the additional presentation for an ARU-CSB-ELC antenna
⑦	Show data as UTF8	shows tag data in the UTF8 format

14.3.5 Grouping



Fig. 45: Basic reading: grouping

It is possible to sort the read result by means of unique tags. This is useful in multi-antenna applications.

If, for example, in a gate application with 4 antennas, a palette of 100 tags is read, the maximum number of the read results is 400. However, not all tags are read by all antennas, therefore, the read result will be about 250.

- Check *Group by unique tags* to find out how many different tags have been read.

14.3.6 Expert settings

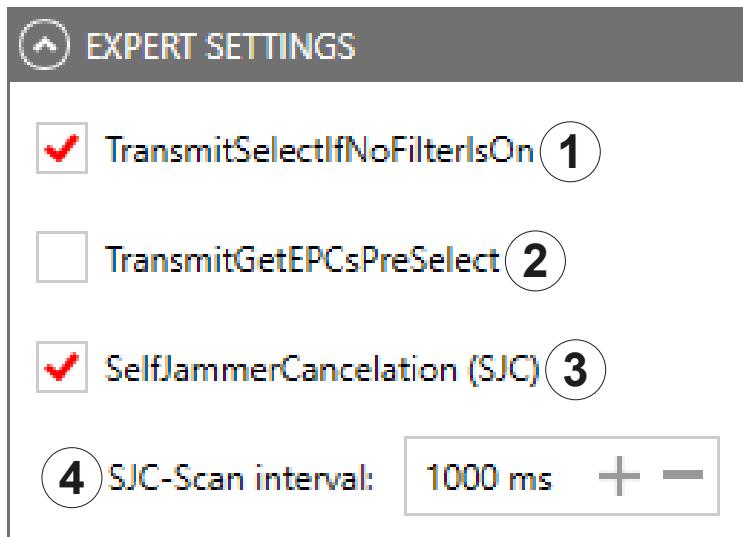


Fig. 46: Basic reading: expert settings

①	<i>TransmitSelectIfNoFilterIsOn</i>	resets all the tags that are defined in the field at a given time When the tag count is very high (> 200), it is possible to speed up the detection of the tags by commanding the reader to change to new <i>Select command</i> ; see <i>EPCglobal Gen2 Specification</i> . It is possible to test it in the menu <i>Expert Settings</i> . ► Check <i>TransmitSelectIfNoFilterIsOn</i> . ⇒ A "select" is sent in each inventory, i.e. all the tags that are defined at this time in the field are reset. However, it can happen that the tags that have been read already are reset and re-recorded again. To capture only new tags, it is necessary to prevent a renewed "select". ► Uncheck <i>TransmitSelectIfNoFilterIsOn</i> . ⇒ The tags are read once. This way, no time is lost due to a reread.
		! Note that it is not possible to retrieve tags in which the read operation had been interrupted. This way, it may happen that not all the tags are read. Keep that in mind when unchecking this parameter in order to achieve top results.

②	<i>Transmit-GetEPCsPreSelect</i>	see Chapter <i>TransmitGetEPCsPreSelect</i> in <i>Configuration Manual for Kathrein RFID UHF Readers</i>
③	<i>SelfjammerCancellation (SJC)</i>	activates/deactivates the optimal receiver sensitivity of the reader This process might be necessary in an industrial environment with increased reflection, e.g. due to metallic structures. However, this process is very time-consuming and slows down the tag detection.
④	<i>SJC Scan interval</i>	sets the interval after which the <i>SelfjammerCancelation</i> process is executed

14.3.7 ARU-CSB-ELC Antenna Reader Unit

The ARU-CSB-ELC antenna reader unit with the integrated 30° wide-range antenna is controlled by the @KRAI reader. The antenna can be switched to three different beam positions.

Each individual position can be selected fix or all selected positions are exchanged dynamically. The user will get a read result with an indication of the position for the run of a tag (left, centre, right).

Using the time sequence of the reading results of these positions, it is possible to determine the direction of a transponder. Tags which do not change their position are captured as well.

The ARU-CSB-ELC antenna is used, e.g. in gate applications. In addition to the "simple" detection that a tag has passed the gate, the direction of the movement is displayed as well. This can be used, for example, to book a delivery of goods as an input or output immediately.

Having selected the *ARU-CSB-ELC* (⑥ in Fig. 44, p. 84) under *Options*, the lower part of the screen shows the spatial allocation of a transponder:



Fig. 47: Basic reading: ARU-CSB-ELC

Tip

The WIRA-30-CSB-KRAI antenna is presented in a similar way and is shown under *Options* when connected.

14.4 LED



Not all readers support the functionality with 12 LEDs; all readers have at least 4 LEDs. Please check the reader data sheet for information.

In this tab, it is possible to assign various functions to the 12 LED channels. It is possible to activate other parameters, depending on the selected function.

Tip

As supplied to customer, the first 4 LEDs are allocated to antennas 1–4, LED 5 is allocated to GSM, LED 6 to KRAI, LED 11 and LED 12 to Bluetooth and Wi-Fi, respectively. It is possible to customise this allocation.

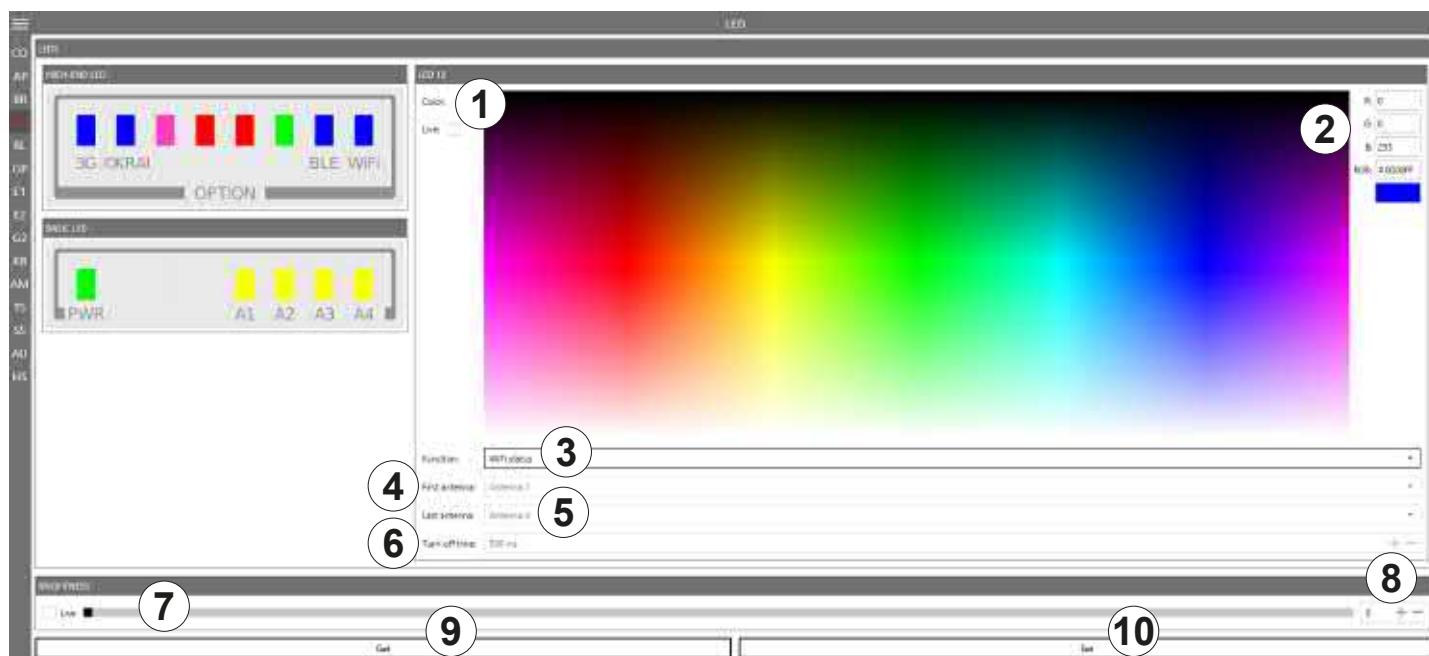


Fig. 48: LED

(1)	Live	shows the changed LED colour in real time
(2)		enters and shows RGB values
(3)	Function	selects between the functions described in <i>Selecting Functions, p. 88</i>
(4)	First antenna	the first antenna for the selected function
(5)	Last antenna	the last antenna for the selected function
(6)	Turn-off time	sets the time for how long LED is on for the selected function
(7)	Brightness (live)	changes the LED brightness for all active LEDs (between 0 (auto brightness determined by the integrated light sensor) and 100) <ul style="list-style-type: none">▶ Move the brightness position along the bar to change the brightness of the LED. ⇒ The number at ⑧ changes.
(8)		changes the LED brightness (between 0 and 100) <ul style="list-style-type: none">▶ Click + or - to change the brightness of the LED.
(9)	Get	shows the current settings for all LEDs

⑩	Set	sets the new settings for all LEDs for which the settings have been altered
---	------------	---

14.4.1 Selecting Functions

- Click on the arrow (③ in Fig. 48, p. 87) to select between the following functions:

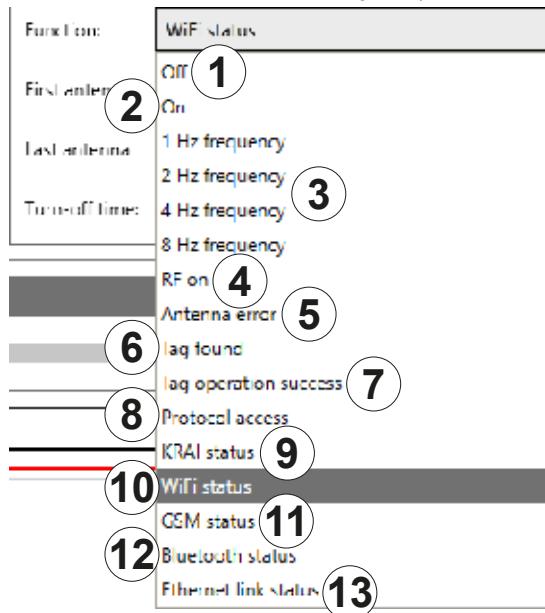


Fig. 49: LED: functions

①	Off	deactivates the LED
②	On	activates the LED (always on)
③	1 Hz – 8 Hz frequency	LED flashes at a frequency of 1/2/4/8 Hz
④	RF on	LED lights up for <i>Turn-off time</i> milliseconds if a radio frequency is present at the antenna <i>First antenna</i> to <i>Last antenna</i> has been successful
⑤	Antenna error	LED lights up for <i>Turn-off time</i> milliseconds if a error occurs at the antenna <i>First antenna</i> to <i>Last antenna</i>
⑥	Tag found	LED lights up for <i>Turn-off time</i> milliseconds as soon as a tag has been found at the antenna <i>First antenna</i> to <i>Last antenna</i>
⑦	Tag operation success	LED lights up for <i>Turn-off time</i> milliseconds if a tag operation at the antenna <i>First antenna</i> to <i>Last antenna</i> has been successful
⑧	Protocol access	enables the protocol to switch the LED on and off
⑨	KRAI status	shows whether a @KRAI antenna is connected to the reader
⑩	WiFi status	shows the Wi-Fi status
		flashing trying to connect
		permanently lit connected
⑪	GSM status	off Wi-Fi disabled
		shows the GSM status
		flashing trying to connect
		permanently lit connected
		off Wi-Fi disabled

		shows the Bluetooth status
⑫	<i>Bluetooth status</i>	flashing trying to connect permanently lit connected off Wi-Fi disabled
⑬	<i>Ethernet link status</i>	shows the Ethernet connection status

14.5 RSSI LED Bar (received signal strength indicator)

This menu is used to determine the strength of the received signal.

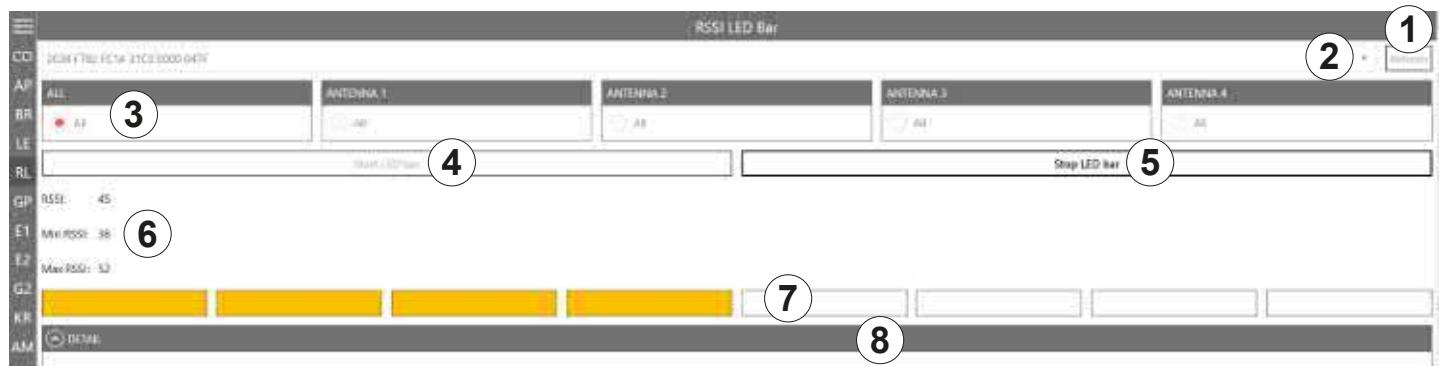


Fig. 50: RSSI LED Bar

①	<i>Refresh</i>	updates the number of detected tags
②		selects a tag from the number of the detected tags by means of the drop-down menu
③	<i>All/Antenna 1–4</i>	selects whether the tag has to be read on all antennas or only one antenna
④	<i>Start LED bar</i>	measures the signal strength
⑤	<i>Stop LED bar</i>	stops the measurement
⑥	<i>RSSI, Min. RSSI, Max. RSSI</i>	shows the current RSSI value as well as the minimum and the maximum RSSI values
⑦		shows the read range by means of the coloured bars <i>green</i> signal strength is high (high RSSI value) <i>yellow</i> signal strength is medium (medium RSSI value) <i>red</i> signal strength is low (low RSSI value)
⑧	<i>Details</i>	shows detail information about RSSI for each antenna and property

14.6 GPIO Functions

Readers with GPIO functionality¹⁾ offer the possibility to set up small controls which trigger the reader, for instance by means of a light barrier, or which trigger an action at the outputs of the reader by reading specific tags. Such an action can switch an output to control the flow of goods.

The GPIO tab allows the reader to interact with its environment. The GPIO function tab allows the user to manually read or switch inputs and outputs of the respective application. For more complex procedures, it is possible to create action lists which execute a sequence of commands on the reader. This list can then be linked to various inputs.



Fig. 51: GPIO

The GPIO tab is divided into 3 sections, *IO Configuration*, consisting of *Input* and *Output*, *Test Input* and *Test Output*, *Action List* and *Assign Input to Action List* which are described in the following chapters.

14.6.1 IO Configuration

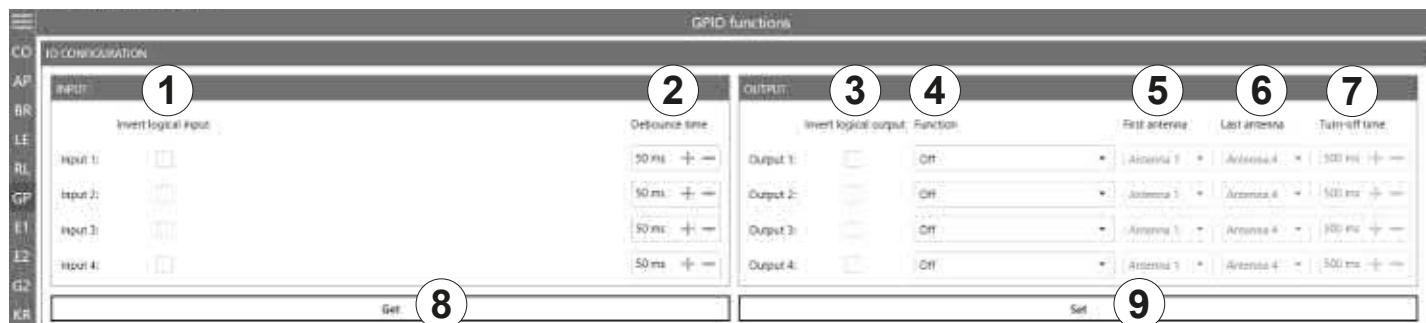


Fig. 52: GPIO: IO Configuration

①	<i>Invert logical input</i>	negates the electrical input signal and uses this state for processing in the reader; if the parameter is not checked, the signal is used
②	<i>Debounce time</i>	assigns a debounce time in milliseconds to each channel depending on the sensor being used (mechanical or electrical switch)
③	<i>Invert logical output</i>	negates the electrical output signal
④	<i>Function</i>	selects between the functions described in <i>Selecting Functions</i> , p. 88
⑤	<i>First antenna</i>	the first antenna for the selected function

¹⁾ All Generation 3 readers have GPIO.

⑥	<i>Last antenna</i>	the last antenna for the selected function
⑦	<i>Turn-off time</i>	sets the time for how long the output is on for the <i>Tag found</i> and <i>Tag operation successful</i> function
⑧	<i>Get</i>	reads the current IO configuration settings
⑨	<i>Set</i>	sets the output settings

14.6.2 Test Input and Output

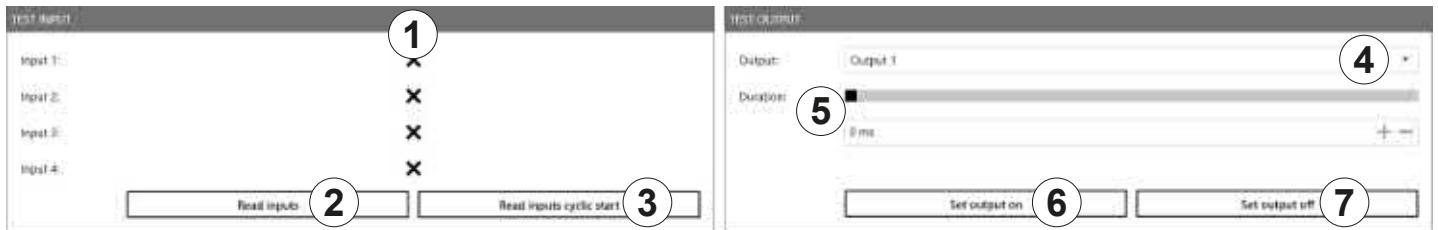


Fig. 53: GPIO: Test Input and Test Output

Test Input

Each input channel has two configuration parameters available:

①	<i>Input 1-4</i>	shows logical input 1–4; will only be shown if <i>Invert logical input</i> for the respective input has been checked at <i>IO Configuration</i> (① in Fig. 52, p. 90)
②	<i>Read inputs</i>	reads the inputs once
③	<i>Read inputs cyclic start/stop</i>	reads the inputs in a loop/stops the reading

Test Output

④	<i>Output</i>	selects output 1–4 by means of the drop-down menu ► In order to use this function, select the <i>Protocol access</i> function for the respective output (see <i>IO Configuration</i> , p. 90 and <i>Selecting Functions</i> , p. 88).
⑤	<i>Duration</i>	sets time in ms after which the output automatically returns to its idle mode either by moving the bar or by entering the value If the duration is set to its maximum value (65535), the output is permanently on.
⑥	<i>Set output on</i>	switches on the output
⑦	<i>Set output off</i>	switches off the output

14.6.3 Action List and Assign Input to Action List

To automate the processes, it is possible to store command sequences on the reader in the form of action lists. These are triggered by a change of edge at the selected input.



Fig. 54: GPIO: Action List and Assign Input to Action List

Action List

Each input channel has two configuration parameters available:

①	Action list	selects an action list (0–127) from the drop-down menu to save the action in
②	Action	selects an action from the drop-down menu, e.g. <i>Activate buzzer (500 ms)</i> , <i>SyncGetEPCs</i> , <i>ASyncGetEPCs</i> , <i>ASyncStopCommand</i> ; see also <i>Adding Actions to the Programme</i> , p. 93 <ul style="list-style-type: none"> ► To see the commands contained in the current action list, type in %userprofile%\Documents\KATHREIN Solutions GmbH\ReaderStart v3 into the Windows search field.
③	Add action	adds action; the action is shown under <i>Details</i> (⑤)
④	Clear action list	deletes actions; no actions are seen under <i>Details</i> (⑤) <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> Tip To remove only one action from the list: <ol style="list-style-type: none"> 1. Select an action from the list shown under <i>Details</i>. 1. Right-click on the selected action. ⇒ The pop-up message <i>Remove entry</i> appears. 2. Click on <i>Remove entry</i> to delete the action. ⇒ The action is deleted from the list. </div>
⑤	Details	shows added actions in the chronological order as they have been selected
⑥	Get action list	shows the current action list
⑦	Set action list	saves the set action list (flashes blue after having added an action to the <i>Details</i> (⑤))

Assign Input to Action List

⑧	Action list	selects an action list (0–127) from the drop-down menu to assign to the input in (⑨)
⑨	Input	assigns the action list to input 1–4 from the drop-down menu
⑩	Assign to rising edge	assigns the action list to the rising edge
⑪	Assign to falling edge	assigns the action list to the falling edge

Tip

- If you would like to assign the action list to both the rising and the falling edge, click *Assign to rising edge* and then *Assign to falling edge*.

To cancel the assignment:

- Restart/reset the reader or select *No action list* under *Action list* (®).

Adding Actions to the Programme

The action lists consist of a sequence of individual actions which can be loaded in the form of an XML file in the *Action* context menu:

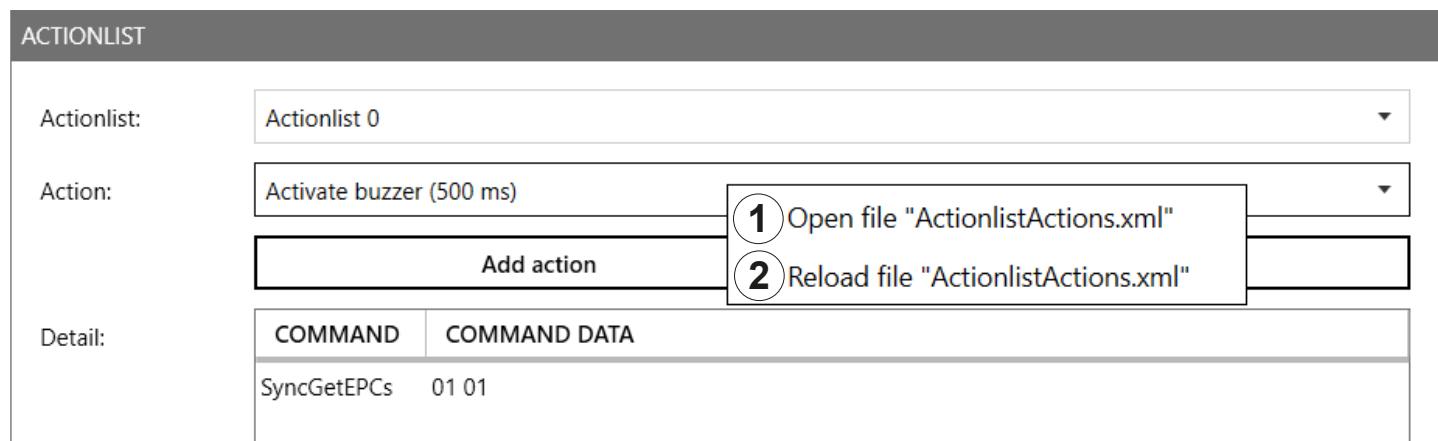


Fig. 55: GPIO: action list, action context menu

① <i>Open file "ActionlistActions.xml"</i>	opens the actions list in the XML format in a text editor
② <i>Reload file "ActionlistActions.xml"</i>	reloads the action list; it is necessary to reload the action list after a new action has been added to the XML file containing the actions or some changes have been made in it

The ReaderStart creates a directory in which the system variables are stored in the folder %userprofile%\Documents\KATHREIN Solutions GmbH\ReaderStart v3. It is possible to edit the ActionlistActions.xml file manually using a text editor.

- To see the individual actions, refer to the *Configuration Protocol*.

The approximately 150 reader commands with corresponding variance of the parameters do not allow for a uniform list. A selection of all options is extensive. Therefore, it is recommended to only list commands required in the application.

The following example demonstrates the syntax of the actions:

<ActionlistActions>

```
<!--Activate buzzer for 500 ms, CommandID: 0x0045, Parameter: 0x01F4-->
<Action>
    <Description>Activate buzzer (500 ms)</Description>
    <CommandID>0045</CommandID>
    <!--LSB first-->
    <Parameter>F4</Parameter>
    <Parameter>01</Parameter>
</Action>
```

```
<!--Get EPCs, CommandID: 0x0101-->
<Action>
    <Description>Get EPCs</Description>
    <CommandID>0101</CommandID>
    <!--LSB first-->
</Action>
</ActionlistActions>
```

The example above shows the *Activate buzzer 500 ms* and *Get EPCs* actions.

14.7 Expert Settings 1

The ReaderStart software is a powerful tool for the reader configuration. It allows the reader to be customised to any application. The *Expert settings 1* and 2 allow the reader's RF interface and communications profile to be optimised to the tag so that the reader is optimally customised to the application.

There are eight parameter sets available for saving the reader configuration. It is possible to save all settings for the transmission power, the antenna multiplex configuration, the RF settings and the air interface parameters.

Other parameters can be changed in *Expert settings 2*.

► For more information about the individual parameters, refer to *Reader Configuration Manual for Kathrein RFID UHF Readers*.



Fig. 56: Expert settings 1

①	Parameter Set	selects a parameter set
②	Get	reads the current settings of the selected parameter set in the system
③	Set	sets the parameters
④	Enabled	activates/deactivates the possibility to make changes in the port
⑤	Power	changes the power on the port (ERP)
⑥	dBm/W	switches between <i>dBm</i> and <i>W</i>
⑦	Port power	shows the selected power on the port
⑧	Cable attenuation	selects cable attenuation in the range between 0 and 63.75 dB

⑨	Antenna type	selects the antenna type between pre-defined and custom antennas If the pre-defined antenna is selected, the programme sets the antenna gain to the maximum value permitted for this antenna. If <i>Custom antenna</i> is selected, it is possible to freely set the gain and power.
⑩	Gain	selects the antenna gain between -32.00 dBIC and 31.75 dBIC
⑪	ERP/EIRP	switches between <i>ERP</i> and <i>EIRP</i>
⑫	Port	selects the antenna port or deactivates it If the antenna is not activated, the system proceeds to the next antenna in the <i>Port Multiplex Configuration</i> . ► For more details, refer to the Chapter <i>MultiplexingAntennaport1...8</i> in the <i>Reader Configuration Manual</i> .
⑬	Exposure time	specifies the exposure time on the antenna; only used for asynchronous operation ► For more details, refer to the Chapter <i>MultiplexingExposureTime1...8</i> in the <i>Reader Configuration Manual</i> .
⑭	Communication Standard	selects a country-specific communication standard; the device version determines which communication standard is permitted
⑮	Communication Profile	selects the profile for the data rate and read reliability This option allows the technician to directly influence the performance of the reader and the spectrum of the signal. The profile names contain basic orientation on the transmission and reception data rates.
⑯	Available channels (only available for ETSI-readers)	selects the channel for the reader to use Depending on the region, the reader transmits in the frequency range 865–868 MHz for Europe or 902–928 MHz for USA/Canada. In Europe, the number of channels to be used can be limited. For this reason, it is necessary to check the related check box for each channel the reader is to use. This way, it is possible to avoid using specific channels on which there is interference.
⑰	Initial Q	reflects the number of tags expected in the field; see also Chapter <i>InitialQ</i> in <i>Reader Configuration Manual</i>
⑱	Sel	specifies whether other parameters are of interest for an inventory of the tag population or not; see also Chapter <i>QuerySel</i> in <i>Configuration Manual for Kathrein RFID UHF Readers</i>
⑲	Session	sets which session the reader is to work with; see also Chapter <i>Sessions</i> in <i>Reader Configuration Manual</i>
⑳	Target	specifies which tags in the population should take part in the inventory; see also Chapter <i>QueryTarget</i> in <i>Configuration Manual for Kathrein RFID UHF Readers</i>



To operate the reader in accordance with the related national standards, it is necessary to take into account the antenna gain and the cable attenuation in the transmission power setting.

- Do not exceed the permitted transmission power. Failure to observe this instruction can result in non-compliant operation of the reader leading the termination of the type approval.



To operate the reader in accordance with the related national standards, it is necessary to set the correct communication profile to use the correct frequency range.

- Make sure to operate the reader in the correct country-specific frequency range. Failure to observe this instruction can result in non-compliant operation of the reader leading the termination of the type approval.

14.7.1 Port Power

In Europe, the radiated power is limited in accordance with ETSI 302208 to 2 W ERP. In the FCC/IC region, max. 1 W connected RF power applies with an antenna gain of 6 dBi. If the antenna gain is greater than 6 dBi, it is necessary to reduce the RF power accordingly. While the European standard refers to a half-wave dipole, FCC part 15/RSS 210 refers to an isotropic radiator.

To set the port power, it is necessary to include the length-dependent cable attenuation and the antenna gain into the calculation of the port power. An example for the calculation of the port power for Europe and FCC/IC is given below.

The following applies to the European approval region:

$$P_{\text{port}} = P_{\text{ERP}} + D_{\text{cable}} - G_{\text{HW}}$$

where P_{port} is the port power of the reader in dBm; P_{ERP} is the port power based on a half-wave dipole in dBm; D_{cable} is the cable attenuation in dB; G_{HW} is the antenna gain based on a half-wave dipole.

The cable attenuation is the length-dependent attenuation of the cable at the related frequency:

$$D_{\text{cable}} = I * D_{\text{dB/m}}$$

where D_{cable} is the cable attenuation in dB; I is the length in m; $D_{\text{dB/m}}$ is the attenuation in dB/m at frequency.

The antenna gain is stated in various different units. These units include dBi and dBic. The units dBi and dBic refer to an isotropic (spherical) radiator, where dBic refers to a circularly polarised isotropic radiator and dBi to a linearly polarised isotropic radiator.

In the European approval area, the radiated power must not exceed 2 W ERP. This figure refers to a half-wave dipole. The relationship shown below exists between an isotropic radiator (dBi) and a half-wave dipole.

$$G_{\text{HW}} = G_{\text{isot}} - 2.14 \text{ dB},$$

where G_{HW} is gain-based on a half-wave dipole and G_{isot} is gain-based on an isotropic radiator in dBi

If the gain of the antenna is referred to the polarisation of a circular isotropic antenna (dBic), the linear gain of the antenna is 3 dB lower. As a result, the port power can be increased by 3 dB.

$$G_{\text{HW}} = G_{\text{isot}} - 2.14 \text{ dB} - 3 \text{ dB},$$

where G_{HW} is gain-based on a half-wave dipole and G_{isot} is gain-based on an isotropic radiator in dBi

In the FCC/IC approval region, the RF power connected at the antenna input must not exceed 1 W. If the gain of the antenna is higher than 6 dBi, it is necessary to reduce the RF power correspondingly. The reader's port power is then:

$$P_{\text{port}} = P_{\text{cond}} + D_{\text{kabel}} \text{ with } P_{\text{cond}} \leq 1 \text{ W and } G_{\text{isot}} \leq 6 \text{ dB},$$

where P_{port} is the port power of the reader in dBm; P_{cond} is the power on antenna output in dBm; D_{cable} is the cable attenuation in dBm; G_{HW} is the antenna gain in dBi.

If the antenna gain is stated in dBic, the reader's transmission power can be increased by 3 dB.

The port power for the European variant can be set in 0.25-dB steps from 6 dBm to 33 dBm.

14.8 Expert Settings 2

The Expert settings 2 tab is divided into four sections for further configuration of the reader. In this tab, it is possible, for example, to change the default parameter set, copy one parameter set into another, read reader parameters to determine their ID and configure *Select Filter Settings*.



Fig. 57: Expert settings 2

14.8.1 Default Parameter Set

The *Default parameter set* allows configuration of the parameter set that is loaded from the Flash into the RAM when the reader is started.

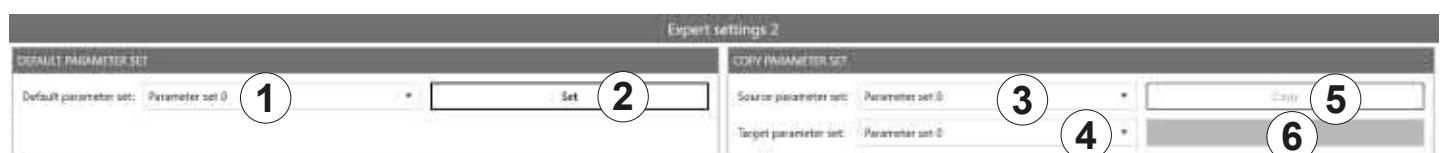


Fig. 58: Expert settings 2: default parameter set and copy parameter set

①	Default Parameter Set	selects a default parameter set
②	Set	sets the selected default parameter set in the reader

14.8.2 Copy Parameter Set

The *Copy parameter set* allows one parameter set to be copied into another.

③	Source parameter set	selects the parameter set to be copied
④	Target parameter set	selects the parameter set into which the source parameter set is to be copied
⑤	Copy	<p>copies the parameter set</p> <p>► Click Copy.</p> <p>⇒ On successful completion of the copy operation, the Copy button briefly glows green and a corresponding message is displayed in the status field.</p> <p>⇒ If there is an error, the Copy button glows red, an error pop-up message appears and a warning is shown in the status field.</p>
⑥		shows the progress of the copying process

14.8.3 Change Reader Parameter

Change reader parameter allows to change all reader settings using their respective configuration IDs.



Fig. 59: Expert settings 2: change reader parameter

(1)	Parameter ID	selects the parameter ID
(2)	Parameter value	shows or sets the parameter value The value is either decimal or hexadecimal, it is possible to switch between <i>dec</i> and <i>hex</i> .
(3)	Active parameter set	shows the current active parameter set
(4)	Get	reads the value of the current parameter set of the reader and shows it at (2)
(5)	Set	writes the parameter value (2) into the selected parameter ID (1)

14.8.4 Select Filter Settings

By means of these settings, it is possible to filter certain tags, e.g. to only read tags with the defined data in the respective memory banks. It is possible to set up to 32 filters.

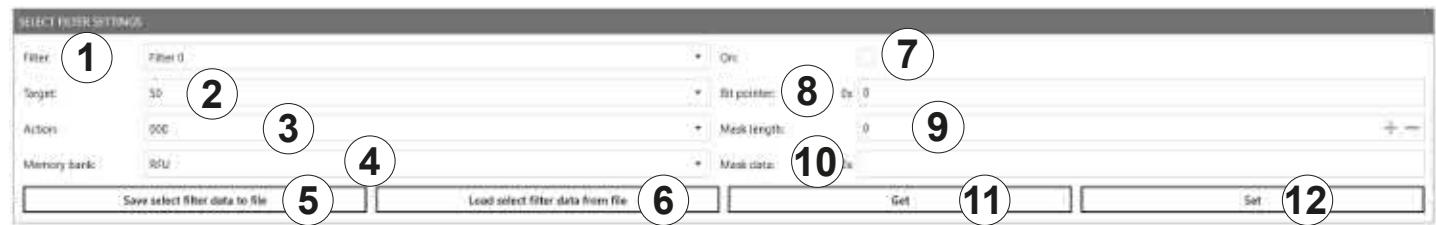
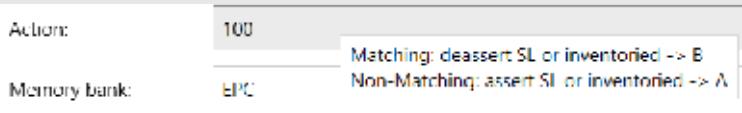


Fig. 60: Expert settings 2: select filter settings

(1)	Filter	selects a filter
(2)	Target	selects the tag target session ► Make sure the target matches the session set in (19) Fig. 57, p. 97.
(3)	Action	selects the action; see also <i>EPCglobal Gen 2 Specification</i> (p. 73) Tip ► To see the description of an action, hover over the <i>Action</i> field. ⇒ The description of the action appears in the tooltip: 
(4)	Memory bank	selects the memory bank (<i>RFU/EPC/TID/User</i>)
(5)	Save select filter data to file	saves the select filter data to file
(6)	Load select filter data to file	loads the select filter data from file
(7)	On	activates or deactivates the select filter
(8)	Bit pointer	sets from which memory address the filter compares the mask data
(9)	Mask length	sets the mask length (0–255)

⑩	Mask data	sets the data to be filtered
⑪	Get	reads the data of the filter selected at ①
⑫	Set	sets the select filter

Tip

In Generation 3 readers, select filter data are permanently stored in the reader, e.g. if the select filter has been activated, it is active after a reader restart.

14.8.5 Applying a Select Filter (Example)

You have the following results of the basic reading but you would like only the tags with the *FC28* in the memory address to take part in the inventory:

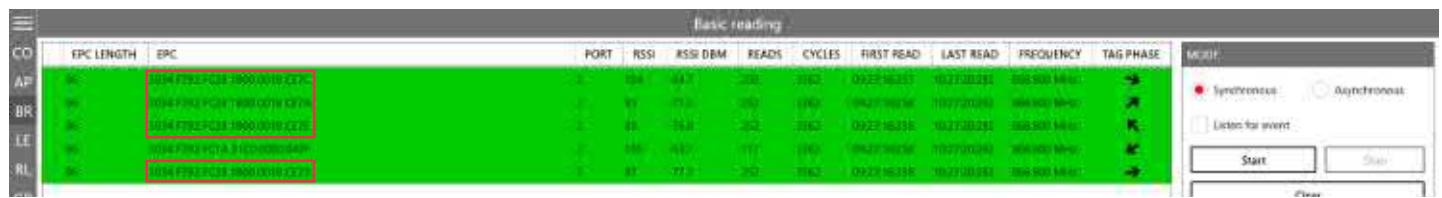
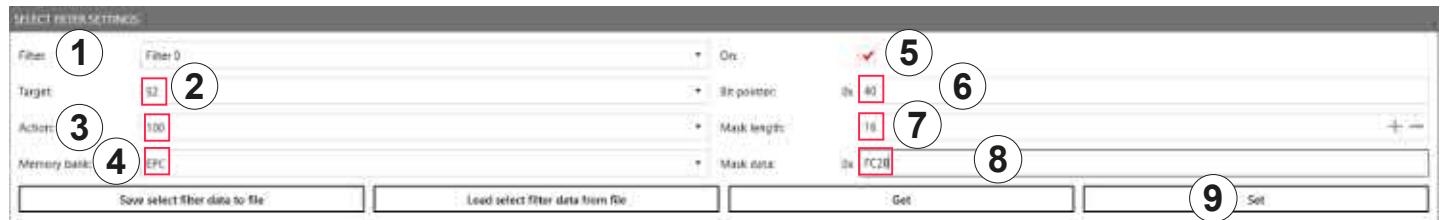


Fig. 61: Basic reading: select filter required

To do so, it is necessary to create a select filter. The advantage of this process is that the filtering takes place already at the air interface level.

To create the select filter as shown in the figure below:



1. Select the filter you would like to save the filtering settings to under *Filter* (①).
2. Select the target (②). Make sure the target matches the session set in ⑩ Fig. 57, p. 97.
3. Select an action (③). In the example, the action is set to **100**; see also *EPCglobal Gen 2 Specification*.
4. Select the *EPC* memory bank (④).
5. Activate the select filter (⑤).
6. Refer to the *EPCglobal Gen 2 Specification* to check from which bit pointer the filter will search for the value according to which you would like to filter the tags (*FC28* in the example); see pp. 44–46 in the *EPCglobal Gen 2 Specification V 2.0.1*. In the example, *FC28* is the third word in the EPC memory bank (bit pointer 0x00 is the CRC, bit pointer 0x10 is the PC, bit pointer 0x20 is the first EPC word). Therefore, *FC28* corresponds to the bit pointer 0x40.
7. Enter **40** at *Bit pointer* (⑥).
8. Enter the mask length at ⑦. In the example, *FC28* is one word, therefore, the value is **16**.
9. Enter the value (*FC28*) at ⑧.
10. Click *Set* (⑨).
11. Go to *Expert settings 1*.
12. In Selection Parameters, set the value at target to **B**; see also *EPCglobal Gen 2 Specification*.
13. Start the reading in the *Basic reading* tab:

Basic reading											Metric	
CO	EPC LENGTH	EPC	PORT	RSSI	RSSI DIM	READS	CYCLES	FIRST READ	LAST READ	FREQUENCY	TAG PHASE	Metric
CO	8	3034 F792 FC1A 31C0 0000 047F	2	-106	-64.7	309	3421	09:27:11.250	14:27:36.856	365.700 kHz	Green	Syncrhonous
AP	8	3034 F792 FC28 1B30 0018 CE7A	2	-96	-75.5	111	1420	09:27:11.250	14:27:36.856	365.700 kHz	Green	Aysynchro
BR	8	3034 F792 FC28 1B30 0018 CE7A	2	-87	-75.5	311	3421	09:27:11.250	14:27:36.856	365.700 kHz	Green	Synchronous
IE	8	3034 F792 FC1A 31C0 0000 047F	2	-106	-64.7	309	3421	09:27:11.250	14:27:36.856	365.700 kHz	Green	Aysynchro
RL	8	3034 F792 FC28 1B30 0018 CE7A	2	-96	-75.5	111	1420	09:27:11.250	14:27:36.856	365.700 kHz	Green	Synchronous

⇒ The reader only reads the tags with the filtered value (marked green). The tag without the filtered value is not read (marked red).

14.9 Test Gen 2 Functions

This tab makes it possible to access individual tag functions. In addition to the functionality in accordance with the EPC Gen2 standard, it is possible, for example, to read and write tags as well as set and change tag passwords.

The user interface consists of the fields *Get all Tags*, *Password for Operation*, *Write EPC*, *Read data*, *Write data*, *Change Password*, *Lock* and *Kill* that are described in the following chapters.

The screenshot shows the 'Test Gen2 functions' interface with several sections:

- GET ALL TAGS:** A list of EPCs. The first entry (3034 F792 FC1A 31C0 0000 047F) is highlighted with a green circle (1). Other entries are marked with red circles.
- PASSWORD FOR OPERATION:** A password field containing '0x 0'.
- WRITE EPC:** Fields for 'New EPC' (0x 0) and 'Auto increment' (unchecked). Buttons for 'Write EPC to selected tag' and 'Write EPC to tag in field'.
- READ DATA:** Fields for 'Memory bank' (EPC), 'Memory address' (0x 0), 'Word count' (0), and 'Data (UTF8)'. Buttons for 'Read data of selected tag', 'Read complete memory bank of selected tag', 'Read data of all tags', and 'Read complete memory bank of all tags'.
- Operations:** Buttons for 'WRITE DATA', 'CHANGE PASSWORD', 'LOCK', and 'KILL'.

Fig. 62: Test Gen2 functions

14.9.1 Get All Tags

The screenshot shows the 'GET ALL TAGS' section with a list of EPCs. The second entry (3034 F792 FC28 1B30 0018 CE7A) is highlighted with a green circle (2).

Fig. 63: Test Gen2 functions: Get all EPCs

①	Refresh	updates the tags read in the field ► For EPC-specific operations, click on a tag to select it from the list.
---	----------------	---

		shows the information about the tag manufacturer and the chip type
②	Info	<ul style="list-style-type: none"> ▶ Click on the information symbol. <p>⇒ The information about the tag is shown:</p> <pre> J031 F921 C1A 31C0 0003 0171 Manufacturer: Impinj Type: Monza R6 3031 F792 FC28 1800 0018 CE7A Manufacturer: NXP Type: UCODE / SL3ST201 3034 F792 FC28 1800 0018 CE7C </pre>

14.9.2 Password for Operation



Fig. 64: TestGen2: password for operation

- | | | |
|---|-----------|---|
| ① | >Password | sets the password for the tag operation in the hexadecimal format |
|---|-----------|---|

14.9.3 Write EPC

In this tab, it is possible to change the EPC of the tag.



Fig. 65: TestGen2: write EPC

		enters an EPC in the hexadecimal format
①	New EPC	<p>!</p> <p>Make sure to comply with the maximum EPC length supported by the tag. If the maximum length is exceeded, the tag will return an error.</p>
②	Auto increment	activates or deactivates increasing the EPC by one with each successful writing process
③	Write EPC to selected tag	writes the EPC on the selected tag
④	Write EPC to tag in field	writes the EPC entered in 1 to a single tag <ul style="list-style-type: none"> ▶ When using this command, make sure there is only one tag in the field. Otherwise, an error message is displayed in the status field.

14.9.4 Read Data

This group supplies detailed access to all the data areas of the tag. Access is obtained by entering the selected memory bank, the address within the memory bank and the number of words.

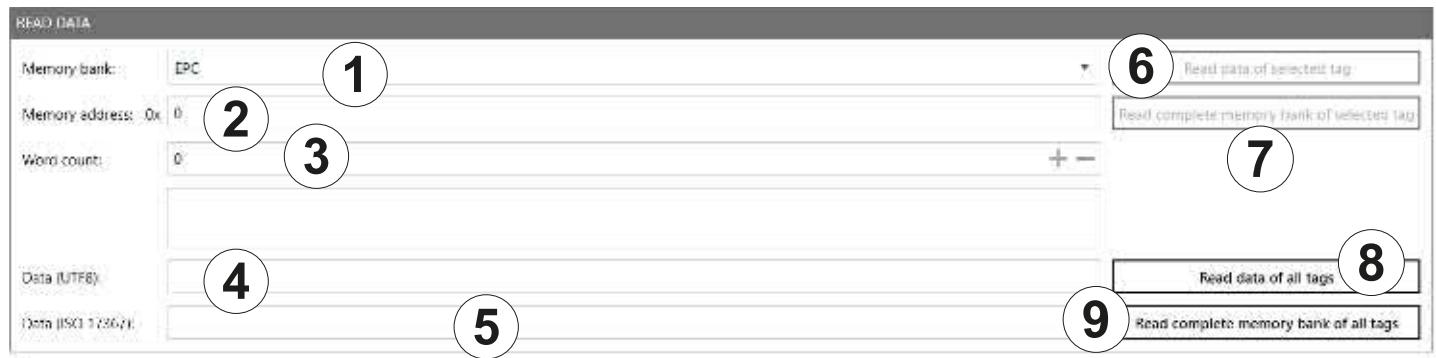


Fig. 66: TestGen2: read data

①	Memory bank	enters the selected memory bank
②	Memory address	enters the address within the memory bank
③	Word count	enters the number of words to read
④	Data (UTF8)	shows the data in the UTF8 format
⑤	Data (ISO 17367)	shows the data in the ISO 17367 format
⑥	Read data of selected tag	reads data from the selected tag
⑦	Read complete memory bank of selected tag	reads the complete memory bank of the selected tag; up to 255 words
⑧	Read data of all tags	reads data from all tags in the field ! If the tags in the field have different passwords and are configured differently, it is necessary to read the data from each tag individually.
⑨	Read complete memory bank of all tags	reads the complete memory bank of all tags in the field; up to 255 words

14.9.5 Write Data

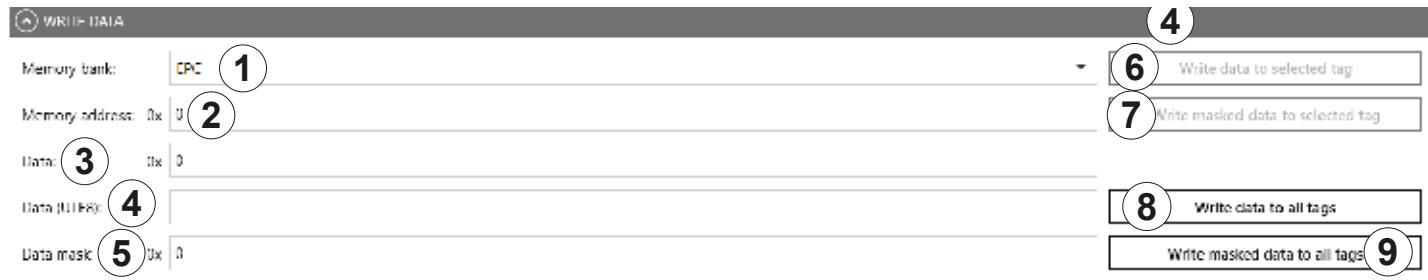


Fig. 67: TestGen2: write data

(1)	Memory bank	enters the selected memory bank
(2)	Memory address	enters the address within the memory bank
(3)	Data	enters data to write in the hexadecimal format
(4)	Data (UTF8)	enters data to write in the UTF8 format
(5)	Data mask	enters the data mask The data mask allows only individual bits on the tag to be changed.
(6)	Write data to selected tag	writes data to the selected tag in the field
(7)	Write masked data to selected tag	writes the masked data to the selected tag
(8)	Write data to all tags	write data to all tags in the field ! ► If the data are written to all tags in the field, make sure all the tags have the same configuration (lock and password).
(9)	Write masked data to all tags	writes the masked data to the all tags in the field

14.9.6 Change Password

To change the password, enter the current password at ① in Fig. 64, p. 101. If no password has yet been set, the default value is 0.

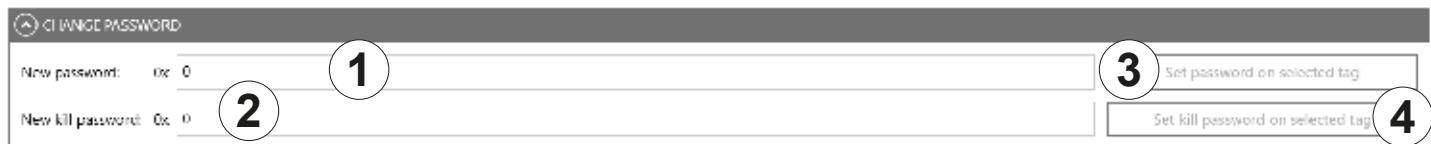


Fig. 68: TestGen2: change password

①	New password	sets the new password in the hexadecimal format for the selected tag
②	New kill password	sets the new password to deactivate the selected tag
③	Set password on selected tag	replaces the old password by the new password for the selected tag
④	Set kill password on selected tag	replaces the old deactivation password by the new deactivation password for the selected tag

14.9.7 Lock

The EPC Gen2 standard provides security mechanisms for the tag data areas. This allows individual memory areas and functionalities of the tags to be provided with a password to protect it against access and/or changes.

Under **Lock**, it is possible to lock the memory banks.

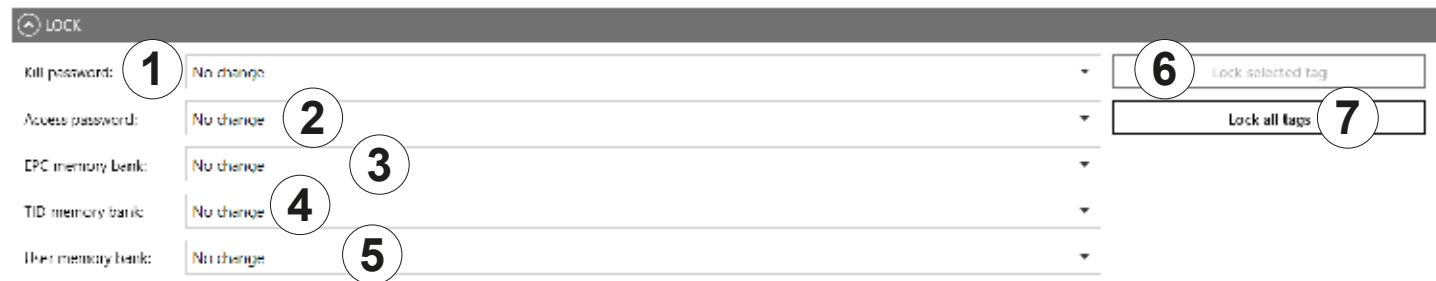


Fig. 69: TestGen2: Lock

		specifies how the kill password is accessible										
		<ul style="list-style-type: none"> ▶ Select one of the following options from the drop-down menu: 										
	① <i>Kill password</i>	<table> <tbody> <tr> <td><i>No change</i></td><td>the current setting for the kill password remains unchanged</td></tr> <tr> <td><i>Accessible</i></td><td>the kill password is readable and writeable from either the open or secured state</td></tr> <tr> <td><i>Accessible with permalock</i></td><td>the kill password is permanently readable and writeable from either the open or secured states and may never be locked</td></tr> <tr> <td><i>Accessible with password</i></td><td>the kill password is readable and writeable from the secured state but not from the open state</td></tr> <tr> <td><i>Not accessible with permalock</i></td><td>the kill password is not readable or writeable from any state</td></tr> </tbody> </table>	<i>No change</i>	the current setting for the kill password remains unchanged	<i>Accessible</i>	the kill password is readable and writeable from either the open or secured state	<i>Accessible with permalock</i>	the kill password is permanently readable and writeable from either the open or secured states and may never be locked	<i>Accessible with password</i>	the kill password is readable and writeable from the secured state but not from the open state	<i>Not accessible with permalock</i>	the kill password is not readable or writeable from any state
<i>No change</i>	the current setting for the kill password remains unchanged											
<i>Accessible</i>	the kill password is readable and writeable from either the open or secured state											
<i>Accessible with permalock</i>	the kill password is permanently readable and writeable from either the open or secured states and may never be locked											
<i>Accessible with password</i>	the kill password is readable and writeable from the secured state but not from the open state											
<i>Not accessible with permalock</i>	the kill password is not readable or writeable from any state											
		<ul style="list-style-type: none"> ▶ For more details, see <i>EPCGlobal Gen2 Specification</i>. 										
	② <i>Access password</i>	<p>specifies how the access password is accessible</p> <ul style="list-style-type: none"> ▶ Select an option from the drop-down menu; see the options at ①. ▶ For more details, see <i>EPCGlobal Gen2 Specification</i>. 										
	③ <i>EPC memory bank</i>	<p>specifies how the EPC memory bank is accessible</p> <ul style="list-style-type: none"> ▶ Select one of the following options from the drop-down menu: <table> <tbody> <tr> <td><i>No change</i></td><td>the EPC memory remains unchanged</td></tr> <tr> <td><i>Writeable</i></td><td>the EPC memory bank is writeable from either the open or secured states</td></tr> <tr> <td><i>Writeable with permalock</i></td><td>the EPC memory bank is writeable from either the open or secured states and may never be locked</td></tr> <tr> <td><i>Writeable with password</i></td><td>the EPC memory bank is writeable from the secured state but not from the open state</td></tr> <tr> <td><i>Not writable with permalock</i></td><td>the EPC memory bank is not writeable from any state</td></tr> </tbody> </table>	<i>No change</i>	the EPC memory remains unchanged	<i>Writeable</i>	the EPC memory bank is writeable from either the open or secured states	<i>Writeable with permalock</i>	the EPC memory bank is writeable from either the open or secured states and may never be locked	<i>Writeable with password</i>	the EPC memory bank is writeable from the secured state but not from the open state	<i>Not writable with permalock</i>	the EPC memory bank is not writeable from any state
<i>No change</i>	the EPC memory remains unchanged											
<i>Writeable</i>	the EPC memory bank is writeable from either the open or secured states											
<i>Writeable with permalock</i>	the EPC memory bank is writeable from either the open or secured states and may never be locked											
<i>Writeable with password</i>	the EPC memory bank is writeable from the secured state but not from the open state											
<i>Not writable with permalock</i>	the EPC memory bank is not writeable from any state											
	④ <i>TID memory bank</i>	<p>specifies how the TID memory bank is accessible</p> <ul style="list-style-type: none"> ▶ Select an option from the drop-down menu; see the options at ③. 										
	⑤ <i>User memory bank</i>	<p>specifies how the User memory bank is accessible</p> <ul style="list-style-type: none"> ▶ Select an option from the drop-down menu; see the options at ③. 										
	⑥ <i>Lock selected tag</i>	locks the selected tag with the settings from ①–⑤										

		locks all the tags with the settings from ①–⑤
⑦	<i>Lock all tags</i>	<p>! ▶ To lock all the tags, make sure that all the tags have the same password.</p>

14.9.8 Kill

!	▶ To deactivate a tag, set a deactivation password that is not 0; see ② in Fig. 68, p. 104. After a kill command, the tag will be unusable!
---	--



Fig. 70: TestGen2: kill

①	<i>Kill selected tag</i>	executes a kill command on the selected tag
②	<i>Kill all tags</i>	executes a kill command on all tags in the field

14.10 @KRAI

This tab allows changing KRAI-specific settings. The **@KRAI** tab is divided into several sections. **Port** and **Port Info** are always available, other sections depend on the antenna connected to the reader, e.g. **Polarisation**, **Direction** etc.

The Reader recognises the connected antennas at boot up, but it is also possible to manually recognise a single port or all ports under **Port**. **Port Info** displays the information about the antenna.

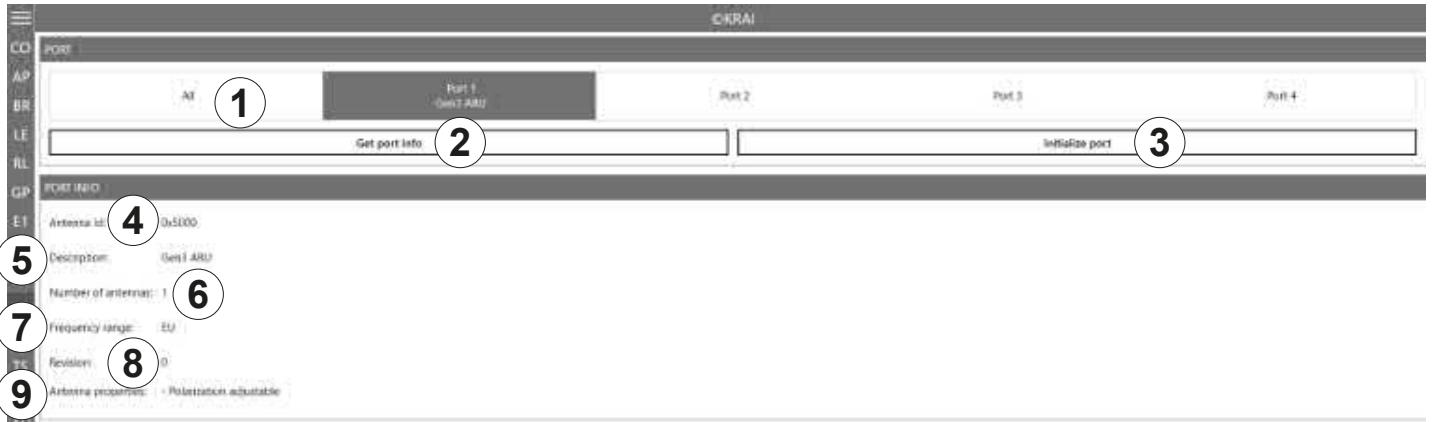


Fig. 71: @KRAI: polarisation

(1)	All/Port 1-4	selects either one or all antennas for <i>Initialise port</i> (③)
(2)	Get port info	retrieves port information for a selected @KRAI antenna
(3)	Initialise port	runs a query of the antennas on this port/these ports
(4)	Antenna Id	shows the antenna ID
(5)	Description	shows the description of the antenna
(6)	Number of antennas	shows the number of the antennas connected to the port
(7)	Frequency range	shows the frequency range the antenna operates in (<i>Global/EU/FCC</i>)
(8)	Revision	shows the hardware version of the antenna
(9)	Antenna properties	shows antenna properties, e.g. <i>polarisation adjustable</i> , <i>LEDs available</i>

Different configuration options are displayed, depending on the types of the connected antennas. The category **Polarisation** is shown for antennas with polarisation switching, the **Jumper Cable Attenuation** is available for smart shelf antennas, e.g. SMSH-30-30KRAI, **LED** is shown for @KRAI WIRA 70 and **Direction** for CSB KRAI antennas, e.g. WiRa 30°.

14.10.1 Polarisation



Fig. 72: @KRAI: polarisation

①		sets the polarisation of the antenna If there are several types of polarisation selected at the same time, the antenna configuration changes after every inventory.
②	<i>Get polarization</i>	reads the current polarisation information of the antenna
③	<i>Set polarization</i>	sets the polarisation on the antenna

14.10.2 LED

Depending on the features that are integrated in the antennas, it is possible to control/configure the LEDs.



Fig. 73: @KRAI: LED

①	<i>LED 1-4</i>	selects the function of the LED 1-4 ► For functions, see Chapter <i>Selecting Functions</i> , p. 88
②	<i>Turn-off time</i>	sets the turn-off time for LED
③	<i>Get LED config</i>	shows the current LED configuration
④	<i>Set LED config</i>	sets the new LED configuration
⑤	<i>LED</i>	selects between LED 1-4
⑥	<i>Duration</i>	sets the duration of how long the LED is on; only if protocol access is selected in ①
⑦	<i>Set LED on</i>	switches the LED on for the duration in milliseconds selected in ⑥; if the duration is set to 65535 ms, the LED is permanently on
⑧	<i>Set LED off</i>	switches off the selected LED

14.10.3 Jumper Cable Attenuation



Fig. 74: @KRAI: jumper cable attenuation

①	<i>Get jumper cable attenuation</i>	reads the current jumper cable attenuation
②	<i>Set jumper cable attenuation</i>	sets the jumper cable attenuation



For cascading smart shelf antennas, it is necessary to use cables with the same attenuation (cable length). Otherwise, the TX power of the antennas that is derived from the jumper cable attenuation is not calculated correctly.

14.10.4 Direction

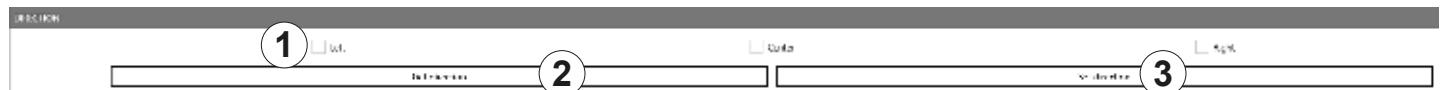


Fig. 75: @KRAI: direction

①	<i>Left/Centre/Right</i>	sets the direction of the antenna If there are several types of direction selected at the same time, the antenna configuration changes after every inventory.
②	<i>Get direction</i>	reads the antenna direction(s) currently set in the antenna
③	<i>Set direction</i>	sets the selected direction(s) in the antenna

14.11 AppManager



This chapter gives a short overview of the apps, the requirements to operate them and the installation instructions.

- For more information on how to operate an app, refer to the user guide for the corresponding app.

14.11.1 Currently Available Apps

AccessManager

Automated vehicle identification (AVI) is one of the key markets that Kathrein Solutions is focusing on. AVI includes free flow identification, plaza and parking applications. For parking applications, Kathrein provides a specially configured software for access control called *AccessManager*.

The RRU 4xxx and ARU 3xxx series readers have a built-in industrial controller with Linux operating system. The entire application can be installed and configured directly on the reader. The system can be operated as an isolated solution without a network connection or alternatively via remote access over the network for configuration purposes or for database adaptations.

The *AccessManager* application software allows user-guided input and configuration of the transponder data that is to be captured. No programming knowledge is required in this case.

Flexible and efficient detection (e.g. of vehicles) is assured on the basis of the four digital inputs provided in Kathrein RFID systems which can be used for activation. A start point can be defined for the application in this way, whereby a light barrier or inductive ground contact is queried in order to activate the reading process.

Skidata

The Skidata app is a software-based solution that provides simple and easy interface integration of Kathrein RFID readers with Ethernet in the latest generation of Skidata barrier systems. With the Skidata app, the reader will become an officially certified SKIDATA compatible product.

Low Level Reader Protocol

Kathrein RFID readers are available with an optional LLRP (Low Level Reader Protocol) stack installable as an LLRP app. All readers with an integrated embedded Linux OS can be controlled via LLRP 1.0.1 port 5084 for easier integration. To specify air interface commands between readers and clients, LLRP is a ratified standard protocol from EPCglobal.

Profinet IO

The Profinet IO app allows the integration of a reader into a Profinet IO environment; the reader acts as an IO device. To run the app, a valid licence key is needed. Licence keys (either a full licence or a time limited demo licence) are bound to the specific reader the app is running on. For obtaining a licence key, the hardware key provided by the app is needed.

TagBlower

The TagBlower app can read tags asynchronously and generate messages, when a tag is coming or going. The app provides a server on a configurable port, where TCP clients can connect to receive those messages. The message format can be specified by the user by setting a coming and/or going datagram. A datagram consists of normal text and keywords.

14.11.2 Installing an App



This chapter describes installing an app shown on the example of *AccessManager*. You can install all other apps following the instructions described below.

✓ The *ReaderStart* software is installed.

✓ The reader is connected to a PC.

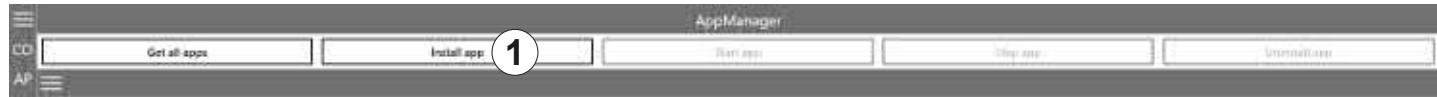
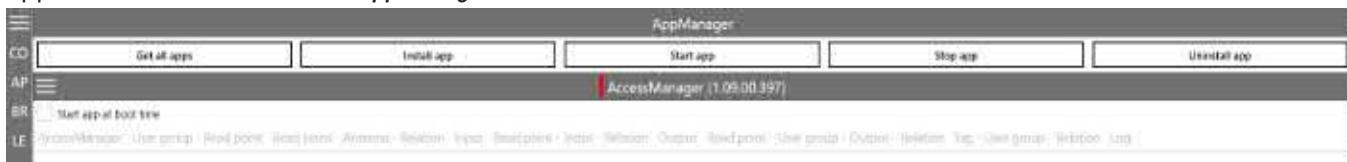


Fig. 76: AppManager: installing an app

1. Go to <https://www.kathrein-solutions.com/products/software/interface-software/accessmanager>.
2. Download the app.
3. If the downloaded app is in the zip format, extract a .tar file. Make sure not to extract the .tar file!
4. Start the *ReaderStart* software.
5. Go to the *AppManager* tab.
6. Click on *Install app* (①).
⇒ A pop-up window to select the file with the app opens.
7. Select the file with the app. Make sure it is the .tar file.
8. Click Open.
⇒ A pop-up message with the progress bar for the installation process appears for the duration of the installation .
After the app has been successfully installed, the corresponding message is displayed in the status field and the app interface is shown in the *AppManager* tab:



Tip

► To see all the installed apps, click the menu symbol at (①).

⇒ The installed apps are displayed:



14.12 TagScan

To represent the relationship between the tag phase and the RSSI value, it is possible to plot both values by means of the TagScan.

- ✓ There is only one tag in the field or a tag has been selected.
- Click *Start* to activate the TagScan.
 - ⇒ The phase shifts are seen in the frequency switching. The RSSI value does not change because the transponder (tag) is not moved.

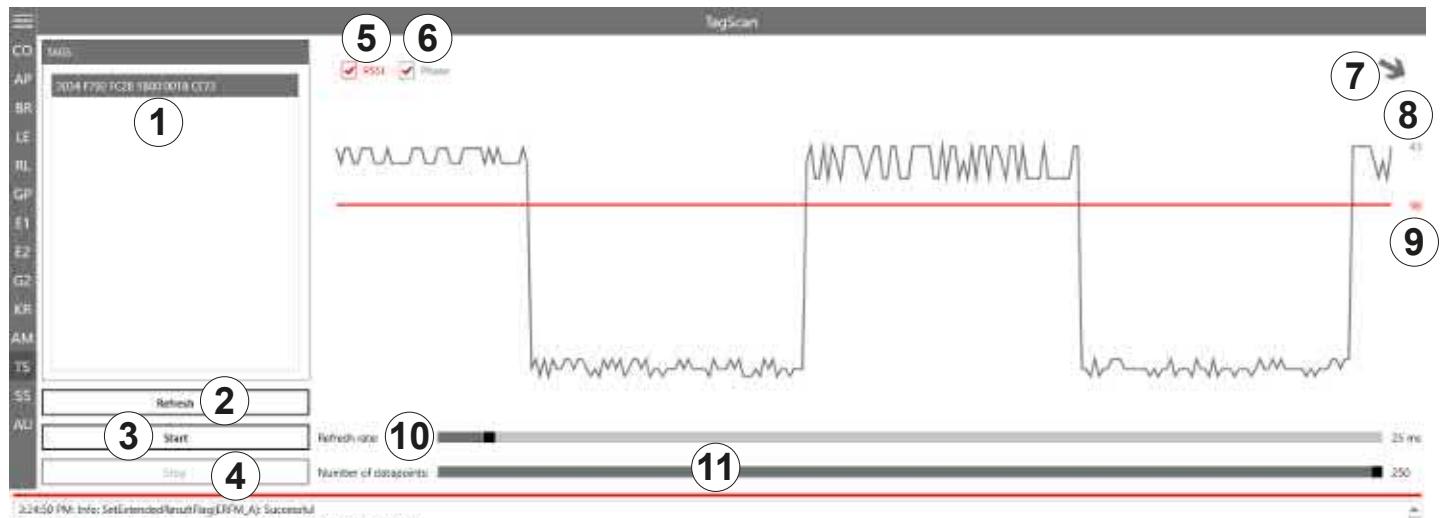


Fig. 77: TagScan: phase shift (due to the channel change), transponder is not moved

①	Tags	shows the number of the tags present in the antenna field
②	Refresh	scans tags in the antenna field anew
③	Start	starts TagScan
④	Stop	stops TagScan
⑤	RSSI	activates/deactivates the presentation of the RSSI value in the graph
⑥	Phase	activates/deactivates the presentation of the phase in the graph
⑦		shows the phase in form of the rotating arrow
⑧		shows the current value of the phase
⑨		shows the current RSSI value
⑩	Refresh rate	sets the interval between the commands
⑪	Number of data points	sets the number of data points in the graph

Tip

- To eliminate the phase shifts, select only one transmission frequency under *Expert settings 1*; see *Expert Settings 1*, p. 94.

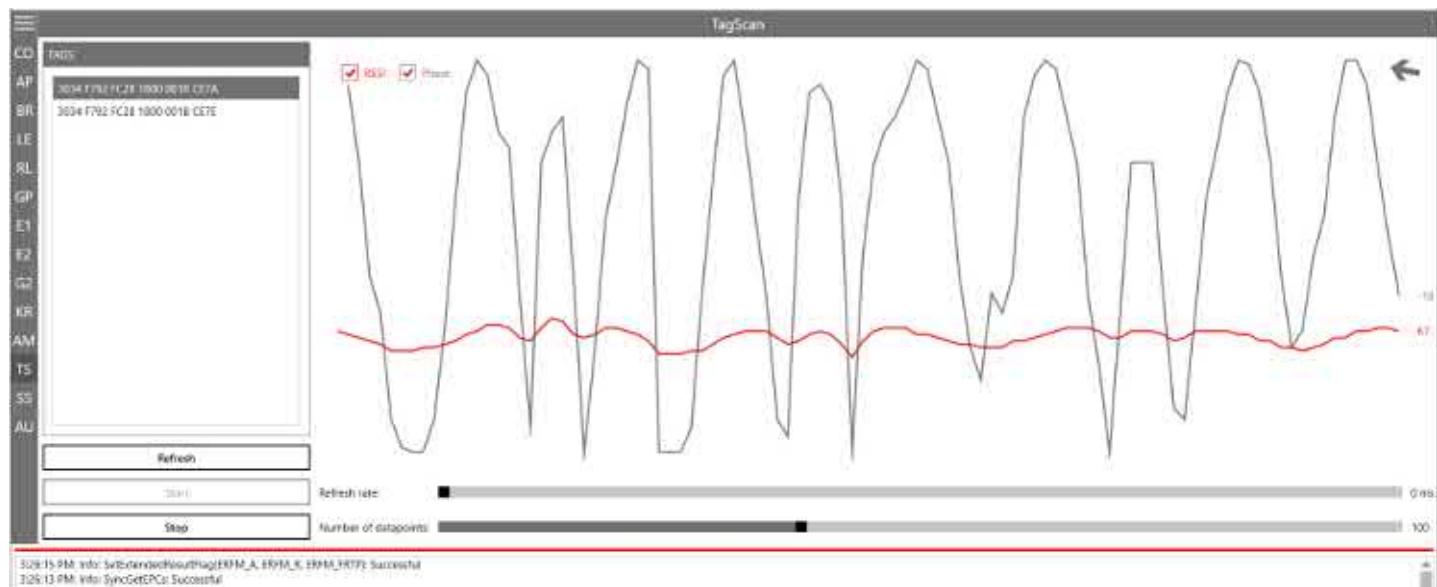


Fig. 78: TagScan: phase shift, transponder is moved

Transponder movement is indicated by the amplitude of the phase. The RSSI value changes in small steps. The direction of the movement is indicated by means of the rotating pointer.

14.13 Spectral Scan

It may happen that the RFID transmission to or from the transponder is disturbed by frequency interfering. *SpectralScan* shows a qualitative frequency spectrum. Due to the fact that it is received by means of the connected RFID antenna, the frequency assignment on location is made visible.

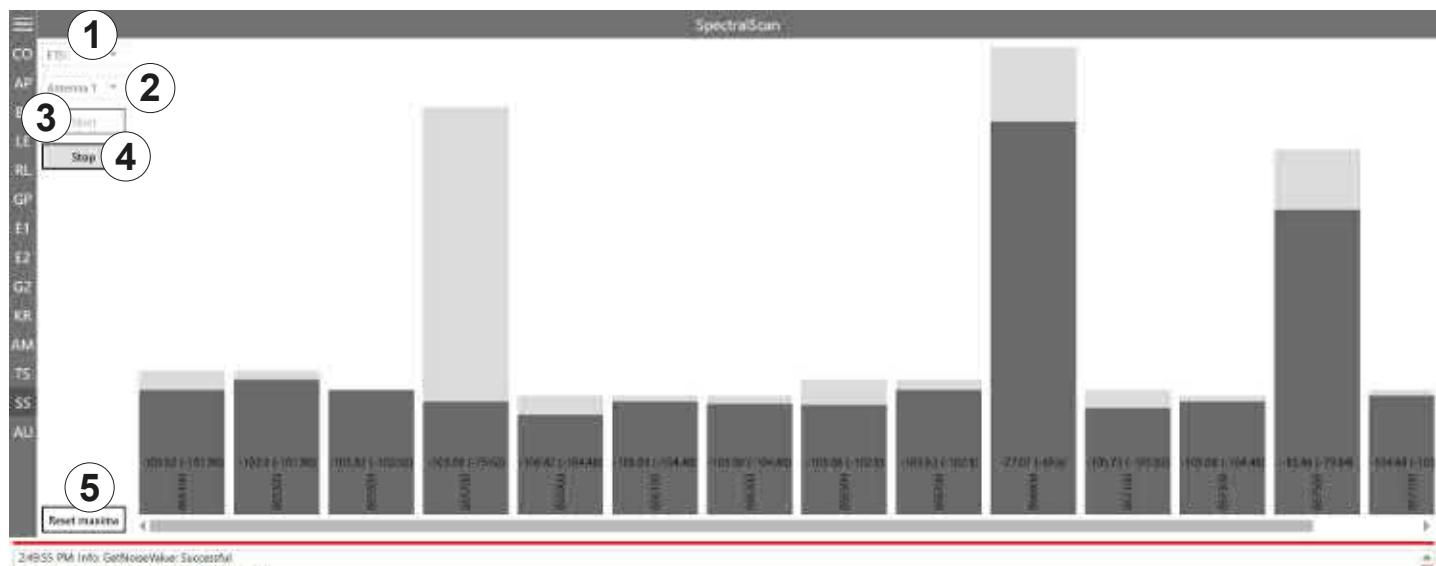


Fig. 79: SpectralScan

①	<i>ETSI</i>	selects the frequency area
②	<i>Antenna 1-n</i>	selects an antenna from the drop-down menu
③	<i>Start</i>	starts SpectralScan
④	<i>Stop</i>	stops SpectralScan
⑤	<i>Reset maxima</i>	resets maxima

If there is more than one reader, spectral scan shows which channels might be occupied by other readers. In Fig. 78, p. 113, the channels 4, 10 and 13 are occupied by other readers. If the user is not satisfied with the reading results and the interferences keep occurring, it is possible to deactivate channels on which the interference occurs (4, 10 and 13) and only activate the channel that is free (7) to achieve better reading results, see ⑯ in Fig. 56, p. 94.

14.14 Authentication

Using this function, it is possible to authenticate a tag.

The Authentication tab consists of 4 areas, *Get All Tags*, *Tags*, *Key* and functions that are described below.

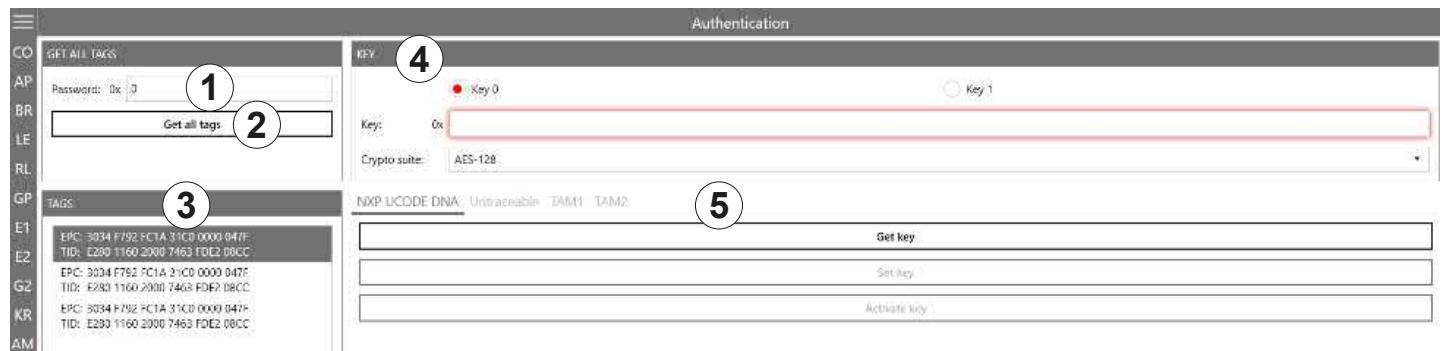


Fig. 80: Authentication

(1)	Password	enters the access password; see <i>Password for Operation</i> , p. 101
(2)	Get all tags	reads all the tags in the antenna field
(3)	Tags	shows all the detected tags
(4)	Key	see <i>Key</i> , p. 115; necessary for <i>TAM1</i> and <i>TAM2</i>
(5)	Functions	see <i>Functions</i> , p. 116

14.14.1 Key



Fig. 81: Authentication: Key

(1)	Key 0/Key 1	selects a key for the authentication (<i>Key 0</i> is only used for <i>TAM1</i> , <i>Key 1</i> is used for both <i>TAM1</i> and <i>TAM2</i>)
(2)	Key	enters the key selected in ①
(3)	Crypto suite	selects the crypto suite
(4)		see <i>Functions</i> , p. 116

14.14.2 Functions

NXP UCODE DNA

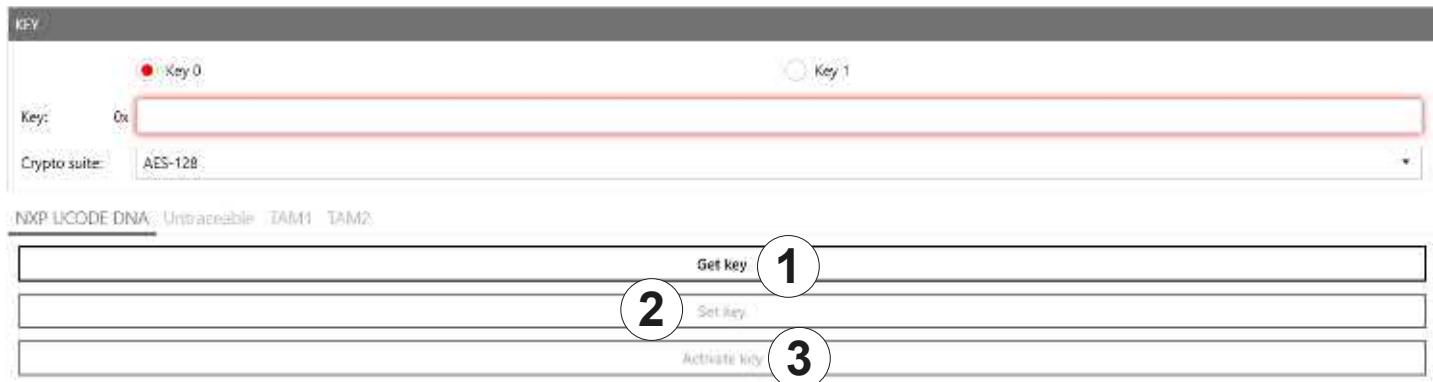


Fig. 82: Authentication: NXP UCODE DNA

(1)	Get key	reads key 0 or key 1 currently set in the selected tag; only if the key has not been activated
(2)	Set key	sets key 0 or key 1 on the selected tag
(3)	Activate key	activates key 0 or key 1 on the selected tag

Untraceable

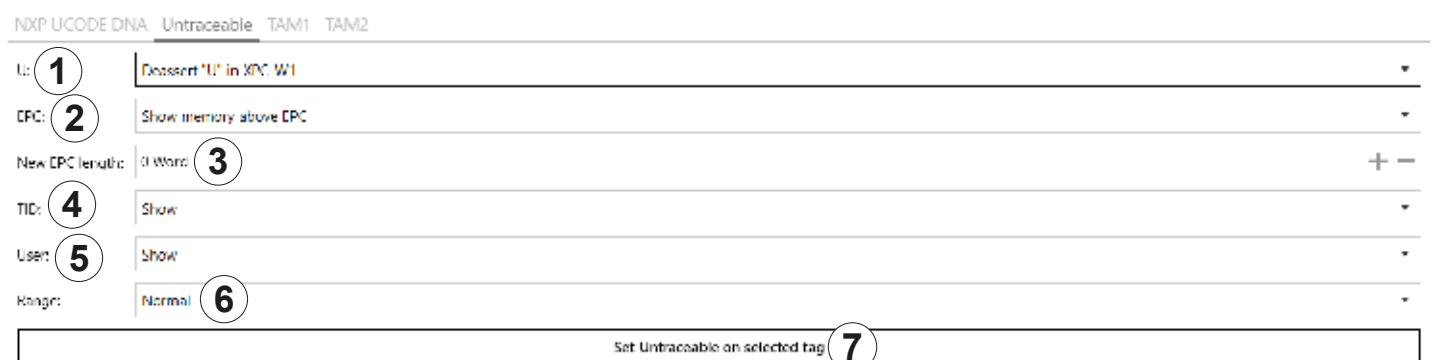


Fig. 83: Authentication: untraceable

(1)	U:	asserts or deasserts U in XPC_W1; see <i>EPCglobal Gen2 Specification</i> , p. 106
(2)	EPC	shows or hides memory above the visible EPC
(3)	New EPC length	sets new EPC length in words
		Show shows the complete TID
(4)	TID	Truncated shows the first two words in case of E2 and only one word in case of E1
		Hide hides the complete TID
(5)	User	shows or hides the user memory bank

		selects a range
		<i>Normal</i> the tag operates in the normal range
⑥	<i>Range</i>	<i>Toggle temporarily</i> The tag temporarily toggles between normal and reduced operating range but reverts to its prior persisting operating range when the tag loses power
		<i>Reduced</i> the tag operates in the reduced operating range
⑦	<i>Set Untraceable on selected tag</i>	sets settings 1–6 on the selected tag

TAM1

TAM1 is used to check whether the selected tag is authentic.

- ✓ The tag has at least one activated key, *Key 0* or *Key 1*.

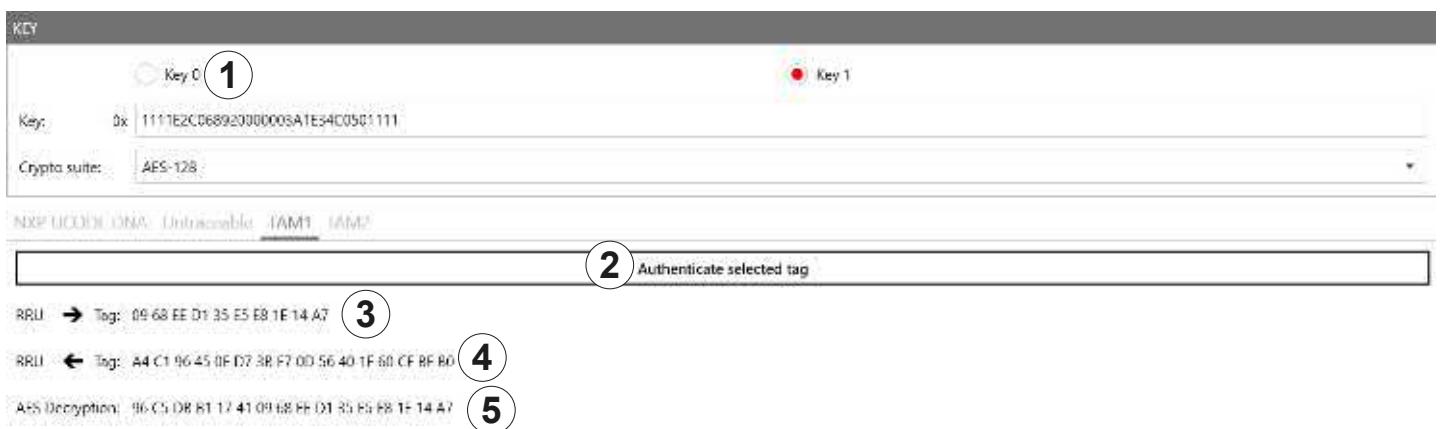


Fig. 84: Authentication: key (TAM1)

	<i>Key</i>	see <i>Key</i> , p. 115
①	<i>Authenticate selected tag</i>	the reader sends the authenticate command to the selected tag; a pop-up message appears whether the authentication was successful or failed.
②	<i>RRU → Tag</i>	shows the random number sent to the tag by the reader
③	<i>RRU ← Tag</i>	shows the encrypted random number sent to the reader from the tag
④	<i>AES Decryption</i>	shows the data decrypted from ③ by means of the key entered at ② in <i>Authentication: Key</i> , p. 115; in the example above, this data contains the random number shown in ②

TAM2

TAM2 is used to read the data of the selected tag.

- ✓ *Key 1* has been activated.



Fig. 85: Authentication: key (TAM2)

①	Profile	selects a profile the data of which is shown
②	Offset	sets the offset for ⑤
③	Block count	sets how many bits rare to be read
④	Protection mode	selects the protection mode for the TAM2 authentication operation
⑤	Read data of selected tag	reads the data of the selected tag provided the correct key 1 has been entered at <i>Key</i>
⑥	Data	shows data read in ⑤

15 Contact Information

Kathrein Solutions GmbH

Lise-Meitner-Straße 7

85737 Ismaning

Phone [+49 \(0\) 89 / 286 7436 0](tel:+498928674360)

Fax +49 (0) 8036 / 90 831 69

Email: iot-info@kathrein-solutions.com

16

Waste Disposal



Electronic equipment is not domestic waste – in accordance with directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL dated 27th January 2003 concerning used electrical and electronic appliances, it must be disposed of properly. At the end of its service life, take this unit for disposal at a designated public collection point.



Electronic equipment is not domestic waste – in accordance with directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL dated 27th January 2003 concerning used electrical and electronic appliances, it must be disposed of properly. At the end of its service life, take this unit for disposal at a designated public collection point.