Automated Hematology Analyzer XN-L series ASTM Host Interface Specifications

Revision 6

Sysmex Corporation

Revision	Date	Major Contents of Changes
1	February 6, 2014	Initial version
2	June 24, 2014	• Added "NRBC#" and "NRBC%" to the list of research item. • Revised the indication of Extended order result of WBC, WBC-C and WBC-D at "10.1.3 Analysis parameter ID". Each data is set to W by correcting WBC • Corrected erroneous description.
3	September 4, 2014	• Added the following items in List of Research Items (Other than model in the destination of North America). WBC-D&, RDW-SD_RESEARCH, RDW-CV_RESEARCH, TNC-C, IPF_RESEARCH • Revised the name of the following items in List of Research Items (Other than model in the destination of North America). (Before) (After) LFR_RESEARCH LFR MFR_RESEARCH MFR HFR_RESEARCH HFR TC-BF#_RESEARCH TC-BF# • Added the following items in List of Research Items (Derived software in the destination of North America). WBC-D&, TNC-C • Added the following items in List of Service Items. PRBC-WDF#
4	November 25, 2014	• Deleted the following items in List of Parameters and List of QC Analysis Parameters. HFLC#, HFLC% • Added the following items in List of IP Massages (SUSPECT). pRBC?(R) • Add the description "Only output if IPF license is registered." of the following items. IPF, IPF#, H-IPF • Add the description "Only output if pRBC license is registered." of the following items. WBC-D&
5	October 15, 2015	• Added the following items in List of Action Messages. ACTION_MESSAGE_Aged_Sample? • Modified the parameter of Table B-2 • Added the following items in List of Parameters AS-LYMP#、AS-LYMP %、NEUT-RI、NEUT-GI、RBC-HE、DELTA-HE • Added the following items in List of QC of Parameters AS-LYMP#、AS-LYMP %、NEUT-RI、NEUT-GI、RBC-HE • Added the following items in List of Research Parameters RE-LYMP#、RE-LYMP % • Added the following items in List of Research Parameters RE-LYMP#、RE-LYMP % • Add a setting to add "_RESEARCH" suffix to the following items of a list of research items. LFR、HFR、MFR、TC-BF#、NRBC%, NRBC #
	March 22, 2016	• Added the following items in List of Parameters MICROR,MACROR,HYPO-HE,HYPER-HE • Added the following items in List of QC of Parameters MICROR,MACROR,HYPO-HE,HYPER-HE • Added the following items in List of Analysis Parameters Ordered MICROR,MACROR,HYPO-HE,HYPER-HE • Modified the parameter of List of Research Items

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6	June 23, 2017	• Modified the following parameter in List of IP Messages (SUSPECT).
		(Before) (After)
		  pRBC iRBC
		  pRBC(R) iRBC(R)
		• Modified the following parameter in List of service items.
		(Before) (After)
		  PRBC-WDF# IRBC-WDF#
		• Modified the following name of lisence and parameter in this document.
		(Before) (After)
		  pRBC iRBC
		• Added the explanation about analysis parameters ordered to IPU from host computer. (Table 15)
		• Deleted IP messages that do not exist from Examples of Communication. (5.3.1)

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Table of Contents

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1. Scope

This document applies to communication between the XN-L series automated hematology analyzer and the host computer using the ASTM protocol.

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 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.

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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-L 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 transmission. To avoid total communication sequence lag b, do not output t research or service items.
*4: In the settings, if the host connection setting or unit setting is changed,　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 2: 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 3: Signal identification level

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

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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.

```
IPU                              Host computer
DB-9                             DB-9      DB-25

TxD      3  ─────────────┐  ┌──  3         2         TxD  ───────
                          ╲╱
RxD      2  ─────────────┐ ╱╲ ┌─  2         3         RxD  ───────
                          
SG       5  ─────────────────  5         7         SG   ───────

RTS      7  ────────┐         7         4         RTS  ───────
                    │     ┌──
CTS      8  ────────┘     │   8         5         CTS  ───────

DTR      4  ────────┐         4         20        DTR  ───────
                    │     ┌──
DSR      6  ────────┘     │   6         6         DSR  ───────

NC       1  ────────

NC       9  ────────
```
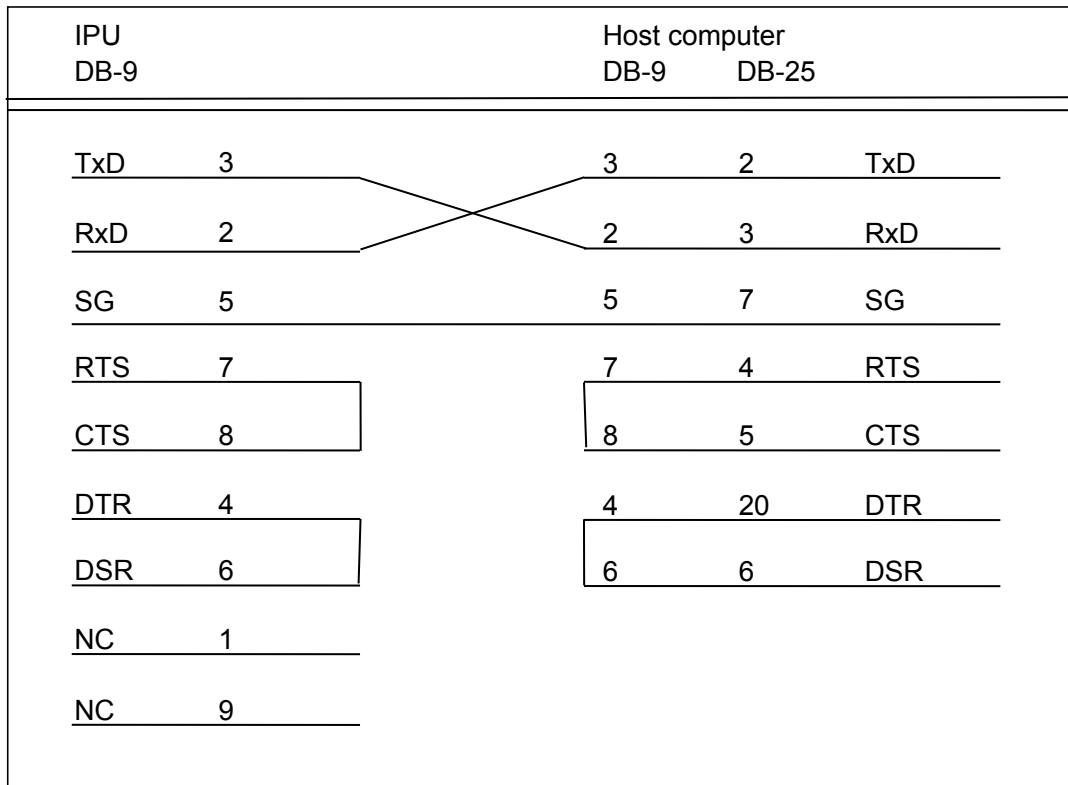
4.1.4. Interface parameters

Table 4: 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).

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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.

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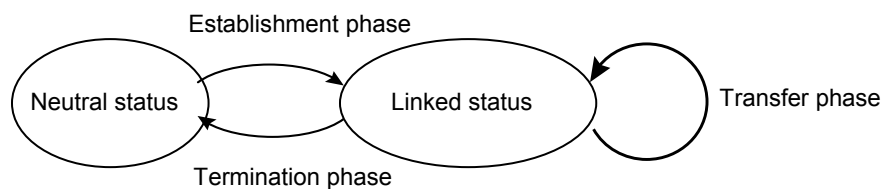
4.2.2. Establishment phase

(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.

```
                    Max. 15 sec.
           +---+
           | E |
           | N |
IPU        | Q |
     _____|   |_____
                      +---+
                      | A |
                      | C |
Host computer         | K |
                      +---+
```

```
                    Max. 15 sec.    At least
           +---+                    10 sec.   +---+
           | E |                              | E |
           | N |                              | N |
IPU        | Q |                              | Q |
     _____|   |_____|  |___
                      +---+
                      | N |
                      | A |
Host computer         | K |
                      +---+
```
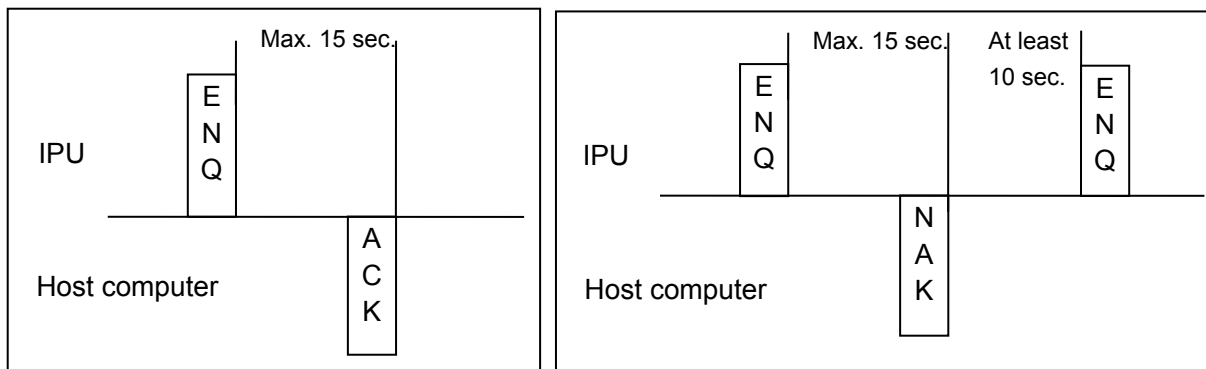
(2) When both the sender and receiver send [ENQ] signals, the host computer must yield control authority to the IPU.
- The IPU sends [ENQ] signal again after 1 second.
- The host computer must wait for 20 seconds before sending [ENQ] signal again.

```
                         At least
                         1 sec.
           +---+                    +---+
           | E |                    | E |
           | N |                    | N |
IPU        | Q |                    | Q |
     _____|   |_____  |   |_____
                +---+
                | E |
                | N |
Host computer   | Q |
                +---+
```

```
                    +---+
                    | E |
                    | N |
IPU                 | Q |
     _____|   |_____
             +---+                         +---+
             | E |                         | E |
             | N |                         | N |
Host computer| Q |                         | Q |
             +---+        At least         +---+
                          20 sec.
```
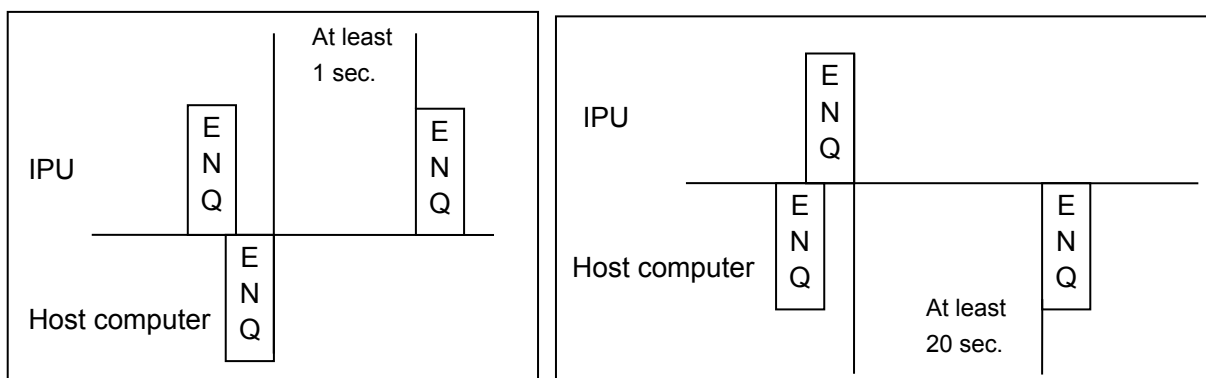
4.2.3. Transfer phase

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.

```
┌──────────────────────────────────────────────────────────────────────────────────┐
│                              Max. 15 sec.                     Max. 15 sec.   ┌───┐ │
│                                                                              │ E │ │
│                   1st attempt                   6th attempt                  │ O │ │
│  Sender                                                                      │ T │ │
│                  ┌───────────┐              ┌───────────┐                    └───┘ │
│                  │Text frame #1│   ...      │Text frame #1│                        │
│                  └───────────┘              └───────────┘                          │
│ ─────────────────────────────┬───┬──────────────────────────────┬───┬──────────── │
│                              │ N │          ...                  │ N │             │
│                              │ A │                               │ A │             │
│  Receiver                    │ K │                               │ K │             │
│                              └───┘                               └───┘             │
└──────────────────────────────────────────────────────────────────────────────────┘
```
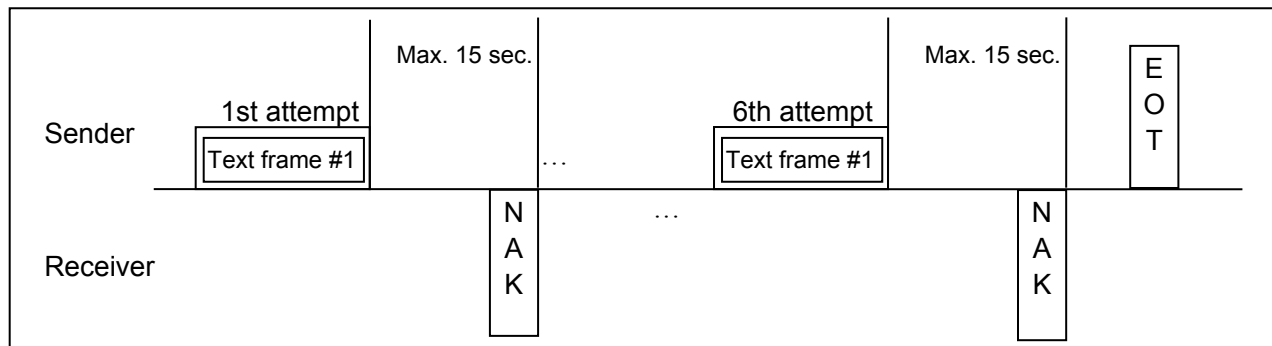
(6)   The IPU processes the response of [EOT] signal from the host computer as [ACK] signal. (Response of [EOT] signal from the receiver is usually a request to suspend a transmission to the sender. However, the IPU does not support this function.)

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.

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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 5: 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 6: 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&)
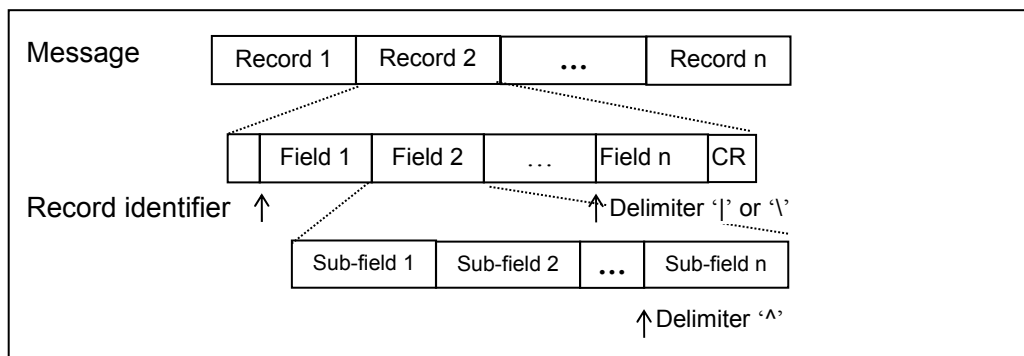
4.3.2. Communication Protocol

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

This protocol is used for the analyzer 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 Sampler Adaptor Number/Tube Position as an inquiry keyword.

Table 7: 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.

Table 8: 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.

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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 9: 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) — applies to the R: Result Record / C: Re-Analysis/Reflex Comment Record block.

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.

4.3.3. Details of Records

4.3.3.1.Header Record

[Example of transmission]
- IPU -> Host computer
  ```
  H|\^&|||XN-35^00-00^11001^^^^12345678|||||||||E1394-97<CR>
  ```
- Host computer -> IPU
  ```
  H|\^&|||||||||||||E1394-97<CR>
  ```

Table 10: 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 11: Product names

Product name	Product name
XN-550	XN-350
XN-530	XN-330
XN-450	XN-150
XN-430	XN-110

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 12: 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 oversea specification in order to have an compatibility with XN
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	-	

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*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.

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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 13: 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	Sampler Adaptor No.^ Sampler Adaptor 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	YYYYMMDDHHMMSS	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.

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2) 12.1.3 Starting Range ID Number
    Sampler Adaptor Number:
        This is a number assigned to the sample of Sampler Adaptor, represented by up to 6-digit extended single-byte characters.

    Sampler Adaptor Position:
        This is a number between 1 and 10, indicating the sample position in a sampler adaptor.

    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 Sampler Adaptor Number/ Sampler Adaptor Position used as a key.

      Note 1:   A real-time inquiry (manual analysis) uses Sample ID as a key, without specifying Sampler Adaptor Number/ Sampler Adaptor Position.
      Note 2:   A batch inquiry from the Work List uses Sampler Adaptor Number/ Sampler Adaptor 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 14: 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	Sampler Adaptor No.^ Sampler Adaptor 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	Sampler Adaptor No.^ Sampler Adaptor 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	Not used	Not used	-	
9.4.7	Requested/Ordered Date and Time	Not used	YYYYMMDDHHMMSS	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 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	-	
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	-	

ASTM field	Field name	IPU ↓ Host computer	Host computer ↓ IPU	Max. size (byte)	Remarks
9.4.24	Instrument Charge to Computer System	Not used	Not used	-	
9.4.25	Instrument Section ID	Not used	Not used	-	
9.4.26	Report Type	F, I	X, Y, Q	1	[IPU -> Host] F: Manual analysis Analysis other than Repeat I: Repeat analysis [Host -> IPU] X: Analysis not performed Y: No order Q: Response to inquiry
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 its 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

Sampler Adaptor Number:

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

Sampler Adaptor Position:

This is a number between 1 and 10, indicating the sample position in a sampler adaptor.   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 Sampler Adaptor Number/ Sampler Adaptor 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 sample adaptor number/sample adaptor 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 Sampler Adaptor Number Sampler Adaptor Position used as a key.

3) 9.4.4 Instrument Specimen ID

Sampler Adaptor Number:

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

Sampler Adaptor Position:

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

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 "96", "XbarM1" (in case of X-barM CBC), "XbarM2" (in case of X-barM DIFF), "XbarM3" (in case of X-barM RET), 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 Sampler Adaptor Number/Sampler Adaptor Position used as a key.

Note 1: Sampler Adaptor Number, Sampler Adaptor 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 15: List of Analysis Parameters Ordered

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

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

*2: For the destination of North America, Analysis order is unavailable.

* If parameters which are not listed in Table 15 are ordered to IPU, these parameters are not measured, but
  NAK is not returned because the communication is correct.
  However, a part of parameters outputs measurement results as "0"; therefore, only parameters listed in
  Table 15 need to be ordered.

IPU arranges the analysis parameters when transmitting analysis results to the host computer.
[Transmitting analysis parameters (output of analysis results or real-time output of QC data)]

> WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, RDW-SD, RDW-CV,MicroR[*9],MacroR[*9],
> PDW[*7], MPV,
> P-LCR[*7], PCT[*7], NEUT#, LYMPH#, MONO#, EO#, BASO#, NEUT%,LYMPH%, MONO%,
> EO%, BASO%, IG#[*1*3], IG%[*1*3],
> AS-LYMP#[*8*9],AS-LYMP%[*8*9],NEUT-RI[*3*9],NEUT-GI[*3*9],RET#, RET%, IRF, LFR[*1*7],
> MFR[*1*7], HFR[*1*7],RET-HE[*4], RBC-HE[*9],HYPO-He[*9],HYPER-He[*9],IPF[*1*4], IPF#[*1*4]
> WBC-BF[*2], RBC-BF[*2], MN#[*2], MN%[*2], PMN#[*2], PMN%[*2], TC-BF#[*1*2]
> 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 IPF license is registered and 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: For the destination for North America, the analysis results are not output.

*8: The analysis results are output if analysis of LYMPH# or LYMPH% is ordered.

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

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

WBC-C, RBC, HGB, HCT, MCV, MCH, MCHC, PLT-I, RDW-SD, RDW-CV, MicroR[*1],MacroR[*1],PDW[*1], MPV, P-LCR[*1], PCT[*1], NEUT#, LYMPH#, MONO#, EO#, BASO#, NEUT%, LYMPH%, MONO%, EO%, BASO%, IG#, IG%, AS-LYMP#[*1],AS-LYMP%[*1],NEUT-RI[*1],NEUT-GI[*1], RET#, RET%, IRF, LFR[*1], MFR[*1], HFR[*1], RET-HE,RBC-HE[*1],HYPO-He[*1],HYPER-He[*1], IPF, IPF#, WBC-D, 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-BF, RBC-BF, MN#, MN%, PMN#, PMN%, TC-BF#

*1: Only when the 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
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
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)

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.
Note 4: When "X" is set, the target sample is not aspirated and the analysis data is not saved in the stored sample list. .

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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.

Table16: 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	YYYYMMDDHHMMSS	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 17: 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	1,5	W, (None)	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RBC	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%	1,5	W, (None)	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LYMPH%	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO%	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO%	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#	1,5	W, (None)	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LYMPH#	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO#	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO#	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%※8	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
AS-LYMP#※8	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT-RI※8	1,5	Not used	○○○.○	FI	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT-GI※8	1,5	Not used	○○○.○	SI	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
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[*8]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MACROR[*8]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PDW[*7]	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS

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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				
MPV	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
P-LCR[*7]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PCT[*7]	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[*7]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MFR[*7]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HFR[*7]	1,5	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,*8]	1,5	Not used	○○○.○	pg	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HYPO-HE[*8]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HYPER-HE[*8]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
DELTA-HE[*2,*6,*8]	1,5	Not used	○○○○.○	pg	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IPF[*6]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IPF#[*6]	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]	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MN%[*4]	1	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PMN#[*4]	1	Not used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PMN%[*4]	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 shown in SI and HGB2 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
HGB2 Units	HGB	○○○.○○	g/dL
	MCH	○○○.○	pg
	MCHC	○○○.○	g/dL
	RET-HE	○○○.○	pg
	RBC-HE	○○○.○	pg
	DELTA-HE	○○○○.○	pg

*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 IPF license is registered and analysis of RET#, RET%, LFR, MFR, HFR, or IRF is ordered.
*7: For the destination of North America, the analysis results are not output.
*8: Only when derived software handles the parameters as reportable parameters, the analysis results are output.

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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:

      The data is set to "W" when WDF channel is used for WBC 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 17: 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 17: 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

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).

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

Table 18: 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-C[*4]	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-I[*4]	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
NEUT-RI[※3]	1	Not used	○○○.○	FI	N,A	YYYYMMDDHHMMSS
NEUT-GI[※3]	1	Not used	○○○.○	SI	N,A	YYYYMMDDHHMMSS
RDW-SD	1	Not used	○○○.○	fL	N,A	YYYYMMDDHHMMSS
RDW-CV	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MICROR[*6]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MACROR[*6]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
PDW[*3]	1	Not used	○○○.○	fL	N,A	YYYYMMDDHHMMSS
MPV	1	Not used	○○○.○	fL	N,A	YYYYMMDDHHMMSS
P-LCR[*3]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
PCT[*3]	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[*3]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
MFR[*3]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
HFR[*3]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
RET-HE[*2]	1	Not used	○○○.○	pg	N,A	YYYYMMDDHHMMSS
RBC-HE[*2,*3,*6]	1	Not used	○○○.○	pg	N,A	YYYYMMDDHHMMSS
HYPO-HE[*6]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
HYPER-HE[*6]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
IPF[*5]	1	Not used	○○○.○	%	N,A	YYYYMMDDHHMMSS
IPF#[*5]	1	Not used	○○○○.○	10*3/uL	N,A	YYYYMMDDHHMMSS
WBC-D[*4]	1	Not used	○○○.○○	10*3/uL	N,A	YYYYMMDDHHMMSS

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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				
WDF-X[*4]	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WDF-Y[*4]	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
WDF-Z[*4]	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
RBC-O[*4]	1	Not used	○○.○○	10*6/uL	N,A	YYYYMMDDHHMMSS
PLT-O[*4]	1	Not used	○○○○	10*3/uL	N,A	YYYYMMDDHHMMSS
RET-RBC-X[*4]	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
RET-RBC-Y[*4]	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
RET-RBC-Z[*4]	1	Not used	○○○.○	ch	N,A	YYYYMMDDHHMMSS
DLT-RBC[*4]	1	Not used	○○.○○	None	N,A	YYYYMMDDHHMMSS
DLT-PLTO[*4]	1	Not used	○○.○○	None	N,A	YYYYMMDDHHMMSS
RET-RBC-WX[*4]	1	Not used	○○○○	None	N,A	YYYYMMDDHHMMSS
RET-RBC-WY[*4]	1	Not used	○○○○	None	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
	DELTA-HE	○○○○○	amol
HGB2 Units	HGB	○○○.○○	g/dL
	MCH	○○○.○	pg
	MCHC	○○○.○	g/dL
	RET-HE	○○○.○	pg
	RBC-HE	○○○.○	pg
	DELTA-HE	○○○○.○	pg

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

*4: For the destination of North America, "~" is added to the top of the parameter.

*5: Only output if IPF license is registered.

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

a) 10.1.3 Analysis Parameter ID

    Parameter   : QC parameter names are output.

    Dilution ratio   : Fixed to "1".

    Analysis result type   : If output from the XbarM chart, the number of batches currently specified in XBarM is output. This parameter is not used if data is output from a screen other than the XbarM chart.

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 18: 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 18: 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).

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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 19: List of IP Massages (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
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).

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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 20: List of IP Massages (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				
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
NRBC?	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
iRBC?*2	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
iRBC?(R)*2*3	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS
PLT_Clumps?	Not used	Not used	○○○	Not used	A, (None)	YYYYMMDDHHMMSS

*1: The Data Value fields indicate the maximum number of digits.
*2: Only output if iRBC license is registered.
*3: Only output if iRBC?(R) is enable in 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).

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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 21: 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_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_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_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_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 Massage 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).

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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 22: 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 Error_Result and barcode reading errors has occurred.

        Error_Result :

           Indicates Error_Result (one of the following analysis errors: "Sample Not Asp Error", "Low Blood Volume", and "Low Count Error".) has occurred.

    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).

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3.7) Outputting the path to image data file will output only the parameters having image data.

> **(Note)**
> **Scattergrams and distributions indicated as being for research should only be used for research purposes.**

> **(Note)**
> **If image data is acquired by the function of shared holder on Windows, host may not provide immediate access to the image data in IPU due to the lag of synchronism between devices.   To ensure acquiring image data, set the lag time until fetiching the data from receiving the electric mail or proceed the process to retry if the data is unavailable.**

Table 23: List of Scatter 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	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF-CBC	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_RET	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_PLT-O	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_RET-E	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF-E	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF(SSC-FSC)[1]	Not used	Not used	File pathData	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF(FSC-SFL)[1]	Not used	Not used	File pathData	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF(FSCW-FSC)[1]	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_WDF-CBC (FSCW-FSC)[1]	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_RET(SFL-SSC)[1]	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_RET(SSC-FSC)[1]	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_RET(FSCW-FSC)[1]	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
DIST_RBC	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
DIST_PLT	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
DIST_RBC(FSC)	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
DIST_RBC(NORMAL)[1]	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
DIST_PLT(NORMAL)[1]	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS

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

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a) 10.1.3 Analysis Parameter ID

Parameter	: Types of image data having data values are output.
SCAT_WDF	: WDF scattergram image data
SCAT_ WDF-CBC	: WDF-CBC scattergram image data
SCAT_RET	: RET scattergram image data
SCAT_PLT-O	: PLT-O scattergram image data (research)
SCAT_RET-E	: RET (ext) scattergram image data (research)
SCAT_WDF-E	: WDF (ext) scattergram image data
SCAT_WDF(SSC-FSC)	: WDF (SSC-FSC) scattergram image data (research)
SCAT_WDF(FSC-SFL)	: WDF(FSC-SFL) 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_WDF-CBC(FSCW-FSC)	: WDF-CBC(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)
DIST_RBC	: RBC size distribution image data
DIST_PLT	: PLT size distribution image data
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)
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.**

The Paths to the image data 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 staring 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 IPU starts, the holder storing the image data is deleted if they have been stored for three days or longer.

<Raw data format>
Refer to Table 24 for scattergram image, and refer to Table 25 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 24: Scattergram Data Format

Parameter	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 25: Particle Size Distribution Data Format

Parameter	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, MIDDLE 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

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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 26: List of Research Items (Other than model in the destination of North America)

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 ration	Extended order result				
WBC-C	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
WBC-D	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NEUT#&[2]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NEUT%&[2]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMP#&[2]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMP%&[2]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
WBC-D&[2][6]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HFLC#	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HFLC%	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
NRBC#[9]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NRBC%[9]	1,5	No used	○○○○.○	/100WBC	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-O	1,5	No used	○○.○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HGB-O[3]	1,5	No used	○○○.○	g/dL	L,H,>,N,A,W	YYYYMMDDHHMMSS
DELTA-HGB[3]	1,5	No used	○○○.○	g/dL	L,H,>,N,A,W	YYYYMMDDHHMMSS
MCHC-O[3]	1,5	No used	○○○.○	g/dL	L,H,>,N,A,W	YYYYMMDDHHMMSS
PLT-O	1,5	No used	○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
PLT-I	1,5	No used	○○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TNC-D	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
FRC#	1,5	No used	○.○○○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
FRC%	1,5	No used	○○.○○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-HE[8]	1,5	No used	○○○.○	pg	L,H,>,N,A,W	YYYYMMDDHHMMSS
DELTA-HE[3]	1,5	No used	○○○○.○	pg	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-Y	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-RBC-Y	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
IRF-Y	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
RPI	1,5	No used	○○○.○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
HYPO-HE[8]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
HYPER-HE[8]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS

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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 ration	Extended order result				
MICROR[8]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
MACROR[8]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
H-IPF[7]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
IPF_RESEARCH[5][7]	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
IPF#_RESEARCH[5][7]	1,5	No used	○○○.○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TNC	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-UPP	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
RET-TNC	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LYMPH%_RESEARCH[5]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO%_RESEARCH[5]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT%_RESEARCH[5]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO%_RESEARCH[5]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
BASO%_RESEARCH[5]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LYMPH#_RESEARCH[5]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MONO#_RESEARCH[5]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NEUT#_RESEARCH[5]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
EO#_RESEARCH[5]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
BASO#_RESEARCH[5]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PDW_RESEARCH[5]	1,5	No used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
P-LCR_RESEARCH[5]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LFR[9]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
MFR[9]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HFR[9]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PCT_RESEARCH[5]	1,5	No used	○○.○○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IG%_RESEARCH[5]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
IG#_RESEARCH[5]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RE-LYMP#[8]	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
RE-LYMP%[8]	1,5	No used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HF-BF#[4]	1	No used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
HF-BF%[4]	1	No used	○○○.○	/100WBC	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-BF#[4]	1	No used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-BF%[4]	1	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-BF#[4]	1	No used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-BF%[4]	1	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-BF#[4]	1	No used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-BF%[4]	1	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
EO-BF#[4]	1	No used	○○○.○○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS

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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 ration	Extended order result				
EO-BF%*4	1	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
RBC-BF2*4	1	No used	○○.○○○○	10*6/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
TC-BF#*4*5*9	1	No used	○○○.○○○	10*3/uL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
NE-SSC	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-SFL	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-FSC	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-N#	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-N%	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-D#	1,5	No used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
BA-D%	1,5	No used	○○○.○	%	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-X	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-Y	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-Z	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-X	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-Y	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-Z	1,5	No used	○○○.○	ch	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-WX	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-WY	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
NE-WZ	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-WX	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-WY	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
LY-WZ	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-WX	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-WY	1,5	No used	○○○○	(なし)	L,H,>,N,A,W	YYYYMMDDHHMMSS
MO-WZ	1,5	No used	○○○○	(なし)	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 or HGB2 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
HGB2 Units	HGB-O	○○○.○○	g/dL
	Delta-HGB	○○○.○○	g/dL
	MCHC-O	○○○.○	g/dL
	RBC-HE	○○○.○	pg
	DELTA-HE	○○○○.○	pg

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

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

*6: Only output if iRBC license is registered.

*7: Only output if IPF license is registered.

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

*9: Output with a"_RESEARCH" suffix depends on service setting.

Table 1: List of Research Items (Derived software in the destination of North America)

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	Para meter	Extended order result				
WBC-C	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
WBC-D&*2*6	1,5	Not used	○○○.○○	10*3/uL	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
NRBC#*8	1,5	Not used	○○○.○○	10*3/uL	L,H,>,N,A,W	YYYYMMDDHHMMSS
NRBC%*8	1,5	Not used	○○○○.○	/100WBC	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
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
TNC-C	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
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	1,5	Not used	○○○.○	pg	L,H,>,N,A,W	YYYYMMDDHHMMSS
DELTA-HE*3	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*7	1,5	Not used	○○○.○	%	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
PDW	1,5	Not used	○○○.○	fL	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
P-LCR	1,5	Not used	○○○.○ *1	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
LFR*8	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,H	YYYYMMDDHH

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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	Para meter	Extended order result				
					H	MMSS
MFR[*8]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
HFR[*8]	1,5	Not used	○○○.○	%	L,H,>,N,A,W,LL,HH	YYYYMMDDHHMMSS
PCT	1,5	Not used	○○.○○	%	L,H,>,N,A,W,LL,HH	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
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
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	YYYYMMDDH

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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	Para meter	Extended order result				
						HMMSS

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

*2: The character "&" applied to the parameter is converted to "&E&" by using escape delimiters.

*3: The data values and units expressed in SI or HGB2 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
HGB2 Units	HGB-O	○○○.○○	g/dL
	Delta-HGB	○○○.○○	g/dL
	MCHC-O	○○○.○	g/dL
	RBC-HE	○○○.○	pg
	DELTA-HE	○○○○.○	pg

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

*5: For the derived software in the destination of North America, "~" is added to the top of all parameters

*6: Only output if iRBC license is registered.

*7: Only output if IPF license is registered.

*8: Output with a "_RESEARCH" suffix depends on service setting.

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:

        The data 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 26: 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 26: 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).

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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 28: 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	No Used	○○○○○	(None)	N	YYYYMMDDHHMMSS
HGB-SAMPLE	1,5	No Used	○○○○○	(None)	N	YYYYMMDDHHMMSS
R-MFV	1,5	No Used	○○○.○	fL	N	YYYYMMDDHHMMSS
S-RBC	1,5	No Used	○○.○○	10*6/uL	N	YYYYMMDDHHMMSS
S-MCV	1,5	No Used	○○○.○	fL	N	YYYYMMDDHHMMSS
L-RBC	1,5	No Used	○○.○○	10*6/uL	N	YYYYMMDDHHMMSS
L-MCV	1,5	No Used	○○○.○	fL	N	YYYYMMDDHHMMSS
P-MFV	1,5	No Used	○○○.○	fL	N	YYYYMMDDHHMMSS
WDF-X	1,5	No Used	○○○.○	ch	N	YYYYMMDDHHMMSS
WDF-Y	1,5	No Used	○○○.○	ch	N	YYYYMMDDHHMMSS
WDF-Z	1,5	No Used	○○○.○	ch	N	YYYYMMDDHHMMSS
WDF-WX	1,5	No Used	○○○○	(None)	N	YYYYMMDDHHMMSS
WDF-WY	1,5	No Used	○○○○	(None)	N	YYYYMMDDHHMMSS
WBC-FX	1,5	No Used	○○○.○	ch	N	YYYYMMDDHHMMSS
DLT-WBCD	1,5	No Used	○○.○○	(None)	N	YYYYMMDDHHMMSS
IRBC-WDF#	1,5	No Used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
RET-RBC-X	1,5	No Used	○○○.○	ch	N	YYYYMMDDHHMMSS
RET-X	1,5	No Used	○○○.○	ch	N	YYYYMMDDHHMMSS
RET-RBC-Z	1,5	No Used	○○○.○	ch	N	YYYYMMDDHHMMSS
RET-RBC-WX	1,5	No Used	○○○○	(None)	N	YYYYMMDDHHMMSS
RET-RBC-WY	1,5	No Used	○○○○	(None)	N	YYYYMMDDHHMMSS
DLT-RBC	1,5	No Used	○○.○○	(None)	N	YYYYMMDDHHMMSS
DLT-PLTO	1,5	No Used	○○.○○	(None)	N	YYYYMMDDHHMMSS
Unclassified	1,5	No Used	○○○○	(None)	N	YYYYMMDDHHMMSS
WBC-D2	1,5	No Used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
TNC-D2	1,5	No Used	○○○.○○○	10*3/uL	N	YYYYMMDDHHMMSS
HGB_NONSI	1,5	No Used	○○○.○	g/dL	N	YYYYMMDDHHMMSS
HGB_SI	1,5	No Used	○○○.○	mmol/L	N	YYYYMMDDHHMMSS
HGB_SI2	1,5	No Used	○○.○○	mmol/L	N	YYYYMMDDHHMMSS
WDF_TOTAL_COUNT	1,5	No Used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
WDF_PLOT_COUNT	1,5	No Used	○○○○○○	(None)	N	YYYYMMDDHHMMSS
RET_TOTAL_COUNT	1,5	No Used	○○○○○○○○	(None)	N	YYYYMMDDHHMMSS
HGB_NONSI2	1,5	No Used	○○○.○○	g/dL	N	YYYYMMDDHHMMSS

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

*2: For the derived software in the destination of North America, "~" is added to the top of all parameters.

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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 28: 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 28: 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.

Table29: 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	No Used	○○○.○○○	10*3/uL	N		YYYYMMDDHHMMSS
LY-BF2#	1,5	No Used	○○○.○○○	10*3/uL	N		YYYYMMDDHHMMSS
MO-BF1#	1,5	No Used	○○○.○○○	10*3/uL	N		YYYYMMDDHHMMSS
MO-BF2#	1,5	No Used	○○○.○○○	10*3/uL	N		YYYYMMDDHHMMSS
MO-BF3#	1,5	No Used	○○○.○○○	10*3/uL	N		YYYYMMDDHHMMSS
HF-BF1#	1,5	No Used	○○○.○○○	10*3/uL	N		YYYYMMDDHHMMSS
HF-BF2#	1,5	No Used	○○○.○○○	10*3/uL	N		YYYYMMDDHHMMSS
LY-BF1%	1,5	No Used	○○○.○	%	N		YYYYMMDDHHMMSS
LY-BF2%	1,5	No Used	○○○.○	%	N		YYYYMMDDHHMMSS
MO-BF1%	1,5	No Used	○○○.○	%	N		YYYYMMDDHHMMSS
MO-BF2%	1,5	No Used	○○○.○	%	N		YYYYMMDDHHMMSS
MO-BF3%	1,5	No Used	○○○.○	%	N		YYYYMMDDHHMMSS
HF-BF1%	1,5	No Used	○○○.○	/100WBC	N		YYYYMMDDHHMMSS
HF-BF2%	1,5	No Used	○○○.○	/100WBC	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 "
   Table29: List of Service Items", regardless of "Link to IPU unit setting" in the service settings.

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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 "

Table29: 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. Comment Record (patient/sample comment)

[Example of transmission]
- IPU -> Host computer
  ```
  C|1||Patient comments<CR>
  ```
- Host computer -> IPU
  ```
  C|1||Patient comments<CR>
  ```

Table30: 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.

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4.3.3.7.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 31: 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>
   ```

4.3.3.8. Message termination record

[Example of transmission]

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

Table 32: 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. Real-Time Inquiry in Manual Mode

IPU	`<ENQ>`
Host	`<ACK>`
IPU	`<STX>1H|\^&|||XN-550^00-01^11001^^^^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>`

5.1.2. Real-Time Inquiry in Sampler Mode

IPU	`<ENQ>`
Host	`<ACK>`
IPU	`<STX>1H|\^&|||XN-550^00-01^11001^^^^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>1`**`H|\^&|||||||||||E1394-97<CR>`**`<ETX><CHK1><CHK2><CR><LF>`
IPU	`<ACK>`
Host	`<STX>2`**`P|1|||100|^Jim^Brown||20010820|M|||||^Dr.1|||||||||||||^`** **`^^WEST`** **`<CR>`**`<ETX><CHK1><CHK2><CR><LF>`
IPU	`<ACK>`
Host	`<STX>3`**`C|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>6`**`C|1||Sample Comments<CR>`**`<ETX><CHK1><CHK2><CR><LF>`
IPU	`<ACK>`
Host	`<STX>7`**`L|1|N<CR>`**`<ETX><CHK1><CHK2><CR><LF>`
IPU	`<ACK>`
Host	`<EOT>`

5.2.2. No order exists

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

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

5.3.1. Output of analysis results

IPU	`<ENQ>`
Host	`<ACK>`
IPU	`<STX>1H|\^&|||XN-550^00-01^11001^^^^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|^^^^Left_Shift?|0|||||||||||20010806120000` `<CR><ETX><CHK1><CHK2><CR><LF>`
Host	`<ACK>`
IPU	`<STX>1R|35|^^^^Atypical_Lympho?|0|||||||||||20010806120000` `<CR><ETX><CHK1><CHK2><CR><LF>`
Host	`<ACK>`
IPU	`<STX>2R|36|^^^^ Blasts/Abn_Lympho?|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_12`

	34567890_ **DIFF.PNG|||N||||||20010806120000<CR>**\<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
	(omitted)
IPU	\<STX>5**L|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>1**H|\\^&|||XN-550^00-00^11001^^^^12345678|||||||||** **E1394-97<CR>**\<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>2**P|1|||100|^Jim^Brown||20010820|M|||||^Dr.1|||||||||||||^** **^^WEST** **<CR>**\<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>3**C|1||Patient Comments<CR>**\<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>4 **O|1||^^ 1234567890^B|^^^^WBC-BF\^^^^RBC-BF\^** **^^^MN#\^^^^MN%\^^^^PMN#\^^^^PMN%||||||||N|||||||||||** **||||F<CR>** \<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>5**C|1||Sample Comments<CR>**\<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>6**R|1|^^^^WBC-BF^1|5.359|10*3/uL||N||||||20010806120000<C** **R>** \<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>7**R|2|^^^^RBC-BF^1|4.4|10*6/uL||A||||||20010806120000<CR>** \<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>0**R|3|^^^^MN#^1|4.041|10*3/uL||W||||||20010806120000<CR>** \<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>1**R|4|^^^^MN%^1|75.4|%||N||||||20010806120000<CR>** \<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>2**R|5|^^^^PMN#^1|1.318|10*3/uL||N||||||20010806120000<CR>** \<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>3**R|6|^^^^PMN%^1|24.6|%||N||||||20010806120000<CR>** \<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>4**L|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>1**H|\\^&|||XN-550^00-01^11001^^^^12345678|||||||||** **E1394-97<CR>**\<ETX>\<CHK1>\<CHK2>\<CR>\<LF>
Host	\<ACK>
IPU	\<STX>2**P|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>5`**R|1|^^^^WBC^1|7.58|10*3/uL||N||||||20010806120000<CR>** `<ETX><CHK1><CHK2><CR><LF>`
Host	`<ACK>`
IPU	`<STX>6`**R|2|^^^^RBC^1|4.49|10*6/uL||N||||||20010806120000<CR>** `<ETX><CHK1><CHK2><CR><LF>`
Host	`<ACK>`
IPU	`<STX>7`**R|3|^^^^HGB^1|13.3|g/dL||N||||||20010806120000<CR>** `<ETX><CHK1><CHK2><CR><LF>`
Host	`<ACK>`
IPU	`<STX>0`**R|4|^^^^HCT^1|37.3|%||N||||||20010806120000<CR>** `<ETX><CHK1><CHK2><CR><LF>`
Host	`<ACK>`
	(omitted)
IPU	`<STX>5`**R|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>1`**L|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>1**H|\\^&|||XN-550^00-01^11001^^^^12345678||||||||| E1394-97<CR>**<ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>2**P|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\DIFF** <ETB><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>4 **Y\DIFF-WBC|||||||Q||||||||||||||F<CR>** <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>5**R|1|^^^^WBC^1|7.58|10*3/uL||N||||||20010806120000<CR>** <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>6**R|2|^^^^RBC^1|4.49|10*6/uL||N||||||20010806120000<CR>** <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>7**R|3|^^^^HGB^1|13.3|g/dL||N||||||20010806120000<CR>** <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
IPU	<STX>0**R|4|^^^^HCT^1|37.3|%||N||||||20010806120000<CR>** <ETX><CHK1><CHK2><CR><LF>
Host	<ACK>
	(...omitted...)
IPU	<STX>0**L|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-550^00-01^11001^^^^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|||||||||||||||||^^^WEST<CR> C|1||Patient`
	`Comments<CR>`
	`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\^^^^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 24, 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.

XN-L series

| Scattergram image data | → | Run-Length compression | → | Huffman encoding | → | Convert to ASCII code |

Transmit

Host computer

| Scattergram image data | ← | Run-Length decompression | ← | Huffman decoding | ← | Conversion into Binary Codes |
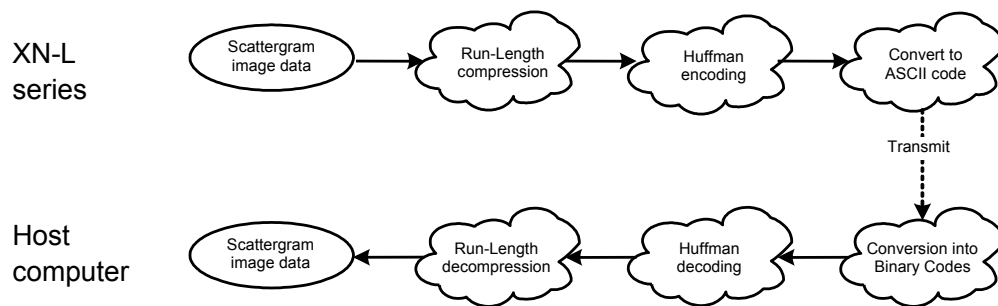
Figure B-1

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.

It is the same color pattern, black, is set to the Scattergram in setting Scattergram.

Table 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

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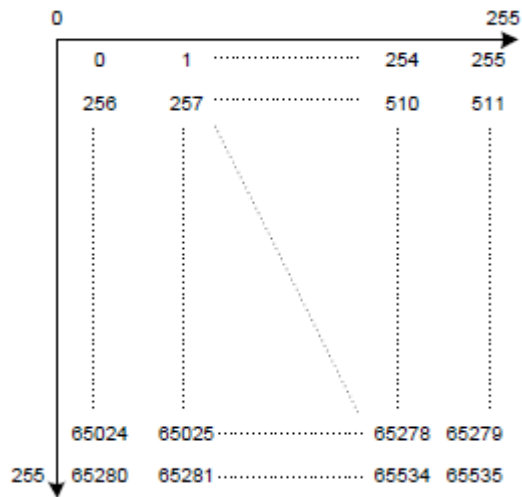
Figure B-2

Table B-2

Color Info	Color	RGB Value		
hex		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	Brown	165	42	42
12	Light Magenta	255	90	255
13	Pale Magenta	255	180	255
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	Brown	165	42	42

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.

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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 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 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.

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Table B-5

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 × 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

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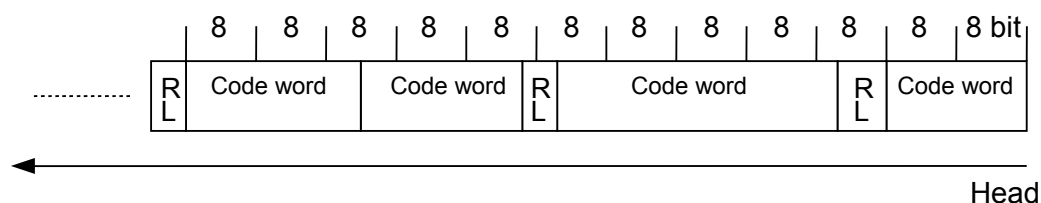
A code word is a sequence of 0 or 1 forming 1 to 32 bits. The intermediate code corresponding to the code word is determined by reference to the table, in order to find whether Run-Length compression was performed. The high-order byte 0 of an intermediate code means Run-Length compression was not performed 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)
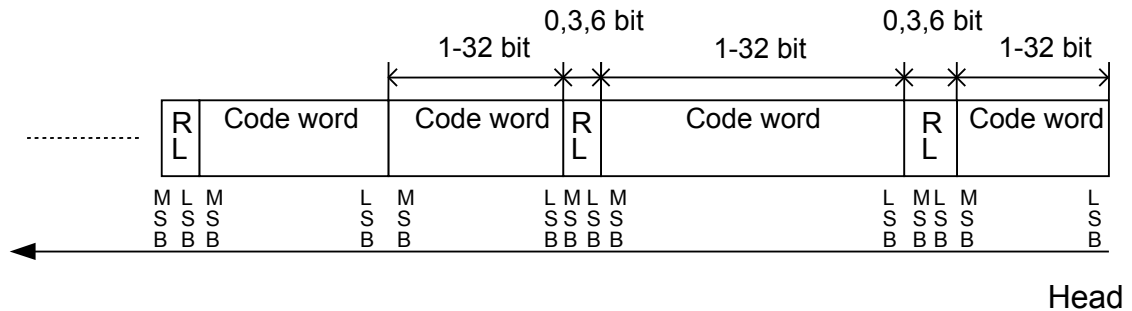
Figure B-5

(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.

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7.3.3. Examples of Decompression

The following communication log examples show how scattergram images of the WDF channel of the XN-L 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)

```
6R|49|^^^^SCAT_WDF|SSC^SFL^1^00000000000001001100
0000>50:000000000000000000000000000000000000000000000101000300000000000300
01000000050003000700000002000400050000003000400070000000;0106001?0000000501
06002=000000030106001=0000000=0006003=000000040006003?000000010006000=000000
040107002?0000000;0007006?00000002010700<=0000000=0108004=0000000:0009004=01
00000<0009007>;?21;4=?6??8?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?
>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;
?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>5=
?<7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?
=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7
?;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>
;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>?
??7;?=7>;?=?>???7;?=7>;?=?>??78;>3??7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?5?15
>9?9?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=
7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?>???7;?=7>;?=?
>?779?=?>???7;?=7>?8=>769>?3?;?=>4?3?;?=7>;?=?>???7;?==6<0<>>???7=;<?>???7:34?
727>;?1?7<7>;?=?<?38;?=?>???7;?=7>;?=?>???7;?=7<2?9?=7>;?=?>?379?=?>???7;?=
7>;?>6?<7>3??934<739;?=?4?89><0877863;;?=?6?3=<4>=10>7?7?;:=<738<46=>7?7?;>9
>7?7?;>=<738<5?9?=7>>===>>?69>>2<7>;??430>7?7?;<=>7;8==?9?=7>>>9=>2;6;;==6=
>7?7?;9=219<>4767>;?=?7<8623=<21<>>??71;2339<56=;79==?>?47467384;;;=;59==?>?
17=?7686;7?<7>;??80<6?>=76;;=;6>777>;?9?7:84;;;=65;8==767>;?9?7992;77688239<
=?>?87<57392?7=?=8?17>;?=?22?08>4;633;<;9==7688?3?;?=>0;776;;>=767>;?9?7<;7=;
>=3<5?9?=7>5:2<;7==8>707;=;>??7>;;02;:>=>=>=1<>7?7?;5=21==>=767;=7>??73383;9
=;==?6=6767>;?1?19<3116>;;>=>=>=<>>??74;<?7047;8;=;5=;6>3;;?=?22?0;2490;7?7>6
8>?8?;?=?86?8428=>=:>=;=;=:;?>?=7>6528=9>>;6;;;=;9;=;;?3?;?=;210;21022796;7;
93707>;?9?7;;;=;=;7;8?70:>=?>??703<288>2<>70=;5;4=76;7==>>?<7>;?2=84388>707;
73;7;;;=;5==?9?=7>5908217<62;<;5=;9;=;9=>1?<7>3?25984?5;16421<;7=;?;6??9?=7>
4:30317<5<?66941=<76=;>=;6;7?<7>;?288>6<2164:11<>176;7==6>;;==>=?<7>;?258:2<
868?84486>;7;;;=;9=;21<>>??7471342;265092188186>;7==>=3=<221<>>??7;;922=963;
<319>>76;7=;<>>??7:3922=86<473=;5;;;==11>>;6=;<>>??76342<8967==:624818;7;;>=
?69>>21<;?=?>?87<490>==3;2457287;8>=;63;;?=?>??:;8255;?6694;24;71=>1767>;?5?
16<2:72=;1<6=>?6=773;;?=?8?0925<;42489685?1=676;;>=6>;7==>=40;?>2?7?;<1;164
=9;27431640;>2:=;=;5;71<;753?=7>;?369:64<;;:4?4;16420<;7=;7;8>?3?;?=9>183>6>
1?972<8<;;==76;;33=<6=27;9=?>??723;22<5;;64?5=?78=10<421>>0827;9>3?>7>;?2=86
>?=?14511<>1087784339<>?17?=7>;?2==9?74?;4408>50<47;8531<>=?7?;750165=?3?75
>94208218833;<;5639<=?>?67648;214;?6:9?;=4:<74==9245728>?3?;?=:2849025==:7>>
>3922590=;>=08;7;=;5=;897?;?=?95==33>77==;:2>9483=<118>727>;?3=9264?;=67=>>
922=2104728>;3?=;2=?>?170591><6;97:>?;;<18;26<47;8==?97<>>???7336?8=>:<>?84
2<8:=;4>71:4=?>?87672164>93>755=;::44;;:64?;<43:=02??;?=7>5818=9;:7=>:=2:<34
>;53;74?86984>539<5??3?;?=:<20;2><63?7;1>;;>76=?5<0729;?1?9?2==;;72><=6?46=2
7=24<4747>;?9???269?;=475>9;:74;9=27=??;0258;>:10>7?7?;0=5?;;7449;397667=631<
```

>3<>?9137>;?5?1745;2:44;;:2==:7:>4;;::4?;;4<473:43294>5?7?;:509>163;3=3:<4?
==>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???<:50902294=?<?4:?7:94;=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::=:=:;=>:?9?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????6337><;<??<?=7>3?>737<?3?>5?7?;?==69?26?;?=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;?=?>???537?<46?8;77????>;?=?6??;41????>>==????;?=7>?=;?
?=7>;?5??<137><3>??=?=7>;?=?>??77637>;?=?>?>7?<7>;?1?2?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 24: Scattergram Data Format".

(2) Converting compressed data into binary data

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

```
00000000000010011000000E50A00000000000000000000000000000000000000
00000000000101000300000000003000100000005000300070000000200040
050000000300040000F0000000B0106001F0000000500106002D00000003010600
1D0000000D0006003D0000000040006003F000000010006000D000000004010700
2F0000000B0007006F00000002010700CD0000000D0108004D0000000A000900
4D0100000C0009007EBF21B4DF6FF8FD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBF
DFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FB
FD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDF
EFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7E5DFC7EBFDFEFF7FBFD7EBFDFEF
F7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7E
BFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7
FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBF
DFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FB
FD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF78BE3F7FBFD
7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBF5F15E9F9FD7EBFDFEFF7FBFD7EBFDFEF
F7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7E
BFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEFF7FBFD7EBFDFEF77
9FDFEFF7FBFD7EF8ED769EF3FBFDE4F3FBFD7EBFDFEFF7FBFDD6C0CEEFF7DBCF
EFF7A34F727EBF1F7C7EBFDFCF38BFDFEFF7FBFD7EBFDFEFF7FBFD7EC2F9FD7E
BFDFEF379FDFEFF7FBFD7EBFE6FC7E3FF934C739BFDF4F89EC0877863BBFDF6F
3DC4ED10E7F7FBADC738C46DE7F7FBE9E7F7FBEDC738C5F9FD7EEDDDEEF69EE2
FC7EBFF430E7F7FBCDE7B8DDF9FD7EEE9DE2B6BBDD6DE7F7FB9D219CE4767EBF
DF7C8623DC21CEEFF71B2339C56DB79DDFEF47467384BBBDB59DDFEF17DF7686
B7FC7EBFF80C6FED76BBDB6E777EBF9F7A84BBBD65B8DD767EBF9F7992B77688
239CDFEF87C57392F7DFD8D17EBFDF2F08E4B633BCB9DD7688F3FBFDE0B776BB
ED767EBF9F7CB7DBED3DC5F9FD7E5A2CB7DD8E707BDBEFF7EB02BAEDEDED1CE7
F7FB5D21DDED767BD7EFF73383B9DBDDF6D6767EBF1F19C3116EBBEDEDEDCEEF
F74BCF7047B8BDB5DB6E3BBFDF2F0B2490B7F7E68EF8FBFDF86F8428DEDAEDBD
BDABFEFD7E6528D9EEB6BBBDB9BDBBF3FBFDB210B21022796B7B93707EBF9F7B
BBDBDB7B8F70AEDFEFF703C288E2CE70DB5B4D76B7DDEEFC7EBF2D84388E707B
73B7BBBDB5DDF9FD7E5908217C62BCB5DB9BDB9DE1FC7E3F25984F5B16421CB7
DBFB6FF9FD7E4A30317C5CF66941DC76DBEDB6B7FC7EBF288E6C2164A11CE176
B7DD6EBBDDEDFC7EBF258A2C868F84486EB7BBBDB9DB21CEEFF7471342B26509
2188186EB7DDED3DC221CEEFF7AB922D963BC319EE76B7DBCEEFF7A3922D86C4
73DB5BBBDD11EEB6DBCEEFF76342C8967DDA624818B7BBEDF69EE21CBFDFEF87
C490EDD3B2457287B8EDB63BBFDFEFFAB8255BF6694B24B71DE1767EBF5F16C2
A72DB1DC6DEF6D773BBFDF8F0925CB42489685F1D676BBED6EB7DDED40BFE2F7
FBC1B164D9B27431640BE2ADBDB5B71CB753FD7EBF369A64CBBA4F4B16420CB7
DB7B8EF3FBFD9E183E6E1F972C8CBBDD76BB33DC6D27B9DFEFF723B22C5BB64F
5DF78D10C421EE0827B9E3FE7EBF2D86EFDF14511CE1087784339CEF17FD7EBF
2DD9F74FFB4408E50C47B8531CEDF7FB750165DF3F75E94208218833BCB5639C
DFEF67648B214BF6A9FBD4AC74DD9245728EF3FBFDA2849025DDA7EEE3922590
DBED08B7BDB5DB897FBFDF95EDD33E77DDBA2E9483DC118E727EBF3D9264FBD6
7DEE922D2104728EB3FDB2DFEF170591EC6B9
```

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(3) Reading the header
   The first 32 bytes of data that is read ("0000000000000100110000000E50A0000000000000000000000000000000000000") is the header. The header content is indicated in Table B-5.

Table 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 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 00000<u>111</u>	4	0002
00000000 00000<u>101</u>	4	0003
00000000 0000<u>1111</u>	6	010B
00000000 0001<u>1111</u>	6	0105
00000000 001<u>01101</u>	6	0103
00000000 000<u>11101</u>	6	000D
00000000 001<u>11101</u>	6	0004
00000000 001<u>11111</u>	6	0001
00000000 0<u>0001101</u>	7	0104
00000000 0<u>0101111</u>	7	000B
00000000 0<u>1101111</u>	7	0102
00000000 <u>11001101</u>	8	010D
00000000 <u>01001101</u>	9	000A
0000000<u>1 01001101</u>	9	000C

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

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(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 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.

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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.
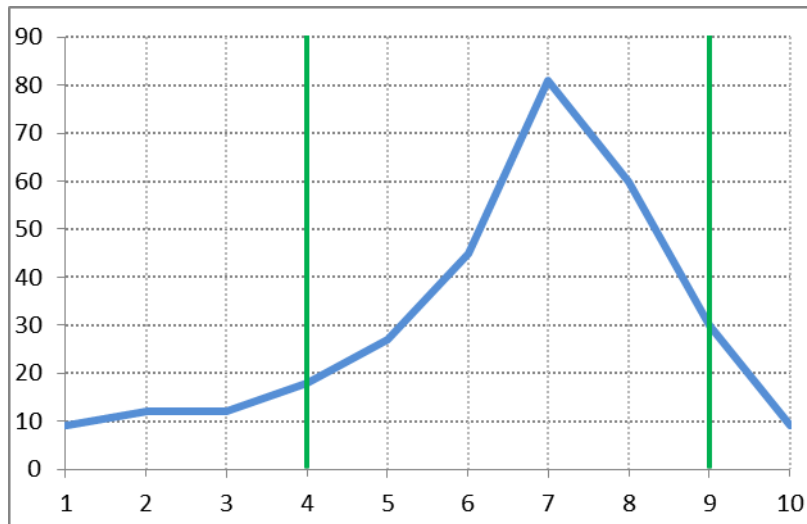
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Figure C-1

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 thus, the image to be constructed is that"RBC particle size distribution data" is overlaid 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 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.
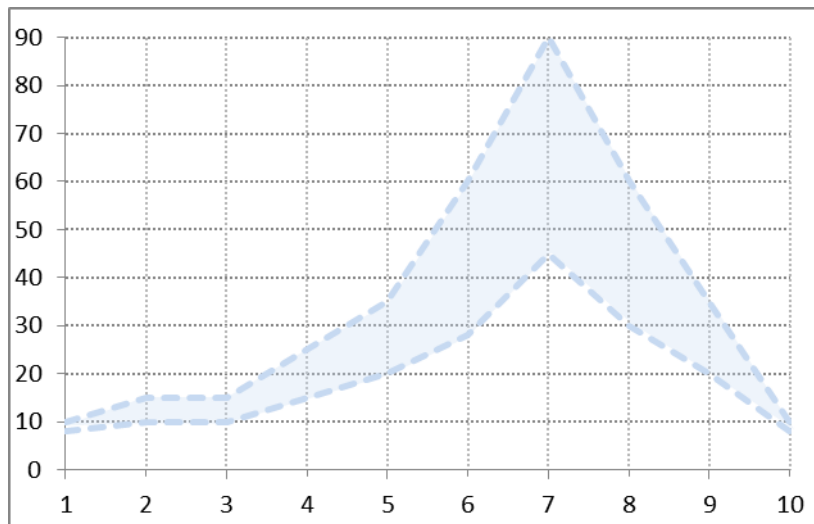
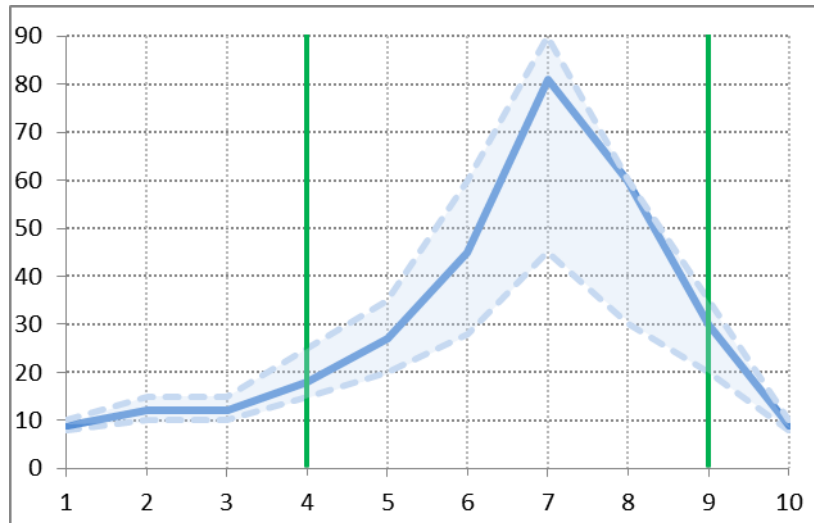R315005

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.

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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 : 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: 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

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