Azenta DP5 User Manual for Version 2.0

DOMINIQUE DUTSCHER SAS



AZENTA
LIFE SCIENCES

388098 Revision B

Azenta, Inc.

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These are the original instructions for DP5.

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1. Introduction

The DP5 is a 2D rack decoding product from Azenta Life Sciences. There are the following versions:

- DP5 Standard – a desktop application with quick decoding, flexible exporting and ease of use.
- DP5 Network – a version of DP5 which, along with the features of DP5 Standard, allows you to control your 2D rack code from a desktop application, web browser, tablet, mobile phone etc. With the DP5 network you can plug your scanner directly into the network without a need for a desktop computer.

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2. Installation

All software required is listed on the reference link and warranty card.

Drivers

A driver is only required for the USB versions of the scanner; the RJ45 versions do not need a driver.

None of Azenta's camera-based scanners require a driver to be installed on a standard Windows 10 computer or Linux. However, specific configurations of Windows 10 may exclude these drivers, so the installation of the driver may still be required.

Installing the Software on Windows

DP5 comes as an MSI installer file.

> ***NOTE:*** DP5 is only supported on Windows 11 and Windows 10 (version 1803 or higher).

To install the software, double-click the installer file. Proceed through the prompts, accepting the licence.

> ***NOTE:*** It is recommended to install to the default location unless there is a strong reason to not do so.

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Installing the Software on Linux

DP5 is supported on Debian-based Linux systems (e.g. Ubuntu, Debian, etc.).

To install DP5, download the deb file and execute the following command:

```
sudo apt install ./<name of DP5 deb file>
```

This will download the correct apt dependencies and install DP5.

Licencing the Software

After DP5 has been installed and the scanner connected, the licence can be applied.

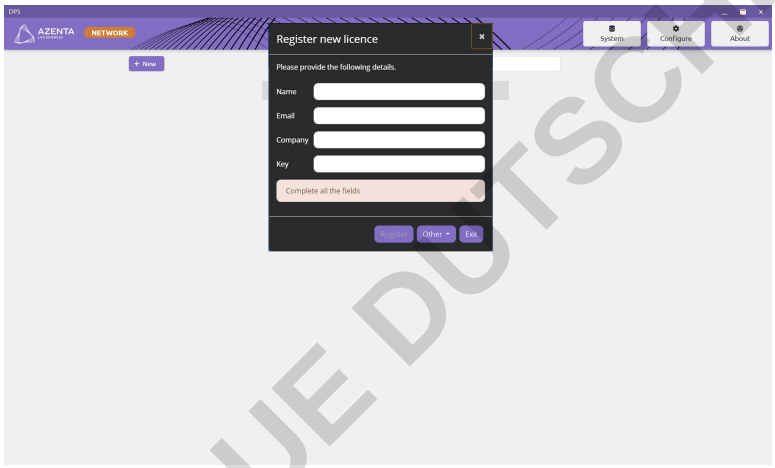
Licence usage utilizes the computer ID. As such, if you are installing or upgrading a licence on the same computer, the licence usage does not increment.

If you are installing or upgrading a licence on a new computer, you need to unregister the licence from the previous computer.

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Applying a Full Licence Online

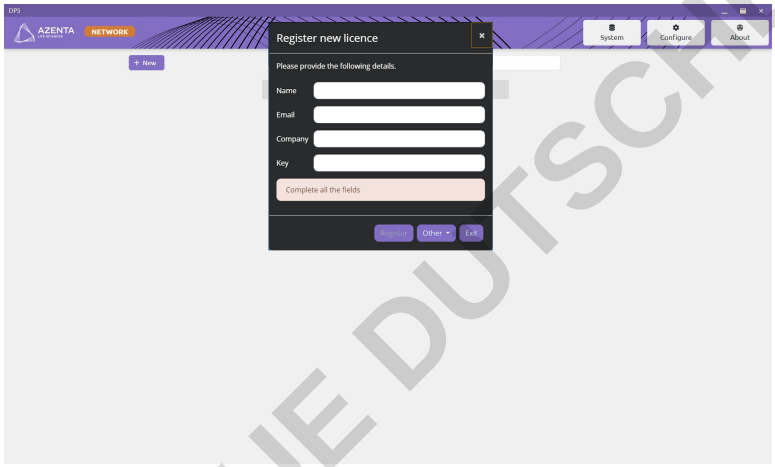
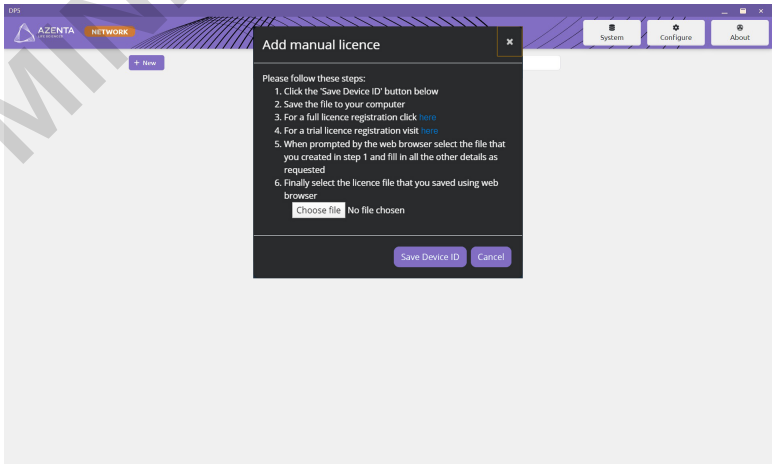
Step	Action
1.	Ensure the PC is connected to the internet. ***NOTE:*** *If it is not connected to the internet, refer to "Applying a Full Licence Offline" on the next page.*
2.	Run the program either from the desktop or the start menu.  The following screen is displayed. 
3.	Enter the details as required and click **Register**. The licence key can be found on the licence certificate included with your device. ***NOTE:*** *If you do not have the licence key, contact support@Azenta.com.* The DP5 then contacts the Azenta licence server and registers your licence. This only operates if your computer is connected to the internet and your security apparatus allows the communication to the licence server. ***NOTE:*** *After the initial registration, no further communication to the internet is required.*

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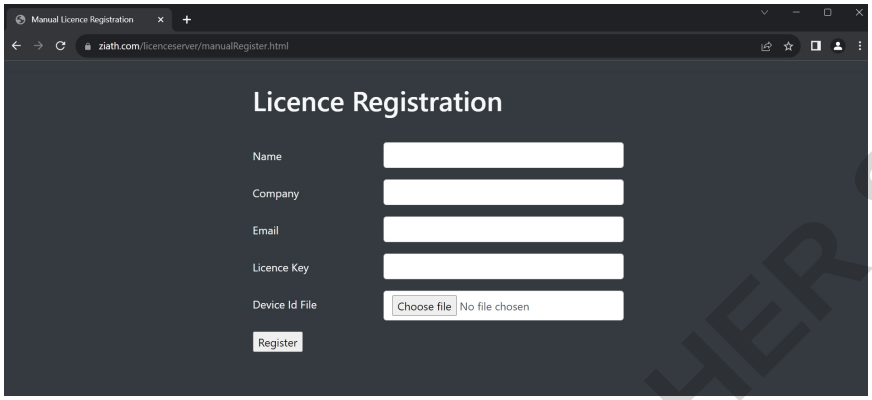
Applying a Full Licence Offline

If internet communication is not available, it is possible to register manually.

Step	Action
1.	Run the program either from the desktop or the start menu.  The following screen is displayed. 
2.	Click **Other > Manual**. The following screen is displayed. 

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Step	Action
3.	Follow the instructions detailed on the screen. ***NOTE:*** *You will need to use another computer that has internet access to complete the steps.*  ***NOTE:*** *The licence key can be found on the licence certificate included with your device. If you do not have the licence key, contact Azenta.*
4.	If this does not operate for your system, contact Azenta with all of the details requested in the pop-up and Azenta will register your licence for you.

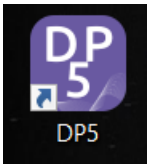
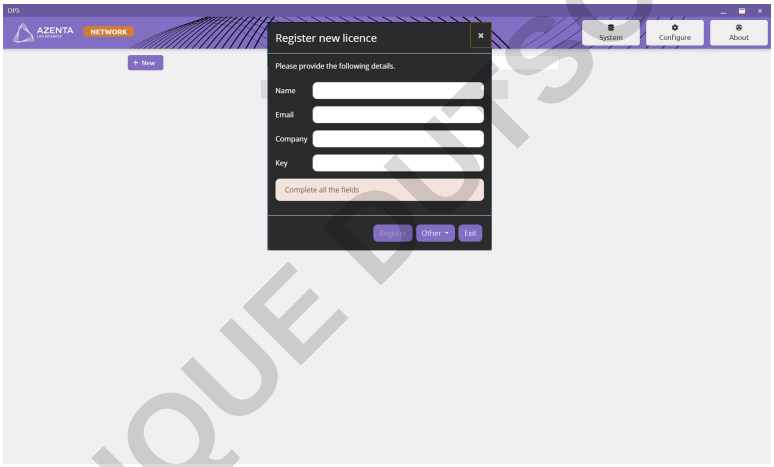
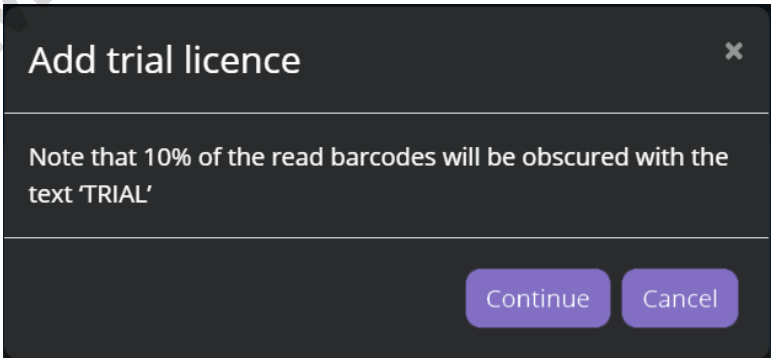
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Applying a Trial Licence

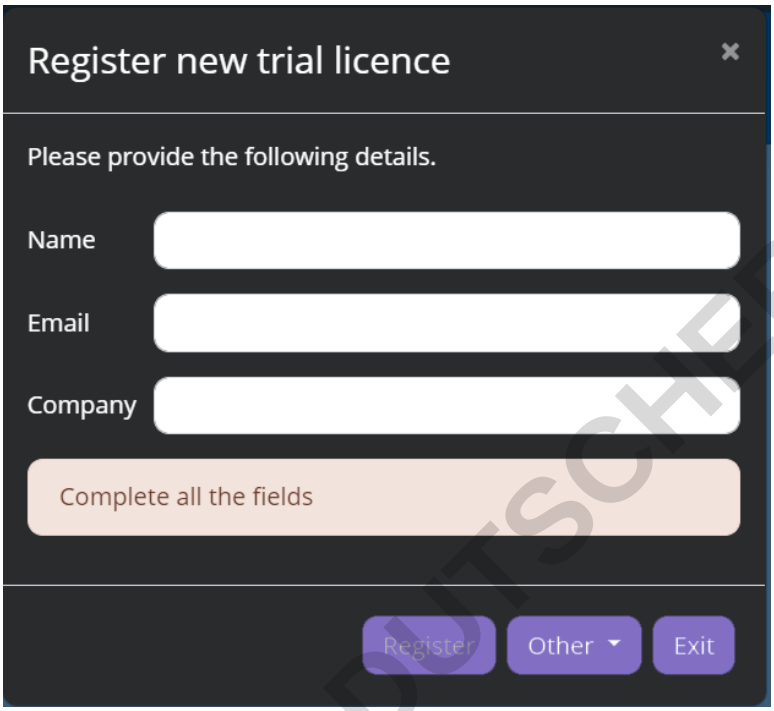
If you are testing the DP5, it is possible to register for a trial licence.

NOTE: In trial mode, 10% of all codes will be obscured by the word 'TRIAL'.

Step	Action
1.	Run the program either from the desktop or the start menu.  The following screen is displayed. 
2.	Click **Other > Trial**. A message is displayed. 

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Step	Action
3.	Click **Continue**. The window is updated to remove the *Key* field, as it is not required for a trial licence. 
4.	Enter the details as required and click the **Register** button.

Applying a DP5 Network Licence

Once the licence has been installed, your system will detect a DP5 Network licence has been installed. This will be enabled when the DP5 network server is started. However, the registration process needs to be executed. If this is not possible, a command line operation is available at DP5.exe (or on a Linux terminal at /usr/bin/dp5-headless) with the following command line switches.

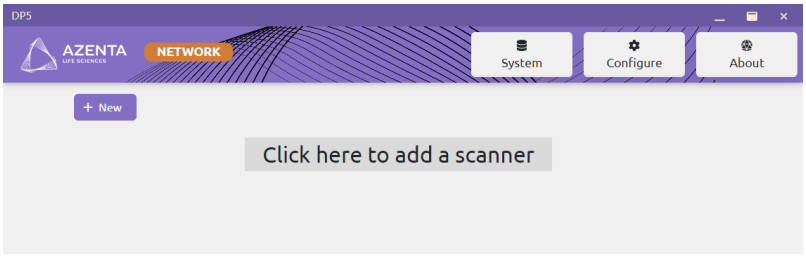
Short Switch	Long Switch	Parameters	Description
-u	--unregister	None	Unregister current licence
-r	--full-register	None	Register Full Licence
-t	--trial-register	None	Register Trial Licence
-n	--registration-name	Name, use double quotes	Registration Licencee Name
-e	--registration-email	Email Address	Registration Licencee Email Address
-c	--registration-company	Company name	Registration Licencee Company Name
-k	--licence-key	Licence Key	Licence Key

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After Registration

After registering, the following screen is displayed.



The tag in the top left-hand corner displays **STANDARD** or **NETWORK**according to the licensed version of DP5. If a trial licence has been registered, this is shown as **TRIAL** in the header.

Importing and Exporting Settings

Existing settings and containers in DP5 version 1.9 are compatible when upgrading to DP5 versions 2.0. Settings and containers are not reverse compatible, thus, settings and containers used in DP5 version 2.0 cannot be used in a previous version of the software

Step	Action
1.	Complete the installation of DP5 2.0.
2.	Navigate to C:\ProgramData\Ziath\DP5.
3.	Copy the dp5.settings file.
4.	Navigate to C:\ProgramData\Azenta\DP5.
5.	Paste the dp5.settings file in the new location.

NOTE: This process can also be completed to import and export licence files and container files.

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3. System Management

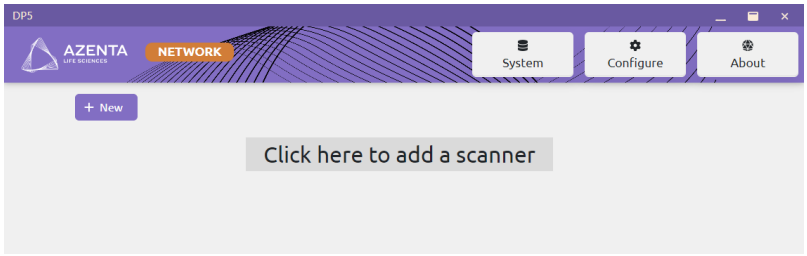
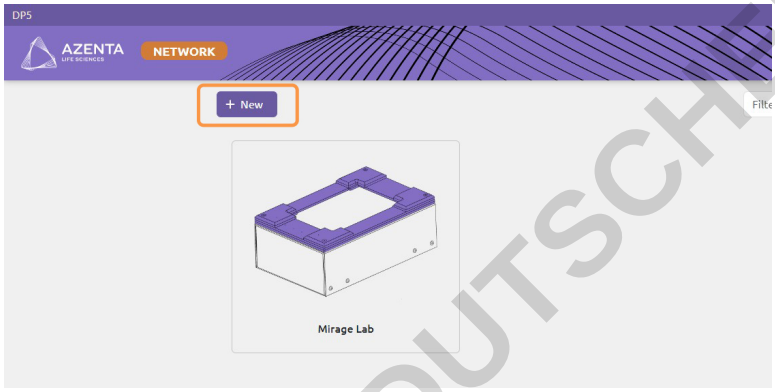
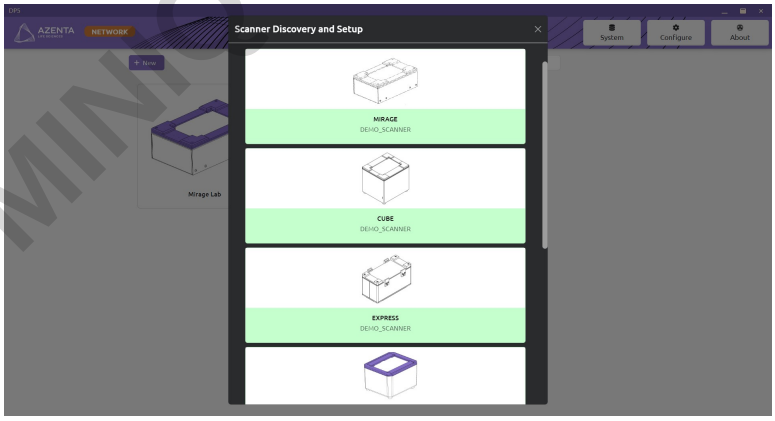
.

Managing Scanners

Adding a Scanner

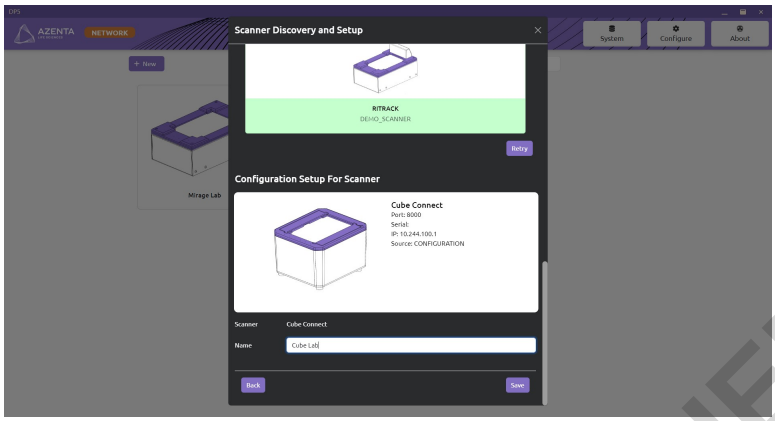
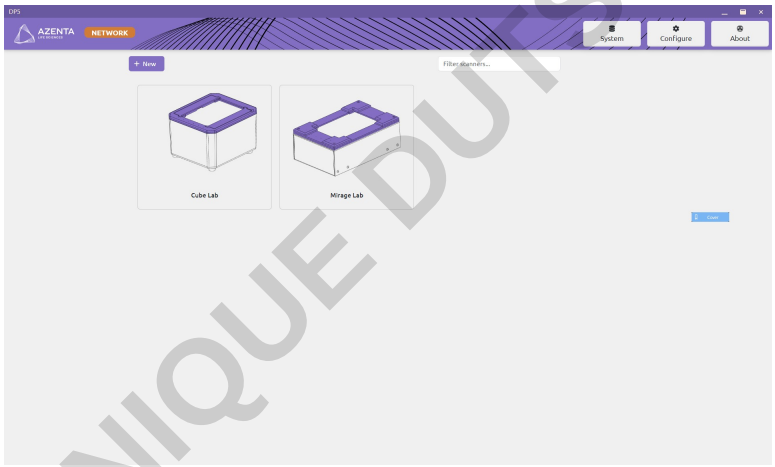
Step	Action
1.	Either connect a USB scanner to the host PC or connect the LAN scanner to the same subnet as the DP5 server (if using DP5 Network).

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Step	Action
2.	If adding a first scanner, click the central large gray button.  For additional scanners, click the **New** button.  DP5 will search for either a local scanner or a network scanner (DP5 network only).
3.	Select the scanner. The following window is displayed. 

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Step	Action
4.	Enter a name for the scanner. 
5.	Select **Save**. The scanner is added. 

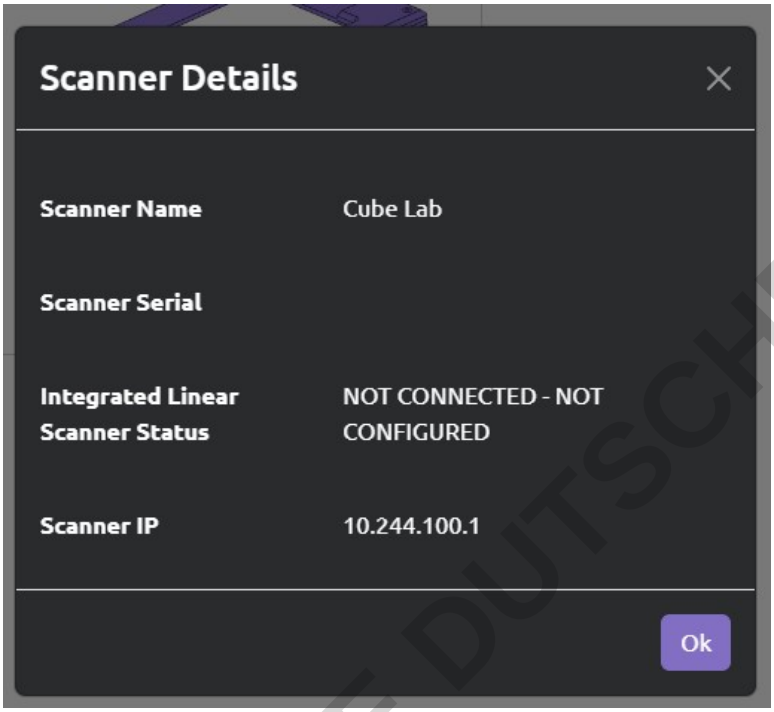
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Viewing Scanner Details

To view an existing scanner's details, right-click the scanner icon and click **Scanner Details**.

A pop-up window is displayed.



Editing a Scanner

To edit an existing scanner, right-click the scanner icon and click **Edit Scanner**.

Deleting a Scanner

To delete an existing scanner, right-click the scanner icon and click **Delete Scanner**.

Update Configuration

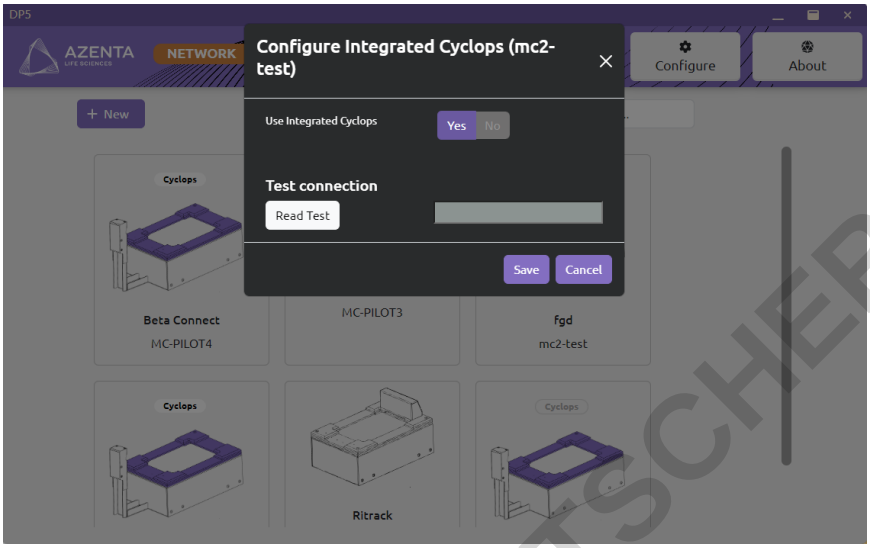
To update the scanner badge if it is a RITrack scanner and has Cyclops attached to it, right-click the scanner and click **Update Configuration**.

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Configuring Integrated Cyclops

If the reader has an integrated Cyclops socket available, right-click the reader icon and click **Configure Integrated Cyclops**. The following window is displayed.



If *Use Integrated Cyclops* is set to **Yes**, all the containers added on that reader use the integrated Cyclops reader to read the container ID code in the rack by default, unless overridden at the container level.

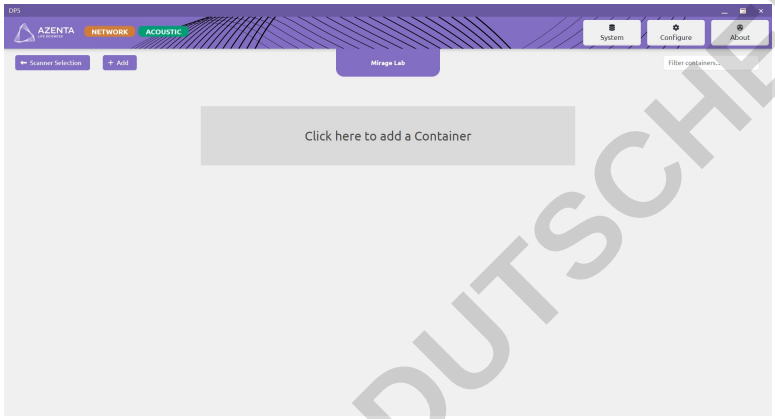
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Managing Containers

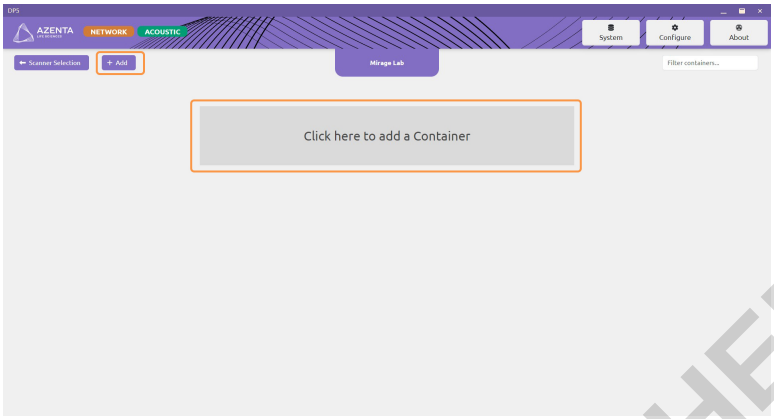
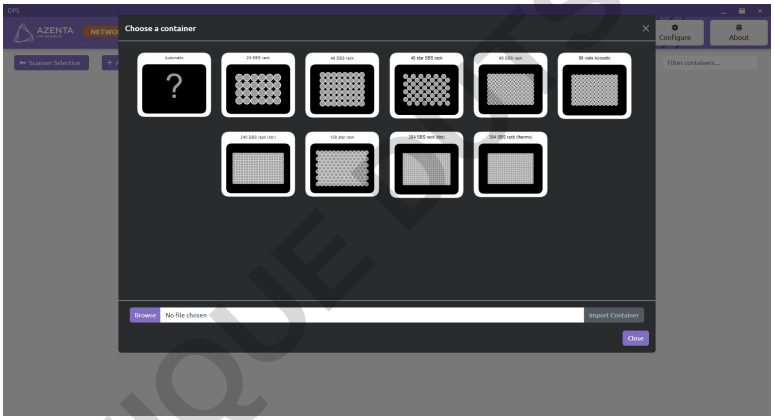
A container is also known as a rack, plate or Cryobox – it is a carrier for 2D coded tubes.

Adding a Container

Step	Action
1.	Select the relevant scanner. The operation screen is displayed. 

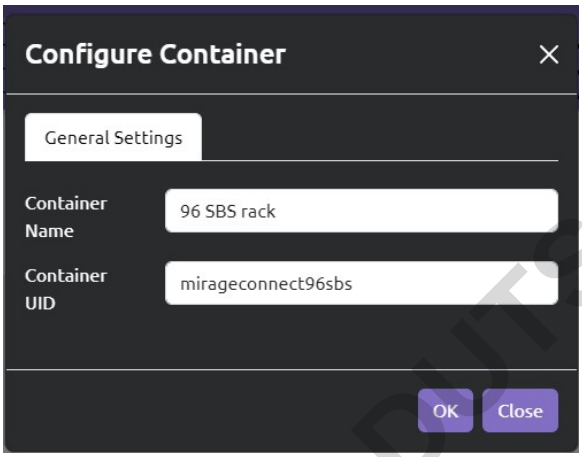
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Step	Action
2.	If adding the first container, you can select the central large gray button. For additional containers, select the **Add** button.  The *Choose a container* window is displayed with all the types of container that the scanner is compatible with. 

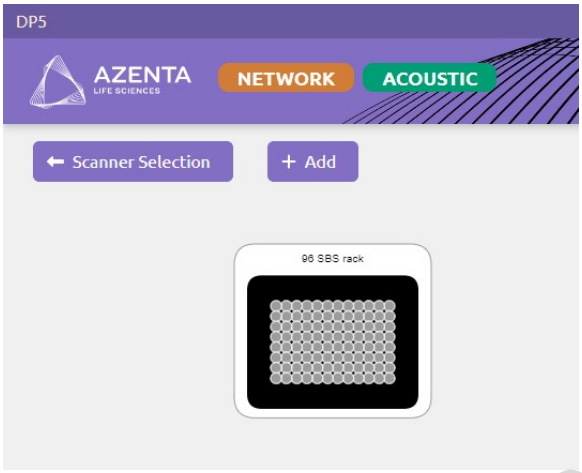
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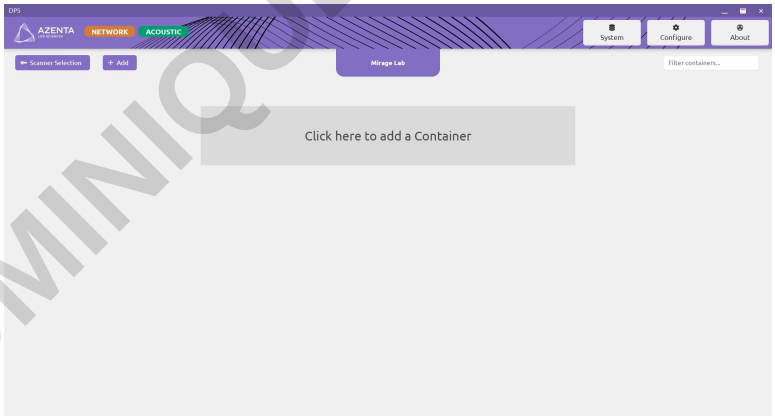
Step	Action
3.	Carry out one of the following: • Select **Automatic** - this instructs the scanner to attempt to distinguish between a 24-, 48- or 96-well rack. • Select an existing container configuration. • If the required configuration is not displayed, contact Azenta, who can provide you with a template file for your particular container. You can then browse for and select the template, then select **Import Container** to make it available for selection. See "Importing a Container" on the next page. The *Configure Container* window is displayed. ***NOTE:*** *The Data sources section is only displayed for the Mirage.* 
4.	Enter the following details: • **Container Name** – this is a name designed to be shown to the end user ***NOTE:*** *Any text can be entered, including non-Latin alphabet characters. The container ID MUST be unique.* • **Container UID** – designed to be used for remote control. ***NOTE:*** *Only the letters a-z and number 0-9 can be used and there cannot be two identical names for this.*

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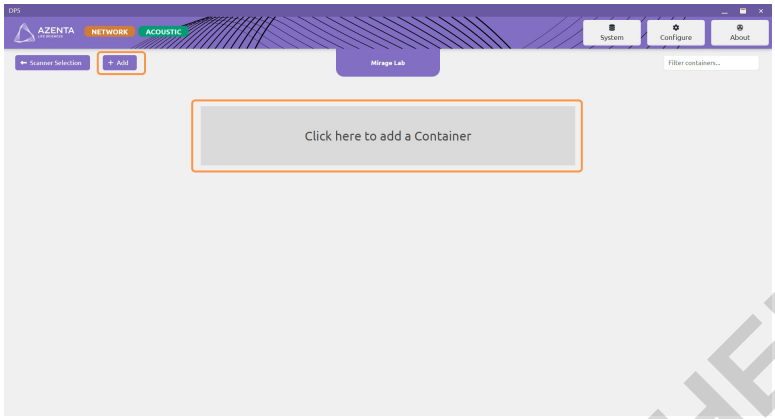
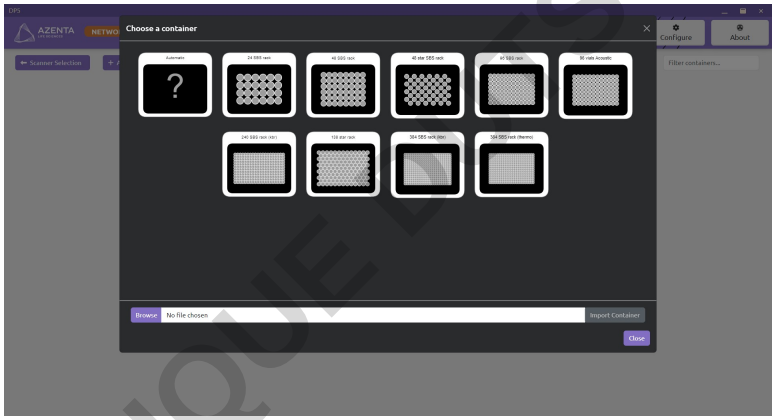
Step	Action
5.	Select **OK**. The container is added. 

Importing a Container

Step	Action
1.	Select the relevant scanner. The operation screen is displayed. 

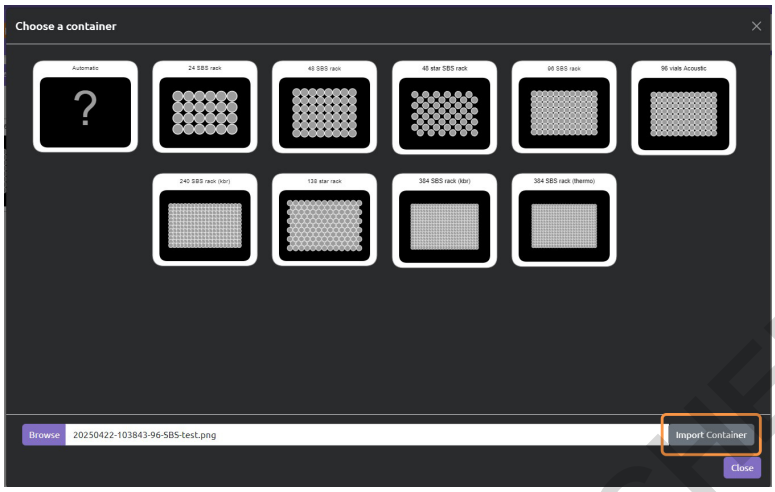
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Step	Action
2.	If adding the first container, you can select the central large gray button. For additional containers, select the **Add** button.  The *Choose a container* window is displayed with all the types of container that the scanner is compatible with. 
3.	Select **Browse**.
4.	Navigate to the container file you want to import. Select **Open**.

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Step	Action
5.	Select **Import Container**. 

Editing a Container

To edit a container, right-click on the relevant container and select **Edit Container**.

The General Settings tab displays the same fields as when adding a new container.

The second tab allows the Exposure Mode for the container to be adjusted to one of the following for when barcodes are unusually bright or dark:

- Low (produces darker images)
- Medium (default)
- High (produces lighter images)

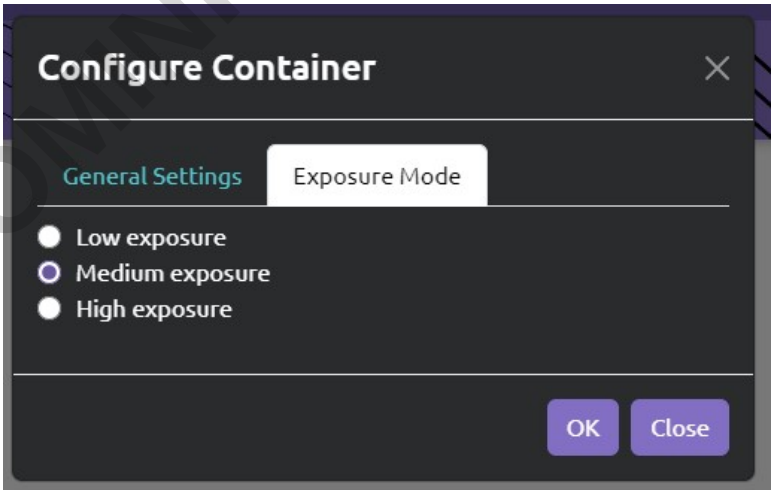


Figure 3-1: Container - Exposure Mode

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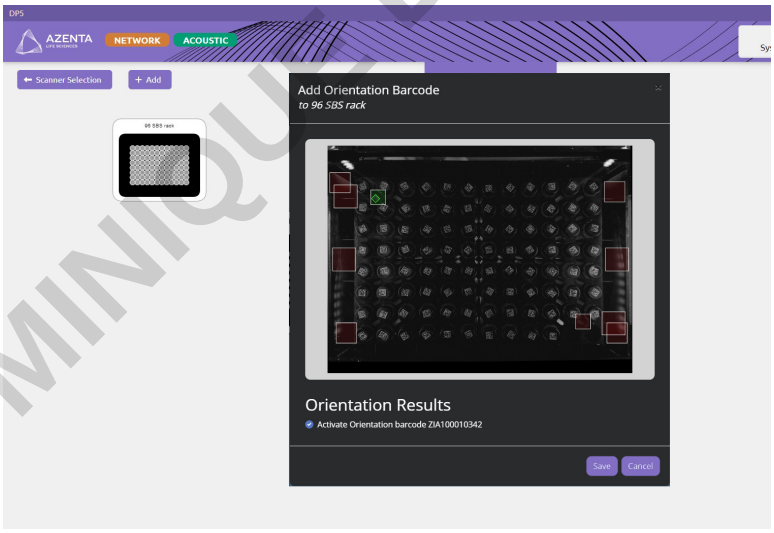
> ***NOTE:*** If low or high is selected, the container shows an icon to indicate the differing exposure.

Deleting a Container

To delete a container, right-click on the relevant container and select **Delete**.

Adding an Orientation Code

Various manufacturers of 2D coded tubes place a 2D code on the rack which can be used to both identify the rack and detect that the rack has been placed on the scanner upside-down. This is described as the Orientation Barcode in DP5. Each manufacturer has a different location that this orientation code can be placed. Therefore, the location of the code needs to be trained for each make and/or model of container.

Step	Action
1.	Place the container which needs to be trained onto the scanner.
2.	Right-click on the relevant container and select **Add orientation barcode**. The rack is then scanned and DP5 analyzes the rack to determine the location of the Orientation Barcode and the **Add Orientation Barcode** window is displayed.  Red locations are orientation barcodes that have not been found and green locations are the correct ones. Should more than one location be found, the menu at the bottom allows for the choice of the orientation barcode to use.
3.	Select **Save**. The container graphic is modified to show the orientation barcode.

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Deleting an Orientation Barcode

To delete an orientation barcode, right-click on the relevant container and select **Delete orientation barcode**.

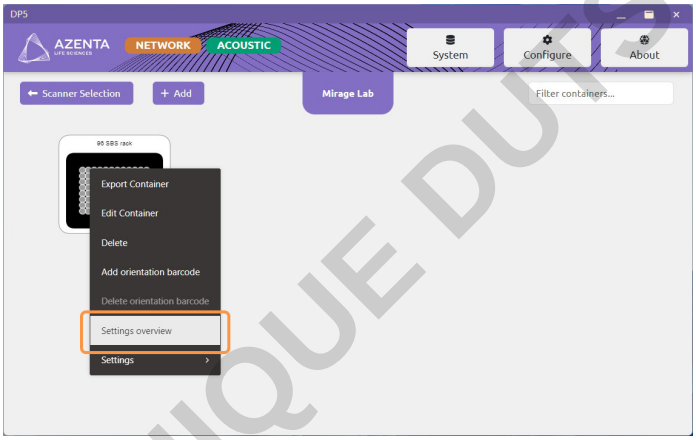
Exporting a Container

To export a container into a file that can then later be imported into another DP5 system, right-click the container and select **Export Container**.

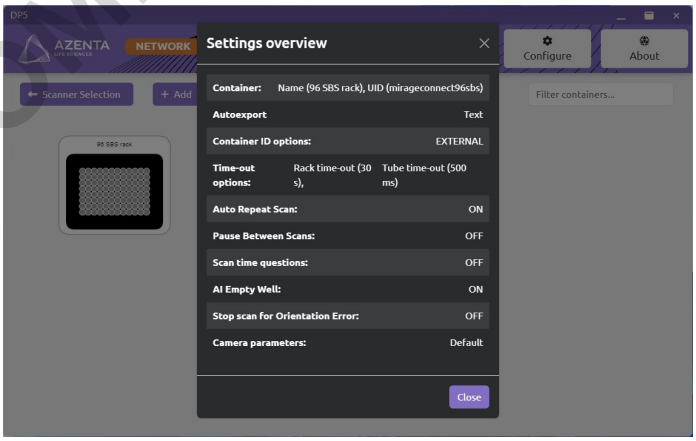
See "Importing a Container" on page 23 for information on importing container files.

View an Overview of the Container Settings

To view an overview of the container settings, right-click on the relevant container and select **Settings overview**.



The *Settings Overview* window is displayed.



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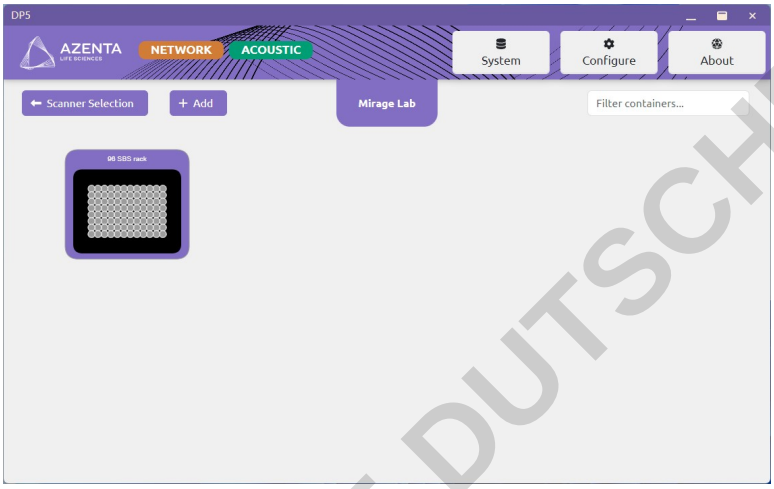
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Editing Container Settings

To edit container settings, right-click the container and select one of the following under **Settings**:

- Container ID – see "Container ID" on page 32
- Export – see "Export" on page 34
- Scan – see "Scan" on page 30
- Sound – see "Sound" on page 51
- Reset settings – restores the settings to default

If the settings have been changed for this container, the container changes appearance to indicate that there are custom settings for the container.



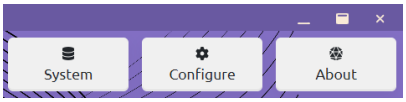
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System Configuration

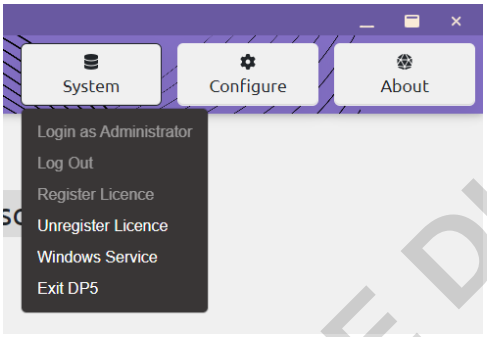
The DP5 has a number of configuration options. The configuration options are split into three categories:

- System
- Configure
- About



System

These are configuration options which apply to the entire system.



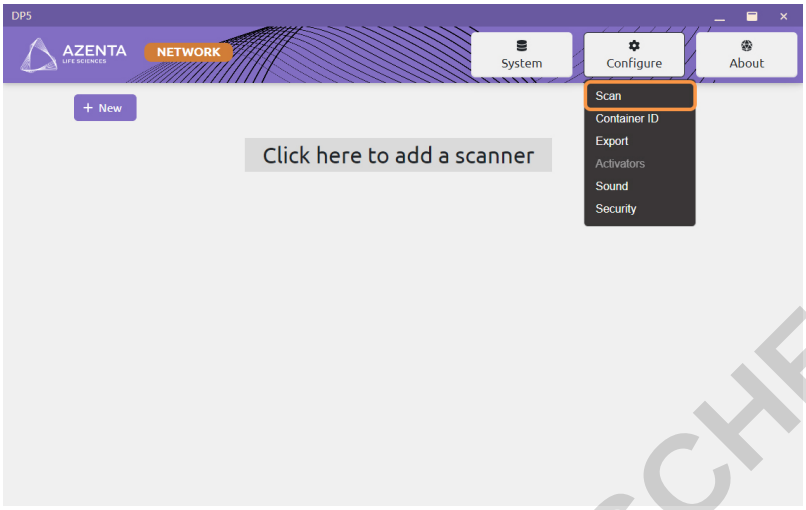
Setting	Definition
Login as Administrator	Allows the user to log in as administrator so that changes can be made to the setup. If you are running DP5 Network, only your interaction is registered with administrator access and no others. If the security system is not configured this option is grayed out.
Log out	Logs out as an administrator. If the security system is not configured, this option is grayed out.
Register Licence	Allows you to register a full licence. ***NOTE:*** *This is only displayed when a trial licence is registered.*
Unregister Licence	Allows you to register a new licence. This can be used to upgrade a licence from Standard to Network.
Windows Service	Registers/Unregister the DP5 headless application as a service. When activated, Windows starts the application at boot up.
Exit DP5	Closes the DP5 program. ***NOTE:*** *If you are running the program from a web browser on DP5 Network, you will not see this option.*

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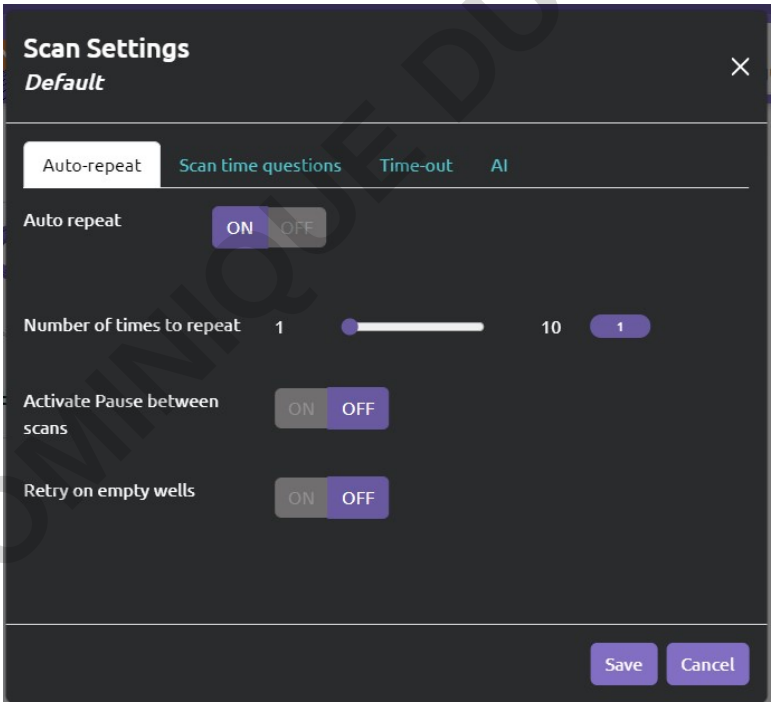
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Configure

This allows the settings of various parameters in DP5.



Scan



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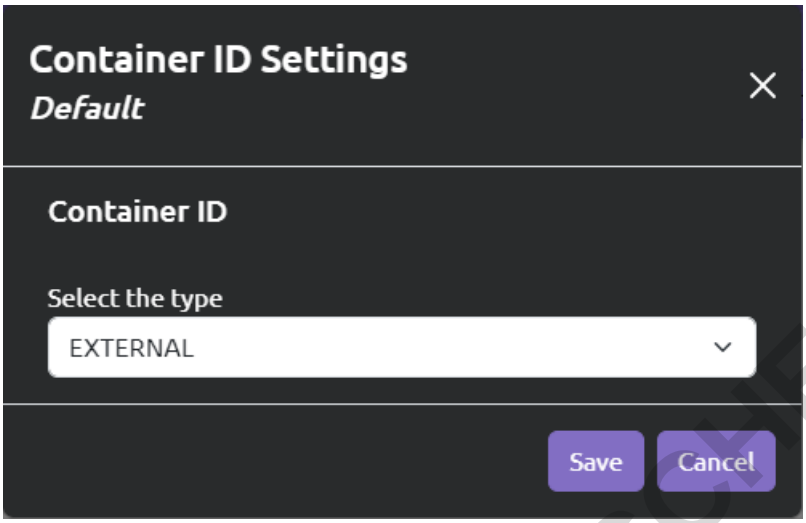
Tab	Setting	Definition
Auto-repeat	Auto repeat	Whether to prompt DP5 to repeatedly scan a rack should a decode error occur and add the results together to make a complete scan.
	Number of times to repeat	The number of repeat scans to carry out should a decode error occur.
	Activate Pause between scans	Whether to pause the scan after an error is detected. It will ask the user for confirmation to continue scanning so the user can clean/check the container.
	Retry on empty wells	Whether to reattempt a scan on wells read as empty.
Scan time questions	Enable scan time questions	Whether to prompt the user with a series of user-defined questions which are determined here. These questions are then available in the scan results.
	Short name	A short phrase which can be used to identify the question in the scan results.
	Full question	The question text that is shown to the user.
Time-out	Activate container time out	Whether to activate the container time out. This will start the timer at the point the scan begins and end either when every tube has finished the decode process or the timer expires.
	Seconds before aborting container	The time in seconds before the timer expires. Should it expire, any tubes which have finished will be reported and all other tubes will report a decode error.
	Activate tube time out	This will start the timer at the point the scan begins and end either when the tube has finished it's decode process or the timer expires.
	Milliseconds before aborting tube	The time in milliseconds before the timer expires. ***NOTE:*** *Since this is measured in milliseconds, it is not advised to use this timer if the computer does something else while decoding a rack that uses the processing speed or memory as a tube may not decode when it should.*
Set AI Active	Activate AI Empty Well	Empty tube detection is performed by a Azenta proprietary AI system, and it is active by default. This option allows you to disable AI in one container to use an algorithmic procedure to classify wells. AI is faster and behaves better in different light conditions, but the algorithmic one can cope with brand new tubes that are not yet supported by the current AI model until a new version is released.

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Container ID

The container ID settings determine how the tube container is identified.



Section	Setting	Definition
Container ID	Select the type	Select from the following: • None - The user is not prompted for the Container ID and a default of #container-barcode is used. • External - This presents a dialog to allow the user to enter the Container ID. This can typically be done via a handheld keyboard wedge scanner. • Azenta - The Azenta Linear Reader configured in Hardware Settings is used. ***NOTE:*** *If the linear scanner is not connected, this option cannot be selected.* • Orientation - Uses the orientation barcode from the scanned container as the Container ID. • Integrated - When selected the integrated Cyclops reader reads the container id code at scan time. ***NOTE:*** *This option is only available for scanners with an external USB socket and will be available on custom container settings of a scanner that has the* ***Use Integration Cyclops*** *option activated. See "Configuring Integrated Cyclops" on page 19.*

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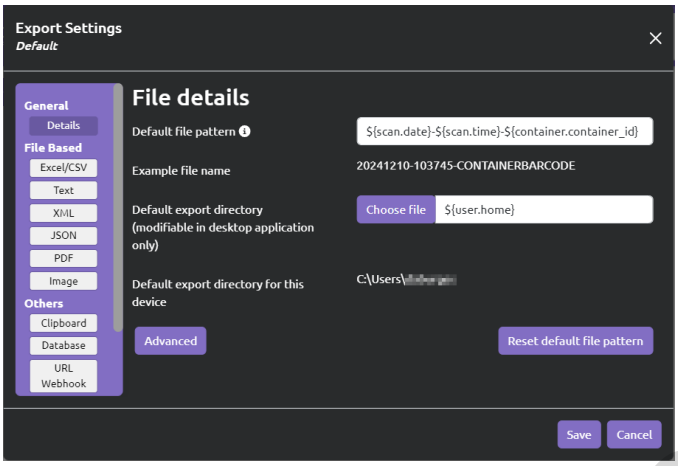
Section	Setting	Definition
Hardware Settings	ONEDR2/Cyclops drop-down	Allows you to configure either a ONEDR2 Azenta linear reader or a Cyclops Azenta linear reader as the main linear reader in the system. ***NOTE:*** *Linear hardware settings need to be configured in the default settings zone which is accessed from the top toolbar in DP5 (as shown in Container specific section) and then selecting "Container ID" from the drop-down list.*
	Types of barcode enabled	If ONEDR2 is selected, select the type of code to be detected. ***NOTE:*** *It is recommended to only select the code type you require as operation is slowed by searching for multiple types.*
	COM Port	If Cyclops reader is selected, the COM port in which the Cyclops linear reader is connected must be selected.
	Auto Scan	When this option is enabled, Cyclops constantly reads what is over the scanner, therefore Activators functionality can be used (see "Activators" on page 50). If this option is disabled, the linear container code is only read at scan time.
	Test	Once the correct COM port is selected, place a rack on the scanner where the linear reader is attached and click the **Test** button. If the connection is successful, a read will be done and the **Save** button is activated.

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Export

Select from the left-hand panel to edit the settings for each export type.



General > Details

Setting	Description
Default file pattern	A pattern which describes the filename that is used in an export. After a scan, DP5 searches for tokens to replace in the filename. The tokens are as detailed below: • ${container.container_id} – this is the container id as configured in the container id settings. • ${container.orientation_barcode} – this is the container orientation barcode • ${container.name} – this is the name of the container as configured • ${container.uid} - this is the uid of the container as configured • ${container.guid} – this is an uneditable id assigned to a container • ${scan.guid} – this an uneditable id assigned to every scan • ${scan.date} – this is the date of the scan in the format of the year with four digits, followed by the month in two digits and two digits representing the day. An example for the 7th of August, 2023 would be 07082023. • ${scan.time} – this is the time of the scan in the format of the hours in the 24 hour clock, two digits representing the minute and two digits representing the seconds. An example of 24 seconds and 3 minutes at 4pm would be 040324. • ${user.home} – this is a special directory on the computer; the precise location for this would differ between different computers and configurations. If a user with the username of norman.woodland is logged into a Windows 10 computer this may be c:\users\normanw and a Linux computer would be /home/woodland.
Example file name	As the details are entered an example filename is shown under the input.
Default export directory (modifiable in desktop application only)	This is the same as the filename and is prepended to the filename as the directory for the export.

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Setting	Description
Default export directory for this device	The default export directory for the device on which DP5 is installed. This is populated automatically.
Reset default file pattern	This resets the above values to the initial default values.
Advanced > Default Scan Date Pattern	This setting allows you to change the way the date is presented after a scan.
Advanced > Default Scan Time Pattern	This setting allows you to change the way the time is presented after a scan.

File Based > Excel/CSV

Tab	Setting	Description
Options	Export on read	Whether to export a file on scanning and under which circumstances. Select the relevant radio button.
	File options	Select from the following: • **Append** – the export will be appended into the existing file. • **Increment** – a new file will be created which will append (1) onto the filename, if there is a file with (1) then (2) will be added etc. • **Overwrite** – the existing file will be overwritten.
	Open after saving	Whether to open the file after export.

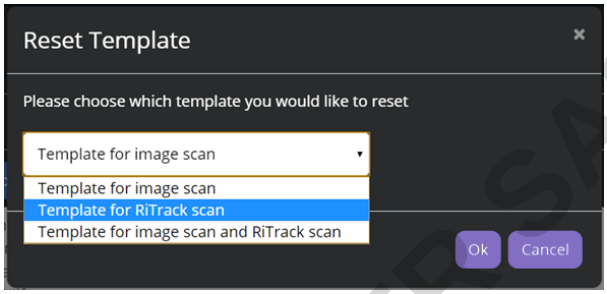
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Tab	Setting	Description
Format	Data type	Select from the following: • CONTAINER ID - the ID of the container. • CURRENT MACHINENAME - the name of the scanner. • CURRENT USERNAME - the username of the user who generated the export. • ORIENTATION BARCODE - the orientation barcode of the container. • SCANNER SERIAL - the serial number of the scanner. • SCAN DATE - the date of the scan. The formatting options allow the date to be formatted using the date format. See Appendix A: "Date and Time Format" on page 73. • SCAN DATETIME - the date and time of the scan. The formatting options allow the date and time to be formatted using the date-time formats. See Appendix A: "Date and Time Format" on page 73. • SCAN TIME - the date and time of the scan. The formatting options allow the date and time to be formatted using the time formats. See Appendix A: "Date and Time Format" on page 73. • TUBE BARCODE - the tube barcode. • TUBE COLUMN - the column of the tube in numerical format starting at 1. • TUBE LOCATION - the row and column of the tube in one item. The formatting is in the format of an 'a' followed by one or more 'n's. The n will denote how many digits used for the position so `an` will give A1 and `ann` will give A01. • TUBE NUMBER - the number of the tube . • TUBE ROW - the row of the tube in numerical format starting at 1 • TUBE ROW_LETTER - the row of the tube in a format of a letter starting at A. When adding RITrack data, the following RITrack data columns can be added by clicking the **Reset table** button and selecting a RITrack option: • RITRACK TUBE_ID : this is the tube barcodes as stored on the RITrack tag. • RITRACK CUSTOM_DATA : this is the custom data as stored on the RITrack tag.
	Header text	The display name of each data type.
	Cell formatting	The way the cell is formatted, if applicable (e.g. for date-time fields). See Appendix A: "Date and Time Format" on page 73.

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Tab	Setting	Description
	Reset table	Resets the template to the default. If using RITrack, select the relevant option from the drop-down list. 
Format options	Order of elements (tube scan result)	This either exports the data *By Row* with row A from column 1 to 12 and then row B from column 2 to 12 and so on. *By Column* exports A1 to H1, followed by A2 to H2 and so on.
	Write headers	Whether to write the headers as detailed in the *Format* tab.
	Type of file	Allows the file to either be a native Excel file which honors text and date formats, or a CSV file which is a special text format easily opened by Excel and other programs.

File Based > Text

This option allows for the export of text files; a text file is any file which only contains text and incorporates multiple export formats such as CSV, TSV, JSON, XML etc.

> ***NOTE:*** DP5 contains default settings for many text files and if that text file format is required it is recommended to use the custom option for that format.

The text file export format uses an advanced templating engine known as FreeMarker (https://freemarker.apache.org/) which can convert the scan results into a text output.

Tab	Setting	Description
Options	Export on read	Whether to export a file on scanning and under which circumstances. Select the relevant radio button.
	File options	Select from the following: • **Append** – the export is appended into the existing file. • **Increment** – a new file is created which appends (1) onto the filename; if there is a file with (1) then (2) is added etc. • **Overwrite** – the existing file will be overwritten.
	Open after saving	Whether to open the file after export.

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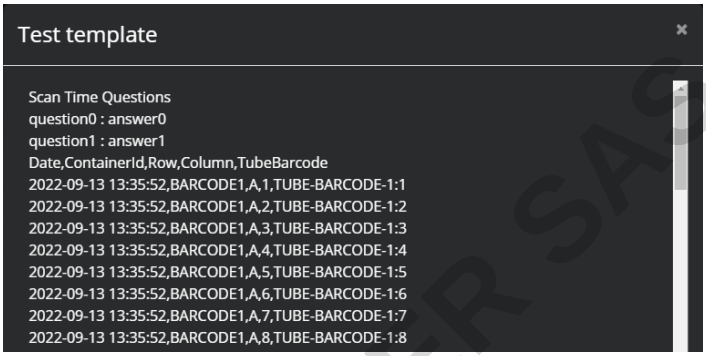
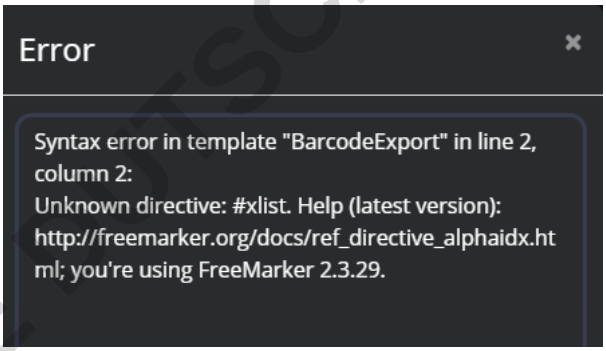
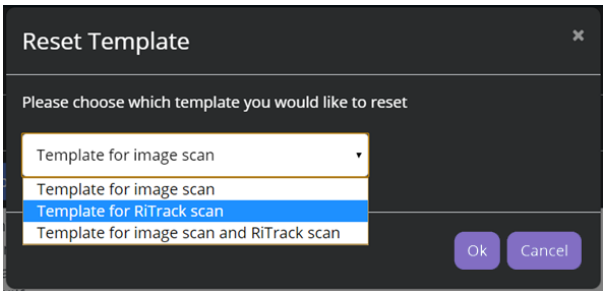
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Tab	Setting	Description

Script	Editor	The editor allows you to make changes to the template. The default export format is as follows:
		`Date,ContainerId,Row,Column,TubeBarcode`
		`<#list 1..numRows as row>`
		`<#list 1..numColumns as col>`
		`${scanDate?datetime},${containerId},${row},${col},`
		`${container.getDecodeResult(row,col).barcode}`
		`</#list>`
		`</#list>`
		This exports the results in the following format:
		`2022-09-13 13:33:22,BARCODE1,1,1,TUBE-BARCODE-1:1`
		`2022-09-13 13:33:22,BARCODE1,1,2,TUBE-BARCODE-1:2`
		`2022-09-13 13:33:22,BARCODE1,1,3,TUBE-BARCODE-1:3`
		`2022-09-13 13:33:22,BARCODE1,1,4,TUBE-BARCODE-1:4`
		…
		When adding RITrack data, the following RITrack data columns can be added by clicking the **Reset template** button and selecting a RITrack option:
		• ritrackContainerId: this is the containerId stored on the RITrack tag
		• ritrackTubeBarcodes.getBarcode(row, col): this is a 2 dimensional array of the tube barcodes as stored on the RITrack tag
		• ritrackTubeBarcodes.getCustomData(row, col): this is a 2 dimensional array of the custom data as stored on the RITrack tag
		For additional information, refer to Appendix B: "Text Export Template Information" on page 74

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Tab	Setting	Description
	Test Template	After a template has been created, it can be tested by clicking this button. This displays a result from the export.  If there is an error in the template, an error message from FreeMarker is displayed. 
	Reset Template	Resets the template to the default. If using RITrack, select the relevant option from the drop-down list. 
	Upload external file	Allows you to import a template by clicking the **Choose file** button.
Extension	Export Extension	The export file extension. This is .txt by default.

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File Based > XML

XML is a standard text format known as Extensible Markup Language. This is a 'self-describing' format used for ease of parsing by computer systems. Due to the unchanging format required by computing systems there are no formatting options for XML.

See Appendix C: "XML Schema for XML Output" on page 78.

NOTE: You cannot append to an XML document. This is due to a limitation in the format of XML.

Setting	Description
Export on read	Whether to export an image file on scanning and under which circumstances. Select the relevant radio button.
File options	Select from the following: • **Increment** – a new file is created which appends (1) onto the filename; if there is a file with (1) then (2)is added etc. • **Overwrite** – the existing file is overwritten.
Open after saving	Whether to open the XML file after export.

File Based > JSON

JSON is a standard text format known as JavaScript Object Notation. This is a format designed for ease of parsing by computer programs and is therefore uneditable. At the time of writing, there is no easily accessible JSON schema, so see Appendix D: "JSON Export Format Examples" on page 82.

NOTE: Due to the nature of the JSON format, it is not possible to append to an existing file so this is not available in the file options for JSON.

Setting	Description
Export on read	Whether to export an image file on scanning and under which circumstances. Select the relevant radio button.
File options	Select from the following: • **Increment** – a new file is created which appends (1) onto the filename; if there is a file with (1) then (2) is added etc. • **Overwrite** – the existing file is overwritten.
Open after saving	Whether to open the JSON file after export.

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File Based > PDF

DP5 has the ability to export to PDF document. Due to the nature of a PDF document export, this is not configurable.

Setting	Description
Export on read	Whether to export an image file on scanning and under which circumstances. Select the relevant radio button.
File options	Select from the following: • **Append** – the export is appended into the existing file. • **Increment** – a new file is created which appends (1) onto the filename; if there is a file with (1) then (2) is added etc. • **Overwrite** – the existing file is overwritten.
Open after saving	Whether to open the PDF file after export.

File Based > Image

Setting	Description
Export on read	Whether to export an image file on scanning and under which circumstances. Select the relevant radio button.
File options	Select from the following: • **Increment** – a new file is created which appends (1) onto the filename; if there is a file with (1) then (2) is added etc. • **Overwrite** – the existing file is overwritten.
Open after saving	Whether to open the image file after export.
Save additional raw image	When enabled, the software saves both the annotated and raw image for every image.
Width of the annotated image	Scales the annotated image according to the desired format. ***NOTE:*** *It is not possible to scale a raw image.*

Others > Clipboard

Tab	Setting	Description
Options	Export on read	Whether to export an image file on scanning and under which cir-cumstances. Select the relevant radio button.

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Tab	Setting	Description

Script	Editor	The editor allows you to make changes to the template. The default export format is as follows:
		`Date,ContainerId,Row,Column,TubeBarcode`
		`<#list 1..numRows as row>`
		`<#list 1..numColumns as col>`
		`${scanDate?datetime},${containerId},${row},${col},`
		`${container.getDecodeResult(row,col).barcode}`
		`</#list>`
		`</#list>`
		This exports the results in the following format:
		`2022-09-13 13:33:22,BARCODE1,1,1,TUBE-BARCODE-1:1`
		`2022-09-13 13:33:22,BARCODE1,1,2,TUBE-BARCODE-1:2`
		`2022-09-13 13:33:22,BARCODE1,1,3,TUBE-BARCODE-1:3`
		`2022-09-13 13:33:22,BARCODE1,1,4,TUBE-BARCODE-1:4`
		…
		When adding RITrack data, the following RITrack data columns can be added by clicking the **Reset template** button and selecting a RITrack option:
		• ritrackContainerId: this is the containerId stored on the RITrack tag
		• ritrackTubeBarcodes.getBarcode(row, col): this is a 2 dimensional array of the tube barcodes as stored on the RITrack tag
		• ritrackTubeBarcodes.getCustomData(row, col): this is a 2 dimensional array of the custom data as stored on the RITrack tag
		For additional information, refer to Appendix B: "Text Export Template Information" on page 74

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Others > Database

This allows for the export of the scan results directly into a DBMS; this is done by the means of SQL script with injected values. Note that all statements are executed as parameterised queries to avoid accidental SQL injection mistakes.

Tab	Setting	Description
Options	Export on read	Whether to export a database file on scanning and under which circumstances. Select the relevant radio button.
Connection	Select database type	The supported database types are MySQL, Oracle, Postgres, MS SQL Server, Access, SQLite and H2. The driver for the DBMS is automatically loaded by DP5.
	Connection URL	The connection URL used to connect to the database. Each DBMS has a different format and the example beneath the text box changes to represent an example format for the URL. This needs to be adapted for the parameters which typically include the address of the server, the port of the server, and the schema of the database.
	Username	The username used to access the database. It is stored in an encrypted format by DP5.
	Password	The password used to access the database. It is stored in an encrypted format by DP5.
	Test connection	Once the options have been filled you can test the execution by clicking this button and executing the SQL. A notification of the results of the error reported by connection is then displayed.

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Tab	Setting	Description
Script	Editor	Defines the SQL script that is executed after each scan. The SQL script is populated with values represented by tokens; the population is via a parametrized query which stops any accidentally SQL injection problems. This dialog has separate sections for the rack script and tube script. The rack script is executed after the rack has been scanned just once for the rack and the tube script is executed after this for each tube scanned; it is possible to select if the tube script is executed on tubes which are either registered as empty or in error from a decode result. As detailed an SQL script can be entered with tokens being replaced in the SQL script. The available tokens are: • CONTAINER-UID – the unique id of the container as a string. • CONTAINER-NAME – the name of the container as a string. • CONTAINER-ID – the id of the container as read by the container id reader as a string. • NUM-ROWS – the number of rows in the container as an integer. • NUM-COLS – the number of columns in the container as an integer. • TUBE-ROW – the row of the container as an integer. • TUBE-COLUMN – the column of the container as an integer. • TUBE-BARCODE – the barcode of the tube as a string. • TUBE-STATUS – the barcode decode status of the tube as a string, possible values are SUCCESS, ERROR, EMPTY and TIMEOUT. • SCAN-TIME – the date/time of the scan as a datetime object. • SCAN-RACK-UUID – a unique id generated for each rack scanned as a string. • SCAN-TUBE-UUID - a unique id generated for each tube scanned as a string. • STA:<short-question>:SHORT – the short question for a scan time question with <short-question> representing the short question to identify the correct scan time question. • STA:<short-question>:FULL – the full question for a scan time question with <short-question> representing the short question to identify the correct scan time question. • STA:<short-question>:ANSWER – the answer for a scan time question with <short-question> representing the short question to identify the correct scan time question. • When using RITrack, the option to add RITrack data is available. The SQL tokens are as follows: ◦ RITRACK_CONTAINER_ID – the container barcode stored in the RITrack tag as a string. ◦ RITRACK_SCAN_TUBE_UUID – the unique id stored for each RITrack tube stored in the RITrack tag. ◦ RITRACK_TUBE_BARCODE– the unique id

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Tab	Setting	Description

		stored for each RITrack tube stored in the RITrack tag.
		◦ RITRACK_TUBE_ROW – the row of the container as an integer stored in RITrack tag.
		◦ RITRACK_TUBE_COLUMN – the column of the container as an integer stored in RITrack tag.
		◦ RITRACK_CUSTOM_DATA – the custom data stored for each tube in RITrack tag as string.
		
		To place a tag in an SQL script enclose it with the '@' character, e.g.:
		`INSERT INTO Rack (TUBE_ID, RACK_ID, ROW, COL, BARCODE) values (@SCAN-TUBE-UUID@, @ SCAN-RACK-UUID@, @ROW@, @COL@, @TUBE-BARCODE@);`
		As an example, this would then be resolved to:
		`INSERT INTO Rack (TUBE_ID, RACK_ID, ROW, COL, BARCODE) values ?,?,?,?,?); : 'E495AE18-39F3-431F-B314-C88822F73048', '66AD49F4-3EA2-4419-8632-18AD41675328', 2, 4, 'ZI579874'`
		NOTE: *Note that it is also possible to upload the scripts from an external file should this be desired.*

	Run Rack Tube and Script	Allows the SQL statements to be populated and viewed after the scripts have been created ***NOTE:*** *This can be executed against the DBMS for testing.*
	Process Empty Tubes	Processes the tube SQL script against tubes where a tube barcode was not detected.
	Process Error Tubes	Processes the tube SQL script against tubes where a tube barcode was detected but the barcode could not be read.
	Revert Rack Script	Replaces the contents of the SQL editor with the previous saved version of the rack script.
	Revert Tube Script	Replaces the contents of the SQL editor with the previous saved version of the tube script.

Others > RITrack

Button/Field	Description
Export on read	Selects to export the scan data into the RITrack tag and under which circumstances. Select the relevant radio button.

Others > URL Webhook

This option sends the export to another application that is using a REST API.

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Button/Field	Description
Export on read	Whether to export a webhook file on scanning and under which circumstances. Select the relevant radio button.
Select the type	The type of export.
URL	The URL to send with a POST.
Test URL Connection	Click this button to test the webhook functions correctly.

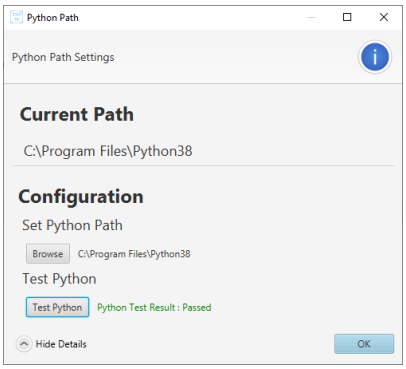
Others > Python

This option is only available in DP5 Network. It allows the results of the scan to be placed in a Python script and the script executed.

Tab	Button/Field	Description
Options	Export on read	Whether to export a Python file on scanning and under which circumstances. Select the relevant radio button.

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Tab	Button/Field	Description
Script	Editor	The version of Python used is 3.8. If NumPy is installed, the version must be version 1.8 or higher. The following instructions assume a good level of knowledge of Python. 1. Install Python version 3.8, if it is not installed. 2. To communicate to Python, a JEP library is used. Details of this can be found at https://github.com/ninia/jep. To install, copy from the resources directory within DP5 to your python site-packages directory. ***NOTE:*** *When using the JEP, the jep.dll is included and referenced with DP5 so there is no need to reference it from your code.* 3. DP5 needs to know where Python 3 is installed. This can be done in several ways with the top item taking priority: ◦ If the Python path is defined using a command line switch of -p or --python-path, this is used as the python path. ***NOTE:*** *This will permanently override the value stored in settings.* ◦ The Python path is read from the settings. This can be set with a systray icon or by passing in the path in the command line the first time DP5 is run.  ◦ If the PYTHONPATH variable is set, this is used and stored in the settings until overridden by one of the above methods. This allows the Python setup to execute. There may be errors which could be related to external C libraries on

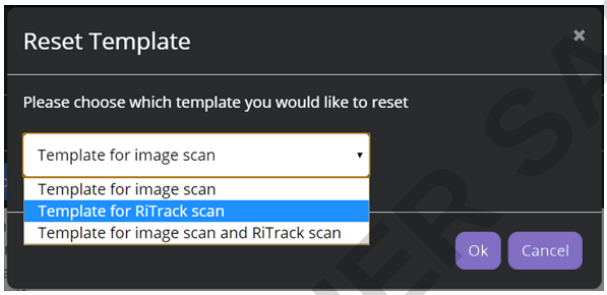
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Tab	Button/Field	Description
		Windows which could require the installation of the VC++ Redistributable library. If you have difficulties with the DP5 -to-Python link being established, contact Azenta at support@Azenta.com. After a scan is completed, DP5 starts a Python VM and load certain objects into the global namespace. These are as follows: • container_id – a string object representing the container id as read by the container id reader. • container_name – a string representing the container's name. • container_uid – a string object representing the container's unique id. • scan_time – a datetime object representing the time and date of the scan. • scan_id – an id automatically created on each scan which is unique. • scan_time_answers – a dictionary which contains key value pairs as follows: ◦ key – the short name of the question ◦ value – a dictionary with the following values ▪ short – the short question for the scan time as a string. ▪ full – the full question for the scan time as a string. ▪ answer – the answer to the scan time as a string. • orientation_barcodes – a list which contains the scanned orientation barcodes as string objects. • tube_barcodes – a two-dimensional list of the scanned barcodes in the format of [row][col]. • tube_status – a two-dimensional list of the scanned barcode status in the format of [row][col]; possible values are SUCCESS, ERROR, EMPTY and TIMEOUT. As the standard installed Python is used, any packages in site-libs installed by a system such as pip can be referenced from this script. If using RITrack, the option to add RITrack data is available (by default, DP5 uses the image only export). However, RITrack data can be added to the Python export by clicking the **Reset original** button and selecting a RITrack option. • ritrack_tube_barcodes – a two-dimensional list of the RITrack tube barcodes in the format of [row][col]. • ritrack_container_id – the container id stored in the RITrack tag. • ritrack_custom_data – the custom data stored each tube in the RITrack tag.

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Tab	Button/Field	Description
	Test script	Executes the script.
	Reset original	Restores the sample script. If using RITrack, select the relevant option from the drop-down list. 

Others > Email

This option is only available in DP5 Network. It allows the scan results to be sent to an email recipient.

Tab	Setting	Description
Options	Export on read	Whether to send an email on scanning and under which circumstances. Select the relevant radio button.
Export Format	To	The recipient's email address.
	Cc	The recipient to carbon copy into the email.
	Bcc	The recipient to blind carbon copy into the email.
	Attach Excel/PDF/XML/CSV/JSON/text	Whether to attach each of the available formats.
Email Template	Editor	Contains the email text content. As with the text exporter, this uses FreeMarker to populate the email content. Please refer to the text export section for further details of the FreeMarker setup in DP5.
	Test template	Tests the template.
	Reset template	Resets the template to the default.
	Upload external file	Allows you to import a template by clicking the **Choose file** button.

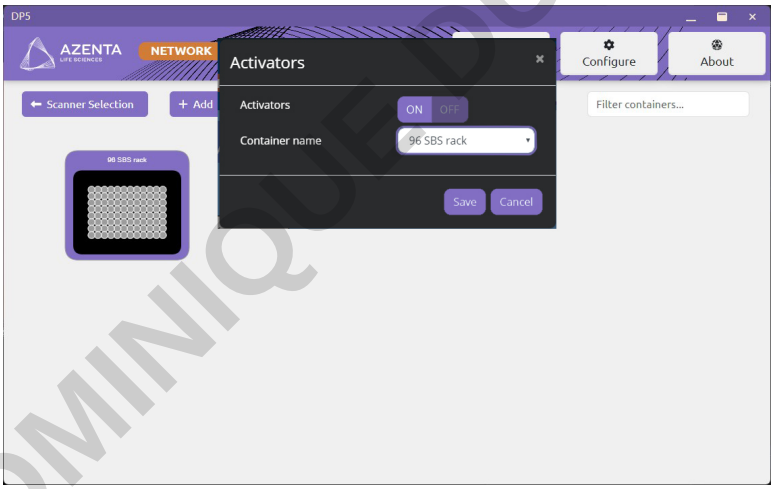
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Tab	Setting	Description
Email Server Settings	Server	The email server used to send email.
	Port	The port of the server.
	Username	The username used to log into the email server.
	Password	The password used to log into the email server. It is stored in an encrypted format.
	Use TLS	This is related to encryption. If it is not known if this is needed, consult the documentation from the organization that provides the email server.
	Test connection	Sends a test email.

Activators

The activator is only available when the Azenta 1DR2 Reader is plugged in. If the activator is enabled, and a user places a rack on the scanner device with a barcode facing the Azenta 1DR2 Reader, the device automatically scans the configured container. The method of identifying the container which has been previously selected is still used to identify the container.

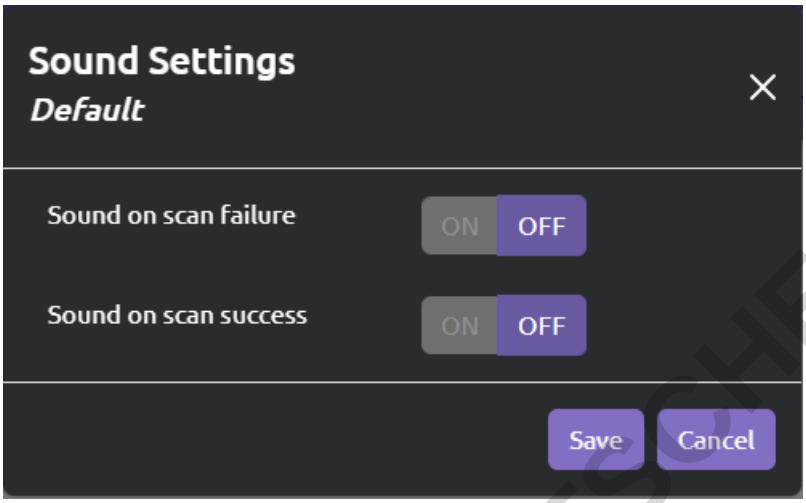


Setting	Description
Activators	Whether the activator is enabled.
Container name	The container to scan when the activator is triggered.

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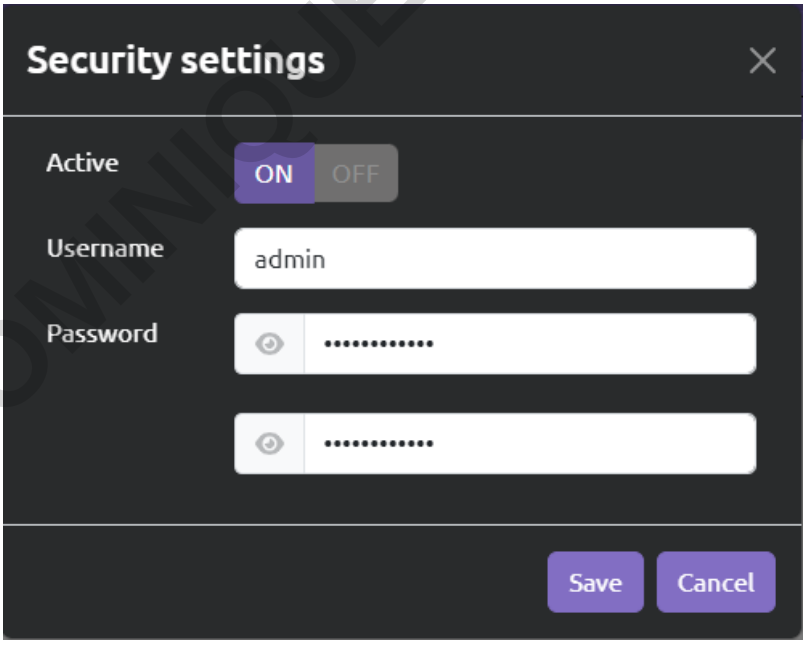
Sound

DP5 can be configured to play a sound when a scan is completed. The system can play a different sound according to a successful scan or a failed scan where at least one barcode was detected and could not be decoded.



Security

The security system, when activated, locks the settings unless an administrator has logged in. This is a light security level designed to stop unwanted tampering.



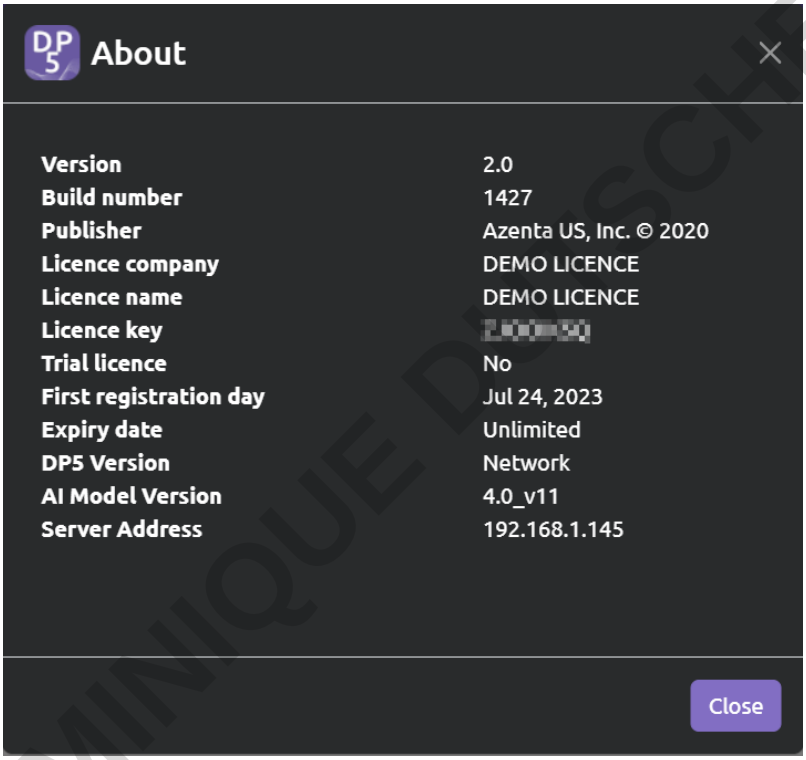
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Setting	Description
Active	If activated, the settings will be locked for all future users after the administrator has logged out.
Username	The username to use for administrator access.
Password	The password to use for administrator access. If the password is unchanged, the eye icon is disabled and the existing password is not visible – this is because the password is not stored inside DP5 for best security practices.

About

The About screen displays the software information.



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4. Operation

DP5 can be operated in several modes:

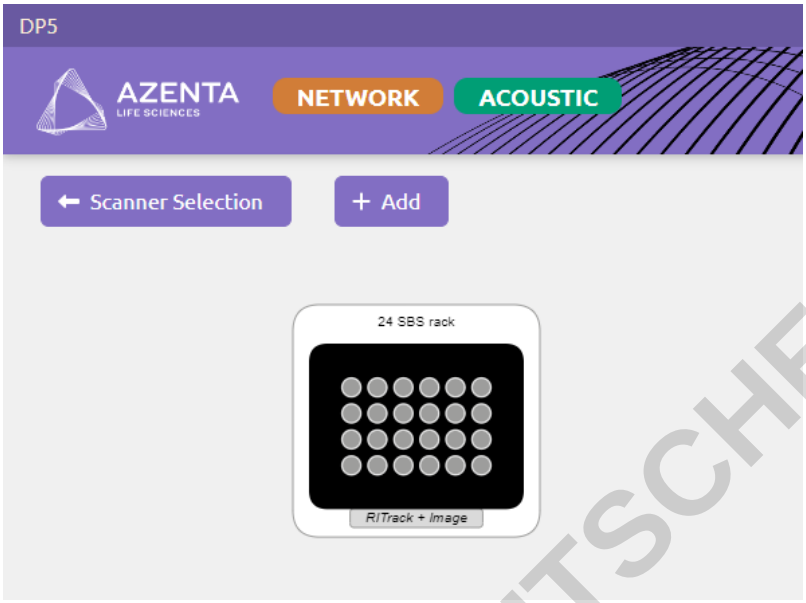
- DP5 Application – this is a typical desktop program which can be run on a Windows or Linux PC to control the scanner. This can be operated via the shortcut DP5.
- DP5 Headless – this is an operation that allows DP5 and the scanner to be operated without a user interface via a programming API. This can be operated via a program installed with DP5 called dp5Headless. A shortcut is not installed with DP5 to avoid confusion.
- DP5 Browser – when a DP5 headless server is running with a DP5 Network licence; you can connect to the DP5 Network by opening a web browser and navigating to `http://[DP5_IP_SERVER_ADDRESS]:8777/` or, if running in the local machine, navigating to `http://localhost:8777/`
- DP5 Mobile – this allows you to control the scanners from a mobile/cell phone. Both Android and iOS are supported.

  NOTE: *This is only available on DP5 Network.*

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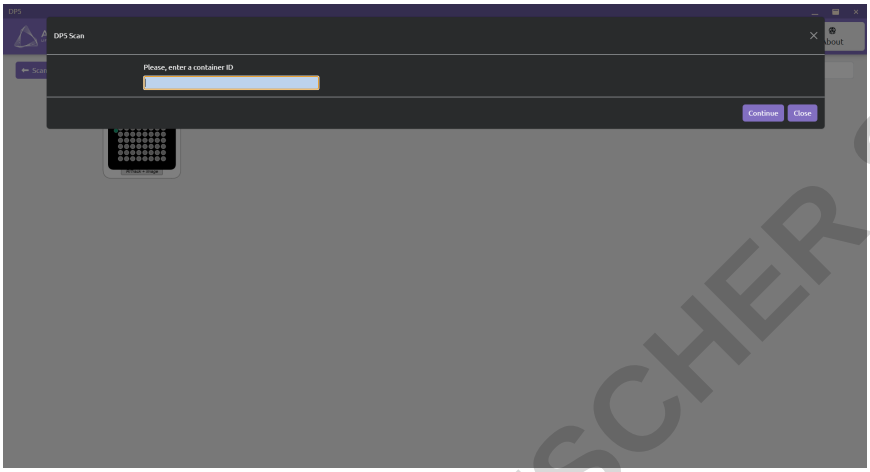
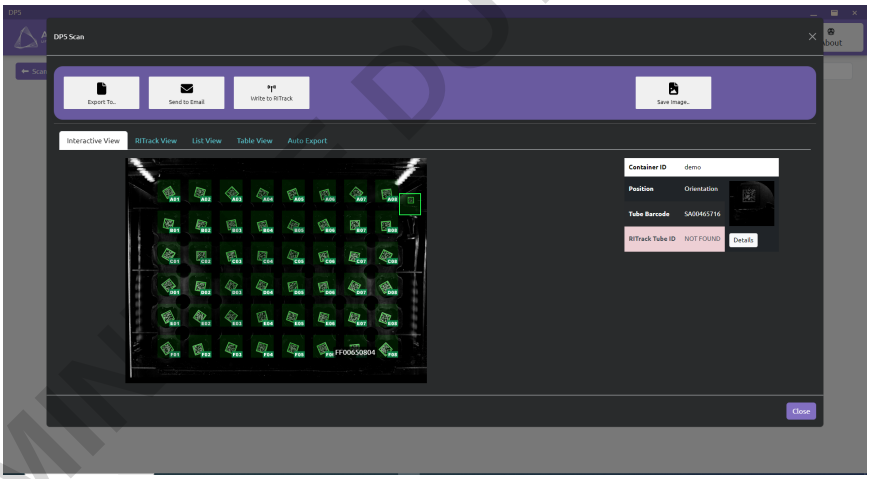
Operating a Scanner

When in a scanner operation screen with a configured rack, the following screen is displayed.



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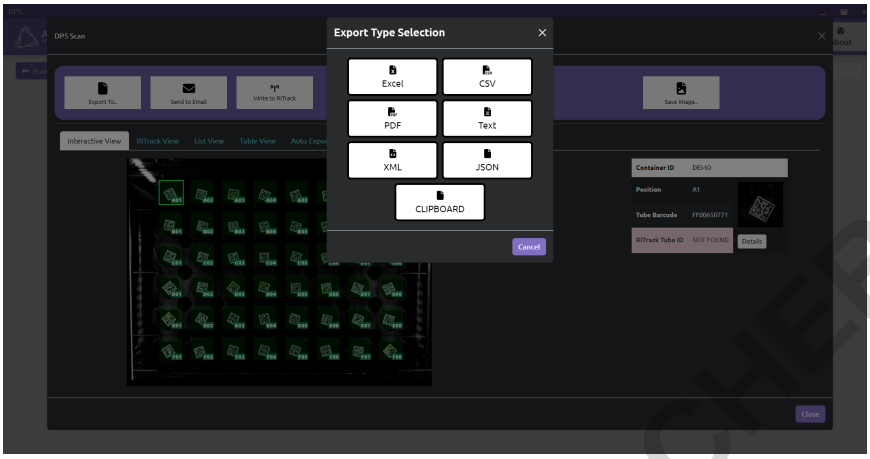
Step	Action
1.	To scan a rack, click on the image of the relevant container. ***NOTE:*** *If the Container ID is set to EXTERNAL, the following dialog is displayed. Enter the container ID and click* ***Continue****.*  The scanner then scans the rack and the following window is then displayed. 
2.	Refer to the following sections to view and manage the scan results.

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Exporting the Scan

Clicking the **Export to** button displays the *Export Type Selection* window, which allows the results to be exported into a specified format.



See "Export" on page 34.

Emailing the Scan

Clicking the **Send to Email** button to email the scan.

> ***NOTE:*** This option is only available with a DP5 Network licence.

See "Others > Email" on page 49.

Saving the Scanned Image

Clicking the **Save image** button allows for the scanned image to be saved. There are two formats:

- Annotated – contains details of the code scan result
- Raw – the image captured directly from the scanner.

NOTE: *Should decoding be difficult for a rack, you can send this raw image to support@Azenta.com for advice.*

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Viewing Scan Details in Different Formats

Select from one of the following tabs to view data in the preferred format:

- Interactive View
- List View
- Table View
- RITrack View - see "RITrack View" on page 60
- Auto Export

Interactive, List or Table View

Status Codes

The image in the *Interactive View* shows the decode status of each tube.

Color	Status	Notes
Green	Decoded	A code has been detected and decoded.
Red	Error	A code has been detected but not decoded. This is typically due to ice or a damaged code.
Gray	Empty	A code has not been detected.
Yellow	Timed out	The scan timed out. This only occurs if timeouts are enabled in Scan settings. See "Scan" on page 30.
	Mismatched data	The scan data and RITrack data do not match.

Tube Selection

Selecting a tube displays the following details:

- Tube Details – shows the details of the tube including the decode image, the container ID, the well reference, and the tube barcode.

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List View

This *List View* shows the scanned data in a simplified list. The information shown in the list is the well reference, the tube barcode, the container ID, the row, and the column.

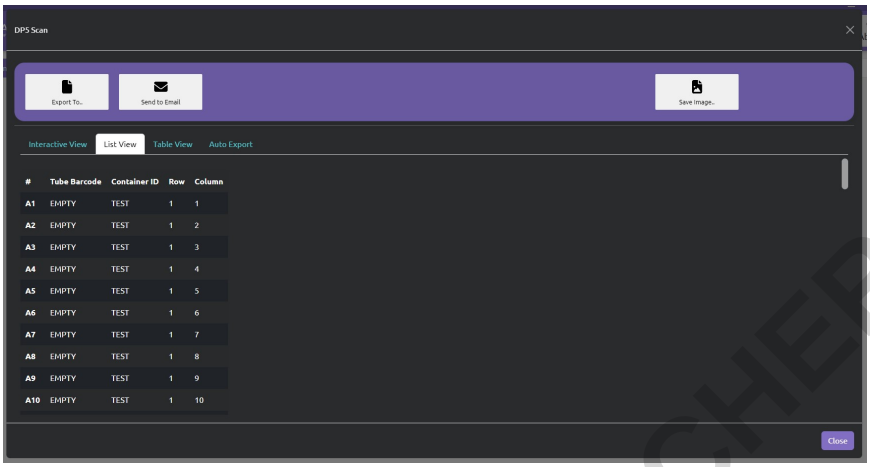
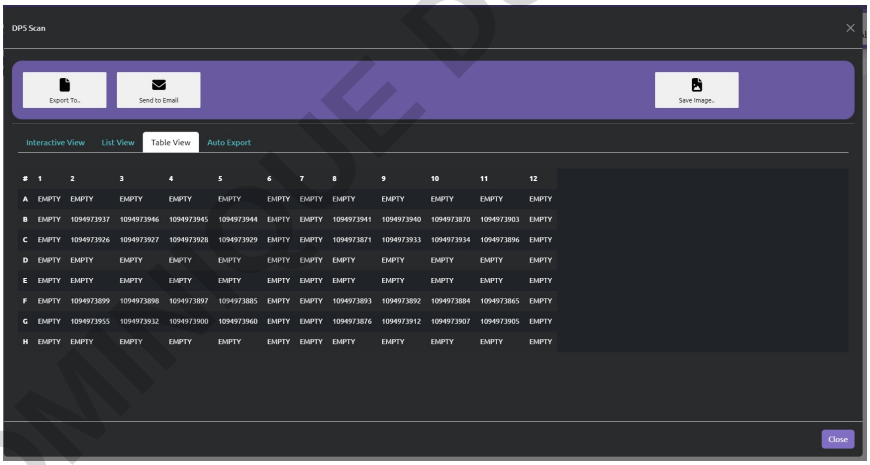


Table View

The Table View shows the scanned data in a table that resembles the layout of the scanned box.

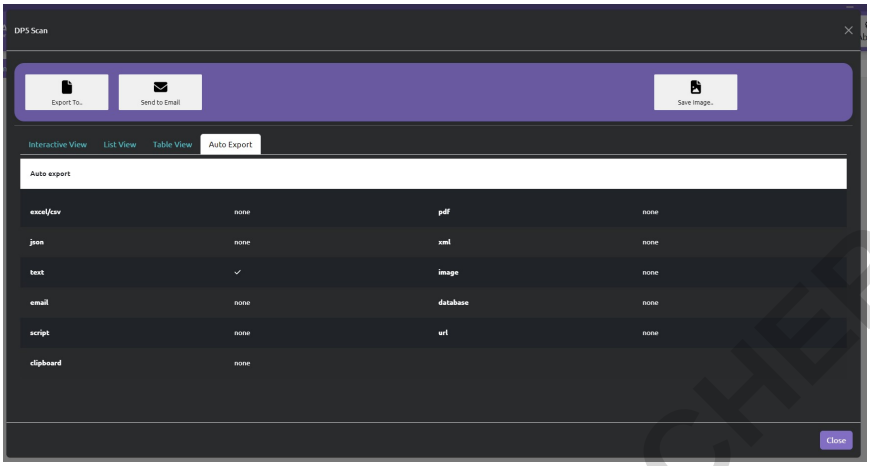


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Auto Export

The Auto Export tab shows the file types that are selected to auto export on read as determined by the Export Settings, see "Export" on page 34.



Additional Features for RITrack

The following features are also available to RITrack users:

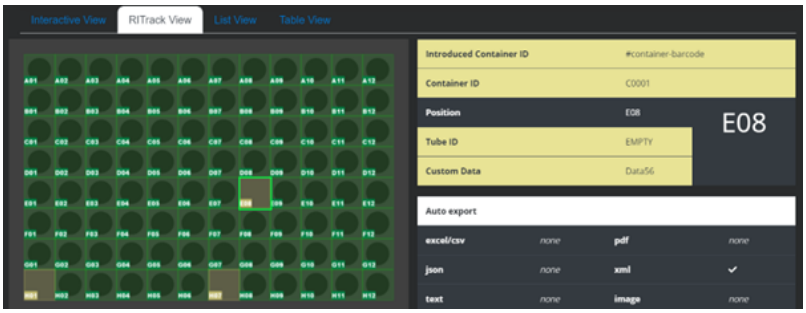
- Interactive View - image and RITrack data is displayed, highlighting any mismatched container ID or tube barcode data in yellow.
- List View - displays extra columns when there is RITrack data.
- Table View - highlights cells with mismatched data between image and RITrack in yellow.

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RITrack View

If the RITrack View tab is selected, the RITrack data is displayed.



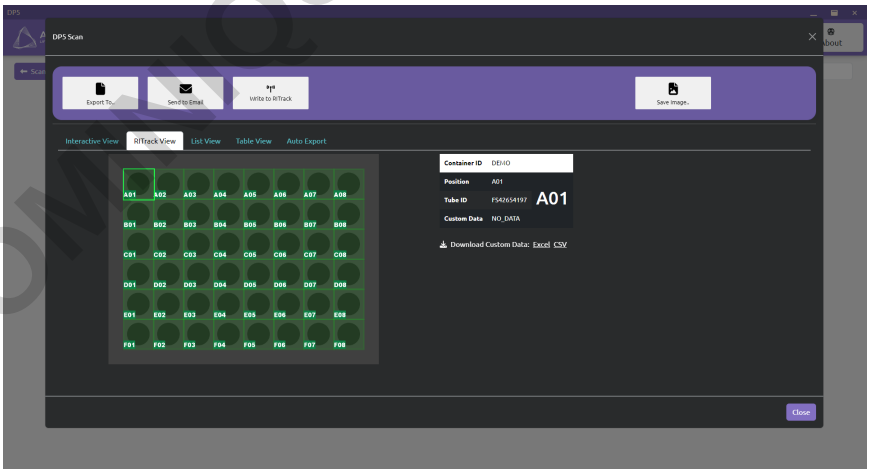
In this view, all locations are displayed. If a square is green, the data is available, and if yellow, the barcode retrieved from the image does not match the data on the RITrack tag. This can be corrected in an export (see "Export" on page 34).

NOTE: Additional export options are available for both manual and automatic operation.

Container ID

If an Azenta linear scanner is attached, the result from the linear reader are displayed on the Container ID tab.

NOTE: The image is tilted and this is expected as this is part of the operation of the linear scanner.

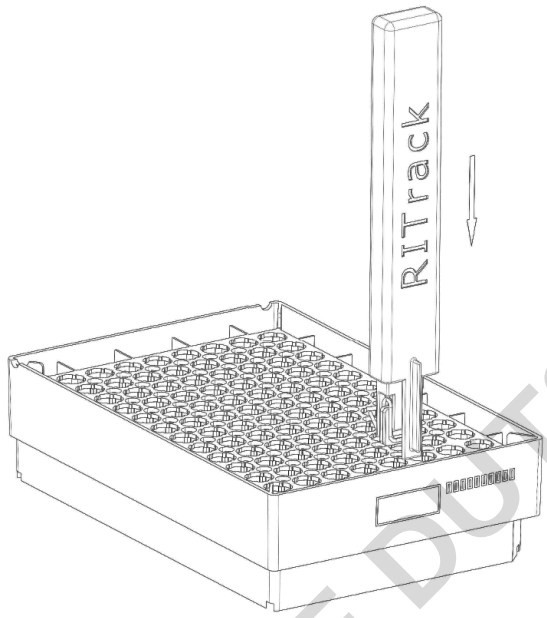


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Operating the RITrack

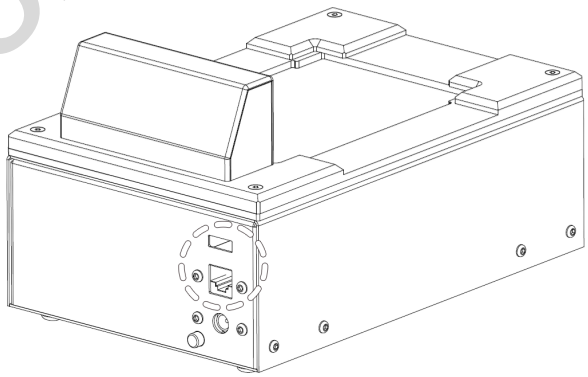
Overview

The RITrack system allows the insertion of a RITrack tag into an existing rack using the insertion tool, onto which data on the tubes in the rack can be stored.



The RITrack tag is resistant to LN_2 (vapor phase only), large temperature changes, and beta irradiation. In addition to the barcode, each tube can have up to 20 characters including the barcode, so if a standard Azenta tube is used (which has 12 characters), eight can be used for custom data. Once a rack has the RITrack tag inserted it, can be read with the use of an adapted RITrack Mirage.

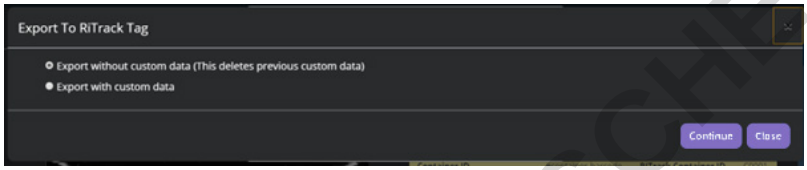
If the RITrack Mirage is to be connected directly to the PC, an RJ45 cable is connected to the scanner and an adapter is connected between the cable and PC to enable a USB connection. Should the scanner need to be communicated to over a LAN, it can be connected to a network wall socket.



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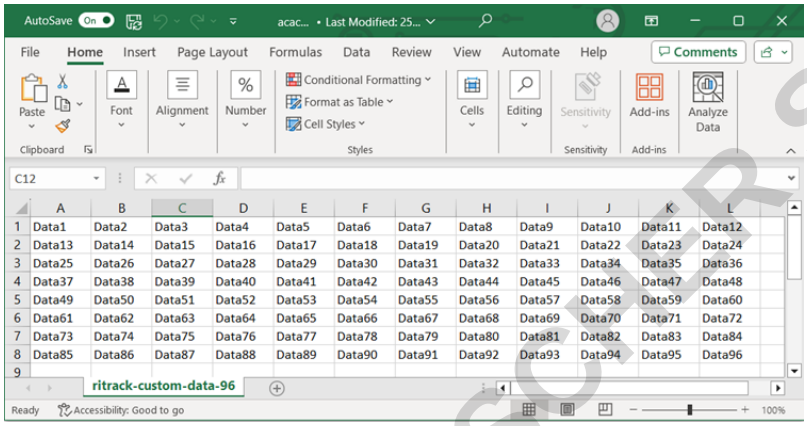
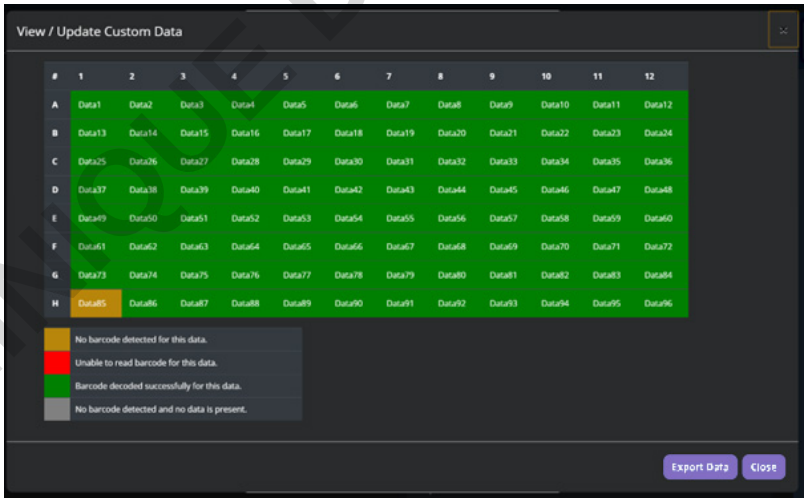
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Manual RITrack Export

Step	Action
1.	When an image scan is performed on a RITrack scanner with a RITrack tag, click the **Export to RITrack** button.  The following window is displayed. 
2.	Select the relevant radio button. If *Export without custom data* is selected, the barcodes read form the image data are exported. If there is no image scan the same barcodes read from the tag are loaded onto the tag. If *Export with custom data* is selected, additional data can be added to the tag.

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Step	Action
3.	If *Export without custom data* was selected, click **Continue** to export the file. If the *Export with custom data* radio button was selected: a. Click the **Browse** button b. Select the relevant Excel or CSV file with data in a table as shown below.  c. Click **Open**. d. Click the **Import** button. The import is then carried out. and the following window is displayed.  The colors shown are in the scan result view and in addition, each cell can be edited to update the data in that cell. Once the correct data is known the user can select export data to update the data on the tag.

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Operating the Remote Control

DP5 comes with a remote control interface to allow for operation via other systems such as robotic platforms and/or LIMS. In keeping with modern practices, DP5 uses a RESTful API to allow for interaction with DP5 Standard and Network. The RESTful API can be communicated via http (default port is 8777) or https (default port is 8778).

NOTE: In DP5 Standard and DP5 Network the SSL certificate for https is self signed.

To start the DP5 in a headless environment, run the *dp5-headless.exe* file included with DP5 in the resources/dp5-server folder. This does not have a shortcut installed to avoid confusion. This should be started to allow for remote control. Once started, this will run a web-server that listens for commands on port 8777.

Command Line Options

The following options can be used:

- server.port – this sets the https port that DP5 will listen to for all requests including operation (network only) and remote access. Default value is 8777.
- http.port – this sets the http port that DP5 will listen to for all requests including operation (network only) and remote access. Default value is 8778.

Typical Operations

The following steps would typically be taken by an external system controlled by DP5.

Step	Action
1.	Start the *dp5-headless.exe* program.
2.	Every second, execute a RESTful call to get the DP5 status. If it is successful and has the status of IDLE, the server has started. An example of this is {{protocol}}://{{host}}:{{port}}/d-p5/remote/v1/system/status.
3.	Each container is recognised by the unique id (uid); this is used to trigger a scan. The scan is then executed by the ScanRack RESTful call. An example of which is {{protocol}}://{{host}}:{{port}}/d-p5/remote/v1/scan?container_uid=mirage96sbs. This will return the scan results in a JSON format.

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RESTful API

This is described using swagger. You can visit the swagger page by visiting the URL `http://[DP5_IP_ADDRESS]:8777/swagger-ui.html`.

Alternatively, you can access to the OpenAPI Specification V3 documents that can be accessed as JSON or YAML.

- JSON: http://[DP5_IP_ADDRESS]:8777/v3/api-docs
- YAML: http://[DP5_IP_ADDRESS]:8777/v3/api-docs.yaml

Code/Platform	Description
Python	Example code to access the DP5 server and execute a scan is available from https://-github.com/ZiathLtd/DP5RemotePython.
.NET Core	Example code to access the DP5 server and execute a scan is available from https://-github.com/ZiathLtd/DP5RemoteNet.
Java	Example code to access the DP5 server and execute a scan is available from https://-github.com/ZiathLtd/DP5RemoteJava.
Postman	Postman collections to access the DP5 server and execute a scan is available from https://-github.com/ZiathLtd/DP5RemotePostmanJson.git.

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5. Troubleshooting

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Assigning IPv4 Address to Scanner in Linux Systems

Problem

In Linux systems, when a scanner is connected via RJ45 (Ethernet) with USB, sometimes it is not identified by DP5. This occurs because the scanner is automatically assigned an IPv6 address, whereas DP5 requires an IPv4 address for communication.

Diagnosis

This is a known issue where the device defaults to an IPv6 address upon connection. To resolve it, we need to configure the system to assign an IPv4 address to the scanner. Follow the steps below to address the issue using Network Manager for a Debian-based Linux PC.

Resolution

If it is a different Linux machine, please use a similar approach to resolve the issue.

1. Verify if the Device is allocated IPv6/IPv4 address.

2. Use a way to force the Device to use IPv4 address.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1.</td><td>
Verify the device IP address
Use the following command to check the current state of the device:
<pre>ip a</pre>
Look for the interface related to your scanner (commonly enx..., eth0, or usb0).
Examples of lines are:
<pre>inet6 fe80::1234:abcd:ef01:2345/64 scope link

----

inet 192.168.1.100/24 brd 192.168.1.255 scope global dynamic eth0</pre>
NOTE: If only inet6 is listed and no inet (IPv4), the scanner is not using IPv4.
</td></tr>
<tr><td>2.</td><td>
Force IPv4 Assignment via Network Manager CLI Tool
a. List the devices:
<pre>nmcli device</pre>
Identify your scanner's interface (e.g., enx123456789abc).
b. List all Network Profiles:
<pre>nmcli con show</pre>
Example Output:
<table>
<tr><th>Name</th><th>UUID</th><th>TYPE</th><th>DEVICE</th></tr>
<tr><td>Wired connection 2</td><td>abc12345-6789-0123-4567-890abcdef012</td><td>ethernet</td><td>enx123456789abc</td></tr>
</table>
c. Delete Default Profiles
Delete the unwanted Wired connection 2 profile (If it is created for the above scanner):
<pre>nmcli con delete "Wired connection 2"</pre>
</td></tr>
</table>

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Step	Action

3.	**Prevent Automatic Profile Creation**
	a. Edit NetworkManager Configuration:
	To stop NetworkManager from creating default profiles for the scanner, edit the configuration file:
	`sudo nano /etc/NetworkManager/NetworkManager.conf`
	Add or modify the [main] section to include:
	`[main]plugins=ifupdown,keyfile no-auto-default= enx123456789abc`
	b. Restart the NetworkManager
	Apply the changes by restarting the NetworkManager service:
	`sudo systemctl restart NetworkManager`

4.	**Create and Apply a Custom Profile**
	a. Create a Profile:
	Create a custom profile generic to all scanners:
	`nmcli con add type ethernet con-name "custom_ipv4_profile"`
	b. Modify the profile
	Configure the profile to:
	Use IPv4 Link Local Addressing
	Disable IPv6
	`nmcli con modify custom_ipv4_profile ipv4.method link-local`
	`nmcli con modify custom_ipv4_profile ipv6.method ignore`
	`nmcli con modify custom_ipv4_profile connection.autoconnect yes`
	c. Activate the Profile
	Manually activate the profile for the device:
	`nmcli con up custom_ipv4_profile ifname enx123456789abc`

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Step	Action

5.	**Verify Configuration**
	a. Check the Device Status:
	`nmcli device status`
	Ensure the device is using the 'custom_ipv4_profile'.
	b. Check the assigned IP address:
	`ip addr show enx123456789abc`
	Confirm that the device has an IPv4 Link Local address (e.g., 192.168.x.x) and no IPv6 address.

Running DP5 2.0 Requires Java 21 or Later

Problem

To run DP5 2.0 on a Linux PC, the user must have Java 21 or later installed globally. Alternatively, the user can create an environment variable DP5_JAVA pointing to the Java 21 binary path.

Diagnosis

This issue arises when the system does not have the required version of Java, causing DP5 2.0 to fail during startup.

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Resolution

Follow the steps for Debian Based Linux-PC to install Java-21 or later, if it is a different Linux machine, please use a similar approach to resolve the issue.

Option 1: Install Java 21 or later Globally

Step	Action
1.	Update the system's package index: `bash sudo apt update`
2.	Install OpenJDK 21: `bash sudo apt install openjdk-21-jdk`
3.	Verify the installation: `bash java -version`

Expected Output:

```
plaintext openjdk version "21" 2025-01-16 OpenJDK Runtime Environment (build 21+35-2564)

OpenJDK 64-Bit Server VM (build 21+35-2564, mixed mode)
```

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Option 2: Use DP5_JAVA Environment Variable

Step	Action
1.	Download and extract Java 21 to a desired location.
2.	Set the DP5_JAVA environment variable to point to the Java 21 binary: `bash export DP5_JAVA=/path/to/java-21/bin/java`

3.	Add the variable to your shell configuration file for persistence (e.g., `.bashrc` or `.zshrc`):
	`bash echo 'export DP5_JAVA=/path/to/java-21/bin/java' >> ~/.bashrc`
	`source ~/.bashrc`

4.	Verify the variable is set: `bash echo $DP5_JAVA`

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6. Appendices

This section contains additional information for DP5.

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Appendix A: Date and Time Format

For the purposes of formatting dates and times there is a specific pattern which is used by FreeMarker. The pattern is a series of characters which represent the date format. The available characters are as follows:

Letter	Date or Time Component	Presentation	Examples
G	Era designator	Text	AD
Y	Year	Year	1996; 96
M	Month in year	Month	July; Jul; VII; 07; 7
W	Week in year	Number	27
W	Week in month	Number	2
D	Day in year	Number	189
D	Day in month	Number	10
F	Day of week in month	Number	2
E	Day in week	Text	Tuesday; Tue
A	Am/pm marker	Text	PM
H	Hour in day (0-23)	Number	0
K	Hour in day (1-24)	Number	24
K	Hour in am/pm (0-11)	Number	0
h	Hour in am/pm (1-12)	Number	12
m	Minute in hour	Number	30
s	Second in minute	Number	55
S	Millisecond	Number	970
z	Time zone	General time zone	Pacific Standard Time; PST; GMT-08:00
Z	Time zone	RFC 822 time zone	-800
'	Escape for text/id	Delimiter	(none)
''	Single quote	Literal	'

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Appendix B: Text Export Template Information

Adding a Title

To add an extra line at the top of the export format, alter the template as follows:

```
Scan from DP5

Date,ContainerId,Row,Column,TubeBarcode

<#list 1..numRows as row>

<#list 1..numColumns as col>

${scanDate?datetime},${containerId},${row},${col},${container.getDecodeResult(row,-
col).barcode}

</#list>

</#list>
```

This will now export:

```
Scan from DP5

Date,ContainerBarcode,Row,Column,TubeBarcode

2022-09-13 13:33:22,BARCODE1,1,1,TUBE-BARCODE-1:1

2022-09-13 13:33:22,BARCODE1,1,2,TUBE-BARCODE-1:2

2022-09-13 13:33:22,BARCODE1,1,3,TUBE-BARCODE-1:3

2022-09-13 13:33:22,BARCODE1,1,4,TUBE-BARCODE-1:4

…
```

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Change Text in Line

To change the lines for the tube barcodes, alter the template as follows:

```
Date,ContainerId,Row,Column,TubeBarcode

<#list 1..numRows as row>

<#list 1..numColumns as col>

-XX ${scanDate?datetime},${containerId},${row},${col},${container.getDecodeResult(row,-
col).barcode}

</#list>

</#list>
```

This will now export:

```
Date,ContainerBarcode,Row,Column,TubeBarcode

-XX 2022-09-13 13:33:22,BARCODE1,1,1,TUBE-BARCODE-1:1

-XX 2022-09-13 13:33:22,BARCODE1,1,2,TUBE-BARCODE-1:2

-XX 2022-09-13 13:33:22,BARCODE1,1,3,TUBE-BARCODE-1:3

-XX 2022-09-13 13:33:22,BARCODE1,1,4,TUBE-BARCODE-1:4

...
```

Additional Information

The template system is flexible and there are extensive instructions available on the FreeMarker website (https://freemarker.apache.org/). Should a custom format be needed, Azenta can help configure FreeMarker. Send the desired format to support@Azenta.com. If you want to create a custom format yourself, see the following instructions.

When a scan is executed, the following information is put into the FreeMarker space.

Data	Description
scanDate	This is a Date object type which contains the date and time of the scan.
containerId	This is a String object which contains the id of the container as captured by the configured container id method.
orientationBarcode	This is the orientation barcode; currently this returns a list of string representing the barcodes. Therefore, to return the scanned code the first element of the list needs to be returned; this is done in case multiple orientationBarcodes are scanned in the future. An example of this is ${orientationBarcodes[0]} which will retrieve the first element.

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Data	Description
container	This represents the container scanned; it is a complicated structure with many parameters; some are listed below:
exportModel	This represents the entire export data; it is a complicated object with the following methods: • getContainer() – this is the container referenced above • getContainerId() – this is the container id as populated by the container id reader • getContainerUid() – this the unique identifier of the container • getContainerGuid() – this is an automatically generated and uneditable unique identifier for the container. This is different from the Uid in that it cannot be set by the user • getOrientationBarcodes() – this is the list of decoded orientation barcodes as DecodeResults which themselves contain the following methods: ◦ getBarcode() – the decoded barcode ◦ getBoundingBox() – a list of points in the image where the barcode is located ◦ getDecodeStatus() – the decode outcome, either SUCCESS, ERROR or EMPTY ◦ getLocationData().getLocation() – this returns a complex object with the following methods ▪ getRow() – returns the row of the tube in the rack (this is -1 for an orientation code) ▪ getColumn() – returns the column of the tube in the rack (this is -1 for an orientation code) • getScanId() – this is a unique code that is generated for every single scan • getScanTime() – this is the date/time of the scan in a Date object as defined in FreeMarker • getTubeBarcodes() – this returns the tubes in the format of the decode result as shown in the getOrientationBarcodes()
containerUid	This is a string representing the uid of the container which was scanned.
containerName	This is the name of the container which was scanned.
numRows	This is a number representing the number of rows in the scanned rack.
numColumns	This is a number representing the number of columns in the scanned rack.

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Command Line Options

The following table outlines the available options when DP5 is run from the command line.

Short Form	Long Form	Is Params required after this command	Description
x	Autoclose	None	This is used to run the system and shut it down again - only needed to generate archive on first run.
d	dev	false	Start in dev mode.
u	unregister	false	Unregister.
r	full-register	false	Register a full licence.
t	trial-register	false	Register a trial licence.
n	registration-name	true	The name to register the licence under.
m	registration-email	true	The email to register the licence under.
o	registration-company	true	The company to register the licence under.
k	licence-key	true	The licence key to register the licence under; not needed if registered a trial licence.
p	python-path	true	The path to the python install.
e	export-format	true	The export format with values excel|text|xml|json.
f	ExportFile	true	The export file to use,if not provided ouput will be written to console/stdout.
b	container-barcode	true	The barcode of container, if container barcode scanner is present.
i	defaultExportDirectory	true	The default export directory to use.
c	container-uid	true	The UID of Container Group.
v	verbose	false	The Verbose option, If specified DP5 will post logs sysouts.
z	one-time-execution	false	This option specifies the app with just execute a scan and then shutdown.
h	defaultExportFile	true	The default export file to use.
l	loggerLevel	true	The log level.

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Appendix C: XML Schema for XML Output

```
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified" xmlns:x-
s="http://www.w3.org/2001/XMLSchema">

  <xs:element name="scanContainer" minOccurs="1" maxOccurs=”1”>

    <xs:complexType>

      <xs:sequence>

        <xs:element name="orientationBarcodes" minOccurs="0" maxOccurs=”1”>

          <xs:complexType>

            <xs:sequence>

              <xs:element name="orientationBarcode" minOccurs="1">

                <xs:complexType>

                  <xs:simpleContent>

                    <xs:extension base="xs:string">

                      <xs:attribute type="xs:byte" name="row"/>

                      <xs:attribute type="xs:byte" name="column"/>

                      <xs:attribute type="xs:string" name="barcode"/>

                      <xs:attribute type="xs:string" name="decodeStatus"/>

                      <xs:attribute type="xs:short" name="x"/>

                      <xs:attribute type="xs:short" name="y"/>

                    </xs:extension>

                  </xs:simpleContent>

                </xs:complexType>

              </xs:element>

            </xs:sequence>

          </xs:complexType>

        </xs:element>

        <xs:element type="xs:string" name="scanId" minOccurs="1" maxOccurs=”1”/>

        <xs:element name="scanTimeAnswers" minOccurs="0" maxOccurs=”1”>

          <xs:complexType>
```

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```
            <xs:sequence>
              <xs:element name="scanTimeAnswer" minOccurs="1">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element type="xs:string" name="answer"/>
                    <xs:element type="xs:string" name="fullQuestion"/>
                    <xs:element type="xs:string" name="shortQuestion"/>
                  </xs:sequence>
                </xs:complexType>
              </xs:element>
              <xs:element name="ritrackTubeBarcodes" minOccurs="0">
                 <xs:complexType>
                   <xs:sequence>
                     <xs:element name="ritrackTubeBarcode" maxOccurs="unbounded" minOc-
curs="0">
                       <xs:complexType>
                         <xs:simpleContent>
                           <xs:extension base="xs:string">
                             <xs:attribute type="xs:byte" name="row"/>
                             <xs:attribute type="xs:byte" name="column"/>
                             <xs:attribute type="xs:string" name="barcode"/>
                             <xs:attribute type="xs:string" name="data"/>
                           </xs:extension>
                         </xs:simpleContent>
                       </xs:complexType>
                     </xs:element>
                   </xs:sequence>
                 </xs:complexType>
               </xs:element>
            </xs:sequence>
```

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```
          </xs:complexType>
        </xs:element>
        <xs:element name="tubeBarcodes" minOccurs="1">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="tubeBarcode" maxOccurs="unbounded" minOccurs="0">
                <xs:complexType>
                  <xs:simpleContent>
                    <xs:extension base="xs:string">
                      <xs:attribute type="xs:byte" name="row" use="optional"/>
                      <xs:attribute type="xs:byte" name="column" use="optional"/>
                      <xs:attribute type="xs:string" name="barcode" use="optional"/>
                      <xs:attribute type="xs:string" name="decodeStatus" use="optional"/>
                      <xs:attribute type="xs:short" name="x" use="optional"/>
                      <xs:attribute type="xs:short" name="y" use="optional"/>
                    </xs:extension>
                  </xs:simpleContent>
                </xs:complexType>
              </xs:element>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
      <xs:attribute type="xs:string" name="containerId"/>
      <xs:attribute type="xs:string" name="linearType"/>
      <xs:attribute type="xs:string" name="scannerSerial"/>
      <xs:attribute type="xs:string" name="scanSource"/>
      <xs:attribute type="xs:string" name="ritrackContainerId" use=”optional”/>
      <xs:attribute type="xs:string" name="scanTime"/>
    </xs:complexType>
```

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```
  </xs:element>
</xs:schema>
```

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Appendix D: JSON Export Format Examples

Without RITrack


```
{
   "scanContainer" : {
      "containerId" : "myBarcode",
      “linearType” : “EXTERNAL”,
      "scanSource" : "IMAGE_RFID_DATA",
      "scanTime" : "20200810 170126",
      "scannerSerial" : "PROTORFID",
      "orientationBarcodes" : {
         "orientationBarcode" : [ {
            "row" : 0,
            "column" : 0,
            "barcode" : "ZIA100010342",
            "decodeStatus" : "SUCCESS",
            "x" : 2748,
            "y" : 560
         } ]
      },
      "scanId" : "da2806f0-f0d0-4b4c-9731-16432edf655b",
      "scanTimeAnswers" : {
         "scanTimeAnswer" : [ {
            "answer" : "Simon",
            "fullQuestion" : "What is your name?",
            "shortQuestion" : "name"
         } ]
      },
      "tubeBarcodes" : {
         "tubeBarcode" : [ {
```


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```
            "row" : 1,
            "column" : 1,
            "barcode" : "ZI1000950395",
            "decodeStatus" : "SUCCESS",
            "x" : 2892,
            "y" : 437
         } , {
            "row" : 1,
            "column" : 2,
            "barcode" : "ZI1000950423",
            "decodeStatus" : "SUCCESS",
            "x" : 2665,
            "y" : 437
         },
…
   {
            "row" : 8,
            "column" : 11,
            "decodeStatus" : "EMPTY",
            "x" : 617,
            "y" : 2029
         }, {
            "row" : 8,
            "column" : 12,
            "decodeStatus" : "EMPTY",
            "x" : 390,
            "y" : 2029
         } ]
      }
   }
```


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```
}
```

With RITrack

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```
{
   "scanContainer" : {
      "containerId" : "#container-barcode",
      "linearType" : "EXTERNAL",
      "ritrackContainerId" : "#container-barco",
      "scanSource" : "IMAGE_RFID_DATA",
      "scanTime" : "20231013 170357",
      "scannerSerial" : "PROTORFID",
      "orientationBarcodes" : {
         "orientationBarcode" : [ ]
      },
      "ritrackTubeBarcodes" : {
         "ritrackTubeBarcode" : [ {
            "row" : 1,
            "column" : 1,
            "barcode" : "FS52501396",
            "data" : "Data1"
         }, {
            "row" : 1,
            "column" : 2,
            "barcode" : "FS52501395",
            "data" : "Data2"
         }, {
            "row" : 1,
            "column" : 3,
            "barcode" : "FS52501380",
```


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```
            "data" : "Data3"
         },
…
{
            "row" : 8,
            "column" : 11,
            "barcode" : "FS52501309",
            "data" : "Data95"
         }, {
            "row" : 8,
            "column" : 12,
            "barcode" : "FS52501388",
            "data" : "Data96"
         } ]
      },
      "scanId" : "e90bf78f-4ea5-4921-a123-b9c1f45c4806",
      "scanTimeAnswers" : {
         "scanTimeAnswer" : [ ]
      },     "tubeBarcodes" : {
         "tubeBarcode" : [ {
            "row" : 1,
            "column" : 1,
            "barcode" : "FS52501396",
            "decodeStatus" : "SUCCESS",
            "x" : 2892,
            "y" : 437
         }, {
            "row" : 1,
            "column" : 2,
            "barcode" : "FS52501395",
```


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```
            "decodeStatus" : "SUCCESS",
            "x" : 2665,
            "y" : 437
         }, {
            "row" : 1,
            "column" : 3,
            "barcode" : "FS52501380",
            "decodeStatus" : "SUCCESS",
            "x" : 2437,
            "y" : 437
         }, {
…
{
            "row" : 8,
            "column" : 11,
            "barcode" : "FS52501309",
            "decodeStatus" : "SUCCESS",
            "x" : 617,
            "y" : 2029
         }, {
            "row" : 8,
            "column" : 12,
            "barcode" : "FS52501388",
            "decodeStatus" : "SUCCESS",
            "x" : 390,
            "y" : 2029
         } ]
      }
   }
}
```


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