HORIBA

Yumizen H2500

2.0

Hematology Analyzer - HELO 2.X

Output Format for Host Connection

Ref: RAA090BUS

Output Format for Host Connection

CE 2797
IVD
HORIBA ABX SAS
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FRANCE
Rx Only

Output Format for Host Connection
Ref: RAA090BUS

Contents

1. Foreword

1.1. Document Update

1.1.1. Revisions

Internal Reference	Software Version used for Documentation	Document Date Issued
RAA090AAEN	1.7.1	11/2024
RAA090BEN	1.7.3	08/2025

This document applies to the latest software version listed and higher versions.

1.1.2. What's New?

Update	Chapter
Updates	Output Data Characteristics Order Record Manufacturer Record Parameters Units
New chapter added.	Universal Test ID Definition

2. Connection

2.1. Ethernet Connection

2.1.1. Ethernet Connection Overview

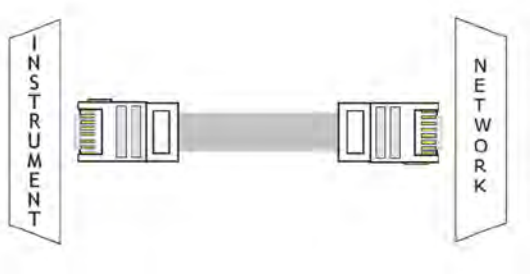
The network connection mode is available for the ASTM format on the Yumizen H2500.

The implementation of network-based communication is based on the Windows Socket standard.

The data transmitted between the client and the server takes the form of ASTM high level packets.

This connection is made through the RJ45 connector on the instrument.

The keepalive feature is activated on the Yumizen H2500. The instrument sends a keepalive signal to the Host every 15 minutes in order to preserve the connection.



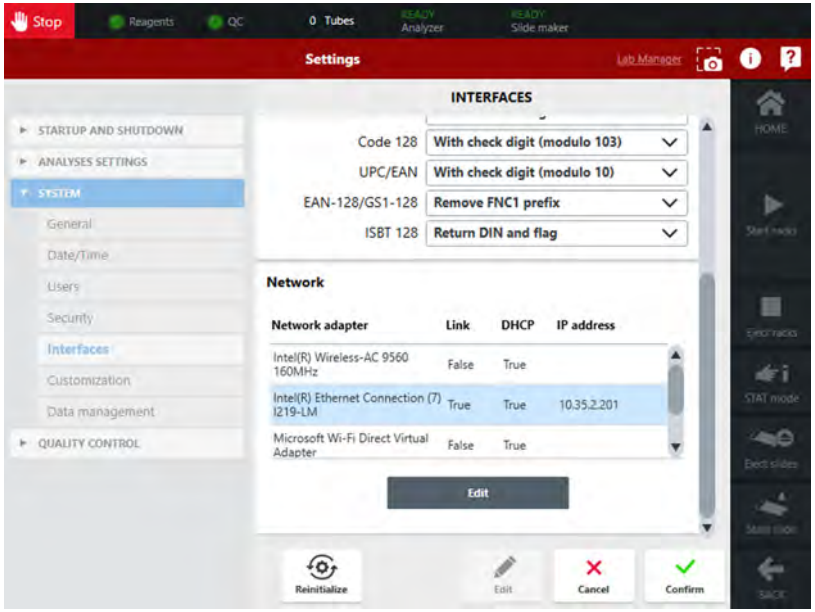
2.1.2. To Configure the Instrument Network

Access: ***Home*** > ***Settings*** > ***System*** > ***Interfaces***

Make sure that the RJ45 cable is connected from the instrument to the laboratory network.

- The instrument network settings must be configured only if a fixed IP address is required.
- Ask the laboratory IT for network settings (free IP address, subnet and gateway).

1. Press **Edit**.
2. Scroll down to see the **Edit** button of the ***Network*** area.
3. In the ***Network*** area, select the line with **True** in the ***Link*** column.
   The information in the ***Link*** column shows you which network card is connected.
   True means connected and **False** not connected.



4. Press **Edit**.
5. Choose **Manual configuration** as the IP address must be fixed.
6. Type the configuration defined by the laboratory IT:
   - **IP address**
   - **Subnet mask**
   - **Default gateway**
7. Press **Confirm** to validate or **Cancel** to go back to the screen without saving changes.

To go back to the default values in all screen areas:

1. Press **Reinitialize**.
2. Press **Confirm**.

2.1.3. To Configure the Connection to the Host

*Access: **Home** > **Settings** > **System** > **Data management***

The IP address provided by your laboratory must be fixed and set during the first installation for each instrument.

1. Press **Edit**.
2. In the ***Data management*** field, select **Yes** to allow the connection to the Host.
3. In the ***DM IP address*** field, enter the fixed IP address of the Host.
4. In the ***TCP port*** field, enter the fixed TCP port number of the Host.
5. In the ***Connection mode*** drop-down list, choose **Query**.
6. In the ***Protocol*** drop-down list, choose **P8000** or **ASTM E1394**.
   If the protocol **ASTM E1394** is selected, M (Manufacturer Information) records are not managed and the following information is not transmitted: curves and matrices, traceability, statistics, remote command.
7. In the ***Parameters units***:
   - Choose **Current** if you want the instrument to send your results to the Host in the units you chose in the ***Home*** > ***Settings*** > ***System*** > ***General*** screen.
   - Or choose **International System (SI)** if you want the instrument to send your results to the Host always in international system.
8. Press **Confirm** to validate or **Cancel** to go back to the screen without saving changes.
9. Test the connection by pressing **Test** in the ***Connection test*** area.
   If the connection is failed, make sure you have the right fixed IP address and repeat the procedure again.

To go back to the default values in all screen areas:

1. Press **Reinitialize**.
2. Press **Confirm**.

3. ASTM Format

The HORIBA analyzers format corresponds to the ASTM specifications LIS01-A2 & LIS2-A2:

- LIS01-A2: Standard specification for low level protocol to transfer messages between clinical and laboratory instruments and computer systems.
- LIS2-A2: Standard specification for transferring information between clinical and laboratory instruments and computer systems.

3.1. Introduction

A connection between a computer (host) and a HORIBA instrument can be performed when the protocol, the format description and the connection mode have been properly setup.

Term	Definition
<ACK>	Acknowledgment (ASCII decimal 6)
[C1]	The most significant character of checksum
[C2]	The least significant character of checksum
[DATA]	The data contents of the record
<ENQ>	Inquire (ASCII decimal 5)
<ETB>	End of transmission block (ASCII decimal 23). For use only when a single record is too large to fit into one frame.
<ETX>	End of text (ASCII decimal 3). Required at the end of each record.
[frame number]	Single digit frame number "0" to "7", starts with "1".
<LF>	Line feed (ASCII decimal 10).
<NAK>	Negative acknowledgment (ASCII Decimal 21).
<STX>	Start of frame (ASCII decimal 2).

Term	Definition
Communications packet	All framing required for transmission of data. This framing includes: <STX>[frame number][DATA] [<ETB> or <ETX>][C1][C2] <LF>
Component Field	One of several related pieces of information within a field.
Field	A specific location within a record for a piece of information, indicated by a field delimiter and position.
Frame	A complete communications packet.
LIS	Laboratory Information System
Message	A collection of related information; a group of records that begins with a "Header" record and ends with a "Terminator" record. A single record could theoretically constitute a message, but within this context, a message always contains multiple records.
<EOT>	End of transmission (ASCII decimal 4)
<CR>	Carriage return (ASCII decimal 13)
Record	In reference to the low level protocol, a record is the message data (shown as [DATA]) as described within the communications packet. If the data is longer than 240 characters, then it must be split in two (or more) parts and sent in two (or more) communications packets. The intermediate packet uses the <ETB> character, and the ending packet uses the <ETX> character. No single communications packet contains more than one record. In reference to the message layer, a record can be one of the following codes: H (header), P (patient), O (order), R (result), L (terminator), C (comment).
Session	A total unit of communication activity used in this standard to indicate the events starting with the establishment phase and ending with the termination phase.
Test	A determination of a single analyte or a combination of values from other determinations or observations from which a variable or gradable result is derived.

3.2. Connection Specifications (LIS01-A2)

3.2.1. Hardware and Software Characteristics

The hardware settings of the interface is an ethernet connection via an RJ45 cable.

3.2.2. Output Data Characteristics

- Characters: ASCII
- Maximum message length: 247 characters
- The numerical values must use the character "." as decimal separator

3.2.3. Communication Protocol

Standard control characters

Control String	Hexadecimal value
<ENQ>	$05
<ACK>	$06
<NAK>	$15
<STX>	$02
<ETX>	$03
<ETB>	$17
<CR>	$0D
<LF>	$0A
<EOT>	$04

Typical discussion between the instrument and the host

Instrument	<>	Host
<ENQ>	>	
	<	<ACK>
<STX>1...Data...<CR><ETX>xx <CR><LF>	>	
	<	<ACK>
<STX>2...Data...<CR><ETX>xx <CR><LF>	>	
	<	<ACK>
<EOT>	>	

Typical discussion between the host and the instrument

Instrument	<>	Host
	<	<ENQ>
<ACK>	>	
	<	<STX>1...Data...<CR><ETX>xx <CR><LF>
<ACK>	>	
	<	<STX>2...Data...<CR><ETX>xx <CR><LF>
<ACK>	>	
	<	<EOT>

Discussion with conflict between the instrument and the host

No answer from Host for an <ENQ>

- Timeout: 15 seconds
- In case of conflict: 1 second before a new transmission, up to 3 transmissions. Host timeout: 20 seconds
- In case of negative answer <NAK>: No time before a new transmission, up to 6 transmissions

Instrument	<>	Host
<ENQ>	>	
	<	<ENQ>
Wait 1 second		Wait 20 seconds
<ENQ>	>	
	<	
	...	
<EOT>	>	

Defect packet during discussion between instrument and host

Instrument	<>	Host
<ENQ>	>	
	<	<ACK>
<STX>1...Data...<CR><ETX>xx <CR><LF>	>	
	<	<NAK>
<STX>1...Data...<CR><ETX>xx <CR><LF>	>	
	<	<ACK>
<STX>2...Data...<CR><ETX>xx <CR><LF>	>	
	<	<ACK>
<EOT>	>	

3.2.4. ASTM Data Frame Format

A sequential number located after the <STX> character is inserted into each data frame. The frame number is set to 1 when the transfer phase is initialized and is incremented by 1 for each frame up to 7 and then returns to 0.

The frame number allows the receiver to distinguish new and re-transmitted frames. In case of re-transmitted frame (after a <NAK> response from the host), the frame number is not incremented: <STX>1...Data...<CR><ETX>xx<CR><LF>.

Frame format

ASTM field	Definition	Transmitted data	# of bytes	Comments
0	STX	$02	1	
1	Frame number	1 to 7, 0, ...	1	Frame number is set to 1, incremented by 1 for each frame up to 7, and then returns to 0
2	Data message		240 max.	Header, Patient, Order, Result and Comment messages
3	End of data message ETX if end frame		1	
4	Checksum		2	
5	CRLF	$0D $0A	2	

Frame checksum

According to LIS01-A2, the frame checksum (<STX>1...Data...<CR><ETX>xx<CR><LF>) is defined as modulo 256 of ASCII values sum between <STX> not included and <ETX> included characters: 1...Data...<CR><ETX>.

3.3. Records General Format Specifications (LIS2-A2)

Data frames encapsulate records defined by the LIS-A2 norm, records themselves encapsulate ASTM fields.

Record ID	ASTM Definition
H	Header
P	Patient
O	Order
R	Result
C	Comment
Q	Query (Request information order)
M	Manufacturer information
L	Terminator record

3.3.1. Structure of Records

Structure of records for order transmission

- H (Header)
- P (Patient)
- .. C (Patient Comments) optional
- .. O (Order)
- .. .. C (Order Comments) optional
- L (Terminator)

The transmission of an order without patient record, even if not allowed in LIS2-A2, is accepted and managed in the Yumizen H2500.

Instrument patient file modification by host

- H (Header)
- P (Patient)
- .. C (Patient Comments) optional
- L (Terminator)

Structure of records for result transmission

- H (Header)
- P (Patient)
- .. C (Patient Comments) optional
- .. O (Order)
- .. .. C (Order Comments) optional
- .. .. C (Run Alarms) optional
- .. .. M (Curves and Matrix points)
- .. .. M (Curves and Matrix points)
- .. .. M (Traceability)
- .. .. R (Result)
- .. .. .. C (Flag Result) optional
- .. .. R (Result)
- .. .. .. C (Flag Result) optional
- .....
- .....
- .. .. R (Result)
- .. .. .. C (Flag Result) optional
- L (Terminator)

Structure of records for statistics

- H (Header)
- .. M (Statistics)
- .. M (Statistics)
- L (Terminator)

Structure of records for remote command

- H (Header)
- .. M (Remote command)
- L (Terminator)

3.3.2. Description of Records

Only fields described with their specified length are used by HORIBA instruments.

The length of a field can be less than the maximum value but must not be more.

Delimiters must be used even if a field is empty.

Field inside records are separated by "|" (ASCII $7C).

Component inside fields are separated by "^" (ASCII $5E).

Repeated fields inside records are separated by "\".

3.3.2.1. Alphanumeric Data

UTF-8 encoding is used for alphanumeric fields.

When alphanumeric data is sent, all the characters below 0x20 are replaced by an escape sequence with the following format: &Xhhh&.

"hhhh" is the hexadecimal value of ASCII character completed with zero on 4 digits.

For example, <ETB> should be replaced by: <&X0017&>.

When alphanumeric data is received, the escape sequence &Xhhhh& is converted to the corresponding characters.

When alphanumeric data is transmitted, all delimiters characters they can contain must be replaced by their corresponding escape sequence as below:

Delimeter	Escape sequence
Field delimiter	&F&
Component delimiter	&S&
Repeat delimiter	&R&
Escape delimiter	&E&

3.3.2.2. Records to Send

Fields that are not used are sent empty.

When sending records, the instrument sends only non-empty components, i.e. without component delimiters for the last empty components of the field.

3.3.2.3. Received Records

If a field value, length, delimiter of a received record does not correspond to the required input type, the instrument generates an error log, and can ignore the record and its following ones (depending on the error and the message).

For more information about errors and messages, refer to the *Appendices > Error Management* chapter.

3.3.2.4. Header Record

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
6.1	Record Type	H	1	Fixed	No	Yes
6.2	Delimiters definition	Like standard: ■ | Field delimiter ■ \ Repeat delimiter ■ ^ Component delimiter ■ & Escape delimiter	4	Text	No	Yes
6.3	Message Control ID					
6.4	Access Password					
6.5	Sender Name (from instrument to host)	MHR1^SerialNumber^Software version	39 (15^12^10)	Fixed^Alphanumeric^Fixed	No	Yes
6.5	Sender Name (from host to instrument)	Host name	32	Alphanumeric	No	No

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
6.6	Sender Address					
6.7	Reserved					
6.8	Sender Telephone Nb					
6.9	Characteristics of Sender					
6.10	Receiver ID					
6.11	Comments or Special Instructions					
6.12	Processing ID	P: Patient message Q: Quality control message D: Technician	1	Fixed list	No	Yes
6.13	ASTM Version Nb	LIS2-A2	9	Fixed	No	Yes
6.14	Date and Time of message					

There should not be the field delimiter between fields 6.1 and 6.2 (as it is in the value of field 6.2).

In case of a response to a request (query, ...), the field 6.5 should be an exact copy from the field 6.10 sent in the request.

3.3.2.5. Patient Record

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
7.1	Record Type	P	1	Fixed	No	Yes
7.2	Sequence Number	1, 2, ...	2	Numeric	No	Yes
7.3	Practice Assigned Patient ID					
7.4	Laboratory Assigned Patient ID	Patient Id	25	Alphanumeric	No	No
7.5	Patient ID No 3					
7.6	Patient Name	Name^First name	41 (20^20)	Alphanumeric	No	No
7.7	Mother's Maiden Name					
7.8	Birth date	YYYYMMDD^AGE^U ■ YYYYMMDD: Date of birth ■ AGE: Patient age ■ U: Unit of age	14 (8^3^1)	Date^Numeric^ Fixed list	No	No
7.9	Patient Sex	M = Male F = Female U = Unknown	1	Fixed list	No	No
7.10	Patient Race-Ethnic Origin	Ethnic origin	20	Alphanumeric	No	No
7.11	Patient Address					
7.12	Reserved					
7.13	Patient Telephone Nb					
7.14	Attending Physician ID	PhysicianID^PhysicianName	20^30	Alphanumeric^ Alphanumeric	No	No^No
7.15	Special Field 1					
7.16	Special Field 2					
7.17	Patient Height					
7.18	Patient Weight					

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
7.19	Patient's Known or Suspected Diagnosis					
7.20	Patient Active Medication					
7.21	Patient's Diet					
7.22	Practice Field 1					
7.23	Practice Field 2					
7.24	Admission and Discharge Dates					
7.25	Admission Status					
7.26	Location	Service name	20	Alphanumeric	No	No
7.27	Nature of Alternative Diagnostic Code and Classifiers					
7.28	Nature of Alternative Diagnostic Code and Classifiers					
7.29	Patient Religion					
7.30	Martial status					
7.31	Isolation Status					
7.32	Language					
7.33	Hospital Service					
7.34	Hospital Institution					
7.35	Dosage Category	Patient type	20	Alphanumeric	No	No

The following units can be used for the patient age transmitted in the Birth date field (7.8).

- Y (year)
- M (month)
- W (week)
- D (day)
- H (hour)

A patient age transmitted in hours (from host) is converted into days when received on the instrument.

3.3.2.6. Order Record

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
8.1	Record Type	O	1	Fixed	No	Yes
8.2	Sequence Number	1, 2, ...	2	Numeric	No	Yes
8.3	Sample ID	SampleID^RackLoadingNb^RackBarcodeID^RackPosition ■ Sample ID ■ Number of runs of the rack ■ Rack ID (barcode) ■ Position of the sample on the rack	31 (16^2^8^2)	Alphanumeric^Numeric^Alphanumeric^Numeric	No	Yes (sample ID or rack information)
8.4	Instrument Specimen ID					

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
8.5	Universal Test ID	^^^TestName (CBC or CBR or DIF or DIR or DIF_LV or RET or CBF or RBC_PLTO or SLIDE_EC) *For more detail, refer to the Universal Test ID Definition chapter*	13 (^^^10)	Fixed list	Yes	From instrument to host: Yes From host to instrument: No
8.6	Priority	R: routine S: STAT	1	Fixed list	No	No
8.7	Requested/Ordered Date and Time					
8.8	Specimen Collection Date and Time	YYYYMMDDH HMMSS	14	Date and time	No	No
8.9	Collection End Time					
8.10	Collection Volume					
8.11	Collector ID					
8.12	Action Code (from instrument to host)	X: test already in progress	1	Fixed list	No	No
8.12	Action Code (from host to instrument)	N: new order C: cancel order	1	Fixed list	No	Yes
8.13	Danger Code					
8.14	Relevant Clinical Information					
8.15	Date/Time Specimen Received					
8.16	Specimen Descriptor	SpecimenType ^^SpecimenLiquid	42 (20^^20)	Alphanumeric	No	No
8.17	Ordering Physician					
8.18	Physician Tel Nb					
8.19	User Field 1					
8.20	User Field 2					
8.21	Laboratory Field 1 (from instrument to host)	Prefix^Value Prefix: FT (free text), AP (analysis profile), SP (slide profile)	41 (10^30)	Fixed list^Alphanumeric	Yes	No
8.21	Laboratory Field 1 (from host to instrument)					
8.22	Laboratory Field 2					
8.23	Date and Time Results reported or last modified					
8.24	Instrument Charge to Computer System					
8.25	Instrument Section ID					
8.26	Report Types (from instrument to host)	F: final P: preliminary result X: order cannot be done I: in instrument pending	1	Fixed list	No	Yes

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
8.26	Report Types (from host to instrument)	Q: response to request information Z: no record for this patient Y: no test for this record O: response to result or download	1	Fixed list	No	Yes
8.27	Reserved					
8.28	Location or Ward of Specimen Collection					
8.29	Nosocomial Infection Flag					
8.30	Specimen Service					
8.31	Specimen institution					

The order must comply with the following conditions, otherwise the received order is ignored:

- Sample ID data of field 8.3 matches Sample ID data of the pending query.
- At least one of the Universal Test ID fields (8.5) contain a known TestName data.
- In case of several Universal Test ID fields (8.5), the order can contain one blood test, one slide test and one or several unknown tests. The order cannot contain several blood tests.
- The Action code field (8.12) from host to instrument is N (new order).

If a received order contains Universal Test ID fields (8.5) with only unknown TestName data, the Yumizen H2500 sends back the order with the Report Types field (8.26) set to X and the received order is ignored.

Remaining Tests

Remaining tests must be sent to the instrument as long as they are not completed.

For example, the instrument sends a blood test result and a slide reflex is requested by the host. The host must send an order which contains a Universal Test ID field (8.5) with the SLIDE_EC TestName.

When the instrument sends the slide test result, the host must send an order with the Action code field (8.12) set to N (new order) and the Report Types field (8.26) set to Y (no test for this record). This means there are no more tests to run.

Option: Yumizen T6000

When the instrument is used with a Yumizen T6000, all tests must be sent to the instrument, including tests which cannot be done on this instrument.

For example, if a slide is requested, the order must contain a Universal Test ID field (8.5) with the SLIDE_EC TestName even if the instrument is not connected to the Yumizen SPS.

3.3.2.7. Result Record

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
9.1	Record Type	R	1	Fixed	No	Yes
9.2	Sequence Number	1, 2, ...	2	Numeric	No	Yes
9.3	Universal Test ID (from instrument to host)	^^^English result name^LOINC Code associated with the result frame, if available	24 (^^^10^10)	^^^Open list^Open list	No	^^^Yes^No
9.3	Universal Test ID (from host to instrument)					

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
9.4	Data or Measurement Value	Test result or --- (invalid) or +++ (above visibility range) or slide status Slide status: ■ BLOOD_DROPPED ■ SLIDE_IN_RACK ■ SLIDE_EJECTED	16	Alphanumeric	No	No
9.5	Unit or Set of units	Unit text (ISO 2955 or specific) or - (if no unit)	10	Open list	No	Yes
9.6	Reference Ranges					
9.7	Result Abnormal Flag (from instrument to host)	L: below reference limits LL: below critical limits H: above reference limits HH: above critical limits <: below limit of quantification >: above linearity range >>: above visibility range X: invalid A: reject N: normal	2	Fixed list	No	Yes
9.7	Result Abnormal Flag (from host to instrument)					
9.8	Nature of Abnormality Testing					
9.9	Result Status (from instrument to host)	F: final result or below limit of quantification or above linearity range W: warning (suspicion on validity) X: above visibility range or invalid or reject or process flag	1	Fixed list	No	Yes
9.9	Result Status (from host to instrument)					
9.10	Date of Change in Normative Values or Units					
9.11	Operator Identification (from instrument to host)	Login^^User profile or LastName FirstName^^User profile User profile: ■ TECHNICIAN ■ MANAGER ■ USER	63 (41^^20)	Alphanumeric	No	Yes
9.11	Operator Identification (from host to instrument)					
9.12	Date/Time Test Starting	YYYYMMDDHHMMSS	14	Date	No	Yes
9.13	Date/Time Test Completed					

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
9.14	Device Identification (from instrument to host)	9380BDED579C	15	Alphanumeric	No	Yes
9.14	Device Identification (from host to instrument)					

The test result and its unit are transmitted in the Data or Measurement Value field (9.4) and in the Unit or Set of units field (9.5).

- Decimal separator: "."
- Symbol "10^" (e.g. 10^9/L) is sent as "1E" (e.g. 1E09/L)
- Symbol "^3" (e.g. mm^3) is sent as "3" (e.g. mm3)
- Symbol "µ" (e.g. µL) is sent as "u" (e.g. uL)

3.3.2.8. Comment Record

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
10.1	Record Type	C	1	Fixed	No	Yes
10.2	Sequence Number	1, 2, ...	2	Numeric	No	Yes
10.3	Comment Source	P: Practice I: Clinical instrument system L: Computer system (Filler)	1	Fixed list	No	Yes
10.4	Comment Text (from instrument to host)	For result comment (after R frame): alarm	200	Open list	Yes	Yes
		For order comment (after O frame): AlarmType^MeasurementType^AlarmMain^AlarmDetail Refer to the table below	103 (20^20^30^30)	Open list	Yes	Yes^No^Yes^No
		For patient comment or sample comment (after P or O frame): free text	200	Alphanumeric	No	Yes
10.4	Comment Text (from host to instrument)	Comments	200	Alphanumeric	No	Yes
10.5	Comment Type	I: Instrument flag comment	1	Fixed list	No	Yes

Alarm type	Measurement type	Alarm main	Alarm detail
P (process)	Not applicable	Process flag category: ■ BAD_IDENTIFICATION ■ BAD_EXTRACTION ■ BAD_SAMPLING ■ BAD_CONDITIONS ■ BAD_CALCULATION ■ STOP_REQUESTED ■ SLIDE_ERROR	Not applicable
D (device)	Measurement type	Alarm main message	Alarm detail message

Alarm type	Measurement type	Alarm main	Alarm detail
S (sample)	Measurement type	Alarm main message	Alarm detail message
C (calculation)	Considered channel	Alarm technical name	Not applicable

Analytical alarms are transmitted in the Comment Text field (10.4) as follows:

- A first comment with the alarm type D (if the analytical alarm is linked to an instrument technical problem) or S (if the analytical alarm is linked to the blood sample), the measurement type and the alarm message (main + detail).
- A second comment with the alarm type C, the considered channel and the alarm technical name.

Refer to the Analytical Alarm Messages (Device Alarm) and Analytical Alarm Messages (Sample Alarm) chapters for the list of analytical alarms and associated transmitted data.

Example of a message sent by Yumizen H2500:
4C|1|I|S^DIFF^WBC_ABN_MAT^SEP_NEU_EOS|I

5C|2|I|C^LMNE^NeuEosSep|I

3.3.2.9. Request Information Record

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
11.1	Record Type	Q	1	Fixed	No	Yes
11.2	Sequence Number	1..99	2	Numeric	No	Yes
11.3	Starting Range ID Number	^SampleID^RackLoadingNb^RackBarcodeID^RackPosition ■ Sample ID ■ Number of runs of the rack ■ Rack ID (barcode) ■ Position of the sample on the rack	32 (^16^2^8^2)	^Alphanumeric^Numeric^Alphanumeric^Numeric	No	Yes (sample ID or rack information)
11.4	End Of identifier List					
11.5	Universal Test ID	ALL	3	Fixed	No	Yes
11.6	Time limits					
11.7	Time Max limits					
11.8	Time Min limits					
11.9	Physician Name					
11.10	Telephone Number					
11.11	Reserved for User					
11.12	Reserved for User					
11.13	Request Information Status Codes	O: request for test information	1	Fixed	No	Yes

3.3.2.10. Manufacturer Record

Curves and Matrices

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.1	Record Type	M	1	Fixed	No	Yes
14.2	Sequence Number	1..99	2	Numeric	No	Yes
14.3	Message Type	MATRIX, HISTOGRAM	10	Fixed	No	Yes
14.4	Measurement Type	For MATRIX: DIFF, PLTO, RET, BFDIFF For HISTOGRAM: DIFF, PLT, WBC, RBC, BFRBC, BFDIFF	20	Alphanumeric	No	Yes
14.5	Name	Graphic name	20	Alphanumeric	No	Yes
14.6	Thresholds	Threshold Encoding Type^Threshold Data FLOATLE-stream/ deflate:base64		Alphanumeric^ Alphanumeric	Yes	No^Yes
14.7	Points	Graphic Encoding Type^Graphic Data FLOATLE-stream/ deflate:base64		Alphanumeric^ Alphanumeric	Yes	No^Yes

The graphic names for matrices and histograms are transmitted in the Name field (14.5) as follows:

- For the matrices: LMNERESABS, RBCPLTRESABS, RETRESFLUO, MPRESABS
- For the histograms: BASOALONGRES, EOSALONGABS, EOSALONGRES, LYMALONGABS, LYMALONGRES, MONALONGABS, MONALONGRES, NEUALONGABS, NEUALONGRES, PLTALONGRES, TNCALONGRES, RBCALONGRES, RBCPLTALONGRES, MNALONGABS, MNALONGRES, PNALONGABS, PNALONGRES

Traceability for Reagents

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.1	Record Type	M	1	Fixed	No	Yes
14.2	Sequence Number	1..99	2	Numeric	No	Yes
14.3	Message Type	REAGENT	10	Fixed	No	Yes
14.4	Traceability Name	Reagent name	20	Open list	Yes	Yes
14.5	Traceability Information	Lot number^Opening Date^Expiration Date	39 (15^14^8)	Alphanumeric^ Date and time^Date	Yes	Yes^No^Yes

The reagent names are transmitted in the Traceability Name field (14.4) as follows:

- For the instrument: BASOLYSE, CLEANER, DILUENT, FLUOCYTE, NUCEDIFF, LYSEBIO
- For the slide system: BUFFER, METHANOL, STAIN1, STAIN2, DILUENT

Traceability for Quality Control

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.1	Record Type	M	1	Fixed	No	Yes
14.2	Sequence Number	1..99	2	Numeric	No	Yes

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.3	Message Type	QC	10	Fixed	No	Yes
14.4	Traceability Name	Quality control indicator name EXTQC, WESTGARD, TIME2QC	20	Open list	Yes	Yes
14.5	Traceability Information	INDETERMINED, CORRECT, INCORRECT	20	Alphanumeric	Yes	Yes

Traceability for Settings

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.1	Record Type	M	1	Fixed	No	Yes
14.2	Sequence Number	1..99	2	Numeric	No	Yes
14.3	Message Type	SETTING	10	Fixed	No	Yes
14.4	Traceability Name	Setting name RUO, WBCDIFF	20	Open list	Yes	Yes
14.5	Traceability Information	For RUO: TRUE, FALSE For WBCDIFF: 2, 5, 6	20	Alphanumeric	Yes	Yes

Statistics

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.1	Record Type	M	1	Fixed	No	Yes
14.2	Sequence Number	1..99	2	Numeric	No	Yes
14.3	Message Type	STATS	10	Fixed	No	Yes
14.4	Statistics Information	Statistic Type^Start Date Time^End Date Time^Session Session: SESSION, UPTIME	81 (30^14^14^20)	Open list^Date and time^Date and time^Open list	No	Yes
14.5	Statistics Item	Name^Info^Value	72 (30^20^20)	Open list^Open list^Alphanumeric	Yes	Yes

The statistic types are transmitted in the Statistics Information field (14.4) as follows:

- SAMPLE_ORDER
- RACK
- PATIENT
- CONTROL
- RERUN_REFLEX
- REPEAT_CALI
- INVALID_RUN
- FAILURE
- REAGENTS
- TECHNICAL_CYCLES

This table gives details of the names and information available for each type of statistic.

Statistic Type	Statistic Name	Statistic Information
SAMPLE_ORDER	■ SamplingNumber ■ AnalyticalSamplingStatistics ■ SlideSamplingStatistics	
RACK	■ RackLoadedFromLoader ■ RackEjectedOnTray ■ RackLoadedFromConveyor ■ RackEjectedOnConveyor	

Statistic Type	Statistic Name	Statistic Information
PATIENT	■ RunReportPatientCBC ■ RunReportPatientDIF ■ RunReportPatientRET ■ RunReportPatientCBR ■ RunReportPatientDIR ■ RunReportPatientCBF ■ RunReportPatientDIF_LV ■ RunReportPatientRBC_PLTO ■ RunReportPatientSLIDE_E ■ RunReportPatientSLIDE_EC ■ RunReportPatientSLIDE_C	
CONTROL	■ RunReportControlCBC ■ RunReportControlDIF ■ RunReportControlRET ■ RunReportControlCBR ■ RunReportControlDIR ■ RunReportControlCBF ■ RunReportControlDIF_LV ■ RunReportControlRBC_PLTO	
RERUN_REFLEX	■ RerunPatient ■ ReflexPatient ■ RerunControl ■ ReflexControl	
REPEAT_CALI	■ RunRepeatabilityDIF ■ RunRepeatabilityDIR ■ RunCalibrationDIF	
INVALID_RUN	■ BadIdentification ■ BadExtraction ■ BadSampling ■ BadCondition ■ BadCalculation ■ StopRequested ■ BadSmearStain	
FAILURE	■ FailureNumber	■ CIM ■ INST ■ SPS

Statistic Type	Statistic Name	Statistic Information
REAGENTS	■ Volume	■ BASOLYSE ■ BUFFER ■ CLEANER ■ DILUENT ■ FLUOCYTE ■ NUCEDIFF ■ LYSEBIO ■ METHANOL ■ STAIN1 ■ STAIN2 ■ RIBBON
TECHNICAL_CYCLES	■ AnalyzerStartup ■ AnalyzerShutdown ■ AnalyzerRecovery ■ AnalyzerBgNoiseCheck ■ AnalyzerCleaner ■ AnalyzerMinoclair ■ CIMStartup ■ CIMShutdown ■ CIMRecovery ■ SPSStartupDaily ■ SPSStartupWeekly ■ SPSShutdownDaily ■ SPSShutdownWeekly ■ SPSRecovery	

Remote Command

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.1	Record Type	M	1	Fixed	No	Yes
14.2	Sequence Number	1..99	2	Numeric	No	Yes
14.3	Message Type	EXECUTE	10	Fixed	No	Yes

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
14.4	Command	Command Type^Command Name^Command ID Command Type: QC Command Name: EXTQC_INCORRECT, EXTQC_CORRECT	42 (10^20^10)	Open list^Open list^Alphanumeric	No	Yes
14.5	Parameter					
14.6	Status (from instrument to host)	Comment status: DONE, FAILED, IGNORED, ACCEPTED, UNKNOWN_COMMAND, UNKNOWN_PARAM	20	Open list	No	Yes
14.6	Status (from host to instrument)					

The host sends a remote command to indicate the external quality control status (correct or incorrect). The Command field (14.4) is: EXTQC_CORRECT or EXTQC_INCORRECT.

The instrument sends a first answer to the host to indicate if the external quality control status update is accepted or not. The Status field (14.6) is:

- ACCEPTED
- IGNORED: the command is ignored when the Processing ID field (6.12) in the header record is not P
- UNKNOWN_COMMAND: unknown Command Type
- UNKNOWN_PARAM: unknown Command Name

The instrument updates the external quality control status and sends a second answer to the host to indicate if the update has been successful or not. The Status field (14.6) is:

- DONE
- FAILED

3.3.2.11. Terminal Record

ASTM field	Definition	Transmitted data	Field max. length	Input type	Repeat delimiter	Mandatory
12.1	Record Type	L	1	Fixed	No	Yes
12.2	Sequence Number	1	1	Fixed	No	Yes
12.3	Termination code (from instrument to host)	N: Normal	1	Fixed	No	Yes
12.3	Termination code (from host to instrument)					

3.4. Special Characteristics for HORIBA Data

3.4.1. Data Presentation

The parameters correspond to the Universal Test ID field (9.3) and the units correspond to the Unit or Set of units field (9.5).

3.4.1.1. Parameters

LOINC Code: Logical Observation Identifiers Names & Codes

CBC Codes	LOINC Code	Definition
RBC	789-8	Red Blood Cells
HGB	718-7	Hemoglobin Concentration
HCT	4544-3	Hematocrit
MCV	787-2	Mean Corpuscular Volume
MCH	785-6	Mean Corpuscular Hemoglobin
MCHC	786-4	Mean Corpuscular Hemoglobin Concentration
RDW-SD	21000-5	Red Distribution Width Standard Deviation
RDW-CV	788-0	Red Distribution Width
MIC *	X-MIC	Microcytic Red Blood Cells percentage (versus RBC)
MAC *	X-MAC	Macrocytic Red Blood Cells percentage (versus RBC)
PLT	777-3	Platelets
PCT *	51637-7	Plateletcrit
PDW *	51631-0	Platelets Distribution Width
MPV	32623-1	Mean Platelet Volume
P-LCC *	96354-6	Platelets - Large Cell Count
P-LCR *	48386-7	Platelets - Large Cell Ratio
WBC	6690-2	White Blood Cells
NRBC#	771-6	Nucleated Red Blood Cells absolute value
NRBC%	58413-6	Nucleated Red Blood Cells percentage
TNC	50774-9	Total Nucleated cells

PLT opt Codes	LOINC Code	Definition
PLT-Ox	97995-5	Platelets from optical channel
LPF	97994-8	Large Platelet Fraction

DIF Codes	LOINC Code	Definition
LYM#	731-0	Lymphocytes absolute value
LYM%	736-9	Lymphocytes percentage
MON#	742-7	Monocytes absolute value
MON%	5905-5	Monocytes percentage
NEU#	751-8	Neutrophils absolute value
NEU%	770-8	Neutrophils percentage
EOS#	711-2	Eosinophils absolute value
EOS%	713-8	Eosinophils percentage
BAS#	704-7	Basophils absolute value
BAS%	706-2	Basophils percentage
IMG#	53115-2	Immature Granulocytic cells absolute value
IMG%	71695-1	Immature Granulocytic cells percentage
IMM# *	X-IMM#	Immature Monocytic cells absolute value
IMM% *	X-IMM%	Immature Monocytic cells percentage
IML# *	X-IML#	Immature Lymphocytic cells absolute value
IML% *	X-IML%	Immature Lymphocytic cells percentage
ALY# *	43743-4	Atypical Lymphocytes absolute value
ALY% *	42250-1	Atypical Lymphocytes percentage
LIC# *	55432-9	Large Immature Cells absolute value
LIC% *	55433-7	Large Immature Cells percentage

RET Codes	LOINC Code	Definition
RET#	14196-0	Reticulocytes absolute value
RET%	17849-1	Reticulocytes percentage
RET-L *	X-RET-L	Reticulocytes with a low RNA content
RET-M *	X-RET-M	Reticulocytes with a medium RNA content
RET-H *	X-RET-H	Reticulocytes with a high RNA content
CRC	X-CRC	Corrected Reticulocyte Count
MRV *	48706-6	Mean Reticulocyte Volume

RET Codes	LOINC Code	Definition
RHCC	X-RHCC	Reticulocyte Hemoglobin Cellular Content
IRF	X-IRF	Immature Reticulocyte Fraction

CBF Codes	LOINC Code	Definition
BFRBC	X-BFRBC	Red Blood Cells absolute value
BFWBC	X-BFWBC	White Blood Cells absolute value
BFMN#	X-BFMN#	Mononuclear absolute value
BFMN%	X-BFMN%	Mononuclear percentage
BFPN#	X-BFPN#	Polymorphonuclear absolute value
BFPN%	X-BFPN%	Polymorphonuclear percentage

*** USA only - RUO parameters (for Research Use Only)**
The following parameters have not been validated for a clinical diagnostic use in USA for this instrument: MIC, MAC, PCT, PDW, P-LCC, P-LCR, IMM#, IMM%, IML#, IML%, ALY#, ALY%, LIC#, LIC%, RETL%, RETM%, RETH%, MRV.

Technical Parameters

These parameters are not used for screening or diagnostic purposes. They may be used by technicians for troubleshooting.

CBC Codes	LOINC Code	Definition
TNCHGB	X-TNCHGB	WBC count in Chamber 2 TNC/HGB
TNCDIF	X-TNCDIF	WBC count in Chamber 4 LMNE/NRBC
TNCBAS	X-TNCBAS	WBC count in Chamber 3 BASO/TNC2

RET Codes	LOINC Code	Definition
MFI	X-MFI	Mean Fluorescence Index
PIC	X-PIC	Peak Index Channel (Fluorescence range)

CBF Codes	LOINC Code	Definition
BFTNCHGB	X-BFTNCHGB	WBC count in Chamber 2 TNC/HGB
BFTNCDIF	X-BFTNCDIF	WBC count in Chamber 4 LMNE/NRBC

3.4.1.2. Universal Test ID Definition

Universal Test ID	Sample type	Parameter list
CBC	Whole blood	RBC / HGB / HCT / MCV / MCH / MCHC / RDW-SD / RDW-CV / MIC* / MAC* / PLT / PCT* / PDW* / MPV / P-LCC* / P-LCR* / WBC / NRBC# / NRBC% / TNC / TNCHGB / TNCDIF / TNCBAS
DIF	Whole blood	CBC + LYM# / LYM% / MON# / MON% / NEU# / NEU% / EOS# / EOS% / BAS# / BAS% / IMG# / IMG% / IMM#* / IMM%* / IML#* / IML%* / ALY#* / ALY%* / LIC#* / LIC%*
DIF_LV	Whole blood	DIF - Low value
RET	Whole blood	RBC / RET# / RET% / RET-L* / RET-M* / RET-H* / CRC / MRV* / MFI / PIC / RHCC / IRF
CBR	Whole blood	CBC + RET
DIR	Whole blood	DIF + RET
RBC_PLTO	Whole blood	RBC / HGB / HCT / MCV / MCH / MCHC / RDW-SD / RDW-CV / MIC* / MAC* / PLT / PCT* / PDW* / MPV / P-LCC* / P-LCR* / PLT-Ox / LPF
CBF	Body fluids	BFRBC / BFWBC / BFTNCHGB / BFTNCDIF / BFMN# / BFMN% / BFPN# / BFPN%
SLIDE_EC	Other	Slide

*** USA only - RUO parameters (for Research Use Only)**
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3.4.1.3. Units

Default unit system: SI (international)

Codes: CBC	SI (international)	Conventional	mmol/L	Japan	China
RBC	10^{12}/L	10^{6}/mm^3	10^{12}/L	10^{4}/µL	10^{12}/L
HGB	g/L	g/dL	mmol/L	g/dL	g/L
HCT	L/L	%	L/L	%	%
MCV	fL	fL	fL	fL	fL
MCH	pg	pg	fmol	pg	pg
MCHC	g/L	g/dL	mmol/L	g/dL	g/L
RDW-SD	fL	fL	fL	fL	fL
RDW-CV	%	%	%	%	%
MIC *	%	%	%	%	%
MAC *	%	%	%	%	%
PLT	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{4}/µL	10^{9}/L
PCT *	%	%	%	%	%
PDW *	fL	fL	fL	fL	fL
MPV	fL	fL	fL	fL	fL
P-LCC *	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{4}/µL	10^{9}/L
P-LCR *	%	%	%	%	%
WBC	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
NRBC#	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
NRBC%	%	%	%	%	%
TNC	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L

Codes: PLT opt	SI (international)	Conventional	mmol/L	Japan	China
PLT-Ox	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{4}/µL	10^{9}/L
LPF	%	%	%	%	%

Codes: DIF	SI (international)	Conventional	mmol/L	Japan	China
LYM#	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
LYM%	%	%	%	%	%
MON#	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
MON%	%	%	%	%	%
NEU#	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
NEU%	%	%	%	%	%
EOS#	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
EOS%	%	%	%	%	%
BAS#	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
BAS%	%	%	%	%	%
IMG#	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
IMG%	%	%	%	%	%
IMM# *	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
IMM% *	%	%	%	%	%
IML# *	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
IML% *	%	%	%	%	%
ALY# *	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
ALY% *	%	%	%	%	%
LIC# *	10^{9}/L	10^{3}/mm^3	10^{9}/L	10^{2}/µL	10^{9}/L
LIC% *	%	%	%	%	%

Codes: RET	SI (international)	Conventional	mmol/L	Japan	China
RET#	10^{9}/L	10^{6}/mm^3	10^{9}/L	10^{4}/µL	10^{9}/L
RET%	%	%	%	%	%
RET-L *	%	%	%	%	%
RET-M *	%	%	%	%	%
RET-H *	%	%	%	%	%
CRC	%	%	%	%	%
MRV *	fL	fL	fL	fL	fL

Codes: RET	SI (international)	Conventional	mmol/L	Japan	China
RHCC	pg	pg	fmol	pg	pg
IRF	ratio	ratio	ratio	ratio	ratio

Codes: CBF	SI (international)	Conventional	mmol/L	Japan	China
BFRBC	10^6/L	10^6/L	10^6/L	10^4/µL	10^6/L
BFWBC	10^6/L	10^6/L	10^6/L	10^2/µL	10^6/L
BFMN#	10^6/L	10^6/L	10^6/L	10^2/µL	10^6/L
BFMN%	%	%	%	%	%
BFPN#	10^6/L	10^6/L	10^6/L	10^2/µL	10^6/L
BFPN%	%	%	%	%	%

*** USA only - RUO parameters (for Research Use Only)**
The following parameters have not been validated for a clinical diagnostic use in USA for this instrument: MIC, MAC, PCT, PDW, P-LCC, P-LCR, IMM#, IMM%, IML#, IML%, ALY#, ALY%, LIC#, LIC%, RETL%, RETM%, RETH%, MRV.

Technical Parameters

Codes: CBC	SI (international)	Conventional	mmol/L	Japan	China
TNCHGB	10^9/L	10^3/mm^3	10^9/L	10^2/µL	10^9/L
TNCDIF	10^9/L	10^3/mm^3	10^9/L	10^2/µL	10^9/L
TNCBAS	10^9/L	10^3/mm^3	10^9/L	10^2/µL	10^9/L

Codes: RET	SI (international)	Conventional	mmol/L	Japan	China
MFI	ratio	ratio	ratio	ratio	ratio
PIC	-	-	-	-	-

Codes: CBF	SI (international)	Conventional	mmol/L	Japan	China
BFTNCHGB	10^6/L	10^6/L	10^6/L	10^2/µL	10^6/L
BFTNCDIF	10^6/L	10^6/L	10^6/L	10^2/µL	10^6/L

3.4.1.4. Slide Status

The slide status is transmitted in the Data or Measurement Value field (9.4).

- BLOOD_DROPPED
- SLIDE_IN_RACK
- SLIDE_EJECTED

3.4.2. Alarms and Pathologies

3.4.2.1. Suspicion and Reject

When a result is suspected of being abnormal or false, it is not reliable and the instrument returns a flag in field 9.9.

Refer to Description of Records.

3.4.2.2. Reference and Critical Ranges

Flags when result exceeds reference or critical ranges are transmitted through field 9.7, they should be compared, to obtain a full result information, to the ranges set by the user.

Refer to Description of Records.

3.4.2.3. Analytical Alarm Messages (Device Alarm)

Analytical alarms are transmitted in the Comment Text field (10.4) as follows:

- A first comment with the alarm type D (if the analytical alarm is linked to an instrument technical problem) or S (if the analytical alarm is linked to the blood sample), the measurement type and the alarm message (main + detail).
- A second comment with the alarm type C, the considered channel and the alarm technical name.

This chapter lists device alarms in separate tables for each measurement type.

- The first column indicates the transmitted data in the first comment.
- The second column indicates the transmitted data in the second comment.

Some non-listed alarms type C may only be transmitted in the second comment and can be ignored.

WBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^WBC^ANA_ERR^UNST_TNC	C^SYNTHESIS_WBC^UnstbResCountTnc1	WBC Analytical error TNC channel unstable measure
D^WBC^ANA_ERR^UNST_TNC	C^SYNTHESIS_WBC^UnstbWidthCumulTnc1	WBC Analytical error TNC channel unstable measure
D^WBC^ANA_ERR^CLOG_TNC	C^TNC^NoEvents	WBC Analytical error TNC channel clog?
D^WBC^ANA_ERR^CLOG_TNC	C^TNC^LowEvents	WBC Analytical error TNC channel clog?
D^WBC^ANA_ERR^UNST_BASO	C^BASO^UnstbResCount	WBC Analytical error BASO channel unstable measure
D^WBC^ANA_ERR^UNST_BASO	C^BASO^UnstbWidthCumul	WBC Analytical error BASO channel unstable measure
D^WBC^ANA_ERR^CLOG_BASO	C^BASO^NoEvents	WBC Analytical error BASO channel clog?
D^WBC^ANA_ERR^CLOG_BASO	C^BASO^LowEvents	WBC Analytical error BASO channel clog?
D^WBC^ANA_ERR^UNST_DIFF	C^LMNE^UnstbResCount	WBC Analytical error DIFF channel unstable measure
D^WBC^ANA_ERR^UNST_DIFF	C^SYNTHESIS_WBC^UnstbResCountLmne1	WBC Analytical error DIFF channel unstable measure
D^WBC^ANA_ERR^LIGHT_BEAM_DIFF	C^LMNE^LightShift	WBC Analytical error DIFF channel light beam error
D^WBC^ANA_ERR^CLOG_DIFF	C^LMNE^NoEvents	WBC Analytical error DIFF channel clog?
D^WBC^ANA_ERR^CLOG_DIFF	C^LMNE^LowEvents	WBC Analytical error DIFF channel clog?
D^WBC^ANA_ERR^UNST_DIFF	C^LMNE^LowCorrel	WBC Analytical error DIFF channel unstable measure
D^WBC^ANA_ERR^UNST_DIFF	C^LMNE^LowBackgndNoiseExcess	WBC Analytical error DIFF channel unstable measure
D^WBC^ANA_ERR^BUBBLE_DIFF	C^SYNTHESIS_WBC^LowAbsCorrel	WBC Analytical error DIFF channel bubble?
D^WBC^ANA_ERR^UNST_DIFF	C^SYNTHESIS_WBC^LmneNoWbc	WBC Analytical error DIFF channel unstable measure
D^WBC^ANA_ERR^UNST_TNC	C^SYNTHESIS_WBC^TncNoWbc	WBC Analytical error TNC channel unstable measure
D^WBC^ANA_ERR^UNBAL_TNC_DIFF_BASO	C^SYNTHESIS_WBC^BasoLmneBalance2	WBC Analytical error TNC/DIFF/BASO channels unbalanced
D^WBC^ANA_ERR^UNBAL_TNC	C^SYNTHESIS_WBC^TncBasoBalance2	WBC Analytical error TNC channel unbalanced
D^WBC^ANA_ERR^UNBAL_DIFF	C^SYNTHESIS_WBC^TncLmneBalance2	WBC Analytical error DIFF channel unbalanced

DIFF

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^DIFF^ANA_ERR^UNST_BASO	C^SYNTHESIS_WBC^BasoNoWbc	WBC Analytical error BASO channel unstable measure
D^DIFF^ANA_ERR^BAL_TNC_BASO	C^SYNTHESIS_WBC^BasoExcess	WBC Analytical error TNC/BASO channel balance

RBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^RBC^ANA_ERR^UNST_RBC	C^RBC^UnstbResCount	RBC Analytical error RBC channel unstable measure
D^RBC^ANA_ERR^CLOG_RBC	C^RBC^NoEvents	RBC Analytical error RBC channel clog?
D^RBC^ANA_ERR^CLOG_RBC	C^RBC^LowEvents	RBC Analytical error RBC channel clog?
D^RBC^ANA_ERR^UNST_RBC	C^RBC^Noise	RBC Analytical error RBC channel unstable measure
D^RBC^ANA_ERR^UNST_RBC	C^RBC^AbnormWidth	RBC Analytical error RBC channel unstable measure
D^RBC^ANA_ERR^CLOG_RBC	C^RBC^RbcMiss	RBC Analytical error RBC channel clog?
D^RBC^ANA_ERR^BAL_RBC_HGB	C^SYNTHESIS_RBC_PLT^AbnormMch	RBC Analytical error RBC/HGB channel balance
D^RBC^ANA_ERR^BAL_RBC_HGB	C^SYNTHESIS_RBC_PLT^AbnormMchc	RBC Analytical error RBC/HGB channel balance

RBC_OTH

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^RBC_OTH^ANA_ERR^INTERF_HGB	C^SYNTHESIS_WBC^TncLmneBalance3	HGB Analytical error HGB channel interference
D^RBC_OTH^ANA_ERR^UNST_HGB	C^HGB^UnstbMeasure	HGB Analytical error HGB channel unstable measure
D^RBC_OTH^ANA_ERR^UNST_HGB	C^HGB^UnstbBlank	HGB Analytical error HGB channel unstable measure
D^RBC_OTH^ANA_ERR^UNST_HGB	C^HGB^BlankShift	HGB Analytical error HGB channel unstable measure

PLT

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^PLT^ANA_ERR^UNST_PLT	C^PLT^UnstbResCount	PLT Analytical error PLT channel unstable measure
D^PLT^ANA_ERR^CLOG_PLT	C^PLT^NoEvents	PLT Analytical error PLT channel clog?
D^PLT^ANA_ERR^CLOG_PLT	C^PLT^LowEvents	PLT Analytical error PLT channel clog?
D^PLT^ANA_ERR^UNST_PLT	C^PLT^Noise	PLT Analytical error PLT channel unstable measure
D^PLT^ANA_ERR^UNST_PLT	C^PLT^AbnormWidth	PLT Analytical error PLT channel unstable measure

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^PLT^ANA_ERR^UNST_PLT	C^PLT^NoiseEvents	PLT Analytical error PLT channel unstable measure
D^PLT^ANA_ERR^CLOG_PLT	C^PLT^PltMiss	PLT Analytical error PLT channel clog?

PLTO

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^PLTO^ANA_ERR^UNST_RBC	C^RBC^UnstbResCount	RBC Analytical error RBC channel unstable measure
D^PLTO^ANA_ERR^CLOG_RBC	C^RBC^NoEvents	RBC Analytical error RBC channel clog?
D^PLTO^ANA_ERR^CLOG_RBC	C^RBC^LowEvents	RBC Analytical error RBC channel clog?
D^PLTO^ANA_ERR^UNST_RBC	C^RBC^Noise	RBC Analytical error RBC channel unstable measure
D^PLTO^ANA_ERR^UNST_RBC	C^RBC^AbnormWidth	RBC Analytical error RBC channel unstable measure
D^PLTO^ANA_ERR^CLOG_RBC	C^RBC^RbcMiss	RBC Analytical error RBC channel clog?
D^PLTO^ANA_ERR^BAL_RBC_HGB	C^SYNTHESIS_RBC_PLT^AbnormMch	RBC Analytical error RBC/HGB channel balance
D^PLTO^ANA_ERR^BAL_RBC_HGB	C^SYNTHESIS_RBC_PLT^AbnormMchc	RBC Analytical error RBC/HGB channel balance
D^PLTO^ANA_ERR^UNST_PLTO	C^RBC_PLTO^UnstbResCount	PLTO Analytical error PLTO channel unstable measure
D^PLTO^ANA_ERR^LIGHT_BEAM_PLTO	C^RBC_PLTO^LightShift	PLTO Analytical error PLTO channel light beam error
D^PLTO^ANA_ERR^CLOG_PLTO	C^RBC_PLTO^NoEvents	PLTO Analytical error PLTO channel clog?
D^PLTO^ANA_ERR^CLOG_PLTO	C^RBC_PLTO^LowEvents	PLTO Analytical error PLTO channel clog?
D^PLTO^ANA_ERR^UNST_PLTO	C^RBC_PLTO^LowCorrel	PLTO Analytical error PLTO channel unstable measure
D^PLTO^ANA_ERR^UNST_PLTO	C^RBC_PLTO^NoiseEvents	PLTO Analytical error PLTO channel unstable measure
D^PLTO^ANA_ERR^UNST_PLTO	C^RBC_PLTO^UnstbPltoCount	PLTO Analytical error PLTO channel unstable measure
D^PLTO^ANA_ERR^BAL_PLTO_RBC	C^SYNTHESIS_RBC_PLT^RbcRbcoBalance	PLTO Analytical error PLTO/RBC channel balance

RET

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^RET^ANA_ERR^UNST_RET	C^RET^UnstbResCount	RET Analytical error RET channel unstable measure
D^RET^ANA_ERR^LIGHT_BEAM_RET	C^RET^LightShift	RET Analytical error RET channel light beam error
D^RET^ANA_ERR^CLOG_RET	C^RET^NoEvents	RET Analytical error RET channel clog?
D^RET^ANA_ERR^CLOG_RET	C^RET^LowEvents	RET Analytical error RET channel clog?

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^RET^ANA_ERR^UNST_RET	C^RET^LowCorrel	RET Analytical error RET channel unstable measure
D^RET^ANA_ERR^CLOG_RET	C^RET^RbcMiss	RET Analytical error RET channel clog?
D^RET^ANA_ERR^CLOG_RET	C^RET^RetMiss	RET Analytical error RET channel clog?
D^RET^ANA_ERR^UNST_RET	C^SYNTHESIS_RBC_PLT^NcRetInterf	RET Analytical error RET channel unstable measure
D^RET^ANA_ERR^BAL_RBC_RET	C^SYNTHESIS_RBC_PLT^RbcRetRbcBalance	RET Analytical error RBC/RET channel balance

BFWBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^BFWBC^ANA_ERR^UNST_TNC	C^BF_TNC^UnstbResCount	WBC Analytical error TNC channel unstable measure
D^BFWBC^ANA_ERR^UNST_TNC	C^BF_TNC^UnstbWidthCumul	WBC Analytical error TNC channel unstable measure
D^BFWBC^ANA_ERR^CLOG_TNC	C^BF_TNC^NoEvents	WBC Analytical error TNC channel clog?
D^BFWBC^ANA_ERR^CLOG_TNC	C^BF_TNC^LowEvents	WBC Analytical error TNC channel clog?
D^BFWBC^ANA_ERR^UNST_DIFF	C^BF_LMNE^LowBackgndNoiseExcess	WBC Analytical error DIFF channel unstable measure
D^BFWBC^ANA_ERR^BAL_DIFF_TNC	C^SYNTHESIS_BF^BfTncLmneBalance	WBC Analytical error DIFF/TNC channel balance

BFDIFF

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^BFDIFF^ANA_ERR^UNST_DIFF	C^BF_LMNE^UnstbResCount	WBC Analytical error DIFF channel unstable measure
D^BFDIFF^ANA_ERR^LIGHT_BEAM_DIFF	C^BF_LMNE^LightShift	WBC Analytical error DIFF channel light beam error
D^BFDIFF^ANA_ERR^CLOG_DIFF	C^BF_LMNE^NoEvents	WBC Analytical error DIFF channel clog?
D^BFDIFF^ANA_ERR^CLOG_DIFF	C^BF_LMNE^LowEvents	WBC Analytical error DIFF channel clog?
D^BFDIFF^ANA_ERR^UNST_DIFF	C^BF_LMNE^LowCorrel	WBC Analytical error DIFF channel unstable measure

BFRBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
D^BFRBC^ANA_ERR^UNST_RBC	C^BF_RBC^UnstbResCount	RBC Analytical error RBC channel unstable measure
D^BFRBC^ANA_ERR^UNST_RBC	C^SYNTHESIS_BF^NoiseBfRbc	RBC Analytical error RBC channel unstable measure
D^BFRBC^ANA_ERR^UNST_RBC	C^SYNTHESIS_BF^AbnormWidthBfRbc	RBC Analytical error RBC channel unstable measure

3.4.2.4. Analytical Alarm Messages (Sample Alarm)

Analytical alarms are transmitted in the Comment Text field (10.4) as follows:

- A first comment with the alarm type D (if the analytical alarm is linked to an instrument technical problem) or S (if the analytical alarm is linked to the blood sample), the measurement type and the alarm message (main + detail).
- A second comment with the alarm type C, the considered channel and the alarm technical name.

This chapter lists device alarms in separate tables for each measurement type.

- The first column indicates the transmitted data in the first comment.
- The second column indicates the transmitted data in the second comment.

Some non-listed alarms type C may only be transmitted in the second comment and can be ignored.

WBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^WBC^WBC_ABN_MAT^SEP_LYM_NRBC	C^LMNE^NrbcWbcInterf	WBC abn. matrix LYM/NRBC
S^WBC^WBC_ABN_MAT^LYM_NRBC	C^LMNE^SuspiciousHgbNrbcInterf	WBC abn. matrix LYM/NRBC
S^WBC^WBC_ABN_MAT^SEP_LYM_NRBC	C^LMNE^NrbcLymInterf	WBC abn. matrix LYM/NRBC
S^WBC^WBC_ABN_MAT^LYMPHOCYTOSIS	C^LMNE^SuspiciousLym	WBC abn. matrix Lymphocytosis?
S^WBC^WBC_ABN_MAT^NEU_NOISE	C^LMNE^SmallNeu	WBC abn. matrix NEU/Noise
S^WBC^WBC_ABN_MAT^NEU_NOISE	C^LMNE^MediumBackgndNoiseExcess	WBC abn. matrix NEU/Noise
S^WBC^WBC_ABN_MAT^NEU_EOS_NOISE	C^LMNE^HighBackgndNoiseExcess	WBC abn. matrix NEU+EOS/Noise
S^WBC^WBC_ABN_MAT^NEU_EOS_NOISE	C^SYNTHESIS_WBC^HighBackgndNoiseExcessLmne1	WBC abn. matrix NEU+EOS/Noise
S^WBC^OOR_WBC^VISIBILITY	C^SYNTHESIS_WBC^WbcLimOfVisibility	WBC out of range High visibility
S^WBC^OOR_WBC^LINEARITY	C^SYNTHESIS_WBC^WbcLimOfLinearity	WBC out of range High linearity
S^WBC^OOR_WBC^LOQ	C^SYNTHESIS_WBC^WbcLimOfQuantif	WBC out of range Low linearity
S^WBC^WBC_ABN_MAT^INTERF_TNC	C^SYNTHESIS_WBC^LmneLowWbc	WBC abn. matrix TNC interference
S^WBC^WBC_ABN_MAT^INTERF_TNC	C^SYNTHESIS_WBC^TncLowWbc	WBC abn. matrix TNC interference
S^WBC^WBC_ABN_MAT^INTERF_NRBC	C^SYNTHESIS_WBC^SuspiciousNrbcCount	WBC abn. matrix NRBC interference
S^WBC^WBC_ABN_MAT^INTERF_NRBC	C^SYNTHESIS_WBC^SuspiciousNrbcCount1	WBC abn. matrix NRBC interference
S^WBC^WBC_ABN_MAT^NRBC_PLTAGR	C^SYNTHESIS_WBC^AbnormNrbcClassification	WBC abn. matrix NRBC/PLT aggregates?

DIFF

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^DIFF^WBC_ABN_MAT^INTERF_LYM	C^BASO^BackgndNoise	WBC abn. matrix LYM interference
S^DIFF^WBC_ABN_MAT^SEP_LYM_NEU	C^LMNE^LymNeuSep	WBC abn. matrix LYM/NEU
S^DIFF^WBC_ABN_MAT^SEP_NEU_EOS	C^LMNE^NeuEosSep	WBC abn. matrix NEU/EOS

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^DIFF^WBC_ABN_MAT^SEP_MON_NEU	C^LMNE^MonNeuSep	WBC abn. matrix MON/NEU
S^DIFF^WBC_ABN_MAT^SEP_LYM_MON	C^LMNE^LymMonSep	WBC abn. matrix LYM/MON
S^DIFF^WBC_ABN_MAT^SEP_LYM_NEU	C^LMNE^LymNeuDensSepExcess	WBC abn. matrix LYM/NEU
S^DIFF^WBC_ABN_MAT^SEP_LYM_MON	C^LMNE^LymMonDensSepExcess	WBC abn. matrix LYM/MON
S^DIFF^WBC_ABN_MAT^SEP_LYM_MON	C^LMNE^LymMonDensSepExcess1	WBC abn. matrix LYM/MON
S^DIFF^WBC_ABN_MAT^SEP_LYM_MON	C^LMNE^LymMonDensSepExcess2	WBC abn. matrix LYM/MON
S^DIFF^WBC_ABN_MAT^SEP_NEU_EOS	C^LMNE^NeuEosDensSepExcess	WBC abn. matrix NEU/EOS
S^DIFF^WBC_ABN_MAT^SEP_MON_NEU	C^LMNE^MonNeuDensSepExcess	WBC abn. matrix MON/NEU
S^DIFF^WBC_ABN_MAT^SEP_NEU_IMG	C^LMNE^NeuImgDensSepExcess	WBC abn. matrix NEU/IMG
S^DIFF^WBC_ABN_MAT^SEP_NEU_IMG	C^LMNE^NeuImgDensSepExcess1	WBC abn. matrix NEU/IMG
S^DIFF^WBC_ABN_MAT^SEP_EOS_IMG	C^LMNE^EosImgDensSepExcess	WBC abn. matrix EOS/IMG
S^DIFF^WBC_ABN_MAT^NEU_IMG	C^LMNE^ShrinkedRightNeuBox	WBC abn. matrix NEU/IMG
S^DIFF^WBC_ABN_MAT^NEU_IMG	C^LMNE^ShrinkedRightNeuBox1	WBC abn. matrix NEU/IMG
S^DIFF^WBC_ABN_MAT^SEP_MON_IMM	C^LMNE^RightMon	WBC abn. matrix MON/IMM
S^DIFF^WBC_ABN_MAT^INTERF_BASO	C^SYNTHESIS_WBC^BasoLowWbc	WBC abn. matrix BASO interference
S^DIFF^WBC_ABN_MAT^BASO_IMG	C^SYNTHESIS_WBC^LicMonBasoInterf	WBC abn. matrix BASO/IMG

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^DIFF^WBC_ABN_MAT^SEP_LYM_MON	C^SYNTHESIS_WBC^LyaMonSep	WBC abn. matrix LYM/MON
S^DIFF^WBC_ABN_MAT^SUSP_NB_LIC0	C^SYNTHESIS_WBC^NbLicExcess0	WBC abn. matrix LIC?
S^DIFF^WBC_ABN_MAT^SUSP_NB_LIC1	C^SYNTHESIS_WBC^NbLicExcess1	WBC abn. matrix LIC?
S^DIFF^WBC_ABN_MAT^SUSP_NB_LIC2	C^SYNTHESIS_WBC^NbLicExcess2	WBC abn. matrix LIC?
S^DIFF^WBC_ABN_MAT^SUSP_P_LIC	C^SYNTHESIS_WBC^PLicExcess	WBC abn. matrix LIC?
S^DIFF^WBC_ABN_MAT^SUSP_NB_ALY0	C^SYNTHESIS_WBC^NbAlyExcess0	WBC abn. matrix ALY?
S^DIFF^WBC_ABN_MAT^SUSP_NB_ALY1	C^SYNTHESIS_WBC^NbAlyExcess1	WBC abn. matrix ALY?
S^DIFF^WBC_ABN_MAT^SUSP_NB_ALY2	C^SYNTHESIS_WBC^NbAlyExcess2	WBC abn. matrix ALY?
S^DIFF^WBC_ABN_MAT^SUSP_NB_ALY3	C^SYNTHESIS_WBC^NbAlyExcess3	WBC abn. matrix ALY?
S^DIFF^WBC_ABN_MAT^SUSP_NB_ALY4	C^SYNTHESIS_WBC^NbAlyExcess4	WBC abn. matrix ALY?
S^DIFF^WBC_ABN_MAT^SUSP_P_ALY	C^SYNTHESIS_WBC^PAlyExcess	WBC abn. matrix ALY?
S^DIFF^WBC_ABN_MAT^SUSP_NB_IMM	C^SYNTHESIS_WBC^NbImmExcess	WBC abn. matrix IMM?
S^DIFF^WBC_ABN_MAT^SUSP_P_IMM	C^SYNTHESIS_WBC^PImmExcess	WBC abn. matrix IMM?
S^DIFF^WBC_ABN_MAT^SUSP_NB_IML	C^SYNTHESIS_WBC^NbImlExcess	WBC abn. matrix IML?
S^DIFF^WBC_ABN_MAT^SUSP_P_IML	C^SYNTHESIS_WBC^PImlExcess	WBC abn. matrix IML?

RBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^RBC^OOR_RBC^VISIBILITY	C^SYNTHESIS_RBC_PLT^RbcLimOfVisibility	RBC out of range High visibility
S^RBC^OOR_RBC^LINEARITY	C^SYNTHESIS_RBC_PLT^RbcLimOfLinearity	RBC out of range High linearity
S^RBC^OOR_RBC^LOQ	C^SYNTHESIS_RBC_PLT^RbcLimOfQuantif	RBC out of range Low linearity
S^RBC^PLT_CONCENT	C^SYNTHESIS_RBC_PLT^PltConcentrateMode	PLT concent. mode
S^RBC^OOR_PLT^VISIBILITY	C^SYNTHESIS_RBC_PLT^PltLimOfVisibility	PLT out of range High visibility

RBC_OTH

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^RBC_OTH^RBC_ABN_HIST^DBL_POP	C^RBC^RbcDoublePop	RBC abn. histogram Double population?
S^RBC_OTH^OOR_HCT^VISIBILITY	C^SYNTHESIS_RBC_PLT^HctLimOfVisibility	HCT out of range High visibility
S^RBC_OTH^OOR_HCT^LINEARITY	C^SYNTHESIS_RBC_PLT^HctLimOfLinearity	HCT out of range High linearity
S^RBC_OTH^OOR_HCT^LOQ	C^SYNTHESIS_RBC_PLT^HctLimOfQuantif	HCT out of range Low linearity
S^RBC_OTH^RBC_ABN_HIST^ABN_DISTRI	C^SYNTHESIS_RBC_PLT^AbnormRbcDistrib	RBC abn. histogram Abnormal distribution
S^RBC_OTH^OOR_HGB^VISIBILITY	C^SYNTHESIS_RBC_PLT^HgbLimOfVisibility	HGB out of range High visibility
S^RBC_OTH^OOR_HGB^LINEARITY	C^SYNTHESIS_RBC_PLT^HgbLimOfLinearity	HGB out of range High linearity
S^RBC_OTH^OOR_HGB^LOQ	C^SYNTHESIS_RBC_PLT^HgbLimOfQuantif	HGB out of range Low linearity
S^RBC_OTH^PLT_ABN_HIST^SCH_MACRO_PLT	C^PLT^Sch	PLT abn. histogram Schistocyte / Macro PLT?
S^RBC_OTH^PLTO_ABN_MAT^RBC_DBL_POP	C^RBC_PLTO^RbcDoublePop	PLTO abn. matrix RBC Double population?

PLT

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^PLT^PLT_INTERF^PLTAGR	C^SYNTHESIS_WBC^PltAggr	PLT Interference PLT aggregates?
S^PLT^PLT_INTERF^PLTAGR	C^SYNTHESIS_WBC^PltAbsAggr	PLT Interference PLT aggregates?
S^PLT^PLT_INTERF^PLTAGR	C^SYNTHESIS_WBC^PltAggrLowPlt	PLT Interference PLT aggregates?
S^PLT^PLT_INTERF^PLTAGR	C^SYNTHESIS_WBC^PltAggrAbnormalPlt	PLT Interference PLT aggregates?
S^PLT^PLT_ABN_HIST^SEP_RBC_PLT	C^PLT^RbcPltFixedSep	PLT abn. histogram RBC/PLT
S^PLT^PLT_ABN_HIST^SEP_RBC_PLT	C^PLT^RbcPltSepOutOfRange	PLT abn. histogram RBC/PLT
S^PLT^PLT_ABN_HIST^ABN_MPV	C^PLT^AbnormMpv	PLT abn. histogram Abnormal MPV
S^PLT^PLT_ABN_HIST^ABN_PDW	C^PLT^AbnormPdw	PLT abn. histogram Abnormal PDW
S^PLT^PLT_ABN_HIST^LARGE_PLT	C^PLT^AbnormPlt	PLT abn. histogram Large PLT?
S^PLT^OOR_PLT^LINEARITY	C^SYNTHESIS_RBC_PLT^PltLimOfLinearity	PLT out of range High linearity
S^PLT^OOR_PLT^LOQ	C^SYNTHESIS_RBC_PLT^PltLimOfQuantif	PLT out of range Low linearity

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^PLT^PLT_ABN_HIST^LOW_COUNT	C^SYNTHESIS_RBC_PLT^LowPlt	PLT abn. histogram Low count
S^PLT^PLTO_ABN_MAT^SCH	C^RBC_PLTO^SchExcess	PLTO abn. matrix Schistocyte?
S^PLT^PLTO_ABN_MAT^PLTAGR_BAL_PLTO	C^SYNTHESIS_RBC_PLT^PltPltoHistoBalance	PLTO abn. matrix PLT aggr. or PLTO/PLT bal.?
S^PLT^PLT_INTERF^PLTAGR	C^SYNTHESIS_RBC_PLT^PltAggrSuspicion	PLT Interference PLT aggregates?

PLTO

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^PLTO^OOR_RBC^VISIBILITY	C^SYNTHESIS_RBC_PLT^RbcLimOfVisibility	RBC out of range High visibility
S^PLTO^OOR_RBC^LINEARITY	C^SYNTHESIS_RBC_PLT^RbcLimOfLinearity	RBC out of range High linearity
S^PLTO^OOR_RBC^LOQ	C^SYNTHESIS_RBC_PLT^RbcLimOfQuantif	RBC out of range Low linearity
S^PLTO^PLT_CONCENT	C^SYNTHESIS_RBC_PLT^PltConcentrateMode	PLT concent. mode
S^PLTO^OOR_PLT^VISIBILITY	C^SYNTHESIS_RBC_PLT^PltLimOfVisibility	PLT out of range High visibility
S^PLTO^PLTO_ABN_MAT^SEP_PLTOX_RBC	C^RBC_PLTO^RbcoPltoFixedSep	PLTO abn. matrix PLT-Ox/RBC
S^PLTO^PLTO_ABN_MAT^LPF_RBC	C^RBC_PLTO^InvalidLpfCalc	PLTO abn. matrix LPF/RBC
S^PLTO^PLTO_ABN_MAT^SEP_LPF_RBC	C^RBC_PLTO^SchLpfInterf	PLTO abn. matrix LPF/RBC
S^PLTO^OOR_PLTO^VISIBILITY	C^SYNTHESIS_RBC_PLT^PltoLimOfVisibility	PLTO out of range High visibility
S^PLTO^OOR_PLTO^LINEARITY	C^SYNTHESIS_RBC_PLT^PltoLimOfLinearity	PLTO out of range High linearity
S^PLTO^OOR_PLTO^LOQ	C^SYNTHESIS_RBC_PLT^PltoLimOfQuantif	PLTO out of range Low linearity
S^PLTO^PLTO_ABN_MAT^PLTAGR_BAL_PLTO	C^SYNTHESIS_RBC_PLT^PltPltoHistoBalance	PLTO abn. matrix PLT aggr. or PLTO/PLT bal.?
S^PLTO^PLT_INTERF^PLTAGR	C^SYNTHESIS_RBC_PLT^PltAggrSuspicion	PLT Interference PLT aggregates?

RET

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^RET^RET_ABN_MAT^SEP_RBC_PLT	C^RET^RbcPltFixedSep	RET abn. matrix RBC/PLT
S^RET^RET_ABN_MAT^SEP_RBC_PLT	C^RET^RbcPltSepOutOfRange	RET abn. matrix RBC/PLT
S^RET^RET_ABN_MAT^RET_PLT	C^RET^ReticulatedPltSepExcess	RET abn. matrix RET/PLT
S^RET^RET_ABN_MAT^SEP_RET_RBC	C^RET^RbcRetFixedSep	RET abn. matrix RET/RBC
S^RET^OOR_RET^VISIBILITY	C^SYNTHESIS_RBC_PLT^RetLimOfVisibility	RET out of range High visibility
S^RET^OOR_RET^LINEARITY	C^SYNTHESIS_RBC_PLT^RetLimOfLinearity	RET out of range High linearity
S^RET^OOR_RET^LOQ	C^SYNTHESIS_RBC_PLT^RetLimOfQuantif	RET out of range Low linearity
S^RET^OOR_RET^LINEARITY	C^SYNTHESIS_RBC_PLT^PRetLimOfLinearity	RET out of range High linearity
S^RET^RET_ABN_MAT^LOW_COUNT	C^SYNTHESIS_RBC_PLT^LowRet	RET abn. matrix Low count

BFWBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^BFWBC^BFWBC_ABN_MAT^NOISE_PN	C^BF_LMNE^HighBackgndNoiseExcess	WBC abn. matrix Noise/PN
S^BFWBC^BFWBC_ABN_MAT^NHC	C^BF_LMNE^NucleatedCellsBfWbcInterf	WBC abn. matrix Non hemato cells?
S^BFWBC^OOR_BFWBC^VISIBILITY	C^SYNTHESIS_BF^BfWbcLimOfVisibility	WBC out of range High visibility
S^BFWBC^OOR_BFWBC^LINEARITY	C^SYNTHESIS_BF^BfWbcLimOfLinearity	WBC out of range High linearity
S^BFWBC^OOR_BFWBC^LOQ	C^SYNTHESIS_BF^BfWbcLimOfQuantif	WBC out of range Low linearity

BFDIFF

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^BFDIFF^BFWBC_ABN_MAT^SEP_MN_PN	C^BF_LMNE^SuspiciousMnPnSep	WBC abn. matrix MN/PN
S^BFDIFF^BFWBC_ABN_MAT^INTERF_LEFT	C^BF_LMNE^BackgndNoise	WBC abn. matrix Left interference

BFRBC

Transmitted data Alarm type, measurement type, alarm message	Transmitted data Alarm type, considered channel, alarm technical name	Description
S^BFRBC^BFRBC_ABN_HIST^INTERF_RBC	C^BF_RBC^BfRbcInterf	RBC abn. histogram RBC interference?
S^BFRBC^OOR_BFRBC^VISIBILITY	C^SYNTHESIS_BF^BfRbcLimOfVisibility	RBC out of range High visibility
S^BFRBC^OOR_BFRBC^LINEARITY	C^SYNTHESIS_BF^BfRbcLimOfLinearity	RBC out of range High linearity
S^BFRBC^OOR_BFRBC^LOQ	C^SYNTHESIS_BF^BfRbcLimOfQuantif	RBC out of range Low linearity

3.5. Curves and Matrix Transmission

3.5.1. General Decoding

The image data must be uncompressed using first the *base64* and secondly the *deflate* algorithms.

The data must be converted from binary to text format.

3.5.2. Matrices

Matrices are transmitted in the manufacturer record as follows:

- The Message Type field (14.3) is set to: MATRIX.
- The Measurement Type field (14.4) is set to: DIFF, PLTO, RET, BFDIFF.
- The Name field (14.5) is set to: LMNERESABS, RBCPLTRESABS, RETRESFLUO, MPRESABS.
- The Thresholds field (14.6) contains the encoding type and the FLOATLE-stream/deflate:base64 coded value of the matrix polygons.
- The Points field (14.7) contains the encoding type and the FLOATLE-stream/deflate:base64 coded value of the matrix points.

Matrix Thresholds

Matrix polygons thresholds data must be in accordance with the following frame:

Number of bytes	Data	Format	Meaning
4	X display min	FLOATLE FLOATLE: IEEE 754 floating point value transmitted in Little Endian byte order (Intel)	X min value for Matrix start
4	X display max	FLOATLE	X max value for Matrix end
4	Y display min	FLOATLE	Y min value for Matrix start
4	Y display max	FLOATLE	Y max value for Matrix end
4	NumberOfList = 3	FLOATLE	One list for X coordinates of polygons, one list for Y coordinates of polygons, one list for box identifiers
4	ListLength	FLOATLE	Number of thresholds in the list
4 x ListLength	X	FLOATLE	X value of the threshold for each threshold
4 x ListLength	Y	FLOATLE	Y value of the threshold for each threshold
4 x ListLength	BoxID	FLOATLE	ID of each box

BoxID for the matrix: LMNERESABS.

BoxID	Box Name
0	LYM
1	MON
2	NEU
3	EOS
4	IMG
5	ALY
7	RN
8	RM
9	IMM
10	IML
11	LN
12	Background Noise Low
13	Background Noise High
15	Low Optical Correlation
16	Background Noise Bubbles
17	Erythroblasts
18	Platelet aggregates
19	MON + RM + IMM
20	LYM + ALY + IML
21	**5DIFF**: LN + NEU + RN + IMG **6DIFF**: LN + NEU
22	**6DIFF**: RN + IMG
23	Erythroblasts + Platelet aggregates

BoxID for the matrix: RBCPLTRESABS.

BoxID	Box Name
0	Small Cells
1	RBC = MIC + RBC_N + MAC
2	PLT = PLT_N + PLT_L
3	RBC_N
4	MIC
5	MAC
6	PLT_N
7	PLT_L

BoxID for the matrix: RETRESFLUO.

BoxID	Box Name
0	Background Noise
1	PLT
2	PLT_RET
3	RBC
4	RET_L
5	RET_M
6	RET_H
7	IMR
8	NRBC
9	WBC

BoxID for the matrix: MPRESABS.

BoxID	Box Name
0	Background Noise Low
1	Background Noise High
2	BFMN = LL + LYM + MON
3	LL
4	LYM
6	MON
7	BFPN = EOS + NEU
8	EOS
9	NEU
10	Immature cells = Immature polynucleated cells + Immature mononucleated cells
11	Immature polynucleated cells
12	Immature mononucleated cells

Matrix Points

Matrix points data must be in accordance with the following frame:

Number of bytes	Data	Format	Meaning
4	X display min	FLOATLE	X min value for Matrix start
4	X display max	FLOATLE	X max value for Matrix end
4	Y display min	FLOATLE	Y min value for Matrix start
4	Y display max	FLOATLE	Y max value for Matrix end
4	X scale NB	FLOATLE	Number of X ticks in the list to display
4 x X scale NB	X scale	FLOATLE	X tick values
4	Y scale NB	FLOATLE	Number of Y ticks in the list to display
4 x Y scale NB	Y scale	FLOATLE	Y tick values
4	NumberOfList = 4	FLOATLE	One list for X points, one list for Y points, one list for the number of points for this coordinate, one list for the population to which the point belongs (X, Y coordinates)
4	ListLength	FLOATLE	Number of elements in the list
4 x ListLength	X	FLOATLE	X (Coordinate)
4 x ListLength	Y	FLOATLE	Y (Coordinate)
4 x ListLength	Qty	FLOATLE	Quantity (number of points for the (X, Y) coordinate)
4 x ListLength	Pop	FLOATLE	Population to which the point (X, Y coordinates) belongs

Population ID for the matrix: LMNERESABS.

Population ID	Population Name
0	LYM
1	MON
2	NEU
3	EOS

Population ID	Population Name
4	IMG
5	ALY
6	LL
7	RN
8	RM
9	IMM
10	IML
11	LN
12	Background Noise Low
13	Background Noise High
14	BAS
15	Low Optical Correlation
16	Background Noise Bubbles
17	Erythroblasts
18	Platelet aggregates

Population ID for the matrix: RBCPLTRESABS.

Population ID	Population Name
0	PLT_N
1	PLT_L
2	MIC
3	MAC
4	RBC_N
5	Small Cells

Population ID for the matrix: RETRESFLUO.

Population ID	Population Name
0	Background Noise
1	PLT
2	PLT_RET
3	RBC
4	RET_L
5	RET_M
6	RET_H
7	IMR
8	NRBC
9	WBC

Population ID for the matrix: MPRESABS.

Population ID	Population Name
0	LYM
1	MON
2	NEU
3	EOS
4	Immature polynucleated cells
6	LL
7	Immature mononucleated cells
8	Background Noise Low
9	Background Noise High

3.5.3. Histograms

Histograms are transmitted in the manufacturer record as follows:

- The Message Type field (14.3) is set to: HISTOGRAM.
- The Measurement Type field (14.4) is set to: DIFF, PLT, WBC, RBC, BFRBC, BFDIFF.
- The Name field (14.5) is set to: BASOALONGRES, EOSALONGABS, EOSALONGRES, LYMALONGABS, LYMALONGRES, MONALONGABS, MONALONGRES, NEUALONGABS, NEUALONGRES, PLTALONGRES,

TNCALONGRES, RBCALONGRES, RBCPLTALONGRES, MNALONGABS, MNALONGRES, PNALONGABS, PNALONGRES.

- The Thresholds field (14.6) contains the encoding type and the FLOATLE-stream/deflate:base64 coded value of the histogram thresholds.
- The Points field (14.7) contains the encoding type and the FLOATLE-stream/deflate:base64 coded value of the histogram points.

Histogram Thresholds

Histogram thresholds data must be in accordance with the following frame:

Number of bytes	Data	Format	Meaning
4	X display min	FLOATLE	X min value for Histogram start
4	X display max	FLOATLE	X max value for Histogram end
4	Y display min	FLOATLE	Y min value for Histogram start
4	Y display max	FLOATLE	Y max value for Histogram end
4	NumberOfList = 2	FLOATLE	One list for X threshold positions and one list of threshold identifiers
4	ListLength	FLOATLE	Number of thresholds in the list
4 x ListLength	X	FLOATLE	X value of the threshold for each threshold
4 x ListLength	ThrsID	FLOATLE	ID of each threshold

ThrsID for the histogram: BASOALONGRES.

ThrsID	Threshold Name	Value
0	RBG	Setting
1	RBasoMin	Setting
2	RBasoMax	Setting

ThrsID for the histogram: RBCALONGRES.

ThrsID	Threshold Name	Value
0	VMic	Setting
1	VMac	Setting

ThrsID for the histogram: PLTALONGRES.

ThrsID	Threshold Name	Value
0	thrPltRbc	Calculated

ThrsID for the histogram: RBCPLTALONGRES.

ThrsID	Threshold Name	Value
0	thrSynthPltRbc	Calculated

ThrsID for the histogram: TNCALONGRES.

ThrsID	Threshold Name	Value
0	RTNC1	Setting
1	RTNC2	Setting
2	RTNC3	Setting

There are no thresholds (ListLength = 0) for the following histograms: EOSALONGABS, EOSALONGRES, LYMALONGABS, LYMALONGRES, MONALONGABS, MONALONGRES, NEUALONGABS, NEUALONGRES, MNALONGABS, MNALONGRES, PNALONGABS, PNALONGRES.

Histogram Points

Histogram points data must be in accordance with the following frame:

Number of bytes	Data	Format	Meaning
4	X display min	FLOATLE	X min value for Histogram start
4	X display max	FLOATLE	X max value for Histogram end
4	Y display min	FLOATLE	Y min value for Histogram start
4	Y display max	FLOATLE	Y max value for Histogram end
4	X scale NB	FLOATLE	Number of X ticks in the list to display
4 x X scale NB	X scale	FLOATLE	X tick values
4	Y scale NB	FLOATLE	Number of Y ticks in the list to display

Number of bytes	Data	Format	Meaning
4 x Y scale NB	Y scale	FLOATLE	Y tick values
4	NumberOfList = 2	FLOATLE	One list for X positions and one list for the Y positions (quantity on each X position)
4	ListLength	FLOATLE	Number of elements in the list
4 x ListLength	X	FLOATLE	X (Coordinate)
4 x ListLength	Y	FLOATLE	Y (Coordinate)

3.6. Example of Data Frame

3.6.1. Example of a Query: With Response

<- <ENQ>

-> <ACK>

<- <STX>1H|\^&|||MHR1^210M2SH01011^1.7.0||||||P|LIS2-A2|
20230929091956<CR><ETX>00<CR><LF>

-> <ACK>

<- <STX>2Q|1|^2023092700000011^1^042249^1||ALL|||||||O<CR><ETX>E6<CR><LF>

-> <ACK>

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-> <ACK>

<- <STX>4Q|3|^2023092700000013^1^042249^3||ALL|||||||O<CR><ETX>EE<CR><LF>

-> <ACK>

<- <STX>5Q|4|^2023092700000014^1^042249^4||ALL|||||||O<CR><ETX>F2<CR><LF>

-> <ACK>

<- <STX>6Q|5|^2023092700000015^1^042249^5||ALL|||||||O<CR><ETX>F6<CR><LF>

-> <ACK>

<- <STX>7Q|6|^2023092700000016^1^042249^6||ALL|||||||O<CR><ETX>FA<CR><LF>

-> <ACK>

<- <STX>0Q|7|^2023092700000017^1^042249^7||ALL|||||||O<CR><ETX>F6<CR><LF>

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-> <ACK>

<- <STX>2Q|9|^2023092700000019^1^042249^9||ALL|||||||O<CR><ETX>FE<CR><LF>

-> <ACK>

<- <STX>3Q|10|^2023092700000020^1^042249^10||ALL|||||||O<CR><ETX>47<CR><LF>

-> <ACK>

<- <STX>4L|1|N<CR><ETX>07<CR><LF>

-> <ACK>

<- <EOT>

-> <ENQ>

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<- <ACK>

-> <STX>2P|1||00000011||PATIENT 11^TEST||19851114^37^Y|M<CR><ETX>C4<CR><LF>

<- <ACK>

-> <STX>3O|1|2023092700000011^1^042249^1||^^^DIF|R|20230927174534|20230927174534||||
N|||BLOOD|||||||||Q<CR><ETX>9B<CR><LF>

<- <ACK>

-> <STX>4P|2||00000012||PATIENT 12^TEST||19970225^26^Y|F<CR><ETX>C5<CR><LF>

<- <ACK>

-> <STX>5O|1|2023092700000012^1^042249^2||^^^DIF|R|20230927174536|20230927174536||||
N||||BLOOD|||||||||Q<CR><ETX>A3<CR><LF>

<- <ACK>

-> <STX>6P|3||00000013||PATIENT 13^TEST||19760228^47^Y|M<CR><ETX>D4<CR><LF>

<- <ACK>

-> <STX>7O|1|2023092700000013^1^042249^3||^^^DIF|R|20230927174538|20230927174538||||
N||||BLOOD|||||||||Q<CR><ETX>AB<CR><LF>

<- <ACK>

-> <STX>0P|4||00000014||PATIENT 14^TEST||19710717^52^Y|F<CR><ETX>C4<CR><LF>

<- <ACK>

-> <STX>1O|1|2023092700000014^1^042249^4||^^^DIF|R|20230927174540|20230927174540||||N||||BLOOD|||||||||Q<CR><ETX>99<CR><LF>

<- <ACK>

-> <STX>2P|5||00000015||PATIENT 15^TEST||19650903^58^Y|M<CR><ETX>D6<CR><LF>

<- <ACK>

-> <STX>3O|1|2023092700000015^1^042249^5||^^^DIF|R|20230927174542|20230927174542||||N||||BLOOD|||||||||Q<CR><ETX>A1<CR><LF>

<- <ACK>

-> <STX>4P|6||00000016||PATIENT 16^TEST||20130315^10^Y|F<CR><ETX>B6<CR><LF>

<- <ACK>

-> <STX>5O|1|2023092700000016^1^042249^6||^^^DIF|R|20230927174544|20230927174544||||N||||BLOOD|||||||||Q<CR><ETX>A9<CR><LF>

<- <ACK>

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<- <ACK>

-> <STX>7O|1|2023092700000017^1^042249^7||^^^DIF|R|20230927174546|20230927174546||||N||||BLOOD|||||||||Q<CR><ETX>B1<CR><LF>

<- <ACK>

-> <STX>0P|8||00000018||PATIENT 18^TEST||19360920^87^Y|F<CR><ETX>D5<CR><LF>

<- <ACK>

-> <STX>1O|1|2023092700000018^1^042249^8||^^^DIF|R|20230927174548|20230927174548||||N||||BLOOD|||||||||Q<CR><ETX>B1<CR><LF>

<- <ACK>

-> <STX>2P|9||00000019||PATIENT 19^TEST||19240128^99^Y|M<CR><ETX>E1<CR><LF>

<- <ACK>

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<- <ACK>

-> <STX>4P|10||00000020||PATIENT 20^TEST||19890613^34^Y|F<CR><ETX>F3<CR><LF>

<- <ACK>

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<- <ACK>

-> <STX>6L|1|N<CR><ETX>09<CR><LF>

<- <ACK>

-> <EOT>

3.6.2. Example of a Query: Known Tube Without Worklist

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-> <ACK>

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-> <ACK>

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-> <ACK>

<- <STX>3L|1|N<CR><ETX>06<CR><LF>

-> <ACK>

<- <EOT>

-> <ENQ>

<- <ACK>

-> <STX>1H|\^&|||YP8K||||||P|LIS2-A2|20230929092446<CR><ETX>BF<CR><LF>

<- <ACK>

-> <STX>2P|1|<CR><ETX>BB<CR><LF>

<- <ACK>

-> <STX>3O|1|2023092700000005^1^042249^1||^^^||||||N|||||||||||**Y**<CR><ETX>6F<CR><LF>

<- <ACK>

-> <STX>4L|1|N<CR><ETX>07<CR><LF>

<- <ACK>

-> <EOT>

3.6.3. Example of a Query: Unknown Tube

<- <ENQ>

-> <ACK>

<- <STX>1H|\^&|||MHR1^210M2SH01011^1.7.0||||||P|LIS2-A2|
20230929091956<CR><ETX>00<CR><LF>

-> <ACK>

<- <STX>2Q|1|^2023092700000205^1^042249^1||ALL|||||||O<CR><ETX>EB<CR><LF>

-> <ACK>

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-> <ACK>

<- <EOT>

-> <ENQ>

<- <ACK>

-> <STX>1H|\^&|||YP8K||||||P|LIS2-A2|20230929092601<CR><ETX>B8<CR><LF>

<- <ACK>

-> <STX>2P|1|<CR><ETX>BB<CR><LF>

<- <ACK>

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<- <ACK>

-> <STX>4L|1|N<CR><ETX>07<CR><LF>

<- <ACK>

-> <EOT>

3.6.4. Example of Result With Rerun and Reflex

<- <ENQ>

-> <ACK>

<- <STX>1H|\^&|||MHR1^210M2SH01011^1.7.0||||||P|LIS2-A2|
20230302102751<CR><ETX>E3<CR><LF>

-> <ACK>

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F<CR><ETX>1F<CR><LF>

-> <ACK>

<- <STX>3O|1|2023092700000020^1^041176^1||^^^DIR|R||20230302082259|||||||BLOOD|||||
AP^STANDARD(m)|||||F<CR><ETX>6E<CR><LF>

-> <ACK>

<- <STX>4C|1|I|S^DIFF^WBC_ABN_MAT^SEP_NEU_EOS|I<CR><ETX>82<CR><LF>

-> <ACK>

<- <STX>5C|2|I|C^LMNE^NeuEosSep|I<CR><ETX>DE<CR><LF>

-> <ACK>

<- <STX>6M|1|HISTOGRAM|WBC|TNCALONGRES|FLOATLE-stream/
deflate:base64^Y2AAgXpnMNWwCEQ7ABEQNwBxgSMQQ+QYGuxBcgA=|FLOATLE-stream/
deflate:base64^xdV/
qF5zHAfwg2EYu2zY2OzaLobhwcYw7rm7G8N2XVyzMVzMXHbxjGEYHhvrzq9u0lzMui2tpbWWpJu
WniQtSUvSknSTtCTdtLS0ltf3Pp/pW<ETB>4B<CR><LF>

-> <ACK>

<- <STX>7P4Qyrdefc45z3nOeZ5zPt/3N8vSeLp5sFTW12pt5A7EfqWxtp+nY/RSpZ
+sKcvqqKdETivtlKnQRTc99LKRLfRRZRvb2UE/
OxlgN9n0LBvCUIZRx0hGMYZ6GpjlJEpMZirTyJnBLGbTShvzWEA7C
+mgkzJLWcZyKqzgWVbRxfO8yMt08wqvsoYe3mAt6+hlPW+zgY28wyY2s4V3eY/
36eMDtvlhVT7iYz5hG5/yGZ+znS/4k<ETB>7A<CR><LF>

-> <ACK>

<- <STX>0q/Ywdd8w7f08x3f8wM7+ZGf
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BjGchLjqOdkxjOBBk7hVE5jlqdzBmcyibM4m3MocS7ncT6TmcIFXMhULuJiLmEal3IZjeQ0MZ1mZj
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A9<CR><LF>

-> <ACK>

<- <STX>1Qf3cC+L6eQ+7ucByizhQR5iKQ/zCI
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dVE8p7nxncZ4zxOiT1lfpX5LvTci+ml89MSUeJct8bw74prpHl3qS6zhrZrKWlUeDmZiqut403aP
+nrt88FzXqPb9gvqanVV/lcl8a7mRw/MjB5K/ZV6MvV5miv75lGaV7tiDm
+NXNgU2dEde<ETB>E8<CR><LF>

-> <ACK>

<-
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-> <ACK>

<- <STX>3M|2|HISTOGRAM|RBC|RBCALONGRES|FLOATLE-stream/deflate:base64^Y2AAgXZnEPn2+3wXIOUAwRIODAxSYHEGhgZ7AA==|FLOA<ETB>6C<CR><LF>

-> <ACK>

<- <STX>4TLE-stream/deflate:base64^dZR5UBRnGsZRFBHHCzArHkBisFDxABURlf6+9/k4hEREE4kHXiErGIiDB0ZcIAHBJUgQcFFGEGE8UIloBNFALFDWZSOwWsB6RROIikfwCKZYUcO+spWt/Wenaqa7Z95v+vf08+s2M3vz2o43n20deYo3wux/vvvPcVz3/iaHBG2Tg7lwL1aC90Vwq4n3q4Xtxrt8bC7DEmxkcOso6RMwRf<ETB>A5<CR><LF>

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-> <ACK>

<- <STX>6wp9DgklVnS6GF0OvNk0r20vzDTbmopzGauvXS7KpfZ8uj6jXzmM1FT+0FmLKQruqPMWUR1TseZ9QTVeH3NvCVUHXyamc9Qpf4b5q6giuRzzF5JZwrOM381nSq/yBlqqLjxO85RS8fa6jnLZTps0cB5msjkcJUzXad9Hjc51y0yBv3A2Zopa/VPnO8uZSS0csYHlJrziHO2UXLpE876jBLr2znvr2Ro7eDMLyjW7BXn/o0qdG<ETB>C7<CR><LF>

-> <ACK>

<-
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-> <ACK>

<-
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-> <ACK>

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-> <ACK>

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-> <ACK>

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wUvecVrynjDW95Rzns
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-> <ACK>

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-> <ACK>

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+Dzple9rD98OOc5z5tz+31PFMVrf8m9TfR7cXR/
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-> <ACK>

<- <STX>2khTba6aKbXvq4Sj
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yHYc5wlGO8T1NHOcEP3CSUzTzIy208hM/08Yv/
Mpp2umgkzN0cZZznKebHi5wkV4ucZnf6CseeK5X+IOr/MlfXKOf69zgJre4zR3uxu+Dd
+ABHuQhBjGYh3mEIQxlGI+SxWM8znCyeYInGcFIRjG<ETB>34<CR><LF>

-> <ACK>

<-
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+s1EDb4q5lh54lLUuHfrWFVvWFPmWF/uSH3pSGttS<ETB>2D<CR><LF>

-> <ACK>

<- <STX>4FRiRNOBZmP5n11ox57wgzfTbMeGeY7WR2L2XM9sUgmfuesN
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-> <ACK>

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-> <ACK>

<- <STX>6MVQBKIdQCwA|FLOATLE-stream/deflate:base64^7dSJi05RGAfga98GY98GY98Z
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APirafTPfd265zznl8UJWpXxrchWhfGbxWLovzwnJ/+/
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-> <ACK>

<-
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+l84zkveMkrXvOGt7zjPR/4yCc
+84VID5SiNGUoSznKU4GKVKlyVUiiKtWoTjI1qEktalOHutSjPg1oSCNSaEwTmpJKM5rTgpa0ojVtaEs72t<ETB>CB<CR><LF>

-> <ACK>

<- <STX>0OBjnSiM11loyvd6E4PetKL3vShL/
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62SuTV75lVklfJlaNyQx4l8iYl5ENeuMcXw516E/o/KfRm+9ALWeGs5oW9L9nfVeEMFobzHBO
+7x16My<ETB>14<CR><LF>

-> <ACK>

<- <STX>1X8K/
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Wv1Ic=<CR><ETX>93<CR><LF>

-> <ACK>

<- <STX>2M|13|HISTOGRAM|DIFF|BASOALONGRES|FLOATLE-stream/deflate:base64^Y2AAgXpnMMXg4QQkHIAliCc4MjAoOCPkGuxBcgA=|FLOATLE-stream/deflate:base64^7dR7aFZlHAfwY800nbXK+63l<ETB>5A<CR><LF>

-> <ACK>

<-
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+UZSsbeV3fqKpZdHdFUdRJtQzE1uf46RGlkaaiSZFURHFlBBTQSU1ZNhOPQ1kOchRTtDIKc7SRDMtXOU6kW8qoD2FFNGZ7vSmmAEMZigljGQspcRMLmv9b9OoYCazmU8li6li<ETB>FB<CR><LF>

-> <ACK>

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Ms1rnODm9xK5sEMtOEBHqSAtjxEO9rzMB3oSCGdeIRHKeIxHucJOtOFrnSjOz3oSS9604e
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-> <ACK>

<- <STX>54yVKGc8EJhIziTLKmczLTOEVpvIqr/E605jODN6ggjd5i7eZyTvM4l1mM4e5zGM+7/E
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+Nxfu10pzJc2UNFdSab7ElTMKwn3eHWa7V+iH88jlqkw9X3n
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-> <ACK>

<- <STX>638lwfw+EPKgNeVMasinJrZaQd9mQh2kmNoR9TcjOOE
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34lPUh63xjfBg==<CR><ETX>0E<CR><LF>

-> <ACK>

<- <EOT>

-> <ENQ>

<- <ACK>

-> <STX>1H|\^&|||YP8K||||||P|LIS2-A2|20230929093211<CR><ETX>B6<CR><LF>

<- <ACK>

-> <STX>2P|1||00000020||PATIENT 20^TEST||19890613^34^Y|F<CR><ETX>C1<CR><LF>

<- <ACK>

-> <STX>3O|1|2023092700000020^1^042249^10||^^^SLIDE_EC|R|20230927174552|20230927174552||||N||||BLOOD|||||||||O<CR><ETX>4E<CR><LF>

<- <ACK>

-> <STX>4L|1|N<CR><ETX>07<CR><LF>

<- <ACK>

-> <EOT>

3.6.5. Example of Result With Nothing Left to Do

<- <ENQ>

-> <ACK>

<- <STX>1H|\^&|||MHR1^210M2SH01011^1.7.0||||||P|LIS2-A2|
20230302102751<CR><ETX>E3<CR><LF>

-> <ACK>

<- <STX>2P|1||000000000||PAT 2303020020^PAT 2303020020||19250709000000^97^Y|
F<CR><ETX>1F<CR><LF>

-> <ACK>

<- <STX>3O|1|2023092700000005^1^041176^1||^^^DIR|R||20230302082259|||||||BLOOD|||||
AP^STANDARD(m)|||||F<CR><ETX>71<CR><LF>

-> <ACK>

<- <STX>4C|1|I|S^DIFF^WBC_ABN_MAT^SEP_NEU_EOS|I<CR><ETX>82<CR><LF>

-> <ACK>

<- <STX>5C|2|I|C^LMNE^NeuEosSep|I<CR><ETX>DE<CR><LF>

-> <ACK>

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deflate:base64^xdV/
qF5zHAfwg2EYu2zY2OzaLobhwcYw7rm7G8N2XVyzMVzMXHbxjGEYHhvrzq9u0lzMui2tpbWWpJu
WniQtSUvSknSTtCTdtLS0ltf3Pp/pW<ETB>4B<CR><LF>

-> <ACK>

<- <STX>7P4Qyrdefc45z3nOeZ5zPt/3N8vSeLp5sFTW12pt5A7EfqWxtp+nY/RSpZ
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OxlgN9n0LBvCUIZRx0hGMYZ6GpjIJEpMZirTyJnBLGbTShvzWEA7C
+mgkzJLWcZyKqzgWVbRxfO8yMt08wqvsoYe3mAt6+hlPW+zgY28wyY2s4V3eY/
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-> <ACK>

<- <STX>0q/Ywdd8w7f08x3f8wM7+ZGf
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BjGchLjqOdkxjOBBk7hVE5jIqdzBmcyibM4m3MocS7ncT6TmcIFXMhULuJiLmEal3IZjeQ0MZ1mZj
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-> <ACK>

<- <STX>1Qf3cC+L6eQ+7ucByizhQR5iKQ/zCI
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+nrt88FzXqPb9gvqanVV/Icl8a7mRw/MjB5K/ZV6MvV5miv75lGaV7tiDm
+NXNgU2dEde<ETB>E8<CR><LF>

-> <ACK>

<-
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+8=<CR><ETX>10<CR><LF>

-> <ACK>

<- <STX>3M|2|HISTOGRAM|RBC|RBCALONGRES|FLOATLE-stream/
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-> <ACK>

<- <STX>4TLE-stream/deflate:base64^dZR5UBRnGsZRFBHHCzArHkBisFDxABURlf6+9/
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+spWt/Wenaqa7Z95v+vf08+s2M3vz2o43n20deYo3wux/vvvPcVz3/
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-> <ACK>

<- <STX>5KMdLL5UNpu/ESa39wgeV5GBaXwTKZcXrqX50wy0K6IZ0ukV2wFz1fL8c21vKZJjvC
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QhXqQV
+xM8swSxDzkWuNH45vfozGdc4nZyNFIIY3wDqGhS1cQc9KgneHU70gk9TkfRcxMXe2bqFO3hV5
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-> <ACK>

<- <STX>6wp9DgklVnS6GF0OvNk0r20vzDTbmopzGauvXS7KpfZ8uj6jXzmM1FT
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yBlqqLjxO85RS8fa6jnLZTps0cB5msjkcJUzXad9Hjc51y0yBv3A2Zopa/
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-> <ACK>

<-
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29jaPM74H6R1fYumtqdYNs5Gtw1MizG4IpuLAbZjAP3ji8dxqPOaQJ0LhPBDuALD1fUeLmhj/
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-> <ACK>

<-
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IUxaBmuBy8HO4ng0JXIWv0xmvShYD8xP/aPyEhYhSvJYWBXMSdrNVJzPkVtQQTYW/
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-> <ACK>

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+1F0XGtKMRC9F3kJQqebBZp9vvFnvhqYdz1UOSe7St9rUbK0qqx8t4PbnJ0wTRZW+khJzyfKh
+7usqBpjEyzd5Rhm8eIvNbLGWvUS9EyMs7IjvlqIh3v1a4B/
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-> <ACK>

<- <STX>247B8vKmc7yiaeSARPCpW1DiuwXc1Rmzv6H9BtsRg
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-> <ACK>

<-
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xYO8Mqw4dBID447hY8+DmLo8D9coG5udMmFvmQrbm0mYdzgOzqUbkHkxHOFbQjC0KghNK3x
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Uq5WRvXXjp<ETB>5E<CR><LF>

-> <ACK>

<-
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+Sd6/8LB9PbpaFExvl0p41csafK6SsOinvPymUt7flywXHs
+V3xzPktJBU6T82WcYZkqTr8ETZUpIgy3skyLC18TJir0Gq+3Hce5xsc9kiA5dvlm89XS9TnkbK/
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-> <ACK>

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+HJIqun5OEufnGwTzdN8THisiRfr0hSKvkcSLogmC/RT6OhvRYbQUfgNea1YRdzR2XVvpdlTj/
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-> <ACK>

<- <STX>6+WaXzParqyuVrE2MVa5OTPtE+6YrTIxiQtY8MX2k/
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-> <ACK>

<- <STX>7M|3|HISTOGRAM|PLT|PLTALONGRES|FLOATLE-stream/
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deflate:base64^jdR7UNRVFAfwVUB0UdQARdBFUBGjGmzV1Nzf75xrtWnMGFg
+cjO<ETB>50<CR><LF>

-> <ACK>

<- <STX>0RAhtHB1HTMBWtRURzMSVFkzAUEXHTBN1IHdzGN6RmumRArqgh
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+Hus0tE6BkhaR45ksbvQDpBLSyNli32hPMRkkTEu10XZMFYqW41OjLtkm86Dhpi6U2ZmH8J8WuL
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-> <ACK>

<- <STX>12Vx5yWEmvP4A8NtqRcAS57ORrPYl8pWSuu4CcDnKFVSCvk
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>

-> <ACK>

<-
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+B5GMfZ8GMYRGEdhlMA4BsMO40cYx2GcgHESxikYZ2CcxfmVwvgJxjkY52FcgHERxi8wLsFww
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-> <ACK>

<-
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-> <ACK>

<- <STX>4E0RdGXxj9YOhg6GAEwegPoz+MYBjBMEJE22/D//
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-> <ACK>

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DZT9ZyjNPMPm4rePmmRajxIw71TIQ7j5dvjueDPtN41vBJ7N4wgffMHM8vzx3L1yoN7Ag38PxbI5A
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-> <ACK>

<- <STX>6wC8eP7sTe
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-> <ACK>

<- <STX>76vLNdLjm9VY3E2ly5NKng6ZjSxo/6UvbenS5jz+rbxB7/FasjX0c
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+JtjVKKOPKmrb5plSz2m8fitO2vuR0oGrhTJ6GMvbfUOa09fH9Qp5GCecgKW37aP8/
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-> <ACK>

<- <STX>0M|4|HISTOGRAM|RBC|RBCPLTALO<ETB>E0<CR><LF>

-> <ACK>

<- <STX>1NGRES|FLOATLE-stream/deflate:base64^Y2AAgXpnMOWg7AIiGRga7BkYBJxAQgA=|
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-> <ACK>

<-
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-> <ACK>

<-
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-> <ACK>

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-> <ACK>

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-> <ACK>

<- <STX>7/MD<CR><ETX>07<CR><LF>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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-> <ACK>

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<- <EOT>

-> <ENQ>

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<- <ACK>

-> <STX>4L|1|N<CR><ETX>07<CR><LF>

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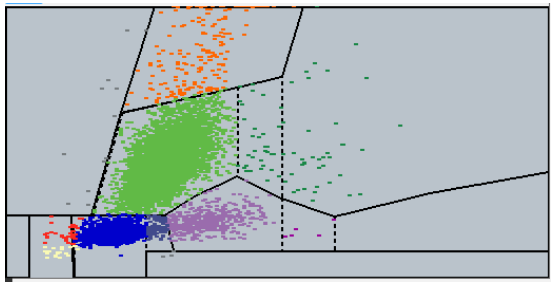
-> <EOT>

3.6.6. Example of Data Frame for Matrices

DIFF



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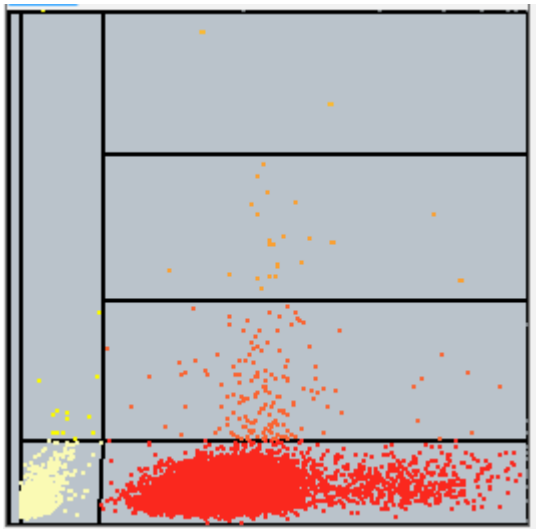

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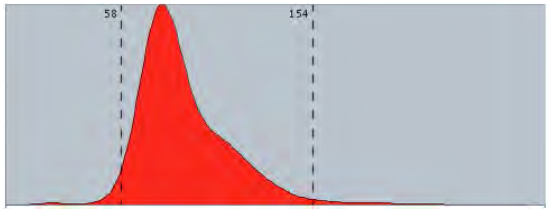
3.6.7. Example of Data Frame for Histograms

RBC



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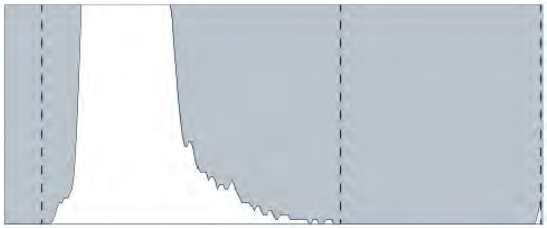
BASO



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4e+PEkxT9GP/
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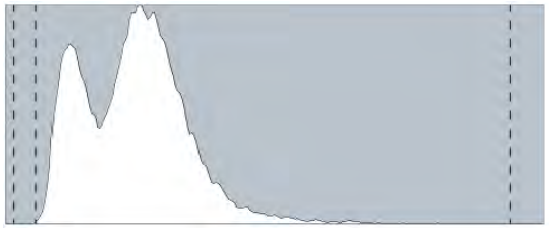
WBC



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3.6.8. Example of Data Frame for Statistics

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kEjectedOnConveyor^^0<CR><ETX>FD<CR><LF>

-> <ACK>

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tPatientCBR^^299\RunReportPatientDIR^^249\RunReportPatientCBF^^17\RunReportPatientDIF_
LV^^0\RunReport<ETB>82<CR><LF>

-> <ACK>

<-
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ontrolCBR^^0\RunReportControlDIR^^0\RunReportControlCBF^^94\RunReportControlDIF_LV^^
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F>

-> <ACK>

<- <STX>2M|7|STATS|INVALID_RUN^20221130202301^20230306080334^UPTIME|
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StopRequested^^0\BadSmearStain^^22<CR><ETX>AC<CR><LF>

-> <ACK>

<- <STX>3M|8|STATS|FAILURE^20221130202301^20230306080334^UPTIME|
FailureNumber^INST^24\FailureNumber^CIM^0\FailureNumber^SPS^30<CR><ETX>37<CR><LF
>

-> <ACK>

<- <STX>4M|9|STATS|REAGENTS^20221130202301^20230306080334^UPTIME|
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e^DILUENT^432352008\Volume^FLUOCYTE^9310200\Volume^LYSEBIO^7029900\Volume^MET
HANOL^10749060\Volume^NUCEDIFF^<ETB>57<CR><LF>

-> <ACK>

<-
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-> <ACK>

<- <STX>6M|10|STATS|TECHNICAL_CYCLES^20221130202301^20230306080334^UPTIME|
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69\AnalyzerCleaner^^148\AnalyzerMinoclair^^6\CIMStartup^^0\CIMShutdown^^0\CIMRecovery
^^0\S<ETB>36<CR><LF>

-> <ACK>

<-
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ly^^1\SPSRecovery^^11<CR><ETX>25<CR><LF>

-> <ACK>

<- <STX>0L|1|N<CR><ETX>03<CR><LF>

-> <ACK>

<- <EOT>

3.6.9. Example of Data Frame for Remote Command

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<- <ACK>

-> <STX>3L|1|N<CR><ETX>06<CR><LF>

<- <ACK>

-> <EOT>

<- <ENQ>

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<- <EOT>

<- <ENQ>

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<- <EOT>