APPENDIX A TECHNICAL INFORMATION

01. SCOPE

This host interface specification is applied to the serial communication or TCP/IP communication between the host computer and XE-2100, XE-2100L and XE-2100D.

02. REVISION HISTORY

The revision history is listed as from the development of the software.

Revision	Date Released	Contents of the changes
1.0	March 06, 2002	Initial version
1.1	June 21, 2002	In the 1.2: Optional Upgrade Software; - a description of the "XE HPC master" is added. In the "7: Analysis Data Format1" and "8: Analysis Data Format 2"; - a description is added that the instrument name is right-aligned and space-padding. - a description is added that Sample ID number is right-aligned and space-padding for the serial connection, or right-aligned and zero-padding for the TCP/IP connection. - an explanation for the Rack Number and Tube Position Number is added for the modes other than the sampler mode. - IG# and IG% are corrected to all spaces, instead of all zeros, when the XE IG master is not installed. - Dutch SI units are additionally described. - HPC# is added. - "HPC analysis mode" is added to the Analysis mode. - Size for the Reserved in the Analysis Data Format 1 is changed from 27 to 21. In "9: QC Data Format 1" and "10: QC Data Format 2"; - a description is added that the instrument name is right-aligned and space-padding. - Dutch SI units are additionally described. - HPC# is added. - Size for the Reserved in the QC Data Format 1 is changed from 53 to 48. - an explanation is added for the parameters other than the control parameters in 3) Numerical Data.
1.2	February 03, 2004	Applicable model of XE-2100D is added. Specifications in the Format A and Format B are unified.

Revision	Date Released	Contents of the changes
1.3	April 27, 2004	In the 1.2: Optional Upgrade Software; - a description of the “1.2.3 XE RET master” is added. A description of the “1.5 About Dutch SI units“ is added. In the “8 Analysis Data Format 2”; - RET-He is added to the Format A and Format B. - Size for the Reserved above ETX is changed. (The Format A is changed from 22 to 17.) (The Format B is changed from 21 to 16.) - a description is added to 19) WBC information that reads as; ”in the case of XE-2100D, ”0” is always output“. In the “9. QC Data Format 1”; - RET-He is added to the Format A and Format B. - Size for the Reserved upper the Manual/Closed is changed. (The Format A is changed from 51 to 47.) (The Format B is changed from 48 to 44.)
1.4	December 07, 2004	In the 1.2: Optional Upgrade Software; - a description of the “1.2.4 XE IPF master” is added. In the “8 Analysis Data Format 2”; - “Instrument name” is corrected to “Instrument ID”. - IPF is added, and the size of “Reserved” is changed accordingly. (The Format A is changed from 17 to 12.) (The Format B is changed from 16 to 11.) In the “9. QC Data Format 1”; - “Instrument name” is corrected to “Instrument ID”. - IPF is added, and the size of the “Reserved” above the “Manual/Closed” is changed accordingly. - Size for the Reserved upper the Manual/Closed is changed. (The Format A is changed from47 to 43.) (The Format B is changed from 44 to 40.) In the “10. QC Data Format 2”; - “Instrument name” is corrected to “Instrument ID”.
1.5	July 07, 2005	• Description was added on the “Analysis Data Format 1 with IP Messages”. • Description was added that the host computer is requested to send the analysis information to the XE-2100 using the “Analysis Information Format 1” and “Analysis Information Format 2”, upon receiving the inquiry from the XE-2100. • Description was added that the analysis data was sent from the XE-2100 using the “Analysis Data Format 1” and “Analysis Data Format 2”. • Description was added that the QC data was sent from the XE-2100 using the “QC Data Format 1” and “QC Data Format 2”.

1. About the instrument models and upgrade software

1.1 Instrument models; XE-2100, XE-2100L and XE-2100D

XE-2100L is built without the RET detector, 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.

XE-2100D is built without the IMI detector, NRBC detector and RET detector, 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.

1.2 Optional Upgrade Software

1.2.1 XE IG master

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

IG#, IG%,

IG Present (an IP message) [This is sent when the analysis data format 1 with IP Messages is used for the analysis data format.].

1.2.2 XE HPC master

When an optional upgrade software XE HPC master is installed to the XE-2100, XE-2100L or XE-2100D, following parameter will be available. For details about XE HPC master, please contact a Sysmex sales or service representative.

HPC#

1.2.3 XE RET master

When an optional upgrade software XE RET master is installed to the XE-2100, following parameter 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 an optional upgrade software XE IPF master is installed to the XE-2100, following parameter 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

1.3 About Format A and Format B

The number of digits for the analysis parameters and control data are different between Format A and Format B, as shown below. Analysis Information Inquiry Format is identical between them. Format B is pre-installed when the instrument is delivered from the factory.

	Format A	Format B
Year	2 digits	4 digits
NRBC%	4 digits	5 digits
IMI#	4 digits	5 digits

1.4 About parameters in the North American specification software

The North American specification software will not display nor output non-approved parameters (PDW, P-LCR, PCT, LFR, MFR and HFR). These parameters are marked with "*1" in the Format tables, and will output spaces or zeros such as " " or "00000". Spaces and zeros are output according to each parameter in each model, as shown below.

	XE-2100	XE-2100L	XE-2100D
PDW	" "	" "	" "
P-LCR	" "	" "	" "
PCT	" "	" "	" "
LFR	" "	"00000"	"00000"
MFR	" "	"00000"	"00000"
HFR	" "	"00000"	"00000"

If these parameters are ordered using the "5: Analysis Information Format 1", it is suggested to set "0" for these parameters.

1.5 About Dutch SI units

When Dutch SI units are selected on the XE, the HGB, MCH, MCHC and RET-He data is output from the IPU as shown in the following.

Parameter	Dutch SI units
HGB	10^{-1}mmol/L
MCH	amol
MCHC	10^{-1}mmol/L
RET-He	amol

1.6 About Analysis Data Format with IP Messages

Analysis data with IP Messages can be output. However, this format can be only used with Format B. When the IP Messages are desired to be output, the "Analysis Data Format 1 with IP Messages" is used instead of the "Analysis Data Format 1 (Standard)". As a result, one sample data is sent to the host computer both in the "Analysis Data Format 1 with IP Messages" and the "Analysis Data Format 2".
The selection of the "Analysis Data Format 1 (Standard)" and the "Analysis Data Format 1 with IP Messages" is only performed at the time of installation. (Customers cannot change this setting.) If customers desire to output the IP Messages to the host computer, contact a Sysmex service representative.

2. Terminology

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

1) Numerics:
   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. Order of Transmission and Reserve areas

The order of transmission is from the top parameter to the bottom. The data sent is the most significant digit first. Zero-suppression is not performed.

Reserve area is not currently used and all zeros "0" are transmitted for the specified number of digits. However, Sysmex reserves the right to use this area in the future and suggests the host computer program not to check the value in this area.

4. Analysis Information Inquiry Format

Table A-1: Analysis Information Inquiry Format

Parameter	No. of Chars.	Remarks
STX	1	(02H)
Text Distinction Code I	1	"R"
Inquiry Mode	1	"1": Real-time inquiry by sample ID number as the key word. "2": Batch inquiry by rack No. and tube position as the key words.
RESERVED	3	"000"
Inquiry Sample ID No.	15	Alpha-numerics with hyphen. Right-aligned, space-padding. Ex: " A1234567890"
RESERVED	2	"00"
Rack No.	6	Right-aligned, zero-padding. Ex: "000012"
Tube Position	2	Right-aligned, zero-padding. Ex: "02"
RESERVED	31	"00 - 00"
ETX	1	(03H)
Total	63	

1) Inquiry Mode

The mode of inquiry is indicated.

"1": Real-time inquiry by sample ID number as the key word.

"2": Batch inquiry by rack No. and tube position as the key words.

2) Inquiry Sample ID Number

This parameter becomes effective with the real-time inquiry by sample ID number as the key word. It consists of 15-digit alpha-numerics, but may include hyphen "-" (2DH) between digits depending on the usage. The hyphen "-" is included in 15 digits.

3) Rack No.

This parameter becomes effective with the batch inquiry by rack No. and tube position as the key words. This is the number assigned to a sample rack. It contains of 6-digit number.

4) Tube Position

This parameter becomes effective with the batch inquiry by rack No. and tube position as the key words. It consists of number from 1 to 10 for an analysis position on a sample rack.

5. Analysis Information Format

The host computer is requested to send the analysis information to the XE-2100 using the "Analysis Information Format 1" and "Analysis Information Format 2", upon receiving the inquiry from the XE-2100. The order of transmission is the "Analysis Information Format 1" first, and then the "Analysis Information Format 2".

5.1 Analysis Information Format 1

Table A-2-1: Analysis Information Format 1

Parameter	No. of Chars.	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"S"
Text Distinction Code 2	1	"1"
Information Status	1	"0": Not registered, "1": Registered, "2": Quality control
Date Ordered	8	"YYYYMMDD" format, Ex: "19990102" for January 02, 1999
RESERVED	3	"000"
Sample ID No.	15	Alpha-numerics with hyphen. Right-aligned, space-padding. Ex: " A1234567890"
RESERVED	2	"00"
Rack No.	6	Right-aligned, zero-padding. Ex: "000012"
Tube Position	2	Right-aligned, zero-padding. Ex: "02"
Inquiry Mode	1	"1": Real-time inquiry by sample ID number as the key word. "2": Batch inquiry by rack No. and tube position as the key words.
Patient ID No.	16	Left-aligned, space-padding, Ex: "A1234567890 "
Patient Name	40	Left-aligned, space-padding, Ex: "SYSMEX XE-2100 "
Sex	1	"1": Male, "2": Female, "3": Unknown
Birthday	8	"YYYYMMDD" format, Ex: "19990102" for January 02, 1999
Doctor	20	Left-aligned, space-padding, Ex: "DOCTOR1 "
Ward	20	Left-aligned, space-padding, Ex: "WARD1 "
Sample Comments	40	Left-aligned, space-padding, Ex: "SAMPLE COMMENT "
RESERVED	18	"00 - 00"
WBC	1	"1": Analyze, "0": Not analyze
RBC	1	"1": Analyze, "0": Not analyze
HGB	1	"1": Analyze, "0": Not analyze
HCT	1	"1": Analyze, "0": Not analyze
MCV	1	"1": Analyze, "0": Not analyze
MCH	1	"1": Analyze, "0": Not analyze
MCHC	1	"1": Analyze, "0": Not analyze
PLT	1	"1": Analyze, "0": Not analyze
LYMPH%	1	"1": Analyze, "0": Not analyze
MONO%	1	"1": Analyze, "0": Not analyze
NEUT%	1	"1": Analyze, "0": Not analyze
EO%	1	"1": Analyze, "0": Not analyze
BASO%	1	"1": Analyze, "0": Not analyze
LYMPH#	1	"1": Analyze, "0": Not analyze
MONO#	1	"1": Analyze, "0": Not analyze
NEUT#	1	"1": Analyze, "0": Not analyze
EO#	1	"1": Analyze, "0": Not analyze
BASO#	1	"1": Analyze, "0": Not analyze
RDW-CV	1	"1": Analyze, "0": Not analyze
RDW-SD	1	"1": Analyze, "0": Not analyze

(To continue to next page)

Table A-2-2: Analysis Information Format 1

(Continued from previous page)

PDW *[1]	1	"1": Analyze, "0": Not analyze, ("0" fixed for North American specification software)
MPV	1	"1": Analyze, "0": Not analyze
P-LCR *[1]	1	"1": Analyze, "0": Not analyze, ("0" fixed for North American specification software)
RESERVED	2	"00"
RET%	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D)
RET#	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D)
IRF	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D)
LFR *[1]	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D, and North American specification software)
MFR *[1]	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D, and North American specification software)
HFR *[1]	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D, and North American specification software)
RESERVED	1	"0"
PCT *[1]	1	"1": Analyze, "0": Not analyze, ("0" fixed for North American specification software)
NRBC%	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100D)
NRBC#	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100D)
RESERVED	15	"00 - 00"
ETX	1	(03H)
Total	255	

(*[1]: See Section 1.4 in this document.)

5.2 Analysis Information Format 2

Table A-3: Analysis Information Format 2

Parameter	No. of Chars.	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"S"
Text Distinction Code 2	1	"2"
Information Status	1	"0": Not registered, "1": Registered, "2": Quality Control
Date Ordered	8	"YYYYMMDD" format, Ex: "19990102" for January 02, 1999
RESERVED	3	"000"
Sample ID No.	15	Alpha-numerics with hyphen. Right-aligned, space-padding. Ex: " A1234567890"
RESERVED	2	"00"
Rack No.	6	Right-aligned, zero-padding. Ex: "000012"
Tube Position	2	Right-aligned, zero-padding. Ex: "02"
Inquiry Mode	1	"1": Real-time inquiry by sample ID number as the key word. "2": Batch inquiry by rack No. and tube position as the key words.
Patient ID No.	16	Left-aligned, space-padding, Ex: "A1234567890 "
Patient Comments	100	Left-aligned, space-padding
RESERVED	97	"00 - 00"
ETX	1	(03H)
Total	255	

1) Information Status

This parameter indicates if the inquired analysis information is registered. If the required sample is not registered, make sure to return "0" (Not registered) in the analysis information text.

"0": Not registered
"1": Registered
"2": Quality control

2) Date Ordered

This parameter indicates the requested date of analysis of the inquired sample.
"YYYYMMDD"
YYYY: Year, MM: Month, DD: Day

3) Sample ID Number

In the case of real-time inquiry by sample ID number as the key word, this number becomes the same with that in the inquiry text. In the case of batch inquiry by rack No. and tube position as the key words, the sample ID number corresponding to the specified rack No. and tube position will be assigned. When the sample ID number is not assigned by the host computer, the ID number sent in the Inquiry Format should be used.
It consists of 15-digit alpha-numerics, but may include hyphen "-" (2DH) between digits depending on the usage. The hyphen "-" is included in 15 digits.
The sample ID No. starting with "QC" is reserved for the Quality Control samples. If QC samples are not analyzed, do not assign the sample ID number starting with "QC".

4) Rack No.

This number is assigned to a sample rack, and consists of 6-digit number.
In the case of batch inquiry by rack No. and tube position as the key words, this number becomes the same with that in the inquiry text. In the case of real-time inquiry by sample ID number as the key word, this number becomes the same with that in the inquiry text.

5) Tube Position

This is the analysis position of the inquired sample in the sample rack, and consists of number from 1 to 10.
In the case of batch inquiry by rack No. and tube position as the key words, this number becomes the same with that in the inquiry text. In the case of real-time inquiry by sample ID number as the key word, this number becomes the same with that in the inquiry text.

6) Inquiry Mode

The mode of inquiry is indicated.
"1" (Other than "2"): Real-time inquiry by sample ID number as the key word.
"2": Batch inquiry by rack No. and tube position as the key words.

7) Patient ID No.

This parameter is the patient ID for the inquired sample, and is unique to a patient.
It consists of 16-digit alpha-numerics, but may include hyphen "-" (2DH) between digits depending on the usage. The hyphen "-" is included in 16 digits.
When no patient ID No. is available, enter all spaces (20H).

NOTE: • When the patient information is to be exchanged between the host computer and the IPU, a unique patient ID number has to be entered.

8) Patient Name

This is the patient name for sample inquiry. The order for patient name should be Family name (20 characters or less) first, then Given name (20 characters or less). A space " " (20H) is needed between Family and Given names as a separator.
When no patient name information is available, enter all spaces (20H).

NOTE: • The space between the Family and Given names is included in 40 characters. For example, when the Family name needs 20 characters, the number of characters used for the Given name is 19 characters or less.

9) Sex

This is the sex of the patient. When no sex information is available, enter "3".
"1": Male
"2": Female
"3": Unknown

10) Birthday

This is the birthday of the patient.
"YYYYMMDD"
YYYY: Year, MM: Month, DD: Day
When no date-of-birth information is available, enter all spaces (20H).

11) Doctor

This is the name of the doctor in charge, and consists of up to 20 alphabets.
When no doctor information is available, enter all spaces (20H).

12) Ward

This is the ward (medical section) in which the patient is staying, and consists of up to 20 alphabets.
When no ward information is available, enter all spaces (20H).

13) Sample Comments

This is the comments for the inquired sample, and consists of up to 40 alphabets.
When no sample comment is available, enter all spaces (20H).

14) Order Information

This indicates the analysis order information for each analysis parameter.
"0": Not analyze
"1": Analyze

15) Patient Comments

This is the comments of the patient for the inquired sample, and consists of up to 100 alphabets.
When no patient comment is available, enter all spaces (20H).

6. Analysis Data Format

The analysis data of a sample is transmitted to the host computer using both the “Analysis Data Format 1 (Standard)” and the “Analysis Data Format 2”. When transmitting with the IP Messages, data is transmitted using both the “Analysis Data Format 1 with IP Messages” and the “Analysis Data Format 2”. The “Analysis Data Format 1 (Standard)” and the “Analysis Data Format 1 with IP Messages” cannot be used at the same time. The order of transmission is the “Analysis Data Format 1” first, and then the “Analysis Data Format 2”.

6.1 Analysis Data Format 1 (Standard)

Table A-4-1: Analysis Data Format 1

Format A: Year, 2-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"1"
Sample Distinction Code	1	"U"
Instrument ID	16	Right-aligned, space-padding, Ex: " XE-2100 A1001"
Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"
RESERVED	3	"000"
Sample ID No.	15	Alpha-numerics and hyphen; For serial connection, right-aligned, space-padding, Ex: " A1234567890"; For TCP/IP connection, right-aligned, zero-padding, Ex: "0000A1234567890"
Year	2	YY, Ex: "01" for year of 2001
Month	2	MM, Ex: "02" for February
Day	2	DD, Ex: "03" for third of month
Hour	2	HH, Ex: "23" for 11PM
Minute	2	MM, Ex: "01"
RESERVED	2	"00"
Rack No.	6	Right-aligned, zero-padding, Ex: "000012"
Tube Position	2	Right-aligned, zero-padding, Ex: "02"
Sample Number Attribute	1	“4”: Sample number was read by the ID Bar Code Reader “2”: Sample number was not read by the ID Bar Code Reader “0”: Other than the above
Analysis Mode	1	“1”: Manual mode “2”: Sampler mode “3”: Closed mode “4”: Capillary mode “5”: HPC analysis mode
Patient ID	16	Left-aligned, space-padding, Ex: "1234567890A "

Format B: Year, 4-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"1"
Sample Distinction Code	1	"U"
Instrument ID	16	Right-aligned, space-padding, Ex: " XE-2100 A1001"
Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"
RESERVED	3	"000"
Sample ID No.	15	Alpha-numerics and hyphen; For serial connection, right-aligned, space-padding, Ex: " A1234567890"; For TCP/IP connection, right-aligned, zero-padding, Ex: "0000A1234567890"
Year	4	YYYY, Ex: "2001" for year 2001
Month	2	MM, Ex: "02" for February
Day	2	DD, Ex: "03" for third of month
Hour	2	HH, Ex: "23" for 11PM
Minute	2	MM, Ex: "01"
RESERVED	2	"00"
Rack No.	6	Right-aligned, zero-padding, Ex: "000012"
Tube Position	2	Right-aligned, zero-padding, Ex: "02"
Sample Number Attribute	1	“4”: Sample number was read by the ID Bar Code Reader “2”: Sample number was not read by the ID Bar Code Reader “0”: Other than the above
Analysis Mode	1	“1”: Manual mode “2”: Sampler mode “3”: Closed mode “4”: Capillary mode “5”: HPC analysis mode
Patient ID	16	Left-aligned, space-padding, Ex: "1234567890A "

Analysis Information	1	"0": Analyzed without any error "1": Analyzed with an error	Analysis Information	1	"0": Analyzed without any error "1": Analyzed with an error
Sample Judgment Information	1	"0": Negative "1": Positive "2": Error "3": Positive + Error "Q": QC sample	Sample Judgment Information	1	"0": Negative "1": Positive "2": Error "3": Positive + Error "Q": QC sample
Positive (Diff)	1	"1": Abnormal WBC Diff data "0": Normal WBC Diff data	Positive (Diff)	1	"1": Abnormal WBC Diff data "0": Normal WBC Diff data
Positive (Morph)	1	"1": Abnormal cell morphology "0": Normal cell morphology	Positive (Morph)	1	"1": Abnormal cell morphology "0": Normal cell morphology
Positive (Count)	1	"1": Abnormal blood cell numerical count "0": Normal blood cell numerical count	Positive (Count)	1	"1": Abnormal blood cell numerical count "0": Normal blood cell numerical count
Error (Func)	1	"1": Analysis error other than the ID bar code read error occurred "0": No analysis error occurred	Error (Func)	1	"1": Analysis error other than the ID bar code read error occurred "0": No analysis error occurred
Error (Result)	1	"1": One of the sample-aspiration related errors occurred, such as "Sample Aspiration Error", "Short Sample Error" and "Sample Value Low" "0": No such error occurred	Error (Result)	1	"1": One of the sample-aspiration related errors occurred, such as "Sample Aspiration Error", "Short Sample Error" and "Sample Value Low" "0": No such error occurred
Order Information	1	"1": Analyzed by an order "0": Analyzed without an order	Order Information	1	"1": Analyzed by an order "0": Analyzed without an order
WBC Abnormal	1	"1": WBC Abnormal is flagged "0": No WBC Abnormal flags	WBC Abnormal	1	"1": WBC Abnormal is flagged "0": No WBC Abnormal flags
WBC Suspect	1	"1": WBC Suspect is flagged "0": No WBC Suspect flags	WBC Suspect	1	"1": WBC Suspect is flagged "0": No WBC Suspect flags
RBC Abnormal	1	"1": RBC Abnormal is flagged "0": No RBC Abnormal flags	RBC Abnormal	1	"1": RBC Abnormal is flagged "0": No RBC Abnormal flags
RBC Suspect	1	"1": RBC Suspect is flagged "0": No RBC Suspect flags	RBC Suspect	1	"1": RBC Suspect is flagged "0": No RBC Suspect flags
PLT Abnormal	1	"1": PLT Abnormal is flagged "0": No PLT Abnormal flags	PLT Abnormal	1	"1": PLT Abnormal is flagged "0": No PLT Abnormal flags
PLT Suspect	1	"1": PLT Suspect is flagged "0": No PLT Suspect flags	PLT Suspect	1	"1": PLT Suspect is flagged "0": No PLT Suspect flags
Units Information	1	"1": Dutch SI Unit is used, "0": Other unit than Dutch SI Unit is used	Units Information	1	"1": Dutch SI Unit is used, "0": Other unit than Dutch SI Unit is used
WBC Information	1	"1": WBC is compensated by the NRBC value, "0": WBC is not compensated ("0" fixed for XE-2100D)	WBC Information	1	"1": WBC is compensated by the NRBC value, "0": WBC is not compensated ("0" fixed for XE-2100D)
PLT Information	1	"1": PLT-O (PLT value by the optical system) is adopted, "0": PLT-O is not adopted ("0" fixed for XE-2100L and XE-2100D)	PLT Information	1	"1": PLT-O (PLT value by the optical system) is adopted, "0": PLT-O is not adopted ("0" fixed for XE-2100L and XE-2100D)
RESERVED	65	"00 - 00"	RESERVED	63	"00 - 00"
RESERVED (for manufacturer)	22		RESERVED (for manufacturer)	22	
ETX	1	(03H)	ETX	1	(03H)
Total	191		Total	191	

Table A-4: Analysis Data Format 1

6.2 Analysis Data Format 1 (with IP Messages)

Table 5: Analysis Data Format 1 with IP Messages

Parameter	Size (byte)	Remarks
STX	1	(02H)
Text Distinction Code 1	1	“D” (fixed)
Text Distinction Code 2	1	“1” (fixed)
Sample Distinction Code	1	“U” (fixed)
Instrument ID	16	Right-aligned, Space-padding, Example: “ XE-2100^A1001”
Sequential Number	10	Right-aligned, space-padding, Ex: “0000000001“ - “9999999999“
(Reserved)	3	“000” (fixed)
Sample No.	15	Alpha-numerics with hyphen. For RS-232C connection, right-aligned, space-padding. Ex: " A1234567890" For TCP/IP connection, right-aligned, zero-padding. Ex: "0000A1234567890"
Year	4	YYYY, Ex: “2001” for the year of 2001.
Month	2	MM, Ex: “01” for the month of January
Day	2	DD, Ex: “01” for the first day of the month
Hour	2	HH, Ex: “23” for the 11:00 PM
Minute	2	MM, Ex: “01” for the minute
(Reserved)	2	“00” (fixed)
Rack Number	6	Right-aligned, zero-padding, Ex: “000012”
Tube Position Number	2	Right-aligned, zero-padding, Ex: “02”
Sample Number Attribute	1	“4”: Sample number was read by the ID bar code reader “2”: Sample number read by the ID bar code reader failed “0”: Other than the above
Analysis Mode	1	“1”: Manual mode “2”: Sampler mode “3”: Closed mode “4”: Capillary mode “5”: HPC analysis mode
Patient ID No.	16	Left-aligned, space-padding, Ex: "1234567890A "
Analysis Information	1	“0”: Analyzed without any error “1”: Analyzed with an error
Sample Judgment Information	1	“0”: Negative “1”: Positive “2”: Error “3”: Positive + Error “Q”: QC sample
Positive (Diff)	1	“1”: Abnormal WBC Diff data ”0”: Normal WBC Diff data
Positive (Morph.)	1	“1”: Abnormal cell morphology ”0”: Normal cell morphology
Positive (Count)	1	“1”: Abnormal blood cell numerical count ”0”: Normal blood cell numerical count
Error (Func.)	1	“1”: Analysis error other than the ID bar code read error occurred ”0”: No analysis error occurred
Error (Result)	1	“1”: One of the sample-aspiration related errors occurred, such as "Sample Aspiration Error", "Short Sample Error" and "Sample Value Low" ”0”: No such error occurred
Order Information	1	”1”: Analyzed by an order, “0”: Analyzed without an order
WBC Abnormal	1	“1”: Flagged, “0”: Not flagged

Parameter		Size (byte)	Remarks
WBC Suspect		1	“1”: Flagged, “0”: Not flagged
RBC Abnormal		1	“1”: Flagged, “0”: Not flagged
RBC Suspect		1	“1”: Flagged, “0”: Not flagged
PLT Abnormal		1	“1”: Flagged, “0”: Not flagged
PLT Suspect		1	“1”: Flagged, “0”: Not flagged
Unit Information		1	“1”: Dutch SI units, “0”: Other units than Dutch SI units
WBC Information		1	“1”: WBC is compensated by the NRBC value, ”0”: WBC is not compensated (“0” fixed for XE-2100D)
PLT Information		1	“1”: PLT-O (PLT value by the optical system) is adopted, ”0”: PLT-O is not adopted ("0" fixed for XE-2100L and XE-2100D)
WBC Abnormal (16 bytes)	WBC Abn Scattergram	1	“1”: Flagged, “0”: Not flagged
	Neutropenia	1	“1”: Flagged, “0”: Not flagged
	Neutrophilia	1	“1”: Flagged, “0”: Not flagged
	Lymphopenia	1	“1”: Flagged, “0”: Not flagged
	Lymphocytosis	1	“1”: Flagged, “0”: Not flagged
	Leukocytosis	1	“1”: Flagged, “0”: Not flagged
	Monocytosis	1	“1”: Flagged, “0”: Not flagged
	Eosinophilia	1	“1”: Flagged, “0”: Not flagged
	Basophilia	1	“1”: Flagged, “0”: Not flagged
	Leukocytopenia	1	“1”: Flagged, “0”: Not flagged
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	NRBC Abn Scattergram	1	“1”: Flagged, “0”: Not flagged ("0" fixed for XE-2100D)
	NRBC Present	1	“1”: Flagged, “0”: Not flagged ("0" fixed for XE-2100D)
	IG Present	1	“1”: Flagged, “0”: Not flagged (“0” fixed when the XE IG master is not installed)
	(Reserved)	1	“0” (fixed)
WBC Suspect (16 bytes)	Blasts?	1	“1”: Flagged, “0”: Not flagged
	Immature Gran?	1	“1”: Flagged, “0”: Not flagged
	Left Shift?	1	“1”: Flagged, “0”: Not flagged
	(Reserved)	1	“0” (fixed)
	NRBC?	1	“1”: Flagged, “0”: Not flagged
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	Atypical Lympho?	1	“1”: Flagged, “0”: Not flagged
	RBC Lyse Resistance?	1	“1”: Flagged, “0”: Not flagged
	Abn Lympho/L-Blasts?	1	“1”: Flagged, “0”: Not flagged (In case of XE-2100D, [Abn Lympho/Blasts?] is output.)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
RBC Abnormal (16 bytes)	RBC Abn Distribution	1	“1”: Flagged, “0”: Not flagged
	Dimorphic Population	1	“1”: Flagged, “0”: Not flagged
	Anisocytosis	1	“1”: Flagged, “0”: Not flagged
	Microcytosis	1	“1”: Flagged, “0”: Not flagged
	Macrocytosis	1	“1”: Flagged, “0”: Not flagged
	Hypochromia	1	“1”: Flagged, “0”: Not flagged

Parameter		Size (byte)	Remarks
	Anemia	1	“1”: Flagged, “0”: Not flagged
	Erythrocytosis	1	“1”: Flagged, “0”: Not flagged
	RET Abn Scattergram	1	“1”: Flagged, “0”: Not flagged ("0" fixed for XE-2100L and XE-2100D)
	Reticulocytosis	1	“1”: Flagged, “0”: Not flagged ("0" fixed for XE-2100L and XE-2100D)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
RBC	RBC Agglutination?	1	“1”: Flagged, “0”: Not flagged
Suspect	Turbidity/HGB Interf?	1	“1”: Flagged, “0”: Not flagged
(16 bytes)	Iron Deficiency?	1	“1”: Flagged, “0”: Not flagged
	HGB Defect?	1	“1”: Flagged, “0”: Not flagged
	(Reserved)	1	“0” (fixed)
	Fragments?	1	“1”: Flagged, “0”: Not flagged
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
PLT	PLT Abn Distribution	1	“1”: Flagged, “0”: Not flagged
Abnormal	Thrombocytopenia	1	“1”: Flagged, “0”: Not flagged
(16 bytes)	Thrombocytosis	1	“1”: Flagged, “0”: Not flagged
	PLT Abn Scattergram	1	“1”: Flagged, “0”: Not flagged ("0" fixed for XE-2100L and XE-2100D)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
PLT	(Reserved)	1	“0” (fixed)
Suspect	(Reserved)	1	“0” (fixed)
(16 bytes)	PLT Clumps?	1	“1”: Flagged, “0”: Not flagged
	(Reserved)	1	“0” (fixed)
	PLT Clumps(S)?	1	“1”: Flagged, “0”: Not flagged
	(Reserved)	1	“0” (fixed)

Parameter		Size (byte)	Remarks
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
	(Reserved)	1	“0” (fixed)
(Reserved)		31	“00……00” All zero’s (fixed)
Reserved (for manufacturer)		22	
ETX		1	(03H)
Total		255	

6.3 Analysis Data Format 2

Table A-6-1: Analysis Data Format 2

Format A: NRBC%, 5-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"2"
Sample Distinction Code	1	"U"
Instrument ID	16	Right-aligned, space-padding, Ex: " XE-2100^A1001"
Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"
RESERVED	3	"000"
Sample ID No.	15	Alpha-numerics and hyphen; For serial connection, right-aligned, space-padding, Ex: " A1234567890"; For TCP/IP connection, right-aligned, zero-padding, Ex: "0000A1234567890"
WBC	6	Output data ($x10^1$/µL)
RBC	5	Output data ($x10^4$/µL)
HGB	5	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
HCT	5	Output data (10^{-1}%)
MCV	5	Output data (10^{-1}fL)
MCH	5	Output data (10^{-1}pg), or in case of Dutch SI (amol)
MCHC	5	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
PLT	5	Output data ($x10^3$/µL)
LYMPH%	5	Output data (10^{-1}%)
MONO%	5	Output data (10^{-1}%)
NEUT%	5	Output data (10^{-1}%)
EO%	5	Output data (10^{-1}%)
BASO%	5	Output data (10^{-1}%)
LYMPH#	6	Output data ($x10^1$/µL)
MONO#	6	Output data ($x10^1$/µL)
NEUT#	6	Output data ($x10^1$/µL)
EO#	6	Output data ($x10^1$/µL)
BASO#	6	Output data ($x10^1$/µL)
RDW-CV	5	Output data (10^{-1}%)
RDW-SD	5	Output data (10^{-1}fL)
PDW *[1]	5	Output data (10^{-1}fL), or all spaces for N. American software
MPV	5	Output data (10^{-1}fL)
P-LCR *[1]	5	Output data (10^{-1}%), or all spaces for N. American software
RET%	5	Output data (10^{-2}%), or "00000" fixed for XE-2100L or XE-2100D

Format B: NRBC%, 6-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"2"
Sample Distinction Code	1	"U"
Instrument ID	16	Right-aligned, space-padding, Ex: " XE-2100^A1001"
Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"
RESERVED	3	"000"
Sample ID No.	15	Alpha-numerics and hyphen; For serial connection, right-aligned, space-padding, Ex: " A1234567890"; For TCP/IP connection, right-aligned, zero-padding, Ex: "0000A1234567890"
WBC	6	Output data ($x10^1$/µL)
RBC	5	Output data ($x10^4$/µL)
HGB	5	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
HCT	5	Output data (10^{-1}%)
MCV	5	Output data (10^{-1}fL)
MCH	5	Output data (10^{-1}pg), or in case of Dutch SI (amol)
MCHC	5	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
PLT	5	Output data ($x10^3$/µL)
LYMPH%	5	Output data (10^{-1}%)
MONO%	5	Output data (10^{-1}%)
NEUT%	5	Output data (10^{-1}%)
EO%	5	Output data (10^{-1}%)
BASO%	5	Output data (10^{-1}%)
LYMPH#	6	Output data ($x10^1$/µL)
MONO#	6	Output data ($x10^1$/µL)
NEUT#	6	Output data ($x10^1$/µL)
EO#	6	Output data ($x10^1$/µL)
BASO#	6	Output data ($x10^1$/µL)
RDW-CV	5	Output data (10^{-1}%)
RDW-SD	5	Output data (10^{-1}fL)
PDW *[1]	5	Output data (10^{-1}fL), or all spaces for N. American software
MPV	5	Output data (10^{-1}fL)
P-LCR *[1]	5	Output data (10^{-1}%), or all spaces for N. American software
RET%	5	Output data (10^{-2}%), or "00000" fixed for XE-2100L or XE-2100D

(*[1]: See Section 1.4 in this document.)

(To continue to next page)

Table A-6-2: Analysis Data Format 2

(Continued from previous page)

RET#	5	Output data ($x10^2$/μL), or "00000" fixed for XE-2100L or XE-2100D	RET#	5	Output data ($x10^2$/μL), or "00000" fixed for XE-2100L or XE-2100D
IRF	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D	IRF	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D
LFR *[1]	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software	LFR *[1]	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
MFR *[1]	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software	MFR *[1]	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
HFR *[1]	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software	HFR *[1]	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
PCT *[1]	5	Output data (10^{-2}%), or see Sec. 1.4 for N. American software	PCT *[1]	5	Output data (10^{-2}%), or see Sec. 1.4 for N. American software
NRBC%	5	Output data (10^{-1}%), or "00000" fixed for XE-2100D	NRBC%	6	Output data (10^{-1}%), or "000000" fixed for XE-2100D
NRBC#	6	Output data ($x10^1$/μL), or "000000" fixed for XE-2100D	NRBC#	6	Output data ($x10^1$/μL), or "000000" fixed for XE-2100D
IG#	6	Output data ($x10^1$/μL), or all spaces when XE IG master is not installed	IG#	6	Output data ($x10^1$/μL), or all spaces when XE IG master is not installed
IG%	5	Output data (10^{-1}%), or all spaces when XE IG master is not installed	IG%	5	Output data (10^{-1}%), or all spaces when XE IG master is not installed
HPC#	6	Output data (x1/μL), or all spaces when XE HPC master is not installed	HPC#	6	Output data (x1/μL), or all spaces when XE HPC master is not installed
RET-He	5	Output data (10^{-1}pg), or in case of Dutch SI (amol), or all spaces when XE RET master is not installed.	RET-He	5	Output data (10^{-1}pg), or in case of Dutch SI (amol), or all spaces when XE RET master is not installed.
IPF	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or specified number of spaces when XE IPF master is not installed or no analysis order for RET#, RET%, LFR, MFR, HFR, nor IRF	IPF	5	Output data (10^{-1}%), or "00000" fixed for XE-2100L or XE-2100D, or specified number of spaces when XE IPF master is not installed or no analysis order for RET#, RET%, LFR, MFR, HFR, nor IRF
Reserved	12	"00 - 00"	Reserved	11	"00 - 00"
ETX	1	(03H)	ETX	1	(03H)
Total	255		Total	255	

(*[1]: See Section 1.4 in this document.)

1) Decimal Point

Decimal point is not sent. Therefore, it is necessary to add decimal point specified for each parameter at the host computer.

2) Instrument ID

The instrument ID is a unique nick name for the analyzer, and is consisted of alphabet (upper case) or numerics to identify which analyzer analyzed which data by the host computer.

3) Sequence No.

This indicates the sequence number of the sample analyzed on the same day, and consists of 10-digit number. Zero-suppression is not carried out.

4) Sample ID No.

The sample ID number consists of 15 digits alpha-numerics which may include a hyphen "-" (2DH) between digits depending on the usage. A hyphen "-" is included in 15 digits. Zero-suppression is not carried out. When a bar code read error occurred, this number is output as shown below.

When an ID read error occurred in the system without any conveyor system

"ERR**********" where "*" indicates an alpha-numerical character.

When an ID read error occurred in the system with a conveyor system, spaces are padded when connected through a serial interface; and zeros are padded when connected through TCP/IP interface.

" ERR**********" or "00ERR**********" where "*" indicates an alpha-numerical character.

5) Date

The order of Year/Month/Day is fixed. Zero-suppression is not carried out.

6) Rack No.

This is the number assigned to a sample rack, and consists of 6-digit number. Zero-suppression is not carried out. However, in case that Analysis mode is other than the Sampler mode analysis, it is reported as " " all spaces (20H).

7) Tube Position

This indicates the analysis position of aimed sample in a sample rack, and consists of number from 1 to 10. Zero-suppression is not carried out. However, in case that Analysis mode is other than the Sampler mode analysis, it is reported as "00".

8) Sample Number Attribute

This indicates where and how the sample number was obtained.

"4": Sample number was read by the ID Bar Code Reader.
"2": Sample number was automatically assigned since the ID Read Error occurred.
"0": Other than the above

9) Analysis Mode

This indicates the analysis mode.

"1": Manual mode
"2": Sampler mode
"3": Closed mode
"4": Capillary mode
"5": HPC analysis mode

10) Patient ID

This indicates the patient ID that is the unique to the patient and is consisted of 16 alpha-numerics including a hyphen "-" (2DH). If the number of characters is less than 16 characters, spaces are padded to the right of text. When there is no patient ID available, all spaces " " (20H) are output.

11) Analysis Information

This indicates the analysis status of the sample.

"0": Analyzed without any error
"1": Analyzed with an error

12) Sample Judgment Information

This indicates the sample judgment information whether re-analysis of the sample is required.

"0": Negative
"1": Positive
"2": Error
"3": Positive + Error
"Q": QC sample

13) Positive (Diff)

This indicates whether the data in the WBC differential parameters is abnormal.

"1": Abnormal
"0": Normal

14) Positive (Morph)

This indicates whether the cell morphology is abnormal.

"1": Abnormal
"0": Normal

15) Positive (Count)

This indicates whether the blood cell numerical count data is abnormal.

"1": Abnormal
"0": Normal

16) Error (Func)

This indicates whether an analysis error other than the ID bar code read error occurred.

"1": Analysis error other than the ID bar code read error occurred.
"0": No analysis error occurred.

17) Error (Result)

This indicates whether one of the sample-aspiration related errors occurred, such as "Sample Aspiration Error", "Short Sample Error" and "Sample Value Low".

"1": One of the sample-aspiration related errors occurred, such as "Sample Aspiration Error", "Short Sample Error" and "Sample Value Low"
"0": No such error occurred

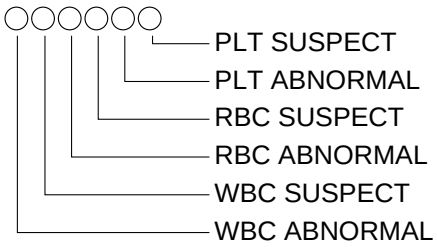
18) Order Information

This indicates whether an analysis order was placed when analyzing the sample.

"1": Analyzed by an order

"0": Analyzed without an order

19) Sample Information (Flag)



The existence of the IP message of WBC, RBC or PLT is indicated.

"1": Existing

"0": None

20) Units Information

This indicates whether the Dutch SI Units system is used.

"1": Dutch SI Unit is used.

"0": Other unit than Dutch SI Unit is used.

21) WBC Information

This indicates whether the WBC value is compensated by the NRBC value. In case of XE-2100D, "0" is always output.

"1": WBC is compensated by the NRBC value.

"0": WBC is not compensated.

22) PLT Information

This indicates whether the PLT-O (PLT value analyzed in the optical system) is adopted. In case of XE-2100L and XE-2100D, "0" is always output.

"1": PLT-O is adopted.

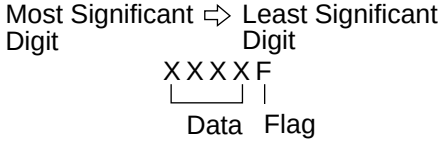
"0": PLT-O is not adopted.

23) Reserved for Manufacturer

This is the pre-fixed information to identify each instrument, and consists of 22 digits of a unique alpha-numerics (capital). It can be used to identify each instrument when more than one XE-2100 is connected to one host computer.

24) Construction and Flag of Numerical Value

The numerical value is constructed as follows. Zero suppression is not carried out.
For the RESERVED parameters, all zeros "00-00" are output.



Details of Flag

"0": Normal

"1": Analysis data is greater than the preset Upper Patient Mark Limit.

"2": Analysis data is less than the preset Lower Mark Limit.

"3": Out of linearity limit.

"4": Analysis data is less reliable

25) Abnormal Value Data
When the value data is displayed with "----", the data is output in the form of "*0000". However, when the parameter is not ordered, such a parameter data is reported as " " (all spaces).

26) WBC Abnormal
"1": WBC Abnormal is flagged.
"0": No WBC abnormal flags.

27) WBC Suspect
"1": WBC Suspect is flagged.
"0": No WBC suspect flags.

28) RBC Abnormal
"1": RBC Abnormal is flagged.
"0": No RBC abnormal flags.

29) RBC Suspect
"1": RBC Suspect is flagged.
"0": No RBC suspect flags.

30) PLT Abnormal
"1": PLT Abnormal is flagged.
"0": No PLT abnormal flags.

31) PLT Suspect
"1": PLT Suspect is flagged.
"0": No PLT suspect flags.

7. QC Data Format

The QC data was sent to the host computer using the “QC Data Format 1” and “QC Data Format 2”. The order of transmission is the “QC Data Format 1” first, and then the “QC Data Format 2”.

7.1 QC Data Format 1

Table A-7-1: QC Data Format 1

Format A: Year, 2-digit; NRBC%, 4-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"1"
Sample Distinction Code	1	"C"
Quality Control No.	1	"1" - "9", "A" - "F", "a" - "e", "M"; See the Table A-7 for details.
Year	2	YY, Ex: "01" for year of 2001
Month	2	MM, Ex: "02" for February
Day	2	DD, Ex: "03" for third of month
Hour	2	HH, Ex: "23" for 11PM
Minute	2	MM, Ex: "01"
Instrument ID	16	Right-aligned, space-padding
RBC	4	Output data ($x10^4$/µL)
HGB	4	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
HCT	4	Output data (10^{-1}%)
MCV	4	Output data (10^{-1}fL)
MCH	4	Output data (10^{-1}pg), or in case of Dutch SI (amol)
MCHC	4	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
RDW-CW	4	Output data (10^{-1}%)
RDW-SD	4	Output data (10^{-1}fL)
PLT	4	Output data ($x10^3$/µL)
PDW *[1]	4	Output data (10^{-1}fL), or all spaces for N. American software
MPV	4	Output data (10^{-1}fL)
P-LCR *[1]	4	Output data (10^{-1}%), or all spaces for N. American software
PCT *[1]	4	Output data (10^{-2}%), or all spaces for N. American software
WBC	5	Output data ($x10^1$/µL)
NEUT%	4	Output data (10^{-1}%)
LYMPH%	4	Output data (10^{-1}%)
MONO%	4	Output data (10^{-1}%)
EO%	4	Output data (10^{-1}%)
BASO%	4	Output data (10^{-1}%)
NEUT#	5	Output data ($x10^1$/µL)
LYMPH#	5	Output data ($x10^1$/µL)

Format B: Year, 4-digit; NRBC%, 5-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"1"
Sample Distinction Code	1	"C"
Quality Control No.	1	"1" - "9", "A" - "F", "a" - "e", "M"; See the Table A-7 for details.
Year	4	YYYY, Ex: "2001" for year of 2001
Month	2	MM, Ex: "02" for February
Day	2	DD, Ex: "03" for third of month
Hour	2	HH, Ex: "23" for 11PM
Minute	2	MM, Ex: "01"
Instrument ID	16	Right-aligned, space-padding
RBC	4	Output data ($x10^4$/µL)
HGB	4	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
HCT	4	Output data (10^{-1}%)
MCV	4	Output data (10^{-1}fL)
MCH	4	Output data (10^{-1}pg), or in case of Dutch SI (amol)
MCHC	4	Output data (g/L), or in case of Dutch SI (10^{-1}mmol/L)
RDW-CW	4	Output data (10^{-1}%)
RDW-SD	4	Output data (10^{-1}fL)
PLT	4	Output data ($x10^3$/µL)
PDW *[1]	4	Output data (10^{-1}fL), or all spaces for N. American software
MPV	4	Output data (10^{-1}fL)
P-LCR *[1]	4	Output data (10^{-1}%), or all spaces for N. American software
PCT *[1]	4	Output data (10^{-2}%), or all spaces for N. American software
WBC	5	Output data ($x10^1$/µL)
NEUT%	4	Output data (10^{-1}%)
LYMPH%	4	Output data (10^{-1}%)
MONO%	4	Output data (10^{-1}%)
EO%	4	Output data (10^{-1}%)
BASO%	4	Output data (10^{-1}%)
NEUT#	5	Output data ($x10^1$/µL)
LYMPH#	5	Output data ($x10^1$/µL)

(*[1]: See Section 1.4 in this document.)

(To continue to next page)

Table A-7-2: QC Data Format 1

(Continued from previous page)

MONO#	5	Output data ($x10^1$/µL)
EO#	5	Output data ($x10^1$/µL)
BASO#	5	Output data ($x10^1$/µL)
NRBC%	4	Output data (10^{-1}%), or "0000" fixed for XE-2100D
RET#	4	Output data ($x10^2$/µL) , or "0000" fixed for XE-2100L or XE-2100D
RET%	4	Output data (10^{-2}%), or "0000" fixed for XE-2100L or XE-2100D
HFR *[1]	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
MFR *[1]	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
LFR *[1]	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
IRF	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
NRBC#	5	Output data ($x10^1$/µL), or "00000" fixed for XE-2100D
IG#	5	Output data ($x10^1$/µL), or "00000" when XE IG master is not installed
IG%	4	Output data (10^{-1}%), or "0000" when XE IG master is not installed
HPC#	5	Output data (x1/µL), or "00000" when XE HPC master is not installed
RET-He	4	Output data (10^{-1}pg), or in case of Dutch SI (amol), or "0000" when XE RET master is not installed.
IPF	4	Output data (10^{-1}%), or "0000" when XE IPF master is not installed
RESERVED	43	"00~00"
Manual / Closed	1	"0": Manual mode "1": Closed mode; See Table A-7 for details.
RESERVED (for Manufacturer)	22	
ETX	1	(03H)
Total	255	

MONO#	5	Output data ($x10^1$/µL)
EO#	5	Output data ($x10^1$/µL)
BASO#	5	Output data ($x10^1$/µL)
NRBC%	5	Output data (10^{-1}%), or "00000" fixed for XE-2100D
RET#	4	Output data ($x10^2$/µL) , or "0000" fixed for XE-2100L or XE-2100D
RET%	4	Output data (10^{-2}%), or "0000" fixed for XE-2100L or XE-2100D
HFR *[1]	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
MFR *[1]	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
LFR *[1]	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D, or see Sec. 1.4 for N. American software
IRF	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
NRBC#	5	Output data ($x10^1$/µL), or "00000" fixed for XE-2100D
IG#	5	Output data ($x10^1$/µL), or "00000" when XE IG master is not installed
IG%	4	Output data (10^{-1}%), or "0000" when XE IG master is not installed
HPC#	5	Output data (x1/µL), or "00000" when XE HPC master is not installed
RET-He	4	Output data (10^{-1}pg), or in case of Dutch SI (amol), or "0000" when XE RET master is not installed.
IPF	4	Output data (10^{-1}%), or "0000" when XE IPF master is not installed
RESERVED	40	"00~00"
Manual / Closed	1	"0": Manual mode "1": Closed mode; See Table A-7 for details.
RESERVED (for Manufacturer)	22	
ETX	1	(03H)
Total	255	

(*[1]: See Section 1.4 in this document.)

Table A-8: File Corresponding to QC No.

Quality Control Number	Manual / Closed	QC File No.	Quality Control Number	Manual / Closed	QC File No.
1	0	1	1	1	21
2	0	2	2	1	22
3	0	3	3	1	23
4	0	4	4	1	24
5	0	5	5	1	25
6	0	6	6	1	26
7	0	7	7	1	27
8	0	8	8	1	28
9	0	9	9	1	29
A	0	10	A	1	30
B	0	11	B	1	31
C	0	12	C	1	32
D	0	13	D	1	33
E	0	14	E	1	34
F	0	15	F	1	35
a	0	16	a	1	36
b	0	17	b	1	37
c	0	18	c	1	38
d	0	19	d	1	39
e	0	20	e	1	40
M	0	XbarM			

(Note: In the Manual/Closed column, "0" indicates Manual mode, and "1" indicates Closed mode.)

7.2 QC Data Format 2

Table A-9: QC Data Format 2

Format A: Year, 2-digit; IMI#, 4-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"2"
Sample Distinction Code	1	"C"
Quality Control No.	1	"1" - "9", "A" - "F", "a" - "e", "M"; See the Table A-7 for details.
Year	2	YY, Ex: "01" for year of 2001
Month	2	MM, Ex: "02" for February
Day	2	DD, Ex: "03" for third of month
Hour	2	HH, Ex: "23" for 11PM
Minute	2	MM, Ex: "01"
Instrument ID	16	Right-aligned, space-padding
BASO-X	4	Output data (10^{-1}ch)
BASO-Y	4	Output data (10^{-1}ch)
DIFF-X	4	Output data (10^{-1}ch)
DIFF-Y	4	Output data (10^{-1}ch)
RESERVED	5	"00000"
NRBC-X	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100D
NRBC-Y	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100D
IMI#	4	Output data (number), or "0000" fixed for XE-2100D
IMI-DC	4	Output data (10^{-1}fL), or "0000" fixed for XE-2100D
IMI-RF	4	Output data (10^{-1}fL), or "0000" fixed for XE-2100D
RBC-O	4	Output data (x10^{4}/µL), or "0000" fixed for XE-2100L or XE-2100D
PLT-O	4	Output data (x10^{3}/µL), or "0000" fixed for XE-2100L or XE-2100D
RBC-X	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100L or XE-2100D
RBC-Y	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100L or XE-2100D
d-RBC	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
d-PLT	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
Dw/X	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
Dw/Y	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
RESERVED	128	"00 - 00"
RESERVED (for Manufacturer)	22	
ETX	1	(03H)
Total	255	

Format B: Year, 4-digit; IMI#, 5-digit

Parameter	No. of Chars.	Example
STX	1	(02H)
Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"2"
Sample Distinction Code	1	"C"
Quality Control No.	1	"1" - "9", "A" - "F", "a" - "e", "M"; See the Table A-7 for details.
Year	4	YY, Ex: "2001" for year of 2001
Month	2	MM, Ex: "02" for February
Day	2	DD, Ex: "03" for third of month
Hour	2	HH, Ex: "23" for 11PM
Minute	2	MM, Ex: "01"
Instrument ID	16	Right-aligned, space-padding
BASO-X	4	Output data (10^{-1}ch)
BASO-Y	4	Output data (10^{-1}ch)
DIFF-X	4	Output data (10^{-1}ch)
DIFF-Y	4	Output data (10^{-1}ch)
RESERVED	5	"00000"
NRBC-X	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100D
NRBC-Y	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100D
IMI#	5	Output data (number), or "0000" fixed for XE-2100D
IMI-DC	4	Output data (10^{-1}fL), or "0000" fixed for XE-2100D
IMI-RF	4	Output data (10^{-1}fL), or "0000" fixed for XE-2100D
RBC-O	4	Output data (x10^{4}/µL), or "0000" fixed for XE-2100L or XE-2100D
PLT-O	4	Output data (x10^{3}/µL), or "0000" fixed for XE-2100L or XE-2100D
RBC-X	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100L or XE-2100D
RBC-Y	4	Output data (10^{-1}ch), or "0000" fixed for XE-2100L or XE-2100D
d-RBC	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
d-PLT	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
Dw/X	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
Dw/Y	4	Output data (10^{-1}%), or "0000" fixed for XE-2100L or XE-2100D
RESERVED	125	"00 - 00"
RESERVED (for Manufacturer)	22	
ETX	1	(03H)
Total	255	

1) Decimal Point

Decimal point is not sent. Therefore, it is necessary to add decimal point specified for each parameter at the host computer.

2) Date

The order of Year/Month/Day is fixed. Zero-suppression is not carried out.

3) Numerical Data

When the value data is displayed with "----", the data is output in the form of "0000" or "00000".

However, when the parameter is not ordered, such a parameter data is reported as " " (all spaces). In this case, zero-padding is not carried out.

Any parameter which is not controlled in the selected QC Chart will be output as "0000" or "00000".

8. ID BAR CODE SPECIFICATIONS

By affixing the bar code label on the sample tube, a sample ID number can be automatically read. Information read from ID number can be also corrected by processing stored data. In using a bar code, make sure it meets the bar code label specifications applicable to XE-2100 ID bar code reader.
The specifications of the bar code label is described in this section.

1. Acceptable Bar Codes

The types of bar codes acceptable to the instrument and the check digit(s) are listed below.

WARNING: • Use the check-digit as much as possible.
If the check-digit cannot be used, the potential of the incorrect reading of the barcode label may be increased.

1) Sample ID number

Type of Bar Code	Check Digit	No. of Digits
ITF	Not Used	Max. 15 digits (Sample ID No.)
	Modulus 10	Max. 15 digits (Sample ID No.)+ 1 digit (Check digit) = 16 digits Max
NW-7(*)	Not Used	Max. 15 digits (Sample ID No.)
	Modulus 11	Max.15 digits (Sample ID No.)+ 1 digit (Check digit) = 16 digits Max
	W. Modulus 11	
	Modulus 16	
CODE 39	Not Used	Max. 15 digits (Sample ID No.)
	Modulus 43	Max.15 digits (Sample ID No.)+ 1 digit (Check digit) = 16 digits Max
JAN-13	Modulus 10	12 digits (Sample ID No.) + 1 digit (Check digit) = 13 digits
JAN-8	Modulus 10	7 digits (Sample ID No.) + 1 digit (Check digit) = 8 digits
CODE 128	Modulus 103	Max.15 digits (Sample ID No.)+ 1 digit (Check digit) = 16 digits Max

Table A-10: Sample ID No. Bar Code

NOTE:
- Do not use the bar code of Rack ID No. as that of Sample ID No.
- For CODE 128, do not use the function characters.
- *: As the Start/Stop code for NW-7, use one of the characters "A," "B," "C," "a," "b," or "c."

2) Rack ID No.

Type of Bar Code	Check Digit	No. of Digits
NW-7	Modulus 16	6 digits (Rack No.) + 1 digit (Check Digit) = 7 digits
CODE 39	Modulus 43	6 digits (Rack No.) + 1 digit (Check Digit) = 7 digits

Table A-11: Rack ID No. Bar Code

NOTE: • As the Start/Stop code, use either "D" or "d."

3) Quality Control

Type of Bar Code	Check Digit	No. of Digits
CODE 128	Modulus 103	3 digits (Fixed character string "QC-") + 8 digits (Lot No.) + 1 digit (Check Digit) = 12 digits

Table A-12: Quality Control Bar Code

NOTE: • The bar code of CODE 128 for quality control is a special code used for the control blood of Sysmex.

2. Dimension of Bar Code Elements

Narrow Element = 190 μm
Wide Element = 1.2 mm
Narrow Element = Gap between characters Wide Element

3. Narrow/Wide Ratio

For each character, the wide element to narrow element ratio must comply with the following:
Narrow (MAX) : Wide (MIN) = 1 : 2.2 or more
Narrow (MIN) : Narrow (MAX) = 1 : 1.3 or less
Wide (MIN) : Wide (MAX) = 1 : 1.4 or less

4. PCS (Print Contrast Signal)

$$PCS = \frac{\text{Reflectivity at the space - Reflectivity at the black inked bar}}{\text{Reflectivity at the space}}$$

The measuring method conforms to JIS (Japanese Industrial Standards) X 0501, "5.3 Optical Characteristic of Bar Code Symbols."
Standard: PCS value ≥ 0.45

5. Reflection Characteristics of the Label Surface

It is possible that a laminated label cannot be read.

6. Irregularity and Roughness of Printing

When a bar element is magnified, the following may be observed.

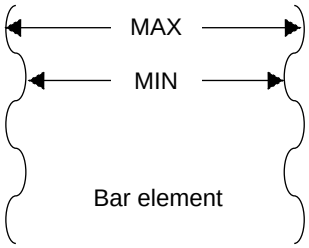


Figure A-7: Roughness of Printing

When the variation coefficient (S) in the width of a bar is defined:

$$S = \frac{MAX - MIN}{MAX} \text{ X } 100\%$$

Then the variation coefficient (S) must be less than or equal to 20%.

7. Dimensions of Bar Code Label

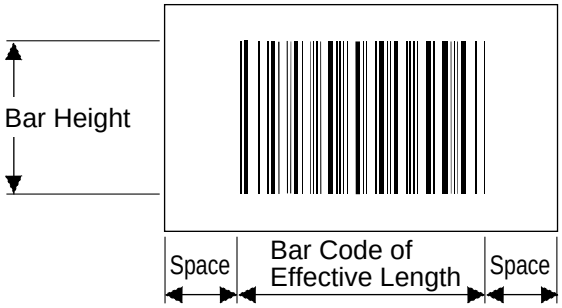


Figure A-8: Dimensions of Bar Code Label

Space:	2.5 mm or more (Normally, at least 5 mm or both right and left.)
Bar Code Effective Length:	48 mm or less (Optimum: 40 mm or less)
Bar Height:	20 mm or more (Rack label height: 6 mm or more)

8. Check Digit

To improve the reliability of an ID No. read, check digit(s) can be added.
Taking the Sample ID No. of "258416" as an example, let us explain how to calculate the check digit for modulus 11 and weighted modulus 11.

1) Modulus 11

(1) Each digit is weighted. The weight corresponding to each digit is as follow.

Digit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Weight	6	5	4	3	2	1	10	9	8	7	6	5	4	3	2

(2) Add up the multiplied results as given below:
S = 14 + 30 + 40 + 16 + 3 + 12 = 115

(3) When the S is divided by 11, calculate the remainder and obtain the complement of the remainder. This complement will be the check digit.
115/11= 10 with remainder 5
11 - 5 = 6, thus the check digit is 6.
However, all English symbols except the numerals of 0 - 9 are regarded as 0 in making calculation. Also, when S is divisible by 11 with remainder 0 and when calculation of the check digit results in 10, zero is entered as the check digit.

2) Weighted Modulus 11
Weighted modulus 11 has two sets of weight. When the check digit is computed to 10 as a result of applying the first weight set, the second weight set is applied. The result should always be one of the 0 to 9 values. Calculation method is entirely the same as modulus 11 except for difference in weighting.

(1) Weighing Each Digit

Weight:	W12	W11	W10	W9	W8	W7	W6	W5	W4	W3	W2	W1
First Set:	6	3	5	9	10	7	8	4	5	3	6	2
Second Set:	5	8	6	2	10	4	3	7	6	8	5	9

	2	5	8	4	1	6
	X	X	X	X	X	X
	8	4	5	3	6	2
Weight	16	20	40	12	6	12

(2) Add up the multiplied results as given below:
S = 16 + 20 + 40 + 12 + 6 + 12 = 106

(3) When the S is divided by 11, calculate the remainder and obtain the complement of the remainder. This complement will be the check digit.
106/11= 9 with remainder 7
11 - 7 = 4, thus the check digit is 4.
However, all English symbols except the numerals of 0 - 9 are regarded as 0 in making calculation. Also, when S is divisible by 11 with remainder 0 and when calculation of the check digit results in 0, zero is entered as the check digit.

NOTE: • For Weighted Modulus 11, weight for the 13th, 14th and 15th digits are assumed 0.

9. HAND HELD BAR CODE READER Specifications

1. Hardware Specifications

1) Specification

(1) The kind of Bar Code: UPC-A, UPC-E, CODE39, CODE128, ITF, NW-7
(2) Decoder: Built-in a reading head.
(3) Interface: RS-232C
(4) Connector: DIN 8P
(5) Power Supply: DC5V+/-5%

2) Pin Arrangement of Connector (DIN 8P)

Pin No.	Signal name		Direction of signal
1	TXD	Transmitting Data	to HOST
2	RXD	Receiving Data	from HOST
3	RTS	Request to Send	to HOST
4	CTS	Clear to Send	from HOST
5	NC		
6	DTR	Data Terminal ready	to HOST
7	SG	Signal Ground	
8	+5V		from HOST

3) Data Transmission Procedure

PRE (ID) DATA POST
PRE: STX
POST: ETX

2. Software Specifications

1) Communication Protocol

Baud Rate	9600
Code	8-bit
Stop Bit	2-bit
Parity	None
RTS/CTS	Use
Protocol	None
Preamble	Transmit STX
Postamble	Transmit ETX

2) Protocol
RTS/CTS Effective
Non Protocol

3) Format
STX DATA ETX

4) The Kind of Bar Code

(1) CODE39
Data can be transmitted without Check Digits, since Check Digits (MOD-43) is judged within Bar Code Reader.
All data may be transmitted with Check Digits, but with no-effect.

(2) JAN, UPC-A, UPC-E, EAN13, EAN8
Data can be transmitted without Check Digits, since Check Digits (MOD-10) is judged within Bar Code Reader.

(3) NW-7
Data can be transmitted without Check Digits, since Check Digits (MOD-16) is judged within Bar Code Reader.
All data except Start/Stop Code may be transmitted by the setup of the Check Digits, but with no-effect.

(4) ITF
Data can be transmitted without Check Digits, since Check Digits (MOD-10) is judged within Bar Code Reader.
All data may be transmitted with Check Digits, but with no-effect.

(5) CODE128
Data can be transmitted without Check Digits, since Check Digits (MOD-103) is judged within Bar Code Reader.

3. Setting for Each Bar Code Symbology

Set the optional manual ID Bar Code Reader, as specified for each bar code symbology.

1) Code39
Check Digit=Use
Check Digit=Not transmit
ST/SP=Not transmit
Full ASCII=Non
Multi-read=No
ID Character=Not transmit

2) NW-7
Check Digit=Not transmit
ST/SP=Not transmit
ST/SP Character=a, b, c, d
Hex Format=No
ID Character=Not transmit

3) UPC-A, UPC-E, EAN13, EAN8
Check Digit=Not transmit
Add-On=No
ID Character=Not transmit

4) ITF
Check Digit=Not transmit
ID Character=Not transmit

5) Code128
Check Digit=Use
Check Digit=Not transmit
ID Character=Not transmit