



Software manual
ReaderStart

DTE800

DTE810

DTE820

DTE830

DTE900

DTE910

DTE930

UK



Content

1	Preliminary note	5
1.1	Symbols used	5
1.2	Safety instructions	5
2	System requirements	5
3	Installation	6
3.1	Software	6
3.2	Hardware	6
4	Function	6
4.1	ReaderStart	6
4.2	RFID system	6
4.2.1	ID tag	7
4.2.2	Antenna	7
4.2.3	UHF reader	7
5	ReaderStart user interface	8
5.1	Menus	8
5.2	Function groups	8
5.3	Status field	9
5.4	Menu bar	9
5.4.1	File	9
5.4.2	Options	10
5.4.3	Info	10
6	Function group [CO] Communication	11
6.1	"COM" section	11
6.2	"Ethernet" section	12
6.2.1	"General" section	12
6.2.2	"eth0" section	13
6.2.3	"IO card configuration" section	13
7	Function group [AP] Application	15
7.1	"Settings" section	16
8	Function group [BR] Basic reading functions	17
8.1	"Table" section	17
8.2	"Mode" section	18
8.3	"Statistics" section	18
8.4	"Options" section	19
9	Function group [GP] GPIO functions	20
9.1	"GPIO card" section	20
9.2	"Input" section	20
9.3	"Output" section	21
9.4	"Test input" section	21
9.5	"Test output" section	21
9.6	"Action list" section	22
9.7	"Assign input to action list" section	22
10	Function group [E1] Expert settings 1	23
10.1	"Current parameter set" section	23
10.2	"Transmission power" section	23
10.3	"Port multiplex configuration" section	24
10.4	"RF settings" section	24
10.5	"Selection parameters" section	25
11	Function group [E2] Expert settings 2	26
11.1	"Default parameter set" section	26
11.2	"Copy parameter set" section	26
11.3	"Change reader parameter" section	27
11.3.1	Example 1:	27
11.3.2	Example 2:	28
11.3.3	Example 3:	29

11.4	"Configuration password" section	30
11.5	"Select filter settings" section	31
11.5.1	Example	32
12	Function group [TA] - Tag access	33
12.1	"Get all tags" section	33
12.2	"Password for operation" section	34
12.3	"Write EPC" section	34
12.4	"Read data" section	34
12.5	"Write data" section	35
12.6	"Change password" section	35
12.7	"Lock" section	36
12.8	"Kill" section	37
13	Function group [AM] - AppManager	38
14	Function group [TS] - TagScan	39
14.1	Stationary ID tag	39
14.2	Moving ID tag	40
15	Function group [SS] - SpectralScan	41
15.1	Example	41
16	Configuration parameters	43
16.1	Introduction	43
16.2	Parameter ID	43
16.2.1	Example	43
16.3	Parameter set	44
16.4	"Global" configuration group	44
16.4.1	DefaultParamset	44
16.5	Configuration group "High-frequency interface" (RFInterface)	44
16.5.1	RFPower1...8	44
16.5.2	TimeToPowerOff	45
16.5.3	ModulationType	45
16.5.4	MultiplexingAntennaport1...8	46
16.5.5	MultiplexingExposureTime1...8	47
16.5.6	CableLoss1...8	47
16.5.7	AntennaGain1...8	47
16.5.8	RSSIThreshold1...8	48
16.5.9	MultiPowerTagAccess1...8	48
16.5.10	MaxAllowedAntennaOutputPower1...8	48
16.5.11	EnableRSSIThresholdAtSpecificCmds	49
16.5.12	FlashWriteAdditionalPower	49
16.5.13	FlashReadAdditionalPower	49
16.6	Configuration group "Tag communication" ("TagComm")	50
16.6.1	UsePilottone	50
16.6.2	InitialQ	50
16.6.3	Session	51
16.6.4	MaxErrors	51
16.6.5	CommunicationProfile	51
16.6.6	CommStandard	52
16.6.7	IntelligentWrite	52
16.6.8	VerifyWrite	52
16.6.9	QueryTarget	53
16.6.10	QuerySel	53
16.6.11	ForcePowerOffAfterEPCWrite	53
16.6.12	TransmitGetEPCsPreSelect	54
16.6.13	TransmitSelectIfNoFilterIsOn	55
16.6.14	NumberOfEPCWords	55
16.6.15	UseBlockWrite	55
16.6.16	DisableReceivingNXPRReadProtectedTags	56
16.7	Configuration group "Observed List" ("ObservedList")	56
16.7.1	GlimpsedTimeoutCnt	56
16.7.2	ObservedThresholdCnt	56
16.7.3	ObservedTimeoutCnt	57

16.8 Configuration group "Host communication" ("HostComm")	57
16.8.1 ExtendedResultFlag	57
16.8.2 AntennaIndependentOperation	57
16.8.3 ASyncAdditionalRSSIDataDeliveryDelta	58
16.8.4 UseMillisecondsAsTimestamp	58
16.9 Configuration group "ETSI"	59
16.9.1 PortChannelListGlobalValue1...16	59
16.9.2 PortChannelListPort1...8Value1...16	59
16.9.3 ChannelSwitchingMode	60
16.9.4 PowerCheckOverAllAllowedChannels	61

Copyright

Microsoft®, Windows®, Windows Vista®, Windows 7®, Windows 8®, Windows 8.1® and Windows 10® are registered trademarks of Microsoft Corporation.

Adobe® and Acrobat® are registered trademarks of Adobe Systems Inc.

All trademarks and company names used are subject to the copyright of the respective companies.

1 Preliminary note

The software manual describes the functions of the devices in combination with the software.

1.1 Symbols used

- ▶ Instruction
- > Reaction, result
- [...] Designation of keys and buttons
- "..." Designation of display text
- Cross-reference



Important note

Non-compliance may result in malfunction or interference.



Information

Supplementary note

1.2 Safety instructions

Please read the operating instructions prior to set-up of the device. Ensure that the product is suitable for your application without any restrictions.

If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.

2 System requirements

- Operating system: Windows 7 (32/64 bits), Windows 8.1 (32/64 bits), Windows 10 (32/64 bits)
- Application software: ReaderStart 3.0x



Other versions of the software may contain changed or new functions which are not described in this software manual.

3 Installation

3.1 Software

Install the software:

- ▶ Insert the data carrier with the software.
- > Alternatively, download the software from the website: www.ifm.com
- ▶ Copy the zip file to an appropriate directory on the PC and unzip.
- ▶ Start the setup file.
- ▶ Use the setup program to install the software on the PC.

3.2 Hardware

The software is compatible with the following devices:

DTE800, DTE810, DTE820, DTE830, DTE835, DTE900, DTE910, DTE920, DTE930

Installation and set-up of the devices are described in the operating instructions:

www.ifm.com

4 Function

4.1 ReaderStart

ReaderStart is a software for UHF readers. Software functions:

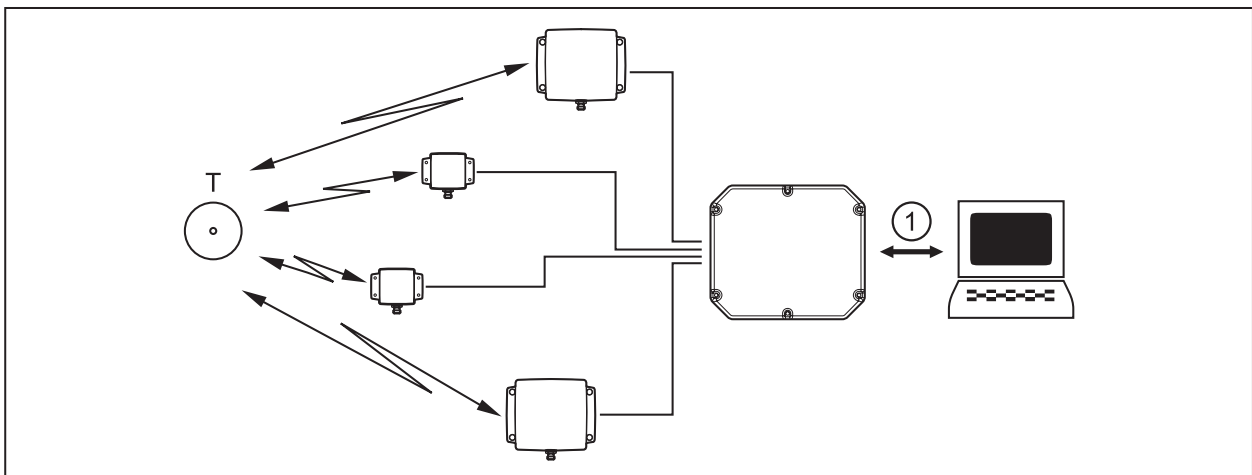
- configuration of UHF readers,
- test environment with monitoring functions for detecting, writing and reading ID tags.

4.2 RFID system

An RFID system consists of the following components:

- UHF reader
- antenna
- ID tag
- Programmable controller or programmable logic controller

The figure below shows the schematic layout of the RFID system:



1. Fig.: RFID system with "T" for the ID tag and ① for the Ethernet connection

4.2.1 ID tag

The ID tag is the data carrier of the RFID system. It consists of different memory banks:

- EPC - Electronic Product Code

The EPC memory bank is readable and writable and has 96 bits of memory by default. The memory bank typically stores the product code, serial number, etc. The system reads the memory bank fastest.

- Data - User data memory

The data memory bank is readable and writable with a memory size depending on the chip type. Typically, the memory size is 512 bits. Memory sizes up to 8 Kbytes are supported. In the memory bank, product-specific data is stored.

- TID - Tag Identifier

The TID memory bank contains the unique tag ID number. The number is assigned by the manufacturer, is internationally unique and cannot be changed.

- RFU - Reserved for future use

The RFU memory bank is reserved for future use. For example, the access password for the ID tag is currently stored here.

4.2.2 Antenna

The antenna is a passive element in the RFID system. The antenna transmits the modulated reader signal.

4.2.3 UHF reader

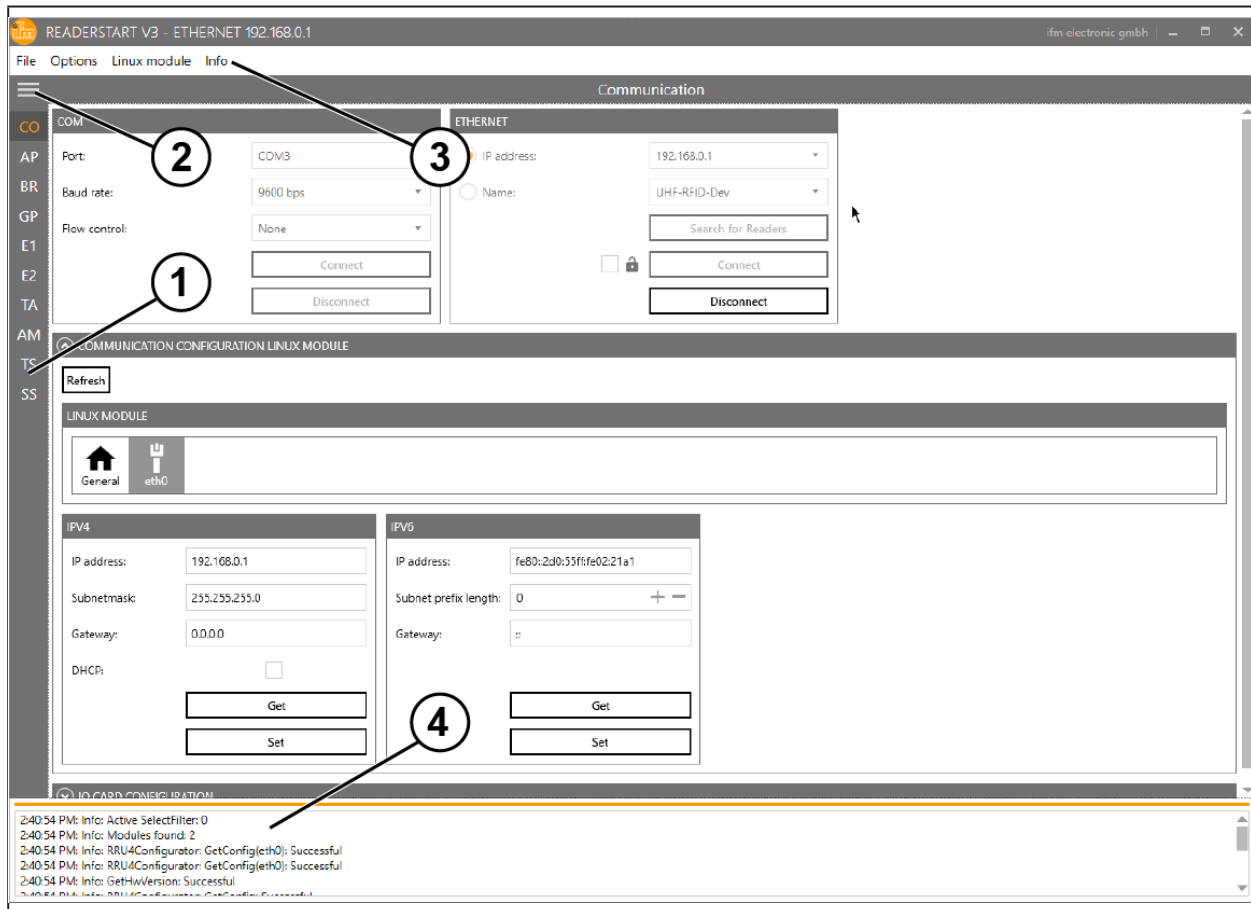
The UHF reader is the main component of the RFID system. Functions of the UHF reader:

- modulate the signal,
- modulate commands,
- decode responses.

The UHF reader has a communication interface through which the user sends the desired commands to the device. An ID tag is accessed whenever it moves into the antenna's reception range.

5 ReaderStart user interface

After the program start, a splash screen is displayed until all the necessary DLLs have been loaded in the background. After this the program window of the software appears.



2. Fig.: ReaderStart interface

- ①: Menu
- ②: Hamburger button
- ③: Menu bar
- ④: Status field

5.1 Menus

The settings and operating elements of the software are divided into menus. The menus can be found on the left ① and at the top ③ of the software. A click on the hamburger icon ② displays the full menu titles on the left-hand side.

5.2 Function groups

The functions of the software in combination with the connected UHF readers are divided into function groups. The individual function groups can be selected via the menu on the left ①.

5.3 Status field

All status messages from the UHF reader and the software are logged in the status field ④ at the bottom of the screen. There are 3 types of status messages:

Info	Shows which action was just performed
Warning	Indicates possible problems in the structure and configuration
Error	Indicates that the desired action could not be executed

Clicking the right mouse button opens the context menu with the following functions:

- delete status messages
- deactivate certain types of status messages
- copy status messages to the clipboard
- save status messages to a file

UK

5.4 Menu bar

The menu bar contains the menus [File], [Options] and [Info].

5.4.1 File

In the [File] menu, the current configuration of the UHF reader is saved to a file or an existing configuration is loaded into the device.



To ensure that the device can be replaced easily in the event of a failure:

- Store the configuration file on a PC or server.

The [File] menu contains the following menu items:

Menu item	Description
Save reader configuration to file	The available parameter sets (0 - 7) are displayed. The parameter sets to be stored can be selected by setting the check. Selecting Save saves the configuration.
Load reader configuration from file	The file with the reader configuration is selected. Then the parameter sets to be loaded are selected. Existing parameter sets are overwritten without prompting.
Save reader IO configuration to file	The storage location is selected. Selecting Save saves the configuration.
Load reader IO configuration from file	The file with the reader IO configuration is selected. Existing parameter sets are overwritten without prompting.

5.4.2 Options

The [Options] menu contains the following menu items:

Menu item	Description
Language select	Selects the software language.  After restart of the software the set language is used.
Reset layout	Resets the layout of the software.
Change path to log file	Changes the path to the log file.  The log file can record read data for test purposes.
Show "No tag" as warning	Shows a warning if no ID tag has been detected in the antenna field.
Auto tag read on tab change	Re-reads the ID tag after a change between the menus ① in the 2. Fig. .
Firmware update	Updates the UHF reader firmware.
Date and time settings	Sets date, time and time zone on the reader.
Load factory defaults	Loads factory default settings onto the UHF reader.  This action cannot be reversed.

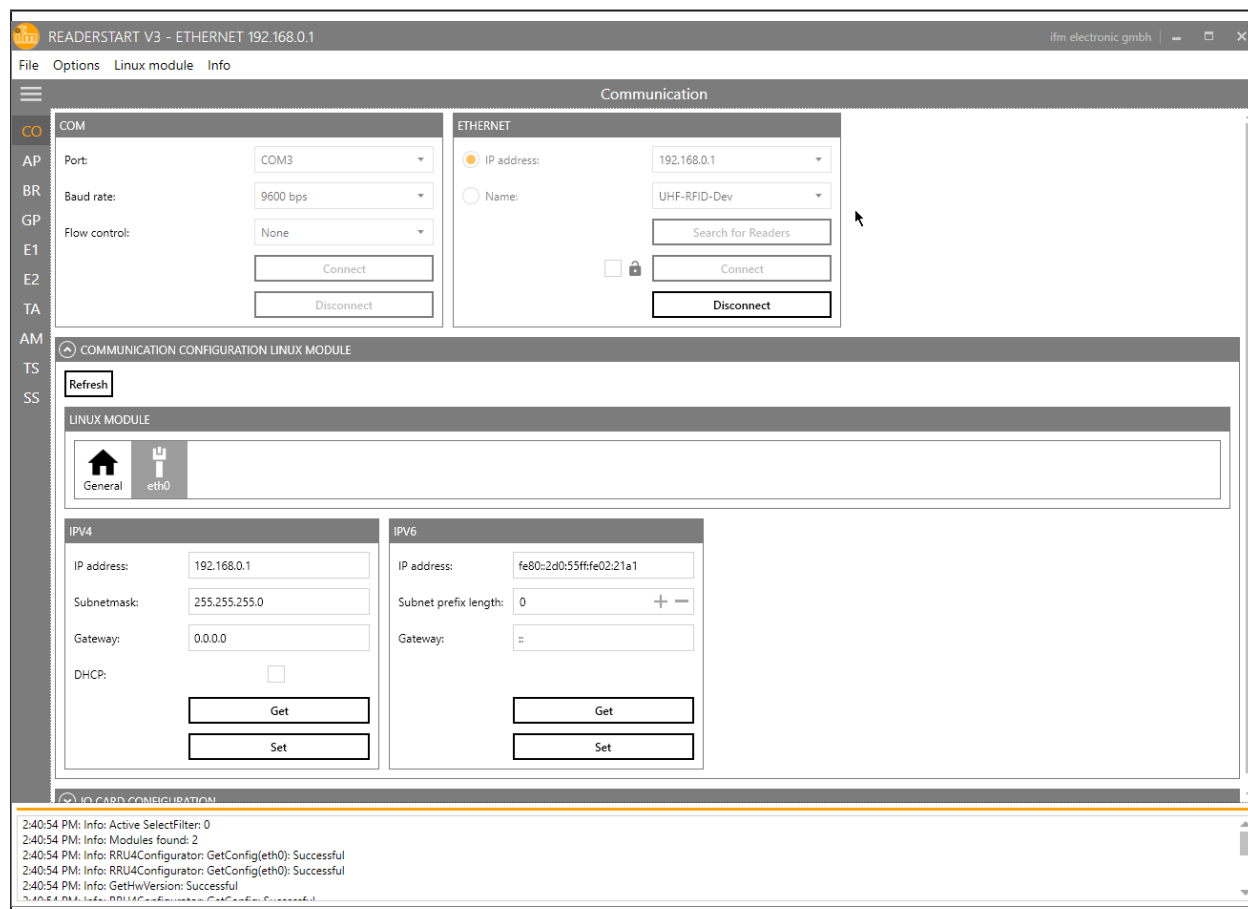
5.4.3 Info

The [Info] menu contains the following menu items:

Menu item	Description
About ReaderStart v3	Shows the respective software version and licences used.
Reader info	Shows information about the UHF reader: • firmware version • Linux module firmware version • serial number • type number • CPU module • PA module • IO modules Click [SHOW MORE] to show additional information for UHF readers with Linux installed: • Linux kernel messages • current network status • active processes • file system
License key	Shows the licence key of the connected UHF reader. The displayed licence key can be marked, edited and copied. Functions of the connected UHF reader can be activated and deactivated via the licence key. Under "FEATURES", the activated and deactivated functions are shown.
Reader error status	Shows the error status of the connected UHF reader in the status field.

6 Function group [CO] Communication

The function group [CO] Communication groups together all the functions for establishing connections and configuring the interface card.



3. Fig.: Function group [CO]

6.1 "COM" section

The serial interface RS-232, RS-485 or RS-422 is used for communication with the UHF reader. The RS-485/RS-422 interface card supports the standard baud rates of the serial interface of a PC.



A level converter converting the RS-232-compliant signal of the PC to a differential RS-485/RS-422 signal is required for the communication.

The "COM" section contains the following operating elements:

Operating element	Description
Port	Sets the COM port. The serial interfaces available in the PC can be selected. It is not checked whether an interface is already in use.
Baud rate	Sets the baud rate.
Flow control	Sets the flow control.
Connect	Connects the set interface. If the interface is already in use, an error message appears.
Disconnect	Disconnects and releases the interface.

6.2 "Ethernet" section

To connect to a PC, the UHF reader must be in the same subnet. Alternatively, the UHF reader can be set to automatically obtain an IP address (DHCP).

The "ETHERNET" section contains the following operating elements:

Operating element	Description									
IP address	Sets the IP address of the UHF reader.									
Name	Sets the host name of the UHF reader.									
Search for readers	Searches for an UHF reader in the network. The UHF reader is shown in green if the network configuration matches and in red if it is located in another subnet like the PC. Example: <table><tr><th>Device</th><th>IP addresses in the same subnet</th><th>IP addresses in different subnets</th></tr><tr><td>UHF reader</td><td>192.168.000.001</td><td>192.168.000.001</td></tr><tr><td>PC</td><td>192.168.000.010</td><td>192.168.002.192</td></tr></table>  You can reset a UHF reader to the factory settings via the "Search for readers" button: ▶ Click on the IP address within the first 20 seconds of finding the UHF reader. ▶ Click "Are you sure to load factory defaults on this reader?". > The UHF reader is reset to the factory default settings and can be accessed at the IP address 192.168.0.1.	Device	IP addresses in the same subnet	IP addresses in different subnets	UHF reader	192.168.000.001	192.168.000.001	PC	192.168.000.010	192.168.002.192
Device	IP addresses in the same subnet	IP addresses in different subnets								
UHF reader	192.168.000.001	192.168.000.001								
PC	192.168.000.010	192.168.002.192								
Connect	Connects the UHF reader with the set IP address. Tick the box [Secure connection] next to the lock symbol to establish a secure SSH connection between the PC and the UHF reader. If the check box is activated, the transmission via Ethernet is encrypted.									
Disconnect	The connection is disconnected.									

Once a UHF reader is connected, the sections "General", "eth0" and "IO configuration" are displayed.

6.2.1 "General" section

The "General" section contains the following operating elements:

Operating element	Description
Name	Reports the host name of the UHF reader to the DNS server. Subsequently, the UHF reader can be addressed using the host name instead of the IP address.
Keep-alive time	Time interval between data packets with which the UHF reader checks whether the counterpart can be reached. As soon as the counterpart can no longer be reached, the connection is closed.  The setting "0 ms" causes a disconnection after the restart of the UHF reader.

6.2.2 "eth0" section

The section "eth0 - IPV4" contains the following operating elements:

Operating element	Description
IP address	The IPV4 address of the Linux module.
Subnet mask	The subnet mask of the IPV4 address.
Gateway	The gateway of the IPV4 address.
DHCP	Automatic issuing of an IP address.

The section "eth0 - IPV6" contains the following operating elements:

Operating element	Description
IP address	The IPV6 address of the Linux module.
Subnet prefix length	The subnet prefix length of the IPV6 address.
Gateway	The gateway of the IPV6 address.

Factory settings of the UHF reader	
Host name	UHF-RFID-Dev
IP address	192.168.0.1
TCP port	4007
Subnet mask	255.255.255.0
Keep-alive time	2000 ms
DHCP	deactivated

6.2.3 "IO card configuration" section

The "IO card configuration" section contains the following operating elements:

Operating element	Description
IO card type	IO card types: • [Auto detect]: Automatic detection restores the interface to the default settings. • [GPIO]: The GPIO contacts of the UHF reader are used. • [Card not used]: The IO card is deactivated and cannot be used.  A faulty configuration can destroy the IO card and the UHF reader.  Changed settings will be adopted after restart of the UHF reader.
Input x	Sets the input.
Invert logical input	Negates the electrical signal.
Debounce time	This assigns a debounce time in milliseconds.
Output x	Sets the output.
Invert logical output	Negates the electrical signal.
Debounce time	This assigns a debounce time in milliseconds.
Off	The output is deactivated.
On	The output is activated.
x Hz frequency	The output flashes at a frequency of x Hz.
RF on	The output is active for the time set in the input field [Turn-off time] as soon as the radio frequency is present at [First antenna] to [Last antenna].

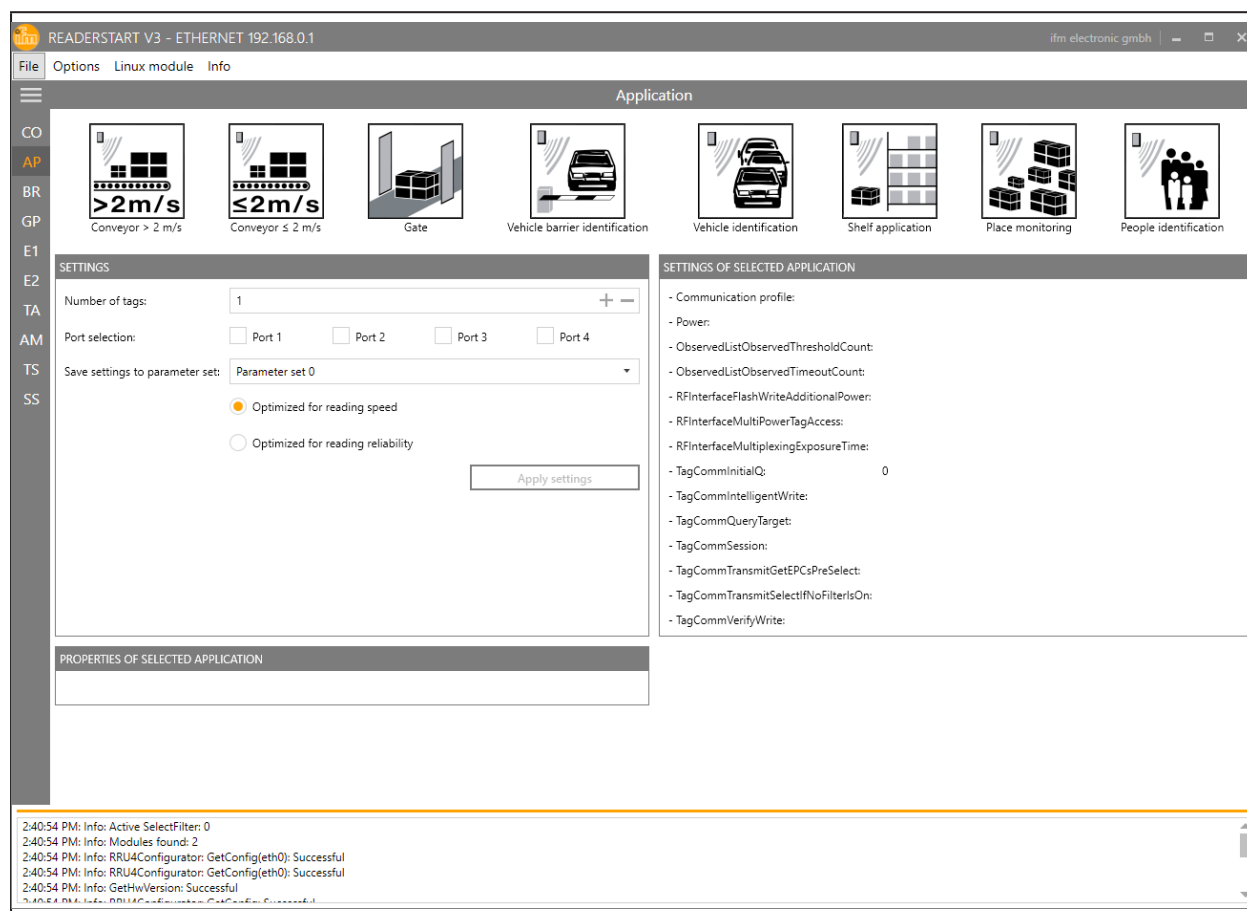
Operating element	Description
Antenna error	The output is active for the time set in the input field [Turn-off time] as soon as an antenna error occurs at [First antenna] to [Last antenna].
Tag found	The output is active for the time set in the input field [Turn-off time] as soon as an ID tag is found on [First antenna] to [Last antenna].
Tag operation success	The output is active for the time set in the input field [Turn-off time] as soon as a tag operation at [First antenna] to [Last antenna] has been successful.
Protocol access	The output is enabled and can be controlled with all protocol commands for GPIO.  To enable access to an output when processing action lists, the output must be set to [Protocol access] (→ 9.6).



Changed settings will be adopted after restart of the UHF reader.

7 Function group [AP] Application

The function group [AP] Application enables configuration of the UHF reader for a selected application. Click on a pictogram to select the application. The properties and settings of the respective application will be displayed. The settings can be adjusted.



4. Fig.: Function group [AP]

The function group [AP] Application contains the following applications:

Application	Description
Conveyor belt > 2 m/s	Application for detecting individual ID tags in the antenna field on a conveyor belt moving at more than 2 m/s. The distance between the ID tags and the antenna is only a few centimetres.
Conveyor belt ≤ 2 m/s	Application for detecting and writing on individual ID 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 ID tags and the antenna is only a few centimetres.
Gate	Application for detecting multiple ID tags in the antenna field as they pass through a gate.
Vehicle barrier identification	Application for detecting and writing on individual ID tags in the antenna field which are not moving. The distance between the ID tags and the antenna is a few metres.
Vehicle identification	Application for detecting and writing on multiple ID tags in the antenna field which are moving at a speed of more than 14 m/s. The distance between the ID tags and the antenna is a few metres.
Shelf application	Application for detecting and writing on many ID tags in the antenna field which are not moving. The distance between the ID tags and the antenna is less than 1 m.

Application	Description
Place monitoring	Application for detecting and writing on multiple ID tags in the antenna field which are not moving. The distance between the ID tags and the antenna is less than 1 m.
People identification	Application for detecting multiple ID tags in the antenna field which are moving at not more than 3 m/s. The distance between the ID tags and the antenna is less than 1 m.

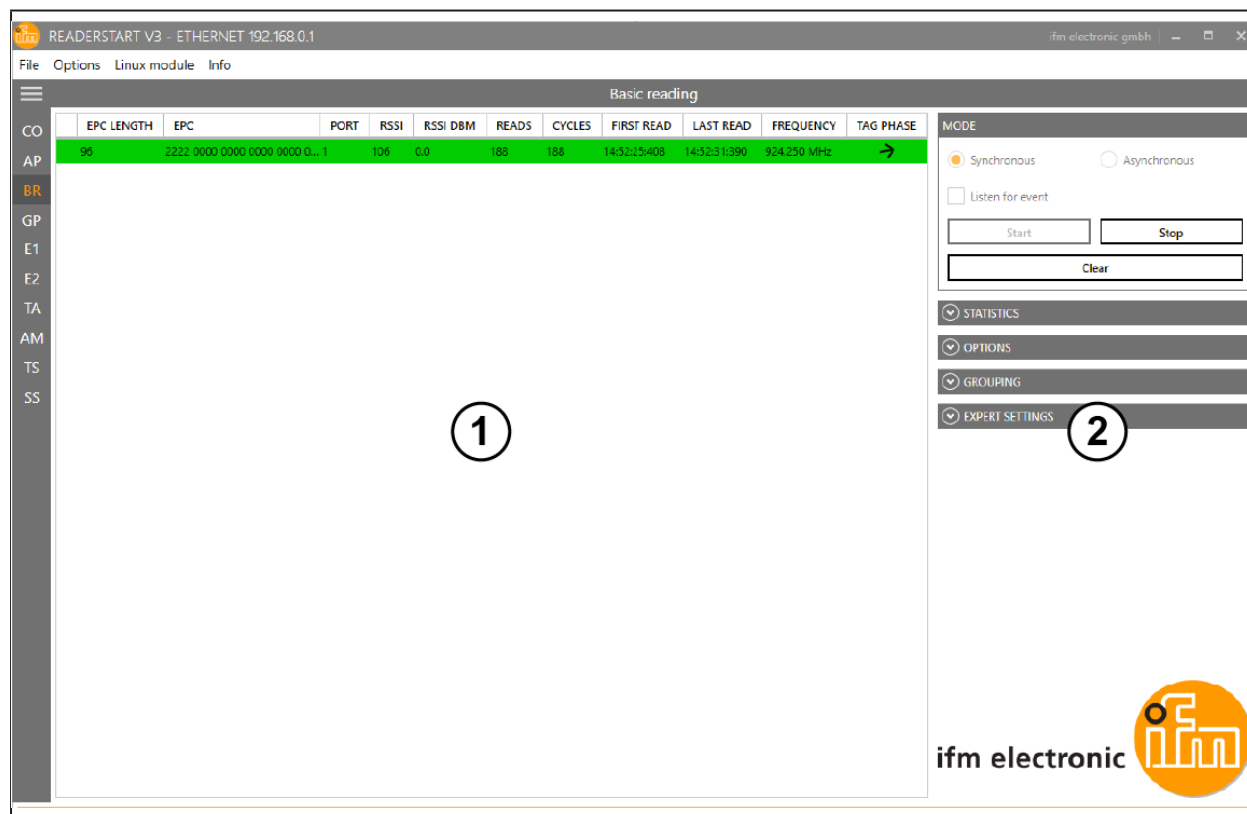
7.1 "Settings" section

The "Settings" section contains the following operating elements:

Operating element	Description
Number of tags	Sets the number of ID tags used in the application.
Port selection	Sets the ports used in the application.
Save settings to parameter set	Sets the parameter set in which the settings are stored.
Optimized for reading speed	An ID tag that has already been read is reset in order to read it fresh. Under some circumstances the time allowed for detecting all ID tags may be insufficient, so that some ID tags are not detected.
Optimized for reading reliability	An ID tag that has already been read is not reset provided it is still being supplied with power. This means that only those ID tags which have not yet been registered are detected. The confidence that all ID tags are read is increased.

8 Function group [BR] Basic reading functions

The function group [BR] Basic reading shows information about read ID tags in the table ①. In the section ② you can configure how ID tags are read.



5. Fig.: Function group [BR]

①: Table with information about read ID tags

②: Settings for reading ID tags

8.1 "Table" section

The status of recognised ID tags is shown in colour in the table:

Colour	ID tag status
Green	ID tag recognised and read successfully
Yellow	ID tag recognised and not read successfully
Red	ID tag not recognised and has left the antenna field

The table columns contain the following information of the detected ID tags:

Information	Description
EPC length	Indicates the length of the EPC (Electronic Product Code) [0 - 496 bit].
EPC	The EPC (Electronic Product Code) of the ID tag [hexadecimal representation].
Port	ID tag was read over this antenna port.
RSSI	Signal strength of the tag response (Received Signal Strength Indicator) [0 - 255, no unit].  An ID tag is in the field and is sufficiently supplied from an RSSI value of "70".
RSSI DBM	The RSSI value in the unit dBm [dBm].
Reads	Shows how many times this ID tag has been read successfully.
Cycles	Number of read processes of ID tags (inventory).

Information	Description
First read	Timestamp of the first reading of the ID tag.
Last read	Timestamp of the last reading of the ID tag.
Frequency	Used operating frequency for communication with the ID tag.
Tag phase	Phase shift of the ID tag.

8.2 "Mode" section

The "mode" section contains the following operating elements:

Operating element	Description
Synchronous / Asynchronous	The tag reading modes are synchronous and asynchronous. • Synchronous: The synchronous mode is ideal for applications when the requirements for timing are not critical. This mode allows the device to switch the carrier off during the idle times, thus saving power. The read process (inventory) of the ID tags is performed across all configured antennas. Once all ID tags in the field have been read from the first to the last antenna, the data is sent to the PC. The read process (inventory) of the ID tags is then retriggered by the PC. • Asynchronous: The asynchronous mode is ideal for applications for which maximum performance is required. The UHF reader starts the inventory of the ID tags as quickly as possible. In the asynchronous mode, not every ID tag that was read is delivered to the PC at the end of an inventory, but only those that have newly appeared in the field or left it. This allows the time required for communication to be minimised.  The timing of when an ID tag is reliably read in the field and when the ID tag no longer appears in the field can be defined using the parameters "ObservedThresholdCnt" (→ 16.7.2) and "ObservedTimeoutCnt" (→ 16.7.3).
Listen for event	Wait for external trigger via GPIOs.
[Start]	Starts the reading of ID tags.
[Stop]	Stops the reading of ID tags.
[Clear]	Deletes the contents of the table.

8.3 "Statistics" section

The "Statistics" section shows the ID tags detected per second. The current reading performance is displayed as "Tags per second".



The reading rate is influenced by settings such as the selected radio profile, the respective baud rate and application-specific data. The settings are made in the expert settings 1 (→ 10) and 2 (→ 11).

8.4 "Options" section

The "Options" section contains the following operating elements:

Operating element	Description
Memory bank	Select the memory bank of the ID tag to be displayed: TID, EPC or User Data.
Break after reading	Sets the idle time in milliseconds between 2 read processes. During the idle time, the carrier can be deactivated.
Bulk reading	Sets the time for reading the internal RAM. When [Bulk reading] is enabled, read processes of ID tags are cached in the internal RAM. After a configurable time the content of the internal RAM (result list) is sent to the PC. This reduces the need for data transfers.
Save to file	Saves the ID tags that have been read to a csv file in the program directory. Right-click on the [Save to file] check box to open a context menu in which the csv file can be opened and deleted.
Selected tag as background	Uses the colour of the selected ID tag as background colour for the table. An ID tag is displayed in the table row with a different colour depending on its status. With this option the status colour can be extended to the entire table background. This makes the status of the ID tag visible from afar.
ARU-CSB-ELC (port)	Activates an additional presentation for ARU-CSB-ELC antennas.
Show data as UTF8	Shows tag data in the UTF8 (instead of hexadecimal) format.

9 Function group [GP] GPIO functions

The function group [GP] GPIO functions reads and switches the inputs and outputs. For more complex procedures, action lists can be created here, which execute a sequence of commands on the UHF reader. This makes it possible to set up small controls, e.g.:

- trigger the reader by a light barrier,
- trigger an action at the outputs by reading an ID tag.

6. Fig.: Function group [GP]

9.1 "GPIO card" section

The "GPIO card" section contains the following operating elements:

Operating element	Description
IO card	Selects the IO card for setting the GPIO functions.

9.2 "Input" section

The "Input" section contains the following operating elements:

Operating element	Description
Invert logical input	Inverts the logical input.
Debounce time	Sets the duration of the debounce time.
Read	Reads the status.

9.3 "Output" section

The "Output" section contains the following operating elements:

Operating element	Description
Invert logical output	Inverts the logical output.
Function	Sets the function to be applied to the output. The following functions are available: • [Off]: Deactivates the output. • [On]: Activates the output. • [1/2/4/8 Hz frequency]: Sets the flashing frequency. • [RF on]: Activates the output when an antenna is active. • [Antenna error]: Activates the output if an error occurs at the antenna (example: antenna is not connected). • [Tag found]: Activates the output when an ID tag is detected. • [Tag operation success]: Activates the output if a tag operation has been successful (example: ID tag was read or written to). • [Protocol access]: Activates the output if a command was sent via the interface (Ethernet IP/TCP) (example: start async reading).
First antenna	Sets the first antenna to respond to.
Last antenna	Sets the last antenna to respond to.
Turn-off time	Sets the duration of the turn-off time.
Set	Writes the settings.

UK

9.4 "Test input" section

In the "Test input" section the state of the inputs is read. The "Test input" section contains the following operating elements:

Operating element	Description
Read inputs	Triggers a one-off read process of the inputs.
Read inputs cyclic start	Triggers a permanent read process of the inputs.

9.5 "Test output" section

In the "Test output" section, the selected output is switched. The "Test output" section contains the following operating elements:

Operating element	Description
Output	The output to be tested is selected.
Duration	Sets the time until the output is switched to the idle state.
Set output on	Sets the output on.
Set output off	Sets the output off.



Before setting, the output must be set to the "Protocol access" function (→ 6.2.3).

9.6 "Action list" section

To automate the processes, command sequences in the form of action lists can be created in the "Action list" section. The action lists are triggered by a change of flank at the input on the respective GPIO card.

The "Action list" section contains the following operating elements:

Operating element	Description
Action list	Selects an action list. The contained actions are executed in the specified order. The action lists are set via an XML file. The XML file is opened or re-read by right-clicking on the [Action] list. For the actions the configuration parameters are used (→ 16). The XML file is stored in the folder "~USER\Documents\IFM Electronic GmbH\ReaderStart v3". After editing and saving, the XML file must be read again by right-clicking on the [Action] list.
Action	Select an action: • [Activate Buzzer(500ms)] • [SyncGetEPCs] • [AsyncGetEPCs] • [AsyncStopCommand]
Add action	Adds an action to the action list.
Clear action list	Clears the contents of an action list.



The created action lists are deleted by restarting the UHF reader.

9.7 "Assign input to action list" section

In the "Assign input to action list" section, an action list is assigned to an input.

The "Assign input to action list" section contains the following operating elements:

Operating element	Description
Action list	Selects an action list.
Input	Select the input that executes the action list.
Assign to rising edge	Executes the action list if there is a rising edge at the selected input.
Assign to falling edge	Executes the action list if there is a falling edge at the selected input.



The action list is executed on rising and falling edges when both buttons are clicked.



The assignment of an action list to an input can be deleted:

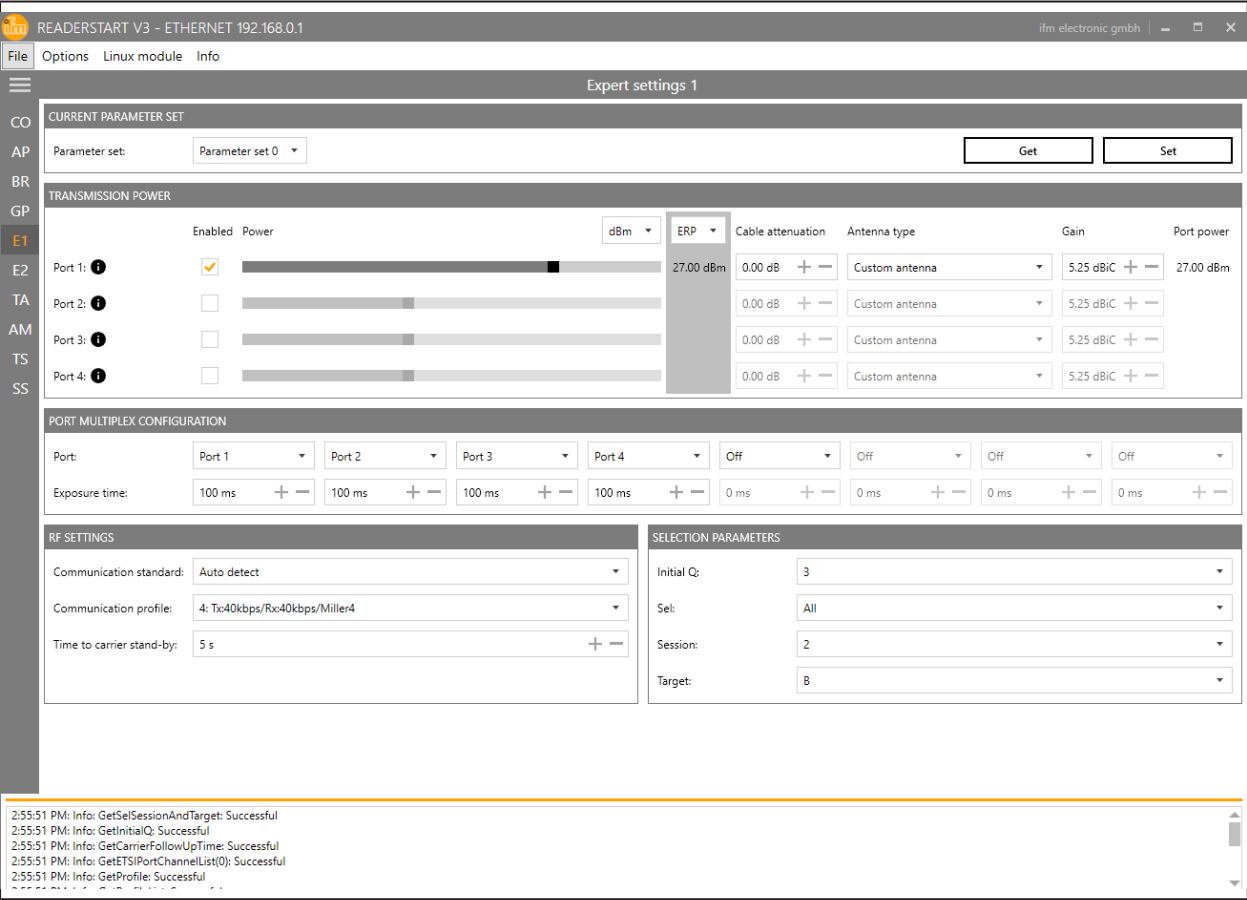
- Select the entry "No action list" in the [Action list],
- reset the UHF reader,
- restart the UHF reader.



For continuous operation of the UHF reader it is recommended to integrate the commands for the digital inputs and outputs with external software.

10 Function group [E1] Expert settings 1

Under "Expert settings 1", you can configure the transmission power, the antenna multiplex configuration and the RF settings.



7. Fig.: Function group [E1]

10.1 "Current parameter set" section

The "Current parameter set" section contains the following operating elements:

Operating element	Description
Parameter set	Selects a parameter set.
Get	The selected parameter set is read.
Set	The selected parameter set is saved.

10.2 "Transmission power" section

In the "Transmission power" section, the power and antenna type of the transmission path are set. The "Transmission power" section contains the following operating elements:

Operating element	Description
Port x	Enables or disables the selected antenna port.
Cable attenuation	Sets the length-dependent cable attenuation.
Antenna type	Selects a predefined antenna. The predefined antenna limits the antenna gain. If "Custom antenna" is selected, the antenna gain can be freely set.
Gain	Sets the antenna gain.  With a predefined antenna, the antenna gain is set automatically.



To ensure an operation in compliance with the standards, observe the antenna gain and cable attenuation permissible in the respective country. Otherwise the operating permit of the device expires.

- According to ETSE 302208, the radiated power must not exceed 2 W ERP in Europe (referred to a half-wave dipole).
- In the FCC approval region, max. 1 W connected HF power at an antenna gain of 6 dBi is permitted (referred to an isotropic radiator).



A maximum output power of 30 dBm can be set per port.

10.3 "Port multiplex configuration" section

In the "Port multiplex configuration" section, the sequence in which the antennas are used to read ID tags is set. The "Port multiplex configuration" section contains the following operating elements:

Operating element	Description
Port	Set an antenna. The set antennas are controlled from left to right. Deactivated antennas are skipped.
Exposure time	Set an exposure time for the selected antenna. This enables asynchronous operation.

10.4 "RF settings" section

In the "RF settings" section the frequency range is set. Depending on the approval, the UHF reader transmits in one of the following frequency ranges:

- 865 - 868 MHz for Europe
- 902 - 928 MHz for America
- 916 - 927 MHz for Australia
- 920 - 925 MHz for Singapore



To ensure an operation in compliance with the standards in the respective country, observe the permissible frequency range. Otherwise the operating permit of the device expires.

The "RF settings" section contains the following operating elements:

Operating element	Description
Communication standard	Sets the country-specific communications standard. The permitted communication standard depends on the respective country.
Communication profile	Sets the data rate and spectrum of the signal. The following communication profiles are available: • [4: Tx:40kbps/Rx40kbps/Miller4] • [6: Tx:80kbps/Rx80kbps/Miller2] • [7: Tx:80/Rx40kbps/Miller4] • [10: Tx:80kbps/Rx80kbps/Miller4] • [31: Tx:80kbps/Rx512kbps/FM0]  Some ID tags require a special data rate. For questions please contact the service department of ifm electronic.
Time to carrier stand-by	Specifies how long the carrier of the UHF reader remains active on the air interface after the last action. Once this time has elapsed the carrier is switched off.

10.5 "Selection parameters" section

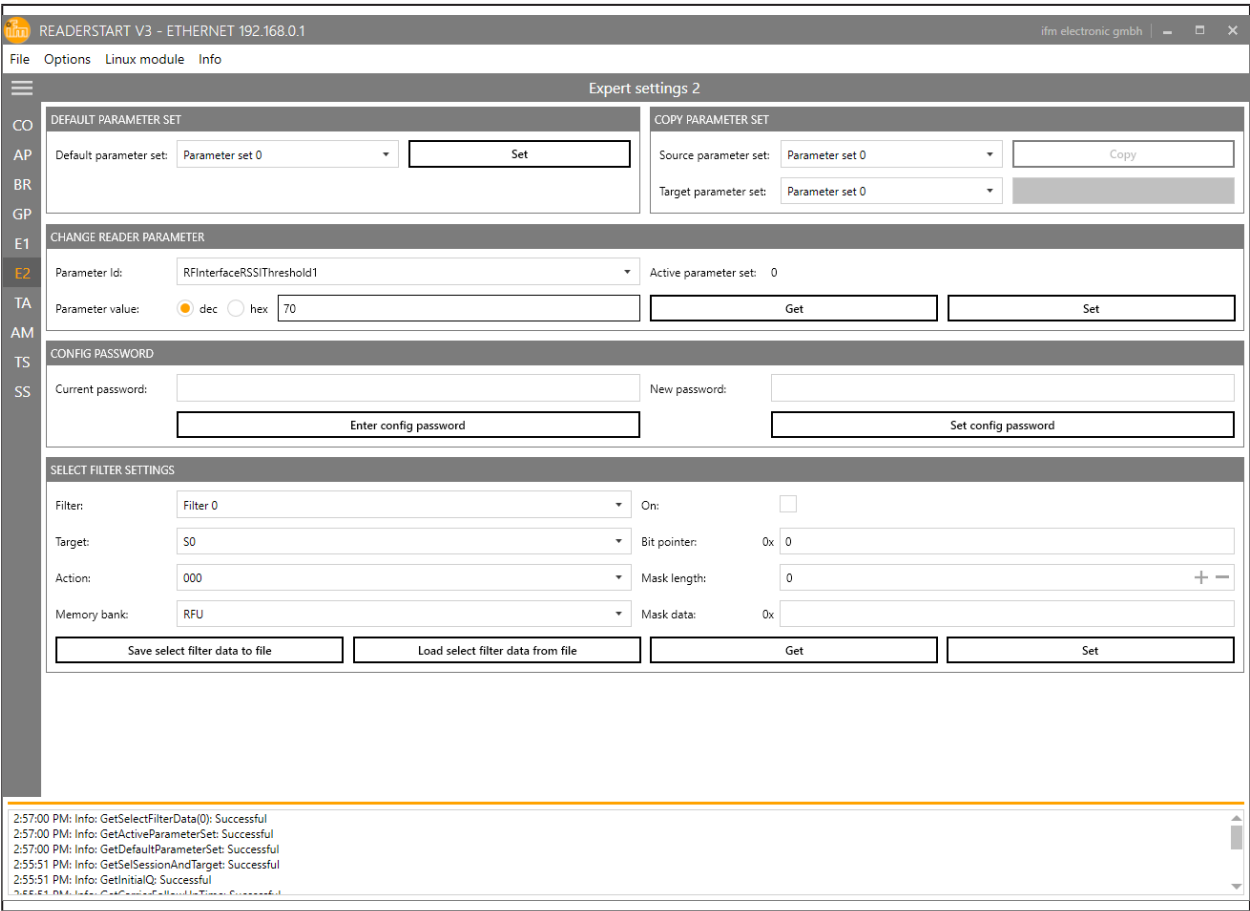
In the "Selection parameters" section, the singularisation of the ID tags according to the EPC standard is set. The "Selection parameters" section contains the following operating elements:

Operating element	Description
Initial Q value	Sets the number of ID tags expected in the field.
Sel	Specifies whether other parameters are of interest for an inventory of the ID tag population or not.
Session	Sets the session to be used by the UHF reader.
Target	Specifies which ID tags in the population should participate in the inventory.

UK

11 Function group [E2] Expert settings 2

In the parameter set "Expert settings 2", the config password and the select filter settings are set.



8. Fig.: Function group [E2]

11.1 "Default parameter set" section

The "Default parameter set" section contains the following operating elements:

Operating element	Description
Default parameter set	Allows configuration of a parameter set that is loaded from the EEPROM into the RAM when the UHF reader boots.
Set	The selected parameter set is saved.

11.2 "Copy parameter set" section

The "Copy parameter set" section allows one parameter set to be copied into another parameter set. The "Copy parameter set" section contains the following operating elements:

Operating element	Description
Source parameter set	Selection of the parameter set to be copied.
Target parameter set	Selection of the copy target.
Copy	Starts copying the parameter set. The successful completion of the copy operation is confirmed with a message.

11.3 "Change reader parameter" section

The "Change reader parameter" section allows reader settings to be changed using the parameter ID. Each setting of the UHF reader has its own parameter ID (→ 16). The "Change reader parameter" section contains the following operating elements:

Operating element	Description
Parameter ID	Selection of the parameter ID of the setting.
Parameter value dec / hex	Input of the parameter value in decimal [dec] or hexadecimal [hex] format.
Get	Reads the parameter value of the selected parameter ID.
Set	Writes the parameter value to the selected parameter ID.

11.3.1 Example 1:

In the example, ID tags below a set RSSI value are ignored to ensure stable communication with the ID tags.

The screenshot shows the 'Expert settings 2' window of the ReaderStart V3 software. The 'CHANGE READER PARAMETER' section is active, displaying the 'Parameter ID' as 'RFInterfaceRSSIThreshold1' and the 'Parameter value' as '70' in decimal format. The 'Set' button is highlighted. Other sections visible include 'DEFAULT PARAMETER SET', 'COPY PARAMETER SET', 'CONFIG PASSWORD', and 'SELECT FILTER SETTINGS'.

9. Fig.: Set RSSI value "70".

Set RSSI value:

- Select the parameter ID [RFInterfaceRSSIThreshold1].
- Set the parameter value "70".
- Click the [Set] button.

Only ID tags with an RSSI value ">70" are recognised.



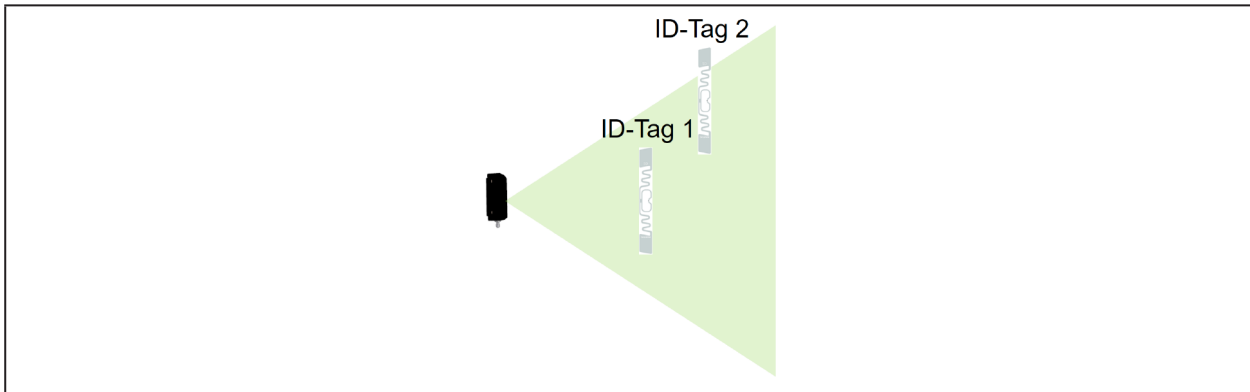
The RSSI value must be set separately for each antenna.

11.3.2 Example 2

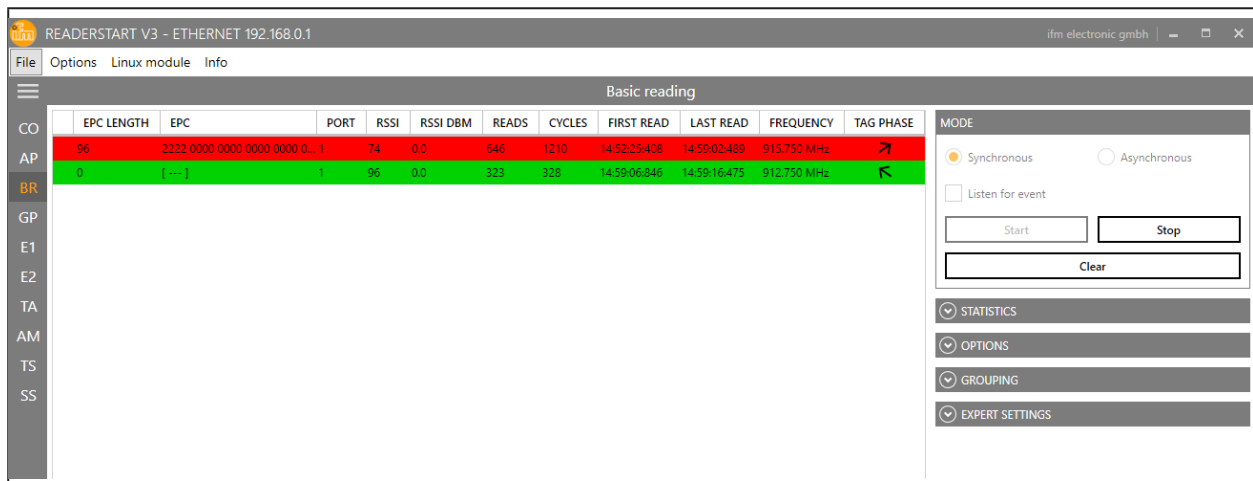
In the example there are 2 ID tags in the antenna field:

- ID tag 1 is located in the middle of the antenna field and is reliably detected.
- ID tag 2 is located at the edge of the antenna field and is not reliably detected.

The ID tags are to be filtered if they are not reliably detected.



10. Fig.: 2 ID tags in the antenna field



11. Fig.: The ID tag marked in red is not reliably detected.

Filter ID tags that are not reliably detected:

- Open function group [E2] 2Expert settings 2".
- In the "Change reader parameter" section
 - set the list "Parameter ID" to [ObservedListObservedThresholdCount],
 - set the input field "Parameter value" to [70],
 - click the [Set] button.

> The ID tags are filtered if they are detected reliably less than 70x.



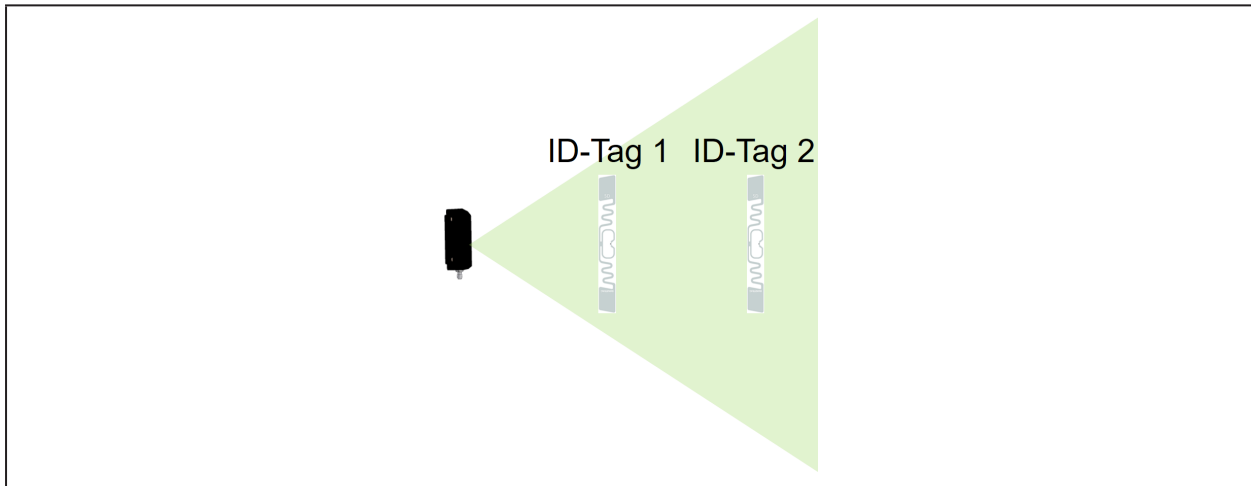
The "Parameter ID" [ObservedListObservedThresholdCount] can only be used in asynchronous mode of the UHF reader (e.g. ASyncGetEPCs).

11.3.3 Example 3:

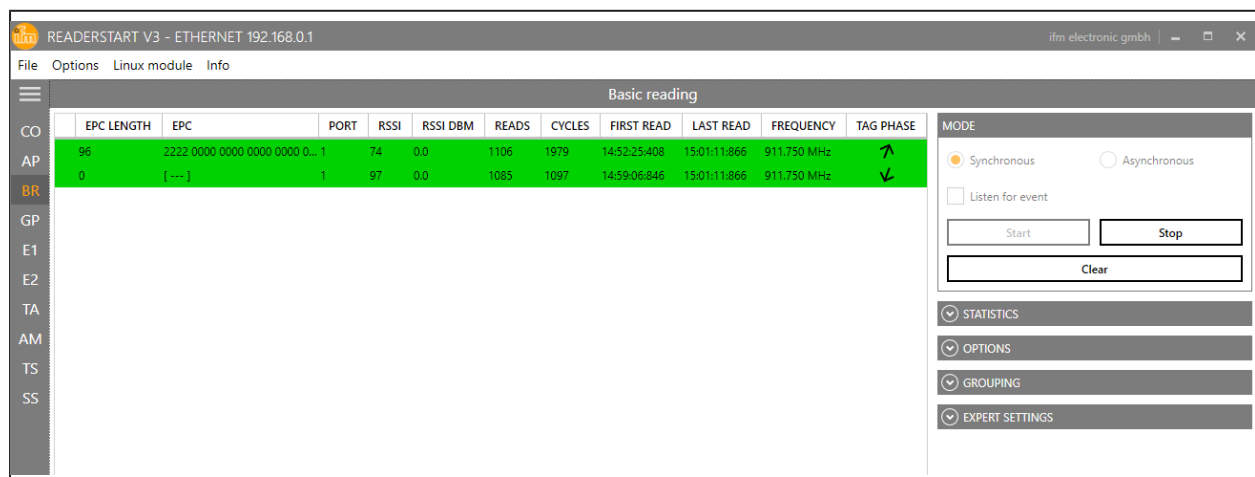
In the example there are 2 ID tags in the antenna field:

- ID tag 1 has the higher received signal strength (RSSI) because it is closer to the antenna.
- ID tag 2 is further away from the antenna.

The ID tag with the higher received signal strength is to be read by the antenna.



12. Fig.: 2 ID tags in the antenna field



13. Fig.: The read ID tags have different received signal strengths.

Restrict the received signal strength:

- Open function group [E2] Expert settings 2".
 - In the "Change reader parameter" section
 - set the list "Parameter ID" to [RFInterfaceRSSIThreshold1],
 - set the input field "Parameter value" to [80],
 - click the [Set] button.
- > The ID tags are only detected if the received signal strength is > 80.



The "Parameter ID" [RFInterfaceRSSIThreshold1] can be set individually for each antenna port.

11.4 "Configuration password" section

In the "Configuration password" section, the password protection is set. The following commands will be protected against changing by the configuration password:

Command	Command
SetCommunicationStandard	SetParameterByConfigId
SetPortPower	SetIOCardHwConfig
SetCarrierFollowUpTime	SetIOCardProtocolConfig
SetPortMultiplexSequenceAndExposureTime	SetTime
SetCableLossAndAntennaGain	SetAntennaMapping
SetETSIPortChannelList	LoadFactoryDefaults
SetETSIPortChannelSwitchingMode	FirmwareUpdatePrepare
SetProfile	SetSelSessionAndTarget
SetModulationType	SetInitialQ
SetExtendedResultFlag	SetMaxAirCommErrors
SetDefaultParameterSet	SetASyncObservedListParameters
SetActiveParameterSet	

The "Configuration password" section contains the following operating elements:

Operating element	Description
Current password	Input of the current configuration password.
New password	Input of the new configuration password.
Enter config password	Deactivates the password protection.
Set config password	Activates the password protection.

Activate the password protection:

- Enter the password in the field [New password].
- Click the [Set config password] button.

The password protection has been activated.

Deactivate the password protection:

- Enter the current password in the field [Current password].
- Click the [Enter config password] button.

The password protection has been deactivated.



The password protection is activated again after 30 seconds. The 30 seconds are reset by any input in the software.

Change the configuration password:

- Enter the current password in the field [Current password].
- Enter the new password in the field [New password].
- Click the [Set config password] button.

The configuration password has been changed.

Delete the configuration password:

- Enter the current password in the field [Current password].
- Do not enter anything in the field [New password].

► Click the [Set config password] button.

The configuration password has been deleted.

11.5 "Select filter settings" section

In the "Select filter settings" section, filters can be set which are brought into effect by means of a "Select" command. The filters can

- filter out and not detect certain ID tags,
- detect ID tags with certain defined data in the respective memory banks.

The "Select filter settings" section contains the following operating elements:

Operating element	Description		
Filter	Selection of a filter.		
Target	Selection of the target session.		
Action	Selection of the action to be performed. The following actions are available (according to EPC global Gen2 specification, page 73):		
	Action	ID tag matching	ID tag not matching
	000	Assert SL or inventoried -> A	Deassert SL or inventoried -> B
	001	Assert SL or inventoried -> A	Do nothing
	010	Do nothing	Deassert SL or inventoried -> B
	011	Negate SL or (A -> B, B -> A)	Do nothing
	100	Deassert SL or inventoried -> B	Assert SL or inventoried -> A
	101	Deassert SL or inventoried -> B	Do nothing
	110	Do nothing	Assert SL or inventoried -> A
	111	Do nothing	Negate SL or (A -> B, B -> A)
Memory bank	Selection of a memory bank.		
On	Activates the selected filter.		
Bit pointer	Input of the start address of the ID tag data from which the mask should start.		
Mask length	Entry of the mask length.		
Mask data	Enter the mask data in hexadecimal format.		
Save select filter data to file	Saves the set filters to an XML file.		
Load select filter data from file	Loads the filter from an XML file.		
Get	Reads the filters from the UHF reader.		
Set	Saves the filters in the UHF reader.		

11.5.1 Example

In the example, ID tags are filtered with the "Select filter settings".

	EPC LENGTH	EPC	PORT	RSSI	RSSI DBM	READS	CYCLES	FIRST READ	LAST READ	FREQUENCY	TAG PHASE
CO	96	2222 0000 0000 0000 0000 0...	1	96	0.0	1790	2988	14:52:25.408	15:02:50.962	906.730 MHz	↓
AP	0	[...]	1	96	0.0	2043	2106	14:59:06.846	15:02:50.962	906.730 MHz	↓
BR	96	1111 0000 0000 0000 0000 0...	1	79	0.0	358	365	15:02:34.499	15:02:50.962	906.730 MHz	↑

14. Fig.: Detected ID tags.

In the figure 3 ID tags are shown. The ID tags have different EPCs. The ID tags with the EPCs "1111..." are to be filtered out.

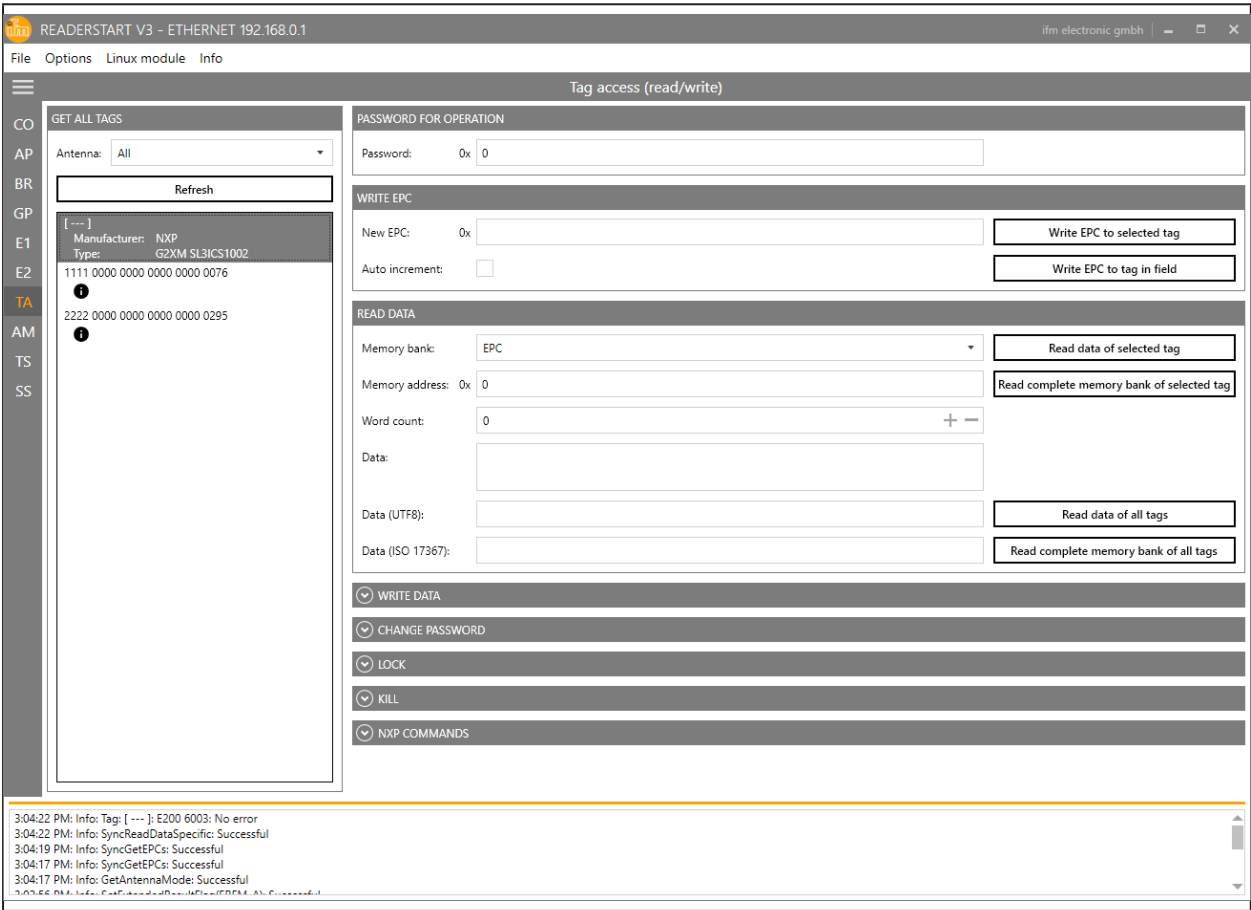
Filter the ID tags with EPC not equal to "2222...":

- Open the function group [E1] "Expert settings 1".
- In the "Selection parameters" section
 - set the "Session" list to [2],
 - set the "Target" list to [B].
- In the "Current parameter set" section, click the [Set] button.
- > The settings are stored in the selected parameter set.
- Open function group [E2] 2Expert settings 2".
- In the "Select filter settings" section
 - set the "Target" list to [S2],
 - set the "Action" list to [100],
 - set the "Memory bank" list to [EPC],
 - set the input field "Bit pointer" to [0x20],
 - set the input field "Mask length" to [16],
 - set the input field "Mask data" to [0x2222],
 - tick the "On:" checkbox.
 - click the [Set] button.
- > The ID tags with EPC not equal to "2222..." are filtered.

12 Function group [TA] - Tag access

Under "Tag access", ID tags are managed in accordance with the EPC Gen2 standard:

- read ID tags,
- edit ID tags,
- change passwords of ID tags.



15. Fig.: Function group [TA]

12.1 "Get all tags" section

In the "Get all tags" section, ID tags in the field of the selected antennas are shown. The "Get all tags" section contains the following operating elements:

Operating element	Description
Antenna	Select an antenna.
Refresh	Search for ID tags in the field of the selected antennas.

The detected ID tags are shown in the area below the [Refresh] button. An ID tag is selected by clicking on it.

 An ID tag must be selected for the settings in function group [TA].

 A click on the "i" symbol shows additional information about the ID tag.

12.2 "Password for operation" section

In the Password for operation, access to locked areas of the ID tag is enabled. The "Password for operation" section contains the following operating elements:

Operating element	Description
Password	Sets the password for the tag operation in the hexadecimal format. After entering the password, the ID tag changes to the "Secured state" and access to locked areas is enabled.

12.3 "Write EPC" section

In the "Write EPC" section, the EPC (Electronic Product Code) of the ID tag is changed. The "Write EPC" section contains the following operating elements:

Operating element	Description
New EPC	Entry of the new EPC in hexadecimal format. The EPC has a maximum length which depends on the ID tag.
Auto increment	Increases the EPC by "1" at each write event.
Write EPC to selected tag	Writes the new EPC to the ID tag.
Write EPC to tag in field	Writes the new EPC to the only ID tag in the antenna field.  There must only be one ID tag in the antenna field. The ID tag does not have to be selected.

12.4 "Read data" section

The "Read data" section offers the possibility to read data from ID tags.



The following settings are necessary for reading data:

- select a memory bank from the [Memory bank] list,
- enter the memory address in the [Memory address] input field,
- enter the number of words in the input field [Word count].

The "Read data" section contains the following operating elements:

Operating element	Description
Memory bank	Selection of a memory bank.
Memory address	Sets the memory address in hexadecimal format.
Word count	Sets the number of words (1 word = 16 bits).
Data	Shows the read data.
Data (UTF8)	Shows the read data in UTF8 format.
Data (ISO 17367)	Shows the read data in ISO 17367 format.
Read data of selected tag	Reads the data from the selected ID tag with the memory bank, memory address and word count settings.
Read complete memory bank of selected tag	Reads the set memory bank of the selected ID tag.
Read data of all tags	Reads the data from the ID tags in the antenna field with the memory bank, memory address and word count settings.
Read complete memory bank of all tags	Reads the set memory bank of the ID tags in the antenna field.

12.5 "Write data" section

In the "Write data" section, data is written to ID tags.



The following settings are necessary for writing data:

- select a memory bank from the [Memory bank] list,
- enter the memory address in the [Memory address] input field,
- enter the writing data in the input field [Data] or in the input field [Data (UTF8)].

The "Write data" section contains the following operating elements:

Operating element	Description
Memory bank	Selection of a memory bank.
Memory address	Sets the memory address in hexadecimal format.
Data	Enters data to write in hexadecimal format.
Data (UTF8)	Enters data to write in UTF8 format.
Data mask	Writes individual bits on the ID tag. The UHF reader changes the data read from the ID tag at the positions where the mask bits are "1". The result is then written back to the ID tag.
Write data to selected tag	Writes the data to the selected ID tag with the memory bank and memory address settings.
Write masked data to selected tag	Writes the data to the selected ID tag with the data mask settings.
Write data to all tags	Writes the data to the ID tags in the antenna field with the memory bank and memory address settings. All ID tags in the antenna field must have the same configuration: • blocked areas identical, • assigned password identical.
Write masked data to all tags	Writes the data to the ID tags in the antenna field with the data mask settings. All ID tags in the antenna field must have the same configuration: • blocked areas identical, • assigned password identical.

12.6 "Change password" section

In the "Change password" section, the passwords for the ID tag are changed. The "Change password" section contains the following operating elements:

Operating element	Description
New password	Enter the new password for the selected ID tag.
New kill password	Sets the new password to deactivate the selected ID tag. The kill password is set to "0" by default.
Set password on selected tag	Activates the new password for the selected ID tag.
Set kill password in selected tag	Activates the new deactivation password for the selected ID tag.



Before changing passwords, the current password must be entered in the "Password for operation" section (→ 12.2).

12.7 "Lock" section

In the "Lock" section, the access to functions of the ID tag is restricted. The "Lock" section contains the following operating elements:

Operating element	Description
Kill password	Specifies how the kill password is accessible: • [No change]: The access remains unchanged. • [Accessible]: The kill password is readable. • [Accessible with permalock]: The kill password is readable (permanent setting). • [Accessible with password]: The kill password is readable after entering a password. • [Not accessible with permalock]: The kill password is not readable (permanent setting).  The functions with the addition "permanent" are stored permanently and irreversibly on the ID tag.
Access password	Specifies how the access password is accessible: • [No change]: The access remains unchanged. • [Accessible]: The access password is readable. • [Accessible with permalock]: The access password is readable (permanent setting). • [Accessible with password]: The access password is readable after entering a password. • [Not accessible with permalock]: The access password is not readable (permanent setting).  The functions with the addition "permanent" are stored permanently and irreversibly on the ID tag.
EPC memory bank	Specifies how the EPC memory bank is accessible: • [No change]: The access remains unchanged. • [Writeable]: The EPC memory bank is writeable. • [Writeable with permalock]: The EPC memory bank is writeable (permanent setting). • [Writeable with password]: The EPC memory bank is writeable after entering a password. • [Not accessible with permalock]: The EPC memory bank is not writeable (permanent setting).  The functions with the addition "permanent" are stored permanently and irreversibly on the ID tag.

Operating element	Description
TID memory bank	Specifies how the TID memory bank is accessible: • [No change]: The access remains unchanged. • [Writeable]: The TID memory bank is writeable. • [Writeable with permalock]: The TID memory bank is writeable (permanent setting). • [Writeable with password]: The TID memory bank is writeable after entering a password. • [Not accessible with permalock]: The TID memory bank is not writeable (permanent setting).  The functions with the addition "permanent" are stored permanently and irreversibly on the ID tag.
User memory bank	Specifies how the user memory bank is accessible: • [No change]: The access remains unchanged. • [Writeable]: The user memory bank is writeable. • [Writeable with permalock]: The user memory bank is writeable (permanent setting). • [Writeable with password]: The user memory bank is writeable after entering a password. • [Not accessible with permalock]: The user memory bank is not writeable (permanent setting).  The functions with the addition "permanent" are stored permanently and irreversibly on the ID tag.
Lock selected tag	Writes the selected security functions to the ID tag.
Lock all tags	Writes the selected security functions to all ID tags in the antenna field.

12.8 "Kill" section

In the "Kill" section, an ID tag is deactivated.



The deactivation of an ID tag cannot be undone. The deactivated ID tag will be unusable.



Before deactivating an ID tag, the kill password must be entered in the "Password for operation" section (→ 12.2).



The ID tag cannot be deactivated if the kill password is set to the default value "0".

The "Kill" section contains the following operating elements:

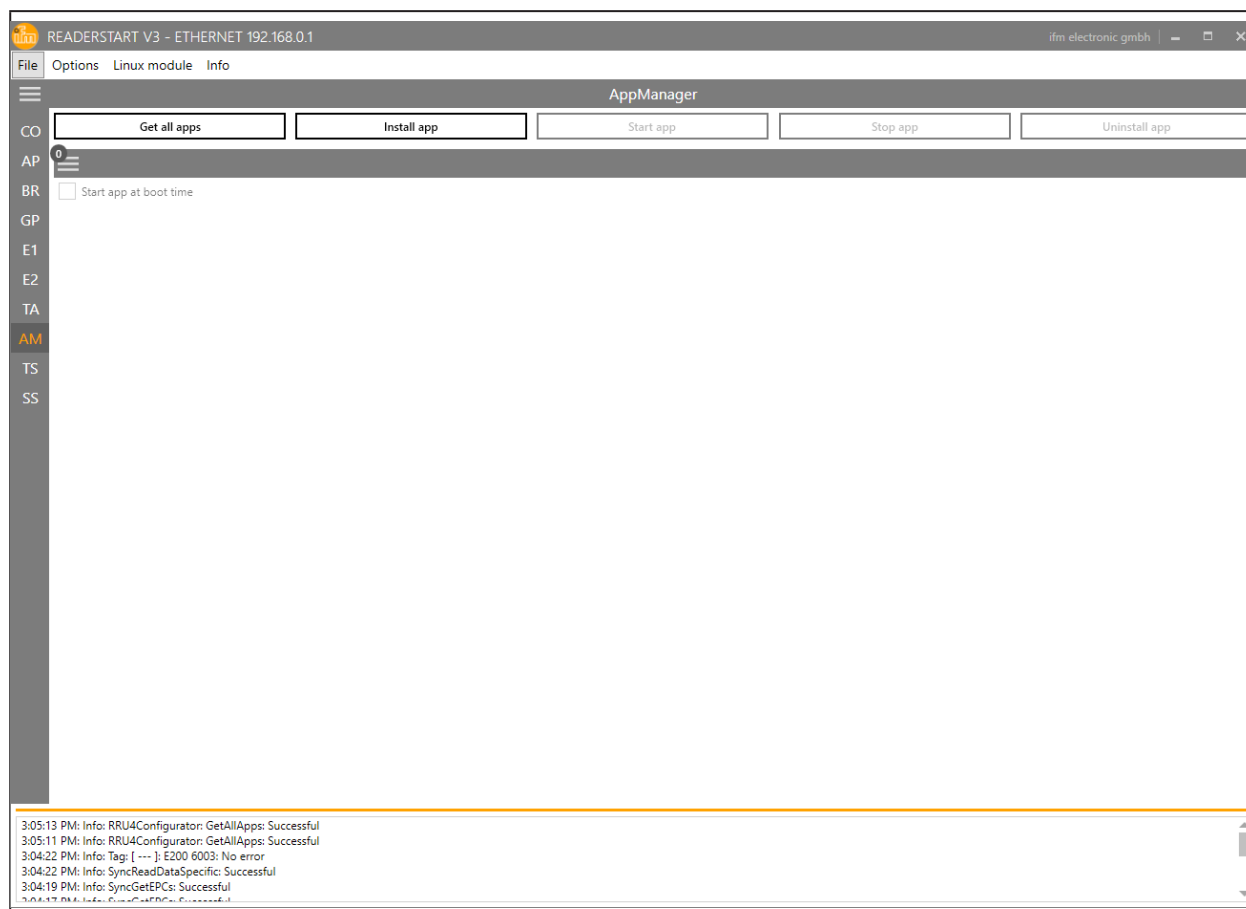
Operating element	Description
Kill selected tag	Executes a kill command on the selected ID tag.
Kill all tags	Executes a kill command on all ID tags in the antenna field.

13 Function group [AM] - AppManager

The function group "AppManager" administers applications on the Linux part of the UHF reader.



The function group "AppManager" is only available for UHF readers with Linux as operating system.



16. Fig.: Function group [AM]

The "AppManager" section contains the following operating elements:

Operating element	Description
Get all apps	Gets all apps installed in the UHF reader. The apps will be displayed below the button.
Install app	Installs an app via a file system window. The application must be packed in the tar format and have the file extension "tar".
Start app	Starts the selected app.
Stop app	Stops the selected app.
Uninstall app	Uninstalls the selected app.
Start app at boot time	Starts the selected app at boot time of the UHF reader.



The apps can be transferred to the UHF reader via an FTP server:

- In the menu bar, select [Linux module].
- Select [FTP] and then [Start].
- > The FTP server can be reached via the IP address "192.168.0.1".



An LLRP app is available for the UHF readers. More information: www.ifm.com

14 Function group [TS] - TagScan

The function group "TagScan" graphically displays the phase and received signal strength (RSSI) of an ID tag.

The "TagScan" section contains the following operating elements:

Operating element	Description
ID tag	Selects an ID tag.
Refresh	Refreshes the ID tags in the field.
Start	Starts the presentation of phase and received signal strength.
Stop	Stops the presentation of phase and received signal strength.
Refresh rate	Sets the refresh rate of the graph.
Number of data points	Sets the number of data points in the graph.

The phase is directly proportional to the movement of the ID tag. Thus the phase provides information on the direction of movement of the ID tag. In the function group [TS] the values "Phase" and "RSSI" are illustrated over time.



The function group [TS] is only available for the following UHF readers with Linux as operating system: DTE810, DTE830, DTE835, DTE910, DTE930



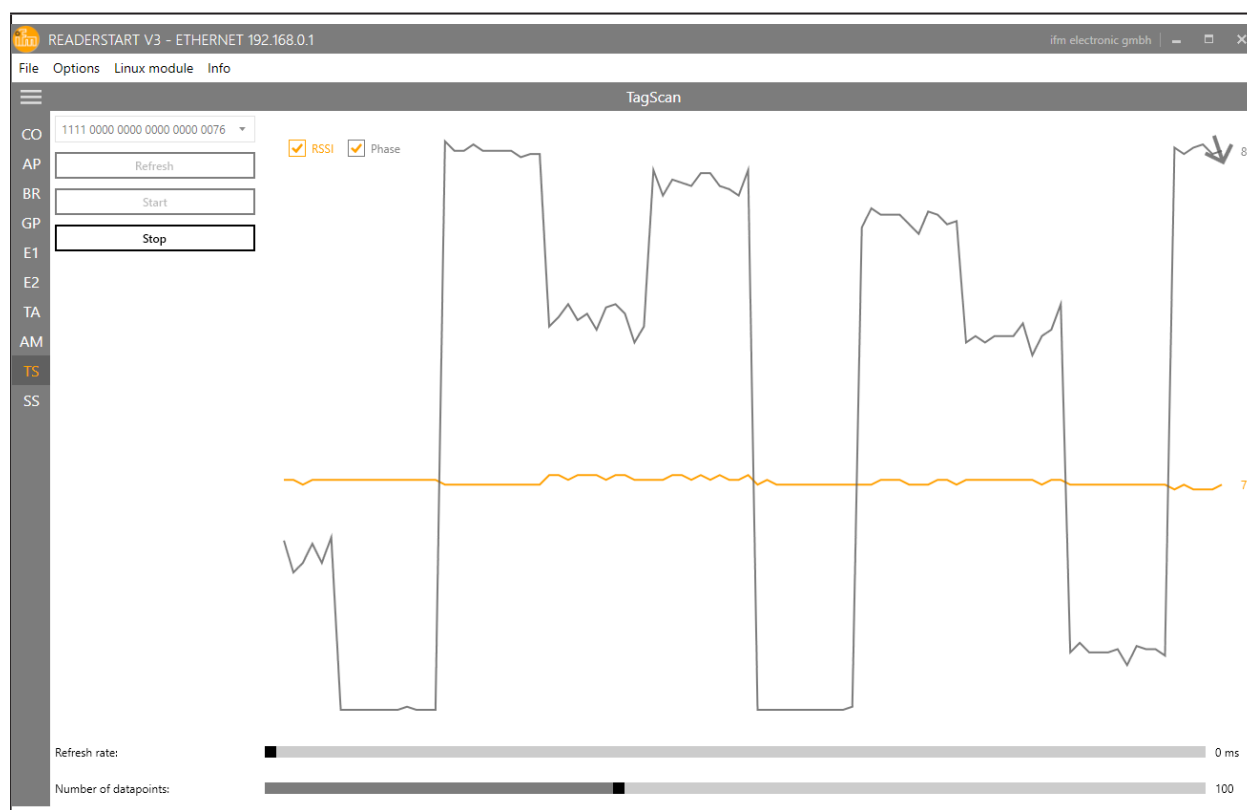
The UHF reader changes the transmission frequency every 4 seconds. Phase jumps can occur. To eliminate phase jumps only select one transmission frequency in the Expert settings [E1] (→ 10).



The values "phase" and "RSSI" are saved in a csv file. Saving is activated under "Basic reading" [BR] (→ 8).

14.1 Stationary ID tag

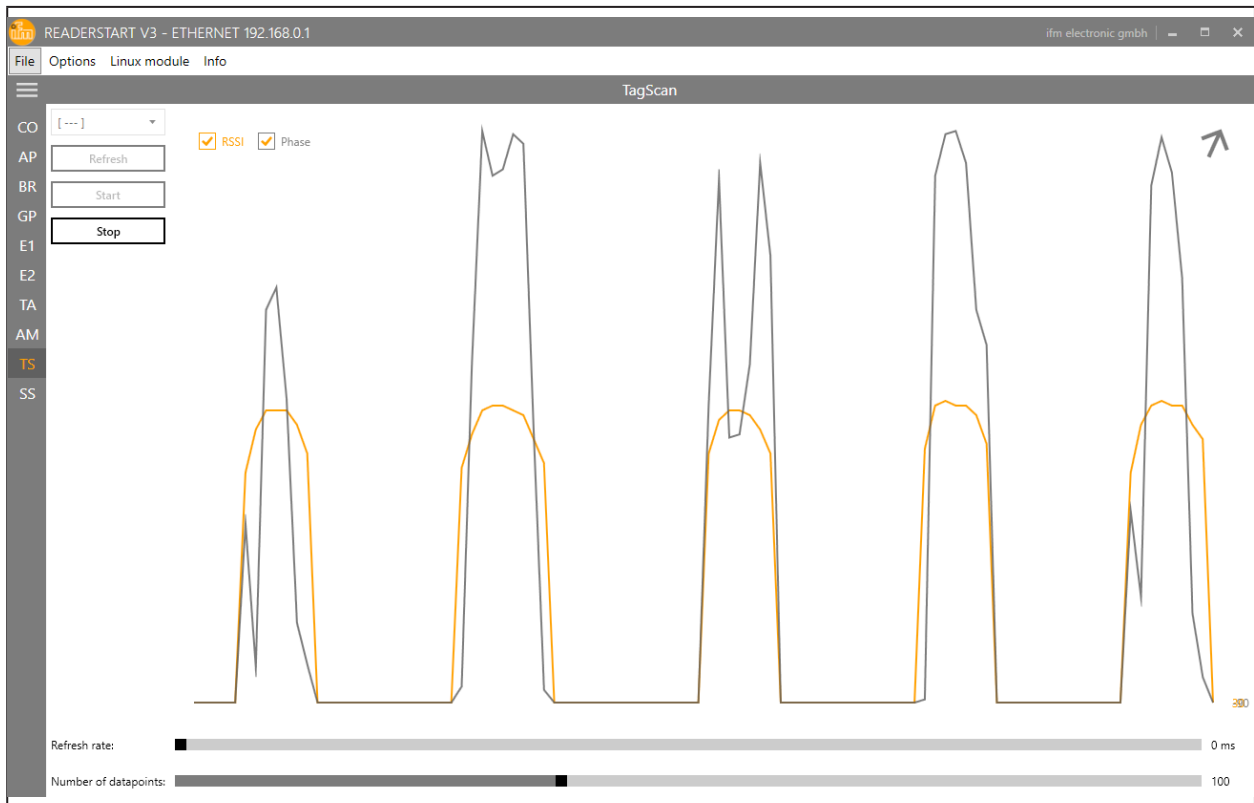
The stationary ID tag does not move. The phase jumps can be seen during the change of the transmission frequency. The RSSI value does not change since the ID tag does not move. The direction of movement is indicated via the rotating pointer at the top right.



17. Fig.: Function group [TS] - stationary ID tag

14.2 Moving ID tag

The moving ID tag is moving. The phase jumps can be seen during the change of the transmission frequency. The RSSI value changes in small steps. The direction of movement is indicated via the rotating pointer at the top right.



18. Fig.: Function group [TS] - moving ID tag

15 Function group [SS] - SpectralScan

The function group "SpectralScan" displays the following high-frequency jammers as levels:

- short-range devices (1st harmonic at 433 MHz),
- neighbouring UHF readers without sufficient decoupling.



The function group [SS] is only available for UHF readers with Linux as operating system.

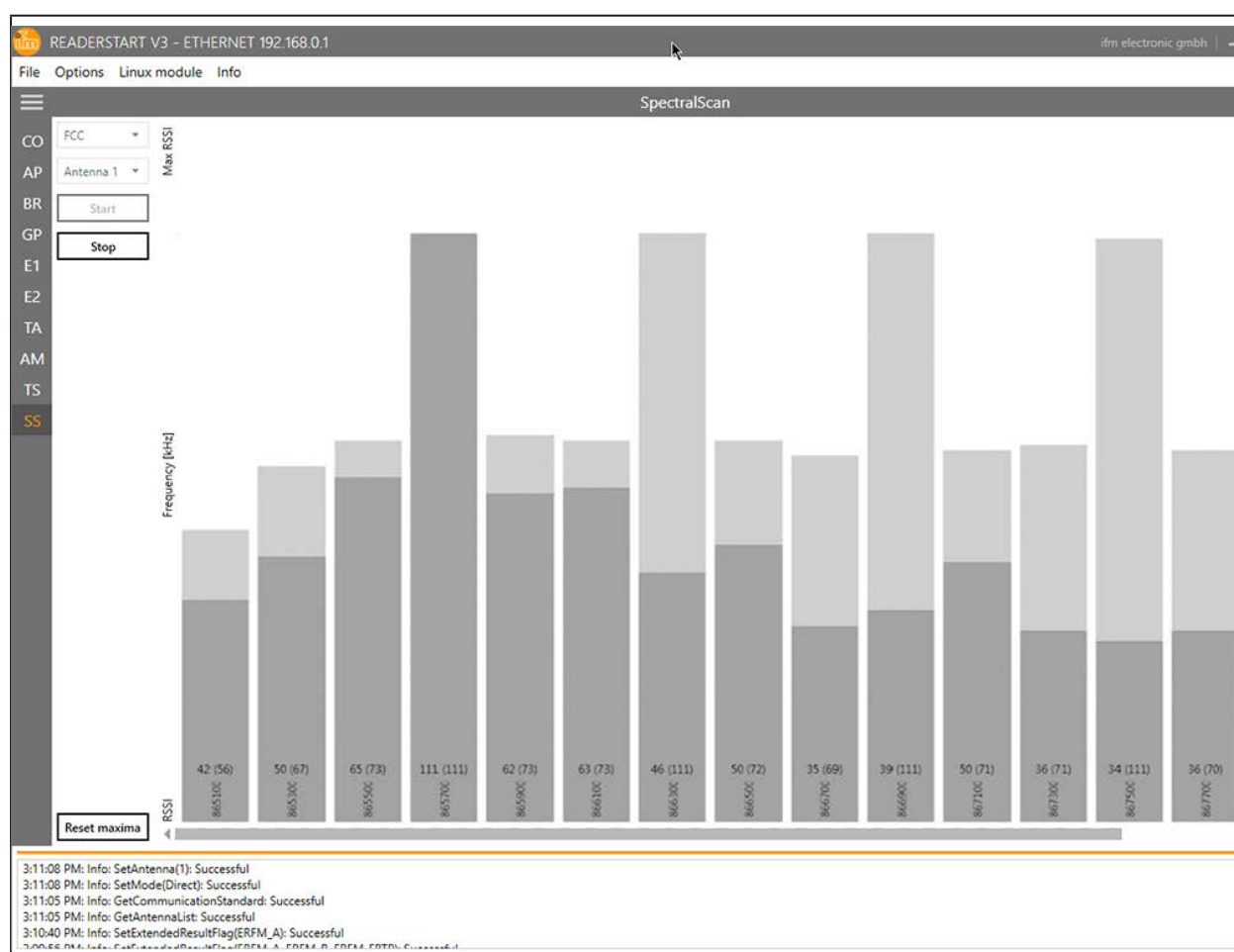
The "SpectralScan" section contains the following operating elements:

Operating element	Description
FCC / Singapore / ETIS	Selects the frequency spectrum for the SpectralScan.
Antenna x	Selects an antenna for the level display.
Start	Starts the level display.
Stop	Stops the level display.
Reset maxima	Resets the recorded data of the SpectralScan.

15.1 Example

As an example, a neighbouring jammer is to be found.

In 19. Fig. the UHF reader uses channel 4. Alternatively channel 7, 10 or 13 would be possible. After 4 seconds the UHF reader changes the channel. The mode "Dense Reader" and the free frequency selection permit trouble-free operation in spite of the neighbouring jammer.



19. Fig.: Function group [SS] - example

In the example there would be a fault if one of the following criteria was met:

- a jammer permanently uses a frequency,
- the level reaches the maximum with a channel other than 4, 7, 10 or 13.

Since antennas have a reference characteristics, the jammer can be found by aligning the antenna:

- Rotate the antenna until the jammer is signalled with maximum strength.
- > The jammer transmits from that direction.

16 Configuration parameters

The chapter "Configuration parameters" contains parameters and notes for optimum configuration of the UHF reader.

16.1 Introduction

A configuration parameter of the UHF reader consists of a 32-bit identification number (ID) and a data portion of 8 to 32 bits depending on the parameter. Below the data portion is called "parameter value" or "value". The parameters are read from the UHF reader and set by means of the ID. Each configuration parameter stands for a certain functionality within the UHF reader.



The file "konfigids.h" contains further information about the structure of the IDs and configuration parameters. The file can be found in the source files of the programming environment.

This file contains macros in the programming language "C" by means of which you can address configuration parameters in your programming environment via a plain text name. The plain text name is translated into the respective parameter ID during compilation.



At www.ifm.com in the download area of the UHF readers, libraries are available for:

- C#
- C++
- VB.net



At www.ifm.com in the download area of the UHF readers, example programs for the following PLC are available:

- Schneider
- Siemens
- Codesys
- Allen-Bradley

16.2 Parameter ID

The ID of a configuration parameter contains the following information:

- configuration group
- consecutive number (to distinguish parameters within a group)
- data type (byte, word, etc.)
- number of data bytes
- signs
- unit

To simplify handling, the configuration parameters have a plain text name. The plain text name starts with "cfgid" followed by the name of the configuration group.

Then follows the function name of the parameter. The function name indicates the function of the configuration parameter.

16.2.1 Example

Configuration parameter "cfgidTagCommIntelligentWrite"

"cfgid": introducing letter combination

"TagComm": name of the configuration group

"IntelligentWrite": function name of the parameter

16.3 Parameter set

The configuration of the UHF reader is organised in parameter sets. Each UHF reader has 8 parameter sets. With one exception ("cfgidGlobalDefaultParamset") all configuration parameters are represented in each parameter set. By using parameter sets the UHF reader can change from one configuration to another with just one command.

The currently selected parameter set is called "active parameter set". Configuration parameters are always read or written on the active parameter set by means of the protocol commands "GetParameterById" and "SetParameterById". A changed active parameter set can be saved in the UHF reader's EEPROM via "SetActiveParamset" and is again available when the UHF reader has been rebooted. The parameter sets are changed with the command "SetActiveParamset".

16.4 "Global" configuration group

16.4.1 DefaultParamset

DefaultParamset	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-7

The parameter "DefaultParamset" indicates which parameter set is to be loaded and activated when the UHF reader has been started.



The parameter "DefaultParamset" is the only one in its configuration group. In contrast to all other parameters the parameter is "independent". That means that the parameter does not exist in every parameter set but only once.

16.5 Configuration group "High-frequency interface" (RFInterface)

16.5.1 RFPower1...8

RFPower1...8	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	¼ dBm(erp)
Value range	0; 68-136

The parameter "RFPower1...8" sets the transmission power of the UHF reader for the specified antenna port. What is meant is the power the antenna is to radiate. It is indicated in dBm(erp). To ensure that the radiated power set via the parameter is correct, the parameters for attenuation of the antenna cable and antenna gain must be set correctly.

Setting a transmission power greater than 0 dBm(erp) is the prerequisite for executing an inventory via the antenna port.



The transmission power is set in dBm(erp). A transmission power in dBm(eirp) must be converted to dBm(erp):

$$\text{dBm(erp)} = \text{dBm(eirp)} - 2.14$$

16.5.2 TimeToPowerOff

TimeToPowerOff	
Firmware	as from v1.30.00
Data type	word (16 bits)
Unit	Seconds
Value range	0-65535

The parameter "TimeToPowerOff" indicates how long the transmitter carrier should remain switched on after an inventory or an ID tag operation in general has been completed.

A certain time elapses until the UHF reader starts with the inventory after it has received an inventory command. The UHF reader needs this time for example for LBT (Listen Before Talk) and an antenna test. Using of the parameter "TimeToPowerOff" it is possible to shorten the time. When an inventory was completed by the UHF reader and if the next inventory command is given within the time span configured with this parameter, the UHF reader does not need the LBT and the antenna test and can start with the inventory faster.



The overall energy consumption of the UHF reader increases during the time the transmission carrier is switched on but there is no imminent ID tag operation.

The LBT (Listen Before Talk) operating mode is only permitted in existing installations.

16.5.3 ModulationType

ModulationType	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0; 1

The parameter "ModulationType" defines the modulation type used by the UHF reader for communication with the ID tag. 2 modulation types are available:

- value 0: Double Side Band (DSB)
- value 1: Phase Reversal Amplitude Shift Keying (PR-ASK)

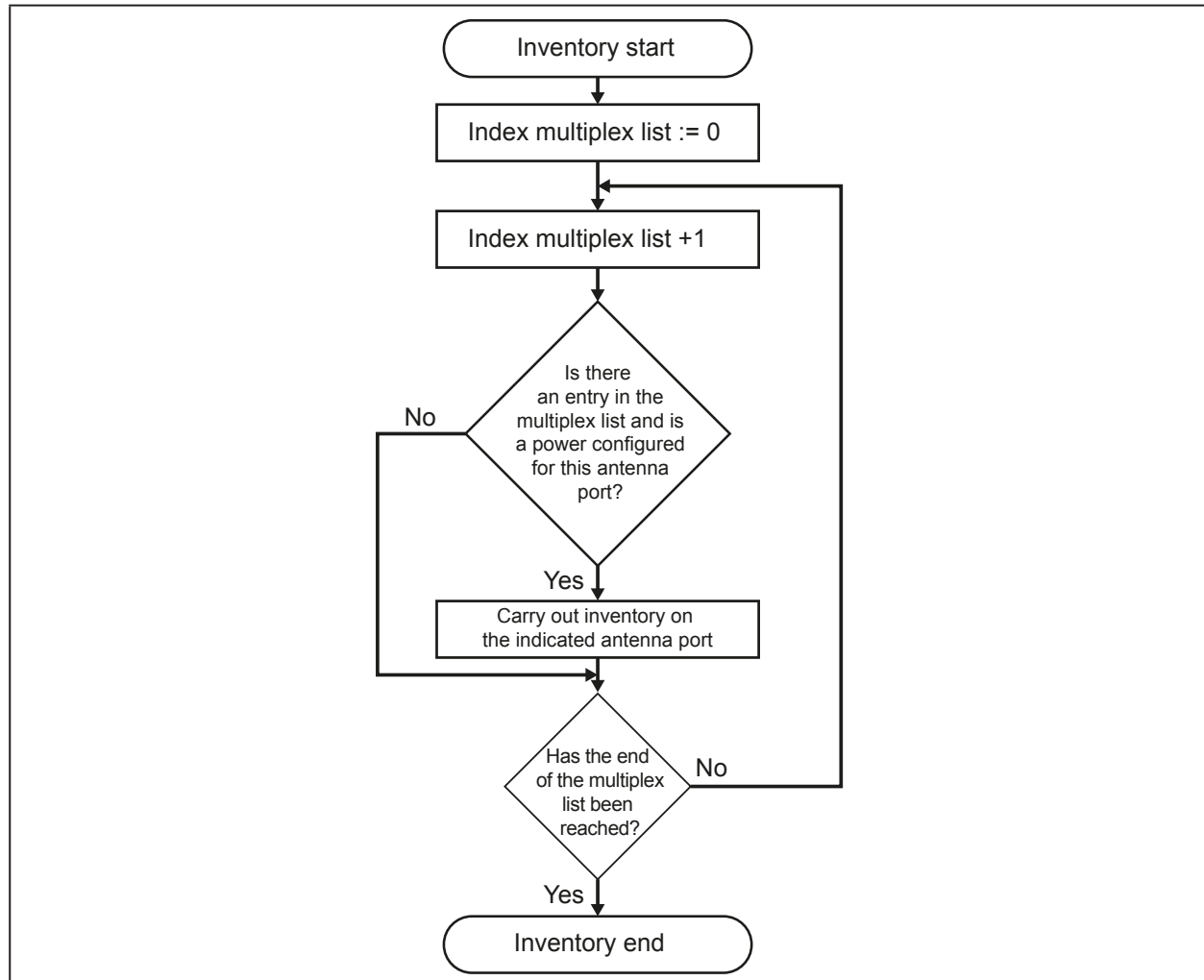


For UHF readers manufactured for the European Union (ETSI), the setting is ignored and the following modulation type is used: "Value 1: Phase Reversal Amplitude Shift Keying (PR-ASK)".

16.5.4 MultiplexingAntennaport1...8

MultiplexingAntennaport1...8	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0; 1-8

The parameter "MultiplexingAntennaport1...8" contains the antenna multiplex list of the UHF reader. In each of the 8 list positions one of the antenna port numbers "1" to "8" or "0" (zero) is entered. The value "0" deactivates the list position and the UHF reader changes to the next list position.



20. Fig.: Flow chart of an inventory

16.5.5 MultiplexingExposureTime1...8

MultiplexingExposureTime1...8	
Firmware	as from v1.30.00
Data type	word (16 bits)
Unit	milliseconds
Value range	0-65535

The parameter "MultiplexingExposureTime1...8" is of interest for the reader commands beginning with "ASync...". Each parameter stands for an exposure time indicating how long the UHF reader is to stay on the respective position - and thus antenna - in the multiplex list for inventories.

In contrast to the synchronous commands the UHF reader does not immediately change to the next entry in the multiplex list but only when the exposure time indicated for the respective multiplex entry with these parameters has elapsed. An ongoing inventory is not interrupted when the exposure time has elapsed but it is continued until it is completed.

16.5.6 CableLoss1...8

CableLoss1...8	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	¼ dB
Value range	0-255

The parameter "CableLoss1...8" contains the cable attenuation of the antenna cable between UHF reader and antenna for the respective antenna port of the UHF reader.



An incorrectly set cable attenuation will affect the transmission power.

16.5.7 AntennaGain1...8

AntennaGain1...8	
Firmware	as from v1.30.00
Data type	byte (8 bits); signed
Unit	¼ dBic
Value range	-128 - 127

The parameter "AntennaGain1...8" communicates the antenna gain of the connected antennas to the UHF reader. The UHF reader calculates the socket power to be applied to the HF output from the set transmission power (antenna radiant power), the antenna gain and the cable attenuation:

$$\text{socket power}_{\text{dBm}} = \text{radiant power}_{\text{dBm(erp)}} - \text{antenna gain}_{\text{dBic}} + \text{cable attenuation}_{\text{dB}} + 5.14$$

Use the following formula to convert an antenna gain indicated in dBi to dBic:

$$\text{antenna gain}_{\text{dBic}} = \text{antenna gain}_{\text{dBi}} + 3$$



Near-field antennas have a negative gain since they are designed for magnetic (not electromagnetic) coupling with the ID tag.

Configure the near-field antennas by indicating an antenna gain of 5.25 dBic (a parameter value of 21 dec) and not more than the maximum input power of the antenna indicated in the data sheet as antenna radiant power ("RFPower1...8").

16.5.8 RSSIThreshold1...8

RSSIThreshold1...8	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0; 255

The parameter "RSSIThreshold1...8" defines the response threshold of the RSSI value for each antenna port. If the UHF reader carries out an inventory, the field strength (RSSI value) of the ID tag response is also measured.



ID tags with an RSSI value smaller than the set value are not detected by the UHF reader.

16.5.9 MultiPowerTagAccess1...8

MultiPowerTagAccess1...8	
Firmware	as from v1.30.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "MultiPowerTagAccess1...8" can be activated for each antenna port. Then the UHF reader reduces the transmission power by half after an inventory with high transmission power and looks for any "overlooked" ID tags.

The stronger the transmission signal of the UHF reader hits an ID tag, the more difficult it is for the ID tag to modulate the transmission light of the UHF reader via back scatter. The strength of the response decreases with increasing transmission power of the UHF reader. This behaviour can have the effect that the UHF reader can only read an ID tag located directly in front of the antenna with low transmission power.

16.5.10 MaxAllowedAntennaOutputPower1...8

MaxAllowedAntennaOutputPower1...8	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	¼ dBm(erp)
Value range	0-255

The parameter "MaxAllowedAntennaOutputPower1...8" limits the radiant power of the antenna at an antenna port to a certain value.

16.5.11 EnableRSSIThresholdAtSpecificCmds

EnableRSSIThresholdAtSpecificCmds	
Firmware	as from v1.46.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The RSSI threshold value set with the parameter "RSSIThreshold1...8" has an effect on unspecified ("...GetEPCs", "...Any") and specified ("...Specific") commands. The effect on specific commands can be activated or deactivated via the parameter "EnableRSSIThresholdAtSpecificCmds".

Example:

The UHF reader cyclically looks for ID tags in the antenna field with "SyncGetEPCs". By means of the configuration parameter "RSSIThreshold1...8" ID tags below a certain RSSI value are not reported. If an ID tag is approaching the RSSI threshold, it is reported to the higher level by the UHF reader when it has reached the threshold. The higher level triggers a specific command for the reported ID tag.

If "EnableRSSIThresholdAtSpecificCmds" is activated, it may now happen that the specific command is rendered ineffective since the RSSI value of the ID tag trembles around the threshold. In this scenario "EnableRSSIThresholdAtSpecificCmds" should be deactivated.

16.5.12 FlashWriteAdditionalPower

FlashWriteAdditionalPower	
Firmware	as from v2.00.00
Data type	byte (8 bits)
Unit	¼ dB
Value range	0-48

The parameter "FlashWriteAdditionalPower" has the effect that more transmission power is used for write commands than for read commands.

Writing data to an ID tag requires more energy than reading data from an ID tag. That means that an ID tag has to be closer to the antenna for writing than for reading with the same transmission power. The parameter "FlashWriteAdditionalPower" activates additional transmission power during writing, so that the different distances for reading and writing do not have to be considered.

16.5.13 FlashReadAdditionalPower

FlashReadAdditionalPower	
Firmware	as from v2.13.00
Data type	byte (8 bits)
Unit	¼ dB
Value range	0-48

The parameter "FlashReadAdditionalPower" has the effect that more transmission power is used for read commands than for write commands.

Certain ID tags need more energy for reading the user memory than for the inventory. That means that an ID tag must be closer to the antenna for reading the user memory than for the inventory to determine the EPC with the same transmission power. The parameter "FlashReadAdditionalPower" activates additional transmission power during reading, so that the different distances for reading and writing do not have to be considered.

16.6 Configuration group "Tag communication" ("TagComm")

16.6.1 UsePilottone

UsePilottone	
Firmware	as from v1.30.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "UsePilottone" activates the pilot tone. ID tags to EPCGlobal Class-1 Gen-2 can transmit a pilot tone before the user data. Once the ID tag has responded, the pilot tone activates the synchronisation of the UHF reader.

Without a pilot tone it is more difficult for the UHF reader to synchronise with the tag response. Permanently activate this parameter to ensure reliable tag detection.

16.6.2 InitialQ

InitialQ	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-15

The parameter "InitialQ" tells the UHF reader how many tags are expected in the antenna field. The value Q defines in the inventory process how many ID tags are in the antenna field and have to be detected. The number x of ID tags is calculated as follows:

$$x = 2^{Q-1}$$

The value Q is communicated to the ID tags. Then the ID tags randomly select one of x "communication slots" for their response.

For a fast and efficient inventory, as many communication slots as possible should be used by ID tags. Multiple use of communication slots would result in collisions.

If the reader detects that Q is too big (hardly any communication slots are used) or too small (there are collisions), the value Q is automatically adapted and transmitted to the ID tags. The time required for adaptation can be reduced by informing the UHF reader of the number of expected ID tags in the antenna field. This way the number of communication slots can be set appropriately already at the beginning of the inventory.

16.6.3 Session

Session	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-3

The parameter "Session" determines which session the UHF reader should work with.

ID tags to EPCGlobal Class-1 Gen-2 support 4 different "sessions". An ID tag can remember for each session whether or not it has been detected by the UHF reader via an inventory process (inventoried flag). The inventoried flags of the sessions have different persistence times. The persistence time indicates how long an ID tag remembers whether or not it was detected by the UHF reader.

Session	ID tag has energy	ID tag has no energy
0	Unlimited persistence	No persistence
1	Persistence longer than 500 milliseconds and shorter than 5 seconds	Persistence longer than 500 milliseconds and shorter than 5 seconds
2	Unlimited persistence	Persistence longer than 2 seconds
3	Unlimited persistence	Persistence longer than 2 seconds

16.6.4 MaxErrors

MaxErrors	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-255

The parameter "MaxErrors" indicates how often a command is carried out by the UHF reader if a response from the ID tag expected by the UHF reader is missing.

16.6.5 CommunicationProfile

CommunicationProfile	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-255

The communication profile between UHF reader and ID tag is set via the parameter "CommunicationProfile". A communication profile consists of:

- the transmitted baud rate (reader to ID tag)
- the received baud rate (ID tag to reader)
- the coding of the data from ID tag to reader

Different transmission rates, received baud rates and coding are available. Since not every combination of these 3 characteristics is possible, selected combinations are available as communication profile. A list of possible communication profiles can be downloaded from the UHF reader via the command "GetProfileList". Whether or not the UHF reader operates in the "Dense UHF-Reader Mode" depends on the selected communication profile.



This parameter used to be called "DefaultProfile" up to firmware v2.04.00. The parameter ID was not changed.

16.6.6 CommStandard

CommStandard	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-255

The parameter "CommStandard" informs the UHF reader which rules are to be used for radio communication with the ID tag. Depending on the country the regulations differ with respect to the transmission power and the transmission channels permitted for communicating with ID tags.



For questions regarding the respective national regulations please contact the ifm support.

16.6.7 IntelligentWrite

IntelligentWrite	
Firmware	as from v1.30.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "IntelligentWrite" accelerates the writing of data on the ID tag. If the parameter is active, the UHF reader first reads the data area to be written to and then only rewrites the parts that change.

In practice it can happen that data is written to an ID tag that already exists. The time needed for this is saved with the "IntelligentWrite" parameter.

Example

Depending on the ID tag it takes 10 to 20 milliseconds to write 16-bit data (one word). In the worst case, an ID tag needs 120 milliseconds to write a 96-bit EPC. Reading data only takes one-fifth up to one tenth of this time.



There is no error message when "IntelligentWrite" is activated if

- a memory area on an ID tag is copy-protected and
- identical content is written to the memory area.

16.6.8 VerifyWrite

VerifyWrite	
Firmware	as from v1.30.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "VerifyWrite" verifies the data written to the ID tag. After writing, the data is read and compared. Inconsistencies are signalled to the higher level as "Verify Fail".



The activated parameter "VerifyWrite" is no guarantee that data is written to an ID tag correctly. With older ID tags, written data can be lost after a few hours.

16.6.9 QueryTarget

QueryTarget	
Firmware	as from v1.30.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "QueryTarget" defines which ID tags are to participate in the inventory.

ID tags to EPCGlobal Class-1 Gen-2 support 4 different "sessions". An ID tag can remember for each session whether or not it has been detected by the UHF reader via an inventory process (inventoried flag).

The status of the inventoried flag can either be "A" or "B". When an ID tag is detected in an inventory, the state of the flag either changes from "A" to "B" or from "B" to "A". The state of the inventoried flag can also be changed by "Select" commands.

With the parameter "QueryTarget" and the "Select" commands filters can be created: If the parameter "QueryTarget" has the value "0", only those ID tags with the inventoried flag "A" participate in the inventory. With all other values, only ID tags with inventoried flag "B" participate in the inventory.



For more information see the "EPCGlobal Class-1 Generation-2 UHF RFID" ((E)) specification V1.2.0 chapter 6.3.2.2 (pages 43f).

16.6.10 QuerySel

QuerySel	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-3

The parameter "QuerySel" defines the contents of the field "Sel" in the Gen2 command "Query". The "Sel" fields tells the ID tag whether or not the content of the "Selected-Flags" is relevant for participation in the inventory. With the parameter "QuerySel" and the "Select" commands filters can be created.



For more information see the "EPCGlobal Standard Class-1 Generation-2 UHF RFID" ((E)) specification V1.2.0 chapter 6.3.2.11.2.1 (page 57).

16.6.11 ForcePowerOffAfterEPCWrite

ForcePowerOffAfterEPCWrite	
Firmware	as from v1.40.00
Data type	byte (8 bits)
Unit	milliseconds
Value range	0-255

The parameter "ForcePowerOffAfterEPCWrite" defines the duration of the repowering of an ID tag. Repowering is performed by the carrier after writing to the EPC memory bank.

During an inventory the ID tag transmits its EPC and a checksum to the reader. This checksum is formed during "power up" of the ID tag via the memory area of the EPC.



An ID tag cannot participate in the inventory if writing to the EPC's memory bank takes place without "power up" (without switching off the antenna field). The transmitted checksum does no longer match the transferred EPC.



For more information see the "EPCGlobal Class-1 Generation-2 UHF RFID" ((E)) specification V1.2.0 chapter 6.3.2.1.2.1 (pages 38).

16.6.12 TransmitGetEPCsPreSelect

TransmitGetEPCsPreSelect	
Firmware	as from v1.41.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "TransmitGetEPCsPreSelect" changes the process of an inventory.

The parameter "TransmitGetEPCsPreSelect" reduces the time to acquire multiple ID tags when more than one antenna is used. For the use of this parameter it must be irrelevant which antenna is used to detect the ID tags.

ID tags that have already been detected by an antenna are no longer detected by the following antennas from the multiplex list.

If "TransmitGetEPCsPreSelect = 0", an inventory is carried out as follows:

1. Select the first antenna from the multiplex list.
2. Carry out a "Select" with the selected antenna to reset all ID tags in the reception range.
3. Carry out an inventory with the selected antenna until no more ID tags are found.
4. Select the next antenna from the multiplex list and return to 2.
5. The protocol command is terminated and the result is transferred to the higher level.

If "TransmitGetEPCsPreSelect $\neq$ 0", an inventory is carried out as follows:

1. Select the first antenna from the multiplex list.
2. Carry out a "Select" with the selected antenna to reset all ID tags in the reception range.
3. Select the next antenna from the multiplex list and return to 2.
4. Select the first antenna from the multiplex list.
5. Carry out an inventory with the selected antenna until no more ID tags are found.
6. Select the next antenna from the multiplex list and return to 5.
7. The protocol command is terminated and the result is transferred to the higher level.



The parameter affects the following protocol commands:

- "SyncGetEPCs"
- "SyncBulkGetEPCs"
- "ASyncGetRawEPCs"
- "ASyncGetEPCs"

16.6.13 TransmitSelectIfNoFilterIsOn

TransmitSelectIfNoFilterIsOn	
Firmware	as from v1.45.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "TransmitSelectIfNoFilterIsOn" determines whether a "Select" is to be sent before the inventory.

A "Select" or a "Select" filter resets all ID tags in the antenna field to a defined initial state. The following inventory detects all ID tags that are in the defined initial state.



The parameter "TransmitSelectIfNoFilterIsOn" is only taken into account if no "Select" filter is defined.

16.6.14 NumberOfEPCWords

NumberOfEPCWords	
Firmware	as from v2.00.00
Data type	byte (8 bits)
Unit	-
Value range	0-31; 255

The parameter "NumberOfEPCWords" deactivates the automatic detection of the EPC length. The UHF reader then operates with a fixed EPC length.



As from firmware v2.00.00 UHF readers read ID tags with an EPC length of 0 to 31 words (0 to 496-bit EPCs).

16.6.15 UseBlockWrite

UseBlockWrite	
Firmware	as from v2.00.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The "UseBlockWrite" parameter activates the "BlockWrite" command for writing data to an ID tag. The "BlockWrite" command allows you to write more than 16 bits to an ID tag (a word) with just one command. The time for writing is reduced.



Not all ID tags support the command "BlockWrite". See also the "EPCGlobal Standard Class-1 Generation-2 UHF RFID" ((E)) specification V1.2.0 chapter 6.3.2.11.3.7 (page 74).

16.6.16 DisableReceivingNXPRReadProtectedTags

DisableReceivingNXPRReadProtectedTags	
Firmware	as from v2.01.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "DisableReceivingNXPRReadProtectedTags" blocks the reception of read-protected ID tags.

If an ID tag has been protected with the "ReadProtect" command, a value of "0" (zero) is transmitted for the EPC and the checksum during an inventory. The ID tag protected in this way has no valid checksum.

Since a UHF reader considers ID tags in an inventory by default, with an EPC and a checksum with a value of "0" (zero), false detections may occur. ID tags are detected although there are none in the field.

The activated parameter changes the behaviour of the reader: In an inventory, ID tags are not taken into account if the EPC and the checksum have the value "0" (zero).

16.7 Configuration group "Observed List" ("ObservedList")

16.7.1 GlimpsedTimeoutCnt

GlimpsedTimeoutCnt	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-255

The parameter "GlimpsedTimeoutCnt" deletes an ID tag from the internal administration list if the ID tag has not been detected after a configurable number of inventories. An ID tag is not detected if it does not respond to a "Go" message.

The parameter "GlimpsedTimeoutCnt" is taken into account by asynchronous protocol commands ("ASync..."). For asynchronous commands a list with all ID tags found in the antenna range is created. If an ID tag is repeatedly located within the antenna range during inventories, a "Come" message is generated for this ID tag and transmitted to the higher level. If an ID tag is repeatedly not detected during inventories, a "Go" message is generated and transferred.



The parameter "GlimpsedTimeoutCnt" has no influence on the generation of a "Come" or "Go" message. If possible, do not change the parameter "GlimpsedTimeoutCnt".

16.7.2 ObservedThresholdCnt

ObservedThresholdCnt	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-255

The parameter "ObservedThresholdCnt" counts the inventories that detect ID tags. The inventories are only counted if a "Come" message has been generated and transmitted to the higher level.

The parameter "ObservedThresholdCnt" is taken into account by asynchronous protocol commands ("ASync..."). With asynchronous commands a list with all ID tags found in the antenna range is created. If an ID tag is repeatedly within the antenna range during inventories, a "Come" message is generated for this ID tag and transmitted to the higher level. If an ID tag is repeatedly not detected in inventories, a "Go" message is generated and transferred.

16.7.3 ObservedTimeoutCnt

ObservedTimeoutCnt	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-255

The parameter "ObservedTimeoutCnt" counts the inventories after an ID tag was no longer detected. The inventories are only counted if a "Go" message has been generated and transmitted to the higher level.

The parameter "ObservedThresholdCnt" is taken into account by asynchronous protocol commands ("ASync..."). With asynchronous commands a list with all ID tags found in the antenna range is created. If an ID tag is repeatedly within the antenna range during inventories, a "Come" message is generated for this ID tag and transmitted to the higher level. If an ID tag is repeatedly not detected in inventories, a "Go" message is generated and transferred.

16.8 Configuration group "Host communication" ("HostComm")

16.8.1 ExtendedResultFlag

ExtendedResultFlag	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-15

The parameter "ExtendedResultFlag" defines which data of the ID tags are transferred to the higher level. Setting the lower 4 bits to "1" sets the parameter:

- Bit 0: Transfer antenna information (on which antenna was the ID tag detected)
- Bit 1: Transfer RSSI value (field strength information of the ID tag response)
- Bit 2: Transfer timestamp (at what time was the ID tag detected)
- Bit 3: Transfer protocol control word (PC, XPC_W1, XPC_W2. See also the "EPCGlobal Class-1 Generation-2 UHF RFID" specification V1.2.0 chapter 6.3.2.1.2 (page 38))

16.8.2 AntennaIndependentOperation

AntennaIndependentOperation	
Firmware	as from v1.30.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "AntennaIndependentOperation" permits distinction between the operations of the reader:

- "antenna-dependent" (parameter deactivated)
- "antenna-independent" (parameter activated)

The parameter "AntennaIndependentOperation" is taken into account by all asynchronous protocol commands ("ASync...") and by the command "SyncBulkGetEPCs". In the case of the mentioned commands, the UHF reader compares the ID tags found via an inventory with ID tags from an internal list.

The antenna-dependent operation uses the EPC and the antenna information. An ID tag detected by several antennas creates several data records in the reader. The data records contain the same EPC but different antenna port numbers.

The antenna-independent mode only uses the EPC. An ID tag detected by several antennas creates only one data record in the reader.

16.8.3 ASyncAdditionalRSSIDataDeliveryDelta

ASyncAdditionalRSSIDataDeliveryDelta	
Firmware	as from v2.00.00
Data type	byte (8 bits)
Unit	-
Value range	0-255

The parameter "ASyncAdditionalRSSIDataDeliveryDelta" provides the RSSI value of an ID tag to

- generate a "TagData-Changed" message and
- transfer it to the higher level.

At a value of 255 no "TagDataChanged" messages are generated.

The parameter "ASyncAdditionalRSSIDataDeliveryDelta" is taken into account by asynchronous protocol commands ("ASync...") except "ASyncGetRawEPCs".

With asynchronous commands a list with all ID tags found in the antenna range is created. If an ID tag is repeatedly within the antenna range during inventories, a "Come" message is generated for this ID tag and transmitted to the higher level. If an ID tag is repeatedly not detected in inventories, a "Go" message is generated and transferred.

Changing the RSSI value (field strength) between the "Come" and "Go" messages allows conclusions to be drawn concerning the movements of an ID tag within the antenna field.



The parameter "ExtendedResultFlag" must be set accordingly so that the RSSI value is part of the "TagDataChanged" message.

16.8.4 UseMillisecondsAsTimestamp

UseMillisecondsAsTimestamp	
Firmware	as from v2.00.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "UseMillisecondsAsTimestamp" sets the type of timestamp:

- UTC time in seconds since 01/01/1970 0:00 h,
- milliseconds elapsed since the start of the reader.

The timestamp contains the time when an ID tag was detected. After an inventory, a timestamp can be transmitted to the higher level (→ 16.8.1). If the parameter is activated, the milliseconds elapsed since the start of the UHF reader are transferred as timestamp.

16.9 Configuration group "ETSI"

16.9.1 PortChannelListGlobalValue1...16

PortChannelListGlobalValue1...16	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-15

The parameter "PortChannelListGlobalValue1...16" administers the radio channels permitted for Europe and creates the ETSI channel list. The ETSI channel list comprises max. 16 entries. Each entry can contain an ETSI channel number in the range from "1" to "15". The value "0" (zero) is the end of the channel list. Entries with an ETSI channel number ">15" are ignored. The configuration parameter "ChannelSwitchingMode" can be set such that the reader randomly selects a channel for the communication with the ID tags from this channel list.



The parameter "PortChannelListGlobalValue1...16" is only relevant if "ETSI_EN302208" or "ETSI_EN302208_LBT" is selected as communication standard.

16.9.2 PortChannelListPort1...8Value1...16

PortChannelListPort1...8Value1...16	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-15

The parameter "PortChannelListPort1...8Value1...16" administers the radio channels permitted for Europe and creates the ETSI channel list for each antenna port. Each ETSI channel comprises max. 16 entries. Each entry can contain an ETSI channel number in the range from "1" to "15". The value "0" (zero) is the end of the channel list. Entries with an ETSI channel number ">15" are ignored. The configuration parameter "ChannelSwitchingMode" can be set such that the reader randomly selects a channel for the communication with the ID tags from this channel list.



The parameter "PortChannelListPort1...8Value1...16" is only relevant if "ETSI_EN302208" or "ETSI_EN302208_LBT" is selected as communication standard.

UK

16.9.3 ChannelSwitchingMode

ChannelSwitchingMode	
Firmware	as from v1.30.00
Data type	byte (8 bits)
Unit	-
Value range	0-1

The parameter "ChannelSwitchingMode" sets the channel selection mode.

ETSI communication standard	Mode 0	Mode 1
ETSI_EN302208	- no LBT - use of the global channel list for each port with random selection of the channel	- no LBT - use of the channel list associated with the port with random channel selection
ETSI_EN302208_LBT	- LBT on the first configured antenna - use of the global channel list in random channel order - no new LBT and therefore no change of channel during change of port	- LBT for each change of port on this port - use of the channel list associated with the port in random channel order



The LBT (Listen Before Talk) operating mode is only permitted in existing installations.



The parameter "ChannelSwitchingMode" is only relevant if "ETSI_EN302208" or "ETSI_EN302208_LBT" is selected as communication standard (only in existing installations).

16.9.4 PowerCheckOverAllAllowedChannels

PowerCheckOverAllAllowedChannels	
Firmware	as from v1.30.00
Data type	bool (8 bits)
Unit	-
Value range	0; 255

The parameter "PowerCheckOverAllAllowedChannels" sets the level settings of the channel plan for the European frequencies according to the valid "4-channel plan" (or the outdated "Listen Before Talk").

The communication standards specify different maximum transmission powers per channel. The transmission power is limited to the smallest maximum power of the selected channels.



The parameter "PowerCheckOverAllAllowedChannels" is only relevant if "ETSI_EN302208" or "ETSI_EN302208_LBT" is selected as communication standard (only in existing installations).

For EN302208:

Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Max. permitted transmission power [W]	0	0	0	2	0	0	2	0	0	2	0	0	2	0	0

Example for EN302208: The channels 3 and 4 are entered in the channel list, which results in a maximum transmission power of 0 watts. The UHF reader signals a "power check error" for the respective channel.

For EN302208_LBT:

Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Max. permitted transmission power [W]	0.1	0.1	0.1	2	2	2	2	2	2	2	2	2	2	0.5	0.5

Example for EN302208_LBT: The channels 3 and 4 are entered in the channel list, which results in a maximum transmission power of 2 watts. The UHF reader transmits with 0.1 watts since the entered channel 3 has a maximum power of 0.1 watts.

UK