



# **XE-2100 series ASTM Communication Specifications**

**Revision 8.0**

**December 12, 2006**

**SYSMEX CORPORATION**

## Scope

This document describes the Data Communication Specifications for XE-2100, XE-2100L and XE-2100D (XE-2100 series installed XE pro) using ASTM E1394-97, E1381-02.

## Revision History

Revision	Date	Major Contents of Changes
1.0	March 7, 2002	Initial Version
2.0	June 10, 2002	Added descriptions about XE HPC master, XE-2100L, Holland SI unit and Extended order of NEUT, LYMPH% and LYMPH#.
3.0	January 31, 2003	<ul style="list-style-type: none"><li>- Added descriptions when no analysis order exists.</li><li>- Added explanations for the Rack No. and Sample ID No. in the Request Information Record (Table 11) and Test Order Record (Table 12).</li><li>- Deleted "W" for the Sample No. Attribute in the Request Information Record (Table 11).</li><li>- Added example of communication</li><li>- Corrected incorrect descriptions and typing mistakes.</li></ul>
4.0	June 26, 2003	<ul style="list-style-type: none"><li>- Added note in "4.3.2 Communication Protocol".</li><li>- Added an explanation on the image data at 2.7) in 4.3.3.5.</li><li>- Corrected and updated communication examples.</li><li>- Added an explanation on the "A.4 Transmission Messages" in the "Appendix A. TCP/ IP Communication".</li></ul>
5.0	January 5, 2004	<ul style="list-style-type: none"><li>- Changes are made in accordance with XE-2100D.</li><li>- File name specification for the image file is described.</li><li>- Sample ID attributes of "W" and "C" are deleted because XE-2100 series will not handle these.</li><li>- QC file name list table is added.</li></ul>
6.0	April 27, 2004	Changes are made in accordance with XE RET master, as below: <ul style="list-style-type: none"><li>- XE RET master is described in "1.2 Upgrade software"</li><li>- RET-He is added in the description of "Analysis parameters are output" and "QC chart parameters are output" below the Table 14 in "4.3.3.4: Test order record".</li><li>- RET-He is added in the Tables 16 and 17 in "4.3.3.5: Result Record", and RET-He unit is described when Holland SI unit is selected.</li></ul>
7.0	December 07, 2004	Changes are made in accordance with XE IPF master, as below: <ul style="list-style-type: none"><li>- XE IPF master is described in "1.2 Upgrade software"</li><li>- Table 13 "QC File Number Table" is added.</li><li>- IPF is added in the description below the Table 14 for the "4.3.3.4: Test Order Record".</li><li>- IPF is added in the Tables 16 and 17 for the "4.3.3.5: Result Record".</li></ul>
8.0	December 12, 2006	<ul style="list-style-type: none"><li>- Changes are made in accordance with ASTM E1381-02.</li><li>- Added note about output of "Immature Gran?" and "IG Present" when XE IG master is installed.</li></ul>

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# 1. About XE-2100 series Upgrade Software

## 1.1 Differences between XE-2100, XE-2100L and XE-2100D

XE-2100L is built without the RET channel, and therefore will not output the following analysis parameters;

RET#, RET%, HFR, MFR, LFR and IRF,

nor output following control parameters;

RBC-O, PLT-O, RBC-X, RBC-Y, d-RBC, d-PLT, Dw/X and Dw/Y.

For details of each parameter, please refer to the operation manual.

XE-2100D is built without the IMI channel, NRBC channel and RET channel, and therefore will not output following parameters;

RET#, RET%, HFR, MFR, LFR, IRF, NRBC# and NRBC%,

nor output following control parameters;

RBC-O, PLT-O, RBC-X, RBC-Y, d-RBC, d-PLT, Dw/X, Dw/Y, NRBC-X, NRBC-Y,

IMI#, IMI-DC and IMI-RF.

For details of each parameter, please refer to the operation manual.

## 1.2 Optional Upgrade Software

### 1.2.1 XE IG master

When XE IG master is installed to the XE-2100, XE-2100L or XE-2100D, following parameters and IP message will be available. For more information about XE IG master, please contact a Sysmex sales or service representative.

IG#, IG%, and IG present (IP message)

Note:

- In case of IG# and IG% have enough reliability (without “\*”), IG Present will be judged. As a result of this judgement, IG Present will be output when it meets requirements. (In this case, Immature Gran? will not be output.)
- In case of IG# and IG% have not enough reliability (with “\*”), Immature Gran? will be judged, because IG Present can not be judged. As a result of this judgment, Immature Gran? will be output when it meets requirements. (In this case, IG Present will not be output.)

### 1.2.2 XE HPC master

When XE HPC master is installed to the XE-2100 or XE-2100L, following parameter will be available. But this software is not applicable to the XE-2100D. For more information about XE HPC master, please contact a Sysmex sales or service representative.

HPC#

### 1.2.3 XE RET master

When XE RET master is installed to the XE-2100, following parameters will be available. But this software is not applicable to the XE-2100L and XE-2100D. For more information about XE RET master, please contact a Sysmex sales or service representative.

RET-He

### 1.2.4 XE IPF master

When XE IPF master is installed to the XE-2100, following parameters will be available. But this software is not applicable to the XE-2100L and XE-2100D. For more information about XE IPF master, please contact a Sysmex sales or service representative.

IPF

## 2. Terminology

The definition of the terminology used in this document is described in the following.

1) Numeric:

Indicates ASCII codes '0' (30h) through '9' (39h).

2) Alphabet:

Indicates ASCII codes 'A' (41h) through 'Z' (5Ah) and 'a' (61h) through 'z' (7Ah).

3) Alpha-numeric:

Indicates numerical or alphabetical character.

### 3. Scope

This document describes the Data Communication Specifications for XE-2100, XE-2100L and XE-2100D (hereinafter, describes XE-2100 series) using ASTM E1394-97, E1381-02.

ASTM (American Society for Testing and Materials), one of the world largest volunteer non-profit organizations, founded in 1898 for the purpose of creating 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 message between clinical laboratory instruments and computer systems.

**ASTM E1394-97:**

Standard specifications to transfer data between clinical laboratory instruments and computer systems.

## 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.

Refer to the subsequent section, “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.

Refer to the subsequent section, “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.

Refer to the subsequent section, “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 XE-2100 series supports serial connection and TCP/ IP.

For serial connection, it conforms to ASTM E1381-02/ ASTM E1394-97.

For TCP/ IP connection, the following two modes are supported as output modes for data formatted according to ASTM 1394-97.

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

\*1: For TCP/ IP connections, if the “Format” setting parameter on the IPU host computer is set to “ASTM 1381-02/ 1394-97”, operation should be performed in ASTM E1381-02 mode. If the parameter is set to “ASTM 1381-95/ 1394-97”, operation should be performed in ASTM E1381-95 mode.

\*2: The IEEE802.3 specifications for the data link layer and the physical layer are not stated in this document.

## 4.1 Physical Layer (Hardware)

### 4.1.1 Connectors

Although ASTM standard specifies a DB-25-pin male connector for the computer as standard, a DB-9-pin male connector which is located on the rear of the instrument is used to communicate.

Table 1: Connector pin assignment

Pin No.	Signal name		Signal direction
1	NC		
2	Receive data	R×D	To XE from host
3	Transmit data	T×D	From XE to host
4	Data terminal ready	DTR	From XE to host
5	Signal ground	SG	-
6	Data set ready	DSR	To XE from host
7	Request to send	RTS	From XE to host
8	Clear to send	CTS	To XE from host
9	NC		

Note: The control signals are not used with ASTM specifications.  
Please do not make connections to unused pins.

### 4.1.2 Signal identification level

Table 2: Signal identification level

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

### 4.1.3 Connection cable

The IPU uses a cable with a DB-9-pin female connector, in accordance with the following connection chart.

IPU DB-9		Host computer 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 3: Interface Parameters

Parameter	Selection of Settings
Baud rate	1200, 2400, 4800, <u>9600</u> , 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

Establishing the settings underlined allows conformance with ASTM standard.

Note: However, 7-bit data lengths, even or odd parity, and two stop bits are recognized by 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 Layers”, except for the connector type. The IPU uses a DB-9-pin male connector. (The ASTM standard specifies a 25-pin connector.)

## 4.2 Data Link Layer (Transmission Protocol)

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

This section describes communication control procedures. For details, refer to ASTM E1381-02. When ASTM E1381-02 mode is intended to use, the TCP connection is established in 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 for the IP address and the port number that are provided by the host computer.

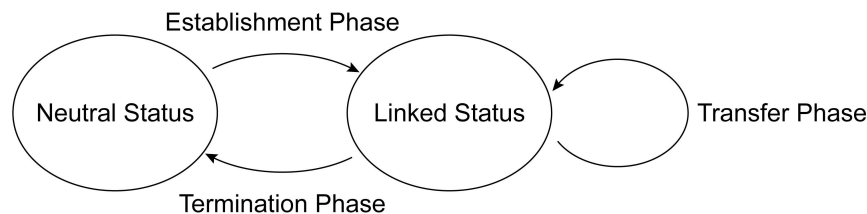
### 4.2.1 Communication Status

The data link layer is consisted of following two 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 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 receiver from linked status to neutral status.



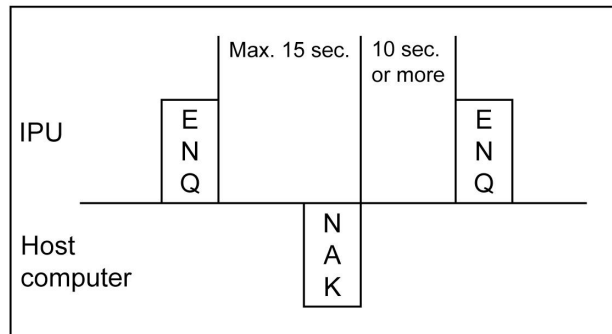
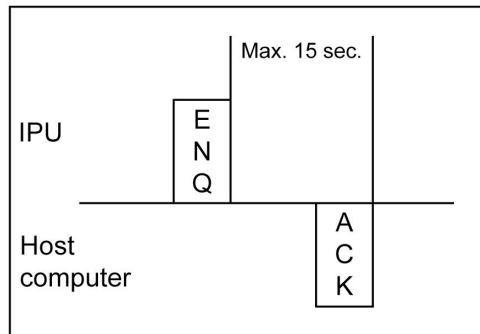
#### 4.2.2 Establishment Phase

- 1) The sender (IPU) sends an [ENQ] signal to the receiver (host computer).

To respond to the sender, the receiver performs the following action:

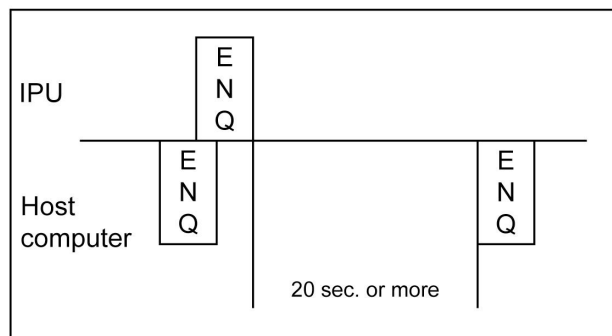
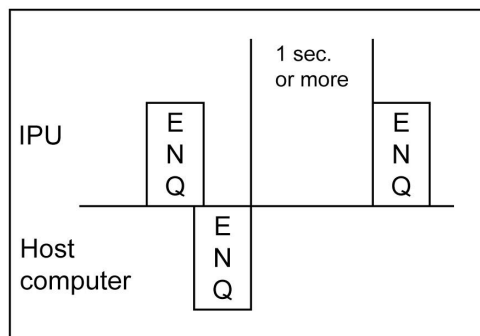
- Returns an [ACK] signal when communications are enabled.
- Returns a [NAK] when communications are disabled.

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



- 2) When both sender and receiver send [ENQ] signals, the host computer must yield control authority to the IPU.

- The IPU sends [ENQ] again after 1 second.
- The host computer must wait for 20 seconds before sending [ENQ] again.



### 4.2.3 Transfer Phase

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

- 1) Messages are sent in each record with multiple frames.  
Each frame contains a maximum of 64,000 characters\* (including frame overhead).  
If the record is longer than 63,993 characters\*, it is divided into two or more frames.

Note \*: When using a serial connection, in order to maintain compatibility with ASTM E1381-95, the maximum number of characters in a record is set to 240 characters. For complete compatibility with ASTM E1381-02, it is necessary to set the maximum number of characters in a record to 63,993 characters. For information on the setting procedures, please contact a Sysmex sales or service representative. When using TCP/ IP connection, the maximum number of characters is set to 63,993 characters.

- 2) Multiple records cannot be included in a single frame.
- 3) If the record is the maximum number of characters or less, it is transferred using a frame with the following structure.  
[STX] [F#] [Text] [ETX] [CHK1] [CHK2] [CR] [LF]

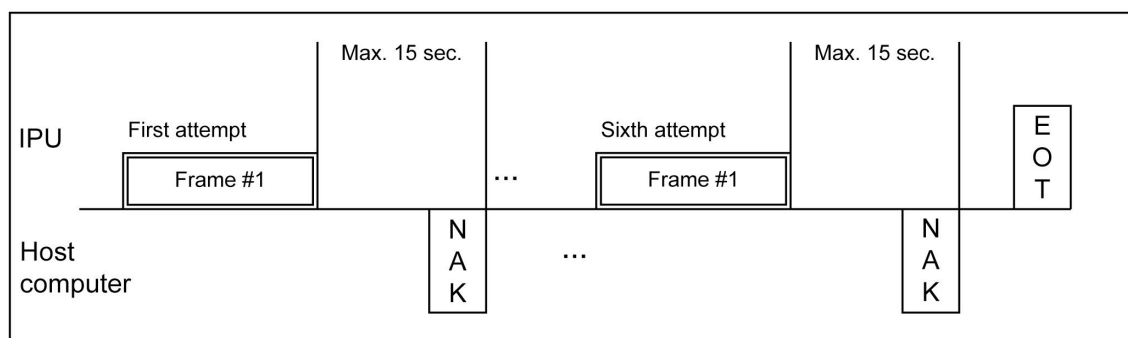
If the record is longer than the maximum number of characters, it is divided into 2 or more frames. The intermediate frame text termination code is [ETB], and the final frame text termination code is [ETX], as shown below.

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

Code	Explanation
[STX]	Start of a frame
[F#]	Frame number. One of the numbers 0 to 7 is used, starting 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 final frame)
[CHK1] [CHK2]	Expressed by characters '0' - '9' and 'A' - 'F'. Characters beginning from the character after [STX] and until [ETB] or [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 codes 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]. After the sender receives [ACK], sender advances the frame number and sends either 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]. After the sender receives [NAK], the sender sends the most recent frame again, using the same frame number. If a total of 6 attempts to send the frame failed, the sender transitions to the termination phase and must end sending of the message.



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

#### 4.2.4 Termination Phase

During the termination phase, the status returns to neutral.

The sender sends the [EOT] to inform the receiver that the message transmission has been completed. When the sender sends [EOT], the sender transitions to neutral status. When the receiver receives [EOT], the receiver transitions to neutral status.

#### 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 for communication line and communication destination device failures.

- 1) During the establishment phase, the timer is set when the sender sends [ENQ]. Time out results if a response of [ACK], [NAK], or [ENQ] is not received within 15seconds. After time out, 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. Time out results if no response is received within 15 seconds. After time out, the sender transitions to the termination phase.  
The receiver sets a 30-second timer when first entering the transfer phase or when responding (either [ACK] or [NAK] ) to a frame. Time out results if the receiver does not receive a frame or [EOT] from the sender within 30 seconds. After time out, the receiver discards the latest incomplete message and transitions to the termination phase.

## 4.3 Presentation Layer

### 4.3.1 Messages, Records and Fields

#### 4.3.1.1 Messages

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

#### 4.3.1.2 Records

A record is a series of text, beginning with an ASCII alphabet character referred to as the identifier, and ending with [CR] complete message.

Table 4: Records

Record Type	Record Identifier	Level	Contents
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 test order inquiry information requesting to the host computer
Test Order Record	O	2	Contains the test order information
Test Result Record	R	3	Contains the analysis result information
Comment Record	C	1 - 4	Contains the specimen comment and patient comment information
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 contains information that is common to all lower-level records.
- All levels other than 0 must be located after higher levels. The comment record can be inserted at any level. They are considered to be one level lower than the preceding record. However, the 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 in prior to R.

#### 4.3.1.3 Fields

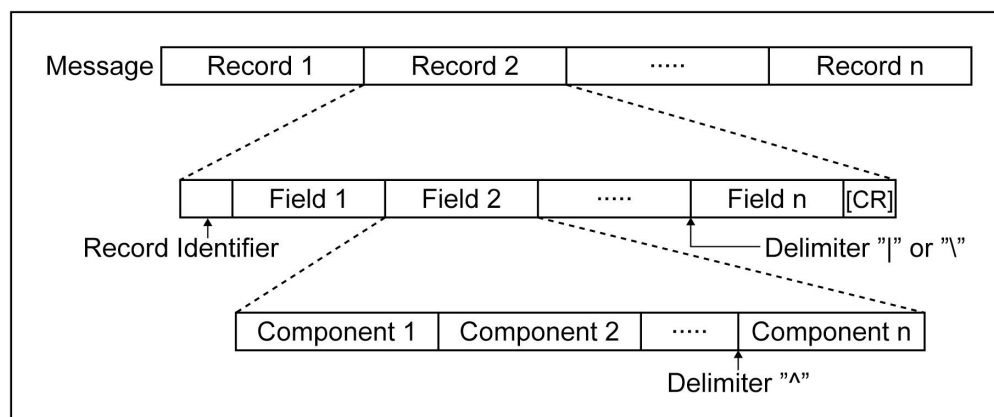
A record is further divided into multiple fields by field delimiters.

A field is identified by its position within a record, and has a variable length.

The followings are used as delimiters.

Table 5: Field Delimiters

Type	Code	Description
Field Delimiter	Vertical bar ( ) [7Ch]	Separates adjacent fields in a record.
Repeat Delimiter	Backslash (\) [5Ch]	Separates multiple number of descriptors in a field.
Component Delimiter	Caret (^) [5Eh]	Separates data elements within a field that has a hierarchical or qualifier nature.
Escape Delimiter	Ampersand (&) [26h]	Is used within a text field to identify special case operations.



## 4.3.2 Communication Protocol

### 4.3.2.1 Analysis Order Inquiry (IPU → Host computer)

This protocol is used for XE-2100 series to inquire to the host computer an analysis order information to obtain the sample information. Inquiry can be made with keyword of either the Sample ID No. or the combination of Rack No. and Tube Position No..

Table 6: Analysis Order Inquiry

IPU	Direction	Host Computer
ENQ	→	
	←	ACK
H (Header Record)	→	
	←	ACK
Q (Request Record)	→	
	←	ACK
L (Message Terminator Record)	→	
	←	ACK
EOT	→	

Note: In case of TCP/ IP communication in ASTM E1381-95 mode, no treatment is performed for ENQ, ACK and EOT codes. Refer to Appendix A for more information.

### 4.3.2.2 Analysis Information (Host computer → IPU)

This protocol is used for the host computer to respond an analysis information against the inquiry made by the IPU. Comment record may be omitted.

Table 7: Analysis Information

IPU	Direction	Host Computer
	←	ENQ
ACK	→	
	←	H (Header Record)
ACK	→	
	←	P (Patient Record)
ACK	→	
	←	C (Patient Comment Record)
ACK	→	
	←	O (Test Order Record)
ACK	→	
	←	C (Specimen Comment Record)
ACK	→	
	←	L (Message Terminator Record)
ACK	→	
	←	EOT

Note: In case of TCP/ IP communication in ASTM E1381-95 mode, no treatment is performed for ENQ, ACK and EOT codes. Refer to Appendix A for more information.



#### 4.3.2.3 Analysis Results & QC Data (IPU → Host computer)

This protocol is used for the IPU to transmit the analysis results, the QC data in a real-time mode (QC sample No. is “QC-xxxxxx”, and transmitted as similar to the regular sample data), and the QC data in a manual batch mode (selected QC data is output in the QC Chart screen). When the QC data is to be output, the patient record contains nothing, thus an empty patient record is transmitted. Comment record may be omitted.

Table 8: Analysis Results and QC Data

IPU	Direction	Host Computer
ENQ	→	
	←	ACK
H (Header Record)	→	
	←	ACK
P (Patient Record)	→	
	←	ACK
C (Patient Comment Record)	→	
	←	ACK
O (Test Order Record)	→	
	←	ACK
C (Specimen Comment Record)	→	
	←	ACK
R (Result Record)	→	
	←	ACK
L (Message Terminator Record)	→	
	←	ACK
EOT	→	

Repeating the No.  
of parameters



Note: In case of TCP/ IP communication in ASTM E1381-95 mode, no treatment is performed for ENQ, ACK and EOT codes. Refer to Appendix A for more information.

### 4.3.3 Details of Record

#### 4.3.3.1 Header Record

[Example of transmission]

■ IPU → Host computer

H\^&|||XE-2100^00-18^11001^12345678|||||E1394-97[CR]

■ Host computer → IPU

H\^&|||||||E1394-97[CR]

Table 9: Details of Header Record

ASTM Field	Field Name	IPU → Host	Host → IPU	Max. Size (Bytes)	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	7^ 13^ 5^ 8	
7.1.6	Sender street address	Not used	Not used	-	
7.1.7	Reserved field	Not used	Not used	-	
7.1.8	Sender Telephone No.	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 No.	E1394-97	E1394-97	8	Fixed
7.1.14	Date and Time of message	Not used	Not used	-	

#### [Detailed Explanation of the fields]

##### 7.1.2 Delimiter definition

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

##### 7.1.5 Sender name or ID

Analyzer name is fixed as “XE-2100”, and software version is referred to the software version the XE-2100 series is working with.

#### 4.3.3.2 Patient Information Record

[Example of transmission]

■ IPU → Host computer

P|1||123456|^Johnson^Thomas||20010820|M|||||^Dr. M|||||||^^^West[CR]

■ Host computer → IPU

P|1||100|^Carol^Thomas||20010820|F|||||^Dr. N|||||||^^^East[CR]

Table 10: Details of Patient Information Record

ASTM Field	Field Name	IPU → Host	Host → IPU	Max. Size (Bytes)	Remarks
8.1.1	Record type	P	P	1	Fixed
8.1.2	Sequence No.	Sequence No.	Sequence No.	4	Sequence No. 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 No.	Patient ID	Patient ID	16	
8.1.6	Patient name	^First name ^Last name	^First name ^Last name	^20 ^20	
8.1.7	Mother's maiden name	Not used	Not used	-	
8.1.8	Birth date	YYYYMMDD	YYYYMMDD	8	Ex: 20010802 (for 2 <sup>nd</sup> of August 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	Not used	Not used	-	
8.1.13	Patient telephone No.	Not used	Not used	-	
8.1.14	Attending doctor ID	^Doctor name	^Doctor 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 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	DRG or AVG	Not used	Not used	-	
8.1.28	DRG or AVG 2	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	-	

### **[Detailed Explanation of the fields]**

**8.1.2 Sequence No.**

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 appears in the message.

**8.1.5 Patient ID No.**

The patient ID is a unique patient identification and may contain a maximum of 16 digits of alpha-numeric and hyphen “-” (2D h).

**8.1.6 Patient name**

The first name and the last name may be 20 characters each with consisting of alpha-numeric.

**8.1.8 Birth date**

The birth date is the date of birth of the patient, and the date format is fixed with “YYYYMMDD”. Here, YYYY indicates the year, MM the month, and DD the day.

**8.1.9 Patient sex**

The patient sex is indicated with M, F or U. Here, M indicates male, F female, and U unknown.

**8.1.14 Attending doctor ID**

The attending doctor ID may be entered with a maximum of 20 characters of alpha-numeric.

**8.1.26 Location**

The patient ward name may be entered with a maximum of 20 characters of alpha-numeric.

#### 4.3.3.3 Request Information Record

[Example of transmission]

■ IPU → Host computer

Q|1|1^1^ 1234567890^B|||20010905150000[CR]

■ Host computer → IPU

Not used

Table 11: Details of Request Information Record

ASTM Field	Field Name	IPU → Host	Host → IPU	Max. Size (Bytes)	Remarks
12.1.1	Record Type	Q	Not used	1	Fixed
12.1.2	Sequence No.	Sequence No.	Not used	4	Sequence No. of records
12.1.3	Starting Range ID No.	Rack No.^ Tube Position^ Sample No.^ Sample No. attribute	Not used	6^ 2^ 15^ 1	Sample No. attribute is one of followings; M: Manual entry A: Automatic assignment by analyzer B: Barcode reader input
12.1.4	Ending Range ID No.	Not used	Not used	-	
12.1.5	Universal test ID	Not used	Not used	-	
12.1.6	Nature of request time limit	Not used	Not used	-	
12.1.7	Beginning request results date and time	YYYYMMDD HHMMSS	Not used	14	
12.1.8	Ending request results date and time	Not used	Not used	-	
12.1.9	Requesting doctor name	Not used	Not used	-	
12.1.10	Requesting doctor telephone No.	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 code	Not used	Not used	-	

#### [Detailed Explanation of the fields]

##### 12.1.2 Sequence No.

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 appears in the message.

##### 12.1.3 Starting Range ID No.

Rack No.

Up to 6-digit number assigned to the rack.

Note that when XE is built with a conveyor system and a real-time inquiry is performed, Rack No. will be a fixed 6-digit number by aligning to the right and padding zeros to the most significant digits.

Tube Position No.

The sample position number within a rack, and is one of the numbers 01 through 10.

Sample ID No.

Consisted of 15-digit of alpha-numeric and hyphen "-" (2D h). When the Sample ID No. is less than 15 digits, the number is aligned to the right and spaces are padded to the most significant digits.

Note that when XE is built with a conveyor system and there are zeros in the most significant digits, zeros are removed (suppressed). And then, the number is aligned to the right and spaces are padded to the most significant digits.

Example: "0301220001" → " 301220001"

Additionally, when XE is built with a conveyor system, depending on the setting of the system, there is a case that zeros are padded to the most significant digits.

Example: "0301220001" → "000000301220001"

[Note 1] In the manual mode analysis and in the real-time inquiry, Sample ID No. is the keyword to inquire. Both the Rack No. and the Tube Position No. will not be set.

[Note 2] In the batch inquiry using the work list, both the Rack No. and the Tube Position No. are the keyword to inquire. The Sample ID No. will not be set.

Sample No. attribute    M: Sample ID No. is manually entered through the Main Unit keypad.  
                              A: Automatically assigned number by the analyzer. This number is assigned by the automatic-increment function, and is used to set the sample number that is started with “ERR”, which is used when the ID Read Error occurred.  
                              B: Barcode reader read number. This is used when the Sample ID No. is read by the ID bar code reader.

#### 12.1.7 Beginning request results date and time

The date format is fixed with “YYYYMMDDHHMMSS”.

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

#### 4.3.3.4 Test Order Record

[Example of transmission]

■ IPU → Host computer

O|1|^123-4567-890123^B|^WBC\RBC\...\NRBC#||||N|||||F[CR]

■ Host computer → IPU

O|1|^123-4567-890123^B|^WBC\RBC\...\NRBC#||20010807101000||||N|||||Q[CR]

Table 12: Details of Test Order Record

ASTM Field	Field Name	IPU → Host	Host → IPU	Max. Size (Bytes)	Remarks
9.4.1	Record type	O	O	1	Fixed
9.4.2	Sequence No.	Sequence No.	Sequence No.	4	Sequence No. of records
9.4.3	Specimen ID	Not used	Rack No.^ Tube Position^ Sample No.^ Sample No. attribute	6^ 2^ 15^ 1	Sample No. attribute is one of followings; M: Manual entry A: Automatic assignment by analyzer B: Barcode reader input
9.4.4	Instrument specimen ID	Rack No.^ Tube Position^ Sample No.^ Sample No. attribute	Not used	6^ 2^ 15^ 1^	
9.4.5	Universal test ID	^^^^Parameter	^^^^Parameter	^^^^6	Test Order of each analysis parameter
9.4.6	Priority	Not used	Not used	-	
9.4.7	Requested/ order date and time	Not used	YYYYMMDD HHMMSS	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, Q	N, Q	1	N: Normal sample Q: QC material
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 doctor	Not used	Not used	-	
9.4.18	Doctor telephone No.	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	-	

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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	Y, Q	1	F: Final results (Fixed) Y: No test order Q: Response to inquiry
9.4.27	Reserved field	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	Material service	Not used	Not used	-	
9.4.31	Material institution	Not used	Not used	-	

#### [Detailed Explanation of the fields]

##### 9.4.2 Sequence No.

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 appears in the message.

##### 9.4.3 Specimen ID

Rack No. Up to 6-digit number assigned to the rack. Return the same number that was inquired.

Tube Position No. The sample position number within a rack, and is one of the numbers 01 through 10. Return the same number that was inquired.

Sample ID No. Consisted of 15-digit of alpha-numeric and hyphen "-" (2D h). The Sample ID No. starting with "QC" is reserved for the quality control samples. For the real-time inquiry using the Sample ID No., return the same number inquired. For the real-time inquiry using the Rack No. and Tube Position No., or for the batch inquiry using the work list, assign the Sample ID No. from the sample that is positioned in the specified Rack No. and Tube Position No..

Sample No. attribute M: Sample ID No. is manually entered through the Main Unit keypad.  
A: Automatically assigned number by the analyzer. This number is assigned by the automatic-increment function, and is used to set the sample number that is started with "ERR", which is used when the ID Read Error occurred.  
B: Barcode reader read number. This is used when the Sample ID No. was read by the ID bar code reader.

##### 9.4.4 Instrument Specimen ID

Rack No. Rack No. that was used to analyze, and is consisted with a 6-digit number. Note that when XE is built with a conveyor system and a real-time inquiry is performed, the Rack No. will be a fixed 6-digit number by aligning to the right and padding zeros to the most significant digits.

Tube Position No. The sample position number within a rack, and is one of the numbers 01 through 10.

Sample ID No. There are cases that the bar code read error number, QC sample number, or QC file number may be set in addition to the usual 15-digit Sample ID No.

Usual sample No. Consisted of 15-digit of alpha-numeric and hyphen "-" (2D h). When the Sample ID No. is less than 15 digits, the number is aligned to the right and spaces are padded to the most significant digits. Note that when XE is built with a conveyor system and there are zeros in the most significant digits, zeros are removed (suppressed). And then, the number is aligned to the right and spaces are padded to the most significant digits.  
Example: "0301220001" → " 301220001"  
Additionally, when XE is built with a conveyor system, depending on the setting of the system, there is a case that zeros are padded to the most significant digits.  
Example: "0301220001" → "000000301220001"



Bar code read error No.	<p>The most significant 3-digit is fixed with “ERR” and remaining 12-digit with numeric. Note that when XE is built with a conveyor system, Sample ID No. becomes “ERR” with 10-digit numeric and spaces are padded to the most significant digits.</p> <p>Example: “ ERR0000000001”</p> <p>Additionally, when XE is built with a conveyor system, depending on the setting of the system, there is a case that zeros are padded to the most significant digits.</p> <p>Example: “00ERR0000000001”</p>
QC sample number	<p>The most significant 3-digit is fixed with “QC-” and remaining 12-digit with alpha-numeric and hyphen “-” (2D h). This QC sample number is used when QC data is output to the host in a real time bases. When the QC sample number is less than 15 digits, the number is aligned to the right and spaces are padded to the most significant digits. Note that when XE is built with a conveyor system, there is a case that zeros are padded to the most significant digits, depending on the setting of the system.</p>
QC File No.	<p>Outputs the file No. “1” through “40” or “XbarM”, and is used to output the QC data manually. Refer to Table 13.</p>
Sample No. attribute	<p>M: Sample ID No. is manually entered through the Main Unit keypad.</p> <p>A: Automatically assigned number by the analyzer. This number is assigned by the automatic-increment function, and is used to set the sample number that is started with “ERR”, which is used when the ID Read Error occurred.</p> <p>B: Barcode reader read number. This is used when the Sample ID No. was read by the ID bar code reader.</p>

[Note] The manual output of the QC data (QC Chart output) will not set the Rack No., Tube Position No. and Sample No. attribute.

Table 13: QC File Number Table

Analysis Mode	Lot	Control Material	Level	QC File No.
Manual	Current	e-CHECK	Level 1	1
			Level 2	2
			Level 3	3
		Other 1	-	7
		Other 2	-	8
	New	e-CHECK	Level 1	11
			Level 2	12
			Level 3	13
		Other 1	-	17
		Other 2	-	18
Closed	Current	e-CHECK	Level 1	21
			Level 2	22
			Level 3	23
		Other 1	-	27
		Other 2	-	28
	New	e-CHECK	Level 1	31
			Level 2	32
			Level 3	33
		Other 1	-	37
		Other 2	-	38

#### 9.4.5 Universal test ID

When an order is sent from the host computer to the IPU, set the parameter that is to be ordered.

When a multiple parameters are to be set, use a repeat delimiter (\).

Example: “^^^^parameter1\^^^^parameter2\^^^^parameter3”

Table 14: Abbreviation of Universal Test ID

Abbreviated parameter name	Parameter name
WBC	Number of all leucocytes
RBC	Number of all erythrocytes
HGB	Hemoglobin concentration
HCT	Hematocrit value: Erythrocytes ratio of total blood volume
MCV	Mean erythrocyte volume in total sample
MCH	Mean hemoglobin volume per RBC
MCHC	Mean hemoglobin concentration of erythrocytes
PLT	Number of all platelets
NEUT%	Neutrophil Percent
LYMPH%	Lymphocyte Percent
MONO%	Monocyte Percent
EO%	Eosinophil Percent
BASO%	Basophil Percent
NEUT#	Neutrophil Count
LYMPH#	Lymphocyte Count
MONO#	Monocyte Count
EO#	Eosinophil Count
BASO#	Basophil Count
NRBC% <sup>*4</sup>	Nucleated RBC Percent
NRBC# <sup>*4</sup>	Nucleated RBC Count
RDW-SD	Calculated distribution width of erythrocytes, standard deviation
RDW-CV	Calculated distribution width of erythrocytes, coefficient of variation
PDW <sup>*1</sup>	Calculated distribution width of platelets
MPV	Mean platelet volume
P-LCR <sup>*1</sup>	Platelet- Large Cell Ratio
PCT <sup>*1</sup>	Plateletcrit
RET% <sup>*3</sup>	Reticulocyte Percent
RET# <sup>*3</sup>	Reticulocyte Count
IRF <sup>*3</sup>	Immature Reticulocyte Fraction
LFR <sup>*1, *3</sup>	Low Fluorescence Ratio
MFR <sup>*1, *3</sup>	Middle Fluorescence Ratio
HFR <sup>*1, *3</sup>	High Fluorescence Ratio

When the IPU sends analysis results to the host computer, analyzed parameters are set.

[When Analysis parameters are output (analysis results output, QC data real time output)]

WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, RDW-SD, RDW-CV, PDW<sup>\*1</sup>, MPV, P-LCR<sup>\*1</sup>, PCT<sup>\*1</sup>, NEUT#, LYMPH#, MONO#, EO#, BASO#, NEUT%, LYMPH%, MONO%, EO%, BASO%, NRBC#<sup>\*4</sup>, NRBC%<sup>\*4</sup>, RET#<sup>\*3</sup>, RET%<sup>\*3</sup>, IRF<sup>\*3</sup>, LFR<sup>\*1, \*3</sup>, MFR<sup>\*1, \*3</sup>, HFR<sup>\*1, \*3</sup>, IG#<sup>\*2-1</sup>, IG%<sup>\*2-1</sup>, HPC#<sup>\*2-2, \*4</sup>, RET-He<sup>\*2-3, \*3</sup>, IPF<sup>\*2-4, \*3</sup>

[When QC chat parameters are output (QC data manual output)]

WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, RDW-SD, RDW-CV, PDW, MPV, P-LCR, PCT, NEUT#, LYMPH#, MONO#, EO#, BASO#, NEUT%, LYMPH%, MONO%, EO%, BASO%, NRBC#<sup>\*4</sup>, NRBC%<sup>\*4</sup>, RET#<sup>\*3</sup>, RET%<sup>\*3</sup>, IRF<sup>\*3</sup>, LFR<sup>\*3</sup>, MFR<sup>\*3</sup>, HFR<sup>\*3</sup>, IG#<sup>\*2-1</sup>, IG%<sup>\*2-1</sup>, HPC#<sup>\*2-2, \*4</sup>, RET-He<sup>\*2-3, \*3</sup>, IPF<sup>\*2-4, \*3</sup>, BASO-X, BASO-Y, DIFF-X, DIFF-Y, NRBC-X<sup>\*4</sup>, NRBC-Y<sup>\*4</sup>, IMI#<sup>\*4</sup>, IMI-DC<sup>\*4</sup>, IMI-RF<sup>\*4</sup>, RBC-O<sup>\*3</sup>, PLT-O<sup>\*3</sup>, RBC-X<sup>\*3</sup>, RBC-Y<sup>\*3</sup>, d-RBC<sup>\*3</sup>, d-PLT<sup>\*3</sup>, Dw/X<sup>\*3</sup>, Dw/Y<sup>\*3</sup>

- \*1: These parameters are not output if the software is the North American specifications.
- \*2-1: Analysis results are output when XE IG master software is installed and if either NEUT# or NEUT% is ordered.
- \*2-2: Analysis results are output when XE HPC master software is installed and if analyzed in the HPC mode. HPC# in the QC chart parameter is output when XE HPC master software is installed.
- \*2-3: Analysis results are output when XE RET master software is installed and if either RET#, RET%, LFR, MFR, HFR or IRF is ordered.
- \*2-4: Analysis results are output when XE IPF master software is installed and if either RET#, RET%, LFR, MFR, HFR or IRF is ordered.
- \*3: XE-2100L and XE-2100D will not output this parameter.
- \*4: XE-2100D will not output this parameter.

#### 9.4.7 Requested/ order data and time

Indicates the date and time of the analysis for the inquired sample.

The format is pre-fixed as “YYYYMMDDHHMMSS”.

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

#### 9.4.12 Action code

Indicates the contents of the result record sent.

N: Normal sample

Q: QC sample

#### 9.4.26 Report type

Indicates the report type.

F: Final result (Fixed. The IPU will always output the final results.)

Y: No test order exists. (Use this when no order exists for the inquiry.)

Q: Response to the inquiry. (Use this when an order exists for the inquiry.)

[Note] When there is no analysis order exists, the analyzer will analyze the sample with a default order.  
If “Q” is not set, the analyzer will determine that there is no analysis order.

#### 4.3.3.5 Result Record

[Example of transmission]

■ IPU → Host

R|1|^^^^WBC^1|7.80|10\*3/μL||N|||||20011116101000[CR]

R|2|^^^^RBC^1|4.20|10\*6/μL||A|||||20011116101000[CR]

...  
R|18|^^^^PCT\_C(S)?|200|||A|||||20011116101000[CR]

■ Host → IPU

Not used

Table 15: Details of Result Record

ASTM Field	Field Name	IPU → Host	Host → IPU	Max. Size (Bytes)	Remarks
10.1.1	Record type	R	Not used	1	
10.1.2	Sequence No.	Sequence No.	Not used	4	Sequence No. of records
10.1.3	Universal test ID	^^^^Parameter^ Dilution ratio^^ Extended order result	Not used	^^^^27^ 1^^ 1	Dilution ratio is one of followings; 1: Non-capillary mode 5: Capillary mode
10.1.4	Data or measurement value	Value	Not used	-	
10.1.5	Units	Unit	Not used	7	
10.1.6	Reference ranges	Not used	Not used	-	
10.1.7	Result abnormal flags	L, H, >, N, A, W	Not used	1	L: Lower than patient limit H: Higher than patient limit >: Out of linearity range N: Normal A: Analysis error or hardware problem W: Low reliability
10.1.8	Nature of abnormality testing	Not used	Not used	-	
10.1.9	Result status	Not used	Not used	-	
10.1.10	Date of change in instrument normative values	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	YYYYMMDD HHMMSS	Not used	14	
10.1.14	Instrument identification	Not used	Not used	-	

[Detailed Explanation of the fields]

10.1.2 Sequence No.

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 appears in the message.

10.1.3 Universal test ID through 10.1.13 Date/ time test completed

Each field is set differently due to the contents of transmission.

## 2.1) Analysis data output

When analysis parameters are output, those parameters that were ordered are output.

**Table 16: Analysis Parameter List**

10.1.3 Parameter name	Universal test ID		10.1.4 Data or measurement value <sup>*1</sup>	10.1.5 Units	10.1.7 Result abnormal flag	10.1.13 Date / time test completed
Dilution ratio	Extended order					
WBC	1 or 5	W or none <sup>*5</sup>	000.00	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
RBC	1 or 5	Not used	00.00	10 <sup>6</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
HGB <sup>*6</sup>	1 or 5	Not used	000.0	g/ dL	L, H, >, N, A or W	YYYYMMDDHHMMSS
HCT	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
MCV	1 or 5	Not used	000.0	fL	L, H, >, N, A or W	YYYYMMDDHHMMSS
MCH <sup>*6</sup>	1 or 5	Not used	000.0	pg	L, H, >, N, A or W	YYYYMMDDHHMMSS
MCHC <sup>*6</sup>	1 or 5	Not used	000.0	g/ dL	L, H, >, N, A or W	YYYYMMDDHHMMSS
PLT	1 or 5	W or none <sup>*4</sup>	0000	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
NEUT%	1 or 5	W or none <sup>*2-1</sup>	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
LYMPH%	1 or 5	W or none <sup>*5</sup>	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
MONO%	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
EO%	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
BASO%	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
NEUT#	1 or 5	W or none <sup>*2-1</sup>	000.00	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
LYMPH#	1 or 5	W or none <sup>*5</sup>	000.00	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
MONO#	1 or 5	Not used	000.00	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
EO#	1 or 5	Not used	000.00	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
BASO#	1 or 5	Not used	000.00	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
IG% <sup>*2-1</sup>	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
IG# <sup>*2-1</sup>	1 or 5	Not used	000.00	10 <sup>3</sup> μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
NRBC% <sup>*5</sup>	1 or 5	Not used	0000.0	/ 100WBC	L, H, >, N, A or W	YYYYMMDDHHMMSS
NRBC# <sup>*5</sup>	1 or 5	Not used	000.00	10 <sup>3</sup> μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
RDW-SD	1 or 5	Not used	000.0	fL	L, H, >, N, A or W	YYYYMMDDHHMMSS
RDW-CV	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
PDW <sup>*3</sup>	1 or 5	Not used	000.0	fL	L, H, >, N, A or W	YYYYMMDDHHMMSS
MPV	1 or 5	Not used	000.0	fL	L, H, >, N, A or W	YYYYMMDDHHMMSS
P-LCR <sup>*3</sup>	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
PCT <sup>*3</sup>	1 or 5	Not used	00.00	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
RET% <sup>*4</sup>	1 or 5	Not used	00.00	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
RET# <sup>*4</sup>	1 or 5	Not used	0.0000	10 <sup>6</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
IRF <sup>*4</sup>	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
LFR <sup>*3, *4</sup>	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
MFR <sup>*3, *4</sup>	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
HFR <sup>*3, *4</sup>	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS
HPC# <sup>*2-2, *5</sup>	1 or 5	Not used	00.000	10 <sup>3</sup> / μL	L, H, >, N, A or W	YYYYMMDDHHMMSS
RET-He <sup>*2-3, *4, *6</sup>	1 or 5	Not used	000.0	pg	L, H, >, N, A or W	YYYYMMDDHHMMSS
IPF <sup>*2-4, *4</sup>	1 or 5	Not used	000.0	%	L, H, >, N, A or W	YYYYMMDDHHMMSS

\*1: Data or measurement value indicates the maximum number of digits and placement of the decimal point.

\*2-1: Analysis results are output when XE IG master software is installed and if either NEUT# or NEUT% is ordered.

\*2-2: Analysis results are output when XE HPC master software is installed and if analyzed in the HPC mode.

\*2-3: Analysis results are output when XE RET master software is installed and if either RET#, RET%, LFR, MFR, HFR or IRF is ordered.

\*2-4: Analysis results are output when XE IPF master software is installed and if either RET#, RET%, LFR, MFR, HFR or IRF is ordered.

\*3: These parameters are not output if the software is the North American specifications.

\*4: XE-2100L and XE-2100D will not output this parameter.

\*5: XE-2100D will not output this parameter.

\*6: When using the Holland SI unit system, data value and units are output as follows.

Parameter name	Data or measurement value	Units
HGB	000.0	mmol/ L
MCH	0000	amol
MCHC	000.0	mmol/ L
RET-He	0000	amol

#### 10.1.3 Universal test ID

Parameter name: Parameter name is output.  
Dilution ratio: "1" indicates either Manual mode, Sampler mode, or Closed mode.  
"5" indicates capillary mode.  
Extended order result: "W" is set when WBC, LYMPH# and LYMPH% are compensated by NRBC and PLT-O is selected in PLT.  
"W" is set when NEUT is compensated by IG when XE IG master is installed.

#### 10.1.4 Data or measurement value

Analysis data of calculation parameter is output. When analysis data is subject to the masking due to the hardware problems, analysis data is masked in the same way that is applied to the IPU display.  
"----": Analysis error or hardware error  
"++++": Overflow from the display range or internal computer range.

#### 10.1.5 Units

Unit for the analysis parameter is output.

#### 10.1.7 Result abnormal flags

Abnormal flags of the analysis result are output.  
L: indicates that the result is lower than the normal range.  
H: indicates that the result is higher than the normal range.  
>: indicates that the result is out of the linearity range.  
N: indicates that the result is normal.  
A: indicates that the result is abnormal, such as analysis error or hardware error.  
W: indicates that the result is flagged with a low reliability mark.

#### 10.1.13 Date / time test completed

Indicates the date and time the test was completed.  
The format is pre-fixed as "YYYYMMDDHHMMSS".  
Here, YYYY indicates the year, MM the month, DD the day, HH the hour in the 24-hour system (00-23), MM the minute (00-59), and SS the second (00-59).

## 2.2) QC Chart data output

When QC Chart parameters are output, those parameters that were ordered are output.

Each field is set differently due to the contents of transmission.

Table 17: QC Parameter List

10.1.3 Parameter name	Universal Dilution ratio	test ID Extended order	10.1.4 Data or measurement value <sup>*1</sup>	10.1.5 Units	10.1.7 Result abnormal flag	10.1.13 Date / time test completed
WBC	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
RBC	1	Not used	00.00	10*6/ $\mu$ L	N or A	YYYYMMDDHHMMSS
HGB <sup>*5</sup>	1	Not used	000.0	g/ dL	N or A	YYYYMMDDHHMMSS
HCT	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
MCV	1	Not used	000.0	fL	N or A	YYYYMMDDHHMMSS
MCH <sup>*5</sup>	1	Not used	000.0	pg	N or A	YYYYMMDDHHMMSS
MCHC <sup>*5</sup>	1	Not used	000.0	g/ dL	N or A	YYYYMMDDHHMMSS
PLT	1	Not used	0000	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
NEUT%	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
LYMPH%	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
MONO%	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
EO%	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
BASO%	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
NEUT#	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
LYMPH#	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
MONO#	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
EO#	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
BASO#	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
IG% <sup>*2-1</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
IG# <sup>*2-1</sup>	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
NRBC% <sup>*4</sup>	1	Not used	0000.0	/ 100WBC	N or A	YYYYMMDDHHMMSS
NRBC# <sup>*4</sup>	1	Not used	000.00	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
RDW-SD	1	Not used	000.0	fL	N or A	YYYYMMDDHHMMSS
RDW-CV	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
PDW	1	Not used	000.0	fL	N or A	YYYYMMDDHHMMSS
MPV	1	Not used	000.0	fL	N or A	YYYYMMDDHHMMSS
P-LCR	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
PCT	1	Not used	00.00	%	N or A	YYYYMMDDHHMMSS
RET% <sup>*3</sup>	1	Not used	00.00	%	N or A	YYYYMMDDHHMMSS
RET# <sup>*3</sup>	1	Not used	0.0000	10*6/ $\mu$ L	N or A	YYYYMMDDHHMMSS
IRF <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
LFR <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
MFR <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
HFR <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
HPC# <sup>*2-2</sup>	1	Not used	00.000	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
RET-He <sup>*2-3, *3, *5</sup>	1	Not used	000.0	pg	N or A	YYYYMMDDHHMMSS
IPF <sup>*2-4, *3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
BASO-X	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
BASO-Y	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
DIFF-X	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
DIFF-Y	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
NRBC-X <sup>*4</sup>	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
NRBC-Y <sup>*4</sup>	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
IMI# <sup>*4</sup>	1	Not used	00000	CNT	N or A	YYYYMMDDHHMMSS
IMI-DC <sup>*4</sup>	1	Not used	000.0	fL	N or A	YYYYMMDDHHMMSS
IMI-RF <sup>*4</sup>	1	Not used	000.0	fL	N or A	YYYYMMDDHHMMSS
RBC-O <sup>*3</sup>	1	Not used	00.00	10*6/ $\mu$ L	N or A	YYYYMMDDHHMMSS
PLT-O <sup>*3</sup>	1	Not used	0000	10*3/ $\mu$ L	N or A	YYYYMMDDHHMMSS
RBC-X <sup>*3</sup>	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
RBC-Y <sup>*3</sup>	1	Not used	000.0	ch	N or A	YYYYMMDDHHMMSS
d-RBC <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
d-PLT <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
Dw/X <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS
Dw/Y <sup>*3</sup>	1	Not used	000.0	%	N or A	YYYYMMDDHHMMSS

- \*1: Data or measurement value indicates the maximum number of digits and placement of the decimal point.
- \*2-1: Analysis results are output when XE IG master software is installed.
- \*2-2: Analysis results are output when XE HPC master software is installed.
- \*2-3: Analysis results are output when XE RET master software is installed.
- \*2-4: Analysis results are output when XE IPF master software is installed.
- \*3: XE-2100L and XE-2100D will not output this parameter.
- \*4: XE-2100D will not output this parameter.
- \*5: When using the Holland SI unit system, data value and units are output as follows.

Parameter name	Data or measurement value	Units
HGB	000.0	mmol/ L
MCH	0000	amol
MCHC	000.0	mmol/ L
RET-He	0000	amol

#### 10.1.3 Universal test ID

Parameter name: QC parameter name is output.  
Dilution ratio: Fixed to "1".  
Extended order result: Not used.

#### 10.1.4 Data or measurement value

QC parameter is output. When QC data is subject to the masking due to the hardware problems, QC data is masked in the same way that is applied to the IPU display.  
"----": Analysis error or hardware error  
"+++++": Overflow from the display range or internal computer range.

#### 10.1.5 Units

Unit for the QC parameter is output.

#### 10.1.7 Result abnormal flags

Abnormal flags of the QC data are output.  
N: indicates that the result is normal.  
A: indicates that the result is abnormal, such as analysis error or hardware error.

#### 10.1.13 Date/ time test completed

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



### 2.3) Abnormal IP Message output

Only those parameters with IP Messages are output.

**Table 18: Abnormal IP Message List**

10.1.3 Universal test ID			10.1.4 Data or measurement value	10.1.5 Units	10.1.7 Result abnormal flag	10.1.13 Date / time test completed
Parameter name	Dilution ratio	Extended order				
WBC_Abn_Scattergram	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
NRBC_Abn_Scattergram <sup>*3</sup>	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Neutropenia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Neutrophilia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Lymphopenia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Lymphocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Leukocytopenia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Leukocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Monocytosis	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Eosinophilia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Basophilia	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
NRBC_Present <sup>*3</sup>	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
IG_Present <sup>*1</sup>	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 <sup>*2</sup>	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
Reticulocytosis <sup>*2</sup>	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
PLT_Abn_Scattergram <sup>*2</sup>	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

\*1: Output when XE IG master is installed.

\*2: XE-2100L and XE-2100D will not output this message.

\*3: XE-2100D will not output this message.

#### 10.1.3 Universal test ID

Parameter name: IP message is output.

Dilution ratio: Not used.

Extended order result: Not used.

#### 10.1.4 Data or measurement value

Not used.

#### 10.1.5 Units

Not used.

#### 10.1.7 Result abnormal flags

A: indicates that the IP message is flagged.

#### 10.1.13 Date/ time test completed

Indicates the date and time the analysis was completed.

The format is pre-fixed as “YYYYMMDDHHMMSS”.

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

## 2.4) Suspect IP Message output

Only those parameters with Suspect IP message are output when the Q-Flag grade value is within the range.

**Table 19: Suspect IP Message List**

10.1.3 Universal test ID			10.1.4 Data or measurement value <sup>*1</sup>	10.1.5 Units	10.1.7 Result abnormal flag	10.1.13 Date / time test completed
Parameter name	Dilution ratio	Extended order				
Blasts?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
Immature_Gran?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
Left_Shift?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
NRBC?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
Atypical_Lympho?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
RBC_Lyse_Resistance?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
Abn_Lympho/ L-Blasts? <sup>*2</sup>	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
RBC_Agglutination?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
Turbidity/ HGB_Interference?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
Iron_Deficiency?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
HGB_Defect?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
Fragments?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
PLT_Clumps?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS
PLT_Clumps (S)?	Not used	Not used	000	Not used	A or none	YYYYMMDDHHMMSS

\*1: Data or measurement value indicates the maximum number of digits.

\*2: XE-2100D will display and output “Abn\_Lympho/ Blasts?”.

### 10.1.3 Universal test ID

Parameter name: IP message is output.

Dilution ratio: Not used.

Extended order result: Not used.

### 10.1.4 Data or measurement value

The Suspect IP message is output when the Q-Flag grade value is 0 to 300.

### 10.1.5 Units

Not used.

### 10.1.7 Result abnormal flags

A: indicates that the IP message is flagged.  
(None is output when no IP message is flagged.)

### 10.1.13 Date/ time test completed

Indicates the date and time the analysis was completed.

The format is pre-fixed as “YYYYMMDDHHMMSS”.

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

## 2.5) Action Message output

Only those parameters flagged with Action message are output.

**Table 20: Action Message List**

10.1.3 Universal test ID			10.1.4 Data or measurement value	10.1.5 Units	10.1.7 Result abnormal flag	10.1.13 Date / time test completed
Parameter name	Dilution ratio	Extended order				
ACTION_MESSAGE_RET <sup>*1</sup>	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_NRBC <sup>*2</sup>	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS
ACTION_MESSAGE_Delta	Not used	Not used	Not used	Not used	A	YYYYMMDDHHMMSS

\*1: XE-2100L and XE-2100D will not output this message.

\*2: XE-2100D will not output this message.

### 10.1.3 Universal test ID

Parameter name: Action message is output.

“ACTION\_MESSAGE\_RET”: Re-analyze RET.

“ACTION\_MESSAGE\_NRBC”: Re-analyze NRBC.

“ACTION\_MESSAGE\_Delta”: Delta Check Error

Dilution ratio: Not used.

Extended order result: Not used.

### 10.1.4 Data or measurement value

Not used.

### 10.1.5 Units

Not used.

### 10.1.7 Result abnormal flags

A: indicates that the action message is flagged.

### 10.1.13 Date/ time test completed

Indicates the date and time the analysis was completed.

The format is pre-fixed as “YYYYMMDDHHMMSS”.

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

## 2.6) Positive/ Error output

Only those parameters flagged with Positive/ Error information are output.

**Table 21: Positive and Error Information List**

10.1.3 Universal test ID			10.1.4 Data or measurement value	10.1.5 Units	10.1.7 Result abnormal flag	10.1.13 Date / time test completed
Parameter name	Dilution ratio	Extended order				
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

### 10.1.3 Universal test ID

Parameter name:

Positive/ Error information is output.

“Positive\_Diff”, “Positive\_Morph”, “Positive\_Count”:

indicates that the hematology analysis value has an abnormality.

“Error\_Func”:

indicates an analysis error other than ID read error occurred.

“Error\_Result”:

indicates one of analysis errors “Blood not asp.”, “Short sample”, or “Low count” occurred.

Dilution ratio: Not used.

Extended order result: Not used.

### 10.1.4 Data or measurement value

Not used.

### 10.1.5 Units

Not used.

### 10.1.7 Result abnormal flags

A: indicates that a Positive or Error is flagged.

### 10.1.13 Date/ time test completed

Indicates the date and time the analysis was completed.

The format is pre-fixed as “YYYYMMDDHHMMSS”.

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

## 2.7) Output of File path to image data

When image data exists, the file path to the image data are output.

**Table 22: Scattergram Information List**

10.1.3 Universal test ID			10.1.4 Data or measurement value	10.1.5 Units	10.1.7 Result abnormal flag	10.1.13 Date / time test completed
Parameter name	Dilution ratio	Extended order				
SCAT_DIFF	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_WBC/ BASO	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_IMI <sup>*2</sup>	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_RET <sup>*1</sup>	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_NRBC <sup>*2</sup>	Not used	Not used	File path	Not used	N	YYYYMMDDHHMMSS
SCAT_PLT-O <sup>*1</sup>	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

\*1: XE-2100L and XE-2100D will not output this message.

\*2: XE-2100D will not output this message.

### 10.1.3 Universal test ID

Parameter name: Type of image data set in the “data or measurement value” is output.

“SCAT\_DIFF”: DIFF scattergram image data  
 “SCAT\_WBC/ BASO”: WBC/ BASO scattergram image data  
 “SCAT\_IMI”: IMI scattergram image data  
 “SCAT\_RET”: RET scattergram image data  
 “SCAT\_NRBC”: NRBC scattergram image data  
 “SCAT\_PLT-O”: PLT-O scattergram image data  
 “DIST\_RBC”: RBC distribution data  
 “DIST\_PLT”: PLT distribution data

Dilution ratio: Not used.

Extended order result: Not used.

### 10.1.4 Data or measurement value

The file path to the image data is output. The symbol “\” used in the file path is converted to the escape sequence “&R&” and sent. The actual image data is written in the folder “C:\shared\PNG\ (date folder)”. Data value is output with the “PNG” and following file path. Date folder is pre-fixed in the “YYYYMMDD” format. The file name is determined with the date (“YYYYMMDDHHMM” fixed), the Sample ID No., and the type of image data, as shown in the following example.

Example: “PNG&R&20030930&R&2003\_09\_30\_12\_00\_1234567890\_DIFF.PNG”

In this case, the image file is stored in the folder name “C:\shared\PNG\20030930”, with the file name “2003\_09\_30\_12\_00\_1234567890\_DIFF.PNG”.

### 10.1.5 Units

Not used.

### 10.1.7 Result abnormal flag

“N” is always output.

### 10.1.13 Date/ time test completed

Indicates the date and time the analysis was completed.

The format is pre-fixed as “YYYYMMDDHHMMSS”.

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

#### 4.3.3.6 Comment Record

[Example of transmission]

■ IPU → Host computer

Not used

■ Host computer → IPU

C|1||patient comments[CR]

Table 23: Details of Comment Record

ASTM Field	Field Name	IPU → Host	Host → IPU	Max. Size (Bytes)	Remarks
11.1.1	Record type	C	C	1	
11.1.2	Sequence No.	Sequence No.	Sequence No.	4	Sequence No. of records
11.1.3	Comment source	Not used	Not used	-	
11.1.4	Comment text	Comments	Comments	140	100: Patient comments 40: Specimen comments
11.1.5	Comment type	Not used	Not used	-	

##### [Detailed Explanation of the fields]

##### 11.1.2 Sequence No.

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 appears in the message.

##### 11.1.4 Comment text

Patient comments: 100 characters or less of alpha-numeric for patient comments.

Specimen comments: 40 characters or less of alpha-numeric for specimen comments.

#### 4.3.3.7 Message Terminator Record

[Example of transmission]

■ IPU → Host computer

L|1|N[CR]

■ Host computer → IPU

L|1|N[CR]

Table 24: Message Terminator Record

ASTM Field	Field Name	IPU → Host	Host → IPU	Max. Size (Bytes)	Remarks
13.1.1	Record type	L	L	1	Fixed
13.1.2	Sequence No.	1	1	4	Always 1.
13.1.3	Terminator code	N	N	1	N: Normal termination

## 5. Examples of Communication

This example of communication is the case of serial connection.

### 5.1 Inquiry of Analysis Order (IPU → Host Computer)

#### 5.1.1 When making a Batch Inquiry from the work list:

IPU	<ENQ>
HC	<ACK>
IPU	<STX>1H \^&   XE-2100^00-22^11001^12345678      E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2Q 1 2^1   20011001153000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>3L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<EOT>

#### 5.1.2 When making a Real-Time Inquiry in the manual mode analysis:

IPU	<ENQ>
HC	<ACK>
IPU	<STX>1H \^&   XE-2100^00-22^11001^12345678      E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2Q 1 ^ 1234567890^B   20011001153000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>3L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<EOT>

#### 5.1.3 When making a Real-Time Inquiry in the sampler mode analysis:

IPU	<ENQ>
HC	<ACK>
IPU	<STX>1H \^&   XE-2100^00-22^11001^12345678      E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2Q 1 2^1^ 1234567890^B   20011001153000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>3L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<EOT>

## 5.2 Analysis Information (Host Computer → IPU)

### 5.2.1 When an Analysis Order exists:

HC	<ENQ>
IPU	<ACK>
HC	<STX>1H ^&       E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
HC	<STX>2P 1  100 ^Johnson^Thomas  20010820 M     ^Dr.1       ^^WEST<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
HC	<STX>3C 1  patient_comments<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
HC	<STX>4O 1 2^1^ 1234567890^B  ^WBC\^RBC\^HGB\^HCT\ ^MCV\^MCH\^MCHC\^PLT\^NEUT%\^LYMPH%\ ^MONO%\^EO%\^BASO%\^NEUT#\^LYMPH#\^MONO#\ ^EO#\^BASO#\^NRBC%\^NRBC#\^RDW-SD\^RDW-CV\ ^PDW\<ETB><CHK1><CHK2><CR><LF>
IPU	<ACK>
HC	<STX>5^MPV\^P-LCR\^PCT\^RET%\^RET#\^IRF\ ^LFR\^MFR\^HFR  20010807101000    N       Q<CR> <ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
HC	<STX>6C 1  specimen_comments<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
HC	<STX>7L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
IPU	<ACK>
HC	<EOT>

### 5.2.2 When no Analysis Order exists:

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



## 5.3 Analysis Results and QC Results (IPU → Host Computer)

### 5.3.1 Transmitting Analysis Results:

IPU	<ENQ>
HC	<ACK>
IPU	<STX>1H ^&   XE-2100^00-22^11001^12345678      E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2P 1  100 ^Johnson^Thomas  20010820 M     ^Dr.1       ^^^WEST <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>3C 1  patient_comments<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>4O 1  2^1^ 1234567890^B ^^^^WBC\^^^^RBC\^^^^HGB\^^^^HCT\ ^^^^MCV\^^^^MCH\^^^^MCHC\^^^^PLT\^^^^NEUT%\^^^^LYMPH%\ ^^^^MONO%\^^^^EO%\^^^^BASO%\^^^^NEUT#\^^^^LYMPH#\^^^^MONO#\ ^^^^EO#\^^^^BASO#\^^^^NRBC%\^^^^NRBC#\^^^^RDW-SD\^^^^RDW-CV\ ^^^^PDW\<ETB><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>5^^^^MPV\^^^^P-LCR\^^^^PCT\^^^^RET%\^^^^RET#\^^^^IRF\^^^^LFR\ ^^^^MFR\^^^^HFR     N     F<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>6C 1  specimen_comments<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>7R 1 ^^^^WBC^1^^^W 7.81 10*3/uL  N     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>0R 2 ^^^^RBC^1 --- 10*6/uL  A     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>1R 3 ^^^^HGB^1 20.5 g/dL  W     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2R 4 ^^^^HCT^1 40.3 %  W     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
	(Omitted)
IPU	<STX>7R 33 ^^^^PLT_Abn_Distribution     A     20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>0R 34 ^^^^Blasts? 0       20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>1R 35 ^^^^Immature_Gran? 40       20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2R 36 ^^^^Left_Shift? 0       20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>3R 37 ^^^^Atypical_Lympho? 0       20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>4R 38 ^^^^RBC_Lyse_Resistance? 10       20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>5R 39 ^^^^Abn_Lympho/L-Blasts? 100   A     20010806120000 <CR><ETX><CHK1><CHK2><CR><LF>

(To continue to next page)

(Continued from previous page)

HC	<ACK>
	(Omitted)
IPU	<STX>4R 46 ^^^^ACTION_MESSAGE_Delta   A<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>5R 47 ^^^^SCAT_DIFF PNG&R&20010806&R&2001_08_06_12_00_1234567890_DIFF.PNG   N     20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
	(Omitted)
IPU	<STX>5L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<EOT>

### 5.3.2 Transmitting QC Result in a real-time mode:

IPU	<ENQ>
HC	<ACK>
IPU	<STX>1H ^&   XE-2100^00-22^11001^^^^12345678     E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2P 1<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>3O 1 ^ QC-12345678^B ^^^^WBC\^^^^RBC\^^^^HGB\^^^^HCT\^^^^MCV\^^^^MCH\^^^^MCHC\^^^^PLT\^^^^NEUT%\^^^^LYMPH%\^^^^MONO%\^^^^EO%\^^^^BASO%\^^^^NEUT#\^^^^LYMPH#\^^^^MONO#\^^^^EO#\^^^^BASO#\^^^^NRBC%\^^^^NRBC#\^^^^RDW-SD\^^^^RDW-CV\^^^^PDW\^^<ETB><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>4^MPV\^^^^P-LCR\^^^^PCT\^^^^RET%\^^^^RET#\^^^^IRF\^^^^LFR\^^^^MFR\^^^^HFR     Q     F<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>5R 1 ^^^^WBC^1 7.58 10*3/uL  N     20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>6R 2 ^^^^RBC^1 4.49 10*6/uL  N     20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>7R 3 ^^^^HGB^1 13.3 g/dL  N     20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>0R 4 ^^^^HCT^1 37.3 %  N     20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
	(Omitted)
IPU	<STX>5R 33 ^^^^SCAT_DIFF PNG&R&20010806&R&2001_08_06_12_00_1234567890_DIFF.PNG   N     20010806120000<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
	(Omitted)
IPU	<STX>6L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<EOT>

### 5.3.3 Transmitting QC Result in a manual batch mode:

IPU	<ENQ>
HC	<ACK>
IPU	<STX>1H\ ^&   XE-2100^00-22^11001^12345678        E1394-97<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>2P 1<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>3O 1  ^1 ^^^^WBC\^^^^RBC\^^^^HGB\^^^^HCT\^^^^MCV\^^^^MCH\ ^^^^MCHC\^^^^PLT\^^^^NEUT%\^^^^LYMPH%\^^^^MONO%\^^^^EO%\ ^^^^BASO%\^^^^NEUT#\^^^^LYMPH#\^^^^MONO#\^^^^EO#\^^^^BASO#\ ^^^^NRBC%\^^^^NRBC#\^^^^RDW-SD\^^^^RDW-CV\^^^^PDW\^^^^MPV\ ^^^^P-LCR\<ETB><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>4^^^^PCT\^^^^RET%\^^^^RET#\^^^^IRF\^^^^LFR\^^^^MFR\^^^^HFR\ ^^^^BASO-X\BASO-Y\ DIFF-X\DIFF-Y\NRBC-X\NRBC-Y\IMI-DC\IMI-RF\ RBC-O\PLT-O\RBC-X\RBC-Y\d-PLT\Dw\X\Dw/Y     Q       F<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>5R 1 ^^^^WBC^1 7.58 10*3/uL  N     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>6R 2 ^^^^RBC^1 4.49 10*6/uL  N     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>7R 3 ^^^^HGB^1 13.3 g/dL  N     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>0R 4 ^^^^HCT^1 37.3 %\ N     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
	(Omitted)
IPU	<STX>5R 33 ^^^^BASO-X^1 69.7 ch  N     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<STX>6R 34 ^^^^BASO-Y^1 80.9 ch  N     20010806120000<CR> <ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
	(Omitted)
IPU	<STX>7L 1 N<CR><ETX><CHK1><CHK2><CR><LF>
HC	<ACK>
IPU	<EOT>

## Appendix A. TCP/ IP Communication

### A.1 Network Interface Layer

The network interface conforms to IEEE802.3.

Communication is performed by 10Base-T.

The RJ45 socket is used in a hub to connect with the IPU of XE-2100 series.

The cable of UTP category 5 should be used for communication.

### A.2 TCP/ IP

The IP address of the IPU for XE-2100 series is fixed. The default value is 192.168.28.142.

When this value is to be changed, please contact a Sysmex sales or service representative.

The IP address for the host computer can be set using the setting screen in the IPU of XE-2100 series. This IP address is fixed but can be changed by the setting screen in the IPU. The IP address may be selected other than “192.168.28.\*” that is used to communicate with the IPU of the analyzer.

The TCP port number of the IPU of XE-2100 series for host communication is fixed. The default value is 5000. This value may be changed in the IPU setting screen.

### A.3 Transmission Timing

Either a real-time transmission upon completion of each analysis, or a batch transmission from the stored data.

### A.4 Transmission Messages

- **In case of ASTM E1381-95 mode;**

Based on the TCP/ IP protocol, records defined by the presentation layer are transmitted to exchange messages. When transmitting, TCP connection has to be established. If not established, the IPU will start communication session in prior to the transmission. Messages exchanged are the records defined in the presentation layer, as listed in the following example.

[Example] Real-Time Inquiry

IPU→HC	H \^&   XE-2100^00-22^11001^12345678     E1394-97<CR> Q 1 2^1^ 1234567890^B   20011001153000<CR> L 1 N<CR>
HC→IPU	H \^&       E1394-97<CR> P 1   100 ^Johnson^Thomas  20010820 M     ^Dr.1       ^^WEST<CR> C 1  patient_comments<CR> O 1 2^1^ 1234567890^B  ^WBC^RBC^HGB^HCT\ ^MCH^MCHC^PLT^NEUT%^LYMPH%\ ^MONO%^EO%^BASO%^NEUT#^LYMPH#^MONO#\ ^EO#^BASO#^NRBC%^NRBC#^RDW-SD^RDW-CV\ ^PDW\ ^MPV^P-LCR^PCT^RET%^RET#^IRF\ ^LFR^MFR^HFR  20010807101000     N       Q<CR> C 1  specimen_comments<CR> L 1 N<CR>

Note that <CR> in the above example indicates “0D”, and no carriage return code is placed at the place where the text line is carriage returned.

- **In case of ASTM E1381-02 mode;**

The record defined in the presentation layer is exchanged, according to the transmission protocol based on the Section “4.2: Data Link Layer”. In prior to the data exchange, the TCP connection has to be established. If not, the IPU will automatically start session in prior to the data exchange. Refer to “5: Example of Communication” of this document for the examples of the communication control procedures. (However, the record division size sent by the IPU for serial connection is different than the size for TCP/ IP connection. Refer to “4.2.3: Transfer Phase”.)

[ end of document ]