artus Basic Plug-in
User Manual

Rotor-Gene AssayManager

Rotor-Gene Q

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Welcome to the *artus* basic plug-in user manual.

1.1   Safety Information

The user-friendly Rotor-Gene AssayManager™ has been specifically developed for use with up to four different Rotor-Gene® Q instruments. Before using Rotor-Gene AssayManager, it is essential that you read this user manual carefully and pay particular attention to the safety information. The instructions and safety information in the user manual must be followed to ensure safe operation of the cycler and to maintain the instrument in a safe condition.

The Rotor-Gene AssayManager user manual does not provide detailed information about the Rotor-Gene Q instrument hardware and maintenance. The Rotor-Gene AssayManager manual only describes the functionality of the Rotor-Gene AssayManager software in combination with Rotor-Gene Q instruments.

Note: The terms "Rotor-Gene Q" and "Rotor-Gene Q instrument", used in this manual, apply to all Rotor-Gene Q and Rotor-Gene Q MDx instruments (not available in all countries) unless otherwise specified.

1.2   Introduction

Thank you for choosing Rotor-Gene AssayManager. We are confident it will become an integral part of your laboratory.

Rotor-Gene AssayManager is a software for routine testing in combination with Rotor-Gene Q instruments. Rotor-Gene AssayManager is able to read in sample information, set up experiments, control up to four different Rotor-Gene Q cyclers, acquire data from these instruments, automatically analyze results, and create reports.

Rotor-Gene AssayManager consists of different components working together. The core application is complemented by different plug-ins that contain assay type specific analysis and visualization of the results. The core application is mandatory for working with Rotor-Gene AssayManager. Optionally additional plug-ins can be installed. At least one plug-in must be installed. Not all plug-ins may be available in all countries. Refer to ▶ www.qiagen.com/Products/Rotor-GeneAssayManager.aspx to discover our continuously expanding range of plug-ins.

1.2.1   **Provided User Manuals**

The core application as well as every available plug-in has its own user manual with specific information about the functionality of the different Rotor-Gene AssayManager components. The user manuals provide a context sensitive help that can be started by simply pressing the "F1" key.
When installing additional plug-ins the corresponding user manuals are automatically added to the existing help system. Alternatively the different user manuals can be accessed, read, and printed as *.pdf files.

Rotor-Gene AssayManager Core Application User Manual	Provides a description of the software and describes functions that are the same for the core application and all different plug-ins. Information about troubleshooting is also provided.
Rotor-Gene AssayManager Plug-in User Manuals	Provide details on how to use the assay type specific plug-ins and their functionalities.

1.2.2   About this User Manual

This user manual provides information about Rotor-Gene AssayManager *artus* basic plug-in, version 1.0 in the following sections:

1. ▶ Introduction
2. ▶ *artus* specific tasks and procedures: Approving samples

1.2.3   General Information

Policy Statement

It is the policy of QIAGEN to improve products as new techniques and components become available. QIAGEN reserves the right to change specifications at any time.

In an effort to produce useful and appropriate documentation, we appreciate your comments on this user manual. Please contact QIAGEN Technical Services.

Version Management

This document is the Rotor-Gene AssayManager *artus* Basic Plug-in User Manual, version 1.0, which provides information about the *artus* basic plug-in, version 1.0.0.

1.2.4   Getting Help

Rotor-Gene AssayManager comes with a detailed help system. The help is provided as *.pdf file and as *.chm file (compiled help file). The following image shows the help page corresponding to the login screen as an example:
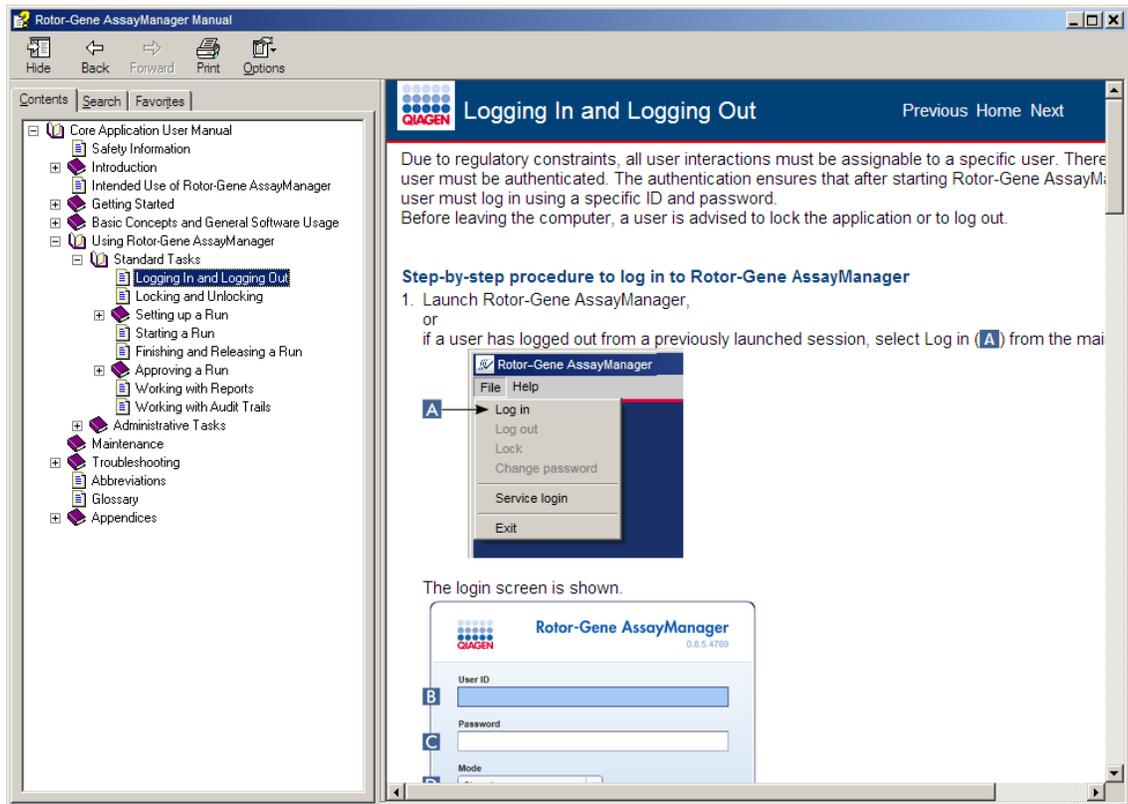
Rotor-Gene AssayManager has a context-sensitive help system. After pressing the "F1" key in dialogs, a context-sensitive help page is shown.

Using Rotor-Gene AssayManager Help
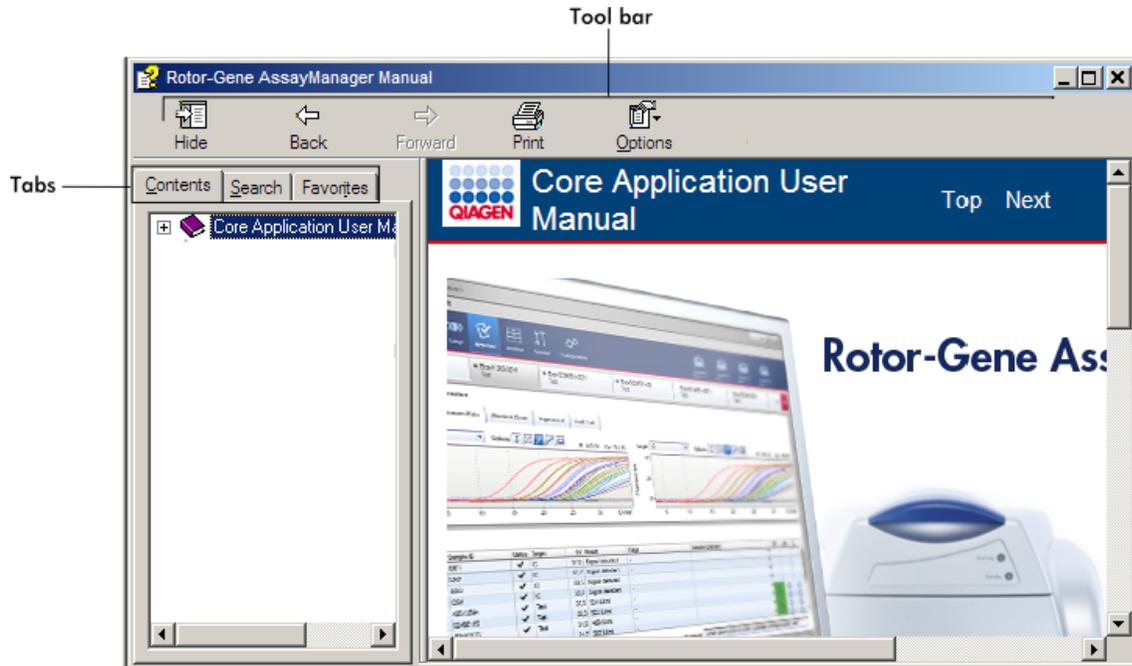
The help file contains two functional areas:

- Tool bar
- Tabs

The tool bar contains the following buttons:

Name	Icon	Description
"Hide" or "Show"	Hide	Hides the left-hand side navigation tab. To display the navigation tab again, click "Show". This button appears instead of "Hide".
"Back"	Back	Returns to the previous screen.
"Forward"	Forward	Returns to the screen displayed before using the "Back" button.
"Print"	Print	The user has the choice: 1) Print the selected topic. 2) Print the selected heading and all subtopics. Select one option and confirm with "OK" or select "Cancel" to go back.

"Options"		Opens the options menu with the following entries:
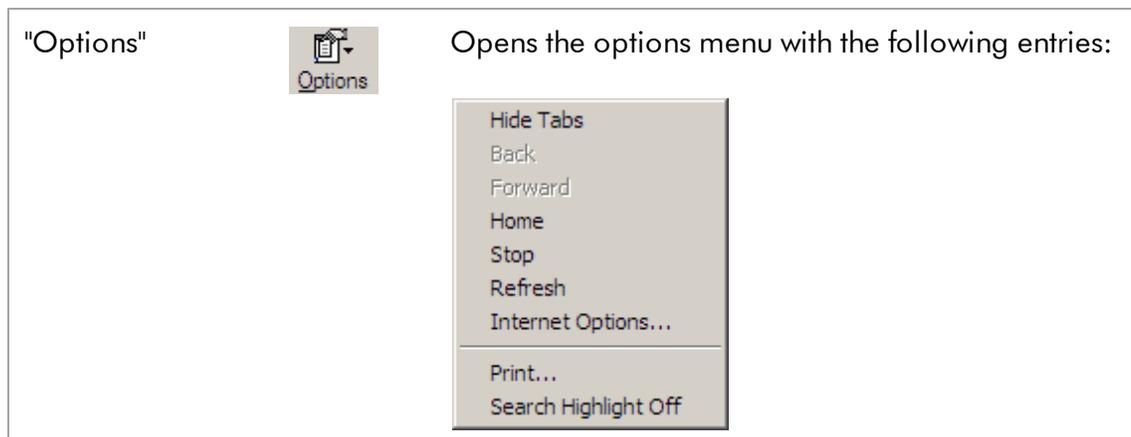
The navigation tab contains the following tabs:

Name	Description
"Contents"	In the "Contents" tab the help content can be browsed by topics.
"Search"	Specific help topics can be found by entering search terms.
"Favorites"	Shortcuts to individual help topics can be added and managed.

1.3   artus Specific Tasks and Procedures

Tasks and procedures specific for the *artus* basic plug-in are described in this chapter. For a general description, refer to the *Rotor-Gene AssayManager Core Application User Manual*.

Installing the artus basic plug-in

A general step-by-step procedure on how to install Rotor-Gene AssayManager plug-ins is provided in the *Rotor-Gene AssayManager Core Application User Manual*. Please refer to the section "Installing Core Application and Plug-ins" of the *Rotor-Gene AssayManager Core Application User Manual*.

Installing assay profiles for the artus basic plug-in

To run and analyze *artus* PCR Kits with the Rotor-Gene AssayManager, specific assay profiles need to be imported into the database. A detailed description of how to import assay profiles is provided in the *Rotor-Gene AssayManager Core Application User Manual*. Please refer to the chapter "Managing Assay Profiles" of the Rotor-Gene AssayManager Core Application User Manual.
The information about which assay profile is needed for a specific *artus* PCR Kit is provided in the *artus* application sheets available on the corresponding *artus* Kit web catalog page at ▶www.qiagen.com.

1.3.1 Approving Samples

The general functionality of the Approval environment is described in the Rotor-Gene AssayManager Core Application User Manual. In the *artus* Basic Plug-in User Manual, only the functionality dedicated to the *artus* plug-in is described.

1.3.1.1 Reviewing Assay Data

Step-by-step procedure to review data of a specific assay

After starting the approval process a screen is opened, split in two main areas: "Plots and information" and "Results". If multiple assays were selected, all the selected assays will be listed in the tab list.

Depending on the assay type experiment information can be reviewed in six different sub tabs:

- "Raw data"
- "Processed data"
- "Standard curve"
- "Experiment"
- "Assay"
- "Audit Trail"

By default the "Experiment" sub tab is opened upon starting the approval process.

Step-by-step procedure to review the amplification plots using the "Raw data" and the "Processed data" sub tab

1. To display only the amplification curves of specific samples:
   a) By default all samples of an assay are selected. Click the "Column select" icon in the header of the results table to deselect all samples.

   b) Click the "Sample selector" check box of the samples whose amplification curve should be displayed.
2. Select the target from the "Target" drop-down list.
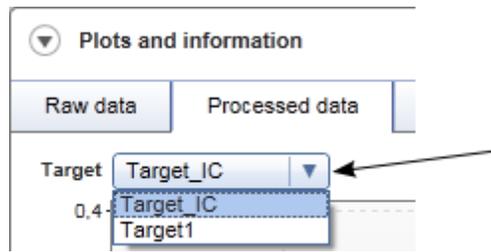
3. Review the individual amplification curves.

1.3.1.2   General Information about Approving Samples

The results of all samples determined by Rotor-Gene AssayManager must be approved (accepted or rejected) in the "Results" area of the "Approval" screen.
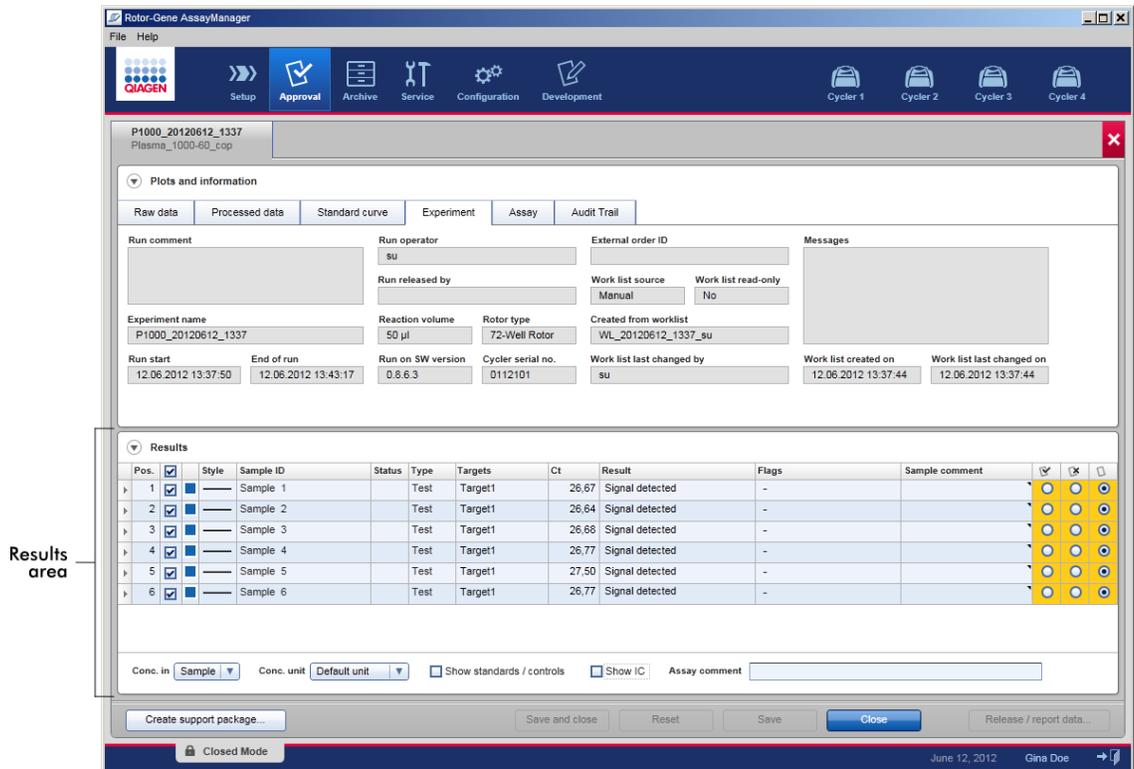
The results area contains the "Results" table with the following detailed information about the individual samples.

- "Position"
- "Color"
- "Style"
- "Sample ID"

- "Status"
- "Type"
- "Targets"
- "C_T"
- "Result"
- "Flags"
- "Sample comment"

Sample results to be approved have three additional approval buttons at the dedicated row end. These buttons are used to interactively accept or reject the sample results.
As a visual aid, the background color of the approval bar changes according to the approval state. Initially, all test samples of a finished experiment have the status "Undefined" and are displayed with a <mark>yellow</mark> background. An "Accepted" sample will change its background color to <mark>green</mark>. A "Rejected" sample changes its background color to <mark>red</mark>.

Background color	Status of test sample
	Undefined
	Accepted
	Rejected
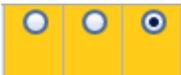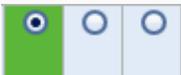
Step-by-step procedure to approve samples

1. In the "Results" list, scroll to the sample to be approved. Every sample result to be approved has three radio buttons at the dedicated row end.

Approval buttons

2. Either accept or reject the result of a sample.

	Click	Changes to
To **accept** a sample result, click the first button in the row.		
To **reject** a sample result, click the second button in the row.		
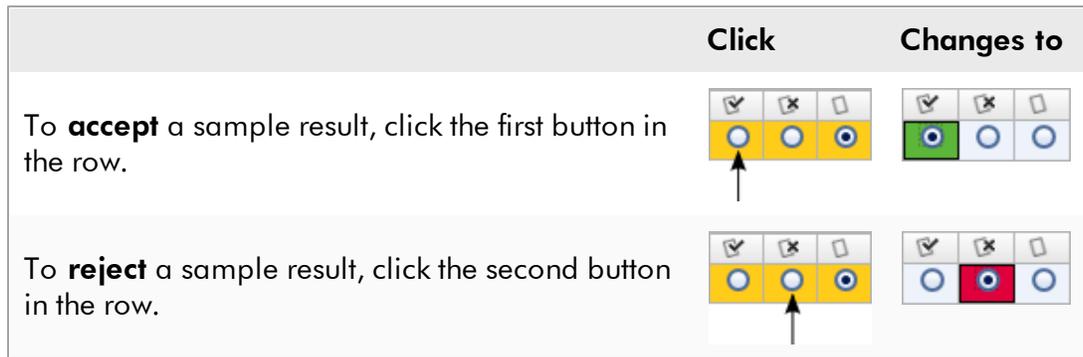
Optional: Enter a comment in the "Sample comment" column.

3. Repeat steps 1 and 2 for every sample until all sample results have either been accepted or rejected. To approve several sample results at once highlight the dedicated rows using the row selector . To highlight adjacent rows, click the first element's row selector, hold down the left mouse button, and move the cursor to last element to be highlighted using the mouse wheel. All rows in between are highlighted. Use the "Control" key to make multiple selections of non-adjacent rows. **A right-click in the highlighted rows opens the** context menu, which can be used to approve or reject all highlighted sample results at once.

> **Note**
>
> It is also possible to approve sample results only partly and approve the other sample results of an assay later. The button bar provides the following buttons to manage the approval process:
>
> | Save and close | Reset | Save | Close |
>
> | **To** | **Click** |
> |---|---|
> | ▪ Save all changes
▪ Change to "Assay selection" screen | Save and Close |
> | ▪ Cancel all changes
▪ Revert to the previous saved approval status; amplification plots and result table options are not reset | Reset |
> | ▪ Save all changes and remain in this screen | Save |
> | ▪ Discard all changes to its previous status
▪ Close this screen and change to "Assay selection" screen | Close |

1.3.1.3   **Concept of Approval Buttons in artus Plug-in**
Approval of external controls

After clicking "Start Approval" in the "Assay selection" screen, the "Approval" screen will be displayed. In the *artus* basic plug-in, the automatic data scan (AUDAS) method is applied for assay analysis. This means that the amplification curves of external controls, such as quantitation standards, no template controls, positive controls, etc., as well as the amplification curves of the test samples are automatically checked for anomalies by Rotor-Gene AssayManager.

In the *artus* basic plug-in, the amplification curves of all external controls are automatically analyzed, and a specific result for each target is determined. The results for external controls in this plug-in do not have to be approved because tailored analysis parameters and rules are applied to the raw data of the external controls. This ensures the detection of any abnormal or invalid amplification curve behavior by Rotor-Gene AssayManager. Each lot of *artus* external controls is tested against predetermined specifications to ensure consistent product quality.

Therefore only the approval buttons for test samples are activated.

Approval of test sample results

The results of the test samples are automatically analyzed and set by Rotor-Gene AssayManager but have to be approved and released by the user logged in with the role of approver. This is because the results of test samples may, for example, be influenced by different sample materials, in contrast to the external controls that have a constant product quality. Since not all potential abnormalities in the raw data can automatically be detected, the test sample results still have to be approved manually.

> **Note**
>
> Use the "Accepted" button for test samples whose results analyzed by Rotor-Gene AssayManager you agree with. Use the "Rejected" button if the test sample result evaluated by Rotor-Gene AssayManager is not acceptable for any reason.

Rotor-Gene AssayManager analysis	Approver accepts the test sample result	Expected behavior of the approver
Sample result is valid and displayed ("Signal detected", "No signal", or target concentration).	Yes	Click "Accepted".
Sample result is invalid justified by at least one corresponding flag.	Yes	Click "Accepted" and re-test the sample.
Sample result is valid and displayed ("Signal detected", "No signal", or target concentration).	No (e.g., an invalid result is not automatically detected by Rotor-Gene AssayManager)	Click "Rejected" and re-test the sample.
Sample result is invalid justified by at least one corresponding flag.	No (e.g., the result of a generally good-looking test sample was set to invalid)	Click "Rejected" and re-test the sample.

> **Note**
>
> A result automatically set to "Invalid" by Rotor-Gene AssayManager cannot be converted to a valid result anymore even if the result is rejected.

Result table options

	Option	Explanation
A	Conc. in [Sample ▼]	Depending on the selection in this drop-down list the detected concentration will automatically be calculated for the eluate or the original sample material before sample preparation. This function is only available for quantitative assays with a conversion factor defined in the assay profile.
B	Conc. unit [Default Unit ▼]	If several concentration units are defined in the assay profile, this menu is populated with the default concentration unit and alternative concentration units. The desired concentration unit can be selected from this drop-down list.
C	☑ Show standards / controls	Show/hide the display of standards/controls in the "Results" table.
D	☑ Show IC	By default, this check box is activated if an assay contains a target of type IC. Deactivate the check box to hide the IC information (target name, C_T value, result, and result flag) from the "Results" table.
E	Assay comment [ ]	Text field to enter a comment about the assay. Comment must not exceed 256 characters. After the first sample has been released, the comment cannot be changed anymore.

1.3.1.4   **Target Results**

Rotor-Gene AssayManager determines the result of a target by combining all relevant analysis results according to core analysis algorithms such as normalization, Automatic Data Scan (AUDAS), and sample and assay rules defined in the corresponding assay profile. The target result can either be "Signal detected", "No signal", the calculated target concentration combined with the selected unit, or "INVALID".

1. The target gets the result "Signal detected" if a C_T value is detected and the assay is not quantitative. Even quantitative targets may get the result "Signal detected" in case the corresponding standard curve could not be calculated.

2. The target gets the result "No signal" if no C_T value is detected.
3. The target gets a concentration value as result if a C_T value is detected, the assay is quantitative, and the target quantification was successful. The concentration is automatically calculated for the selected concentration unit.
4. The target result is set to "INVALID" if one or more sample flags are assigned to the sample during analysis by Rotor-Gene AssayManager that are defined to set the target result to "INVALID". If the check box "Enable processing of unclear samples" in the configuration settings is deactivated, even results of samples with the upstream flag "Unclear" (e.g., flagged by QIAsymphony AS) are set to "INVALID".

1.3.1.5   **Sample Flags**

The following sample flags may be assigned to individual targets during analysis by Rotor-Gene AssayManager. This is a complete list of all flags that can occur when using the *artus* basic plug-in. Depending on the settings in a specific assay profile not all flags may be relevant.

The appearance of flags in Rotor-Gene AssayManager is connected either with an invalidation of the corresponding target for a test sample, control, or standard, or the flag is only displayed as "warning" without consequences for the result. The column "behavior" below lists how Rotor-Gene AssayManager reacts to a certain flag. For the flag type "Variable", the behavior of Rotor-Gene AssayManager depends on the settings in the assay profile used.
Please refer to the *artus* PCR Kit application sheets for a detailed listing of the flags and their specific behavior for the different *artus* assay profiles.

Explanation of table row colors:

- Red refers to core analysis
- Blue refers to assay and sample analysis
- Green refers to AUDAS

Flag	Behavior	Description
ABOVE_UPPER_LOQ	Variable	The upper limit of quantification is exceeded. The target concentration is too high. Only a qualitative result is presented.
ASSAY_INVALID	Invalid	Assay is set to invalid because at least one external control is invalid.

BELOW_LOWER_LOQ	Variable	The lower limit of quantification is not reached. The target concentration is too low. Only a qualitative result is presented.
CONCENTRATION_ABOVE_AC CEPTED_RANGE	Variable	The target concentration is higher than the defined cut-off concentration.
CONCENTRATION_BELOW_A CCEPTED_RANGE	Variable	The target concentration is lower than the defined cut-off concentration.
CORRESPONDING_CONTROL _INVALID	Invalid	Target is set to invalid because at least one corresponding external control is invalid.
CORRESPONDING_POSITIVE_ CONTROL_TARGET_INVALID	Invalid	The target result is set to invalid because the corresponding positive control is invalid.
CT_ABOVE_ACCEPTED_RANGE	Variable	The detected C_T value is higher than the defined cut-off C_T.
CT_BELOW_ACCEPTED_RANG E	Variable	The detected C_T value is lower than the defined cut-off C_T.
CURVE_SHAPE_ANOMALY	Invalid	The raw data amplification curve shows a shape that deviates from the established behavior for this assay. There is a high likelihood of incorrect results or a result misinterpretation.
FLAT_BUMP	Invalid	The amplification curve shows a shape like a flat bump deviating from the established behavior for this assay There is a high likelihood of incorrect results or result misinterpretation (e.g., wrong C_T value determination).
FLUORESCENCE_TOO_LOW	Variable	The fluorescence signal is lower than the defined fluorescence cut-off.

FLUORESCENCE_TOO_STRONG	Variable	The fluorescence signal is higher than the defined fluorescence cut-off.
IC_INVALID	Invalid	An internal control in the same tube is invalid.
IC_NO_SIGNAL	Invalid	No signal is detected for an internal control in the same tube.
INHIBITION_BY_CT	Variable	The defined maximum C_T range between the C_T for the internal control of that sample and the C_T for the internal control of the NTC is exceeded..
INHIBITION_BY_FLUORESCENCE	Variable	The defined maximum fluorescence difference between the internal control fluorescence of the NTC and the internal control fluorescence of that sample for the last cycle is exceeded.
LOW_FLUORESCENCE_CHANGE	Warning	The percentage fluorescence change for this sample relative to the sample tube with the largest fluorescence change is lower than a defined limit. This flag corresponds to the NEG (NTC) flag of the Rotor-Gene software and appears only if the "NTC threshold outlier removal" function of the Rotor-Gene software was enabled in the imported .qit file. For more details refer to the *Rotor-Gene Q User Manual*.
LOW_REACTION_EFFICIENCY	Warning	The reaction efficiency for this sample has not reached a defined limit. This flag corresponds to the NEG (R.Eff) flag of the Rotor-Gene software and can appear only if the "

		Reaction Efficiency Threshold outlier removal" function of the Rotor-Gene software was enabled in the imported .qit file. For more details refer to the *Rotor-Gene Q User Manual*.
MAX_CORRELATION_IN_STANDARD_CURVE_EXCEEDED	Variable	Either an upper limit for the R^2 value or an upper limit for the R value is exceeded.
MAX_EFFICIENCY_EXCEEDED	Variable	The upper limit for reaction efficiency is exceeded.
MULTI_THRESHOLD_CROSSING	Invalid	The amplification curve crosses the threshold more than once. An unambiguous C_T cannot be determined. This flag corresponds to the NEG (Multi C_T) flag of the Rotor-Gene software. For more details refer to the *Rotor-Gene Q User Manual*.
NO_CT_DETECTED	Variable	No C_T is detected for this target.
NORM_FACTOR_ALTERATION	Warning	Deviation during the normalization procedure. The amplification curve is displayed with a default normalization; results should be manually checked for correctness.
OTHER_IC_INVALID	Invalid	An internal control in another tube is invalid.
OTHER_IC_NO_SIGNAL	Invalid	No signal is detected for an internal control in another tube.
OTHER_TARGET_INVALID	Invalid	A target in another tube is invalid.
OUT_OF_COMPUTATION_RANGE	Invalid	The calculation of the concentration for this sample exceeds the technical limit.

SATURATION	Invalid	The raw data fluorescence is saturating strongly before the inflexion point of the amplification curve.
SATURATION_IN_PLATEAU	Warning	The raw data fluorescence is saturating in the plateau phase of the amplification curve.
SPIKE	Variable	A spike in the raw data fluorescence is detected in the amplification curve, but outside the region where the C_T is determined.
SPIKE_CLOSE_TO_CT	Invalid	A spike is detected in the amplification curve close to the C_T.
STEEP_BASELINE	Invalid	A steeply rising baseline for the raw data fluorescence is detected in the amplification curve.
STRONG_BASELINE_DIP	Invalid	A strong drop in the baseline for the raw data fluorescence is detected in the amplification curve.
STRONG_NOISE	Invalid	Strong noise outside the growth phase of the amplification curve detected.
STRONG_NOISE_IN_GROWTH_PHASE	Invalid	Strong noise is detected in the growth (exponential) phase of the amplification curve.
TOO_LESS_CORRELATION_IN_STANDARD_CURVE	Variable	Either a lower limit for the R^2 value or a lower limit for the R value is not reached.
TOO_LESS_EFFICIENCY	Variable	A lower limit for reaction efficiency is not reached.
UNCERTAIN	Variable	Results from the automatic data scan (AUDAS) are conflicting to results from the core analysis. An unambiguous automatic assessment of data validity is

UNEXPECTED_CT_DETECTED	Variable	A C_T value is detected for a target that should not amplify.
UPSTREAM	Variable	Sample status was set to invalid or unclear by an upstream process (e.g., from QIAsymphony Assay Setup). **Note**: For "unclear" flags from upstream processes, the behavior of Rotor-Gene AssayManager is defined in the "Configuration" environment and not in the Assay Profile. "Invalid" flags from upstream processes always result in an invalid corresponding sample in Rotor-Gene AssayManager.
WAVY_BASE_FLUORESCENCE	Invalid	Wavy baseline for the raw data fluorescence detected in the amplification curve.

(continued at top: not possible.)

1.3.2   Report Profiles for artus Assays

In a report profile used to report data for an artus assay several options must be set in a certain way in order to get an appropriate PDF report. Report profiles can be created and managed in the "Report Profiles" tab of the "Configuration" environment.

The following configuration is useful for report profiles used for artus assays:

1. Go to "External Controls - Overview" in the "Content selection" area and select the "Show target result only" radio button.
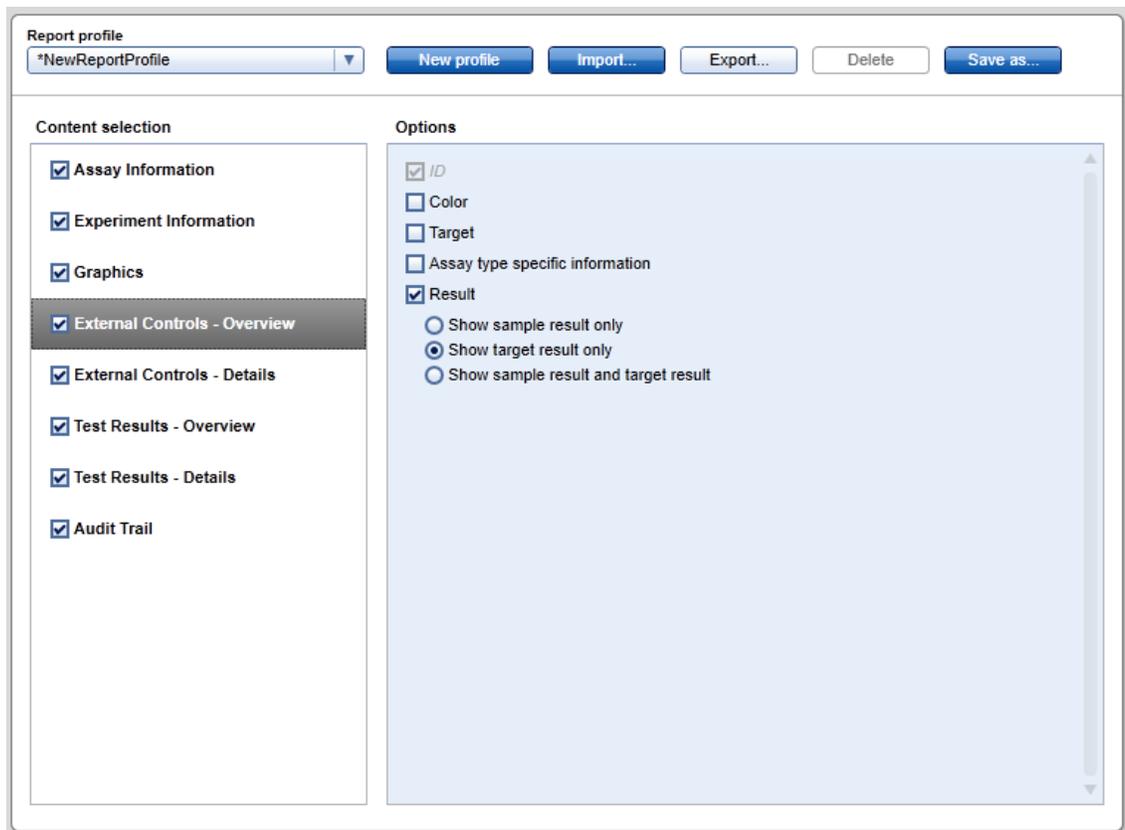
2. Go to "External Controls - Details" in the "Content selection" area and deselect the "Sample result" check box.

3. Go to "Test Results - Overview" in the "Content selection" area and select the "Show target result only" radio button.
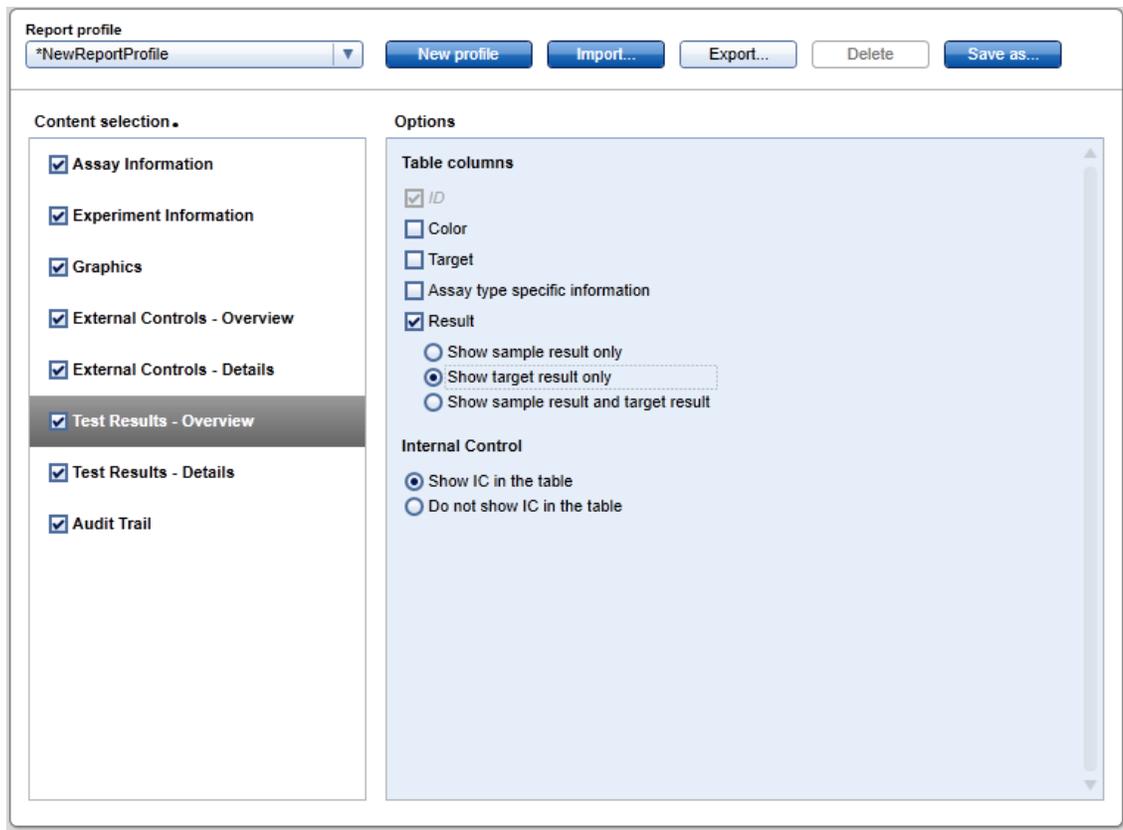
4. Go to "Test Results - Details" in the "Content selection" area and deselect the "Sample result" check box.

Besides these configuration the report profiles can be adapted to the individual needs for the report.

Pre-configured report profiles for artus assays can be downloaded from the artus PCR Kit web catalog pages or from ▶ www.qiagen.com/Products/Rotor-GeneAssayManager.aspx. For importing the report profiles, please refer to the section "Managing report profiles" of the *Rotor-Gene AssayManager Core Application User Manual*.

1.4   Hint for Online Documentation

Rotor-Gene AssayManager uses plug-ins to increase its functionality. In order to have a clear distinction between the core application manual and the plug-in manuals and to keep the documentation short and focused, general topics are explained in the core application manual.

Providing you the best information depends on the environment you are currently in, especially for the following items:

▶ Help for "Plots and information" table
▶ Help for "Results" table

1.4.1 Help for Plots and Information Table

The help information for the "Plots and information" table is available either in the *artus* plug-in user manual or in the Rotor-Gene AssayManager core application user manual.

The table below shows - depending on the current environment - where to find more information.

Environment	Help file and topic
"Approval"	***artus* plug-in user manual (i.e. this manual)** Topic: ▶ General information about approving samples
"Archive"	**Rotor-Gene AssayManager core application user manual** Topics: ■ Basic Concepts ➜ Environments ➜ "Archive" Environment ■ Using Rotor-Gene AssayManager ➜ Administrative Tasks ➜ Managing Archives

In case the information is referenced to the Rotor-Gene AssayManager core application user manual, open the help file using the Windows Start menu:

Start ➜ Programs ➜ QIAGEN ➜ Rotor-Gene AssayManager

1.4.2 Help for Results Table

The help information for the "Results" table is available either in the *artus* plug-in user manual or in the Rotor-Gene AssayManager core application user manual.

The table below shows - depending on the current environment - where to find more information.

Environment	Help file and topic
"Approval"	**Rotor-Gene AssayManager core application user manual** Topic: ■ Using Rotor-Gene AssayManager ➜ Standard Tasks ➜ Approving a Run
"Archive"	**Rotor-Gene AssayManager core application user manual**

Environment	Help file and topic
	Topic: ■ Using Rotor-Gene AssayManager ➜ Administrative Tasks ➜ Managing Archives

In case the information is referenced to the Rotor-Gene AssayManager core application user manual, open the help file using the Windows Start menu:

Start ➜ Programs ➜ QIAGEN ➜ Rotor-Gene AssayManager

1.5   Appendix

The appendix contains the Liability Clause and the License Terms for the *artus* basic plug-in.

> **Note**
>
> Further information, such as a glossary, can be found in the *Rotor-Gene AssayManager Core Application User Manual*.

Liability Clause

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License Terms

QIAGEN's *artus* basic plug-in for Rotor-Gene AssayManager™ Software License Agreement
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The above limitation shall apply accordingly in case of:
- delay,
- compensation due to defect,
- compensation for wasted expenses.

8. NO SUPPORT
Nothing in this agreement shall obligate QIAGEN to provide any support for the SOFTWARE. QIAGEN may, but shall be under no obligation to, correct any defects in the SOFTWARE and/or provide updates to licensees of the SOFTWARE. You shall make reasonable efforts to promptly report to SOFTWARE any defects you find in the SOFTWARE, as an aid to creating improved revisions of the SOFTWARE.

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If you fail to comply with the terms and conditions of this Agreement, QIAGEN may terminate this Agreement and your right and license to use the SOFTWARE. You may terminate this Agreement at any time by notifying QIAGEN. Upon the termination of this Agreement, you must delete the SOFTWARE from your computer(s) and archives.

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