



**Automated Hematology Analyzer  
XN series  
Onboard Rules Feature Specifications**

Revision 9

**Sysmex Corporation**

## History of Revisions

Revision	Date	Change
1.0	August 16, 2012	Initial version
2.0	December 20, 2012	<ul style="list-style-type: none"> <li>Action taken in response to errors at time of translation and formatting comments</li> <li>Added “hsA” to arguments of AnalysisMode function (attachment)</li> </ul>
3	March 12, 2012	<ul style="list-style-type: none"> <li>Added description that the maximum number of digits in a conditional expression is 400 digits. (5.2.1.2)</li> <li>Added “[TIPS] Conditional expression is displayed in red and becomes a syntax error in the Registration dialog box”. (5.3.10)</li> </ul>
4	July 26, 2013	<ul style="list-style-type: none"> <li>Added description about function of feeding out to DIA in the SP rule. (5.1.3)</li> </ul>
5	February 03, 2014	<ul style="list-style-type: none"> <li>Added ActionMessageDetail function to the function list (attachment).</li> </ul>
6	May 08, 2014	<ul style="list-style-type: none"> <li>Added the argument “Review:AgedSample?” to ActionMessageDetail function.</li> <li>Changed the argument “Retest:MixingFailure?” of ActionMessageDetail function to “Retest:SuspectSample”.</li> </ul>
7	February 02, 2015	<ul style="list-style-type: none"> <li>Added the argument “Reserved” to ActionMessageDetail function.</li> <li>Added the description that Reflex function that spans multiple analyzers cannot be used in XN-9000.</li> </ul>
8	March 01, 2016	<ul style="list-style-type: none"> <li>Deleted the argument “Reserved” from ActionMessageDetail function.</li> <li>Added the PriorityCode function.</li> <li>Added “^”, “In”, and “log” to the arithmetic operators.</li> <li>Added the description on the behavior of operation results.</li> </ul>
9	August 16, 2016	<ul style="list-style-type: none"> <li>Added the smear condition, number of preparations, additional rinses, and alarm to the Smear arguments described in Attachment.</li> <li>Added the description of XN-3100 (Standalone mode) and XN-1500 to XN-3000 (Standalone mode).</li> <li>Added the smear condition, number of preparations, additional rinses, and alarm to the SP rule.</li> </ul>

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## 1. Scope

This specifications document applies to the onboard rules feature of the XN series automated hematology analyzers (XN-1000 / XN-1500 / XN-2000 / XN-3000 / XN-3100 / XN-9000 / XN-9100). In addition, it also applies to the onboard rules feature when connecting to an upper-level terminal and WAM.

The target audience of this specifications document is assumed to be persons in charge of creating onboard rules as well as service representatives within Sysmex (Academic Department and Service Department). As for the information regarding usage by laboratory managers and persons in charge of blood tests, it should be explained by the target audience.

## 2. Overview

The XN series uses a new sampler technology that enables the rack to move in both directions, making auto retests (Repeat/Rerun/Reflex analysis to be mentioned later) possible. By using these auto retests, the work of picking up the sample and manually analyzing it again can be eliminated, contributing to a more efficient test work flow.

The conditional expressions to determine whether or not to perform the automatic retest can be customized in the IPU screen according to the operational usage of the laboratory. Customization is possible not only on the conditional expressions for automatic retests, but also adding comments to samples, auto validation, auto output, and auto smear. These functionalities are controlled by a set of rules collectively referred to as “onboard rules”. This document will explain each function of the onboard rules, and illustrate some applications.

## 3. Terminology

The aforementioned auto retests are defined as follows, according to its purpose and analysis order.

Repeat	A retest using the same order as the initial analysis, when the data could not be obtained due to an analysis error.
Rerun	A retest using the same order as the initial analysis, when the data obtained is not reliable.
Reflex	A retest using the initial analysis order with additional discrete test(s), when the data obtained was insufficient.

The terms for explaining the onboard rules are defined as follows:

Prerequisite	Conditions for whether or not to evaluate each of the onboard rules. These are preset for each type of onboard rules, and are determined by system model and settings.
Conditional expression	Conditions applied when the prerequisites are met, to determine whether or not to execute the action. The conditions can be entered by the user using information about the analysis data (analysis value, order, flag, patient information, etc.). Multiple conditional expressions can be set for one onboard rule.
Action	The process that the onboard rule executes when the conditional expression holds true. The conditional expression and the action is paired one-to-one, and the user can choose the action from a set of predefined options. If the conditional expression corresponding to an action holds true, the action is said to be “qualified”.
Priority	The order used to determine which action will be executed if multiple actions are qualified. The action with the highest priority will be executed.

The following definitions will be used to make all references to the equipment precise.

Analyzer	An analyzer refers to any one of XN-20, XN-21, XN-10, or XN-11.
Sampler	A sampler refers to any one of SA-20, SA-10, SA-30, CV-50, or SA-01.
Instrument	An instrument refers to a combination of one sampler and one or more analyzers connected to it.
System model	A system model is a general term used to refer to one of XN-1000, XN-2000, XN-3000, and XN-9000.

[Example] The XN-2000 has two analyzers (any of XN-20, XN-21, XN-10, or XN-11) connected to one sampler (SA-20), hence consists of one instrument.

[Example] A three unit configuration of the XN-9000 has three samplers (CV-50), with one analyzer (any of XN-20, XN-21, XN-10, or XN-11) connected to each of them, and hence consists of three instruments.

## 4. System Configuration

### 4.1. Onboard Rule Functionalities Available by System Model

The functionalities provided by the onboard rules are Repeat/Rerun/Reflex analysis, adding comments, smear preparation, auto validation, and auto output. Depending on the system model, some of these functionalities are not available. Table 4-1 shows the onboard rules available by system model.

For example, since the sampler in XN-1000 (SA-01) does not allow the rack to move in both directions, the Repeat/Rerun/Reflex analysis functionality is unavailable, but the comment-adding functionality can be used to caution. Also, only on XN-3000, XN-3100 and XN-1500 with SP, the SP rule can be used to determine from the XN analysis results, whether or not to prepare smear slides.

**Table 4-1: Available onboard rules by system model**

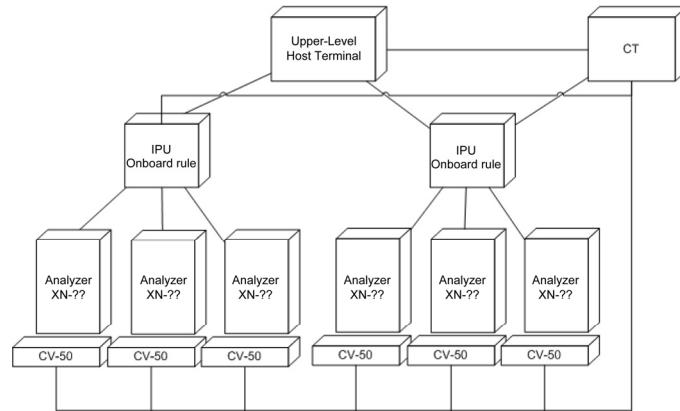
Onboard Rule	XN-1000, XN-2000, XN-3000 (Host mode), XN-3100 (Host mode), XN-9000	XN-3000 (Standalone mode), XN-3100 (Standalone mode), XN-1500	XN-1000 (SA-01)
Repeat Rule	✓	✓	—
Rerun/Reflex/ Comment Rule	✓	✓	—
Comment Rule	—	—	✓
SP Rule	—	✓	—
Validation Rule	✓	✓	✓
Output Rule	✓	✓	✓

### 4.2. Sharing of Repeat/Rerun/Reflex Judgment between the Onboard Rules and the Upper-Level Host Terminal

When using the XN series connected to an upper-level host terminal, some of the rules can be divided among the onboard rules (Repeat rule and Rerun/Reflex/Comment rule will be discussed in this section), for the purpose of distributing the load on the upper-level host terminal. Here, the rules configured as onboard rules are a subset of the rules set in the upper-level host terminal. In other words, if a judgment cannot be made by onboard rules alone, the upper-level terminal, which has more information, is inquired to perform a rule-based judgment.

[Example of onboard rule-based judgment with upper-level host terminal]

We will discuss the process flow for an XN-9000 model with six analyzers connected.

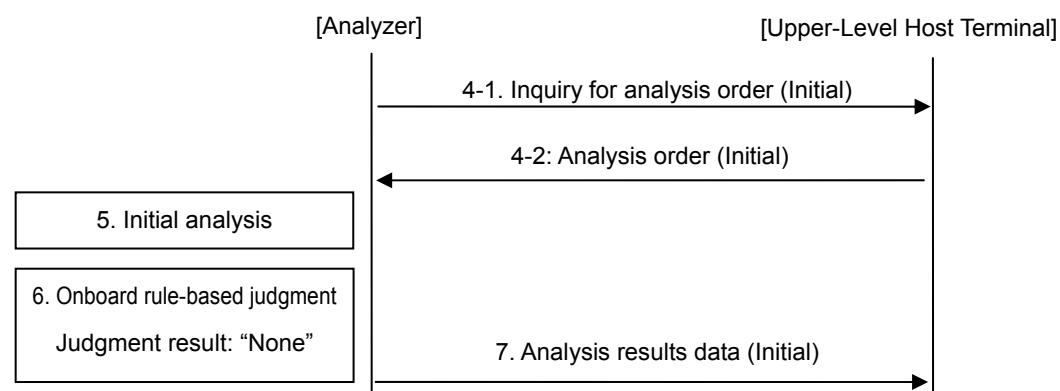


1. The sample rack arrives.
2. The CT inquires the upper-level host terminal to determine the transportation method, and sends the transportation instruction to CV-50.
3. The CV-50 transports the sample rack to the front of the analyzer.
4. The IPU inquires the upper-level host terminal to determine the initial analysis order.
5. The analyzer performs the initial analysis for the instructed analysis order.
6. Once the results of the initial analysis by the analyzer are received by the IPU, onboard rule-based judgment is performed on the IPU.

The action determined by the onboard rule-based judgment is one of the following:

- “None”: Based on the onboard rule-based judgment, no further analysis will be performed on this same sample.
  - “Repeat”/“Rerun”/“Reflex”: Based on the onboard rule-based judgment, a Repeat/Rerun/Reflex analysis will be performed.
  - “QueryToHost”: Judgment is not possible with onboard-rules; upper-level host terminal will be inquired.
- The subsequent process after each action is determined is shown below:

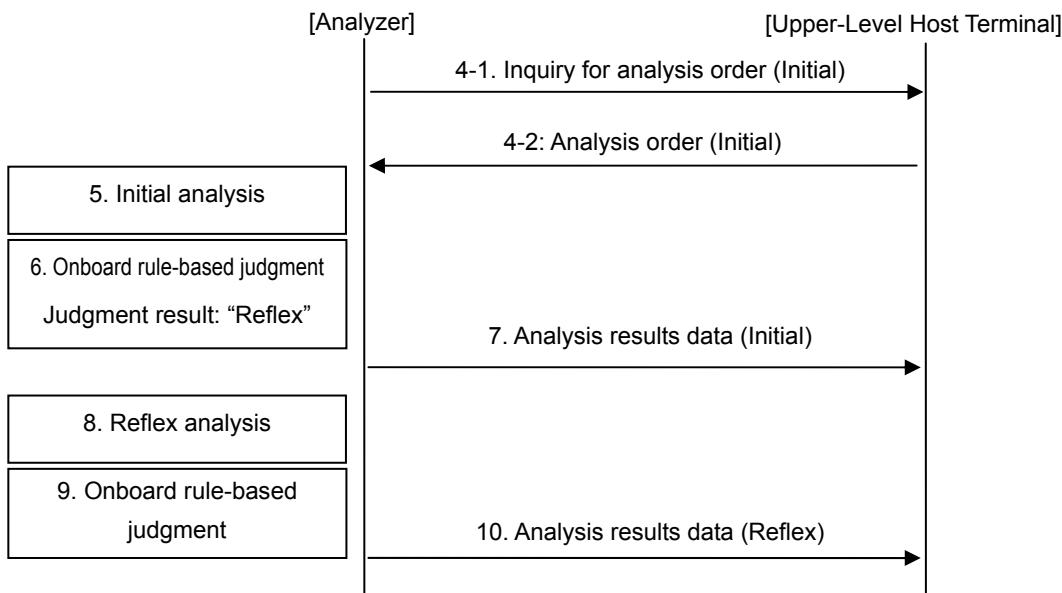
[Case 1: When the onboard rule determines the action as “None”]



7. An electronic message, containing the analysis results data with the action set for “None”, is sent from the IPU to the upper-level host terminal.

[Case 2: When the onboard rule determines the action as “Repeat”/“Rerun”/“Reflex”]

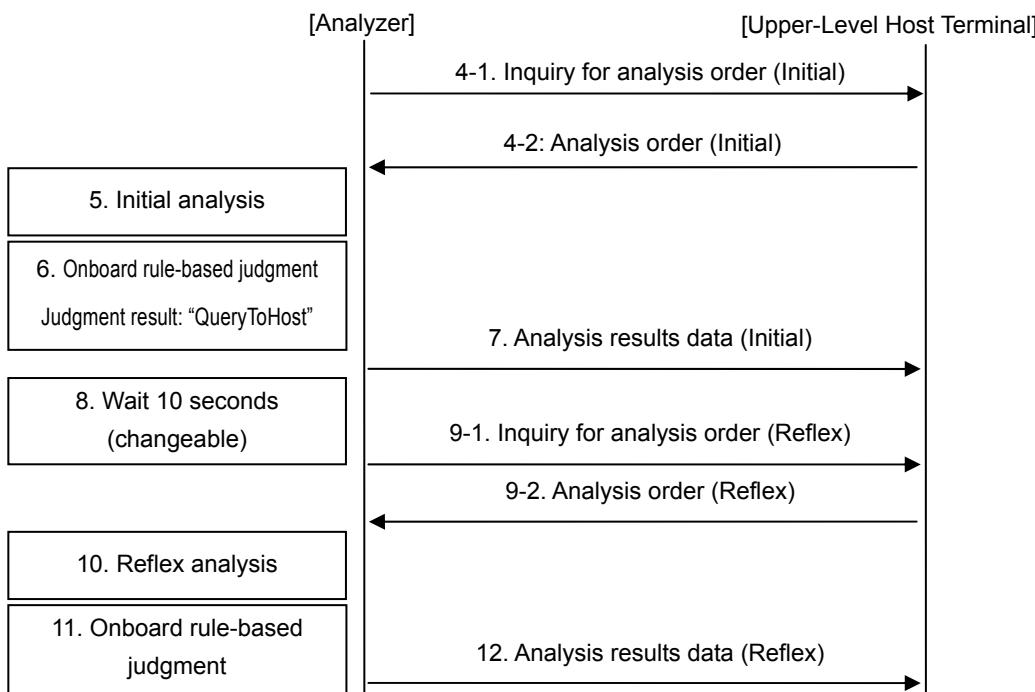
Since the process is common between “Repeat”, “Rerun”, and “Reflex”, this example will discuss the case when the determined action is “Reflex”. For cases where the determined action is “Repeat” or “Rerun”, simply replace the words accordingly.



7. An electronic message, containing the analysis results data with the action set for “Reflex”, is sent from the IPU to the upper-level host terminal.
8. The analyzer performs a Reflex analysis according to the result of the onboard rule-based judgment (6.).
9. Once the results of the Reflex analysis by the analyzer are received by the IPU, onboard rule-based judgment is performed on the IPU.
10. An electronic message, containing the analysis results data with the judgment result of the onboard rule (9.), is sent from the IPU to the upper-level host terminal.

[Case 3: When the onboard rule determines the action as “QueryToHost”]

In response to QueryToHost, the upper-level host terminal may send an instruction to not analyze or to perform a Reflex analysis (regardless of whether or not an order is added, the order type will be Reflex). This example will use the case when Reflex analysis is ordered.



7. An electronic message, containing the analysis results data with the action set for “QueryToHost”, is sent from the IPU to the upper-level host terminal.
8. The IPU waits 10 seconds from the time it sends the analysis data before the time it sends the inquiry for analysis order. The wait time can be changed by a setting.
9. The IPU inquires the upper-level host terminal to determine the Rerun/Reflex analysis order.  
(If the instruction is to not do the analysis, the process ends here. The remainder of this process is for the case when Reflex analysis is ordered.)
10. The analyzer performs a Reflex analysis according to the instruction from the upper-level host terminal.
11. Once the results of the Reflex analysis by the analyzer are received by the IPU, onboard rule-based judgment is performed on the IPU.
12. An electronic message, containing the analysis results data with the judgment result of the onboard rule, is sent from the IPU to the upper-level host terminal.

The following is a summary of where the onboard rule information is stored within the electronic message that is sent from the IPU to the upper-level host terminal. For details on communication specifications, refer to Communication Specifications.

**Table 4-2: Location of onboard rules information sent between IPU and upper-level host terminal**

Transmission timing	Information about onboard rule	Storage location within electronic message	
		Standard and DPS format	ASTM format
Inquiry for analysis order (IPU → Upper-level host terminal)	Whether or not it is for initial analysis	Analysis order inquiry format “Inquiry Timing Distinction Code”	Query record “Requested Information Status Code”
Analysis order (IPU ← Upper-level host terminal)	Whether or not the order exists	Analysis order information format “Order Distinction Code”	Analysis order record “Report Type”
Analysis results data (IPU → Upper-level host terminal)	Rule result	Analysis data format “Evaluation Based on Repeat/Rerun/Reflex rule”	Result record “Result Status”
	Order type	Analysis data format “Order Type”	Analysis order record “Action Code”, “Report Type”

Table 4-3 shows the possible combinations of actions for each operational usage of the laboratory.

**Table 4-3: Possible combinations of actions by operational usage of laboratory**

Laboratory operational usage	None	Repeat/Rerun/Reflex	QueryToHost
Judge by onboard rules alone	✓	✓	—
Judged by upper-level terminal alone (*)	—	—	✓
Judged by both onboard rules and upper-level terminal (*)	✓	✓	✓
No Rerun/Reflex analysis	✓	—	—

(\*) Applicable to all system models except XN-3000 (Standalone mode) / XN-3100 (Standalone mode)

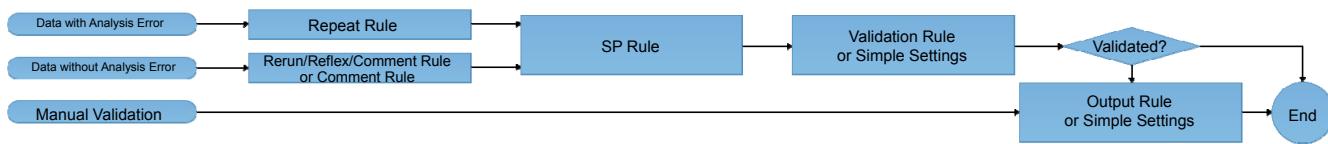
If the operational usage is to “Judge by both onboard rules and upper-level host terminal”, you can configure it to execute “QueryToHost” as the designated action of the onboard rule, or when no other actions are qualified except “None”. See 5.1.2 on how the action is determined, and 5.2.2.1 on how to configure this setting.

## 5. Software Specifications

### 5.1. Onboard Rule-Based Judgment Process Flow

In this section the overall flow of the onboard rule-based judgment and common processes will be explained, and then the prerequisites, conditional expressions, actions and priorities will be explained for each onboard rule.

Each onboard rule is evaluated in the order of the flow chart in Fig. 5-1. Only when the onboard rule meets the “Prerequisites” in Table 5-1, each individual conditional expression registered to the onboard rule is evaluated, and one action is determined from all the actions set in the conditional expression, based on priority, and is executed.



**Fig. 5-1: Onboard rules flow chart**

A note regarding the “Subject to onboard rules” column in Table 5-1. The following analysis data are considered to be outside the scope of onboard rule-based judgment: QC, calibration, precision check, background check, optical axis adjustment, rinsing sample, sample number “0”, and barcode reader reading errors. All other analysis data are considered to be within the scope of onboard rule-based judgment.

Actions that are not executed even when they are determined by the rule are indicated in the “Remarks” column in Table 5-1. If manual analysis is necessary because auto retests are not physically possible on the hardware, or if the determined action has already been executed, it will not be executed. Those that are specific to certain types of onboard rules will be discussed later.

To prevent any rule’s conditional expression from causing an analysis to be executed numerous times, a Repeat analysis is not allowed on a Repeat analysis, and a Rerun/Reflex analysis is not allowed on a Rerun/Reflex analysis. In other words, a single sample can have a maximum of four analyses: (1) Initial analysis, (2) Repeat analysis on the Initial analysis, (3), Rerun/Reflex analysis, and (4) Repeat analysis on the Rerun/Reflex analysis.

**Table 5-1: Prerequisites for onboard rules**

Onboard rule	System model	Setting	Subject to onboard rules	Analysis error	Order type	SP order	Validation	Prerequisite	Remarks
Repeat rule	All except XN-1000 (SA-01)	“Repeat” setting enabled	Yes	Initial Rerun Reflex				Evaluate Repeat rule	–
					Manual Manual(Open) Initial/Repeat Rerun/Repeat Reflex/Repeat			Same as above	Do not run Repeat analysis even if conditions are met
					None			Do not evaluate Repeat rule	–
			No					Same as above	–
		“Repeat” setting disabled						Same as above	–
	XN-1000 (SA-01)							Same as above	–

Rerun/Reflex/Comment rule or Comment rule	All except XN-1000 (SA-01)	“Rerun/Reflex” setting enabled	Yes	None	Initial			Evaluate Rerun/ Reflex/ Comment rule	—		
					Initial/Repeat						
					Manual						
			Yes		Manual(Open)						
					Rerun						
	XN-1000 (SA-01)				Reflex						
					Reflex/Repeat						
					Reflex/Repeat						
			Yes					Same as above	Do not run Rerun/Reflex analysis even if conditions are met Only add comment		
			No					Do not evaluate	—		
	SP Rule	XN-3000 (Standalone mode), XN-3100 (Standalone mode) and XN-1500	“Perform Judgment of SP Rule” setting enabled	Yes	Initial	Not registered		Evaluate SP rule	—		
					Initial/Repeat						
					Rerun						
					Reflex						
					Rerun/Repeat						
			“Perform Judgment of SP Rule” setting disabled	No	Reflex/Repeat						
					Manual						
		Other than above			Manual(Open)						
								Same as above	—		
								Same as above	—		
								Same as above	—		
								Same as above	—		
Validation rule		“Auto Validate” setting enabled AND “Set in rule view”	Yes	Not registered	Initial			Evaluate validation rule	—		
					Initial/Repeat						
					Rerun						
					Reflex						
		“Auto Validate” setting enabled AND “Use simple settings”	No	Registered	Rerun/Repeat						
					Reflex/Repeat						
					Manual						
					Manual(Open)						
Output rule		“Auto Output” enabled AND “Set in rule view”	Yes	Not validated	Initial			Evaluate output rule	Output only to destination with no output		
					Initial/Repeat						
					Rerun						
					Reflex						
		“Auto Output” enabled AND “Use simple settings”	No	Already validated	Rerun/Repeat						
					Reflex/Repeat						
					Manual						
					Manual(Open)						
		“Auto Output” disabled	Yes	Do not evaluate	Initial						
					Initial/Repeat						

### 5.1.1. Repeat rule

In order to obtain analysis results that were not obtainable due to analysis error, a Repeat analysis is performed as an action from the Repeat rule.

The Repeat rule executes the action under the condition that an analysis error has occurred (i.e. conditional expression does not have settings). A fixed number of records are registered that correspond to analysis errors, and the action to be executed when an analysis error occurs can be modified to match the operational usage of the laboratory (see 5.2.1.1 on how to modify). The selectable actions are listed below:

Repeat	Performs a Repeat analysis when an analysis error occurs.
BlockRepeat	Does not perform a Repeat analysis when an analysis error occurs.
None	Makes the occurrence of analysis errors irrelevant to Repeat analysis. The “None” action can be selected as an alternate solution for not being able to delete the records, since there are fixed number of them.

If different conditional expressions qualify conflicting actions, the action to be executed is determined by the following priority:

“BlockRepeat” > “Repeat” > “None”

[Example] If both “BlockRepeat” and “Repeat” are simultaneously qualified by separate conditional expressions, the Repeat analysis will not be performed. If “Repeat” and “None” are simultaneously qualified by separate conditional expressions, the Repeat analysis will be performed.

At the time of installation, the action recommended by Sysmex is set as the default setting. Analysis errors for which a Repeat analysis would be meaningless cannot be changed from the “BlockRepeat” action. Such action are displayed on the screen as “BlockRepeat (Fixed)”.

[Example] For analysis errors such as “Insufficient blood volume”, since there is no chance that a Repeat analysis will improve the problem, the action cannot be changed from “BlockRepeat”.

### 5.1.2. Rerun/Reflex/Comment rule and Comment rule

For analysis results with no errors, you can obtain more desirable data by performing a Rerun/Reflex analysis, or caution the workers by adding a comment. The above functionalities can be realized with the Rerun/Reflex/Comment rule and the Comment rule.

With the Rerun/Reflex/Comment rule, you can register onboard rules to match to the operational usage of the laboratory, by entering the conditional expressions, actions, and comments to add, on the screen (see 5.2.1.2 and onward on how to register). With the XN-1000 (SA-01) configuration, since the Rerun/Reflex analysis cannot be performed, the Comment rule is used which does not have an action setting.

The selectable actions for the Rerun/Reflex/Comment rule are listed below:

Rerun	Performs a Rerun analysis when the conditional expression holds true.
Reflex	Performs a Reflex analysis when the conditional expression holds true.
QueryToHost	Inquires the upper-level host terminal if the conditional expression holds true. Selectable only when configured to be used in Service Settings (see 5.2.2.1 for configuration method).
BlockRerunReflex	Does not perform a Rerun/Reflex analysis or inquire the upper-level host terminal if the conditional expression holds true.
None	Makes the result of the conditional expression irrelevant to Rerun/Reflex analysis. Select if you want to add a comment only.

If different conditional expressions qualify conflicting actions, the action to be executed is determined by the following priority:

“BlockRerunReflex” > “Rerun” > “Reflex” > “QueryToHost” > “None”

[Example] If “Rerun” and “Reflex” actions are qualified simultaneously by separate conditional expressions, only the Rerun analysis for the same order as the initial analysis will be performed. Reflex analysis with additional discrete tests will not be performed. See 5.3.1 if you want to prioritize Reflex higher than Rerun.

Below are additional specifications for determining the action.

- For the XN-2000 and XN-3000, you can specify which analyzer within the instrument you want to use to perform the Rerun analysis. If multiple “Rerun” actions are qualified, the analyzer is determined according to the following priority: (1) Perform the Rerun analyses on different analyzers - “Rerun(DifferentModule)”, (2) Perform the Rerun analyses on the same analyzer - “Rerun(SameModule)”, (3) Do not specify analyzer - “Rerun(AnyModule)”. However, even if “Rerun(DifferentModule)” was specified, if the Rerun analysis cannot be performed due to a non-existing analysis item or the status of the analyzer, the Rerun analysis will be performed on the same analyzer.
- If the “Reflex” actions from multiple conditional expressions specify different discrete tests to be added, the Reflex analysis will be performed on the union of the respective discrete tests.

[Example] If the discrete test in the initial analysis was CBC, and the actions “Reflex(DIFF)” and “Reflex(RET)” become qualified simultaneously, the Reflex analysis will be performed with discrete tests CBC+DIFF+RET.

- If all of the discrete tests specified to be added by the “Reflex” actions have already been analyzed in the initial analysis, the Reflex analysis will not be executed.
- If no other actions are qualified except “None”, you can also execute “QueryToHost” instead of “None”. See 5.2.2.1 on how to configure this.
- If the result of Rerun/Reflex analysis is Rerun, Rerun(AnyModule) is set and an instrument is not specified.
- In XN-9000, actions that span multiple analyzers cannot be specified. For example, in an A1, A1, B4 configuration, Reflex(PLT-F) cannot be executed for a result analyzed by B4.

### 5.1.3. SP rule

Only on the system model XN-3000 (Standalone mode), XN-3100 (Standalone mode) and XN-1500, the SP rule determines whether or not smear preparation is necessary, and registers the SP order in the smear registration screen. As the prerequisite in Table 5-1 shows, the SP rule is evaluated only if the SP order has not been registered in the

[Example] If an SP order was registered by the SP rule-based judgment from the initial analysis, the order is considered as already registered by the time the Reflex analysis is performed, so the SP rule will not be evaluated.

With SP rules, similar to the Rerun/Reflex/Comment rule (5.1.2), you can register onboard rules to match the way the laboratory is operated, by entering the conditional expressions and actions in the screen. The selectable actions are listed below:

Smear	Prepares smear slides when the conditional expression holds true.
BlockSmear	Does not prepare smear slides when the conditional expression holds true.

If “Smear” and “BlockSmear” become qualified simultaneously from different conditional expressions, the action to be executed is determined by the following priority:

“BlockSmear” > “Smear”

[Example] If “BlockSmear” and “Smear” become qualified simultaneously by different conditional expressions, smear preparation will not be performed.

For the “Smear” action, the number of smear slides to prepare (1 slide, 2 slides) and cassette (cassette 1, cassette 2, either) can be specified. For the number of slides, 2 slides has higher priority than 1 slide. For cassette, cassette 2 (right cassette) has higher priority than cassette 1 (left cassette). In XN-3100 (Standalone mode) and XN-1500, the smear condition, number of preparations, additional rinses, and alarm can also be specified. If the smear condition become qualified simultaneously from different conditional expressions, the condition is determined by the following priority:

16 > 15 > ... > 2 > 1 > “Specify by SP”

For number of preparations, a higher number has higher priority. For additional rinses, a higher number has higher priority. For alarm, “Yes” has priority than “No”.

When the system model is the XN-3000 (Standalone mode), XN-3100 (Standalone mode) or XN-1500 and “Connecting the DIA” is set to ON in the SystemConfig, whether or not to perform “Feed out the cassette to DIA” can be set for each slide glass. Setting to perform feed-out to DIA has higher priority than the other one.

#### 5.1.4. Validation rule, Output rule

In auto validation and auto output judgment, you can use the simple settings, in which the condition is selected from a set of preset options, or the onboard rules, in which the conditional statements can be customized. Regardless of whether simple settings or Output rule is used, the judgment on whether or not to perform auto output is determined after validation is done (see Fig. 5-1), and requires that the validation is complete (see Table 5-1).

With Validation rules and Output rules, similar to the Rerun/Reflex/Comment rule (5.1.2), you can register onboard rules to match the way the laboratory is operated, by entering the conditional expressions and actions in the screen.

The selectable actions for the Validation rule are listed below:

Validate	Validates when the conditional expression holds true.
BlockValidate	Does not validate when the conditional expression holds true.

The selectable actions for the Output rule are listed below:

ReportTo(...)	Outputs to the destination specified in (...) when the conditional expression holds true.
BlockReport	Does not output when the conditional expression holds true.

If different conditional expressions with conflicting actions hold true, the action to be executed is determined by the following priority:

“BlockValidate” > “Validate”

“BlockReport” > “ReportTo(…)”

[Example] If “BlockReport” and “ReportTo(HC)” become qualified simultaneously from different conditional expressions, auto output will not be performed.

In the Output rule, you can specify the output destination in combination with the action. The three types of destinations are: Host Computer (HC), Graphic Printer (GP), and Ticket (DP). If the “ReportTo(…)” actions from multiple conditional expressions specify different output destinations, the output will be sent to the union of the respective destinations.

[Example] If “ReportTo(HC)” and “ReportTo(GP)” become qualified simultaneously from different conditional expressions, the output will be sent to HC+GP.

[Example] If an analysis data, for which “ReportTo(HC)” has already been executed, was manually validated, and the Output rule determines the action to be “ReportTo(HC+GP)”, it will only output to GP since it has not been output yet.

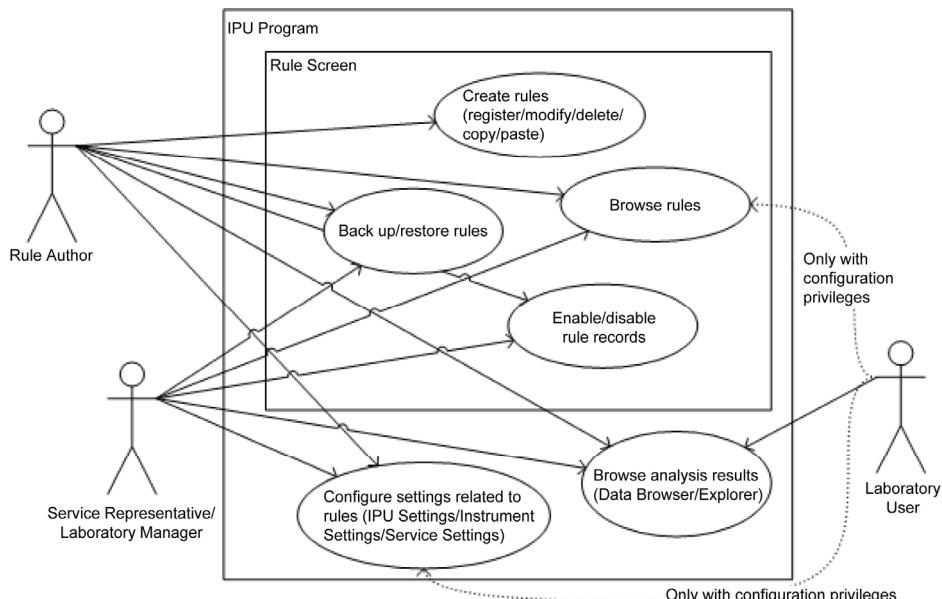
## 5.2. How to Use Onboard Rules

Three roles (actors) listed in Table 5-2 are assumed to be the users of the onboard rules. This section will explain the role of each actor, as well as the necessary usage for each actor.

**Table 5-2: Actors who use onboard rules**

Actor name	IPU user	Role
Rule author	super	An internal person who listens to the requests from the laboratory and creates onboard rules (see 5.2.1 for usage).
Service representative/ Laboratory manager	sysmex admin	A service representative or laboratory manager who applies the created onboard rules to the laboratory (see 5.2.2 for usage).
Laboratory user	General user	A person in charge of blood tests, who browses the registered onboard rules and checks the obtained analysis results (see 5.2.3 for usage).

Fig. 5-2 shows how each actor uses the different functions of the onboard rules.



**Fig. 5-2: Use cases for onboard rules**

Each actor can use the necessary functions by logging into the IPU as IPU user indicated in the “IPU user” column of Table 5-2. Table 5-3 shows the privileges granted for each user.

**Table 5-3: Privileges granted to IPU users**

Function name		super	sysmex	admin	General user
Rule screen	Register/Modify/Delete	✓	(*2)	(*2)	—
	Copy/Paste	✓	(*2)	(*2)	—
	Backup/Restore	✓	✓	✓	—
	Enable/Disable	✓	✓	✓	—
	Print	✓	✓	✓	—
	Browse/Sort rules	✓	✓	✓	✓(*1)
Setting	Service settings	✓	✓	—	—
	IPU settings/Analyzer settings	✓	✓	✓	✓(*1)
Browse analysis results		✓	✓	✓	✓

(\*1) Only allowed for users with “Modify Settings” privilege.

(\*2) Privilege can be granted by super user in Service Settings (see 5.3.2).

### 5.2.1. Creating onboard rule records (Rule author)

This section explains the necessary usage by an internal person in listening to laboratory requests and creating the onboard rules. Make sure to evaluate the created onboard rules sufficiently before applying them.

#### 5.2.1.1. Modifying records for Repeat rule

This section explains how a record is modified for a Repeat rule (see 5.1.1). First, check the settings to be applied to the laboratory (see 5.2.2.1). If the settings use the Repeat rule, use the steps in this section to modify the Repeat rule records to match the operational usage of the laboratory.

The “Repeat Rule” tab in the Rule screen contains a fixed number of preset records that were registered at the time of installation. There is one record for each type of analysis error, and the action for when the analysis error occurs can be selected from “None”, “Repeat”, and “BlockRepeat”. However, records showing the action as “BlockRepeat(Fixed)” cannot be changed from “BlockRepeat”.

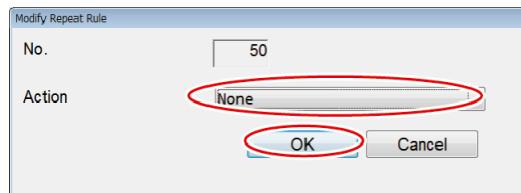
As an example, we will explain how to configure the rule to meet the laboratory request to change “BlockRepeat” to “None” for analysis data with <Data Errors>. At the time of installation, the action for <Data Errors> is set to “BlockRepeat”, so Repeat analysis will not be performed, even if “Repeat” actions become qualified by other analysis errors. By changing the action to “None”, we want it to have the same behavior as if the record for <Data Errors> does not exist.

[Steps for modifying a Repeat rule]

1. Open the “Repeat Rule” tab in the Rule screen, and select the record for “<Data Errors>”.
2. Open the “Modify Repeat Rule” dialog box by clicking the [Modify] button on the toolbar. (You can also modify by pressing [Enter] or [F8] on the keyboard, or double-clicking the record.)



3. Open the “Action” combo box and change from “BlockRepeat” to “None”, then click [OK].



\* Depending on whether or not analyzable items exist, the value for the “No.”, which is a serial number, may be different.

4. Check the record for “<Data Errors>” in the “Repeat Rule” tab. Make sure that the value in the “Action” column has changed to “None”, and that the date modified reflects the date and time when it was set.

### 5.2.1.2. Registering records for rules other than Repeat rule

This section explains how to register onboard rules other than the Repeat rule (Rerun/Reflex/Comment rule (see 5.1.2), Comment rule (see 5.1.2), SP rule (see 5.1.3), Validation rule (see 5.1.4), and Output rule (see 5.1.4)).

First, check the settings to be applied to the laboratory (see 5.2.2.1).

If it is configured to use onboard rules, use the corresponding tab in the Rule screen to register the onboard rule records to accommodate the operational usage of the laboratory. Table 5-4 shows the parameters that can be entered for each single record of onboard rules.

**Table 5-4: List of input parameters for record registration**

Parameter name	Parameter to enter	Parameter reference source
No.	Serial number between 1 to 100. When the Registration dialog box opens, the next available number is assigned automatically. This cannot be changed after registration is complete.	This is output to the comment record in the ASTM output, when the “Rerun/Reflex/Comment rule” or “Comment rule” conditional expression holds true.
Name	Name containing a maximum of 20 characters total.	This is output to the comment record in the ASTM output, when the “Rerun/Reflex/Comment rule” or “Comment rule” conditional expression holds true.
Description	Description containing a maximum of 200 characters total. Enter any additional description of the conditional expression, or details that cannot be fully described in the action comment.	Only displayed on the Rule screen, and cannot be referenced from other functions.
Conditional expression	Enter the conditional expression by making selections and using buttons on the screen. A conditional expression of over 400 digits cannot be registered.	Evaluated when the analysis data is received.
Action	Select from preset options by onboard rule type (See attachment 2 “Onboard Rule Action List”).	One set action is executed when the conditional expression holds true.
Slide glass	Specifies the slide glass for the SP rule. Can be set only in “SP Rule”.	Referenced when the SP rule’s conditional expression with “Smear” action holds true.
Action comment	Action comment containing a maximum of 40 characters total. Can be set only in “Rerun/Reflex/Comment Rule” and “Comment Rule”.	Displayed in the “Error/Rule Comments” field in the Browser screen when the conditional expression holds true.
Importance	Select from “Low”, “Medium” and “High”. Can be set only in “Rerun/Reflex/Comment Rule” and “Comment Rule”.	Sets the order and color with which the comments are displayed on the Browser screen. Output by “Importance” when the comment record of the ASTM output is output.

Since the registration procedure is the same for all onboard rule types, we will use the Rerun/Reflex/Comment rule in this section. The following are steps for registering a rule, using as an example a request to “perform a Reflex analysis with an added PLT-F test, if the message ‘PLT Abn Distribution’ appears”.

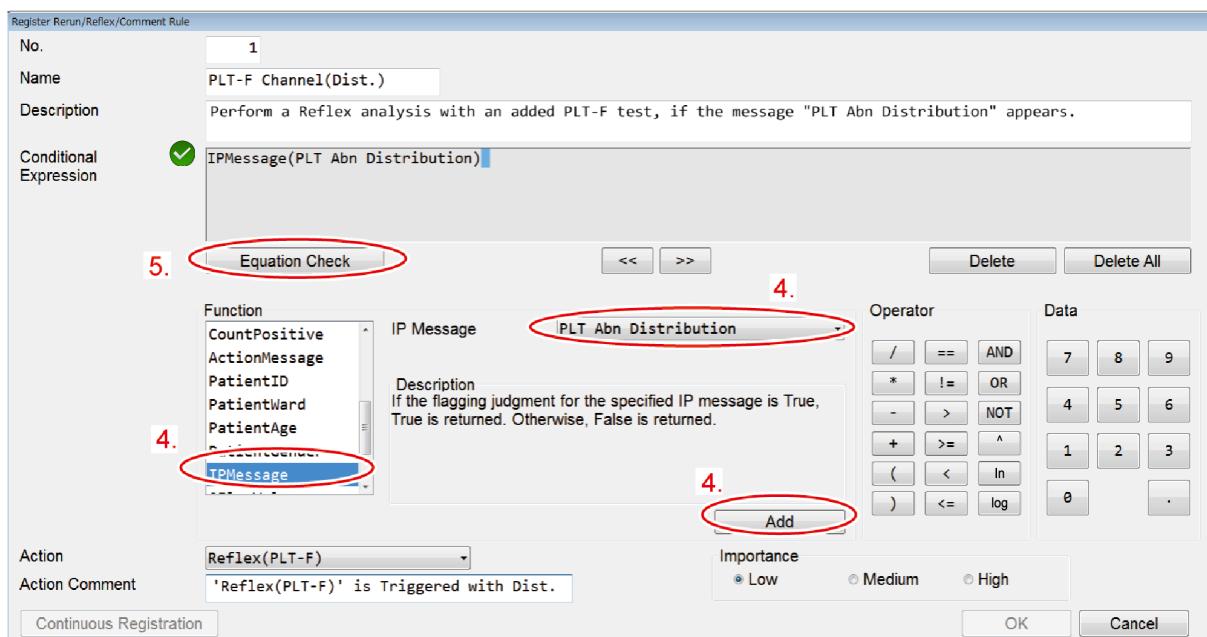
[Steps for registering a Rerun/Reflex/Comment rule]

1. Open the “Rerun/Reflex/Comment Rule” tab in the Rule screen.
2. Open the “Register Rerun/Reflex/Comment Rule” dialog box by clicking the [Regist.] button on the toolbar (You can also register by pressing the [F7] key).



Once the number of registered records reaches 100, you will need to start deleting records to register new records (see 5.2.1.6 and 5.3.7).

3. Enter the parameters in each of the controls in the Registration dialog box.



Leave “No.” as displayed, unless you need to assign a specific number.

Enter the values for “Name”, “Description”, and “Action Comment” using the keyboard.

Select “Action” and “Importance” from their respective set of options.

4. Use the controls on the screen to write a conditional expression to evaluate if the message “PLT Abn Distribution” appeared. Select “IPMessage” from the “Function” list, and select “PLT Abn Distribution” from “IP Message” shown to the right. Click the [Add] button.
5. Once you have finished entering the conditional expression, click [Expression Check] button. If there are no syntax errors in the conditional expression, a green check mark is displayed, and the [OK] and [Continuous Registration] buttons become enabled.
6. Click [OK] to register the record and close the screen, and [Continuous Registration] button to continue registering records.
7. In the “Rerun/Reflex/Comment Rule” tab, check the registered record. Make sure the Update Date reflects the date and time when the record was set.

### 5.2.1.3. Modifying records for rules other than Repeat rule

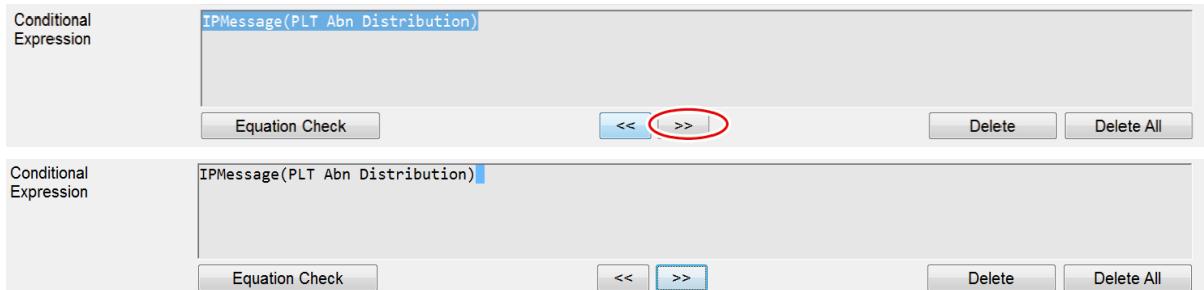
If you need to modify an already registered record, use the modify function for the rule. We will explain the steps for modifying a rule, using an example of this request: “With the registered rule which only evaluates if the message ‘PLT Abn Distribution’ appeared, the frequency of the Reflex analysis became too high, so **judge by using the AND condition with another condition, that the PLT value must be less than 50,000.**

[Steps for modifying a Rerun/Reflex/Comment Rule]

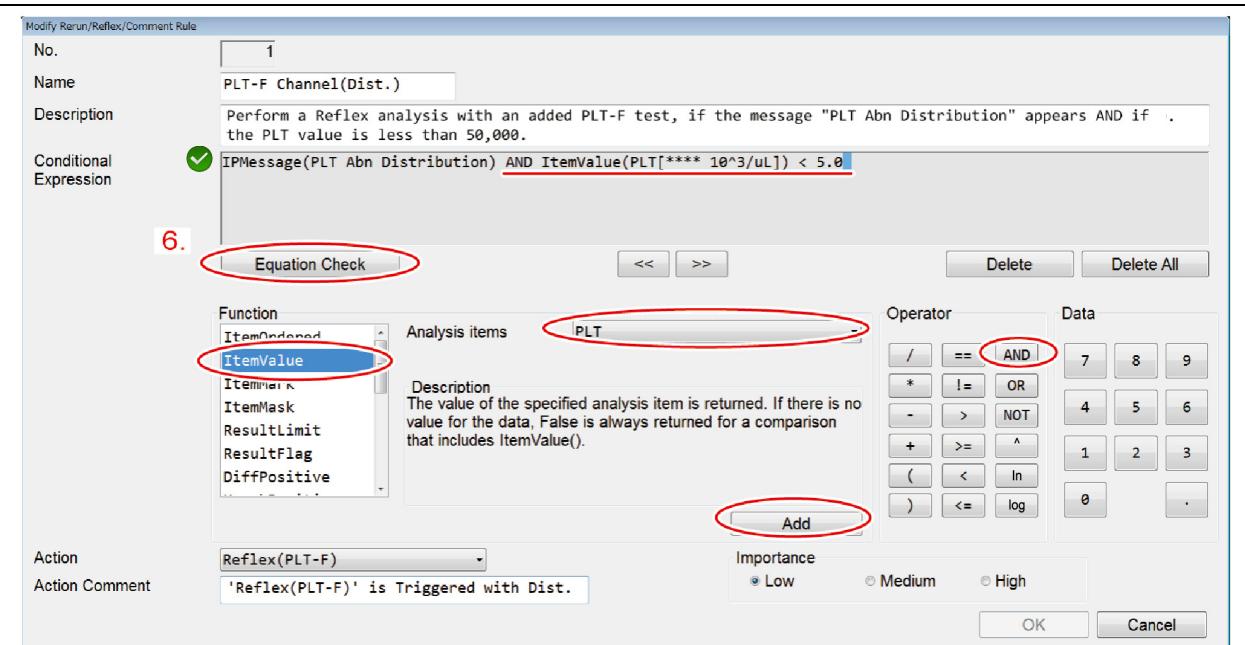
1. Open the “Rerun/Reflex/Comment Rule” tab in the Rule screen, and select the record you want to modify.
2. Open the “Modify Rerun/Reflex/Comment Rule” dialog box by clicking the [Modify] button on the toolbar.  
(You can also modify by pressing [Enter] or [F8] on the keyboard, or double-clicking the record.)



3. Modify the parameters in the Modify dialog box. However, note that “No.” cannot be modified from the registered value.
4. To add the condition “PLT value is under 50,000”, move the cursor (blue highlighted block) to the insertion point. Move to the end by clicking the “>>” button.



5. With the cursor moved to the end, click the [AND] button. Select “ItemValue” from the “Function” list, and select “PLT” from “Analysis items” shown to the right. Click the [Add] button. Click the appropriate buttons so that the expression “AND ItemValue(PLT[\*\*\*\* 10^3/uL]) < 5.0” is added to the conditional expression display area.



6. Once you have finished entering the conditional expression, click [Expression Check] button. If there are no syntax errors in the conditional expression, a green check mark is displayed, and the [OK] button becomes enabled. (In the Modify dialog box, the [Continuous Registration] function is unavailable.)
7. Click [OK]. In the “Rerun/Reflex/Comment Rule” tab, check the modified record. Make sure the Update Date reflects the date and time when the record was set.

#### 5.2.1.4. Copying/Pasting records for rules other than Repeat rule

The copy/paste function is useful when registering multiple rules that are similar.

In the following example, we will explain the steps to register the rule “If **‘WBC Abn Scattergram’** appears AND **‘WBC value is less than 500**, perform a Reflex analysis on **‘DIFF+WPC’**”, by copying and pasting an already registered rule “If **‘PLT Abn Distribution’** appears AND **‘PLT value is less than 5,000,000**, perform a Reflex analysis on **‘PLT-F’**”.

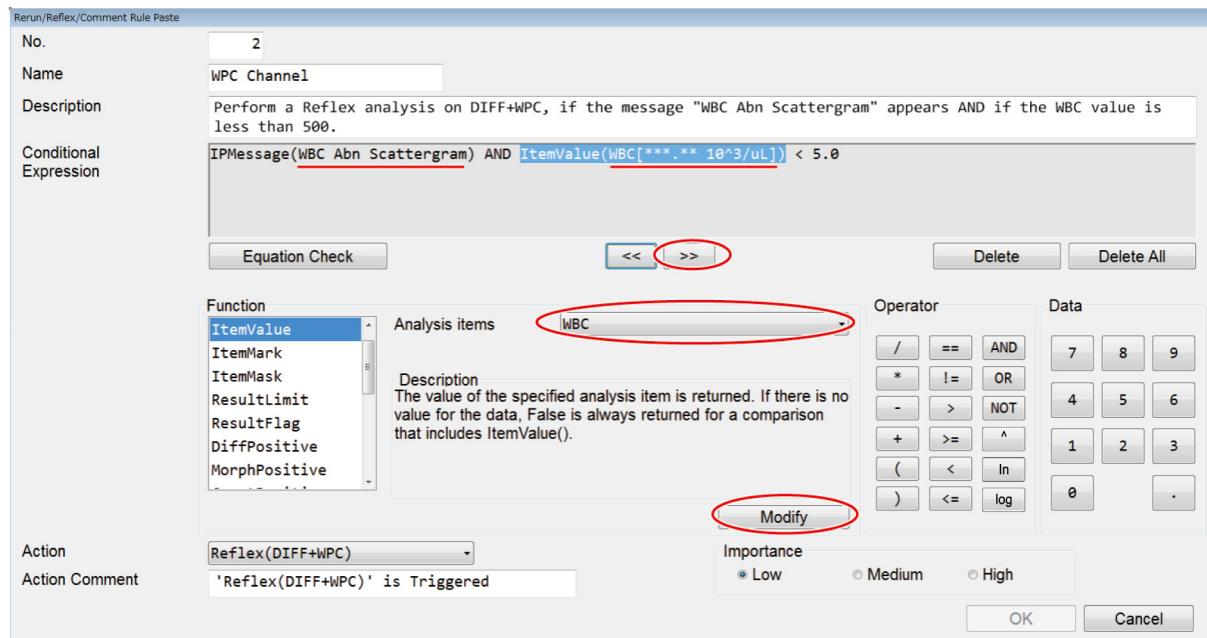
##### [Steps for copying/pasting a Rerun/Reflex/Comment Rule]

1. Open the “Rerun/Reflex/Comment Rule” tab in the Rule screen, and select one record that is already registered.
2. Copy by clicking the [Copy] button on the toolbar (You can also copy by pressing [Ctrl] + [C] on the keyboard).



3. Open the “Paste Rerun/Reflex/Comment Rule” dialog box by clicking the [Paste] button on the toolbar (You can also paste by pressing [Ctrl]+[V] on the keyboard).
4. Modify as necessary the parameters displayed in the Paste dialog box.
5. In the conditional expression display area, make sure that the cursor is on the function “IPMessage” at beginning of the expression, then change the IP message from “PLT Abn Distribution” to “WBC Abn Scattergram”. Click the [Modify] button.

6. Click the “>>” button to move the cursor to the function “ItemValue”, then change the item from “PLT” to “WBC”. Click the [Modify] button.



7. Once you have finished entering the conditional expression, click [Expression Check] button. If there are no syntax errors in the conditional expression, a green check mark is displayed, and the [OK] button becomes enabled. (The [Continuous Registration] button is not available in the Paste dialog box; however, after the Paste dialog box is closed, you can continue to use the paste function.)
8. Click [OK]. In the “Rerun/Reflex/Comment Rule” tab, check the modified record. Make sure the Update Date reflects the date and time when the record was set.

Note that in the above example, both the copy source and destination were “Rerun/Reflex/Comment rule”.

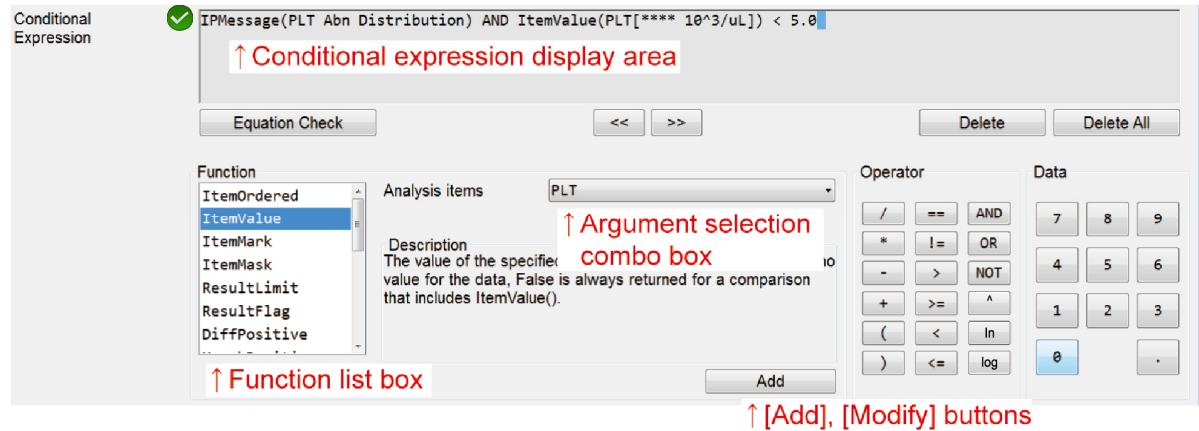
Pasting on a different type of onboard rule is also possible. However, the “Repeat Rule” whose number of records is fixed, cannot be used as copy source or destination. Since the parameters that can be entered will vary with onboard rule type, carefully review the displayed controls on the Paste dialog box.

#### 5.2.1.5. Entering conditional expressions

As mentioned already, conditional expressions for rules are entered not by keyboard, but by using a control panel such as that shown in Fig. 5-3. The control panel has various controls such as display area, buttons, list boxes, and combo boxes. Table 5-5 explains each of the controls.

The following cases require attention although a green check mark appears for expression check.

- The range of supported numbers is from  $-1.79769313486232 \times 10^{308}$  to  $+1.79769313486232 \times 10^{308}$ . If a value is outside of this range, rules following that onboard rule are not judged.
- An operation that includes a non-number will return a non-number, so a logical operation including a non-number will always be false.
- If the anti-logarithm of a logarithm is negative, the result of a logarithm operation will be a non-number.



**Fig. 5-3: Control panel for entering conditional expressions for onboard rules**

**Table 5-5: Explanation of controls on the control panel**

Control name		Description
Display, cursor operation	Conditional expression display area	Displays the entered conditional expression. A cursor (blue highlighted block) indicates the entry/deletion position.
	[<<] / [>>] buttons	Moves the cursor to the left/right within the conditional expression display area.
	[Delete] button	Deletes the element selected by the cursor. If no element is selected, then the previous element is deleted.
	[Delete All] button	Deletes all elements of the entered conditional expression.
Function entry	Function list box	Select the function to be placed as an element in the conditional expression (See attachment 1 "Onboard Rule Function List"). The argument selection combo box and description fields are updated according to the selected function in the Function list box.
	Argument selection combo box	Up to two arguments are displayed, according to the selected function type in the Function list box. If the argument type is analysis item, items that cannot be analyzed are also displayed.
	[Add], [Modify] buttons	Inserts the selected function in the Function list box to the conditional expression display area. If an entered function is selected by the cursor, the [Modify] button replaces it. If there is nothing selected, the [Add] button inserts the function.
Number entry	Operator buttons	<ul style="list-style-type: none"> <li>Arithmetic operators: “/”, “*”, “-”, “+”, “^”, “ln”, “log”</li> <li>The anti-logarithm of "ln" and "log" must be enclosed in parentheses.</li> <li>Parentheses: “(”, “)”</li> <li>Comparative operators: “==”, “!=”, “&gt;”, “&gt;=”, “&lt;”, “&lt;=”</li> <li>Logical operators: “AND”, “OR”, “NOT”</li> </ul>
	Numeric value buttons	Enter numeric values by combining 0 - 9 and decimal point.
Express check	[Expression Check] button	Checks the entered conditional expression for correctness. If there are no syntax errors in the conditional expression, a green check mark  is displayed. When confirming the content of the conditional expression, [Expression Check] is required to have been executed.

Examples of valid and invalid conditional expressions entered from the control panel are discussed below:

**Table 5-6: Examples of valid and invalid conditional expressions**

Sample conditional expression	Description of conditional expression
 55.5 >= 50.0 * 1.1	“Numeric value Comparative operator Numeric Value” is a valid conditional expression. Here, such combination as “Numeric value Arithmetic operator Numeric Value” shown on the right side is also considered a “Numeric Value”. The example is an obvious conditional expression that always holds true.
 ItemValue(WBC-D) >= ItemValue(WBC-N) * 1.1	In addition to elements entered using the numeric value buttons, functions with return values (ItemValue, PatientAge, QFlagValue) are also considered as “Numeric value”. This example shows a conditional expression that holds true if the WBC-D value is at least 1.1 times the WBC-N value.  * <b><u>If the denominator of the quotient is 0, the result may not be obtained as intended. Express as a product as shown in the example.</u></b>
 20.0 >= ItemValue(WBC) >= 10.0	Comparative operations containing three or more terms, e.g. “Numeric value Comparative operator Numeric value Comparative operator Numeric value”, are invalid.
 20.0 >= ItemValue(WBC) AND ItemValue(WBC) >= 10.0	“Conditional expression Logical operator Conditional expression” is a valid conditional expression. Comparative operations with three or more terms can be rewritten as a valid conditional expression, using the AND operator.
 IPMessage(NRBC Present) AND PatientAge(Months) >= 6	Functions that return TRUE/FALSE can alone make up a conditional expression. This example consists of “Conditional expression Logical operator Conditional expression” and is hence a valid conditional expression.  This conditional expression hold true if the message “NRBC Present” appears for a patient over 6 months old.
 IPMessage(NRBC Present) >= 6 AND PatientAge(Months)	If a conditional expression is entered where a numeric value needs to be entered, or if a numeric value is entered where a conditional expression needs to be entered, the expression is invalid. In this example, the conditional expression has the above errors in two places.
 IPMessage(NRBC Present) AND IPMessage(Anemia) OR IPMessage(Fragments?)	Conditional expression containing three or more logical operators, e.g. “Conditional expression Logical operator Conditional expression Logical operator Conditional expression”, are also considered as a valid conditional expression.  However, AND has higher priority than OR, “X AND Y OR Z” is the same as “( X AND Y ) OR Z”.
 IPMessage(NRBC Present) AND ( IPMessage(Anemia) OR IPMessage(Fragments?) )	If you want to give higher priority to OR than AND in the above conditional expression, used the parentheses to express it as “X AND ( Y OR Z )”.

#### 5.2.1.6. Deleting and initializing records

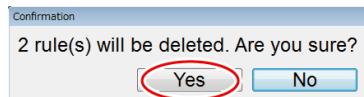
If a record that you registered in 5.2.1.2 becomes unnecessary, you can delete it. However, you cannot delete Repeat rules, which has a fixed number of records. Since there are no differences in the process between the onboard rule types, we will use the Rerun/Reflex/Comment rule as an example in this section.

[Steps for deleting a Rerun/Reflex/Comment Rule]

1. Open the “Rerun/Reflex/Comment Rule” tab in the Rule screen, and select record(s) that are no longer needed (multiple selection possible).
2. Delete by clicking the [Delete] button on the toolbar (You can also delete by pressing the [Delete] key on the keyboard).



3. A Confirmation dialog box opens. Select [Yes] if there is no problem in deleting it.



If you want to delete all records, you can initialize from [File] - [Initialize] (procedure in the Administrator's Guide). The type of onboard rule to initialize can be selected by tab. For the Repeat rules, initializing will revert all records to their initial installation values. For all other onboard rules, initializing will delete all records.

#### 5.2.1.7. Distributing onboard rules using backup

Onboard rules that have completed evaluation can be applied to other laboratories using the backup/restore function (procedures in the Administrator's Guide). Even if rules are created in the laboratory, saving a backup of the onboard rules is useful for responding to questions and requests.

## 5.2.2. Applying onboard rules to laboratory (Service representative/Laboratory manager)

This assumes that a service representative visits the laboratory and configures the onboard rules at the time of installation or request. For settings other than the Service Settings, it is also assumed that laboratory manager, who has been informed by the service representative, could perform the configuration.

### 5.2.2.1. Settings for onboard rules

Depending on the applicable laboratory's operation, a judgment is made on whether or not each functionality of the onboard rules is necessary, then the settings are changed as necessary.

#### ➤ Settings for Repeat analysis

Laboratory operational usage	Location of setting
Perform Repeat analysis	<ul style="list-style-type: none"> <li>Select the “Repeat” checkbox in [Analyzer Settings] - [Repeat Settings] (default setting).</li> </ul>
Do not perform Repeat analysis	<ul style="list-style-type: none"> <li><u>Clear the “Repeat” checkbox in [Analyzer Settings] - [Repeat Settings].</u></li> </ul>

\* Can be set in all system models except XN-1000 (SA-01).

\* Since each instrument has this setting, for XN-9000, this is set per analyzer.

#### ➤ Settings for Rerun/Reflex analysis

Laboratory operational usage	Location of setting
If Rerun/Reflex analysis is performed by onboard rule-based judgment alone	<ul style="list-style-type: none"> <li>Select the “Rerun/Reflex” checkbox in [Analyzer Settings] - [Rerun/Reflex Settings] (default setting).</li> <li>Set [Service Settings] - [IPU settings] - [Miscellaneous] - [Query host computer for Rerun/Reflex analysis] to “0” (default setting).</li> <li><u>Register records in the “Rerun/Reflex/Comment Rule” tab in the Rule screen</u> (Note: No records means the same as not performing Rerun/Reflex analysis).</li> </ul>
Perform Rerun/Reflex analysis by upper-level terminal’s judgment alone	<ul style="list-style-type: none"> <li>Select the “Rerun/Reflex” checkbox in [Analyzer Settings] - [Rerun/Reflex Settings] (default setting).</li> <li><u>Set [Service Settings] - [IPU settings] - [Miscellaneous] - [Query host computer for Rerun/Reflex analysis] to “1”.</u></li> <li>Do not register any records in the “Rerun/Reflex/Comment Rule” tab in the Rule screen (default setting).</li> <li><u>Configure [IPU Setting] - [Host Computer Connection Settings] appropriately so that the host terminal can be inquired.</u></li> </ul>
Perform Rerun/Reflex analysis by judgment from both the onboard rules and upper-level terminal	<ul style="list-style-type: none"> <li>Select the “Rerun/Reflex” checkbox in [Analyzer Settings] - [Rerun/Reflex Settings] (default setting).</li> <li><u>Set [Service Settings] - [IPU settings] - [Miscellaneous] - [Query host computer for Rerun/Reflex analysis] to “1” or “2”,</u> (Note: If set to “1”, when the Rerun/Reflex/Comment rule does not qualify any action except for “None”, the upper-level host terminal will be inquired. If set to “2”, the upper-level host terminal will be inquired only if the rule with the “QueryToHost” action holds true.)</li> </ul>

	<ul style="list-style-type: none"> <li>• <u>Register records in the “Rerun/Reflex/Comment Rule” tab in the Rule screen.</u></li> <li>• <u>Configure [IPU Setting] - [Host Computer Connection Settings] appropriately so that the host terminal can be inquired.</u></li> </ul>
Do not perform Rerun/Reflex analysis	<ul style="list-style-type: none"> <li>• <u>Clear the “Rerun/Reflex” checkbox in [Analyzer Settings] - [Rerun/Reflex Settings].</u></li> <li>• Set [Service Settings] - [IPU settings] - [Miscellaneous] - [Query host computer for Rerun/Reflex analysis] to “0” (default setting). (Note: Records registered in the “Rerun/Reflex/Comment Rule” tab in the Rule screen will be ignored.)</li> </ul>

\* Can be set in all system models except XN-1000 (SA-01).

\* XN-3000 (Standalone mode), XN-3100 (Standalone mode) and XN-1500 cannot be configured to operate by judgment from upper-level host terminal.

\* Since each instrument has this setting, for XN-9000, this is set per analyzer. For this reason, analysis cannot be performed with a different analyzer specified.

\* Configuring the “Service Setting” requires logging in as sysmex or super user.

Even for users who cannot configure the Service Settings, it is possible to check the settings from the comment in the upper right corner of the Rule screen.

\* If the “Rerun/Reflex” check box is cleared, comment will not be added either.

➤ Onboard rules settings for adding comments

For XN-1000 (SA-01): There is no setting to disable the comment function.

For other system models: Comments are added in conjunction with the above “Rerun/Reflex” setting.

➤ Settings for judgment of smear preparation

Laboratory operational usage	Location of setting
Perform judgment of smear preparation	<ul style="list-style-type: none"> <li>• Select the “Perform Judgment of SP Rule” checkbox in [Analyzer Settings] - [SP Rule Setting] (default setting).</li> </ul>
Do not perform judgment of smear preparation	<ul style="list-style-type: none"> <li>• <u>Clear the “Perform Judgment of SP Rule” checkbox in [Analyzer Settings] - [SP Rule Setting].</u> (Note: Records registered in the “SP Rule” tab in the Rule screen will be ignored.)</li> </ul>

\* Can be set only in XN-3000 (Standalone mode), XN-3100 (Standalone mode) and XN-1500.

➤ Settings for validation rule

Laboratory operational usage	Location of setting
Do not auto validate	<ul style="list-style-type: none"> <li>Clear the “Auto Validate” checkbox in [IPU Setting] - [Auto Validate] (default setting). (Note: Records registered in the “Validation Rule” tab in the Rule screen will be ignored.)</li> </ul>
Auto validate by simple settings	<ul style="list-style-type: none"> <li><b><u>Select the “Auto Validate” checkbox in [IPU Setting] - [Auto Validate]. Then select “Use simple settings” and configure the sample to auto validate.</u></b> (Note: Records registered in the “Validation Rule” tab in the Rule screen will be ignored.)</li> </ul>
Auto validate using onboard rules	<ul style="list-style-type: none"> <li><b><u>Select the “Auto Validate” checkbox in [IPU Setting] - [Auto Validate]. Then select “Set in rule view”.</u></b></li> <li><b><u>Register records in the “Validation Rule” tab in the Rule screen.</u></b></li> </ul>

\* The settings for auto validation can be checked from the flow chart displayed in the Rule screen.

➤ Settings for output rule

Laboratory operational usage	Location of setting
Do not auto output	<ul style="list-style-type: none"> <li>Clear the “Auto Output” checkbox in [IPU Setting] - [Auto Output] (default setting). (Note: Records registered in the “Output Rule” tab in the Rule screen will be ignored.)</li> </ul>
Auto output by simple settings	<ul style="list-style-type: none"> <li><b><u>Select the “Auto Output” checkbox in [IPU Setting] - [Auto Output]. Then select “Use simple settings” and configure the conditions for auto output.</u></b> (Note: Records registered in the “Output Rule” tab in the Rule screen will be ignored.)</li> <li><b><u>In [IPU Setting], configure [Host Computer Connection Settings], [Printer Connection Settings], and [Ticket (DP) Setting] appropriately to ensure output to the specified destination.</u></b></li> </ul>
Auto output using onboard rules	<ul style="list-style-type: none"> <li><b><u>Select the “Auto Output” checkbox in [IPU Setting] - [Auto Output]. Then select “Set in rule view”.</u></b></li> <li><b><u>Register records in the “Output Rule” tab in the Rule screen.</u></b></li> <li><b><u>In [IPU Setting], configure [Host Computer Connection Settings], [Printer Connection Settings], and [Ticket (DP) Setting] appropriately to ensure output to the specified destination.</u></b></li> </ul>

\* The settings for auto output can be checked from the flow chart displayed in the Rule screen.

### 5.2.2.2. Restoring distributed rules

Onboard rules distributed by the rule author can be applied to the laboratory by using a restore operation (procedure in Administrator's Guide). Unless specifically requested, Sysmex recommend restoring the Rerun/Reflex/Comment rules to their defaults.

#### [Steps for restoring default rules]

1. Login as super, sysmex, or admin user.
2. Open the “Rerun/Reflex/Comment Rule” tab in the Rule screen, and make sure there are no records.
3. Select [File] - [Restore] on the toolbar.
4. According to the analyzer placed at left-most position and the registration license (check by opening “Version Information” from the Menu screen), restore the backup using the path indicated in Table 5-7.
5. The “Restore” dialog box opens. Make sure only the “Rerun/Reflex/Comment Rule” checkbox is selected, and click [OK].
6. If the “Confirmation” dialog box is displayed, click the [Yes] button.  
If a confirmation message about the unit is displayed, there is no problem with the default rules (see 5.3.8).
7. In the “Rerun/Reflex/Comment” tab in the Rule screen, check that the records are registered, and all records are showing the Valid icon .

**Table 5-7: Default rule storage path by analyzer and registration license**

Left-most analyzer	Registration license	Default storage path for default rules
XN-20/XN-21	PLT-F	C:\Program Files\Sysmex\XN_XX-XX_XXX\IPU\Default Settings\Default Rules\A1\
	-	C:\Program Files\Sysmex\XN_XX-XX_XXX\IPU\Default Settings\Default Rules\A2\
XN-10 / XN-11	RET, PLT-F	C:\Program Files\Sysmex\XN_XX-XX_XXX\IPU\Default Settings\Default Rules\B1\
	PLT-F	C:\Program Files\Sysmex\XN_XX-XX_XXX\IPU\Default Settings\Default Rules\B2\
	RET	C:\Program Files\Sysmex\XN_XX-XX_XXX\IPU\Default Settings\Default Rules\B3\
	-	C:\Program Files\Sysmex\XN_XX-XX_XXX\IPU\Default Settings\Default Rules\B4\

\* “XX-XX\_XXX” in the paths represent the current version number.

### 5.2.2.3. Enable/Disable/Invalid states of the restored rules

If a request is received to disable specific records within the registered rules, set the enable/disable states of the rule records (procedure in Administrator's Guide). This can be checked by looking at the icons displayed in the left-most column on the Rule screen (Enabled: , Disabled: , Invalid: ).

- |                   |   |
|-------------------|---|
| [Usage example 1] | If the registered rules contain rules that were meant as a temporary solution until the upgrade, these specific records will become unnecessary after the upgrade. Even in the absence of super user with deletion privilege, these rules can be disabled by sysmex user or admin user. |
| [Usage example 2] | By disabling and backing up records that you might need in the future, or multiple records that differ only in parameters, you can restore them and enable them according to the operational usage of the laboratory or by request.   |

If a confirmation message about the unit is displayed at the time of restoring the backup (see 5.3.8), or if, after restoring the backup, there are records showing the Invalid icon  in the left-most column in the Rule screen, this means that environment in which the onboard rules were created is different from the laboratory environment in which the backup was restored. Check that the intended backup file was restored.

If the record contains a function or action that cannot be used in the post-restore environment, the record is invalid. To enable an invalid record, it must be modified (see 5.2.1.3). Even if an invalid record exists, the other records showing the Enabled icon  will work.

### 5.2.3. Checking the onboard rules' registered records and judgment results (Laboratory user)

This section will discuss the functions necessary for laboratory users involved in blood tests to browse the registered onboard rules and to check the obtained analysis results. The display functions of the Rule screen, opening/closing of the flow chart, and the sort function are described in the Administrator's Guide.

#### 5.2.3.1. Checking the result of onboard rule-based judgment from the analysis data

Information about the onboard rule-based judgment, which can be obtained from the analysis results, can be checked in the Explorer screen and the Browser screen, as shown in Table 5-8. Description of each item and detailed display information will be provided later. Also refer to the "Instructions for Use" for the display functions.

**Table 5-8: Checking information on onboard rule-based judgment**

Item	Explorer screen (When installed)	Browser screen
Order Type	Displayed as text in the "Order Type" column of the common displayed item.	Displayed on the "Sample Link" button when selected. You can also navigate to another analysis data for the same sample.
Rule Result	Displayed as text in the "Rule Result" column in the Sample Info tab.	Displayed as an icon in the "Rule Result".
Error/Rule Comments	—	Displayed as text in the "Error/Rule Comments" field in the main tab.
Number of Rule Comments	Only the number is displayed as text at the end of the "Rule Result" column in the Sample Info tab.	Displayed as a balloon icon in "Rule Result".
Validation	Displayed as "V" in the common displayed item. Displayed as "(Auto Validate)" in the "Validator" column in the Sample Info tab.	—
Output	"DGH" disappears from the "Output" column in the common displayed item (with approx. 40-second delay after output).	—

##### ➤ Order Type

The Order Type indicates whether an analysis result is from the initial analysis or a Repeat/Rerun/Reflex, as shown in Table 5-9. With the "Sample Link" button in the Browser screen, if there is analysis data for a different order type on the same sample, you can navigate to it by clicking. You can also check which analyzer was used.

[Example]



The order type for the displayed analysis data is Initial. It also shows that a Reflex analysis was performed on the same instrument.

**Table 5-9: Order types**

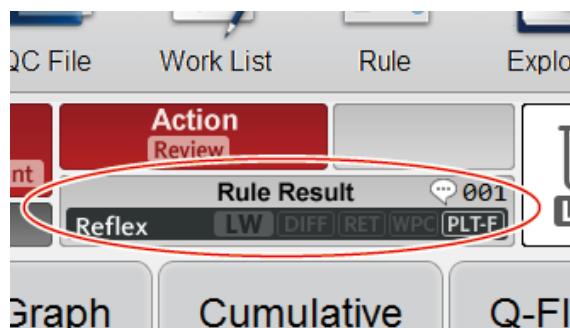
Order Type	Analysis method	Reflex performed	Rerun performed	Repeat performed	Open
Initial	Sampler	–	–	–	–
Initial/Repeat		–	–	✓	–
Rerun		–	✓	–	–
Rerun/Repeat		–	✓	✓	–
Reflex		✓	–	–	–
Reflex/Repeat		✓	–	✓	–
Manual	Manual	–	–	–	–
Manual(Open)		–	–	–	✓

If the initial analysis was judged as “QueryToHost” and was analyzed again, the order type will be displayed as “Reflex”.

#### ➤ Rule Result

Rule Result displays the action that was judged by the Repeat rule, Rerun/Reflex/Comment rule, or the Comment rule, and determined by priority. In the Browser screen, the specified analyzer is also displayed for a Rerun analysis, and the discrete tests are also displayed for a Reflex analysis.

[Example]



The rule result of the displayed analysis data is “Reflex”, and the discrete test to be added is “PLT-F”. In addition, from the balloon icon on the upper right corner, the number of rule comments is 1.

#### ➤ Error/Rule Comments

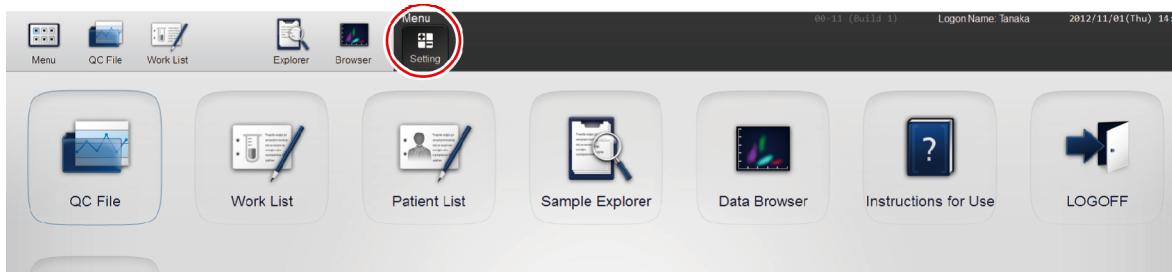
If an analysis error occurred, it is displayed. If there was no analysis error, a rule comment added by the Rerun/Reflex/Comment Rule or the Comment rule is displayed.

### 5.2.3.2. Displaying the Rule screen

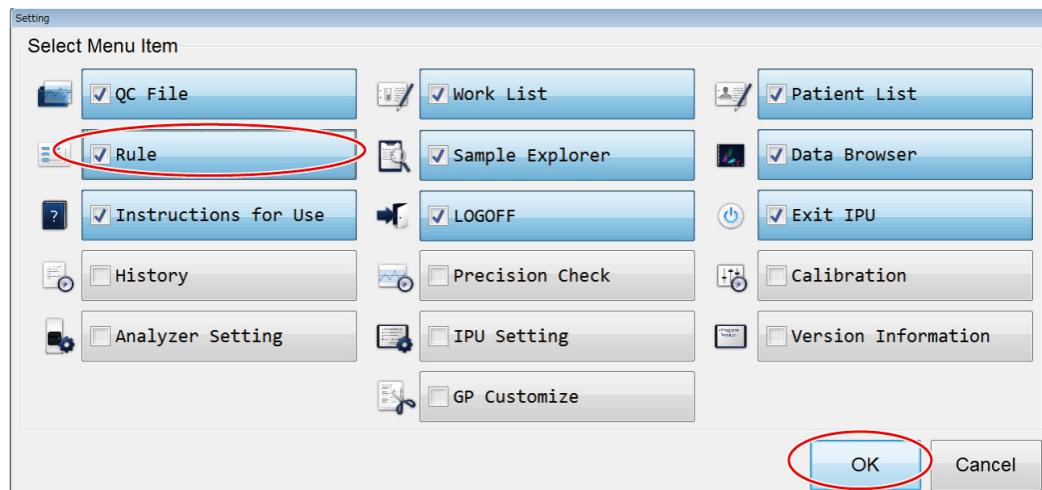
General users with configuration privilege can browse the Rule screen. However, since the Rule screen is not displayed by default for general users, display settings must be configured for users who will be browsing the Rule screen.

#### [Steps for displaying the rule screen]

1. Log in as a general user with configuration privilege.
2. Click the [Setting] button in the Menu screen.



3. In the “Setting” dialog box, select the checkbox on the [Rule] button, then click [OK] to close the dialog box.



4. Check that the “Rule” icon in the Menu screen and “Rule” button on the Menu bar are displayed.

## 5.3. TIPS

### 5.3.1. [SETTING] To prioritize Reflex over Rerun

In version 00-11, a setting was added to prioritize Reflex over Rerun. By logging in as super user or sysmex user and changing the following settings, you actualize an operational usage in which Reflex has higher priority. Confirm that this does not pose any problems in the operational usage of the laboratory before applying this setting.

Laboratory operational usage	Location of setting
Prioritize Rerun over Reflex	Set [Service Settings] - [IPU settings] - [Miscellaneous] - [Rerun and Reflex priority] to “0” (default setting).
Prioritize Reflex over Rerun	<u>Set [Service Settings] - [IPU settings] - [Miscellaneous] - [Rerun and Reflex priority]</u> to “1”.

- When set to 0:      “BlockRerunReflex” > “Rerun” > “Reflex” > “QueryToHost” > “None”
- When set to 1:      “BlockRerunReflex” > “Reflex” > “Rerun” > “QueryToHost” > “None”

The default setting is to prioritize Rerun, which is the same behavior as versions 00-10 and prior. As a background for prioritizing Rerun, there was a notion that a Reflex analysis based on judgment from an unreliable analysis result would be incorrect. However, since the Reflex analysis contains the order for a Rerun analysis, and there is no third analysis allowed, this setting was added due to a request for an administrative option for prioritizing Reflex.

Aside from the change in prioritization, a change was made to match the Rule Result displayed on the screen with the actual analysis. If there was no discrete test to add in the Reflex analysis, a setting of “0” was displayed as “Reflex”, despite the fact in actuality, no retest was performed. A change was made so that a setting of “1” displays “None” (asterisks \* in the table). Table 5-10 shows the possible combinations.

**Table 5-10: Behavior of service settings prioritizing Reflex over Rerun**

[Rerun Judgment]	[Reflex Judgment]	[Analyzed]	Rule result	
			Setting: 0	Setting: 1
FALSE	FALSE	FALSE	None	None
FALSE	FALSE	TRUE		
FALSE	TRUE	FALSE	Reflex	Reflex
FALSE	TRUE	TRUE	Reflex	None(*)
TRUE	FALSE	FALSE	Rerun	Rerun
TRUE	FALSE	TRUE		
TRUE	TRUE	FALSE	Rerun	Reflex
TRUE	TRUE	TRUE	Rerun	Rerun

- [Rerun Judgment]: As a result of evaluating the Rerun/Reflex/Comment rules registered in the Rule screen, a conditional expression with the “Rerun” action holds true.
- [Reflex Judgment]: As a result of evaluating the Rerun/Reflex/Comment rules registered in the Rule screen, a conditional expression with the “Reflex” action holds true.
- [Analyzed]: All of the discrete tests to be added by the qualified “Reflex” action has been analyzed in the initial analysis.

### 5.3.2. [SETTING] To grant rule creation privilege to service representative/laboratory manager

By logging in as super user and changing the following settings, you can grant the same privileges as the rule authors to a service representative or laboratory manager. In other words, the same operations allowed for super user can be performed even when logged in as sysmex user or admin user.

Laboratory operational usage	Location of setting
Do not allow sysmex and admin users to create rules	Set [Service Setting] - [IPU settings] - [Super user settings] - [Register and modify rules] to “0” (default setting).
Allow sysmex and admin users to create rules	<b>Set [Service Setting] - [IPU settings] - [Super user settings] - [Register and modify rules] to “1”.</b>

\* Can be set only by super user. The setting is not displayed for sysmex user.

When applying this setting, make sure to provide the service representative and the laboratory manager with sufficient explanation on how to create onboard rules (see 5.2.1).

### 5.3.3. [SETTING] To compare results between Initial and Rerun/Reflex analyses in cumulative tab

A setting was added in version 00-08 to allow both the initial analysis and Rerun/Reflex analysis to be displayed in the Cumulative tab in the Data Browser screen. By logging in as super user or sysmex user and changing the following settings, the results from the initial analysis and the Rerun/Reflex analysis can be displayed on the Cumulative tab.

Laboratory operational usage	Location of setting
Do not display the cumulative tab	Set [Service Settings] - [IPU settings] - [Miscellaneous] - [The display specification of the Cumulative tab...] to “0” (default setting in XN-9000).
Display only the final results of the onboard rules on the cumulative tab	Set [Service Settings] - [IPU settings] - [Miscellaneous] - [The display specification of the Cumulative tab...] to “1” (default setting in all system models except XN-9000).
Display all analysis results of the onboard rules on the cumulative tab	<b>Set [Service Settings] - [IPU settings] - [Miscellaneous] - [The display specification of the Cumulative tab...] to “2”.</b>

The cumulative tab in the XN series displays up to 7 previous results, for the purpose of checking for change over time in the analysis results with the same patient ID. To avoid the situation where displaying both the initial analysis results and the Rerun/Reflex analysis results makes displaying the oldest analysis results impossible, a specification was added for displaying only the last onboard rule results. However, if the operational usage of the laboratory is such that the cumulative tab is used for the purpose of comparing the results from Initial and Rerun/Reflex analysis, the same functions of the existing models cannot be maintained. Hence this setting was added.

For the XN-9000, it is recommended that the cumulative data be browsed on the upper-level host terminal.

In particular, for XN-9000 with over three analyzers, since a maximum of three units can be connected to one IPU, analysis data from analyzers connected to other IPUs cannot be referenced.

### 5.3.4. [TIPS] To output only the final results of the onboard rules

This example shows how to use the onboard rules to implement the following usage: “If the analysis results from the initial analysis are evaluated, and subsequently a Repeat/Rerun/Reflex analysis is performed, do not output the initial analysis results, but only output the final results from the Repeat/Rerun/Reflex analysis”.

This setting can only be applied if the number of analyzers does not exceed three (because for XN-9000 with over three analyzers, the final results as seen from one IPU will not match the results for the entire XN-9000) AND if the operational usage is such that rule-based judgment by upper-level host terminal is not enabled (because results would be automatically output by QueryToHost even if they are not the final results).

[Steps for configuring to output only the final results]

- Configure to prioritize Reflex over Rerun (see 5.3.1)
- Validation rule: Configure to use onboard rules (see 5.2.2.1)
- Register records listed in Table 5-11 from the Validation Rule tab.
- Output rule: Configure to auto output all samples using simple settings (see 5.2.2.1)

**Table 5-11: Rules for auto validating only the final results**

No.	Conditional expression	Action
1	NOT RepeatOrdered() AND NOT RerunReflexOrdered()	Validate
2	OrderType(Reflex/Repeat) OR OrderType(Rerun/Repeat)	Validate
3	( OrderType(Reflex) OR OrderType(Rerun) ) AND RerunReflexOrdered()	Validate
4	OrderType(AnyRepeat) AND NOT RerunReflexOrdered()	Validate

The derivation process will be skipped, since the final results of the onboard rules can be expressed as shown in Table 5-12, the conditional expressions in Table 5-11 were derived from simplifying the logical expressions.

**Table 5-12: Final results of onboard rules**

Order Type	Rule result	Final result
Initial	None	✓
	Repeat	—
	Rerun/Reflex	—
Initial/Repeat	None	✓
	Repeat	✓
	Rerun/Reflex	—
Rerun	None	✓
	Repeat	—
	Rerun/Reflex	✓
Reflex	None	✓
	Repeat	—
	Rerun/Reflex	✓
Rerun/Repeat	None	✓
	Repeat	✓
	Rerun/Reflex	✓
Reflex/Repeat	None	✓
	Repeat	✓
	Rerun/Reflex	✓

### 5.3.5. [TIPS] To add one record to registered rules

When you use the onboard rule restore function, since all records in the specified screen get overwritten by the data in the backup file, it is not possible to use the restore function to add one single record. However, by combining the restore function and the copy/paste function, you can add a single record.

[Steps for adding one record]

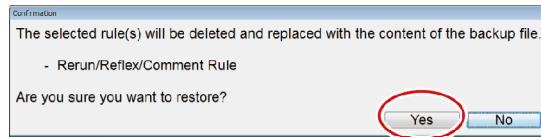
Preparation: Prepare the backup file that contains the one record you want to add.

1. Login as super user.
2. In the Rule screen, open the onboard rule tab to which you want to add the one rule (hereinafter referred to as “target tab”).
3. Select [File] - [Backup] on the toolbar, and back up the registered rules. In the “Save As” dialog box, save with an appropriate file name.
4. Select [File] - [Restore] on the toolbar, and restore the backup file you prepared.

5. The “Restore” dialog box opens. Make sure only the target tab is selected, and click [OK] (Rerun/Reflex/Comment Rule in this example).



6. The “Confirmation” dialog box is displayed. Click the [Yes] button.



7. In the Rule screen, select the one record you want to add, and click the [Copy] button on the toolbar.
8. Select [File] - [Restore] on the toolbar, and restore the rules you backed up in step 3. Similar to the previous steps, only restore the target tab.
9. Click the [Paste] button on the toolbar to paste the record you copied in step 7. Check that the Paste dialog box shows the record you want to add, then click [OK].

### 5.3.6. [TIPS] Rerun/Reflex analysis not executed as expected

Check the following if the Reflex/Reflex analysis is not performed as expected.

- Is it configured to perform Rerun/Reflex analysis? (see 5.2.2.1)
- Is the analysis data in question “subject to onboard rules” in 5.1?
- Did any analysis error get added?
  - A Rerun/Reflex/Comment rule does not evaluate any analysis result that was judged by a Repeat rule.
- Has a Rerun/Reflex analysis been performed already on this analysis data?
  - Rerun/Reflex analysis is not performed more than once on the same sample (see 5.1)
- Is the configured Rerun/Reflex/Comment rule record enabled ?
  - Records that are disabled or invalid are not evaluated.
- Does another conditional expression hold true with a higher priority action “Rerun” or “BlockRerunReflex”?
- Was the discrete test to be added in the Reflex already analyzed in the initial analysis?
  - If there are no additional discrete tests, the Reflex analysis is not performed even if the conditional expression holds true.

The same applies to other onboard rules; check the prerequisites in Table 5-1, and check the registered records.

### 5.3.7. [TIPS] To reduce the number of records

If the number of registered rules other than the Repeat rules has reached the maximum of 100, you will need to delete some of registered records to register new rules. If there are no records that can be deleted, try to consolidate conditional expressions without changing their behavior. As an example, we will look at the two records below:

No.	Conditional expression	Action
1	IPMessage(PLT Abn Distrib.) AND ItemValue(PLT) < 5.0	Rerun(PLT-F)
2	IPMessage(PLT Abn Distrib.) AND IPMessage(Fragments?)	Rerun(PLT-F)

The two conditional expressions can be consolidated using an OR condition, so that if either one of the conditional expressions holds true, then Rerun(PLT-F) is executed. The using logical expression transform “(X AND Y) OR (X AND Z) = X AND (Y OR Z)”, this can be consolidated into one record.

No.	Conditional expression	Action
1	IPMessage(PLT Abn Distrib.) AND ( ItemValue(PLT) < 5.0 OR IPMessage(Fragments?) )	Rerun(PLT-F)

Contrary, if you want to test the conditional expression in pieces or the number of digits in the expression reaches the maximum, if there is room for more records, separating an expression into multiple records will allow you to enable/disable them, instead of modifying the rule.

### 5.3.8. [TIPS] Unit confirmation message on restore

If the unit for the destination or HGB is different, a Confirmation dialog box will display the following message at the time of restoring a backup: “Data that uses a different unit for HGB will be restored. After restoring, check the conditional expressions that contain ItemValue.”



Caution is necessary only when all of the following is satisfied. For default rules, since the following do not apply, there is no problem even if the confirmation message is displayed.

- The function “ItemValue” uses HGB, MCH, or MCHC, which are all related to HGB units.
- The HGB units are different from the environment in which the backup was created.

#### [Example of different HGB units used (problematic)]

If the conditional expression “ItemValue(HGB[\*\*\*.\* g/dL]) >= 12.0” is backed up and restored to an environment with SI units, it changes to “ItemValue(HGB[\*\*\*.\* mmol/L]) >= 12.0”. Although the unit is different, the numeric value on the right side is unchanged, hence the conditional expression now has a different meaning from when it was registered. To make of meaning of the conditional expression the same as when it was registered, multiply the right side by 0.6206 so that it becomes “ItemValue(HGB[\*\*\*.\* mmol/L]) >= 7.45”.

For items with no relevance to the HGB units, there is no problem even if the environment uses different unit settings in the IPU settings.

[Example of different HGB units used (non problematic)]

If the conditional expression “ItemValue(WBC[\*\*\*\*.\* 10^2/uL]) >= 5.0” is backed up and restored to an environment in which the unit setting is “WBC[\*\*\*.\* 10^3/uL]”, the conditional expression is still the same as when it was registered, “ItemValue(WBC[\*\*\*\*.\* 10^2/uL]) >= 5.0”. The displayed unit will be different, but it will be judged using the same meaning as when it was registered. Hence this is a non-issue.

### 5.3.9. [TIPS] What to do when adding a license to a laboratory with already deployed rules

For example, if a license for PLT-F channel is added to an environment to which the rules have already been deployed, the Repeat rules still do not include records for PLT-F-related analysis errors, namely, “PLT-F sampling error” and “PLT-F channel error”. This is because the Repeat rule records are determined at initial startup or by initialization operation. The necessary records must be added to the already configured Repeat rules, using steps below:

[When adding a license to a laboratory with rules already deployed]

1. Login as super, sysmex, or admin user.
2. Back up the onboard rules to a file.
3. From the created backup file, restore Repeat rules.
4. Check if the actions for the analysis errors related to the added license works for the operational usage of the laboratory.

Note: In the restore process, initialization is executed inside the program before the data from the backup file is written to the database. During this initialization, the Repeat rule records for the added license are added, and the content of the backup is restored for the other records.

### 5.3.10. [TIPS] Conditional expression is displayed in red and becomes a syntax error in the Registration dialog box

The number of digits in a conditional expression is limited to 400 digits or less for the rules other than Repeat rules.

When exceeding 400 digits, the expression is displayed in red and cannot be registered because of “syntax error”.

A conditional expression should be short because a long and complex one is complicated , making it difficult to find which part is to be modified. When a conditional expression is consolidated by OR, separating the expression into multiple records enables you to reduce its number of digits. As an example, we will look at a record below.

No.	Conditional expression	Action
1	IPMessage(PLT Abn Distrib.) OR ItemValue(PLT) < 5.0	Rerun(PLT-F)

If either one of the conditional expressions consolidated by OR holds true, Action Rerun(PLT-F) can be executed based on this rule. For this reason, the number of digits can be reduced on both expressions by using two conditional expressions below.

No.	Conditional expression	Action
1	IPMessage(PLT Abn Distrib.)	Rerun(PLT-F)
2	ItemValue(PLT) < 5.0	Rerun(PLT-F)

The description in this section (The number of records is increased and the number of digits in a conditional expression is reduced.) is opposite to the description in 5.3.7 (The number of records is reduced and the number of digits in a conditional expression is increased.).

[End of document]

Function	Rule				Description	Primary Argument Name: Selections	Secondary Argument Name: Selections
	Rerun/Reflex/Comment	SP	Validation	Output			
ItemOrdered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if an order exists for the specified analysis item, and FALSE if it does not. If [Discrete] is specified, it returns TRUE if even one analysis item included in that discrete test is analyzed, and returns FALSE otherwise.	Analysis Item: List of available order items, and list of discrete tests	
ItemValue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns the value of the specified analysis item. If the data has no value, any comparison containing ItemValue() will always return FALSE.	Analysis Item: List of items	
ItemMark	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the specified analysis item is tagged with the specified mark, and FALSE otherwise.	Analysis Item: List of items	Mark: "+**" "@ "!" "+*" "-"
ItemMask	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the specified analysis item is masked, and FALSE otherwise.	Analysis Item: List of items	
ResultLimit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if any analysis item deviates outside the reference interval, and FALSE otherwise.		
ResultFlag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the judgment of the analysis result matches the specified judgment, and FALSE otherwise. However, if N/A was selected or if flag judgment was not performed, it returns TRUE.	Judgment: "Positive" "Negative" "N/A"	
DiffPositive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the analysis result is Diff positive, and FALSE otherwise.		
MorphPositive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the analysis result is Morph positive, and FALSE otherwise.		
CountPositive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the analysis result is Count positive, and FALSE otherwise.		
ActionMessage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the specified action message exists, and FALSE if it does not.	Action Message: "Check" "Review" "Retest"	
ActionMessageDetail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the specified action message exists, and FALSE if it does not.	Action Message: "Check:Sample" "Check:DeltaWBC" "Check:DeltaHGB" "Check:DeltaMCV" "Check:DeltaPLT" "Review:WBC" "Review:RBC" "Review:PLT" "Review:AgedSample?" "Retest:SuspectSample" "Retest:PLT" "Reserved"	
PriorityCode	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the priority code of analysis result matches the specified priority code, and FALSE otherwise.	Priority code: 0 - 9, A - Z	
PatientID	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the patient ID in the analysis result matches the specified patient ID, and FALSE otherwise.	Patient ID: Entry via edit control	
PatientWard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the ward name for the patient in the analysis result matches the specified ward name, and FALSE otherwise.  Even if the ward name specified for the argument "Ward Name" has been deleted, when the list of ward names is displayed, it will show the selected ward name on the first line. The second line and onward will contain the list of ward names that are already registered. Example: Suppose that rule No.6, which is registered as a validation rule, contains the function PatientWard(Psychiatric), and that it is enabled. Even if "Psychiatric" is deleted from the Patient Information screen, validation rule No.6 will show PatientWard(Psychiatric) and the rule remains valid (To be discussed later).	Ward Name: List of ward names	
PatientAge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns the age of the patient in the analysis result, in the specified unit. If there is no age data, any comparison containing PatientAge() will always return FALSE.	Unit: "Years" "Months" "Weeks" "Days"	
PatientGender	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the sex of the patient in the analysis result matches the specified sex, and FALSE otherwise.	Sex: "Male" "Female" "Unknown"	
IPMessage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the flag judgment for the IP message is judged to be TRUE, and FALSE otherwise.	IP Message: List of IP messages	
Error	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if an error with the specified error code has occurred, and FALSE otherwise.	Error Code: List of error codes	
ErrorResult	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the analysis result shows that an error has occurred, and FALSE otherwise.		
QFlagValue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns the grade value of Q-Flag for the specified IP message, between 0 to 300. If there is no value, any comparison containing QFlagValue() will always return FALSE.	IP Message: Table of suspect IP messages	
AnalysisMode	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the analysis mode matches the specified mode, and FALSE otherwise.	Analysis Mode: "WB" "LW" "PD" "BF" "HPC" "hsA"	
RerunReflexRule	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE/FALSE for the Rerun/Reflex/Comment rule with the specified rule number. If the rule has not been evaluated, it will always return FALSE.  Not available in affordable edition models. (*)	Rule Number: Table of rule numbers	
CommentRule	-	-	<input type="radio"/>	<input type="radio"/>	Returns TRUE/FALSE for the Comment rule with the specified rule number. If the rule has not been evaluated, it will always return FALSE.  Only available in affordable edition models. (*)	Rule Number: Table of rule numbers	
RerunReflexOrdered	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if an order was placed by the Rerun/Reflex/Comment rule in the Rule screen, and FALSE otherwise.  Not available in affordable edition models. (*)		
RepeatOrdered	-	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if an order was placed by the Repeat rule in the Rule screen, and FALSE otherwise.  Not available in affordable edition models. (*)		
OrderType	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Returns TRUE if the analysis result matches the specified order type, and FALSE otherwise. (For analysis data whose previous judgment was "QueryToHost", "Reflex" will be assigned as the order type.)  For affordable edition models, only "Initial" and "Manual" can be selected for the argument.	Order Type: "Initial" "Initial/Repeat" "Rerun" "Rerun/Repeat" "Reflex" "Reflex/Repeat" "AnyRepeat" "Manual"	
IsQueryToHost	-	-	-	<input type="radio"/>	Returns TRUE if the Rerun/Reflex/Comment rule determined that a query the host is to be performed, and FALSE otherwise.  Not available in XN-3000 Standalone mode, or in affordable edition models. Selectable only on systems other than XN-3000 Standalone mode and affordable edition models, and only if "Query host computer for Rerun/Reflex analysis" in the IPU Service Settings is set to 1 or 2. (*)		
SPRule	-	-	<input type="radio"/>	<input type="radio"/>	Returns TRUE/FALSE for the SP rule with the specified rule number. If the rule has not been evaluated, it will always return FALSE.  Not available on systems other than XN-3000 Standalone mode. Even if the SP rule specified by the argument "Rule Number" has been deleted, when the list of rule numbers is displayed, it will show the selected rule number on the first line. The second line and onward will contain the list of rule number that are already registered. Example: Suppose that rule No.6, which is registered as a validation rule, contains the function SPRule(3), and that it is enabled. Even if the SP rule No.3 is deleted, validation rule No.6 will show SPRule(3), but the rule will be invalid. (To be discussed later)	Rule Number: Table of rule numbers	
SPOrdered	-	-	<input type="radio"/>	<input type="radio"/>	Returns TRUE if an order was placed by the SP rule in the Rule screen, and FALSE otherwise.  Not available on systems other than XN-3000 Standalone mode.		

\* If a backup file is restored from an IPU with different instrument configuration and/or settings, the specified argument is shown on the first line even if it is not selectable. The second line and onward will contain the list of arguments above.

Action (16 alphanumeric characters)	Rule					Argument (20 characters)																																																																																																																																															
	Repeat	Rerun/Reflex/ Comment	SP	Validation	Output																																																																																																																																																
None	<input type="radio"/>	<input type="radio"/>	-	-	-																																																																																																																																																
Repeat	<input type="radio"/>	-	-	-	-																																																																																																																																																
BlockRepeat	<input type="radio"/>	-	-	-	-																																																																																																																																																
QueryToHost	-	<input type="radio"/>	-	-	-	Selectable only on configurations other than XN-3000 Intelligent Edition, Standalone mode, if "Query to host computer for Rerun/Reflex analysis" in the IPU Service Settings is set to 2.																																																																																																																																															
Reflex	-	<input type="radio"/>	-	-	-	DIFF DIFF+RET RET PLT-F DIFF+PLT-F DIFF+RET+PLT-F RET+PLT-F DIFF+WPC DIFF+RET +WPC DIFF+PLT-F+WPC DIFF+RET+PLT-F+WPC LW_DIFF																																																																																																																																															
						Only the discrete tests that can be analyzed on the instrument's configuration can be selected. Specifying LW_DIFF will add DIFF to the discrete tests and perform the analysis in Low WBC mode.																																																																																																																																															
Rerun	-	<input type="radio"/>	-	-	-	DifferentModule SameModule AnyModule																																																																																																																																															
						DifferentModule and AnyModule are selectable only if twin module is used. If it includes a discrete test that cannot be analyzed even though it was determined as DifferentModule, it will be analyzed on the same module at the discretion of the instrument.																																																																																																																																															
BlockRerunReflex	-	<input type="radio"/>	-	-	-																																																																																																																																																
Validate	-	-	-	<input type="radio"/>	-																																																																																																																																																
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ReportTo	-	-	-	-	<input type="radio"/>	HC GP DP HC+GP HC+DP GP+DP HC+GP+DP																																																																																																																																															
BlockReport	-	-	-	-	<input type="radio"/>																																																																																																																																																
Smear	-	-	<input type="radio"/>	-	-	Smear is performed using a combination of the options below. <table border="1"> <thead> <tr> <th>Smear</th> <th>Slide cassette (1st)</th> <th>Slide cassette(2nd) *3</th> <th>Smear condition*4</th> <th>Number of preparations*4</th> <th>Additional rinses*4</th> <th>Alarm*4</th> </tr> </thead> <tbody> <tr> <td>1Slide</td> <td>Do Not Specify</td> <td>Feed out to DIA</td> <td>Do Not Specify</td> <td>Specify by SP</td> <td>1 slide</td> <td>No</td> <td>No</td> </tr> <tr> <td>2Slide</td> <td>Cassette 1 *1</td> <td>Do not feed out to DIA</td> <td>Cassette 1 *1</td> <td>Do not feed out to DIA</td> <td>12 slides</td> <td>1 rinse</td> <td>Yes</td> </tr> <tr> <td></td> <td>Cassette 2 *2</td> <td></td> <td>Cassette 2 *2</td> <td></td> <td>23 slides</td> <td>2 rinses</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>34 slides</td> <td>3 rinses</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>45 slides</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>6</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>7</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>8</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>9</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>10</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>12</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>13</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>14</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>15</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>16</td> <td></td> <td></td> </tr> </tbody> </table>	Smear	Slide cassette (1st)	Slide cassette(2nd) *3	Smear condition*4	Number of preparations*4	Additional rinses*4	Alarm*4	1Slide	Do Not Specify	Feed out to DIA	Do Not Specify	Specify by SP	1 slide	No	No	2Slide	Cassette 1 *1	Do not feed out to DIA	Cassette 1 *1	Do not feed out to DIA	12 slides	1 rinse	Yes		Cassette 2 *2		Cassette 2 *2		23 slides	2 rinses							34 slides	3 rinses							45 slides								5								6								7								8								9								10								11								12								13								14								15								16		
Smear	Slide cassette (1st)	Slide cassette(2nd) *3	Smear condition*4	Number of preparations*4	Additional rinses*4	Alarm*4																																																																																																																																															
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2Slide	Cassette 1 *1	Do not feed out to DIA	Cassette 1 *1	Do not feed out to DIA	12 slides	1 rinse	Yes																																																																																																																																														
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BlockSmear	-	-	<input type="radio"/>	-	-																																																																																																																																																

\*1: Right cassette for XN-1500 and XN-3100.

\*2: Left cassette for XN-1500 and XN-3100.

\*3: This option can be selected when 2Slide is selected.

\*4: This option can be selected in XN-1500 and XN-3100 only.