

## APPENDIX A                      TECHNICAL INFORMATION

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## 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	<p>In the 1.2: Optional Upgrade Software;</p> <ul style="list-style-type: none"> <li>- a description of the "XE HPC master" is added.</li> </ul> <p>In the "7: Analysis Data Format1" and "8: Analysis Data Format 2";</p> <ul style="list-style-type: none"> <li>- a description is added that the instrument name is right-aligned and space-padding.</li> <li>- 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.</li> <li>- an explanation for the Rack Number and Tube Position Number is added for the modes other than the sampler mode.</li> <li>- IG# and IG% are corrected to all spaces, instead of all zeros, when the XE IG master is not installed.</li> <li>- Dutch SI units are additionally described.</li> <li>- HPC# is added.</li> <li>- "HPC analysis mode" is added to the Analysis mode.</li> <li>- Size for the Reserved in the Analysis Data Format 1 is changed from 27 to 21.</li> </ul> <p>In "9: QC Data Format 1" and "10: QC Data Format 2";</p> <ul style="list-style-type: none"> <li>- a description is added that the instrument name is right-aligned and space-padding.</li> <li>- Dutch SI units are additionally described.</li> <li>- HPC# is added.</li> <li>- Size for the Reserved in the QC Data Format 1 is changed from 53 to 48.</li> <li>- an explanation is added for the parameters other than the control parameters in 3) Numerical Data.</li> </ul>
1.2	February 03, 2004	<p>Applicable model of XE-2100D is added.</p> <p>Specifications in the Format A and Format B are unified.</p>

## 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).

#### 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#

### 1.3 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 zeros such as “0000” or “00000”.

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

## **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

Parameter	No. of Chars.	Remarks
STX	1	(02H)
Text Distinction Code I	1	"R"
Inquiry Mode	1	
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	

**Table A-1:** Analysis Information Inquiry Format

### 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 1

Parameter	No. of Chars.	Remarks
STX	1	(02H)
Text Distinction Code 1	1	"S"
Text Distinction Code 2	1	"1"
Information Status	1	
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, "2": Batch
Patient ID No.	16	Left-aligned, space-padding, Ex: "A1234567890 "
Patient Name	40	
Sex	1	"1": Male, "2": Female, "3": Unknown
Birthday	8	"YYYYMMDD" format, Ex: "19990102" for January 02, 1999
Doctor	20	
Ward	20	
Sample Comments	40	
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
PDW <sup>*1</sup>	1	"1": Analyze, "0": Not analyze, ("0" fixed for North American specification software)
MPV	1	"1": Analyze, "0": Not analyze
P-LCR <sup>*1</sup>	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)

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

(To continue to next page)

**Table A-2-1: Analysis Information Format 1**

(Continued from previous page)

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 <sup>*1</sup>	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D, and North American specification software)
MFR <sup>*1</sup>	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D, and North American specification software)
HFR <sup>*1</sup>	1	"1": Analyze, "0": Not analyze, ("0" fixed for XE-2100L and XE-2100D, and North American specification software)
RESERVED	1	"0"
PCT <sup>*1</sup>	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	

(<sup>\*1</sup>: See Section 1.4 in this document.)

**Table A-2-2: Analysis Information Format 1**

## 6. 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": QC
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, "2": Batch
Patient ID No.	16	Left-aligned, space-padding, Ex: "A1234567890 "
Patient Comments	100	
RESERVED	97	"00 - 00"
ETX	1	(03H)
Total	255	

**Table A-3: Analysis Information Format 2**

### 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 First name, then Last name. A space " " (20H) is needed between First and Last name as a separator. When the First name exceeds 20 characters, the first 20 characters will be taken as the First name. Last name will start after the space (20H) and first 20 characters will be used. When no patient name information is available, enter all spaces (20H).

<p><b>NOTE:</b>     • Due to space character " " (20H) Last name can only use 19 characters (normally 20 characters), when First name uses all 20 characters.</p>
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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).

## 7. Analysis Data Format 1

Format A: Year, 2-digit

Format B: Year, 4-digit

Parameter	No. of Chars.	Example	Parameter	No. of Chars.	Example
STX	1	(02H)	STX	1	(02H)
Text Distinction Code 1	1	"D"	Text Distinction Code 1	1	"D"
Text Distinction Code 2	1	"1"	Text Distinction Code 2	1	"1"
Sample Distinction Code	1	"U"	Sample Distinction Code	1	"U"
Instrument Name	16	Right-aligned, space-padding	Instrument Name	16	Right-aligned, space-padding
Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"	Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"
RESERVED	3	"000"	RESERVED	3	"000"
Sample ID No.	15	Alpha-numeric and hyphen; For serial connection, right-aligned, space-padding, Ex: " A1234567890"; For TCP/IP connection, right-aligned, zero-padding, Ex: "0000A1234567890"	Sample ID No.	15	Alpha-numeric 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	Year	4	YYYY, Ex: "2001" for year 2001
Month	2	MM, Ex: "02" for February	Month	2	MM, Ex: "02" for February
Day	2	DD, Ex: "03" for third of month	Day	2	DD, Ex: "03" for third of month
Hour	2	HH, Ex: "23" for 11PM	Hour	2	HH, Ex: "23" for 11PM
Minute	2	MM, Ex: "01"	Minute	2	MM, Ex: "01"
RESERVED	2	"00"	RESERVED	2	"00"
Rack No.	6	Right-aligned, zero-padding, Ex: "000012"	Rack No.	6	Right-aligned, zero-padding, Ex: "000012"
Tube Position	2	Right-aligned, zero-padding, Ex: "02"	Tube Position	2	Right-aligned, zero-padding, Ex: "02"
Sample ID Information	1		Sample ID Information	1	
Analysis Mode	1		Analysis Mode	1	
Patient ID	16	Left-aligned, space-padding, Ex: "1234567890A "	Patient ID	16	Left-aligned, space-padding, Ex: "1234567890A "
Analysis Information	1		Analysis Information	1	
Sample Judgment Information	1		Sample Judgment Information	1	
Positive (Diff)	1		Positive (Diff)	1	
Positive (Morph)	1		Positive (Morph)	1	
Positive (Count)	1		Positive (Count)	1	
Error (Func)	1		Error (Func)	1	
Error (Result)	1		Error (Result)	1	
Order Information	1		Order Information	1	
Sample Information (INTERPRETATION)	6		Sample Information (INTERPRETATION)	6	
Unit Information	1		The Unit Information	1	
WBC Information	1	("0" fixed for XE-2100D)	WBC Information	1	("0" fixed for XE-2100D)
PLT Information	1	("0" fixed for XE-2100L and XE-2100D)	PLT Information	1	("0" fixed for XE-2100L and XE-2100D)
RESERVED	65	"00 - 00"	RESERVED	63	"00 - 00"
Instrument ID (Fixed)	22	"XE-2100^XXXXXXXX^XXXXX"	Instrument ID (Fixed)	22	"XE-2100^XXXXXXXX^XXXXX"
ETX	1	(03H)	ETX	1	(03H)
Total	191		Total	191	

Table A-4: Analysis Data Format 1

## 8. 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 Name	16	Right-aligned, space-padding
Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"
RESERVED	3	"000"
Sample ID No.	15	Alpha-numeric 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 ( $\times 10^3/\mu\text{L}$ )
RBC	5	Output data ( $\times 10^4/\mu\text{L}$ )
HGB	5	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
HCT	5	Output data ( $10^{-1}\%$ )
MCV	5	Output data ( $10^{-1}\text{fL}$ )
MCH	5	Output data ( $10^{-1}\text{pg}$ ), or in case of Dutch SI (amol)
MCHC	5	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
PLT	5	Output data ( $\times 10^3/\mu\text{L}$ )
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 ( $\times 10^3/\mu\text{L}$ )
MONO#	6	Output data ( $\times 10^3/\mu\text{L}$ )
NEUT#	6	Output data ( $\times 10^3/\mu\text{L}$ )
EO#	6	Output data ( $\times 10^3/\mu\text{L}$ )
BASO#	6	Output data ( $\times 10^3/\mu\text{L}$ )
RDW-CV	5	Output data ( $10^{-1}\%$ )
RDW-SD	5	Output data ( $10^{-1}\text{fL}$ )
PDW <sup>*1</sup>	5	Output data ( $10^{-1}\text{fL}$ ), or "00000" fixed for N. American software
MPV	5	Output data ( $10^{-1}\text{fL}$ )
P-LCR <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed 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 Name	16	Right-aligned, space-padding
Sequence No.	10	Right-aligned, zero-padding, "0000000001" - "9999999999"
RESERVED	3	"000"
Sample ID No.	15	Alpha-numeric 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 ( $\times 10^3/\mu\text{L}$ )
RBC	5	Output data ( $\times 10^4/\mu\text{L}$ )
HGB	5	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
HCT	5	Output data ( $10^{-1}\%$ )
MCV	5	Output data ( $10^{-1}\text{fL}$ )
MCH	5	Output data ( $10^{-1}\text{pg}$ ), or in case of Dutch SI (amol)
MCHC	5	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
PLT	5	Output data ( $\times 10^3/\mu\text{L}$ )
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 ( $\times 10^3/\mu\text{L}$ )
MONO#	6	Output data ( $\times 10^3/\mu\text{L}$ )
NEUT#	6	Output data ( $\times 10^3/\mu\text{L}$ )
EO#	6	Output data ( $\times 10^3/\mu\text{L}$ )
BASO#	6	Output data ( $\times 10^3/\mu\text{L}$ )
RDW-CV	5	Output data ( $10^{-1}\%$ )
RDW-SD	5	Output data ( $10^{-1}\text{fL}$ )
PDW <sup>*1</sup>	5	Output data ( $10^{-1}\text{fL}$ ), or "00000" fixed for N. American software
MPV	5	Output data ( $10^{-1}\text{fL}$ )
P-LCR <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for N. American software
RET%	5	Output data ( $10^{-2}\%$ ), or "00000" fixed for XE-2100L or XE-2100D

(<sup>\*1</sup>: See Section 1.4 in this document.)

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Table A-5-1: Analysis Data Format 2

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RET#	5	Output data ( $\times 10^2/\mu\text{L}$ ), or "00000" fixed for XE-2100L or XE-2100D	RET#	5	Output data ( $\times 10^2/\mu\text{L}$ ), 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 <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for XE-2100L or XE-2100D, or N. American software	LFR <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for XE-2100L or XE-2100D, or N. American software
MFR <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for XE-2100L or XE-2100D, or N. American software	MFR <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for XE-2100L or XE-2100D, or N. American software
HFR <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for XE-2100L or XE-2100D, or N. American software	HFR <sup>*1</sup>	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for XE-2100L or XE-2100D, or N. American software
PCT <sup>*1</sup>	5	Output data ( $10^{-2}\%$ ), or "00000" fixed for N. American software	PCT <sup>*1</sup>	5	Output data ( $10^{-2}\%$ ), or "00000" fixed for N. American software
NRBC%	5	Output data ( $10^{-1}\%$ ), or "00000" fixed for XE-2100L or XE-2100D	NRBC%	6	Output data ( $10^{-1}\%$ ), or "000000" fixed for XE-2100L or XE-2100D
NRBC#	6	Output data ( $\times 10^1/\mu\text{L}$ ), or "000000" fixed for XE-2100L or XE-2100D	NRBC#	6	Output data ( $\times 10^1/\mu\text{L}$ ), or "000000" fixed for XE-2100L or XE-2100D
IG#	6	Output data ( $\times 10^1/\mu\text{L}$ ), or all spaces when XE IG master is not installed	IG#	6	Output data ( $\times 10^1/\mu\text{L}$ ), 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 ( $\times 1/\mu\text{L}$ ), or all spaces when XE HPC master is not installed	HPC#	6	Output data ( $\times 1/\mu\text{L}$ ), or all spaces when XE HPC master is not installed
Reserved	22	"00 - 00"	Reserved	21	"00 - 00"
ETX	1	(03H)	ETX	1	(03H)
Total	255		Total	255	

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

**Table A-5-2: Analysis Data Format 2**

### 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 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-numeric including a hyphen "-" (2D h). 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), Positive (Morph), Positive (Count)

This indicates whether the blood cell differential data is abnormal.

"1": Abnormal

"0": Normal

14) 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.

15) 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

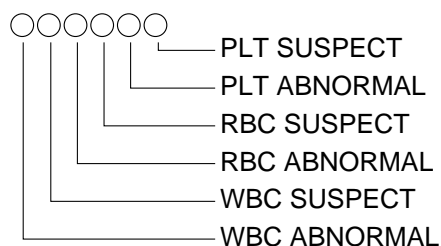
16) Order Information

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

"1": Analyzed by an order

"0": Analyzed without an order

17) Sample Information (Flag)



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

"1": Existing

"0": None

18) 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.

19) WBC Information

This indicates whether the WBC value is compensated by the NRBC value.

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

"0": WBC is not compensated.

20) PLT Information

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

"1": PLT-O is adopted.

"0": PLT-O is not adopted.

21) Instrument ID

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

22) 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.

Most Significant Digit	Least Significant Digit	Details of Flag
X X X X F		"0": Normal
└───┘		"1": Analysis data is greater than the preset Upper Patient Mark Limit.
Data Flag		"2": Analysis data is less than the preset Lower Mark Limit.
		"3": Out of linearity limit.
		"4": Analysis data is less reliable

23) 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).

## 9. 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 Name	16	Right-aligned, space-padding
RBC	4	Output data ( $\times 10^4/\mu\text{L}$ )
HGB	4	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
HCT	4	Output data ( $10^{-1}\%$ )
MCV	4	Output data ( $10^{-1}\text{fL}$ )
MCH	4	Output data ( $10^{-1}\text{pg}$ ), or in case of Dutch SI (amol)
MCHC	4	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
RDW-CW	4	Output data ( $10^{-1}\%$ )
RDW-SD	4	Output data ( $10^{-1}\text{fL}$ )
PLT	4	Output data ( $\times 10^3/\mu\text{L}$ )
PDW <sup>*1</sup>	4	Output data ( $10^{-1}\text{fL}$ ) , or "0000" for N. American software
MPV	4	Output data ( $10^{-1}\text{fL}$ )
P-LCR <sup>*1</sup>	4	Output data ( $10^{-1}\%$ ), or "0000" for N. American software
PCT <sup>*1</sup>	4	Output data ( $10^{-2}\%$ ), or "0000" for N. American software
WBC	5	Output data ( $\times 10^3/\mu\text{L}$ )
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 ( $\times 10^3/\mu\text{L}$ )
LYMPH#	5	Output data ( $\times 10^3/\mu\text{L}$ )
MONO#	5	Output data ( $\times 10^3/\mu\text{L}$ )
EO#	5	Output data ( $\times 10^3/\mu\text{L}$ )
BASO#	5	Output data ( $\times 10^3/\mu\text{L}$ )
NRBC%	4	Output data ( $10^{-1}\%$ )
RET#	4	Output data ( $\times 10^2/\mu\text{L}$ )

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

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 Name	16	Right-aligned, space-padding
RBC	4	Output data ( $\times 10^4/\mu\text{L}$ )
HGB	4	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
HCT	4	Output data ( $10^{-1}\%$ )
MCV	4	Output data ( $10^{-1}\text{fL}$ )
MCH	4	Output data ( $10^{-1}\text{pg}$ ), or in case of Dutch SI (amol)
MCHC	4	Output data (g/L), or in case of Dutch SI ( $10^{-1}\text{mmol/L}$ )
RDW-CW	4	Output data ( $10^{-1}\%$ )
RDW-SD	4	Output data ( $10^{-1}\text{fL}$ )
PLT	4	Output data ( $\times 10^3/\mu\text{L}$ )
PDW <sup>*1</sup>	4	Output data ( $10^{-1}\text{fL}$ ) , or "0000" for N. American software
MPV	4	Output data ( $10^{-1}\text{fL}$ )
P-LCR <sup>*1</sup>	4	Output data ( $10^{-1}\%$ ), or "0000" for N. American software
PCT <sup>*1</sup>	4	Output data ( $10^{-2}\%$ ), or "0000" for N. American software
WBC	5	Output data ( $\times 10^3/\mu\text{L}$ )
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 ( $\times 10^3/\mu\text{L}$ )
LYMPH#	5	Output data ( $\times 10^3/\mu\text{L}$ )
MONO#	5	Output data ( $\times 10^3/\mu\text{L}$ )
EO#	5	Output data ( $\times 10^3/\mu\text{L}$ )
BASO#	5	Output data ( $\times 10^3/\mu\text{L}$ )
NRBC%	5	Output data ( $10^{-1}\%$ )
RET#	4	Output data ( $\times 10^2/\mu\text{L}$ )

(To continue to next page)

**Table A-6-1: QC Data Format 1**



(Continued from previous page)

RET%	4	Output data (10 <sup>-2</sup> %)	RET%	4	Output data (10 <sup>-2</sup> %)
HFR <sup>*1</sup>	4	Output data (10 <sup>-1</sup> %), or "0000" for N. American software	HFR <sup>*1</sup>	4	Output data (10 <sup>-1</sup> %), or "0000" for N. American software
MFR <sup>*1</sup>	4	Output data (10 <sup>-1</sup> %), or "0000" for N. American software	MFR <sup>*1</sup>	4	Output data (10 <sup>-1</sup> %), or "0000" for N. American software
LFR <sup>*1</sup>	4	Output data (10 <sup>-1</sup> %), or "0000" for N. American software	LFR <sup>*1</sup>	4	Output data (10 <sup>-1</sup> %), or "0000" for N. American software
IRF	4	Output data (10 <sup>-1</sup> %)	IRF	4	Output data (10 <sup>-1</sup> %)
NRBC#	5	Output data (x10 <sup>1</sup> /μL)	NRBC#	5	Output data (x10 <sup>1</sup> /μL)
IG#	5	Output data (x10 <sup>1</sup> /μL), or "00000" when XE IG master is not installed	IG#	5	Output data (x10 <sup>1</sup> /μL), or "00000" when XE IG master is not installed
IG%	4	Output data (10 <sup>-1</sup> %), or "0000" when XE IG master is not installed	IG%	4	Output data (10 <sup>-1</sup> %), or "0000" when XE IG master is not installed
HPC#	5	Output data (x1/μL), or "00000" when XE HPC master is not installed	HPC#	5	Output data (x1/μL), or "00000" when XE HPC master is not installed
RESERVED	51	"00~00"	RESERVED	48	"00~00"
Manual / Closed	1	"0": Manual mode "1": Closed mode; See Table A-7 for details.	Manual / Closed	1	"0": Manual mode "1": Closed mode; See Table A-7 for details.
Instrument ID (Fixed)	22	"XE-2100^XXXXXXXX^XXXXX"	Instrument ID (Fixed)	22	"XE-2100^XXXXXXXX^XXXXX"
ETX	1	(03H)	ETX	1	(03H)
Total	255		Total	255	

(<sup>\*1</sup>: See Section 1.4 in this document.)

**Table A-6-2: QC Data Format 1**

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.)

**Table A-7: File Corresponding to QC No.**

## 10. 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 Name	16	Right-aligned, space-padding
BASO-X	4	Output data (10 <sup>-1</sup> ch)
BASO-Y	4	Output data (10 <sup>-1</sup> ch)
DIFF-X	4	Output data (10 <sup>-1</sup> ch)
DIFF-Y	4	Output data (10 <sup>-1</sup> ch)
RESERVED	5	"00000"
NRBC-X	4	Output data (10 <sup>-1</sup> ch)
NRBC-Y	4	Output data (10 <sup>-1</sup> ch)
IMI#	4	Output data (number)
IMI-DC	4	Output data (10 <sup>-1</sup> fL)
IMI-RF	4	Output data (10 <sup>-1</sup> fL)
RBC-O	4	Output data (x10 <sup>2</sup> /μL)
PLT-O	4	Output data (x10 <sup>3</sup> /μL)
RBC-X	4	Output data (10 <sup>-1</sup> ch)
RBC-Y	4	Output data (10 <sup>-1</sup> ch)
d-RBC	4	Output data (10 <sup>-1</sup> %)
d-PLT	4	Output data (10 <sup>-1</sup> %)
Dw/X	4	Output data (10 <sup>-1</sup> %)
Dw/Y	4	Output data (10 <sup>-1</sup> %)
RESERVED	128	"00 - 00"
Instrument ID (Fixed)	22	"XE-2100^XXXXXXXXX^XXXXX"
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 Name	16	Right-aligned, space-padding
BASO-X	4	Output data (10 <sup>-1</sup> ch)
BASO-Y	4	Output data (10 <sup>-1</sup> ch)
DIFF-X	4	Output data (10 <sup>-1</sup> ch)
DIFF-Y	4	Output data (10 <sup>-1</sup> ch)
RESERVED	5	"00000"
NRBC-X	4	Output data (10 <sup>-1</sup> ch)
NRBC-Y	4	Output data (10 <sup>-1</sup> ch)
IMI#	5	Output data (number)
IMI-DC	4	Output data (10 <sup>-1</sup> fL)
IMI-RF	4	Output data (10 <sup>-1</sup> fL)
RBC-O	4	Output data (x10 <sup>2</sup> /μL)
PLT-O	4	Output data (x10 <sup>3</sup> /μL)
RBC-X	4	Output data (10 <sup>-1</sup> ch)
RBC-Y	4	Output data (10 <sup>-1</sup> ch)
d-RBC	4	Output data (10 <sup>-1</sup> %)
d-PLT	4	Output data (10 <sup>-1</sup> %)
Dw/X	4	Output data (10 <sup>-1</sup> %)
Dw/Y	4	Output data (10 <sup>-1</sup> %)
RESERVED	125	"00 - 00"
Instrument ID (Fixed)	22	"XE-2100^XXXXXXXXX^XXXXX"
ETX	1	(03H)
Total	255	

Table A-8: QC Data Format 2

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".

## 11. 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-16:** 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-17:** 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 (*1)	Modulus 103	3 digits (Fixed character string "QC-") + 8 digits (Lot No.) + 1 digit (Check Digit) = 12 digits
NW-7 (*2)	Not Used	4 digits - 13 digits (File No.) (*3)

**Table A-18:** Quality Control Bar Code

**NOTE:**

- \*1: The bar code of CODE 128 for quality control is a special code used for the control blood of Sysmex.
- \*2: As the Start/Stop code for NW-7, use either "C" or "c."
- \*3: The numerals that can be used are 1 to 9 and all the digits must be identical.

## 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)

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

The measuring method conforms to JIS (Japanese Industrial Standards) X 0501, "5.3 Optical Characteristic of Bar Code Symbols."

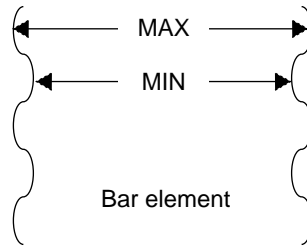
Standard: PCS value  $\geq 0.45$

## 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.



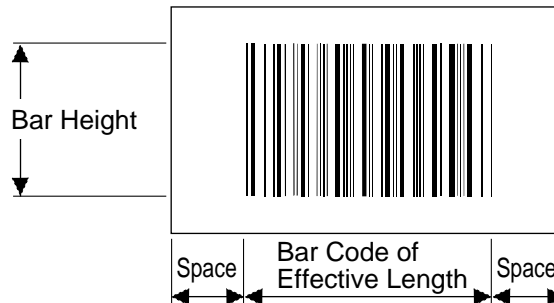
**Figure A-7:** Roughness of Printing

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

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

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.

$$115/11 = 10 \text{ with remainder } 5$$

$$11 - 5 = 6, \text{ thus the check digit is } 6.$$

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.

<p><b>NOTE:</b>      • For Weighted Modulus 11, weight for the 13th, 14th and 15th digits are assumed 0.</p>
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## 12. 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