

Automated Hematology Analyzer XN series
ASTM Host Interface Specifications

Revision 20

Sysmex Corporation

Revision History

Revision	Date	Major Contents of Changes
1.0	June 18, 2009	Initial version
1.5	October 22, 2009	Revised corresponding to revision 1.5
2.0	January 26, 2010	<ul style="list-style-type: none"> • Modification made in response to indication by Quality Design department. • Changed size of “Analyzer name” in the Header Record. • Revised “Analysis Parameter ID” in the request information record. • Revised output data in the Result Record. • Added Rerun/Reflex Comment Record. • Corrected erroneous description.
2.5	May 20, 2010	<ul style="list-style-type: none"> • Changed Max. size of Analyzer name in the Header Record. • Modified to set Order Type to Action Code and Report Code in the Analysis Order Record. • Changed QC file number to “1” through “94”. • Added LWBC (With/without low WBC mode) to the Analysis Parameter ID in the Analysis Order Record. • Added Analysis result type to the Analysis Parameter ID in the Result Record, and modified to output the number of batches at XbarM control. • Added flags for panic limit to the Result Abnormal Flag in the Result Record. • Modified to set the repeat/rerun/reflex judgment to the Result Status in the Result Record. • Revised Result Record corresponding to determination of reportable, research, service, and QC parameters. • Changed Max. size of rule name in the Rerun/Reflex Comment Record.
4.0	January 22, 2011	<ul style="list-style-type: none"> • Added AREA-F# to research parameter output area in the Result Record. (4.3.3.5) • Changed parameter name of research parameter output area in the Result Record “RBC-Y” to “RET-RBC-Y”. (4.3.3.5) • Changed parameter name of QC parameter output area in the Analysis Order Record and Result Record “RBC-Y” to “RET-RBC-Y”. (4.3.3.4) (4.3.3.5) • Changed parameter name of QC parameter output area in the Analysis Order Record and Result Record “RBC-X” to “RET-RBC-X”. (4.3.3.4) (4.3.3.5) • Changed parameter name of QC parameter output area in the Analysis Order Record and Result Record “RBC-WX” to “RET-RBC-WX”. (4.3.3.4) (4.3.3.5) • Changed parameter name of QC parameter output area in the Analysis Order Record and Result Record “RBC-WY” to “RET-RBC-WY”. (4.3.3.4) (4.3.3.5) • Changed parameter name of QC parameter output area in the Analysis Order Record and Result Record “PLTF-X” to “PLT-F-X”. (4.3.3.4) (4.3.3.5) • Changed parameter name of QC parameter output area in the Analysis Order Record and Result Record “PLTF-Y” to “PLT-F-Y”. (4.3.3.4) (4.3.3.5) • Added “WNR-Z”, “WDF-Z”, “WPC-Z”, “RET-RBC-Z”, “PLT-F-Z”, “PLT-F-RBC-X” and “PLT-F-RBC-Y” to the parameter name of QC parameter output area in the Analysis Order Record and Result Record. (4.3.3.4) (4.3.3.5) • Changed parameter name of IP messages (SUSPECT) output area “Abn_Lympho/ Blasts?” to “Blasts/Abn_Lympho?” in the Result Record. (4.3.3.5) • Added “Abn_Lympho?” to the IP messages (SUSPECT) output area in the Result Record. (4.3.3.5) • Brushed up action message output area in the Result Record. (4.3.3.5)

4.1	March 14, 2011	<ul style="list-style-type: none"> • Corrected erroneous descriptions listed below. “M116M” → “XN-20/XN-10” “Instrument name” → “Analyzer name” “Instrument Serial Number” → “Analyzer Number” “Research tab” → “IPU's Laboratory-Use-Only tab” “D-He” → “DELTA-HE” • Corrected the usable number of characters for Rack Number to be extended to one-byte character. • Changed the character string to be set to analyzer name “XN-20/XN-10” to either of “XN-20” or “XN-10” in the Header Record. (4.3.3.1) • Added explanation for “LWBC” of the Analysis Parameter ID when the IPU transmits analysis results to the host computer in the Analysis Order Record. (4.3.3.4) • Added “OPEN” indicating open analysis to the Analysis Parameter ID when the IPU transmits analysis results to the host computer in the Analysis Order Record. (4.3.3.4) • Added “Manual (Open)” to the explanation for Action Code when the IPU transmits analysis results to the host computer in the Analysis Order Record. (4.3.3.4) • Added descriptions of “research (Can be displayed in the main screen) items” to the Result Record. (4.3.3.5) • Modified to use extended order result at using WDF channel in the WBC Result Record. (4.3.3.5) • Corrected erroneous parameter name of result record for “DLT-PLTO” in the QC parameters. (4.3.3.5) • Corrected erroneous decimal point position and unit of result record for “DLT-RBC” and “DLT-PLTD” in the QC parameters. (4.3.3.5) • Modified Analysis Result Record Abnormal Flag to be output in the Result Record for research parameter. (4.3.3.5) • Corrected erroneous parameter name of Result Record for research parameter LYMP#&. (4.3.3.5) • Corrected erroneous parameter name of Result Record for research parameter LYMP%&. (4.3.3.5) • Corrected erroneous parameter name of Result Record for research parameter RET-UPP. (4.3.3.5) • Corrected erroneous parameter name of Result Record for research parameter RET-TNC. (4.3.3.5) • Corrected erroneous parameter name of Result Record for research parameter NE-FSC. (4.3.3.5) • One digit increased number of Result Record for research parameter RBC-BF2. (4.3.3.5) • One digit increased number of Result Record for research parameter AREA-F#. (4.3.3.5) • Totally revised List of Service Items in the Result Record. (4.3.3.5) • Changed List of Service Items in revision 4.0 and prior to List of Only Host Items. (4.3.3.5)
4.2	April 18, 2011	<ul style="list-style-type: none"> • Changed output position List of Research Items to List of Service Items regarding AREA-F#. (4.3.3.5)
6.1	October 18, 2011	<ul style="list-style-type: none"> • Added HPC# to the Table 4.3.3.5.2: List of Parameters and Table 4.3.3.5.3: List of QC Analysis Parameters. (4.3.3.5) • Added descriptions of HPC to the Analysis Order Record. (4.3.3.4) • Added HPC% to the Table 4.3.3.5.11: List of Research Items. (4.3.3.5)
7.0	December 26, 2011	<ul style="list-style-type: none"> • Corrected erroneous descriptions in note on IPF in the Analysis Order Record. (4.3.3.4) • Modified descriptions of HPC# to the Analysis Order Record. (4.3.3.4) • Corrected erroneous descriptions in note on IPF in the Analysis Order Record. (4.3.3.5) • Added Action Message “Difference exists between PLT and PLT-F channels.” to the Result Record. (4.3.3.5)

8.0	February 01, 2012	<ul style="list-style-type: none"> Added that description that either of “Fixed” or “Link to IPU unit setting” is output depending on the service settings regarding data values and units in the Result Record. (4.3.3.5) Added description that the connection with the host computer is broken when the host connection setting or unit setting is changed in the IPU settings. (4)
9.0	April 26, 2012	<ul style="list-style-type: none"> Added HGB2 specifications to List of Parameters and List of QC Parameters. (4.3.3.5) Added HGB_NONSI2 to the List of Service Items. (4.3.3.5) Added messages about output paths of scattergram and histogram for research to the Result Record. (4.3.3.5) Added note concerning when the host acquires image data to the Result Record. (4.3.3.5) Changed scope of application “XN-20/XN-10” to “XN Series Automated Hematology Analyzer”. (1) With this modification, changed “XN-20/XN-10” to “XN Series Automated Hematology Analyzer”, “analysis module” or “IPU”. (applied to whole document)
10.0	July 11, 2012	<ul style="list-style-type: none"> Added “HGB-O” and “PLT-F” to the research parameter in the Result Record. (4.3.3.5) Added descriptions concerning when XN-3000 Standalone mode is used as listed below. Added behavior when XN-3000 Standalone mode is used to the communication protocol. (4.3.2.1) (4.3.2.2) (4.3.2.4) (4.3.2.5) Added SP-10 to the Product names in the Header Record. (4.3.3.1) Added “SMEAR” to the Analysis Parameter ID in the Analysis Order Record. (4.3.3.4) Added behavior for preparing the slide to the Action Code and Report Type in the Analysis Order Record. (4.3.3.4) Added Result Record (Slide preparation result data). With this modification, changed Result Record to Result Record (Analysis result data, QC data). (4.3.3.5) (4.3.3.6) Added Comment Record (replacement information comments). (4.3.2.5) Added behavior when patient information is not registered. (4.3.2.3)
11.0		Unused
12.0	October 10, 2012	<ul style="list-style-type: none"> Added “PRBC?” to the IP Messages (SUSPECT). (4.3.3.5) Corrected erroneous description of section number (4.3.3.5) and explanation of research scattergrams (4.3.3.5). (This correction does not affect the behavior of software.) Added Analysis Parameter ID of hsA mode to the List of Research Items. (4.3.3.5) Added description that research items except those described above are not output nor used when analysis is performed in hsA mode. (4.3.3.4) (4.3.3.5)
13	Unused	
14	July 26, 2013	<ul style="list-style-type: none"> Added description that “12.1.7 Beginning Request Results Date & Time” is not used in the Inquiry Record. (This modification does not affect the behavior of program.) (4.3.3.3) Added description of discretes corresponding to “XbarM1” through “XbarM5” in the QC File Number. (This modification does not affect the behavior of program.) (4.3.3.4) Added HPC% to List of Parameters and List of QC Parameters corresponding to changing HPC% to reportable parameter in the destination of North America. (4.3.3.4) Added “DELTA-HGB” and “MCHC-O” to the research parameter in the Result Record. (4.3.3.5)

15	February 03, 2014	<ul style="list-style-type: none"> Added Raw data format in addition to PNG file format (existing output format for image) in response to the addition of the Service settings (the method of image data output in the ASTM format). (4.3.3.5) Added “ACTION_MESSAGE_Sample_Mixing_Failure?” to the List of Action Messages. (4.3.3.5) Deleted description of HGB2 units from List of Parameters and List of QC Parameters in response to the release of Communication Specifications for XN-21/XN-11. (4.3.3.5) Added description that switching to Low WBC mode cannot be ordered from host computer in manual mode analysis. (4.3.3.4)
16	May 21, 2014	<ul style="list-style-type: none"> In the case of particle size distribution data with normal range, text is added indicating that data values are not sent. (4.3.3.5) An example of decompression of scattergram output data using the Raw data method is added. (7.3.3) Normal range data and an example of image construction of particle size distribution data are added. (8) Added “ACTION_MESSAGE_Aged_Sample?” to Table 4.3.3.5.6: List of Action Messages. (4.3.3.5) Table 4.3.3.5.6: List of Action Messages. “ACTION_MESSAGE_Sample_Mixing_Failure?” is changed to “ACTION_MESSAGE_Suspect_Sample” (4.3.3.5) NEUT-RI, NEUT-GI, RBC-HE, and DELTA-HE are added to Table 4.3.3.5.2: List of Parameters. (4.3.3.5) NEUT-RI, NEUT-GI, and RBC-HE are added to Table 4.3.3.5.3: List of QC Analysis Parameters. (4.3.3.5) RE-LYMP# and RE-LYMP% are added to Table 4.3.3.5.11: List of Research Items. (4.3.3.5)
17	August 08, 2014	<ul style="list-style-type: none"> Added description that the destination of North America will be excluded from Scope (1)
18	October 14, 2014	<ul style="list-style-type: none"> AS-LYMP% and AS-LYMP# are added to Table 4.3.3.5.3: List of QC Analysis Parameters. (4.3.3.5) AS-LYMP% and AS-LYMP# are added to Table 4.3.3.5.3: List of QC Analysis Parameters. (4.3.3.5) WBC-N (SSC-FFC) and WBC-N (SSC-FSC)2 are added to Table 4.3.3.5.1: Details of the Result record (4.3.3.5) Added IPF# to Analysis Data Format 1 and Quality Control Data Format 1 due to changing IPF# and HPC% to reportable parameter. (4.3.3.5) pRBC?(R) is added to Table 4.3.3.5.5: List of IP Messages (SUSPECT). (4.3.3.5) Modified so that “Z”: No Patient Information can be specified to Report Type of Analysis Order Record. (4.3.3.4) Modified so that analyzer can be specified to ID of analyzer during Query To Host. (4.3.3.4) In case of QC control data, the reason why result abnormal flag is not output is written. (4.3.3.5) “Type of Analysis Result” that does not exist is deleted. (4.3.3.5) Modified error of output order of XbarM. (4.3.3.4)
19	Unused	
20	February 5, 2016	<ul style="list-style-type: none"> Modified so that the WPC scattergram (HPC only) can be output. (4.3.3.5 Table 4.3-2) Added Priority Code to the priority of Analysis Order Record details. (4.3.4.4.) Added parameters. (4.3.3.4., 4.3.3.5.) Added “Giant Platelet” to the list of IP message (Suspected). (4.3.3.5.)

Table of Contents

Revision History.....	2
Table of Contents	6
1. Scope	7
2. General	7
3. Terminology	7
4. Communication Specifications.....	8
4.1. Physical Layer (Hardware).....	9
4.1.1. Connector	9
4.1.2. Signal identification level.....	9
4.1.3. Connection cable	10
4.1.4. Interface parameters	10
4.1.5. Standard specifications (ASTM E1381-02)	10
4.2. Data Link Layer (Transmission Protocol).....	11
4.2.1. Communication status	11
4.2.2. Establishment phase	12
4.2.3. Transfer phase	13
4.2.4. Termination phase	14
4.2.5. Timeout	14
4.3. Presentation Layer	15
4.3.1. Messages, Records, and Fields.....	15
4.3.2. Communication Protocol.....	17
4.3.3. Details of Records	20
5. Examples of Communication	65
5.1. Analysis Order Inquiry (IPU -> Host computer).....	65
5.2. Analysis Order Information (Host computer -> IPU)	66
5.3. Analysis Results & QC Data (IPU -> Host computer).....	67
6. Appendix A TCP/IP Communication.....	71
6.1. Network Interface Layer	71
6.2. TCP/IP	71
6.3. Timing of Transmission	71
6.4. Transmitted Messages	71
7. Appendix B De-compression Procedures of the Scattergram Data.....	72
7.1. Purpose	72
7.2. Process Flow	72
7.3. How to Decompress Image Data.....	73
7.3.1. Converting to binary code	74
7.3.2. Decompressing	74
7.3.3. Examples of Decompression	77
8. Appendix C Particle size distribution data	82
8.1. Image construction of particle size distribution data.....	82
8.1.1. Construction example.....	82
8.2. Image construction of particle size distribution data with normal range.....	84
8.2.1. Construction example.....	84
8.2.2. Normal range data	86

1. Scope

This document applies to communication between the XN series (except the destination of North America) automated hematology analyzer and the host computer using the ASTM protocol. The description of the destination of North America is moved to “Automated Hematology Analyzer XN series ASTM Host Interface Specifications (North America)”.

2. General

ASTM (the American Society for Testing and Materials)

ASTM is one of the world's largest volunteer non-profit organizations, founded in 1898 to create standard regulations for materials, products and system services.

This specification conforms to the following two standards:

- ASTM E1381-02
Specifications for low-level protocols to transfer data between clinical laboratory instruments and computer systems.
- ASTM E1394-97
Standard specifications for transferring data between clinical instruments and computer systems.

3. Terminology

Definitions of the terms used in this document are described below.

Table 3.1: Terminology

Numeric character	Single-byte characters corresponding to ISO/IEC 646 (ASCII) character codes “0” (30h) through “9” (39h).
Alphabetic character	Single-byte characters corresponding to ISO/IEC 646 (ASCII) character codes “A” (41h) through “Z” (5Ah) and “a” (61h) through “z” (7Ah).
Alpha-numeric character	Numeric or alphabetical characters.
Single-byte character	ISO/IEC 646 (ASCII) character codes 00h through 7Fh (7-bit codes) except control characters (00h through 1Fh) and DEL (7Fh).
Extended single-byte character	ISO/IEC 8859 character codes 00h through FEh (8-bit codes) except control characters (00h through 1Fh, 80H through 9FH) and DEL (7Fh). For example, single-byte katakana and Latin-1 characters are included.
Any character	An aggregate including extended single-byte characters and double-byte characters.
Repeat analysis	Redoing an analysis due to an analysis error.
Rerun analysis	Running an analysis again with the same parameters, based on results of the initial analysis.
Reflex analysis	Running an analysis again with additional parameters, based on results of the initial analysis.

4. Communication Specifications

Communication specifications are based on a layer protocol.

- (1) Physical layer
Specifies the sending and receiving of signals between the IPU and the host computer through mechanical and electrical connections.
See “4.1 Physical Layer (Hardware).”
- (2) Data link layer
Specifies the sending and receiving of data by link connections and for each frame between the IPU and the host computer.
See “4.2 Data Link Layer (Transmission Protocol).”
- (3) Presentation layer
Specifies the messages that are sent and received by the IPU and the host computer.
See “4.3 Presentation Layer”.

Presentation layer	←	Specifies message specifications.
Data link layer	←	Specifies link connection and frame specifications.
Physical layer	←	Specifies mechanical and electrical specifications.

Note:

The IPU of the XN series automated hematology analyzer supports serial and TCP/IP connections.

For serial connections, the IPU conforms to ASTM E1381-02/ASTM E1394-97.

For TCP/IP connections, the IPU supports the following two modes for data output conforming to the ASTM 1394-97 format:

1. ASTM E1381-02 mode

The presentation layer conforms to ASTM E1394-97.

The data link layer conforms to ASTM E1381-02.

The physical layer conforms to IEEE802.3.

2. ASTM E1381-95 mode

The presentation layer conforms to ASTM E1394-97.

The data link layer and the physical layer conform to IEEE802.3.

	Serial connection *3	TCP/IP connection	
		ASTM E1381-95 mode *1	ASTM E1381-02 mode *1
Presentation layer	ASTM E1394-97	ASTM E1394-97	ASTM E1394-97
Data link layer *2	ASTM E1381-02	IEEE802.3	ASTM E1381-02
Physical layer *2	ASTM E1381-02	IEEE802.3	IEEE802.3

*1: In TCP/IP connections, the IPU runs in the ASTM E1381-02 mode if “ASTM 1381-02/1394-97” is selected for the Host Setting on the IPU. The IPU runs in the ASTM E1381-95 mode if “ASTM 1381-95/1394-97” is selected.

*2: The IEEE802.3 specifications for the data link and physical layers are not described in this document.

*3: In serial connections, if the Service settings are configured to output research and service items, the IPU may take a long time to output analysis results due to a larger number of records transmitted. To avoid causing the total communication sequence to be slowed, make settings not to output research or service items.

*4: If the host connection setting or unit setting is changed in the IPU settings, the connection with the host computer is broken and reconnection with the new settings is attempted. For this reason, these settings must not be changed during transmission/reception of data to/from the host computer.

4.1. Physical Layer (Hardware)

4.1.1. Connector

Although the ASTM standard specifies a D-SUB 25-pin male connector as standard, a D-SUB 9-pin-male I/O connector located on the back of the IPU is used for communications.

Table 4.1.1.1: : Connector pin assignment

Pin No.	Signal name		Signal direction
1		NC	
2	Receive data	RxD	IN
3	Transmit data	TxD	OUT
4	Data terminal ready	DTR	OUT
5	Signal ground	SG	—
6	Data set ready	DSR	IN
7	Request to send	RTS	OUT
8	Clear to send	CTS	IN
9		NC	

* The control signals are not used with ASTM specifications. For this reason, do not make connections to pins not in use.

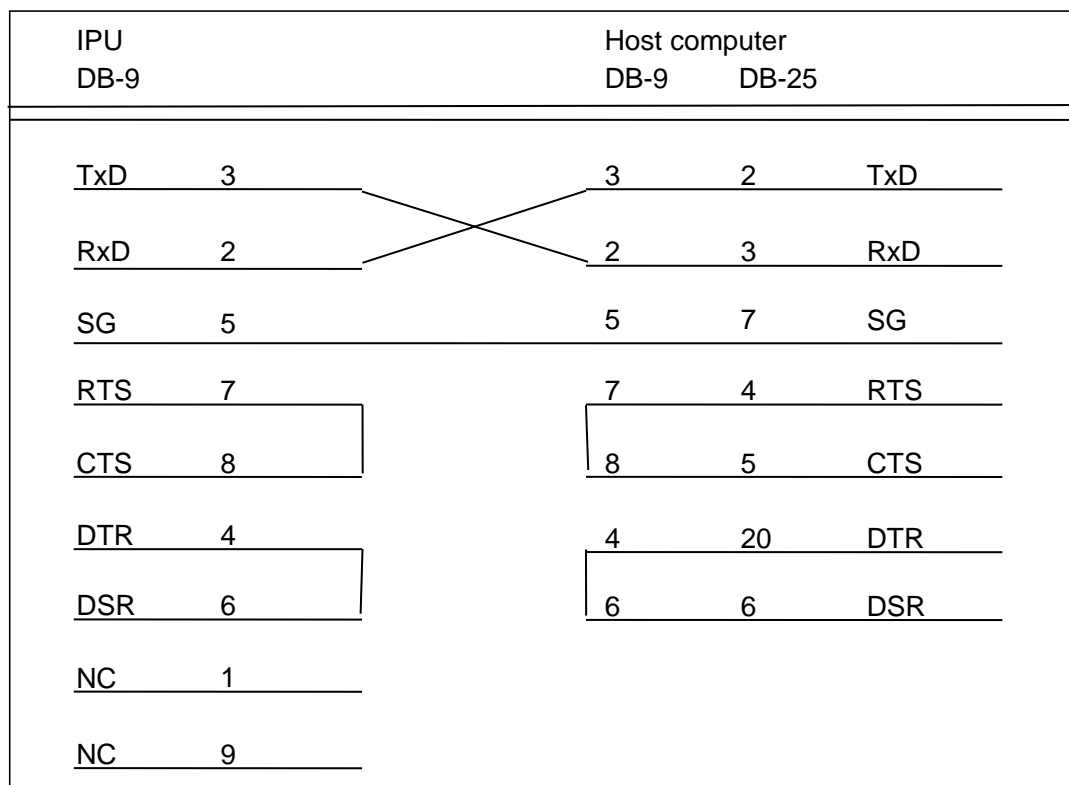
4.1.2. Signal identification level

Table 4.1.2.1: Signal identification level

Level	Data signal	Control signal
+3V or higher	Logic “0”, start bit	ON
-3V or lower	Logic “1”, stop bit	OFF

4.1.3. Connection cable

Configure a cable with a D-SUB 9 pin female adaptor for connecting to the IPU's D-SUB 9 male connector in accordance with the following connection chart.



4.1.4. Interface parameters

Table 4.1.4.1: Interface parameters

Parameter	Selection of settings
Baud rate	600, 1200, 2400, 4800, <u>9600</u> , 14400, 19200, 38400 bps
Data length	7 bits, <u>8 bits</u>
Stop bit	<u>1 bit</u> , 2 bits
Parity	<u>None</u> , Even, Odd

The underlined values conform to the ASTM standard.

Note: However, 7-bit data lengths, Even/Odd parity and two stop bits are allowed by the ASTM standard for use with special applications.

4.1.5. Standard specifications (ASTM E1381-02)

The physical layer of the IPU conforms to ASTM E1381-02 “5. Physical Layer”, except for the connector type. The IPU uses a D-SUB 9-pin male connector (the ASTM standard specifies a 25-pin male connector).

4.2. Data Link Layer (Transmission Protocol)

The data link layer transfers data between systems using a character-based protocol in accordance with ASTM E1381-02 “6. Data Link layer”.

This section briefly describes communication control procedures. For details, refer to ASTM E1381-02.

When ASTM E1381-02 mode is intended to be used, the TCP connection is established prior to the communication. To establish the TCP connection, the host computer acts as a server and the IPU acts as a client. The IPU establishes a connection by requesting a connection to the IP address and the port number that are provided by the host computer.

4.2.1. Communication status

The data link layer has the following two communication states:

- Neutral status
- Linked status

Transition to each status is accomplished through the following three phases.

(1) Establishment phase

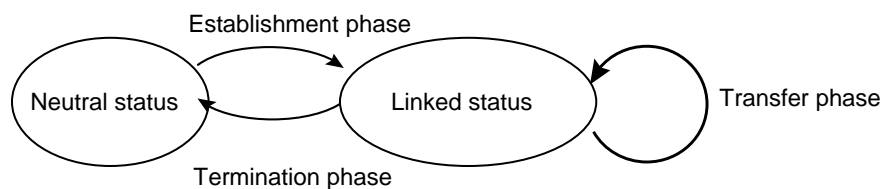
Establishes a communication line, and determines the direction of data transfer. In this way, the sender and the receiver are identified, and the change is made from neutral status to linked status.

(2) Transfer phase

The sender transmits messages to the receiver until all messages are transferred.

(3) Termination phase

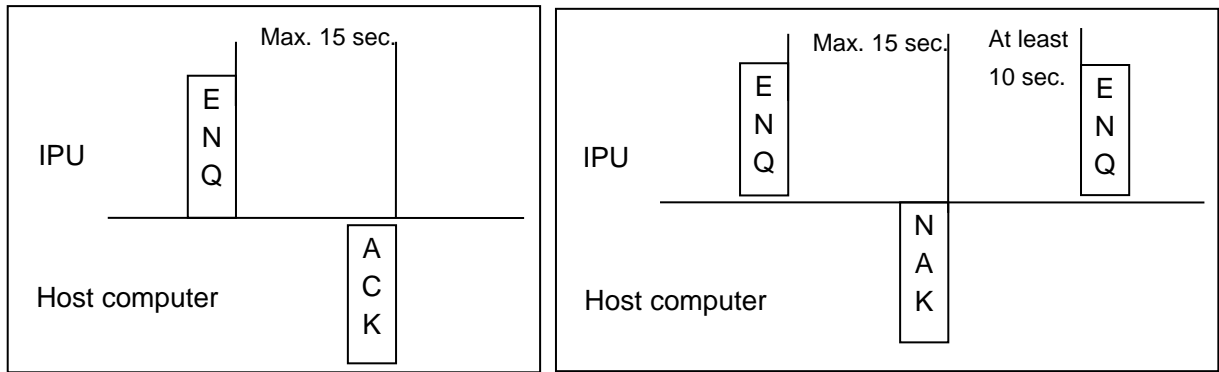
Releases the communication line. Changes both the sender and the receiver from linked status to neutral status.



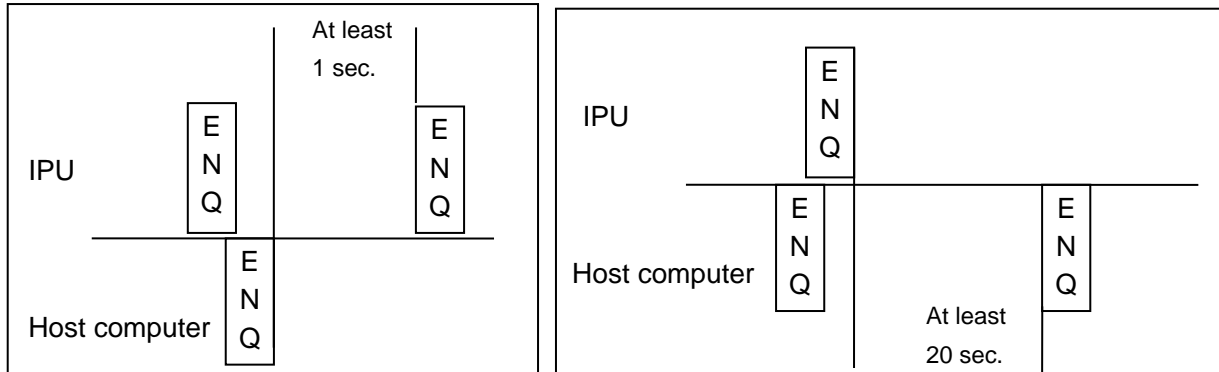
4.2.2. Establishment phase

- (1) The sender (IPU) sends an [ENQ] signal to the receiver (host computer). To respond to the sender, the receiver performs the following action:
- Returns an [ACK] signal when the communication is enabled.
 - Returns a [NAK] signal when the communication is disabled.

If the receiver responds with [NAK] signal, the sender waits for at least 10 seconds before attempting to send another [ENQ] signal.



- (2) When both the sender and receiver send [ENQ] signals, the host computer must yield control authority to the IPU.
- The IPU sends [ENQ] signal again after 1 second.
 - The host computer must wait for 20 seconds before sending [ENQ] signal again.



4.2.3. Transfer phase

During the transfer phase, the sender sends messages to the receiver. The transfer phase continues until all messages have been sent.

- (1) Messages are sent in each record with multiple frames. Each frame contains a maximum of 64,000 characters (including frame overhead). If the record is longer than 63,993 characters*, it is divided into two or more frames.
 - *: For serial connections, the maximum number of characters in each record is set to 240 to ensure compatibility with ASTM E1381-95. To ensure full compatibility with ASTM E1381-02, the maximum number of characters in each record must be set to 63,993. For detailed instructions to make this setting, please contact your local sale branch or sales representative. For TCP/IP connections, the maximum number of characters is set to 63,993.
- (2) Multiple records cannot be included in a single frame.
- (3) If the record contains the maximum number of characters or less, a frame with the following structure will be transferred.

[STX] [F#] [Text] [ETX] [CHK1] [CHK2] [CR] [LF]

If the record is longer than the maximum number of characters, it is divided into two or more frames. The intermediate frame text termination code is [ETB], and the final frame text termination code is [ETX], as shown below.

[STX] [F#] [Text] [ETB] [CHK1] [CHK2] [CR] [LF]

[STX] [F#] [Text] [ETB] [CHK1] [CHK2] [CR] [LF]

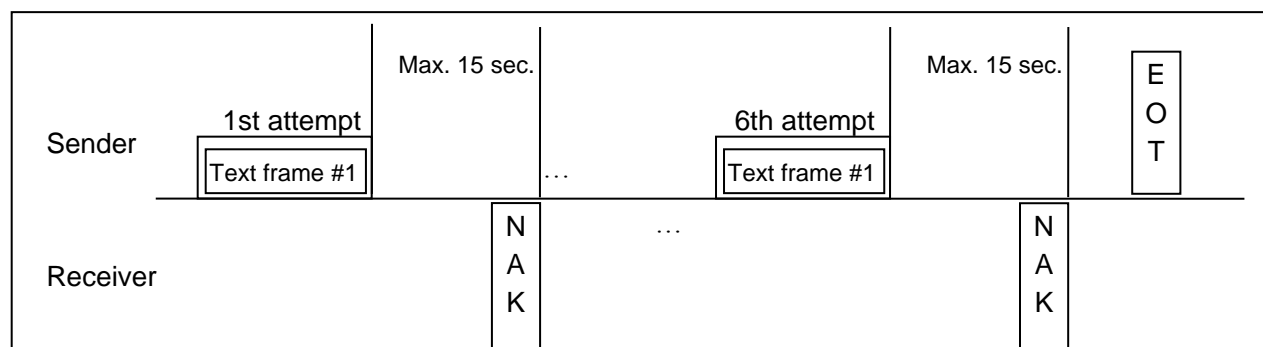
.....

[STX] [F#] [Text] [ETX] [CHK1] [CHK2] [CR] [LF]

Symbol	Description
[STX]	Start of a frame
[F#]	Frame number One of the numbers 0 to 7 is used, beginning with 1 and repeating 2, 3, 4, 5, 6, 7, 0. In case of retransmission, the same frame number is sent.
[Text]	ASTM E1394-97 records are used. For this reason, the codes below will not be used. 0x00-0x06, 0x08, 0x0A, 0x0E-0x1F, 0x7F, 0xFF
[ETB]	Control code indicating end of text (for intermediate frame)
[ETX]	Control code indicating end of text (for the final frame)
[CHK1] [CHK2]	Expressed by characters "0" – "9" and "A" – "F". Characters starting from the character following [STX] up to [ETB] or up to [ETX] (including [ETB] or [ETX]) are added in binary. The 2-digit numbers, which represent the least significant 8 bits in hexadecimal code, are converted to ASCII characters "0" – "9" and "A" – "F". The most significant digit is stored in CHK1 and the least significant digit in CHK2.
[CR] [LF]	Control code indicating end of frame

- (4) If the receiver has successfully received the frame and is prepared to receive the next frame, the receiver responds with [ACK] signal. After the sender receives [ACK] signal, the sender advances the frame number and either sends a new frame or transitions to the termination phase.

- (5) If the receiver fails to receive the frame and is prepared to receive the same frame again, the receiver responds with [NAK] signal. After receiving [NAK] signal, the sender sends the most recent frame again, using the same frame number. If the sender fails to send the same frame 6 times consecutively, the sender has to transition to the termination phase to stop sending the message.



- (6) The IPU processes the response of [EOT] signal from the host computer as [ACK] signal. (Response of [EOT] signal from the receiver is usually a request to suspend a transmission to the sender. However, the IPU does not support this function.)

4.2.4. Termination phase

During the termination phase, the status returns to neutral.

The sender sends [EOT] signal to inform the receiver that the message transmission has been completed.

The sender transitions to neutral status by sending [EOT] signal, and the receiver transitions to neutral status by receiving [EOT] signal.

4.2.5. Timeout

The timer is used to detect a failure to coordinate between the sender and the receiver. The timer is used as a mean of recovery from failure in a communication line or communication destination device.

- (1) During the establishment phase, the timer is set when the sender sends [ENQ] signal. A timeout occurs if an [ACK], [NAK] or [ENQ] signal response is not received within 15 seconds. After the timeout, the sender transitions to the termination phase.
- (2) During the transfer phase, the 15-second timer is set when the sender sends the final character of a frame. A timeout occurs if no response is received within 15 seconds. After the timeout, the sender transitions to the termination phase. The receiver sets a 30-second timer when first entering the transfer phase or when responding (either with [ACK] signal or [NAK] signal) to a frame. A timeout occurs if the receiver receives no frame or [EOT] signal from the sender within 30 seconds. After the timeout, the receiver discards the current incomplete message and transitions to the termination phase.

4.3. Presentation Layer

4.3.1. Messages, Records, and Fields

4.3.1.1.Messages

In the presentation layer, all data is transmitted using messages. A message is composed of record arrays that start with a message header record (H) and end with a message termination record (L).

4.3.1.2.Records

A record is a series of text, beginning with an ASCII alphabetic character called the identifier and ending with [CR].

Table 4.3.1.2.1: Records

Record type	Record identifier	Level	Description
Header Record	H	0	Contains the sender and the receiver information
Patient Information Record	P	1	Contains the patient information
Inquiry Record	Q	1	Contains inquiry into the host computer for analysis order information
Analysis Order Record	O	2	Contains analysis order information
Analysis Result Record	R	3	Contains analysis results
Comment Record	C	1-4	Contains comments about the sample or patient
Manufacturer Information Record	M	1-4	Not used
Scientific Information Record	S	N/A	Not used
Message Terminator Record	L	0	Indicates the end of the message

- A smaller level number indicates a higher level.
- A higher-level record has information that is commonly contained in all lower-level records.
- Any level other than 0 must be located after higher levels. However, the comment record can be inserted at any level. They are considered to be one lower level than the preceding record. However, consecutive comment records are not allowed.

[Example of transmission]

H -> P -> O -> R -> L : Correct

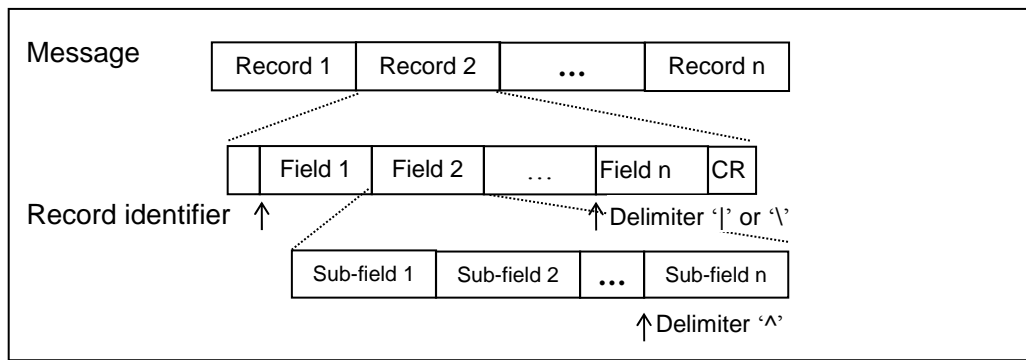
H -> R -> L : Incorrect because P and O must be transmitted prior to R.

4.3.1.3.Fields

A record is further divided into multiple fields by field delimiters. A field is identified by its position within a record and has a variable length. The following are used as delimiters.

Table 4.3.1.3.1: Fields

Delimiter type	Code	Description
Field delimiter	Vertical bar () [7Ch]	Separates adjacent fields within a record.
Repeat delimiter	Back slash (\) [5Ch]	Used when there are plural components of the same type in one field, to repeat the same field.
Component delimiter	Caret (^) [5Eh]	Separates a single field into various sub-fields.
Escape delimiter	Ampersand (&) [26H]	Used within a text field to identify special case operations. However, names and comments in Japanese are expressed with double-byte characters without escape delimiters. The IPU uses S_JIS as the double-byte character code set. (' '→&F&, '\ '→&R&, '^ '→&S&, '&'→&E&, hexadecimal→&Xxxxx&)



4.3.2. Communication Protocol

4.3.2.1. Analysis Order inquiry (IPU-> Host computer)

This protocol is used for the analysis module to inquire about analysis orders to obtain information about the sample to be tested by the analyzer.

Inquiries can be made using the Sample ID Number or Rack Number/Tube Position as an inquiry keyword.

When XN-3000 Standalone mode is used, a query for SP-10 slide preparation information is made at the same time.

In this case, only a query using the sample number as keyword can be made.

Table 4.3.2.1.1: Analysis Order Inquiry

IPU	Direction	Host computer
ENQ	→	
	←	ACK
H : Header Record	→	
	←	ACK
Q : Inquiry Record	→	
	←	ACK
L : Message Terminator Record	→	
	←	ACK
EOT	→	

Note: This table is created assuming that the data link layer conforms to E1381. If the IPU is in TCP/IP connection in the ASTM E1381-95 mode, ENQ, ACK, and EOT are not handled. For more information, see Appendix A.

4.3.2.2. Information about Analysis Order (Host computer -> IPU)

This protocol is used for the host computer to respond to an inquiry about analysis information. A comment record can be omitted.

When using XN-3000 Standalone mode, return SP-10 slide preparation information at the same time.

Table 4.3.2.2.1: Analysis Information

IPU	Direction	Host computer
	←	ENQ
ACK	→	
	←	H : Header Record
ACK	→	
	←	P : Patient Information Record
ACK	→	
	←	C : Patient Comment Record
ACK	→	
	←	O : Analysis Order Record
ACK	→	
	←	C : Sample Comment Record
ACK	→	
	←	L : Message Terminator Record
ACK	→	
	←	EOT

Note: This table is created assuming that the data link layer conforms to E1381. If the IPU is in TCP/IP connection in the ASTM E1381-95 mode, ENQ, ACK, and EOT are not handled. For more information, see Appendix A.

4.3.2.3. Analysis Results or QC Data (IPU -> Host computer)

This protocol is used for the IPU to perform output of analysis results, real-time output of QC data (control blood sample number is “QC-XXXXXX” and transmitted in a similar manner to regular samples), and manual output of QC data (data selected in the QC chart screen is output). If QC data is output when patient information is not registered, the patient information record is sent blank. A comment record can be omitted.

Table 4.3.2.3.1: Analysis results/QC data

IPU	Direction	Host computer
ENQ	→	
	←	ACK
H: Header Record	→	
	←	ACK
P: Patient Information Record	→	
	←	ACK
C: Patient Comment Record	→	
	←	ACK
O: Analysis Order Record	→	
	←	ACK
C: Sample Comment Record	→	
	←	ACK
R: Result Record	→	
	←	ACK
C: Re-Analysis/Reflex Comment Record	→	
	←	ACK
L: Message Terminator Record	→	
	←	ACK
EOT	→	

Repeat n
times (n =
the number
of items)



Note: This table is created assuming that the data link layer conforms to E1381. If the IPU is in TCP/IP connection in the ASTM E1381-95 mode, ENQ, ACK, and EOT are not handled. For more information, see Appendix A.

4.3.2.4.Slide preparation result data (IPU→Host computer)

When XN-3000 Standalone mode is used, this is sent when the SP-10 slide preparation result is output. If patient information is not registered, the patient information record is sent blank.

Table 4.3.2.4.1: Slide preparation result data

IPU	Direction	Host computer
ENQ	→	
	←	ACK
H: Header Record	→	
	←	ACK
P: Patient Information Record	→	
	←	ACK
O: Analysis Order Record	→	
	←	ACK
R: Result Record (Slide preparation result data)	→	
	←	ACK
L: Message Terminator Record	→	
	←	ACK
EOT	→	

Note: This table is created based on the assumption that the data link layer conforms to E1381.
In ASTM E1381-95 mode of TCP/IP, ENQ, ACK and EOT are not handled.
Refer to Appendix A.

4.3.2.5.Reagent replacement information (IPU→Host computer)

When XN-3000 Standalone mode is used, this is sent when SP-10 consumable replacement is reported.
The comment record cannot be omitted.

Table 4.3.2.5.1: Reagent replacement information

IPU	Direction	Host computer
ENQ	→	
	←	ACK
H: Header Record	→	
	←	ACK
R: Replacement information Comment Record	→	
	←	ACK
L: Message Terminator Record	→	
	←	ACK
EOT	→	

Note: This table is created based on the assumption that the data link layer conforms to E1381.
In ASTM E1381-95 mode of TCP/IP, ENQ, ACK, and EOT are not handled.
Refer to Appendix A.

4.3.3. Details of Records

4.3.3.1. Header Record

[Example of transmission]

- IPU -> Host computer

H|\^&|||XN-10^00-00^11001^12345678|||||E1394-97<CR>

- Host computer -> IPU

H|\^&|||||||E1394-97<CR>

Table 4.3.3.1.1: Details of Header Record

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
7.1.1	Record Type	H	H	1	Fixed
7.1.2	Delimiter Definition	\^&	\^&	4	Fixed
7.1.3	Message Control ID	Not used	Not used	-	
7.1.4	Access Password	Not used	Not used	-	
7.1.5	Sender Name or ID	Analyzer name^ Software version^ Analyzer serial No.^ PS code	Not used	10^ 13^ 5^ 8	
7.1.6	Sender Address	Not used	Not used	-	
7.1.7	Reserved	Not used	Not used	-	
7.1.8	Sender Phone Number	Not used	Not used	-	
7.1.9	Sender Characteristics	Not used	Not used	-	
7.1.10	Receiver ID	Not used	Not used	-	
7.1.11	Comment	Not used	Not used	-	
7.1.12	Processing ID	Not used	Not used	-	
7.1.13	ASTM Version Number	E1394-97	E1394-97	8	Fixed
7.1.14	Date and Time of Message	Not used	Not used	-	

[Detailed explanation of the fields]

1) 7.1.2 Delimiter Definition

The characters “|\^&” are used as a fixed character string. No field delimiter is required between 7.1.1 and 7.1.2

2) 7.1.5 Sender Name or ID

Set one of the text strings in the table below for the product name. For the software version, set the software version of the IPU.

Table 4.3.3.1.2: Product names

Product name	Product name
XN-20	SA-10
XN-10	SA-20
XN-21	SA-30
XN-11	CV-50
SP-10	

4.3.3.2. Patient Information Record

[Example of transmission]

■ IPU -> Host computer

P|1|||123456|^Jim^Brown||20010820|M|||||^Dr.1|||||||^^^WEST<CR>

■ Host computer -> IPU

P|1|||100|^ Jim^Brown||20010820|M|||||^Dr.2|||||||^^^EAST<CR>

Table 4.3.3.2.1: Details of Patient Information Record

ASTM field	Field name	IPU ↓ Host computer*1	Host computer ↓ IPU	Max. size (byte)	Remarks
8.1.1	Record Type	P	P	1	Fixed
8.1.2	Sequence Number	Sequence No.	Sequence No.	4	Sequence Number of records
8.1.3	Practice-Assigned Patient ID	Not used	Not used	-	
8.1.4	Laboratory-Assigned Patient ID	Not used	Not used	-	
8.1.5	Patient ID Number	Patient ID	Patient ID	16	
8.1.6	Patient Name	^First name^Last name	^First name^Last name	^20^20	^First name^Last name for non-Japanese version
8.1.7	Mother's Maiden Name	Not used	Not used	-	
8.1.8	Birth Date	YYYYMMDD	YYYYMMDD	8	Ex.:20010802 (August 2, 2001)
8.1.9	Patient Sex	M, F or U	M, F or U	1	M: male, F: female, U: unknown
8.1.10	Patient Race	Not used	Not used	-	
8.1.11	Patient Address	Not used	Not used	-	
8.1.12	Reserved Field	Not used	Not used	-	
8.1.13	Patient Telephone Number	Not used	Not used	-	
8.1.14	Attending Physician ID	^Physician name	^Physician name	^20	
8.1.15	Special Field 1	Not used	Not used	-	
8.1.16	Special Field 2	Not used	Not used	-	
8.1.17	Patient Height	Not used	Not used	-	
8.1.18	Patient Weight	Not used	Not used	-	
8.1.19	Patient's Known or Suspected Diagnosis	Not used	Not used	-	
8.1.20	Patient Active Medications	Not used	Not used	-	
8.1.21	Patient's Diet	Not used	Not used	-	
8.1.22	Practice Field 1	Not used	Not used	-	
8.1.23	Practice Field 2	Not used	Not used	-	
8.1.24	Admission and Discharge Dates	Not used	Not used	-	
8.1.25	Admission Status	Not used	Not used	-	
8.1.26	Location	^^^Ward	^^^Ward	^^^20	
8.1.27	Alternative diagnosis code and classifier type	Not used	Not used	-	
8.1.28	Alternative diagnosis code and classification	Not used	Not used	-	
8.1.29	Patient Religion	Not used	Not used	-	
8.1.30	Marital Status	Not used	Not used	-	
8.1.31	Isolation Status	Not used	Not used	-	
8.1.32	Language	Not used	Not used	-	
8.1.33	Hospital Service	Not used	Not used	-	
8.1.34	Hospital Institution	Not used	Not used	-	
8.1.35	Dosage Category	Not used	Not used	-	

*1 When transmitting QC data, only 8.1.1 "Record Type" and 8.1.2 "Sequence Number" are used (any other field is not used).

[Detailed explanation of the fields]

1) 8.1.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appears in the message. This number is reset to 1 when a higher-level record appears in the message.

2) 8.1.5 Patient ID Number

The patient ID Number is a unique patient identifier. Up to 16-digit extended single-byte characters can be used.

3) 8.1.6 Patient Name

Up to 20 any characters can be used for the first name and the last name, respectively.

4) 8.1.8 Birth Date

This is the date of birth of the patient. The format is fixed to “YYYYMMDD”.

YYYY indicates the year, MM the month, and DD the day.

5) 8.1.9 Patient Sex

The patient sex is indicated by M, F or U.

M: Male, F: Female, U: Unknown

6) 8.1.14 Attending Physician ID

Up to 20 any characters can be used for the name of the attending physician.

7) 8.1.26 Location

Up to 20 any characters can be used for the name of the patient ward.

4.3.3.3. Inquiry Record

[Example of transmission]

- IPU -> Host computer

Q|1|1^1^ ABCDE1234567890^B|||20010905150000|||F<CR>

- Host computer -> IPU

Not used

Table 4.3.3.1: Details of Inquiry Record

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
12.1.1	Record Type	Q	Not used	1	Fixed
12.1.2	Sequence Number	Sequence No.	Not used	4	Sequence Number of records
12.1.3	Starting Range ID Number	Rack No.^ Rack Position^ Sample ID No.^ Sample No. Attribute	Not used	6^ 2^ 22^ 1	Sample Number attribute is one of the following: M: Manual input A: Automatic assignment by analyzer. B: Barcode reader C: Assignment by host computer
12.1.4	Ending Range ID Number	Not used	Not used	-	
12.1.5	Universal Test ID	Not used	Not used	-	
12.1.6	Nature of Request Time Limits	Not used	Not used	-	
12.1.7	Beginning Request Results Date & Time	YYYYMMDDHHM MSS	Not used	14	
12.1.8	Ending Request Results Date & Time	Not used	Not used	-	
12.1.9	Requesting Physician Name	Not used	Not used	-	
12.1.10	Requesting Physician Telephone Number	Not used	Not used	-	
12.1.11	User Field No. 1	Not used	Not used	-	
12.1.12	User Field No. 2	Not used	Not used	-	
12.1.13	Requested Information Status Codes	F, N, C	Not used	1	F: Real-time inquiry (manual analysis) or batch inquiry N: Real-time inquiry (sampler analysis) for initial analysis. C: Real-time inquiry (sampler analysis) for re-analysis

[Detailed explanation of the fields]

1) 12.1.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appears in the message. This number is reset to 1 when a higher-level record appears in the message.

2) 12.1.3 Starting Range ID Number

Rack Number:

This is a number assigned to the sample rack, represented by up to 6-digit extended single-byte characters.

Rack Position:

This is a number between 1 and 10, indicating the sample position in a rack.

Sample ID Number:

The sample ID number is expressed with 22-digit extended single-byte characters. A number less than 22 digits is right-aligned with space padding.

Sample Number Attribute:

M: Manual input

The Sample ID Number is manually entered through the touch panel or the IPU keyboard.

A: Automatic assignment by analyzer

The number is assigned by the automatic-increment function of the analyzer. This number is used when a barcode reading error occurs and a sample number starting with “ERR” is given to the sample.

B: Barcode reader

This is used when the sample ID number is read by the barcode reader.

C: Assignment by host computer

This is used when the host computer assigns a sample number in response to the inquiry with Rack Number/Rack Position used as a key.

Note 1: A real-time inquiry (manual analysis) uses Sample ID as a key, without specifying Rack Number/Rack Position.

Note 2: A batch inquiry from the Work List uses Rack Number/Rack Position as a key, without specifying Sample ID.

3) 12.1.7 Beginning Request Results Date & Time

The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

The date and time when the inquiry is performed is set in the sampler mode analysis, and “18991230000000” is set in the manual mode analysis.

This field is for compatibility with host computer which has previously referenced this field. When newly connecting the host computer to XN, please ignore and do not retrieve the date and time to be set in this field.

4) 12.1.13 Requested Information Status Codes

Indicates the timing of inquiry:

F: Real-time inquiry (manual analysis) or batch inquiry

N: Real-time inquiry (sampler analysis) for initial analysis.

C: Real-time inquiry (sampler analysis) for re-analysis

4.3.3.4. Analysis Order Record

[Example of transmission]

- IPU -> Host computer
O|1| | ^ ^ ABCDE1234567890 ^B | ^ ^ ^ ^ WBC \ ^ ^ ^ ^ RBC \ . . .
 \ ^ ^ ^ ^ BASO# | | | | | | N | | | | | | | | | | | F <CR>
- Host computer -> IPU
O|1| | ^ ^ ABCDE1234567890 ^B | | ^ ^ ^ ^ WBC \ ^ ^ ^ ^ RBC \ . . .
 \ ^ ^ ^ ^ BASO# | | 20010807101000 | | | | N | | | | | | | | | | | Q <CR>

Table 4.3.3.4.1: Details of Test Order Record

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
9.4.1	Record Type	O	O	1	Fixed
9.4.2	Sequence Number	Sequence No.	Sequence No.	4	Sequence Number of records
9.4.3	Specimen ID	Not used	Rack No.^ Rack Position^ Sample ID No.^ Sample No. Attribute	6^ 2^ 22^ 1	Sample Number attribute is one of the following: M: Manual input A: Automatic assignment by analyzer B: Barcode reader C: Assignment by host computer
9.4.4	Instrument Specimen ID	Rack No.^ Rack Position^ Sample ID No.^ Sample No. Attribute	Not used	6^ 2^ 22^ 1^	
9.4.5	Analysis Parameter ID	^^^^Parameter	^^^^Parameter	^^^^6	Any order for a specific analysis parameter
9.4.6	Priority	Code	Code	1	Set the Priority Code in uppercase alphanumeric characters. If characters other than uppercase alphanumeric are input to the IPU, input characters will be skipped over. Input and output will follow the service setting “Input and output priority code”. Refer to Table 4.3.3.4.4: About Priority Code
9.4.7	Requested/Ordered Date and Time	Not used	YYYYMMDDHHMSS	14	
9.4.8	Specimen Collection Date and Time	Not used	Not used	-	
9.4.9	Collection End Time	Not used	Not used	-	
9.4.10	Collection Volume	Not used	Not used	-	
9.4.11	Collector ID	Not used	Not used	-	
9.4.12	Action Code	N, A, Q	N, Q	1	N: Manual analysis Initial analysis Slide preparation A: Rerun analysis Reflex analysis Q: QC analysis
9.4.13	Danger Code	Not used	Not used	-	
9.4.14	Relevant Clinical Information	Not used	Not used	-	
9.4.15	Date/Time Specimen Received	Not used	Not used	-	
9.4.16	Specimen Descriptor	Not used	Not used	-	
9.4.17	Ordering Physician	Not used	Not used	-	
9.4.18	Physician Telephone Number	Not used	Not used	-	
9.4.19	User Field No. 1	Not used	Not used	-	

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
9.4.20	User Field No. 2	Not used	Not used	-	
9.4.21	Laboratory Field No. 1	Not used	Not used	-	
9.4.22	Laboratory Field No. 2	Not used	Not used	-	
9.4.23	Date/time Results Reported or Last Modified	Not used	Not used	-	
9.4.24	Instrument Charge to Computer System	Not used	Not used	-	
9.4.25	Instrument Section ID	Not used	A, S, D	-	This is a setting to specify the device used at the time of Query to Host on XN-2000/3000. If there is not setting, its behavior is same as that set at the time of A. “A”: Do not specify analyzer to analyze (Any). “S”: Analyze using the same analyzer used at the initial analysis (SameModule analysis). “D”: Analyze with the different analyzer used at the initial analysis (DifferentModule analysis). However, ignore this parameter in case of XN-1000/9000 and in the initial analysis.
9.4.26	Report Type	F, I	X, Y, Q, Z	1	[IPU -> Host] F: Manual analysis Analysis other than Repeat Slide preparation I: Repeat analysis [Host -> IPU] X: Analysis not performed Y: No order Q: Response to inquiry Z: Analysis not performed (error is notified) For more details, refer to Table 4.3-14: Behavior of analysis by presence of Report Type and Order Parameters.
9.4.27	Reserved	Not used	Not used	-	
9.4.28	Location or Ward of Specimen Collected	Not used	Not used	-	
9.4.29	Nosocomial Infection Flag	Not used	Not used	-	
9.4.30	Specimen Service	Not used	Not used	-	
9.4.31	Specimen Institution	Not used	Not used	-	

[Detailed explanation of the fields]

1) 9.4.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appears in the message. This number is reset to 1 when a higher-level record appears in the message.

2) 9.4.3 Specimen ID

Rack Number:

This is a number assigned to the sample rack, represented by up to 6-digit extended single-byte characters. Return the same number as was used for the inquiry.

Rack Position:

This is a number between 1 and 10, indicating the sample position in a rack. Return the same number as was used for the inquiry.

Sample ID Number:

The sample ID number is expressed with 22-digit extended single-byte characters. A number less than 22 digits should be right-aligned with space padding.

Any sample number beginning with “QC” is reserved for QC analysis.

For a real-time inquiry with Sample ID Number being used as a keyword, return the same number as was used for the inquiry.

For a real-time inquiry with Rack Number/Rack Position being used as a keyword, or for a batch inquiry from the Work List, assign a sample ID number for the sample corresponding to the specified rack number/rack position.

Sample Number Attribute:

M: Manual input

The Sample ID Number is manually entered through the touch panel or the IPU keyboard.

A: Automatic assignment by analyzer

The number is assigned by the automatic-increment function of the analyzer. This number is used when a barcode reading error occurs and a sample number starting with “ERR” is given to the sample.

B: Barcode reader

This is used when the sample ID number is read by the barcode reader.

C: Assignment by host computer

This is used when the host computer assigns a sample number in response to the inquiry with Rack Number/Rack Position used as a key.

3) 9.4.4 Instrument Specimen ID

Rack Number:

This is a rack number for the analyzed sample, expressed with up to 6-digit alphanumeric characters.

Rack Position:

This is a number between 1 and 10, indicating the tube position of the analyzed sample in a rack.

Sample ID Number:

In addition to a standard Sample ID Number, Barcode Reading Error Number, QC Sample Number, and QC File Number may be specified.

Standard Sample ID Number	: 22-digit extended single-byte characters are used. A number less than 22 digits is right-aligned with space padding.
Reading Error Number	: The first three digits are “ERR”, followed by a 12-digit number. A number less than 22 digits is right-aligned with space padding.
QC Sample Number	: The first three digits are “QC-”, followed by a 12-digit number. This number is used for real-time output of QC data. A QC number less than 22 digits is right-aligned with space padding.
QC File Number	: One of “1” through “94”, “XbarM1” (in case of X-barM CBC), “XbarM2” (in case of X-barM DIFF), “XbarM3” (in case of X-barM WPC), “XbarM4” (in case of X-barM RET) or “XbarM5” (in case of X-barM PLT-F) is assigned. This number is used for manual output of QC data.

Sample Number Attribute:

M: Manual input

The Sample ID Number is manually entered through the touch panel or the IPU keyboard.

A: Automatic assignment by analyzer

The number is assigned by the automatic-increment function of the analyzer. This number is used when a barcode reading error occurs and a sample number starting with “ERR” is given to the sample.

B: Barcode reader

This is used when the sample ID number is read by the barcode reader.

C: Assignment by host computer

This is used when the host computer assigns a sample number in response to the inquiry with Rack Number/Rack Position used as a key.

Note 1: Rack Number, Rack Position, and Sample Number Attribute are excluded for manual output of QC data (output from QC charts).

4) 9.4.5 Analysis Parameter ID

When returning order information, the host computer is to indicate the analysis parameter(s) ordered.

Use delimiters to indicate two or more parameters.

Example: “^^^^Parameter1\^^^^Parameter2\^^^^Parameter3”

Table 4.3.3.4.2: List of Analysis Parameters Ordered

List of parameters			
Parameter	Full name	Parameter	Full name
WBC*5	White blood cell count	NRBC%	Nucleated red blood cell percent
RBC*5	Red blood cell count	NRBC#	Nucleated red blood cell count
HGB	Hemoglobin content	RDW-SD	Red blood cell distribution width
HCT	Hematocrit	RDW-CV	Red blood cell distribution width
MCV	Mean red blood cell volume	PDW	Platelet distribution width
MCH	Mean corpuscular hemoglobin	MPV	Mean platelet volume
MCHC	Mean corpuscular hemoglobin concentration	P-LCR	Platelet large cell ratio
PLT	Platelet count	PCT	Plateletcrit
NEUT%*5	Neutrophil ratio	RET%	Reticulocyte ratio
LYMPH%*5	Lymphocyte ratio	RET#	Reticulocyte count
MONO%*5	Monocyte ratio	IRF	Immature reticulocyte fraction
EO%*5	Eosinophil ratio	LFR	Low fluorescence ratio
BASO%	Basophil ratio	MFR	Middle fluorescence ratio
NEUT#*5	Neutrophil count	HFR*1	High fluorescence ratio
LYMPH#*5	Lymphocyte count	PLT-F*1	With/without PLT-F channel
MONO#*5	Monocyte count	WPC*2	With/without WPC channel
EO#*5	Eosinophil count	LWBC*3	With/without low WBC mode
BASO#	Basophil count	SMEAR*4	With/without slide preparation

*1: If PLT analysis is not ordered, PLT-F is regarded as having no analysis order.

*2: If analysis of NEUT%, LYMPH%, MONO%, EO%, BASO%, NEUT#, LYMPH#, MONO#, EO#, and BASO# is not ordered, WPC is regarded as having no analysis order.

*3: If analysis of NEUT%, LYMPH%, MONO%, EO%, BASO%, NEUT#, LYMPH#, MONO#, EO#, and BASO# is not ordered, LWBC is regarded as having no analysis order. Switching to Low WBC mode cannot be ordered from host computer in manual mode analysis. To perform an analysis in Low WBC mode in manual mode analysis, switch the mode to Low WBC mode in the mode switching screen before analysis.

*4: Only set when XN-3000 Standalone mode is used. For differences in slide preparation processing that depend on whether or not there is a SMEAR order, refer to the table below.

SEMAR order exists	Slide is prepared according to the default SP order of the IPU.
No SEMAR order	Slide is prepared according to the SP rule of the IPU.

*5: Not used if analyzed in hsA mode.

The IPU arranges the analyzed parameters when transmitting analysis results to the host computer.

[Transmitting analyzed parameters (output of analysis results or real-time output of QC data)]

WBC*⁹, RBC*⁹, HGB, HCT, MCV, MCH, MCHC, PLT, RDW-SD, RDW-CV, MicroR*10, MacroR*10, PDW*¹, MPV, P-LCR*¹, PCT*¹, NEUT#*⁹, LYMPH#*⁹, MONO#*⁹, EO#*⁹, BASO#, NEUT%*⁹, LYMPH%*⁹, MONO%*⁹, EO%*⁹, BASO%, IG#*^{1*3}, IG%*^{1*3}, AS-LYMP#*^{10*11}, AS-LYMP%*^{10*11}, RE-LYMP%*^{10*11}, RE-LYMP#*^{10*11}, NEUT-RI*^{3*10}, NEUT-GI*^{3*10}, NRBC#, NRBC%, RET#, RET%, IRF, LFR*¹, MFR*¹, HFR*¹, HPC#*^{1*8}, HPC%*^{8*10}, RET-HE*⁴, RBC-He*10, HYPO-He*10, HYPER-He*10, IPF*⁷, IPF#*⁷, WBC-BF*², RBC-BF*², MN#*^{2*9}, MN%*^{2*9}, PMN#*^{2*9}, PMN%*^{2*9}, TC-BF#*^{1*2}, PLT-F, WPC, LWBC*⁵, OPEN*⁶

- *1: If derived software handles the parameters as research items, only the items defined in the Service settings to be output (Output_Analysis Information) are transmitted.
- *2: The analysis results are output if the analysis is performed in the body fluid mode (other parameters are not output).
- *3: The analysis results are output if analysis of NEUT# or NEUT% is ordered.
- *4: The analysis results are output if analysis of RET#, RET%, LFR, MFR, HFR, or IRF is ordered.
- *5: This parameter is output if the analysis is performed in the low WBC mode.
- *6: This parameter is output if an open, manual analysis is performed.
- *7: The analysis results are output if there is an analysis order for the PLT-F channel.
- *8: The analysis results are output if the analysis is performed in HPC mode, or if real-time output of quality control data is performed.
- *9: Not used if analyzed in hsA mode.
- *10: Only when derived software handles the parameters as reportable parameters, the analysis results are output.
- *11: The analysis results are output if analysis of LYMP# or LYMP% is ordered.

[Transmitting QC chart items (manual output of QC data)]

WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, RDW-SD, RDW-CV, MicroR*1, MacroR*1, PDW, MPV, P-LCR, PCT, NEUT#, LYMPH#, MONO#, EO#, BASO#, NEUT%, LYMPH%, MONO%, EO%, BASO%, IG#, IG%, AS-LYMP#*¹, AS-LYMP%*¹, RE-LYMP%*¹, RE-LYMP#*¹, NEUT-RI*¹, NEUT-GI*¹, NRBC#, NRBC%, RET#, RET%, IRF, LFR, MFR, HFR, HPC#, HPC%*¹, RET-HE, RBC-He*1, HYPO-He*1, HYPER-He*1, IPF, IPF#, WBC-D, WNR-X, WNR-Y, WNR-Z, WDF-X, WDF-Y, WDF-Z, RBC-O, PLT-O, RET-RBC-X, RET-RBC-Y, RET-RBC-Z, DLT-RBC, DLT-PLTO, RET-RBC-WX, RET-RBC-WY, WBC-P, WPC-X, WPC-Y, WPC-Z, PLT-F, PLT-F-X, PLT-F-Y, PLT-F-Z, PLT-F-RBC-X, PLT-F-RBC-Y, WBC-BF, RBC-BF, MN#, MN%, PMN#, PMN%, TC-BF#

- *1: Only when derived software handles the parameters as QC parameters and the quality control the analysis results are output.

5) 9.4.7 Requested/Ordered Date and Time

Indicates the date and time when the analysis was ordered for the sample. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

6) 9.4.12 Action Code

[IPU -> HOST]

Indicates the order type for the results record to be sent.

N: Manual, Manual (Open), Initial, Initial/Repeat, Slide preparation

A: Rerun, Rerun/Repeat, Reflex, Reflex/Repeat

Q: QC

Note 1: For QC data analysis, the action code is set to “Q” irrespective of the order type.

[HOST -> IPU]

Indicates the content of the results record to be sent.

N: Normal sample analysis

Q: QC sample analysis

7) 9.4.26 Report Type

[IPU -> HOST]

Indicates the order type for the results record to be sent.

F: Manual, Manual (Open), Initial, Rerun, Reflex, Slide preparation

I: Initial/Repeat, Rerun/Repeat, Reflex/Repeat

[HOST -> IPU]

Indicates whether there is an order corresponding to the inquiry from the IPU.

Q: Response to inquiry (use this if there is an order corresponding to the inquiry)

Y: No order (use this if there is no order corresponding to the inquiry)

X: No aspiration (use this to indicate that no aspiration should be performed on the sample)

Z: No aspiration (error is shown) (use this to indicate that no aspiration should be performed on the sample)

Note 2: Any value other than above is regarded as having no order.

Note 3: If the Report Type is set to “Y” or any value indicating no order, the sample will be analyzed with the analyzer’s default order.

Whether or not there is slide preparation processing depends on the result of SP rule judgment on the IPU.

Note 4: When “X” is set, the target analysis and slide preparation are not performed.

Analysis stop and error message are displayed only at the time of initial analysis. If Report Type Z is specified at the time of retest, it is considered as “X” and sampler analysis is not stopped. Also, if Report Type Q and Order Parameter “NO” are specified at the time of retest, sampler analysis is not stopped.

Table 4.3.3.4.3: Behavior of analysis by presence of Report Type and Order Parameters

Condition			Behavior		
Setting of stopping sampler analysis [Instruction not to aspirate]	Report Type	Order Parameter	Sampler Analysis	Error message*	Specify device at the time of Query To Host
Stop	Q	Ordered	Analyze according to the order.	NO	Not Available
		Not Ordered	Stop. After rerun, skip the analysis of this sample.	YES	Not Available
	Y	Ordered	Analyze with default order	NO	Available
		Not Ordered	Analyze with default order	NO	Not Available
	X	Ordered	Stop. After rerun, skip the analysis of this sample.	YES	Available
		Not Ordered	Stop. After rerun, skip the analysis of this sample.	YES	Not Available
	Z	Ordered	Stop. After rerun, skip the analysis of this sample.	YES	Not Available
		Not Ordered	Stop. After rerun, skip the analysis of this sample.	YES	Not Available
Do not stop	Q	Ordered	Analyze according to the order.	NO	Available
		Not Ordered	Skip the analysis.	NO	Not Available
	Y	Ordered	Analyze with default order	NO	Available
		Not Ordered	Analyze with default order	NO	Not Available
	X	Ordered	Skip the analysis.	NO	Not Available
		Not Ordered	Skip the analysis.	NO	Not Available
	Z	Ordered	Skip the analysis.	YES	Available
		Not Ordered	Skip the analysis.	YES	Not Available

* Display “No Analysis Orders” error

Table 4.3.3.4.4: About Priority Code

The service setting “Input and output priority code”	Priority code input from Host Computer	Priority Code output to Host Computer	Behavior to input to the IPU	Code to be output from the IPU
0 (default)	Not executed	Not executed	Ignore the input codes	The priority field always outputs as without the field.
1	Executed	Not executed	If uppercase alphanumeric characters are input, behave the input character as priority code.	The priority field always outputs as without the field.
2	Not executed	Executed	Ignore the input codes.	If the Priority Code is undesignated, outputs as without the priority field If the Priority Code is designated, the designated Priority Code will be output.
3	Executed	Executed	If uppercase alphanumeric characters are input, behave the input character as priority code.	If the Priority Code is undesignated, outputs as without the priority field If the Priority Code is designated, the designated Priority Code will be output.

4.3.3.5.Result Record (Analysis result data, QC data)

[Example of transmission]

■ IPU -> Host computer

R|1|^^^^WBC^1|7.80|10*3/uL||N|||||20011116101000<CR>

R|2|^^^^RBC^1|10.00|10*6/uL||A|||||20011116101000<CR>

.....

R|18|^^^^PLT_C(S)?|200|||A|||||20011116101000<CR>

■ Host computer -> IPU

Not used.

Table 4.3.3.5.1: Details of the Result record

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
10.1.1	Record Type	R	Not used	1	
10.1.2	Sequence Number	Sequence No.	Not used	4	Sequence Number of records
10.1.3	Analysis Parameter ID	^^^^Parameter^ Dilution ratio^ Analysis result type^^ Extended order result	Not used	^^^^27 ^ 1^2^^ 1	[Dilution ratio] 1: Non-capillary 5: Capillary
10.1.4	Data Value	Data value	Not used	-	
10.1.5	Unit	Unit	Not used	7	
10.1.6	Reference Range	Not used	Not used	-	
10.1.7	Result Abnormal Fags	L, H, >, N, A, W	Not used	2	L: Lower than patient limit H: Higher than patient limit >: Out of assured linearity N: Normal A: Analysis/hardware error W: Low reliability LL: Lower than panic value HH: Higher than panic value
10.1.8	Nature of Abnormality Testing	Not used	Not used	-	
10.1.9	Result Status	F, I, P, N	Not used	1	Indicates judgment based on Repeat/Rerun/Reflex rule: F: None I: Repeat P: Rerun or Reflex N: Query to host
10.1.10	Date of Change in Instrument Normative Values or Units	Not used	Not used	-	
10.1.11	Operator Identification	Not used	Not used	-	
10.1.12	Date/Time Test Started	Not used	Not used	-	
10.1.13	Date/Time Test Completed	YYYYMMDDHHM MSS	Not used	14	
10.1.14	Instrument Identification	Not used	Not used	-	

[Detailed explanation of the fields]

1) 10.1.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appears in the message. This number is reset to 1 when a higher-level record appears in the message.

2) 10.1.9 Result Status

Indicates judgment based on the Repeat/Rerun/Reflex rule:

F: None (there is no applicable rule, or evaluation based on the Repeat/Rerun/Reflex rule is not made)

I: Repeat

P: Rerun or Reflex

N: Query to host

3) 10.1.3 Analysis Parameter ID / 10.1.4 Data Value / 10.1.5 Unit / 10.1.7 Result Abnormal flags / 10.1.13 Date/Time Test Completed

Values assigned to the individual fields will vary depending on the content to be transmitted.

3.1) Outputting analysis parameters: the parameters having analysis orders are output.

Table 4.3.3.5.2: List of Parameters

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
WBC* ⁹	1,5	W, (None)	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RBC* ⁹	1,5	Not used	○○.○○	10*6/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HGB* ²	1,5	Not used	○○○.○	g/dL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HCT	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MCV	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MCH* ²	1,5	Not used	○○○.○	pg	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MCHC* ²	1,5	Not used	○○○.○	g/dL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PLT	1,5	W, (None)	○○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT%* ⁹	1,5	W, (None)	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LYMPH%* ⁹	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO%* ⁹	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO%* ⁹	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
BASO%	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT#* ⁹	1,5	W, (None)	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LYMPH#* ⁹	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO#* ⁹	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO#* ⁹	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
BASO#	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IG%* ^{3*5}	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IG#* ^{3*5}	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
AS-LYMP% * ¹⁰	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
AS-LYMP#* 10	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RE-LYMP% * ¹⁰	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RE-LYMP#* 10	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT-RI* ¹⁰	1,5	Not used	○○○.○	FI	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT-GI* ¹⁰	1,5	Not used	○○○.○	SI	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NRBC%	1,5	Not used	○○○○.○	/100WBC	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NRBC#	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
RDW-SD	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RDW-CV	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MicroR*10	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MacroR*10	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PDW*3	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MPV	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
P-LCR*3	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PCT*3	1,5	Not used	○○.○○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RET%	1,5	Not used	○○.○○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RET#	1,5	Not used	○.○○○○○	10*6/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IRF	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LFR*3	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MFR*3	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HFR*3	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HPC#*8	1	Not used	○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HPC%*8*10	1	Not used	○○.○○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RET-HE*2*6	1,5	Not used	○○○.○	pg	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RBC-HE*2*6*10	1,5	Not used	○○○.○	pg	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HYPO-HE*6*10	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HYPER-HE*6*10		Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
DELTA-HE*2*6*10	1,5	Not used	○○○○.○	pg	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IPF*7	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IPF#*7*10	1,5	Not used	○○○.○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
WBC-BF*4	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RBC-BF*4	1	Not used	○○.○○○	10*6/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MN#*4*9	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MN%*4*9	1	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PMN#*4*9	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PMN%*4*9	1	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
TC-BF#*3*4	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS

*1: The Data Value field indicates the maximum number of digits and the decimal positions.

*2: The data values and units expressed in SI units are as follows:

Units	Parameter	Data Value	Unit
SI Units	HGB	○○○.○	mmol/L
	MCH	○○○○	amol
	MCHC	○○○.○	mmol/L
	RET-HE	○○○○	amol
	RBC-HE	○○○○	amol
	DELTA-HE	○○○○○	amol

*3: If derived software handles the parameters as research (Can be displayed in the main screen) items, only the items defined in the Service settings to be output (Output Analysis Information) are transmitted.

*4: Analysis results are output if the analysis is performed in the body fluid mode (other items are not output).

*5: Analysis results are output if analysis of NEUT# or NEUT% is ordered.

*6: Analysis results are output if analysis of RET#, RET%, LFR, MFR, HFR, or IRF is ordered.

*7: Analysis results are output when there is an analysis order for the PLT-F channel.

*8: Analysis results are output when analysis is performed in HPC mode, or when real-time output of quality control data is performed.

*9: Not output if analyzed in hsA mode.

*10: Only when derived software handles the parameters as reportable parameters, the analysis results are output.

a) 10.1.3 Analysis Parameter ID

Parameter:

Analysis parameter names are output.

Dilution ratio:

1: Manual mode, Sampler mode

5: Capillary mode

Analysis result type:

Not used

Extended order result:

This parameter is set to “W” in the cases WDF channel is used for WBC, IG is corrected for NEUT# or NEUT%, or PLT-F or PLT-O is selected for PLT.

b) 10.1.4 Data Value

Data values for individual parameters are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, analysis data is output using the decimal point position indicated in “Table 4.3-16: List of Parameters”.

When “Link to IPU unit setting” is enabled in the service settings, analysis data is output using the linked decimal point position in the IPU unit settings.

If any data value is to be masked due to failure such as an analyzer error, the output data value is also masked as on the IPU display.

---- : Analysis or hardware error

++++ : Out of range

c) 10.1.5 Unit

Units for individual parameters are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, the units indicated in “Table 4.3-16: List of Parameters” are output.

When “Link to IPU unit setting” is enabled in the service settings, the linked units in the IPU unit settings are output.

d) 10.1.7 Result Abnormal Flag

L: Lower than limit

H: Higher than limit

>: Out of assured linearity

N: Normal result

A: Abnormal result due to analysis or hardware error

W: Low reliability mark is attached to the result by flagging

LL: Lower than clinical panic limit

HH: Higher than clinical panic limit or out of permissible limits for background check

*In case of QC parameters, Result Abnormal Flag is not output.

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.2) Outputting QC parameters: the QC chart parameters having analysis orders are output.

Table 4.3.3.5.3: List of QC Analysis Parameters

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
WBC	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
RBC	1	Not used	○○.○○	10*6/uL	N,A	YYYYMMDDHHMMSS
HGB*2	1	Not used	○○○.○	g/dL	N,A	YYYYMMDDHHMMSS
HCT	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MCV	1	Not used	○○○.○	fL	N,A	YYYYMMDDHHMMSS
MCH*2	1	Not used	○○○.○	pg	N,A	YYYYMMDDHHMMSS
MCHC*2	1	Not used	○○○.○	g/dL	N,A	YYYYMMDDHHMMSS
PLT	1	Not used	○○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
NEUT%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
LYMPH%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MONO%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
EO%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
BASO%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
NEUT#	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
LYMPH#	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
MONO#	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
EO#	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
BASO#	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
IG%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
IG#	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
AS-LYMP%*3	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
AS-LYMP#*3	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
RE-LYMP%*3	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
RE-LYMP#*3	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
NEUT-RI*3	1	Not used	○○○.○	FI	N,A	YYYYMMDDHHMMSS
NEUT-GI*3	1	Not used	○○○.○	SI	N,A	YYYYMMDDHHMMSS
NRBC%	1	Not used	○○○○.○	/100WBC	N,A	YYYYMMDDHHMMSS
NRBC#	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
RDW-SD	1	Not used	○○○.○	fL	N,A	YYYYMMDDHHMMSS
RDW-CV	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MicroR*3	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MacroR*3	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
PDW	1	Not used	○○○.○	fL	N,A	YYYYMMDDHHMMSS
MPV	1	Not used	○○○.○	fL	N,A	YYYYMMDDHHMMSS
P-LCR	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
PCT	1	Not used	○○.○○	%	N,A	YYYYMMDDHHMMSS
RET%	1	Not used	○○.○○	%	N,A	YYYYMMDDHHMMSS
RET#	1	Not used	○.○○○○	10*6/uL	N,A	YYYYMMDDHHMMSS
IRF	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
LFR	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MFR	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
HFR	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
HPC#	1	Not used	○○.○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
HPC%	1	Not used	○○.○○	%	N,A	YYYYMMDDHHMMSS
RET-HE*2	1	Not used	○○○.○	pg	N,A	YYYYMMDDHHMMSS
RBC-HE*2*3	1	Not used	○○○.○	pg	N,A	YYYYMMDDHHMMSS

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
HYPO-He*2,*3	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
HYPER-He*2,*3	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
IPF	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
IPF#*3	1	Not used	○○○.○	10*3/uL	N,A	YYYYMMDDHHMMSS
WBC-D	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
WNR-X	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WNR-Y	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WNR-Z	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WDF-X	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WDF-Y	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WDF-Z	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
RBC-O	1	Not used	○○.○○	10*6/uL	N,A	YYYYMMDDHHMMSS
PLT-O	1	Not used	○○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
RET-RBC-X	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
RET-RBC-Y	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
RET-RBC-Z	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
DLT-RBC	1	Not used	○○.○○	None	N,A	YYYYMMDDHHMMSS
DLT-PLTO	1	Not used	○○.○○	None	N,A	YYYYMMDDHHMMSS
RET-RBC-WX	1	Not used	○○○○	None	N,A	YYYYMMDDHHMMSS
RET-RBC-WY	1	Not used	○○○○	None	N,A	YYYYMMDDHHMMSS
WBC-P	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS
WPC-X	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WPC-Y	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WPC-Z	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
PLT-F	1	Not used	○○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
PLT-F-X	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
PLT-F-Y	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
PLT-F-Z	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
PLT-F-RBC-X	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
PLT-F-RBC-Y	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WBC-BF	1	Not used	○○○.○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
RBC-BF	1	Not used	○○.○○○	10*6/uL	N,A	YYYYMMDDHHMMSS
MN#	1	Not used	○○○.○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
MN%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
PMN#	1	Not used	○○○.○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
PMN%	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
TC-BF#	1	Not used	○○○.○○○	10*3/uL	N,A	YYYYMMDDHHMMSS

*1: The Data Value field indicates the maximum number of digits and the decimal position.

*2: The data values and units expressed in SI units are as follows:

Units	Parameter	Data Value	Unit
SI Units	HGB	○○○.○	mmol/L
	MCH	○○○○	amol
	MCHC	○○○.○	mmol/L
	RET-HE	○○○○	amol
	RBC-HE	○○○○	amol

*3: Analysis results are only output if the destination-specific software handles the parameters as quality control parameters.

a) 10.1.3 Analysis Parameter ID

Parameter : QC parameter names are output.

Dilution ratio : Fixed to “1”.

Extended order result : Not used.

b) 10.1.4 Data Value

QC data values for individual QC analysis parameters are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, analysis data is output using the decimal point position indicated in “Table 4.3-17: List of QC Analysis Parameters”.

When “Link to IPU unit setting” is enabled in the service settings, analysis data is output using the linked decimal point position in the IPU unit settings.

If any data value is to be masked due to failure such as an analyzer error, the output data value is also masked as on the IPU display.

---- : Analysis or hardware error

++++ : Out of range

c) 10.1.5 Unit

Units for individual QC parameters are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, the units indicated in “Table 4.3-17: List of QC Analysis Parameters” are output.

When “Link to IPU unit setting” is enabled in the service settings, the linked units in the IPU unit settings are output.

d) 10.1.7 Result Abnormal Flag

N: Normal result

A: Abnormal result due to analysis or hardware error

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the QC analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.3) Outputting IP messages (ABNORMAL): The parameters having IP message flags are output.

(Note)

The IP messages (ABNORMAL) are intended for use in a clinical laboratory for inspection only, and not for patient diagnosis. The IP messages (ABNORMAL) notify the operator of the possibility of specific sample abnormality confirmed by checking analysis data.

Table 4.3.3.5.4: List of IP Messages (ABNORMAL)

10.1.3 Analysis Parameter ID			10.1.4 Data Value	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
WBC_Abn_Scattergram	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Neutropenia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Neutrophilia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Lymphopenia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Lymphocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Leukocytopenia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Leukocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Monocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Eosinophilia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Basophilia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
NRBC Present	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
IG Present	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
RBC_Abn_Distribution	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Dimorphic Population	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Anisocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Microcytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Macrocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Hypochromia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Anemia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Erythrocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
RET_Abn_Scattergram	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Reticulocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
PLT_Abn_Scattergram	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
PLT_Abn_Distribution	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Thrombocytopenia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Thrombocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS

a) 10.1.3 Analysis Parameter ID

Parameter : The IP messages are output.
Dilution ratio : Not used
Analysis result type : Not used
Extended order result : Not used

b) 10.1.4 Data Value

Not used

c) 10.1.5 Unit

Not used

d) 10.1.7 Result Abnormal Flag

A: Indicates the IP message flag is on.

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the QC analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.
YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.4) Outputting IP messages (SUSPECT): The parameters with Q-FLAG data are output.

(Note)

The IP messages (SUSPECT) and Q-Flag data are intended for use in a clinical laboratory for inspection only, and not for patient diagnosis. The IP messages (SUSPECT) and Q-Flag notify the operator of the possibility of specific sample abnormality confirmed by checking analysis data.

Table 4.3.3.5.5: List of IP Messages (SUSPECT)

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
Blasts?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Left_Shift?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Atypical_Lympho?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Blasts/Abn_Lympho?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Abn_Lympho?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
RBC_Agglutination?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Turbidity/HGB_Interfe- rence?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Iron_Deficiency?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
HGB_Defect?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Fragments?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
PRBC?*2	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
PLT_Clumps?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
Giant_Platelet?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
pRBC?(R)*2*3	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS

*1: The Data Value fields indicate the maximum number of digits.

*2: Only output if pRBC license is registered.

*3: Only output if use of pRBC(R) is set in the service settings.

a) 10.1.3 Analysis Parameter ID

Parameter : The IP messages are output.
Dilution ratio : Not used
Analysis result type : Not used
Extended order result : Not used

b) 10.1.4 Data Value

Q-FLAG grade values ranging from 0 to 300 are output.

c) 10.1.5 Unit

Not used

d) 10.1.7 Result Abnormal Flag

A: Indicates the IP message flag is on.
(If no IP message flag is on, result abnormal flags are not output.)

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the QC analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.
YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.5) Outputting Action Messages: The parameters having Action Message flags are output.

(Note)

The Action Messages are intended for use in a clinical laboratory for inspection only, and not for patient diagnosis. The Action Messages notify the operator of the possibility of specific sample abnormality confirmed by checking analysis data.

Table 4.3.3.5.6: List of Action Messages

10.1.3 Analysis Parameter ID			10.1.4 Data Value	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
ACTION_MESSAGE_Delta	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Delta_WBC	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Delta_HGB	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Delta_MCV	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Delta_PLT	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_WBC	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_RBC	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Review_PLT	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_PLT	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Suspect_Sample	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Aged_Sample?	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS

a) 10.1.3 Analysis Parameter ID

Parameter : Action Messages are output.

ACTION_MESSAGE_Delta : A wrong sample may have been tested.
 ACTION_MESSAGE_Delta_WBC : A significant difference is observed in WBC.
 ACTION_MESSAGE_Delta_HGB : A significant difference is observed in HGB.
 ACTION_MESSAGE_Delta_MCV : A significant difference is observed in MCV.
 ACTION_MESSAGE_Delta_PLT : A significant difference is observed in PLT.
 ACTION_MESSAGE_WBC : There is a difference between WNR and WDF channels.
 ACTION_MESSAGE_RBC : There is a difference between RBC and RET channels.
 ACTION_MESSAGE_Review_PLT : There is a difference between PLT and PLT-F channels.
 ACTION_MESSAGE_PLT : PLT test result may be less reliable.
 ACTION_MESSAGE_Suspect_Sample : Suspect sample, check the sample.
 ACTION_MESSAGE_Aged_Sample? : Aged Sample?

Dilution ratio : Not used

Analysis result type : Not used

Extended order result : Not used

b) 10.1.4 Data Value

Not used

c) 10.1.5 Unit

Not used

d) 10.1.7 Result Abnormal Flag

A: Indicates the Action Message flag is on.

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the QC analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.
 YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.6) Outputting Positive/Error judgments: The parameters having Positive/Error judgment are output.

(Note)

The Positive/Negative and Error judgments are intended for use in a clinical laboratory for inspection only, and not for patient diagnosis. The Positive/Negative and Error judgments notify the operator of the possibility of specific sample abnormality confirmed by checking analysis data.

Table 4.3.3.5.7: List of Positive/Error Judgments

10.1.3 Analysis Parameter ID			10.1.4 Data Value	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
Positive_Diff	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Positive_Morph	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Positive_Count	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Error_Func	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Error_Result	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS

a) 10.1.3 Analysis Parameter ID

Parameter : Positive/Error judgments are output.

Positive_Diff, Positive_Morph, Positive_Count:

Indicates a data value of a blood cell type has some error.

Error_Func :

Indicates an analysis error other than barcode reading errors has occurred.

Error_Result :

Indicates one of the following analysis errors has occurred: “Sample Not Asp Error”, “Low Blood Volume”, and “Low Count Error”.

Dilution ratio : Not used

Analysis result type : Not used

Extended order result : Not used

b) 10.1.4 Data Value

Not used

c) 10.1.5 Unit

Not used

d) 10.1.7 Result Abnormal Flag

A: Indicates the Positive or Error flag is on.

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the QC analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.7) Outputting image data: the parameters having image data are output.

(Note)

Scattergrams and distributions indicated as being for research should only be used for research purposes.

Table 4.3.3.5.8: List of Image Information

10.1.3 Analysis Parameter ID			10.1.4 Data Value	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
SCAT_WDF	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WNR	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_RET	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_PLT-F	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_PLT-O	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_RET-E	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF-E	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WNR(SFL-SSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WNR(SSC-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WNR(FSCW-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF(SSC-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF(FSC-SFL)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF(FSCW-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_RET(SFL-SSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_RET(SSC-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_RET(FSCW-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_PLT-F(SFL-SSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_PLT-F(SSC-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_PLT-F(FSCW-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC(SSC-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC(FSC-SFL)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC(FSCW-FSC)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
DIST_RBC	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
DIST_PLT	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
DIST_WDF(FSC)	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
DIST_RBC(FSC)	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
DIST_RBC(NORMAL)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
DIST_PLT(NORMAL)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC(HPC only)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC(SSC-FSC)(HPC only)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC(FSC-SFL)(HPC only)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS
SCAT_WPC(FSCW-FSC)(HPC only)*1	Not used	Not used	Data	Not used	N	YYYYMMDDHHMMSS

*1: Only output when output of research scattergrams and histograms is set in the service settings.

a) 10.1.3 Analysis Parameter ID

Parameter	
SCAT_WDF	: Types of image data having data values are output.
SCAT_WNR	: WDF scattergram image data
SCAT_WPC	: WNR scattergram image data
SCAT_RET	: WPC scattergram image data
SCAT_PLT-F	: RET scattergram image data
SCAT_PLT-O	: PLT-F scattergram image data
SCAT_RET-E	: PLT-O scattergram image data (research)
SCAT_WDF-E	: RET (ext) scattergram image data (research)
SCAT_WNR(SFL-SSC)	: WDF (ext) scattergram image data
	: WNR (SFL-SSC) scattergram image data (research)

SCAT_WNR(SSC-FSC)	: WNR (SSC-FSC) scattergram image data (research)
SCAT_WNR(FSCW-FSC)	: WNR (FSCW-FSC) scattergram image data (research)
SCAT_WDF(SSC-FSC)	: WDF (SSC-FSC) scattergram image data (research)
SCAT_WDF(FSC-SFL)	: WDF (FSC-SFL) scattergram image data (research)
SCAT_WDF(FSCW-FSC)	: WDF (FSCW-FSC) scattergram image data (research)
SCAT_RET(SFL-SSC)	: RET (SFL-SSC) scattergram image data (research)
SCAT_RET(SSC-FSC)	: RET (SSC-FSC) scattergram image data (research)
SCAT_RET(FSCW-FSC)	: RET (FSCW-FSC) scattergram image data (research)
SCAT_PLT-F(SFL-SSC)	: PLT-F (SFL-SSC) scattergram image data (research)
SCAT_PLT-F(SSC-FSC)	: PLT-F (SSC-FSC) scattergram image data (research)
SCAT_PLT-F(FSCW-FSC)	: PLT-F (FSCW-FSC) scattergram image data (research)
SCAT_WPC(SSC-FSC)	: WPC (SSC-FSC) scattergram image data (research)
SCAT_WPC(FSC-SFL)	: WPC (FSC-SFL) scattergram image data (research)
SCAT_WPC(FSCW-FSC)	: WPC (FSCW-FSC) scattergram image data (research)
DIST_RBC	: RBC size distribution image data
DIST_PLT	: PLT size distribution image data
DIST_WDF(FSC)	: WDF (FSC) particle size distribution image data (research)
DIST_RBC(FSC)	: RBC (FSC) particle size distribution image data (research)
DIST_RBC(NORMAL)	: RBC particle size distribution image data with normal range (research)
DIST_PLT(NORMAL)	: PLT particle size distribution image data with normal range (research)
SCAT_WPC(HPC only)	: WPC (HPC only) scattergram image data (research)
SCAT_WPC(SSC-FSC)(HPC only)	: WPC (SSC-FSC)(HPC only) scattergram image data (research)
SCAT_WPC(FSC-SFL)(HPC only)	: WPC(FSC-SFL)(HPC only) scattergram image data (research)
SCAT_WPC(FSCW-FSC)(HPC only)	: WPC(FSCW-FSC)(HPC only) scattergram image data (research)
Dilution ratio	: Not used
Analysis result type	: Not used
Extended order result	: Not used

b) 10.1.4 Data Value

The output content varies depending on the service setting (the method of image data output in the ASTM format). When it is “0:PNG File(Folder Sharing)” refer to <PNG file format>, and when it is “1:Raw Data” refer to <Raw data format>.

<PNG file format>

(Note)

When image data is acquired using the Windows folder sharing function, a lag in synchronization between the terminals may prevent the host from immediately accessing the image data in the IPU. To ensure certain acquisition of the image data, add processing such as a delay time between reception of the message and execution of image acquisition, or a retry when the image data cannot be acquired.

Paths to the image files are output. The character “\” appearing in the path is converted to the escape sequence “&R&”. Image data files are exported to the “C:\shared\ PNG\<date>” folder. A character string representing the file path starting with “PNG” is output. The format for the <date> folder is fixed to “YYYYMMDD”. A file name is composed of the date (format is fixed to “YYYYMMDDHHMM”), sample number*, and image data type.

* If the sample number contains invalid characters (\ : * ? " < > |) in Windows, they are replaced with “ ” (space(20h)) and used as the sample number in the file name.

Example: “PNG&R&20030930&R&2003_09_30_12_00_1234567890_WDF.PNG”

In this example, the image data file named “2003_09_30_12_00_1234567890_WDF.PNG” is stored in the “C:\shared\PNG\20030930” folder.

When the host computer is connected, the folders are deleted if they have been stored for three days or longer.

<Raw data format>

Refer to Table 4.3-23 for scattergram image, and refer to Table 4.3-24 for particle size distribution image.

Parameters in the table are sent from top to bottom; the most significant digit first and the least significant digit last.

Table 4.3.3.5.9: Scattergram Data Format

Parameter (sub-field)	Description
X-axis name	FSC, SSC, SFL or FSCW is set.
Y-axis name	FSC, SSC, SFL or FSCW is set.
Scattergram Compression Info	Indicates whether the scattergram is compressed (Run-Length and Huffman). (See Appendix B “Specifications for Scattergrams Compression” for decompressing scattergrams.) “0”: Not compressed, “1”: Compressed
Scattergram Data	The scattergram data is converted to ASCII code text before output. (Refer to Appendix B “De-compression Procedures of the Scattergram Data” for information about scattergram data including converting into ASCII text.)

Ex) FSC^SSC^1^09:545??546...534<5252

Table 4.3.3.5.10: Particle Size Distribution Data Format

Parameter (sub-field)	Description
X-axis name	Indicates the X-axis name. Ex) RBC Particle Distribution : 250 fL
Data X-axis Size	Indicates the data count in the X-axis (horizontal) direction. Ex) 50 is output in RBC particle distribution, and the data values are assigned to “DISCRI 1” through “DISCRI 50”.
Data Y-axis Size	Indicates the maximum data value in the Y-axis (vertical) direction, that is, the maximum value in the data assigned to “DISCRI 1” through “DISCRI N”.
LOWER DISCRI	Indicates the lower discrete limit position. For example, LOWER DISCRI value “5” means the lower discrete limit is positioned at DISCRI 5. * When there are no lower limit discretes, “0” is output. * Indicates the LSc discrete position in RBC(FSC).
MIDDLE DISCRI	Indicates the intermediate discrete position. For example, LOWER DISCRI value “10” means the intermediate discrete is positioned at DISCRI 10. * When there are no intermediate discretes, “0” is output. * “0” is always output in RBC(FSC).
UPPER DISCRI	Indicates the upper discrete limit position. For example, UPPER DISCRI value “25” means the upper discrete limit is positioned at DISCRI 25. * When there are no upper limit discretes, “0” is output. * Indicates the HSc discrete position in RBC(FSC).
RATIO (dividing ratio)	Indicates the ratio for normalization. Data at discrete positions “DISCRI 1” to “DISCRI 50” multiplied by Ratio equals to the particle size distribution data.
DISCRI 1	Indicates the frequency of DISCRI 1.
DISCRI 2	Indicates the frequency of DISCRI 2.
.	.
.	...omitted...
.	.
DISCRI N	Indicates the frequency of DISCRI N. * This is output in the size designated by Data X-axis Size.

Ex) 250fL^50^256^5^25^3^3^4^5^...^0

* For an example of image construction of data in particle size distribution data format, refer to “Appendix C: Particle size distribution data”.

* In the case of particle size distribution data with normal range of DIST_RBC (NORMAL) and DIST_PLT (NORMAL), none of the items indicated in the particle size distribution data format are output (R record without data values is output).

The image of these particle size distribution data is the particle size distribution data without normal range that is normally sent, to which the normal range data is added. The normal range data are fixed values. For details, refer to “Appendix C: Particle size distribution data”.

c) 10.1.5 Unit

Not used

d) 10.1.7 Result Abnormal Flag

The value “N” is always output.

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the QC analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”. YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.8) Research items related to analysis orders are output.

(Note)

No research item is output if the Service settings are configured not to output research items.

(Note)

Analysis results for research items should be used for research purposes only. Do not use these analysis results for patient diagnosis.

Table 4.3.3.5.11: List of Research Items

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
WBC-N	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
WBC-D	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NEUT#&*2	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NEUT%&*2	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMP#&*2	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMP%&*2	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
HFLC#	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HFLC%	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
WBC-P	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-O	1,5	Not used	○○.○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HGB-O*3	1,5	Not used	○○○.○	g/dL	L,H,>,N,A,W	YYYYMMDDHHMMSS
DELTA-HGB*3	1,5	Not used	○○○.○	g/dL	L,H,>,N,A,W	YYYYMMDDHHMMSS
MCHC-O*3	1,5	Not used	○○○.○	g/dL	L,H,>,N,A,W	YYYYMMDDHHMMSS
PLT-O	1,5	Not used	○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
PLT-I	1,5	Not used	○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
PLT-F	1,5	Not used	○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
PLT-F2	1,5	Not used	○○○○.○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TNC-N	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TNC-D	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TNC-P	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HPC%*6	1	Not used	○○.○○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
FRC#	1,5	Not used	○.○○○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
FRC%	1,5	Not used	○○.○○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-HE*3*8	1,5	Not used	○○○.○	pg	L,H,>,N,A,W	YYYYMMDDHHMMSS
DELTA-HE*3*8	1,5	Not used	○○○○.○	pg	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-Y	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-RBC-Y	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
IRF-Y	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
RPI	1,5	Not used	○○○.○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
HYPO-HE	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
HYPER-HE	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
MICROR	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
MACROR	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
H-IPF	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
IPF#*8	1,5	Not used	○○○.○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TNC	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-UPP	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-TNC	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMPH%_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO%_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
NEUT%_RESEARCH*5	1,5	W, (None)	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO%_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
BASO%_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LYMPH#_RESEARCH*5	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO#_RESEARCH*5	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT#_RESEARCH*5	1,5	W, (None)	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO#_RESEARCH*5	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
BASO#_RESEARCH*5	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PDW_RESEARCH*5	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
P-LCR_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LFR_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MFR_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HFR_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PCT_RESEARCH*5	1,5	Not used	○○.○○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IG%_RESEARCH*5	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IG#_RESEARCH*5	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
AS-LYMP%L*8	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
RE-LYMP%L*8	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
HF-BF#*4	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HF-BF%*4	1	Not used	○○○.○	/100WBC	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-BF#*4	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-BF%*4	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-BF#*4	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-BF%*4	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-BF#*4	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-BF%*4	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
EO-BF#*4	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
EO-BF%*4	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-BF2*4	1	Not used	○○.○○○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TC-BF#_RESEARCH*4*5	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NE-SSC	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-SFL	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-FSC	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-N#	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-N%	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-D#	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-D%	1,5	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-X	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-Y	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-Z	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-X	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-Y	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-Z	1,5	Not used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-WX	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-WY	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-WZ	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-WX	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-WY	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-WZ	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-WX	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
MO-WY	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-WZ	1,5	Not used	○○○○	(None)	L,H,>,N,A,W	YYYYMMDDHHMMSS
WBC(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC(HSA)*7	1	Not used	○○.○○○○○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-I(HSA)*7	1	Not used	○○.○○○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-O(HSA)*7	1	Not used	○.○○○○○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NEUT#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMPH#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
MONO#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
EO#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NEUT%(HSA)*7	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMPH%(HSA)*7	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
MONO%(HSA)*7	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
EO%(HSA)*7	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
MN#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
PMN#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HF#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
MN%(HSA)*7	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
PMN%(HSA)*7	1	Not used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
HF%(HSA)*7	1	Not used	○○○.○	/100WBC	L,H,>,N,A,W	YYYYMMDDHHMMSS
TC#(HSA)*7	1	Not used	○○○.○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS

*1: The Data Value field indicates the maximum number of digits and the decimal position.

*2: The character “&” appearing in item names is converted to “&E&” using escape delimiters.

*3: The data values and units expressed in SI units are as follows:

Units	Parameter	Data Value	Unit
SI Units	HGB-O	○○○.○	mmol/L
	Delta-HGB	○○○.○	mmol/L
	MCHC-O	○○○.○	mmol/L
	RBC-HE	○○○○	amol
	DELTA-HE	○○○○○	amol

*4: Analysis results are output if the analysis is performed in the body fluid mode (other items are not output).

*5: Output values for these items are the ones displayed in the IPU’s Laboratory-Use-Only tab.

*6: Analysis results are output when analysis is performed in HPC mode, or when real-time output of QC data is performed. The same parameter is not output multiple times in the Result Record. Therefore, a parameter is not output as research item when derived software outputs the parameter as reportable parameter.

*7: Analysis results are only output for parameters analyzed in hsA mode (other parameters are not output). The parameter name “WBC(HSA)”, which is the parameter name “WBC” that appears on the screen with “(HSA)” appended, is output.

*8: Analysis results are only output if the destination-specific software handles the parameters as research parameters.

a) 10.1.3 Analysis Parameter ID

Parameter:

Research item names are output.

Dilution ratio:

1: Manual mode, Sampler mode

5: Capillary mode

Analysis result type:

Not used

Extended order result:

This parameter is set to “W” when IG is corrected for NEUT#_Research or NEUT%_Research.

b) 10.1.4 Data Value

Data values for individual research items are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, analysis data is output using the decimal point position indicated in “Table 4.3-25: List of Research Items”.

When “Link to IPU unit setting” is enabled in the service settings, analysis data is output using the linked decimal point position in the IPU unit settings.

If any data value is to be masked due to failure such as an analyzer error, the output data value is also masked as on the IPU display.

---- : Analysis or hardware error

++++ : Out of range

c) 10.1.5 Unit

Units for individual research items are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, the units indicated in “Table 4.3-25: List of Research Items” are output.

When “Link to IPU unit setting” is enabled in the service settings, the linked units in the IPU unit settings are output.

d) 10.1.7 Result Abnormal Flag

L: Lower than limit

H: Higher than limit

>: Out of assured linearity

N: Normal result

A: Abnormal result due to analysis or hardware error

W: Low reliability mark is attached to the result by flagging

LL: Lower than clinical panic limit

HH: Higher than clinical panic limit or out of permissible limits for background check

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.9) Service items related to analysis orders are output.

(Note)

No service item is output if the Service settings are configured not to output service items.

(Note)

Analysis results for service items should be used for research purposes only. Do not use these analysis results for patient diagnosis.

Table 4.3.3.5.12: List of Service Items

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Diluti- on ratio	Extended order result				
HGB-BLANK	1,5	Not used	○○○○○	(None)	N	YYYYMMDDHHMMSS
HGB-SAMPLE	1,5	Not used	○○○○○	(None)	N	YYYYMMDDHHMMSS
R-MFV	1,5	Not used	○○○.○	fL	N	YYYYMMDDHHMMSS
S-RBC	1,5	Not used	○○.○○	10*6/uL	N	YYYYMMDDHHMMSS
S-MCV	1,5	Not used	○○○.○	fL	N	YYYYMMDDHHMMSS
L-RBC	1,5	Not used	○○.○○	10*6/uL	N	YYYYMMDDHHMMSS
L-MCV	1,5	Not used	○○○.○	fL	N	YYYYMMDDHHMMSS
P-MFV	1,5	Not used	○○○.○	fL	N	YYYYMMDDHHMMSS
WNR-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WNR-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WNR-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WNR-WX	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
WNR-WY	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
WDF-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WDF-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WDF-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WDF-WX	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
WDF-WY	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
WBC-FX	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
DLT-WBCD	1,5	Not used	○○.○○	(None)	N	YYYYMMDDHHMMSS
WPC-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
DLT-WBCP	1,5	Not used	○○.○○	(None)	N	YYYYMMDDHHMMSS
WPC-AREA1#	1,5	Not used	○○○○○	(None)	N	YYYYMMDDHHMMSS
WPC-AREA2#	1,5	Not used	○○○○○	(None)	N	YYYYMMDDHHMMSS
WPC-AREA3#	1,5	Not used	○○○○○	(None)	N	YYYYMMDDHHMMSS
RET-RBC-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
RET-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
RET-RBC-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
RET-RBC-WX	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
RET-RBC-WY	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
DLT-RBC	1,5	Not used	○○.○○	(None)	N	YYYYMMDDHHMMSS
DLT-PLTO	1,5	Not used	○○.○○	(None)	N	YYYYMMDDHHMMSS
Unclassified	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
PLT-F-AREA1#	1,5	Not used	○○○○○	(None)	N	YYYYMMDDHHMMSS
PLT-F-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
PLT-F-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
PLT-F-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
PLT-F-RBC-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Diluti- on ratio	Extended order result				
PLT-F-RBC-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
PLT-F-RBC-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
PLT-F-RBC-WX	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
PLT-F-RBC-WY	1,5	Not used	○○○○	(None)	N	YYYYMMDDHHMMSS
DLT-PLT-F	1,5	Not used	○○.○○	(None)	N	YYYYMMDDHHMMSS
NRBC-1%	1,5	Not used	○○○○.○	/100WBC	N	YYYYMMDDHHMMSS
NRBC-2%	1,5	Not used	○○○○.○	/100WBC	N	YYYYMMDDHHMMSS
WBC-N2	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
TNC-N2	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
WBC-D2	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
TNC-D2	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
WBC-P2	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
TNC-P2	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
HGB_NONSI	1,5	Not used	○○○.○	g/dL	N	YYYYMMDDHHMMSS
HGB_SI	1,5	Not used	○○○.○	mmol/L	N	YYYYMMDDHHMMSS
HGB_SI2	1,5	Not used	○○.○○	mmol/L	N	YYYYMMDDHHMMSS
WNR_TOTAL_COUNT	1,5	Not used	○○○○○○○○	(None)	N	YYYYMMDDHHMMSS
WDF_TOTAL_COUNT	1,5	Not used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
WDF_PLOT_COUNT	1,5	Not used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
WPC_TOTAL_COUNT	1,5	Not used	○○○○○○○○	(None)	N	YYYYMMDDHHMMSS
WPC_PLT_COUNT	1,5	Not used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
RET_TOTAL_COUNT	1,5	Not used	○○○○○○○○	(None)	N	YYYYMMDDHHMMSS
PLT-F_SIGNAL_COUNT_A	1,5	Not used	○○○○○○○○	(None)	N	YYYYMMDDHHMMSS
PLT-F_DATA_COUNT_A	1,5	Not used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
PLT-F_PLOT_COUNT_A	1,5	Not used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
PLT-F_PLOT_COUNT_B	1,5	Not used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
AREA-F#	1,5	Not used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
HGB_NONSI2	1,5	Not used	○○○.○○	g/dL	N	YYYYMMDDHHMMSS
WBC-N(SSC-FSC)*2	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WBC-N(SSC-FSC)2*2	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS

*1: The Data Value field indicates the maximum number of digits and the decimal position.

*2: Only when derived software handles the parameters as service items, the analysis results are output.

a) 10.1.3 Analysis Parameter ID

Parameter:

Service item names are output.

Dilution ratio:

1: Manual mode, Sampler mode

5: Capillary mode

Analysis result type:

Not used

Extended order result:

Not used

b) 10.1.4 Data Value

Data values for individual service items are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, analysis data is output using the decimal point position indicated in “Table 4.3-26: List of Service Items”.

When “Link to IPU unit setting” is enabled in the service settings, analysis data is output using the linked decimal point position in the IPU unit settings.

If any data value is to be masked due to failure such as an analyzer error, the output data value is also masked as on the IPU display.

---- : Analysis or hardware error

++++ : Out of range

c) 10.1.5 Unit

Units for individual service items are output.

When “Link to IPU unit setting” is disabled (default setting) in the service settings, the units indicated in “Table 4.3-26: List of Service Items” are output.

When “Link to IPU unit setting” is enabled in the service settings, the linked units in the IPU unit settings are output.

d) 10.1.7 Result Abnormal Flag

N: Normal result

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

3.10) Only Host items related to analysis orders are output.

(Note)

Only Host items are not output if the Service settings are configured not to output Only Host items.

(Note)

Analysis results for Only Host items should be used for research purposes only. Do not use these analysis results for patient diagnosis.

Table 4.3.3.5.13: List of Service Items

10.1.3 Analysis Parameter ID			10.1.4 Data Value *1	10.1.5 Unit	10.1.7 Result Abnormal Flag	10.1.13 Date/Time Test Completed
Parameter	Dilution ratio	Extended order result				
LY-BF1#	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
LY-BF2#	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
MO-BF1#	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
MO-BF2#	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
MO-BF3#	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
HF-BF1#	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
HF-BF2#	1,5	Not used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
LY-BF1%	1,5	Not used	○○○.○	%	N	YYYYMMDDHHMMSS
LY-BF2%	1,5	Not used	○○○.○	%	N	YYYYMMDDHHMMSS
MO-BF1%	1,5	Not used	○○○.○	%	N	YYYYMMDDHHMMSS
MO-BF2%	1,5	Not used	○○○.○	%	N	YYYYMMDDHHMMSS
MO-BF3%	1,5	Not used	○○○.○	%	N	YYYYMMDDHHMMSS
HF-BF1%	1,5	Not used	○○○.○	/100WBC	N	YYYYMMDDHHMMSS
HF-BF2%	1,5	Not used	○○○.○	/100WBC	N	YYYYMMDDHHMMSS
WPC-GR-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-GR-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-GR-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-LY-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-LY-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-LY-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-MO-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-MO-Y	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-MO-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-LY2-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-LY2-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-SC-X	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-SC-Z	1,5	Not used	○○○.○	ch	N	YYYYMMDDHHMMSS
WPC-GR#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-LY#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-MO#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-LY2#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-SC#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-FL-H1#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-FL-H2#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-FL-H3#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-FL-L1#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-LC1#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS
WPC-LC2#	1,5	Not used	○○○.○○	10*3/uL	N	YYYYMMDDHHMMSS

*1: The Data Value field indicates the maximum number of digits and the decimal position.

a) 10.1.3 Analysis Parameter ID

Parameter:

Only Host item names are output.

Dilution ratio:

1: Manual mode, Sampler mode

5: Capillary mode

Analysis result type:

Not used

Extended order result:

Not used

b) 10.1.4 Data Value

Data values for individual Only Host item are output.

Analysis data is output using the decimal point position indicated in “Table 4.3-27: List of Service Items”, regardless of “Link to IPU unit setting” in the service settings.

If any data value is to be masked due to failure such as an analyzer error, the output data value is also masked as on the IPU display.

---- : Analysis or hardware error

++++ : Out of range

c) 10.1.5 Unit

Units for individual Only Host items are output.

The units indicated in “Table 4.3-27: List of Service Items” are output, regardless of “Link to IPU unit setting” in the service settings.

d) 10.1.7 Result Abnormal Flag

N: Normal result

e) 10.1.13 Date/Time Test Completed

Indicates the date and time the analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

4.3.3.6.Result Record (Slide preparation result data)

(Note)

Only output when XN-3000 Standalone mode is used.

[Example of transmission]

■ IPU -> Host computer

R | 1 | ^^^^SMEAR^^^^ | OK | 10*3/uL | | | | | 20011116101000<CR>

■ Host computer -> IPU

Not used

Table 4.3.3.6.1: Details of Result Record (Slide Preparation Result Data)

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
10.1.1	Record Type	R	Not used	1	
10.1.2	Sequence Number	Sequence No.	Not used	4	Sequence Number of records
10.1.3	Analysis Parameter ID	^^^^Item Name^^ ^^	Not used	^^^^5^^ ^^^	ASP: Aspiration result SMEAR: Smearing result STAIN: Staining result
10.1.4	Data Value	Result	Not used	2	OK: Success NG: Failure NB: No blood CN: Cancelled RC: Recovery slide
10.1.5	Unit	Not used	Not used	-	
10.1.6	Reference Range	Not used	Not used	-	
10.1.7	Result Abnormal Flags	Not used	Not used	-	
10.1.8	Nature of Abnormality Testing	Not used	Not used	-	
10.1.9	Result Status	Not used	Not used	-	
10.1.10	Date of Change in Instrument Normative Values or Units	Not used	Not used	-	
10.1.11	Operator Identification	Not used	Not used	-	
10.1.12	Date/Time Test Started	Not used	Not used	-	
10.1.13	Date/Time Test Completed	YYYYMMDDHH MMSS	Not used	14	
10.1.14	Instrument Identification	Not used	Not used	-	

[Detailed explanation of the fields]

1) 10.1.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appeared in the message. This number is reset to 1 when a higher-level record appeared in the message.

2) 10.1.3 Analysis Parameter ID

This parameter is set to one of the slide preparation result types:

ASP : Aspiration result is output.

SMEAR : Smearing result is output.

STAIN : Staining result is output.

If an error occurs during the SP-10 smearing process, the staining result is not output.

However, when the sample list stored in the SP-10 is manually output, the staining result is output even if an error occurs during the smear process.

The manually output data includes the following as updated as of the time when the smearing process was completed:

- Date
- Time
- Status

3) 10.1.4 Data Value

This parameter is set to one of the slide preparation results:

OK : Success (the slide was successfully prepared)

NG : Failure (the SP-10 failed in preparing the slide)

NB : No blood (the sample was found having no blood)

CN : Cancelled (the SP-10 was ordered to cancel)

RC : Recovery (the SP-10 finished preparing the slide as Recovery slide).

Assigned values differ depending on the Analysis Parameter ID.

Data value Analysis Parameter ID	Success “OK”	Failure “NG”	No blood “NB”	Cancelled “CN”	Recovery “RC”
Aspiration result	○	○	○	○	-
Smearing result	○	○	○	○	- *
Staining result	○	○	-	-	○

Data values marked with ○ can be assigned.

* Because the smearing result “Recovery” is not managed as of now, there is no possibility that the value “RC” is assigned; this is a reserved word for future extension.

Depending on the instrument settings, either “OK” or “NG” can be set and output for the sample whose slide preparation result is “Recovery”.

In this case, the word “Recovery” is displayed in the sample list screen, but either “OK” or “NG” is assigned to the output result.

4) 10.1.13 Date/Time Test Completed

Indicates the date and time the analysis was completed. The format is fixed to “YYYYMMDDHHMMSS”.

YYYY indicates the year, MM the month, DD the day, HH the hour in 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

4.3.3.7. Comment Record (patient/sample comment)

[Example of transmission]

- IPU -> Host computer
C|1||Patient comments<CR>
- Host computer -> IPU
C|1||Patient comments<CR>

Table 4.3.3.7.1: Details of Comment Record (Patient/Sample Comment)

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
11.1.1	Record Type	C	C	1	
11.1.2	Sequence Number	Sequence No.	Sequence No.	4	Sequence Number of records
11.1.3	Comment Source	Not used	Not used	-	
11.1.4	Comment Text	Comments	Comments	100: Patient comments 40: Sample comments	Patient comments Comment on Sample
11.1.5	Comment Type	Not used	Not used	-	

[Detailed explanation of the fields]

1) 11.1.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appeared in the message. This number is reset to 1 when a higher-level record appeared in the message.

2) 11.1.4 Comment Text

Comment Record subsequent to Patient Information Record:

This is a comment on the patient. Up to 100 any characters can be used.

Comment Record subsequent to Analysis Order Record:

This is a comment on the sample to be analyzed. Up to 40 any characters can be used.

4.3.3.8. Comment Record (Rerun/Reflex comment)

[Example of transmission]

- IPU -> Host computer
C|1||1^Rule Name1\2^Rule Name2<CR>
- Host computer -> IPU
Not used

Table 4.3.3.8.1: Details of Comment Record (Rerun/Reflex Comment)

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
11.1.1	Record Type	C	Not used	1	
11.1.2	Sequence Number	Sequence No.	Not used	4	Sequence Number of records
11.1.3	Comment Source	Not used	Not used	-	
11.1.4	Comment Text	Rule No.^Rule Name	Not used	3^20	
11.1.5	Comment Type	Not used	Not used	-	

[Detailed explanation of the fields]

1) 11.1.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appeared in the message. This number is reset to 1 when a higher-level record appeared in the message.

2) 11.1.4 Comment Text

Any rule number and rule name in the IPU Rerun/Reflex rules found applicable are output. Any characters can be used. If two or more rules are applicable, the output rule numbers and rule names are separated by delimiters.

Example: If Rule No. 1: Rule Name “WBC High”, Rule No. 2: Rule Name “RBC Low”, Rule No. 23: Rule Name “NEED PLT-F” are applicable, the Comment Record (Rerun/Reflex comment) will be output as follows:

C|1||1^WBC HIGH\2^RBC LOW\23^Need to PLT-F analysis<CR>

4.3.3.9.Comment Record (replacement information comments)

(Note)

Only output when XN-3000 Standalone mode is used.

[Example of transmission]

- IPU -> Host computer

C | 1 | | 1 <CR>

- Host computer -> IPU

C | 1 | | ABCDEFG^123456789012345^20121023^ ^HIJKLMN^123456789012345^20121023 <CR>

Table 4.3.3.9.1: Comment Record (replacement information comments) details

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
11.1.1	Record Type	C	Not used	1	
11.1.2	Sequence Number	Sequence No.	Not used	4	Sequence Number of Record
11.1.3	Comment Source	Not used	Not used	-	
11.1.4	Comment Text	Replacement Information	Not used	1	
11.1.5	Comment Type	Not used	Not used	-	

[Detailed explanation of the fields]

1) 11.1.2 Sequence Number

The sequence number starts with 1 and indicates the sequence position in which the record appeared in the message. This number is reset to 1 when a higher-level record appeared in the message.

2) 11.1.4 Comment Text

Replacement Information:

If a consumable has been replaced on the SP-10, one of the following consumable codes is set in the 1st record and sent to the host computer.

“1”: Staining solution 1

“2”: Staining solution 2

“3”: Buffer

“4”: Rinse water

“5”: DiluCell CL

“6”: Methanol

4.3.3.10.Message termination record

[Example of transmission]

- IPU -> Host computer
L | 1 | N<CR>
- Host computer -> IPU
L | 1 | N<CR>

Table 4.3.3.10.1: Message Terminator Record

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
13.1.1	Record Type	L	L	1	Fixed
13.1.2	Sequence Number	1	1	4	Always “1”
13.1.3	Termination Cord	N	N	1	N: Normal termination

5. Examples of Communication

It is assumed that the following communications are made in serial connection.

5.1. Analysis Order Inquiry (IPU -> Host computer)

5.1.1: Batch Inquiry from Work List

IPU	<ENQ>
Host	<ACK>
IPU	<STX>1H \^& XN-20^00-01^11001^12345678 E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2Q 1 2^1 20011001153000 <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<EOT>

5.1.2: Real-Time Inquiry in Manual Mode

IPU	<ENQ>
Host	<ACK>
IPU	<STX>1H \^& XN-20^00-01^11001^12345678 E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2Q 1 ^1234567890^B 20011001153000 <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<EOT>

5.1.3: Real-Time Inquiry in Sampler Mode

IPU	<ENQ>
Host	<ACK>
IPU	<STX>1H \^& XN-20^00-01^11001^12345678 E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2Q 1 2^1^1234567890^B 20011001153000 <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<EOT>

5.2. Analysis Order Information (Host computer -> IPU)

5.2.1: Order exists

Host	<ENQ>
IPU	<ACK>
Host	<STX>1H \^& E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>2P 1 100 ^Jim^Brown 20010820 M ^Dr.1 ^^WEST <CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>3C 1 Patient Comments<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>4 O 1 2^1^1234567890^B ^^^^WBC\^^^^RBC\^^^^HGB \^^^^HCT\^^^^MCV\^^^^MCH\^^^^MCHC\^^^^PLT\^^^^NEUT %\^^^^LYMPH%\^^^^MONO%\^^^^EO%\^^^^BASO%\^^^^NEUT# \^^^^LYMPH#\^^^^MONO#\^^^^EO#\^^^^BASO#\^^^^RDW-SD \^^^^RDW-CV\^^^^PDW\^^^^MPV\^^^^P-LCR\^^ <ETB><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>5 ^^PCT 20010807101000 N Q<CR> <ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>6C 1 Sample Comments<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>7L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<EOT>

5.2.2: No order exists

Host	<ENQ>
IPU	<ACK>
Host	<STX>1H \^& E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>2P 1<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>3O 1 2^1^1234567890^B 20010910101000 Y<CR> <ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<STX>4L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
Host	<EOT>

5.3. Analysis Results & QC Data (IPU -> Host computer)

5.3.1: Output of analysis results

IPU	<ENQ>
Host	<ACK>
IPU	<STX>1H \^& XN-20^00-01^11001^12345678 E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2P 1 100 ^Jim^Brown 20010820 M ^Dr.1 ^ ^WEST <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3C 1 Patient Comments<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>4 O 1 2^1^ 1234567890^B ^^^^WBC\^^^RBC\^^^HGB \^^^HCT\^^^MCV\^^^MCH\^^^MCHC\^^^PLT\^^^NEUT %\^^^LYMPH%\^^^MONO%\^^^EO%\^^^BASO%\^^^NEUT# \^^^LYMPH#\^^^MONO#\^^^EO#\^^^BASO#\^^^RDW-SD \^^^RDW-CV\^^^PDW\^^^MPV\^^^P-LCR\^^ <ETB><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>5 ^^PCT 20010807101000 N Q<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>6C 1 Sample Comments<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>7R 1 ^^^^WBC^1^^^W 7.81 10*3/uL N 20010806120000<C R> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>0R 2 ^^^^RBC^1 ---- 10*6/uL A 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>1R 3 ^^^^HGB^1 20.5 g/dL W 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2R 4 ^^^^HCT^1 40.3 % W 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
	(...omitted...)
IPU	<STX>7R 33 ^^^^PLT Abn Distribution A 20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>0R 34 ^^^^Blasts? 0 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>1R 35 ^^^^Immature_Gran? 40 20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2R 36 ^^^^Left_Shift? 0 20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3R 37 ^^^^Atypical_Lympho? 0 20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>4R 38 ^^^^RBC_Lyse_Resistance? 10 2001080612000 0 <CR><ETX><CHK1><CHK2><CR><LF>

Host	<ACK>
IPU	<STX>5R 39 ^^^^Abn_Lympho/Blasts? 100 A 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
	(...omitted...)
IPU	<STX>4R 46 ^^^^ACTION_MESSAGE_Delta A<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>5R 47 ^^^^SCAT_DIFF PNG&R&20010806&R&2001_08_06_12_00_1234567890_DIFF.PNG N 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
	(omitted)
IPU	<STX>5L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<EOT>

5.3.2: Output of analysis results in body fluid mode

IPU	<ENQ>
Host	<ACK>
IPU	<STX>1H \^& XN-20^00-00^11001^^^^12345678 E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2P 1 100 ^Jim^Brown 20010820 M ^Dr.1 ^^WEST<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3C 1 Patient Comments<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>4O 1 ^1234567890^B ^^^^WBC-BF\^^^^RBC-BF\^ ^^^MN#\^^^^MN#\^^^^PMN#\^^^^PMN% N F<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>5C 1 Sample Comments<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>6R 1 ^^^^WBC-BF^1 5.359 10*3/uL N 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>7R 2 ^^^^RBC-BF^1 4.4 10*6/uL A 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>0R 3 ^^^^MN%^1 4.041 10*3/uL W 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>1R 4 ^^^^MN%^1 75.4 % N 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2R 5 ^^^^PMN%^1 1.318 10*3/uL N 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3R 6 ^^^^PMN%^1 24.6 % N 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>4L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<EOT>

5.3.3: Real-time output of QC data

IPU	<ENQ>
Host	<ACK>
IPU	<STX>1H \^& XN-20^00-01^11001^12345678 E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2P 1<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3 O 1 ^ QC-12345678^B ^^^^WBC\ ^^^^RBC\ ^^^^HGB \ ^^^^HCT\ ^^^^MCV\ ^^^^MCH\ ^^^^MCHC\ ^^^^PLT\ ^^^^NEUT %\ ^^^^LYMPH%\ ^^^^MONO%\ ^^^^EO%\ ^^^^BASO%\ ^^^^NEUT# \ ^^^^LYMPH#\ ^^^^MONO#\ ^^^^EO#\ ^^^^BASO#\ ^^^^RDW-SD \ ^^^^RDW-CV\ ^^^^PDW\ ^^^^MPV\ ^^^^P-LCR\ ^^^^ <ETB><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>4 PCT Q F<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>5R 1 ^^^^WBC^1 7.58 10*3/uL N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>6R 2 ^^^^RBC^1 4.49 10*6/uL N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>7R 3 ^^^^HGB^1 13.3 g/dL N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>0R 4 ^^^^HCT^1 37.3 % N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
	(omitted)
IPU	<STX>5R 33 ^^^^SCAT_DIFF PNG&R&20010806&R&2001_08_06_12_00_12 34567890_ DIFF.PNG N 20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
	(...omitted...)
IPU	<STX>1L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<EOT>

5.3.4: Manual output of QC data

IPU	<ENQ>
Host	<ACK>
IPU	<STX>1H \^& XN-20^00-01^11001^12345678 E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2P 1<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>3 O 1 ^1 ^^^WBC\^^^RBC\^^^HGB\^^^HCT\^^^MCV\^ ^^^MCH\^^^MCHC\^^^PLT\^^^NEUT%\^^^LYMPH%\^^^M ONO%\^^^EO%\^^^BASO%\^^^NEUT#\^^^LYMPH#\^^^MO NO#\^^^EO#\^^^BASO#\^^^RDW-SD\^^^RDW-CV\^^^PD W\^^^MPV\^^^P-LCR\^^^PCT\^^^DIFF-X\^ <ETB><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>4 ^^^DIFF-Y\^^^DIFF-WBC Q F<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>5R 1 ^^^WBC^1 7.58 10*3/uL N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>6R 2 ^^^RBC^1 4.49 10*6/uL N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>7R 3 ^^^HGB^1 13.3 g/dL N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>0R 4 ^^^HCT^1 37.3 % N 20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
	(...omitted...)
IPU	<STX>0L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<EOT>

6. Appendix A TCP/IP Communication

6.1. Network Interface Layer

Conforms to IEEE802.3.

Communications are based on 10Base-T.

The RJ45 socket is used for a hub to connect to the IPU.

The UTP Category 5 cable is used as a communication cable.

6.2. TCP/IP

The IP address of the host computer is to be specified on the IPU screen. The address should be a value other than 192.168.28.*, which is reserved in the IPU.

The TCP port number used for communications with the host is a fixed value (the default is 5000). This port number can be changed on the IPU screen.

6.3. Timing of Transmission

Either transmission by every test cycle or batch transmission of stored samples data can be selected via settings on the data processing unit.

6.4. Transmitted Messages

- ASTM E1381-95 mode

According to the TCP/IP protocol, records defined in the presentation layer are transmitted. While the records are sent/received, a TCP connection must be established. If the TCP connection is not established, the IPU automatically starts a session before sending the records. Only records defined in the presentation layer are transmitted as shown below.

Example: Real-time inquiry

IPU→Host	H \^& XN-20^00-01^11001^12345678 E1394-97<CR> > Q 1 2^1^1234567890^B 20011001153000<CR>L 1 N<CR>
Host→IPU	H \^& E1394-97<CR> P 1 100 ^Jim^Brown 20010820 M ^Dr.1 ^1^WEST<CR>C 1 Patient Comments<CR> O 1 2^1^1234567890^B ^1^WBC\^1^RBC\^1^HGB \^1^HCT\^1^MCV\^1^MCH\^1^MCHC\^1^PLT\^1^NEUT %\^1^LYMPH%\^1^MONO%\^1^EO%\^1^BASO%\^1^NEUT# \^1^LYMPH#\^1^MONO#\^1^EO#\^1^BASO#\^1^RDW-SD \^1^RDW-CV\^1^PDW\^1^MPV\^1^P-LCR\^1^PCT 200 10807101000 N Q<CR> C 1 Sample Comments<CR>L 1 N<CR>

Note: <CR> stands for the carriage return code "0D". There is no carriage return at word-wrap sections in the messages above.

- In case of ASTM E1381-02 mode

According to "4.2 Data Link Layer (Transmission Protocol)", records defined in the presentation layer are transmitted. While the records are sent/received, a TCP connection must be established. If the TCP connection is not established, the IPU automatically starts a session before sending the records. For examples of transmitted messages, refer to "5. Examples of Communication". (Note that in TCP/IP communication a record will not be divided because the maximum number of characters in a record is set to 63,993.)

7. Appendix B

De-compression Procedures of the Scattergram Data

7.1. Purpose

When the scattergram image data is sent to the host computer in the <Raw data format>, the image data is compressed and transmitted. The host computer has to uncompress the data to obtain desired images. This appendix provides information about decompressing the image data.

7.2. Process Flow

Figure B-1 shows the process flow of sending the scattergram image data to the host computer in the <Raw data format>. First, the data goes through Run-Length compression, and then Huffman coding. Next, the compressed and coded binary data is converted to ASCII code text, set to the sub-field of scattergram data described in Table 4.3-23, and then sent to the host computer.

Upon receipt of the text data, the host computer is to convert into binary data, decode and decompress the data, and obtain the image data.

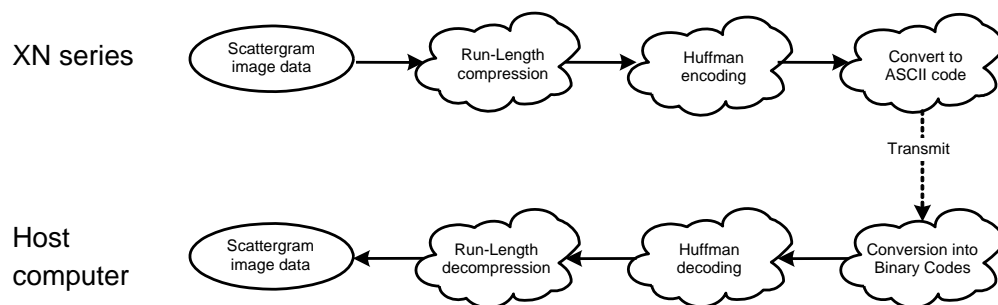


Figure B-1

The resolution of a scattergram is 256 x 256; i.e. a scattergram has 65,536 dots. Each dot has 1 byte in depth to express the color information. To obtain image data in the same structure as in the sender, prepare an array of unsigned char type consisting of 65,536 elements, and write the decompressed image data into the array. Figure B-2 shows the relationship between dot numbers in Table B-1 and the actual image.

To reproduce images in similar color hue to those on the IPU display, use the color palette shown in Table B-2.

Table 7.2.1: B-1

Address +0000h	Dot No. 0 color info
Address +0001h	Dot No. 1 color info
Address +0002h	Dot No. 2 color info
Address +FFFFh	Dot No. 65535 color info

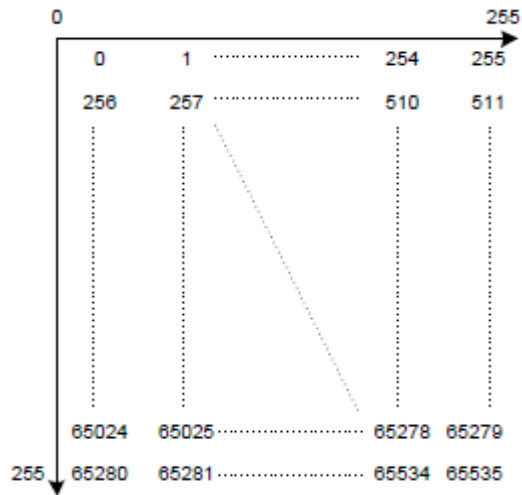


Figure B-2

Table 7.2.2: B-2

Color Info	Color	RGB Value		
		R	G	B
0	Black	0	0	0
1	Navy	0	0	128
2	Green	0	128	0
3	Teal	0	128	128
4	Maroon	128	0	0
5	Purple	128	0	128
6	Olive	128	128	0
7	Silver	192	192	192
8	Gray	128	128	128
9	Blue	0	0	255
A	Lime	0	255	0
B	Cyan	0	255	255
C	Red	255	0	0
D	Magenta	255	0	255
E	Yellow	255	255	0
F	White	255	255	255
10	Dark Purple	75	0	106
11	Not Used	0	0	0
12	Ultra Violet	192	30	192
13	Not Used	0	0	0
14	Not Used	0	0	0
15	Not Used	0	0	0
16	Not Used	0	0	0
17	Not Used	0	0	0
18	Dark Magenta	102	0	159
19	Not Used	0	0	0
1A	Light Ultra Violet	210	30	210

7.3. How to Decompress Image Data

The host computer acquires the scattergram data from the received scattergram result record based on the scattergram data format. The Scattergram Compression Info parameter in the format indicates whether the scattergram data is compressed. “1” indicates the data is compressed, and “0” indicates the scattergram data is not compressed. Note that the host computer is required to convert into binary code data irrespective of whether the image data is compressed or not.

7.3.1. Converting to binary code

Scattergrams image data from the IPU is converted to ASCII character codes before transmitted to the host computer. The binary data is divided into units of 4 bits; with each high-order 4-bit unit is given 3. The host computer has to retrieve the low-order 4 bits from every incoming character, and convert them into binary data.

[Steps to convert into binary code]

Step 1.

Retrieve the low-order 4 bits from the received data

Step 2.

Create binary data so that each byte consists of odd-numbered data in the high-order 4 bits and even-numbered data in the low-order 4 bits, and then write the binary data into a buffer for received data.

Table B-3 shows ASCII characters and their corresponding binary data values (0h – Fh).

Table 7.3.1.1: B-3

ASCII	text	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
	code	30h	31h	32h	33h	34h	35h	36h	37h	38h	39h	3Ah	3Bh	3Ch	3Dh	3Eh	3Fh
Binary		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Example: 1? (31h 3Fh) -> 1F

7.3.2. Decompressing

Scattergram images are compressed via Huffman coding and Run-Length compression. Accordingly, the compressed data has to be decompressed in the steps illustrated below.



The compressed data sent from the analyzer is structured as follows:

Header (32 bytes)	Header: Contains data sizes before/after compression and the number of tables generated during Huffman coding (see Table B-4).
Table (8 bytes)	Table: Huffman codes are represented by bit sequences. A table contains a 32-bit code word, a code length indicating how many lower bits are valid codes, and an intermediate code corresponding to the code word. A table appears n times, where n is the number of tables as indicated in the header (see Table B-5).
Table (8 bytes)	
....	
Compressed image data	Byte sequences have to be converted to bit sequences because decompression is performed in units of bit.

Table 7.3.2.1: B-4 Header

Name	Data Type (C language)	Size (byte)	Contents
type	unsigned long	4	Not used (*Note 1)
dsiz	unsigned long	4	Size of decompressed image data
tsiz	unsigned long	4	Number of tables
comprssiz	unsigned long	4	Size of compressed image data
dm[4]	unsigned long	4 × 4	Not used (*Note 1)

Note 1: Currently these areas are not used, filled with 00h.

Table 7.3.2.2: B-5 Table

Name	Data Type (C language)	Size (byte)	Contents
ptn	unsigned long	4	Code word
no	unsigned short	2	Intermediate code (*Note 2)
ptnq	unsigned char	1	Code length (bit)
dm	unsigned char	1	Not used (*Note 1)

Note 1: Currently these areas are not used, filled with 00h.

Note 2: An intermediate code contains binary data for 1 dot (00h - FFh) corresponding to the code word in the low-order byte, and contains a value indicating whether the data is Run-Length compressed (01h: Yes, 00h: No) in the high-order byte.

[Steps to decompress the data]

Step 1. Read the header

The first 32 bytes of the incoming binary data represent the header. Read the parameters of type, dsiz, tsiz, comprssiz, and dm[4] listed in Table B-4, keeping in mind that the byte order is little-endian.

The dsiz parameter, for instance, is determined by the 5th through the 8th bytes in the binary data converted from ASCII text, and it should be noted that the 5th byte data comes to the low-order byte and the 8th byte data comes to the high-order byte. For example, 00h 20h 00h 00h turns into 00002000h.

Step 2. Read the table(s)

The subsequent $8 \times \text{tsiz}$ (the number of tables) bytes of the binary data represent tables. Read the parameters of ptn, no, ptnq, and dm listed in Table B-5, keeping in mind that the byte order is little-endian. Repeat this operation tsiz times to create tables.

Step 3. Decompress the data

- (1) Expand the binary data subsequent to tables into a bit sequence. Placing the retrieved binary data in a line from right to left, process the data from right to left. (See Figure B-4)

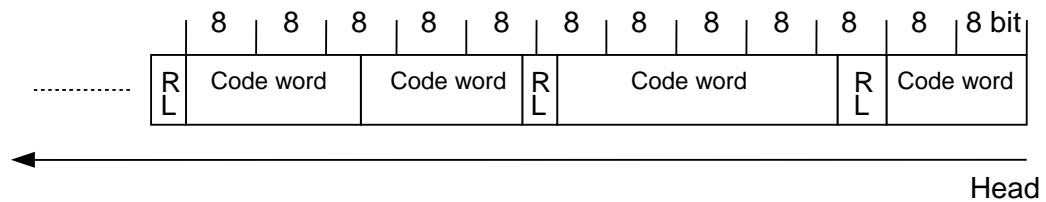


Figure B-4

A code word is a sequence of 0 or 1 forming 1 to 32 bits. The intermediate code corresponding to the code word is determined by reference to the table, in order to find whether Run-Length compression was performed. The high-order byte 0 of an intermediate code means Run-Length compression was not performed and RL is 0 bit. In this case, Run-Length decompression is not needed. If the high-order byte of an intermediate code is 1 (Run-Length compression performed), RL is either 3 or 6 bits depending on the low-order byte (1 dot of image). The RL indicates the number of repetitions. If the low-order byte is “00h”, the number of repetitions is indicated in 6 bits; otherwise the number of repetitions is indicated in 3 bits (See Figure B-5)

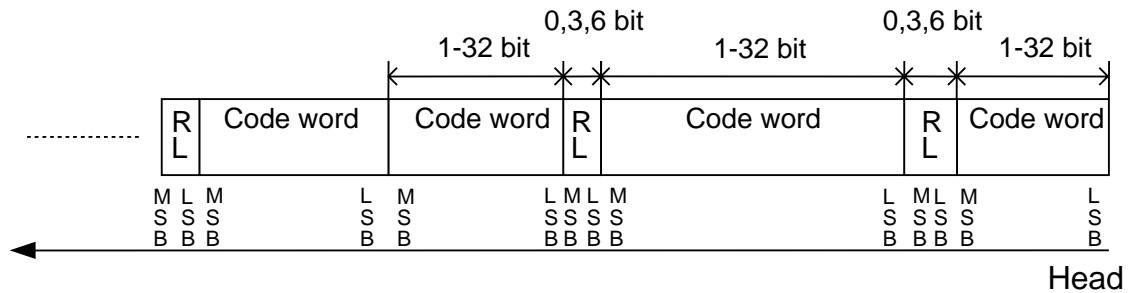


Figure B-5

- (2) Compare the bit sequence from the top with the code word. If the bit pattern matches the code word, obtain actual image dots based on the intermediate code. If the intermediate code indicates “Run-Length performed”, obtain the number of repetitions based on the 3 or 6 bits following the code word. The actual number of repetitions is the read out value plus 1. Obtain the actual 1 dot of an image according to the intermediate code, and then output the dot value n times, where n is the number of repetitions. Even if “Run-Length not performed” is indicated, values of the actual 1 image dots have to be obtained and output according to the intermediate code. It is recommended the obtained image dots should be stored in an array shown in Table B-1.
- (3) Compare the subsequent bit sequence with the code word in the table, obtain the intermediate code, and decompress the Run-Length compressed data if necessary. Repeating these steps retrieves the scattergram image from the compressed data.

7.3.3. Examples of Decompression

The following communication log examples show how scattergram images of the WDF channel of the XN series automated hematology analyzer are decompressed after being sent to the host computer.

(1) Contents of communication log (the text that is actually transmitted has no line breaks)

[illegible]

```

==>2;794:1?<7>510<1?9;9766:54;97667=5;<238<<196>>7?7?;0==?9;9;2>5==27=?65;7>
;?9?95><53=7:5>;=6><>?5;16=6997>4?6=6528;?9?14<5=72><=6?46;;:2>5=977459223;=6
;?7?7?<:50902294=?<?4:??94;=7:5?9<=48;;:8?>29??06?>=0<45:85:6=;5::95=?0??:=<
?<>67<>=?6495=845:6=;5;56?>3?79;;2651?9;?5:9>;;>75==<7255;<445:85:=5::;77394
=?4?0921=;;766:759>9;;749?962<9:>314:1;67214:2=5::>56:??5::;5521<:>?878410<4
;72>5=97:>4;;:4?==3>75592289;;38556;;;567;55;==::>4:547>7=;66<=?;;>?1?97680;
=1;><56::?56:??57<;=5::?<7>=3<72>>93>362;=94742;4;515:1=5::=>:59=5:::5=?2?0:
215;;2>=?;??2<9>086;;:5:>;57;;47?5::47?5::95:2<:>?57<4?069=?;674=?3?2?0;26=;
116;;=5>55<?1?>5>;=5=6>?77254;?6:9?;;64?;>6314:2<:505;;;573=7??>:8:5=?6??;:4
25=;?76?;07315:16:6;?5?<?993?62=?<7>4>18596248;66?5;0<892188308>528682;47==5
>;55<?9?>6:3762;;;?9?93059125?;?>6959:4:5=:6::=9?3?7?54:??562?;?1?952<?;;46<<9
927=22<41060:=10;5::553=7??>;81=:15<3=:437?4;=1?9;859018;264414459865::;57:
?>?<71;=:683=:147?48:=>8?8<235;1642:2?8;48082::=:=:>:??3<7>=717=2?>9?;:=
?753;3851146;6308;=0>>55?5?<?9=3;62;528?>809?==6=0?:7>>;7;47:??>8?>;62082<822
0:228::;?5?3>78?>;=56::595:=5?63>;?;::=1:??31;<388215;1643084104749:5=:57=5
?3>7<?6;:=1<>5>9110=:=:1:6>;?;35;4>=0?;954184134=216:>769?97;;57:??>?<51=;55
>1?:=:5?436;68?>1:5::?>:??0?23:02314:37=9;>7<?9?56;==::=443=:127?48606=758=3
;>5?>?>?313?31;>5214:4568>=:=:==5?3>7<?>;114=:423?:?5>;=7:??1069:36;435;6=>
>?>794:1;62:48<;=5::5>?5?<79;=5>556;;9<2?5?>?>7>7==?740=366==>8?:?57>;?>20<
:=50;556:??=:7::9>3?6<;=54:=56??>=6=01:6::=50=3<69:36;;9>=0?;?>9232;4=:6::;
=556:::=082=9?>7;3=65;=56::;95:84734;4;>5?<36;;<69=?>?>09;==?0?29456=;52294
:1<:506;?9::=7::5:37:54:?:55<1?::=>?;79>=0?76;687==386=7:85?1>4:95:2;6=:6:
2;4415:20<4568;756:??5::;55190:=473?:?5?>1:=<1::=?>?5?>=6?;?>9>5:116:5596766;
;5767;55;=6:2;46?91:5;;?7>3=:15?>?13?::=?7?;392==76::;>214:215:1>5<:=7337:43
;??56;;<:1:=>??>7>4;6=;5:::0<55887294:156;51215:917?5849>=0?;?>:85:=5::568>
82=4560529436=85>==713?::=?7?;11:15541::18:5:9?2?;?>:6::15:108652943:17;;?5?
99255;21<:50;515:33<05><?>7>5?38>1=44:5:7>;?5?1147318:5086?2?;?>=0=:8:50882:
;?>?6?0;222184912=8>6214:10<;595=?>?77?<=2=?>?71;7?<84??87?<72??9?>7>;?>347
?<887?7??6337><;<??<?>7>3?>737?<3?>5?7?;?>=69??6?;?>7><;?>?>0>?57?>7>;?9??7
????7><2;?9??19;7?;?>??<6?;?>4?7?;?>?47?3?>7?7?;?>=<9??13;?>=?>7?<3>??871;?
=?>?07?<949??0137><2;?>?>?7537?<46??8;77??7>;?>?6??;41??>>=?>??;?>7>=?>?
?>7>;?5??<137><3>??>?>7>;?>?>?7637>;?>?>?>7?<7>;?1??2;7>;?>?8??>21;?>?>77
?>7>;?9?05|||N||F|||20130726202001

```

The data that is between “6R|49|^^^SCAT_WDF|SSC^SFL^1^” and the ending “||N||F|||20130726202001” is the data part of the scattergram. Looking at “6R|49|^^^SCAT_WDF|SSC^SFL^1^”, the scattergram compression information is “1”, and therefore this scattergram data is “Compressed”. For details, refer to “Table 4.3-23: Scattergram Data Format”.

(2) Converting compressed data into binary data

Example: ASCII character “1?” (31h, 3Fh) → Binary data 1Fh

[illegible]

(3) Reading the header

The first 32 bytes of data that is read (“000000000000010011000000E50A00000000000000000000000000000000”) is the header. The header content is indicated in Table B-5.

Table 7.3.3.1: B-5

Name	Size (bytes)	Contents	Value
type	4	Reserved	00000000h (0)
dsiz	4	Size of decompressed image data	00010000h (65536) bytes
tsiz	4	Number of tables	00000011h (17)
comprssiz	4	Size of compressed image data	00000AE5h (2789) bytes
dm[4]	4 × 4	Reserved	00000000h × 4

(4) Reading the tables

There are 17 tables and each table is 8 bytes, and therefore when the data below that follows the header is read, the tables are as shown in Table B-6.

“0000000000010100”, “0300000000000300”, “0100000005000300”, “0700000002000400”,
 “0500000003000400”, “0F0000000B010600”, “1F00000005010600”, “2D00000003010600”,
 “1D0000000D000600”, “3D00000004000600”, “3F00000001000600”, “0D00000004010700”,
 “2F0000000B000700”, “6F00000002010700”, “CD0000000D010800”, “4D0000000A000900”
 “4D0100000C000900”

Table 7.3.3.2: B-6

Code word (binary notation)	Code length	Intermediate code (hexadecimal notation)
00000000 0000000 <u>0</u>	1	0100
00000000 000000 <u>11</u>	3	0000
00000000 000000 <u>01</u>	3	0005
00000000 000001 <u>11</u>	4	0002
00000000 000001 <u>01</u>	4	0003
00000000 000011 <u>11</u>	6	010B
00000000 000111 <u>11</u>	6	0105
00000000 001011 <u>01</u>	6	0103
00000000 000111 <u>01</u>	6	000D
00000000 001111 <u>01</u>	6	0004
00000000 001111 <u>11</u>	6	0001
00000000 000011 <u>01</u>	7	0104
00000000 001011 <u>11</u>	7	000B
00000000 011011 <u>11</u>	7	0102
00000000 110011 <u>01</u>	8	010D
00000000 010011 <u>01</u>	9	000A
00000001 010011 <u>01</u>	9	000C

(The underlined part of the code word shows the effective bits indicated by the code length.)

(5) Decompressing

The data “7EBF21B4...” that follows the tables is shown below by byte in binary format from right to left.

“...10110100 00100001 10111111 01111110”

This bit sequence is processed from right to left.

The initial bit matches the code word in the first table. The intermediate code “0100” indicates a run-length compressed dot pattern of “Black”. If the low-order byte of the intermediate code is “00”, the number of repetitions is expressed using 6 bits, and therefore “111111” starting from the 2nd bit represents the number of repetitions. The binary number “111111” is equal to decimal 63, and thus the number of repetitions is 64 (63 plus 1).

Comparing the bits starting from the 8th bit against the code words in the tables, the bits match the first code word. The intermediate code is “0100”, and therefore the “Black” dot pattern continues an additional 64 repetitions.

By repeating this processing, the data can be analyzed as shown in Table B-7. This scattergram image starts with 132 repetitions of “Black”, followed by one repetition of “Purple”, 27 repetitions of “Black”, one repetition of “Navy”, and 64 repetitions of “Black”.

Table 7.3.3.3: B-7

No.	Matching code word	Intermediate code	Run-length compression	Color	Number of repetitions
1	0	0100	Yes	Black	111111 (63+1)
2	0	0100	Yes	Black	111111 (63+1)
3	0	0100	Yes	Black	000011 (3+1)
4	001	0005	No	Purple	(0+1)
5	0	0100	Yes	Black	011010 (26+1)
6	111111	0001	No	Navy	(0+1)
7	0	0100	Yes	Black	111111 (63+1)
...
...

The scattergram image can be obtained by repeating this processing until the end of the input data is reached.

8. Appendix C Particle size distribution data

8.1. Image construction of particle size distribution data

The result record of the particle size distribution data below is used as an example.

* This differs from the result record of an actual RBC distribution.

7R		58		^^^^DIST_RBC		250fL		10^80^4^0^9^3^3^4^4^6^9^15^27^20^10^3				N	
	F					20131016173317							

8.1.1. Construction example

(1) The data can be interpreted as shown below.

Data X-axis Size = 10
Data Y-axis Size = 80
LOWER DISCRI = 4
MIDDLE DISCRI = 0 (none)
UPPER DISCRI = 9
Ratio = 3
DISCRI 1 = 3
DISCRI 2 = 4
DISCRI 3 = 4
DISCRI 4 = 6
DISCRI 5 = 9
DISCRI 6 = 15
DISCRI 7 = 27
DISCRI 8 = 20
DISCRI 9 = 10
DISCRI 10 = 3

(2) The value of Ratio is 3, therefore the broken-line data are as follows.

Broken line data: 9, 12, 12, 18, 27, 45, 81, 60, 30, 9

(3) When the broken-line data and the LOWER, MIDDLE, and UPPER DISCRI values are used, the image is as shown in Figure C-1.

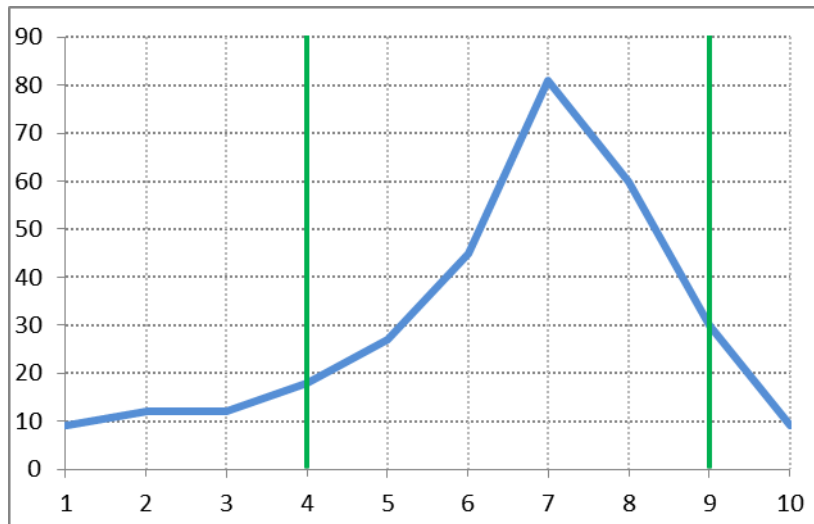


Figure C-1

Note: This is a conceptual graph that illustrates how a particle size distribution graph is created. When displayed on the IPU, the horizontal and vertical axis scales are hidden.

8.2. Image construction of particle size distribution data with normal range

For particle size distribution data with normal range, a result record similar to the following is sent.

7R 59 ^^^^DIST_RBC(NORMAL) N F 20131016173317

“DIST_RBC(NORMAL)” indicates “RBC particle size distribution data with normal range”, and therefore the image to be constructed is “RBC particle size distribution data” with “RBC normal range data” overlaid. Even in “RBC particle size distribution data with normal range”, the particle size distribution data itself is the same as “RBC particle size distribution data” without normal range, and therefore sending of the “particle size distribution data with normal range” is omitted. In addition, the normal range data are fixed values that do not depend on the sample, and therefore these data are not sent.

* The above also applies to particle size distributions with normal range other than RBC.

* For normal range data, refer to “8.2.2 Normal range data”.

8.2.1. Construction example

The data in Table C-1 is used as an example of the normal range data that is applied to the “RBC particle size distribution data” used in the “Image construction of particle size distribution data” example.

* The image in Figure C-1 is used as the RBC particle size distribution image.

* This is not actual normal range data.

* The normal range values have not been normalized.

Table 8.2.1.1: C-1

	Normal range (lower limit)	Normal range (upper limit)
DISCRI 1	8	10
DISCRI 2	10	15
DISCRI 3	10	15
DISCRI 4	15	25
DISCRI 5	20	35
DISCRI 6	28	60
DISCRI 7	45	90
DISCRI 8	30	60
DISCRI 9	20	35
DISCRI 10	8	10

The normal range is as shown in Figure C-2. By drawing this as an overlay on Figure C-1, the image of the particle size distribution data with normal range can be constructed as shown in Figure C-3.

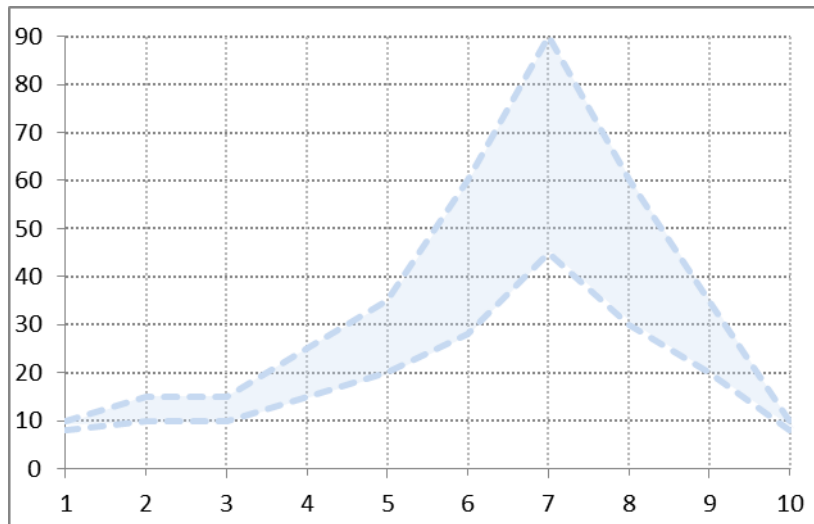


Figure C-2

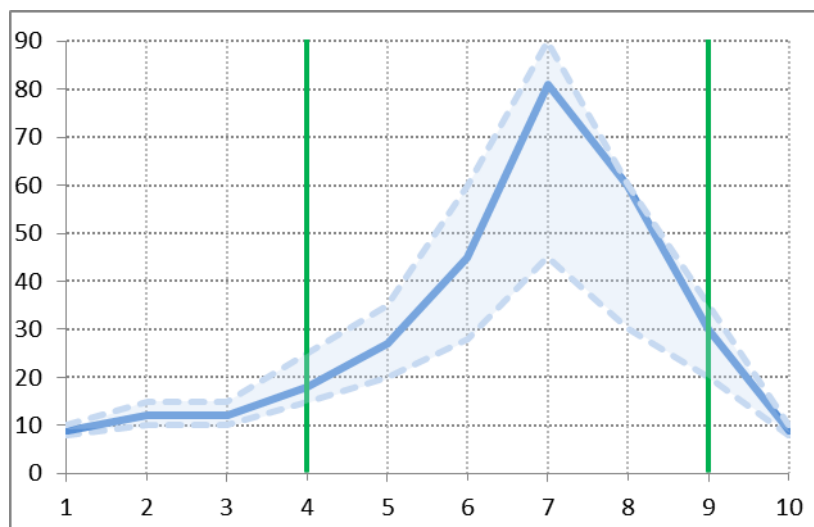


Figure C-3

Note: This is a conceptual graph that illustrates how a particle size distribution graph is created. When displayed on the IPU, the horizontal and vertical axis scales and the normal range boundary lines (dashed lines) are hidden.

8.2.2. Normal range data

The normal range data for each particle size distribution on the IPU are shown below.

* The values have not been normalized.

Table 8.2.2.1: C-2: Normal range data for RBC particle size distribution

	Lower limit value	Upper limit value
DISCRI 1	347	1449
DISCRI 2	641	1881
DISCRI 3	385	891
DISCRI 4	131	388
DISCRI 5	32	186
DISCRI 6	0	97
DISCRI 7	0	67
DISCRI 8	0	47
DISCRI 9	0	57
DISCRI 10	0	116
DISCRI 11	0	296
DISCRI 12	0	774
DISCRI 13	0	1820
DISCRI 14	0	3819
DISCRI 15	423	6927
DISCRI 16	1754	10611
DISCRI 17	3991	13464
DISCRI 18	6481	14220
DISCRI 19	7849	12928
DISCRI 20	6547	11344
DISCRI 21	3720	9710
DISCRI 22	1448	7620
DISCRI 23	229	5421
DISCRI 24	0	3538
DISCRI 25	0	2188
DISCRI 26	0	1315
DISCRI 27	47	808
DISCRI 28	125	541
DISCRI 29	171	422
DISCRI 30	165	410
DISCRI 31	164	431
DISCRI 32	152	472
DISCRI 33	168	495
DISCRI 34	176	513
DISCRI 35	197	507
DISCRI 36	204	473
DISCRI 37	192	442
DISCRI 38	160	403
DISCRI 39	115	361
DISCRI 40	61	319
DISCRI 41	21	265
DISCRI 42	0	220
DISCRI 43	0	176
DISCRI 44	0	135
DISCRI 45	0	97
DISCRI 46	0	68
DISCRI 47	0	48
DISCRI 48	0	29
DISCRI 49	0	19
DISCRI 50	0	11

Table 8.2.2.2: C-3: Normal range data for PLT particle size distribution

	Lower limit value	Upper limit value
DISCRI 1	0	0
DISCRI 2	0	4
DISCRI 3	3	35
DISCRI 4	15	112
DISCRI 5	40	258
DISCRI 6	84	470
DISCRI 7	134	594
DISCRI 8	157	567
DISCRI 9	159	488
DISCRI 10	149	404
DISCRI 11	131	328
DISCRI 12	108	262
DISCRI 13	85	208
DISCRI 14	64	168
DISCRI 15	49	133
DISCRI 16	36	106
DISCRI 17	27	86
DISCRI 18	19	71
DISCRI 19	13	60
DISCRI 20	8	50
DISCRI 21	6	42
DISCRI 22	4	35
DISCRI 23	3	30
DISCRI 24	2	26
DISCRI 25	1	23
DISCRI 26	0	20
DISCRI 27	0	18
DISCRI 28	0	16
DISCRI 29	0	14
DISCRI 30	0	13
DISCRI 31	0	13
DISCRI 32	0	12
DISCRI 33	0	12
DISCRI 34	0	13
DISCRI 35	0	15
DISCRI 36	0	18
DISCRI 37	0	22
DISCRI 38	0	28
DISCRI 39	0	35
DISCRI 40	0	42

[End of document]