



XP Series Interface Specifications

Revision: 1.4

Sysmex Corporation

1. Revision History

The revisions made after the development are described in chronological order.

Version number	Date	Major contents of changes	Person in charge							
1.0	2011.9.2	Release of first version	Sakurai							
1.1	2011.12.9	Corrected erroneous description. 1) Added normal particle size distribution, abnormal particle size distribution, and manual analysis information to the XP-format particle size distribution analysis information (4.1.1.7).	Sakurai							
1.2	2012.10.31	Corrected erroneous description. 1) Added description of the connector form and pin layout etc. to the description of the Serial 1 signal cable (3.1.1). 2) In the pocH format, the explanation “In diluent mode, this value is masked as “*0000.”” was deleted (4.1.2.1). 3) In the KX-21N format, the explanation “In diluent mode, this value is masked as “*0000.”” was deleted (4.1.3.1). 4) In the K-1000 format, the explanation “In diluent mode, this value is masked as “*0000.”” was deleted (4.1.4.1).	Saito							
1.3	2013.01.22	Corrected erroneous description. 1) In the XP format, the content of the correspondence table between particle size distribution flags and flagging characters was revised as follows (4.1.1.7): <ul style="list-style-type: none"> • The PLT flagging character for particle size distribution FLAG “1” was changed from “RL or PL (1)” to “PL (1)” • The PLT flagging character for particle size distribution FLAG “2” was changed from “RU or PL (2)” to “PU (2)” 2) In the KX-21N format, the content of the correspondence table between particle size distribution flags and flagging characters was revised as follows (4.1.3.7): <ul style="list-style-type: none"> • The PLT flagging character for particle size distribution FLAG “1” was changed from “RL (1)” to “PL (1)” • The PLT flagging character for particle size distribution FLAG “2” was changed from “RU (2)” to “PU (2)” 	Kajino							
1.4	2014.02.28	Corrected erroneous description. 1) In the XP format, an erroneous description for RESERVED in the analysis data format was revised as follows (4.1.1.1): <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Parameter</th> <th>Character count</th> <th>Format</th> </tr> </thead> <tbody> <tr> <td rowspan="2">RESERVED</td> <td rowspan="2">85</td> <td><Before revision> 106 spaces (20H)</td> </tr> <tr> <td><After revision> 85 spaces (20H)</td> </tr> </tbody> </table>	Parameter	Character count	Format	RESERVED	85	<Before revision> 106 spaces (20H)	<After revision> 85 spaces (20H)	Nishikawa
Parameter	Character count	Format								
RESERVED	85	<Before revision> 106 spaces (20H)								
		<After revision> 85 spaces (20H)								

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1 Scope

The specifications described in this document apply to the XP series.

2 General

These specifications define the external input and output of the XP series. The table below lists the external input and output ports that the XP series is provided with each of which input or output data in the required format.

Port	I/O type	Connected device	Format type
Serial 1	IN/OUT	Host computer	XP format
			pocH format
			KX-21N format
			ASTM format ^{*1}
			K-1000 format
			K-DPS format
Serial 2	IN	Handheld barcode reader	Sample number input format
			Control blood data input format
			Calibrator data input format
Ethernet	IN/OUT	Host computer	XP format
			pocH format
			KX-21N format
			ASTM format ^{*1}
			K-1000 format
			K-DPS format

* 1 The ASTM format is described in the separate ASTM Communication Specifications (ASTM E1394-97, E1381-95).

3 Communication format

3.1 Serial 1

3.1.1 Signal lines

- Connect the signal lines to the HOST Output connector in the rear of the instrument.
- For connections, use a 9-pin female D-Sub connector (the instrument is provided with a male connector).
- Use inch screw threads to fix the connector.

The following signal lines are used for communication. However, RTS/CTS may not be used depending on the setup.

Pin number	Signal name		Signal direction
1			
2	RxD	Received Data	IN
3	TxD	Transmitted Data	OUT
4	DTR	Data Terminal Ready	OUT
5	SG	Signal Ground	
6	DSR	Data Set Ready	IN
7	RTS	Request to Send	OUT
8	CTS	Clear to Send	IN
9			

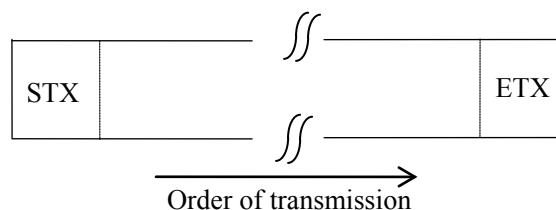
3.1.2 Character codes

Data: ASCII code

Control codes: STX (0x02), ETX (0x03), ACK (0x06), NAK (0x15)

3.1.3 Structure of text

STX (02 h) is sent before the data and ETX (03 h) is sent at the end of the data.



3.1.4 Communication Procedure

Class A and Class B are supported.

Class A	One-way transmission without requiring a response from the host computer
Class B	Transmits data and then waits for the acknowledgment (ACK or NAK) from the host computer

3.1.5 Response Code (Class B)

A single character providing ACK (06H) or NAK (15H) without STX or ETX is sent as the response code for Class B.

3.1.6 Response Time

After sending text data, the device becomes ready to receive a response within 200 msec.

After receiving text data, the device becomes ready to send a response within 5,000 msec.

3.1.7 Retransmission Time

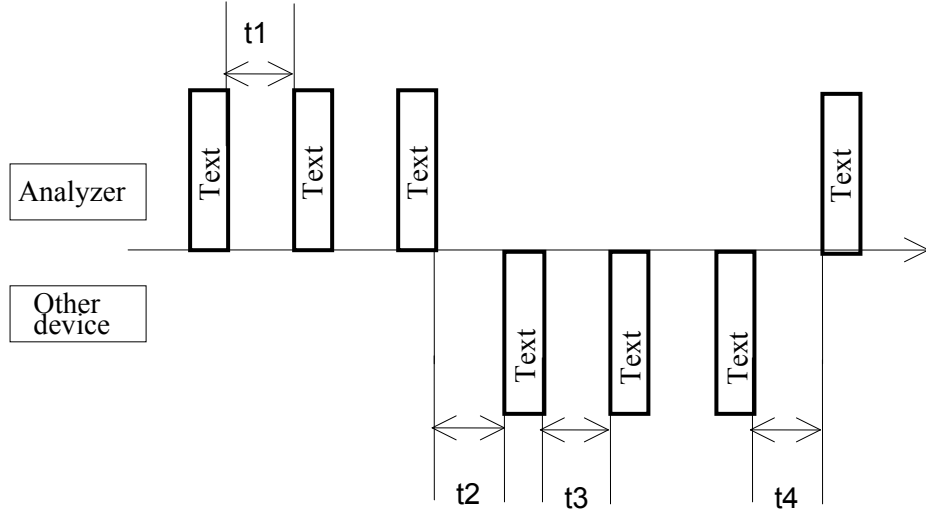
After receiving a NAK response, the device should wait for at least 200 msec before retransmitting data.

3.1.8 Retransmission Count

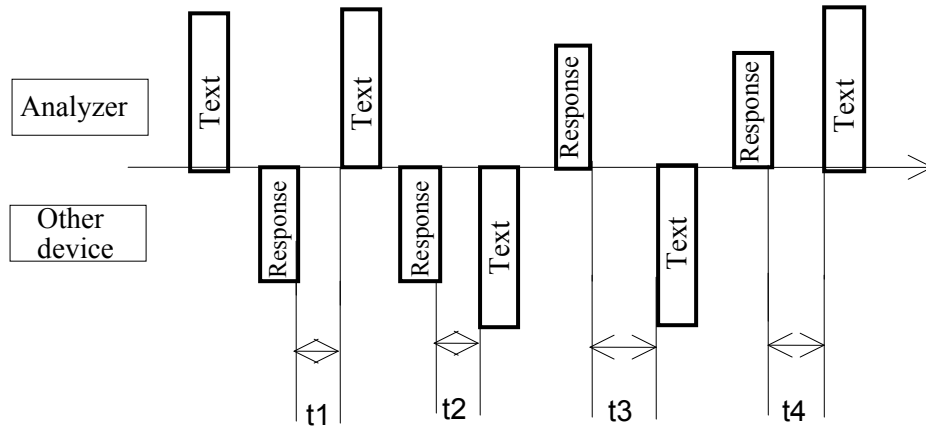
When the device receives NAK from the host computer, it will retransmit the data up to 3 times. Therefore, it will transmit the same text data for a maximum of 4 times.

3.1.9 Interval

3.1.9.1 For Class A



3.1.9.2 For Class B



	Transmission Interval (* denotes the default value)	Remarks
t1	Transmitted after 0, 2* 3, 5, 7, 10 or 15 sec	Depends on the other device
t2	It should be possible to send within 200 ms	Depends on the analyzer
t3	It should be possible to send within 200 ms	Depends on the analyzer
t4	It should transmit after 1 sec or longer interval	Depends on the other device

3.1.10 Abnormal Processing

Parameter	Description	Processing (Error name (Ver. 1.1))
Transmission error	During reception of data, a frame error, parity error or overrun error is detected	Interruption of transmission (HC Off-line)
Break code	When break code is received	Ignore
Off-line	The control signal DSR from the host computer is not active	Interruption of transmission (HC Off-line)
(Resend)	After data is transmitted, NAK is sent from the host computer (Class B only)	Resend
(HC ACK code error)	After data is transmitted, a code other than ACK or NAK is sent from the host computer (Class B only)	Interruption of transmission (HC Off-line)
Retransmission limit exceeded	After data is transmitted, a response other than ACK for the 4th time is received (Class B only)	Interruption of transmission (HC retransmission limit exceeded)
Reception limit exceeded	There is an error in the received text and NAK is sent 7 times	Interruption of transmission
CTS time-out	During transmission of data, the control signal CTS does not become active within 5 seconds (only if RTS/CTS control is selected)	Interruption of transmission (HC ACK time-out)
Response time-out	After data is transmitted, ACK or NAK is not received within 15 seconds (Class B only)	Interruption of transmission (HC ACK time-out)
STX time-out	(1) STX is not received within 15 seconds after the text transmission is requested (Class A only) (2) ACK is received after requesting transmission of text data, but STX is not received within 15 seconds after receiving ACK (Class B only) (3) STX for the subsequent subtext is not received within 15 seconds after the last subtext is received (Class A only) (4) STX for the subsequent subtext is not received within 15 seconds after the last subtext is received and ACK is sent (Class B only)	Interruption of transmission
ETX time-out	ETX is not received within 15 seconds after STX is received	Interruption of transmission

3.2 Serial 2 Transmission Format

The transmission parameters are listed below.

Parameter	Set value	Remarks
Baud rate	9600 bps	
Data length	8 bit	
Stop bit	1 bit	
Parity bit	None	
RTS/CTS	Enabled	
Transfer protocol	Non-procedure	
Check digit	Not transmitted	But transmitted as part of EAN13 and EAN8
ID character	Not transmitted	
Preamble	(02H)	
Postamble	(03H)	

3.3 Parallel Transmission Format

This format complies with the Centronics interface.

3.4 Ethernet Transmission Format

3.4.1 Physical Layer/Data Link Layer

This format complies with the IEEE802.3 standard.

3.4.2 Network/Transport Layers

Based on the TCP/IP protocol.

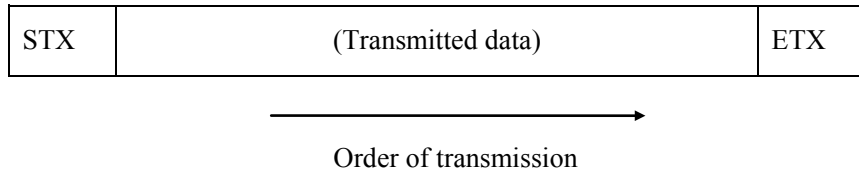
3.4.3 Session Layer

This layer uses a bit serial interface (Class A).

During the start-up process, connection is established with the host computer acting as a server and the device (M77M) acting as a client. If connection fails, a connection error is output to the application and a new connection is attempted after error recovery.

3.4.4 Presentation Layer

In this layer, data is transmitted in ASCII code, and STX is added at the start of data and ETX at the end.



* For details on transmitted data, refer to the Format chapter.

3.4.5 Application Layer

There are no additional details to mention.

4 Format

4.1 Serial 1

4.1.1 XP Format

The XP format includes an Analysis Data Format for outputting sample analysis data and a Quality Control Data Format for outputting quality control data. The 2 formats differ in text length and content. (They are differentiated by the Sample Distinction Code.)

If the transmitted data exceeds 256 bytes including 'STX' and 'ETX', the data is split into multiple portions of up to 256 bytes, which are transmitted in order starting from the first portion and no other data is placed in this data stream. Text distinction code II shows the order of text data.

4.1.1.1 Analysis Data Format

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "U"
Instrument ID	40	(Instrument name)^(PS code)^(Instrument number) A 40-character string that is left-aligned and padded with spaces Example (for XP-300): "XP-300^12345678^123456789012345 " Example (for XP-100): "XP-100^12345678^123456789012345 "
Year	4	Zero-padded 4-digit year: Example "2001"
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Analysis Status	1	Analysis Mode Whole blood mode: '0', Diluent mode: '5'
Sample ID	15	A 15-character instrument ID that is right-aligned and padded with spaces or zeros as specified by the ID Pad. setting of the host output setting Example: " AB-12345", "0000000AB-12345"
Particle Size Distribution Analysis Data	6	(XXXXXX)
Reserve	1	'0'
WBC [x10 ² /uL]	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763" (XXXXF)
RBC [x10 ⁴ /uL]	5	(XXXXF)
HGB [g/dL]	5	(XXXXF)

Parameter	No. of characters	Format
HCT [%]	5	(XXXXF)
MCV [fL]	5	(XXXXF)
MCH [pg]	5	(XXXXF)
MCHC [g/dL]	5	(XXXXF)
PLT [$\times 10^4$ /uL]	5	(XXXXF)
W-SCR [%]	5	(XXXXF)
W-MCR [%]	5	(XXXXF)
W-LCR [%]	5	(XXXXF)
W-SCC [$\times 10^2$ /uL]	5	(XXXXF)
W-MCC [$\times 10^2$ /uL]	5	(XXXXF)
W-LCC [$\times 10^2$ /uL]	5	(XXXXF)
RDW-SD [fL]	5	(XXXXF)
RDW-CV [%]	5	(XXXXF)
PDW [fL] ^{*1}	5	(XXXXF)
MPV [fL]	5	(XXXXF)
P-LCR [%] ^{*1}	5	(XXXXF)
PCT [%] ^{*1}	5	(XXXXF)
ETX	1	(03H)
	Total 176	

*1. When the PDW/P-LCR and PCT in the Service settings are set to Not used, "0000" is output.

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "2"
WBC Particle Distribution Data	100	50 two-digit hexadecimals converted to ASCII code
RBC Particle Distribution Data	100	50 two-digit hexadecimals converted to ASCII code
ETX	1	(03H)
	Total 204	

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "3"
PLT Particle Distribution Data	80	40 two-digit hexadecimals converted to ASCII code
WBC LD	2	2 two-digit hexadecimals converted to ASCII code
WBC T1	2	2 two-digit hexadecimals converted to ASCII code
WBC T2	2	2 two-digit hexadecimals converted to ASCII code
WBC UD	2	2 two-digit hexadecimals converted to ASCII code
RBC LD	2	2 two-digit hexadecimals converted to ASCII code
RBC UD	2	2 two-digit hexadecimals converted to ASCII code
PLT LD	2	2 two-digit hexadecimals converted to ASCII code
PLT UD	2	2 two-digit hexadecimals converted to ASCII code
Operator ID	15	A 15-character operator ID that is left-aligned and padded with spaces Example: "ABCDEFGH I" * When the OPERATOR setting is set to Not Used, 15 spaces (20H) are output.
ResearchW [$\times 10^2/\mu\text{L}$]	7	6 significant figures that are zero padded without a decimal point plus 1-digit flag data Example: Data ($76.91 \times 10^2/\mu\text{L}$, flag data (0) --> "0076910" (XXXXXXF) * Flag data is fixed at '0.' * When the ResearchW setting is set to Not Used, 7 spaces (20H) are output. * When WBC analysis data is masked, the following is output. WBC: *0000 --> ResearchW: *000000 WBC: *0003 --> ResearchW: *000003
ResearchS	7	(XXXXXXF) Same as ResearchW (except for the following). * When W-SCC analysis data is masked, the following is output. W-SCC: *0000 --> ResearchS: *000000 W-SCC: *0003 --> ResearchS: *000003
ResearchM	7	(XXXXXXF) Same as ResearchW (except for the following). * When W-MCC analysis data is masked, the following is output. W-MCC: *0000 --> ResearchM: *000000 W-MCC: *0003 --> ResearchM: *000003
ResearchL	7	(XXXXXXF) Same as ResearchW (except for the following). * When W-LCC analysis data is masked, the following is output. W-LCC: *0000 --> ResearchL: *000000 W-LCC: *0003 --> ResearchL: *000003
RESERVED	85	85 spaces (20H)
ETX	1	(03H)
	Total 228	

4.1.1.2 Quality Control Data Format

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "C"
Instrument ID	40	(Instrument name)^(PS code)^(Instrument number) A 40-character instrument ID that is left-aligned and padded with spaces. Example (for XP): "XP^12345678^12345 "
Lot ID	10	A 10-character Lot ID that is left-aligned and padded with spaces
Data Type	1	QC system X-bar control: 'X,' L-J control: 'L'
Year	4	Zero-padded 4-digit year: Example "2001"
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Hour	2	Zero-padded 2-digit hour: Example "10"
Minute	2	Zero-padded 2-digit minute: Example "15"
Data ID	1	1-digit QC file number: Example "1"
Not used	1	'0'
Reserve	1	'0'
WBC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76)→"0076" (XXXX)
W-SCR	4	(XXXX)
W-MCR	4	(XXXX)
W-LCR	4	(XXXX)
W-SCC	4	(XXXX)
W-MCC	4	(XXXX)
W-LCC	4	(XXXX)
RBC	4	(XXXX)
HGB	4	(XXXX)
HCT	4	(XXXX)
MCV	4	(XXXX)
MCH	4	(XXXX)
MCHC	4	(XXXX)
RDW-SD	4	(XXXX)
RDW-CV	4	(XXXX)
PLT	4	(XXXX)
PDW ^{*1}	4	(XXXX)
MPV	4	(XXXX)
P-LCR ^{*1}	4	(XXXX)
PCT ^{*1}	4	(XXXX)
W-SMV	4	(XXXX)
W-LMV	4	(XXXX)
ETX	1	(03H)
Total 159		

*1. When the PDW/P-LCR and PCT in the Service settings are set to Not used, "****" is output.

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "2"
WBC Particle Distribution Data	100	50 two-digit hexadecimal converted to ASCII code
RBC Particle Distribution Data	100	50 two-digit hexadecimal converted to ASCII code
ETX	1	(03H)
Total 204		

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "3"
PLT Particle Distribution Data	80	40 two-digit hexadecimal converted to ASCII code
WBC LD	2	2 two-digit hexadecimal converted to ASCII code
WBC T1	2	2 two-digit hexadecimal converted to ASCII code
WBC T2	2	2 two-digit hexadecimal converted to ASCII code
WBC UD	2	2 two-digit hexadecimal converted to ASCII code
RBC LD	2	2 two-digit hexadecimal converted to ASCII code
RBC UD	2	2 two-digit hexadecimal converted to ASCII code
PLT LD	2	2 two-digit hexadecimal converted to ASCII code
PLT UD	2	2 two-digit hexadecimal converted to ASCII code
Operator ID	15	A 15-character operator ID that is left-aligned and padded with spaces Example: "ABCDEFGHI " * When the OPERATOR setting is set to Not Used, 15 spaces (20H) are output.
RESERVED	113	113 spaces (20H)
ETX	1	(03H)
Total 228		

4.1.1.3 Instrument ID

The instrument ID [(Instrument name)^(PS code)^(Instrument number)] is a left-aligned and space padded 40-character string.

Example (for XP):

Analyzer name: [XP]

PS Code: [12345678]

Instrument number: A serial number of user defined settings [123456]

--> "XP^12345678^123456"

4.1.1.4 Date Format

The date format is a fixed format that does not depend on the system settings.

4.1.1.5 Analysis Status

Analysis status indicates the following data.

Code	Description
"0"	Whole blood mode analysis
"5"	Diluent mode analysis

* Since calibrator mode and QC mode analysis results are also analyzed in the whole blood mode, they are output by whole blood mode analysis.

4.1.1.6 Sample ID

If there are less than 15 digits in the sample ID, the number is expanded to 15 digits by adding spaces or zeros to the left side of the number according to the ID Pad. setting in the HC output setting.

Example:

Space padding: 12345 -->" 12345"

Zero padding: 12345 -->"000000000012345"

4.1.1.7 Particle Size Distribution Analysis Data

Particle size distribution analysis data includes the following 6 types of data.

Parameter	No. of characters
WBC Particle Size Distribution Data	1
WBC Particle Size Distribution Flag	1
RBC Particle Size Distribution Data	1
RBC Particle Size Distribution Flag	1
PLT Particle Size Distribution Data	1
PLT Particle Size Distribution Flag	1

1) Particle Size Distribution Data

Particle size distribution data includes the following 3 types of data.

Code	Description
"0"	Normal particle size distribution
"1"	Abnormal particle size distribution
"2"	Manual discriminator

2) Particle Size Distribution Flag

There are 10 types of particle size distribution flags, each of which correspond to LCD screen and printer flagging characters.

Particle size distribution data that indicates normal particle size distribution is "0" while

data that indicates abnormal particle size distribution is a number between "1" and "8" or "A."

Correspondence between Particle Size Distribution Flag and Flagging Characters

Particle Size Distribution Flag	LCD Screen and Printer Flagging Characters and HC Flagging Items			Remarks
	WBC	RBC	PLT	
"0"	Normal	Normal	Normal	Normal (WBC/RBC/PLT)
"1"	WL (1)	RL (1)	PL (1)	Degree of L discrete limit is high (WBC/RBC/PLT)
"2"	WU (6)	RU (2)	PU (2)	Degree of H discrete limit is high (WBC/RBC/PLT)
"3"		DW (4) ^{*2}	DW (4)	Distribution width cannot be calculated (RBC/PLT)
"4"		MP (3) ^{*2}	MP (3)	There are 2 or more peaks (RBC/PLT)
"5"	T1 (2)			T1 discrete cannot be determined (WBC)
"6"	T2 (3)			T2 discrete cannot be determined (WBC)
"7"	F1, F2 (4)			T1 relative level exceeds the set value (WBC)
"8"	F2, F3 (5)			T2 relative level exceeds the set value (WBC)
"A"	AG (7) ^{*1}			The count of particles equal to or less than WBC-LC exceeds the set value (WBC)

The numbers in brackets () indicate flagging priority.

- * 1. On screen, "AG" is added to PLT, while in HC "A" is added to WBC.
- * 2. On the XP, screen priority is "DW" and "MP" (for HC, "MP" and "DW").

4.1.1.8 Numeric Data

Numeric data is expressed in the following format.

Data is output as 4 significant digits without a decimal point and no zero suppression.

XXXX F

┌───┐ |

Data flag

Flag details

Code	Description	Priority ^{*1}
"0"	Normal	4
"1"	Abnormal value assessment is +	3
"2"	Abnormal value assessment is -	
"3"	Out of assured linearity	1
"4"	Low reliability	2

*1 Indicates flagging priority (lower numbers indicate higher priority).

4.1.1.9 Decimal Point

Since the decimal point varies with the unit that is set, host output omits the decimal point and outputs only significant numeric values. Significant numeric values do not vary with

the system of units, but are identical to screen indications. For details, refer to the external specifications. The order of transmission is from the top parameter in the table; the most significant digit first with zero-padding.

4.1.1.10 Data Mask

Masked data is output according to the following fixed format.

Output format for masked data

Mask Indication	Output Format	Priority ^{*1}	Remarks
"++++"	"*0003"	1	Overflow data
"****"	"*0000"	2	Analysis error (instrument error)
"----"	"*0000"	3	Data error, data that cannot be analyzed, etc.

*1. Indicates masking priority.

*2. The output format for QC data is "****."

4.1.1.11 Operator ID

The Operator ID is a 15-character string that is left-aligned and padded with spaces.

4.1.1.12 WBC Research Items

WBC research items: The zero padded 6 significant figures of ResearchW without a decimal point plus 1-digit flag data.

4.1.1.13 Data ID

The data ID in the QC format is output as 1 character for the QC file numbers from '1' to '3.'

4.1.1.14 Particle Size Distribution Data and Discrete Values

Particle size distribution data is 50 characters of data for WBC and RBC and 40 characters of data for PLT converted with ASCII to a 2-digit hexadecimal data. Discrete values are WBC LD, WBC T1, WBC T2, WBC UD, RBC LD, RBC UD, PLT LD and PLT UD. Like the particle size distribution data, they are indicated as 2-digit hexadecimal data converted with ASCII.

Example:

ch[0]=123(0x7B)

ch[1]=45(0x2D)

ch[2]=56(0x38)

...

ch[49]=67(0x43)

The above data is sorted as shown below.

“7B2D38.....43”

4.1.2 poch Format

The poch format includes an Analysis Data Format for outputting sample analysis data and a Quality Control Data Format for outputting quality control data. The 2 formats differ in text length and content. (They are differentiated by the Sample Distinction Code.) If the transmitted data exceeds 256 bytes including STX and ETX, the data is split into multiple portions of up to 256 bytes, which are transmitted in order starting from the first portion and no other data is placed in this data stream. Text distinction code II shows the order of text data.

4.1.2.1 Analysis Data Format

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "U"
Instrument ID	40	(Instrument name)^(PS code)^(Instrument number) A 40-character string that is left-aligned and padded with spaces Example (for poch-100i): "poch-100i^12345678^123456789012345" Example (for poch-80i): "poch-80i^12345678^123456789012345"
Year	4	Zero-padded 4-digit year: Example "2001"

Parameter	No. of characters	Format
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Analysis Status	1	Analysis Mode Whole blood mode: '0', Diluent mode: '5'
Sample ID	15	A 15-character instrument ID that is right-aligned and padded with spaces or zeros as specified by the ID Pad. setting of the host output setting Example:" AB-12345", "0000000AB-12345"
Particle Size Distribution Analysis Data	6	(XXXXXX)
Reserve	1	'0'
WBC	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
RBC	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
HGB	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
HCT	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
MCV	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
MCH	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
MCHC	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
PLT	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
W-SCR	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
W-MCR	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
W-LCR	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
W-SCC	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
W-MCC	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
W-LCC	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
RDW-SD	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"

Parameter	No. of characters	Format
RDW-CV	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
PDW ^{*1}	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
MPV	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
P-LCR ^{*1}	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763"
ETX	1	(03H)
Total 171		

*1. When the PDW/P-LCR in the Service setting is set to Not used, "*0000" is output.

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "2"
WBC Particle Distribution Data	100	50 two-digit hexadecimals converted to ASCII code
RBC Particle Distribution Data	100	50 two-digit hexadecimals converted to ASCII code
ETX	1	(03H)
Total 204		

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "3"
PLT Particle Distribution Data	80	40 two-digit hexadecimals converted to ASCII code
WBC LD	2	2 two-digit hexadecimals converted to ASCII code
WBC T1	2	2 two-digit hexadecimals converted to ASCII code
WBC T2	2	2 two-digit hexadecimals converted to ASCII code
WBC UD	2	2 two-digit hexadecimals converted to ASCII code
RBC LD	2	2 two-digit hexadecimals converted to ASCII code
RBC UD	2	2 two-digit hexadecimals converted to ASCII code
PLT LD	2	2 two-digit hexadecimals converted to ASCII code
PLT UD	2	2 two-digit hexadecimals converted to ASCII code
Operator ID	15	A 15-character operator ID that is left-aligned and padded with spaces Example: "ABCDEFGH I" * When the OPERATOR setting is set to Not Used, 15 spaces (20H) are output.
ResearchW	7	6 significant figures that are zero padded without a decimal point plus 1-digit flag data Example: Data (76.91 x 102/uL), flag data (0) --> "0076910" * Flag data is fixed at '0.' * When the ResearchW setting is set to Not Used, 7 spaces (20H) are output. * In modes other than whole blood mode, 7 spaces (20H) are output. * When WBC analysis data is masked, the following is output. WBC: *0000 --> ResearchW: *000000 WBC: *0003 --> ResearchW: *000003
RESERVED	106	106 spaces (20H)
ETX	1	(03H)
Total 228		

4.1.2.2 Quality Control Data Format

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "C"
Instrument ID	40	(Instrument name)^(PS code)^(Instrument number) A 40-character instrument ID that is left-aligned and padded with spaces Example (for XP): "XP^12345678^123456789012345 "
Lot ID	10	A 10-character Lot ID that is left-aligned and padded with spaces
Data Type	1	QC system X-bar control: 'X,' L-J control: 'L'
Year	4	Zero-padded 4-digit year: Example "2001"
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Hour	2	Zero-padded 2-digit hour: Example "10"
Minute	2	Zero-padded 2-digit minute: Example "15"
Data ID	1	1-digit QC file number: Example "1"
Not used	1	'0'
Reserve	1	'0'
WBC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-SCR	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-MCR	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-LCR	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-SCC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-MCC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-LCC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
RBC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
HGB	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
HCT	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
MCV	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
MCH	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
MCHC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
RDW-SD	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
RDW-CV	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"

Parameter	No. of characters	Format
PLT	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
PDW ^{*1}	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
MPV	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
P-LCR ^{*1}	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-SMV	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-LMV	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
ETX	1	(03H)
Total 155		

*1. When the PDW/P-LCR in the Service setting is set to Not used, "*****" is output.

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "2"
WBC Particle Distribution Data	100	50 two-digit hexadecimals converted to ASCII code
RBC Particle Distribution Data	100	50 two-digit hexadecimals converted to ASCII code
ETX	1	(03H)
Total 204		

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "3"
PLT Particle Distribution Data	80	40 two-digit hexadecimals converted to ASCII code
WBC LD	2	2 two-digit hexadecimals converted to ASCII code
WBC T1	2	2 two-digit hexadecimals converted to ASCII code
WBC T2	2	2 two-digit hexadecimals converted to ASCII code
WBC UD	2	2 two-digit hexadecimals converted to ASCII code
RBC LD	2	2 two-digit hexadecimals converted to ASCII code
RBC UD	2	2 two-digit hexadecimals converted to ASCII code
PLT LD	2	2 two-digit hexadecimals converted to ASCII code
PLT UD	2	2 two-digit hexadecimals converted to ASCII code
Operator ID	15	A 15-character operator ID that is left-aligned and padded with spaces Example: "ABCDEFGHI " * When the OPERATOR setting is set to Not Used, 15 spaces (20H) are output.
RESERVED	113	113 spaces (20H)
ETX	1	(03H)
Total 228		

4.1.2.3 pocH Format Details

The pocH format includes instrument ID, particle distribution data, and lot data (only for the QC format), in addition to the data included in the KX-21N format. For details about other data, refer to the KX-21N format.

4.1.2.4 Particle Size Distribution Data and Discrete Values

Particle size distribution data is 50 characters of data for WBC and RBC and 40 characters of data for PLT converted with ASCII to a 2-digit hexadecimal data. Discrete values are WBC LD, WBC T1, WBC T2, WBC UD, RBC LD, RBC UD, PLT LD and PLT UD. Like the particle size distribution data, they are indicated as 2-digit hexadecimal data converted with ASCII.

Example:

ch[0]=123(0x7B)

ch[1]=45(0x2D)

ch[2]=56(0x38)

...

ch[49]=67(0x43)

The above data is sorted as shown below.

“7B2D38.....43”

4.1.2.5 Instrument ID

The instrument ID [(Instrument name)^(PS code)^(Instrument number)] is a left-aligned and space padded 40-character string.

Example (for pocH-100i):

Instrument name: [pocH-100i]

PS Code: [1234]

Instrument number: A serial number of user settings [123456]

--> “pocH-100i^1234^123456”

4.1.2.6 Operator ID

The Operator ID is a 15-character string that is left-aligned and padded with spaces.

4.1.2.7 WBC Research Items

WBC research items: The zero padded 6 significant figures of ResearchW without a decimal point plus 1-digit flag data.

4.1.3 KX-21N Format

The KX-21N format includes an Analysis Data Format for outputting sample analysis data and a Quality Control Data Format for outputting quality control data. The 2 formats differ in text length and content. (They are differentiated by the Sample Distinction Code.) Text distinction code II is normally "1."

However, if the text exceeds 256 bytes in a future modification, the text will be divided into 2 or more blocks. The numbers in text distinction code II shows the order of the blocks. (The ETB code is not used.)

4.1.3.1 Analysis Data Format

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "U"
Year	4	Zero-padded 4-digit year: Example "2001"
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Analysis Status	1	Analysis Mode Whole blood mode: '0', Diluent mode: '5'
Sample ID	15	A 15-character instrument ID that is right-aligned and padded with spaces or zeros as specified by the ID Pad. setting of the host output setting Example: " AB-12345"
Particle Size Distribution Analysis Data	6	(XXXXXX)
Reserve	1	"0"
WBC [x10 ² /uL]	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763" (XXXXF)
RBC [x10 ⁴ /uL]	5	(XXXXF)
HGB [g/dL]	5	(XXXXF)
HCT [%]	5	(XXXXF)
MCV [fL]	5	(XXXXF)
MCH [pg]	5	(XXXXF)
MCHC [g/dL]	5	(XXXXF)
PLT [x10 ⁴ /uL]	5	(XXXXF)
W-SCR [%]	5	(XXXXF)
W-MCR [%]	5	(XXXXF)
W-LCR [%]	5	(XXXXF)
W-SCC [x10 ² /uL]	5	(XXXXF)
W-MCC [x10 ² /uL]	5	(XXXXF)
W-LCC [x10 ² /uL]	5	(XXXXF)

Parameter	No. of characters	Format
RDW-SD [fL]	5	(XXXXF)
RDW-CV [f%]	5	(XXXXF)
PDW [fL] ^{*1}	5	(XXXXF)
MPV [fL]	5	(XXXXF)
P-LCR [%] ^{*1}	5	(XXXXF)
ETX	1	(03H)
Total 131		

*1. When the PDW/P-LCR in the Service setting is set to Not used, "*0000" is output.

4.1.3.2 Quality Control Data Format

Parameter	No. of characters	Example
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "C"
Data Type	1	X or L
Year	4	Zero-padded 4-digit year: Example "2001"
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Hour	2	Zero-padded 2-digit hour: Example "05"
Minute	2	Zero-padded 2-digit minute: Example "17"
Data ID	1	QC file number (from 1): Example "1"
Not used	1	0
Reserve	1	0
WBC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-SCR	4	0325
W-MCR	4	0125
W-LCR	4	0550
W-SCC	4	0015
W-MCC	4	0006
W-LCC	4	0026
RBC	4	0456
HGB	4	0160
HCT	4	0398
MCV	4	0873
MCH	4	0351
MCHC	4	0402
RDW-SD	4	0338
RDW-CV	4	0102
PLT	4	0213
PDW ^{*1}	4	0079
MPV	4	0094

Parameter	No. of characters	Example
P-LCR ^{*1}	4	0456
W-SMV	4	0482
W-LMV	4	2034
ETX	1	(03H)
Total 105		

*1. When the PDW/P-LCR in the Service setting is set to Not used, "****" is output.

4.1.3.3 Sample ID

If there are less than 15 digits in the sample ID, the number is expanded to 15 digits by adding spaces or zeros to the left side of the number according to the ID Pad. setting in the HC output setting.

Example:

Space padding: 12345 --> " 12345"

Zero padding: 12345 --> "000000000012345"

4.1.3.4 Decimal Point

Since the decimal point varies with the unit that is set, host output omits the decimal point and outputs only 4 significant numeric values. Significant numeric values do not vary with the system of units, but are identical to screen indications. For details, refer to the external specifications. The order of transmission is from the top parameter in the table; the most significant digit first with zero-padding.

4.1.3.5 Date Format

The date format is a fixed format that does not depend on the system settings.

4.1.3.6 Analysis Status

Analysis status indicates the following data.

Code	Description
"0"	Whole blood mode analysis
"5"	Diluent mode analysis

4.1.3.7 Particle Size Distribution Analysis Data

Particle size distribution analysis data includes the following 6 types of data.

Parameter	No. of characters
WBC Particle Size Distribution Data	1
WBC Particle Size Distribution Flag	1
RBC Particle Size Distribution Data	1
RBC Particle Size Distribution Flag	1
PLT Particle Size Distribution Data	1
PLT Particle Size Distribution Flag	1

1) Particle Size Distribution Data

Particle size distribution data includes the following 3 types of data.

Code	Description
"0"	Normal particle size distribution
"1"	Abnormal particle size distribution
"2"	Manual discriminator

2) Particle Size Distribution Flag

There are 10 types of particle size distribution flags, each of which correspond to LCD screen and printer flagging characters.

Particle size distribution data that indicates normal particle size distribution is "0" while data that indicates abnormal particle size distribution is a number between "1" and "8" or "A."

Correspondence between Particle Size Distribution Flag and Flagging Characters

Particle Size Distribution Flag	LCD Screen and Printer Flagging Characters and HC Flagging Items			Remarks
	WBC	RBC	PLT	
“0”	Normal	Normal	Normal	Normal (WBC/RBC/PLT)
“1”	WL (1)	RL (1)	PL (1)	Degree of L discrete limit is high (WBC/RBC/PLT)
“2”	WU (6)	RU (2)	PU (2)	Degree of H discrete limit is high (WBC/RBC/PLT)
“3”		DW (4) ^{*2}	DW (4)	Distribution width cannot be calculated (RBC/PLT)
“4”		MP (3) ^{*2}	MP (3)	There are 2 or more peaks (RBC/PLT)
“5”	T1 (2)			T1 discrete cannot be determined (WBC)
“6”	T2 (3)			T2 discrete cannot be determined (WBC)
“7”	F1, F2 (4)			T1 relative level exceeds the set value (WBC)
“8”	F2, F3 (5)			T2 relative level exceeds the set value (WBC)
“A”	AG (7) ^{*1}			The count of particles equal to or less than WBC-LC exceeds the set value (WBC)

The numbers in brackets () indicate flagging priority.

- * 1. On screen, "AG" is added to PLT, while in HC "A" is added to WBC.
- * 2. On the KX-21N, screen priority is "DW" and "MP" (in HC, "MP" and "DW").

4.1.3.8 Numeric Data

Numeric data is expressed in the following format.

Data is output as 4 significant digits without a decimal point and no zero suppression.

```
XXXX F
  ┌───┬─┐
  Data  flag
```

Flag details

Code	Description	Priority ^{*1}
“0”	Normal	4
“1”	Abnormal value assessment is +	3
“2”	Abnormal value assessment is -	
“3”	Out of assured linearity	1
“4”	Low reliability	2

*1 Indicates flagging priority (lower numbers indicate higher priority).

4.1.3.9 Data Mask

Masked data is output according to the following fixed format.

Output format for masked data

Mask Indication	Output Format	Priority ^{*1}	Remarks
“++++”	“*0003”	1	Overflow data
“****”	“*0000”	2	Analysis error (instrument error)
“----”	“*0000”	3	Data error, data that cannot be analyzed, etc.

*1. Indicates masking priority.

*2. The output format for QC data is “****.”

4.1.3.10 Data ID

The data ID in the QC format is output as 1 character for the QC file numbers from ‘1’ to ‘3.’

4.1.4 K-1000 Format

The K-1000 format includes an Analysis Data Format for outputting sample analysis data and a Quality Control Data Format for outputting quality control data. The 2 formats differ in text length and content. (They are differentiated by the Sample Distinction Code.) Text distinction code II is normally "1."

However, if the text exceeds 256 bytes in a future modification, the text will be divided into 2 or more blocks. The numbers in text distinction code II shows the order of the blocks. (The ETB code is not used.)

4.1.4.1 Analysis Data Format

Parameter	No. of characters	Format
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "U"
Year	2	Zero-padded 2-digit year: Example "01"
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Analysis Status	1	Analysis Mode Whole blood mode: '0', Diluent mode: '5'
Sample ID	12	A 12-character instrument ID that is right-aligned and padded with spaces or zeros as specified by the ID Pad. setting of the host output setting However, the 3 most significant digits are deleted if Sample No. includes 15 digits. Example: " AB-12345"
Particle Size Distribution Analysis Data	6	(XXXXXX)
RDW Switching Information	1	"S" or "C" RDW-CV: 'C', RDW-SD: 'S'
WBC [x10 ² /uL]	5	4 significant figures that are zero padded without a decimal point plus 1-digit flag data. Example: Data (76), flag (3) --> "00763" (XXXXF)
RBC [x10 ⁴ /uL]	5	(XXXXF)
HGB [g/dL]	5	(XXXXF)
HCT [%]	5	(XXXXF)
MCV [fL]	5	(XXXXF)
MCH [pg]	5	(XXXXF)
MCHC [g/dL]	5	(XXXXF)
PLT [x10 ⁴ /uL]	5	(XXXXF)
W-SCR [%]	5	(XXXXF)
W-MCR [%]	5	(XXXXF)
W-LCR [%]	5	(XXXXF)
W-SCC [x10 ² /uL]	5	(XXXXF)
W-MCC [x10 ² /uL]	5	(XXXXF)
W-LCC [x10 ² /uL]	5	(XXXXF)

Parameter	No. of characters	Format
RDW-SD [fL]/ RDW-CV [%]	5	(XXXXF) Either SD or CV is output depending on the setting.
PDW [fL] ^{*1}	5	(XXXXF)
MPV [fL]	5	(XXXXF)
P-LCR [%] ^{*1}	5	(XXXXF)
ETX	1	(03H)
	Total 121	

*1 When the PDW/P-LCR in the Service setting is set to Not used, "*0000" is output.

4.1.4.2 Quality Control Data Format

Parameter	No. of characters	Example
STX	1	(02H)
Text Distinction Code I	1	Fixed character: "D"
Text Distinction Code II	1	Block Number: "1"
Sample Distinction Code	1	Fixed character: "C"
Data Type	1	X or L
Year	2	Zero-padded 2-digit year: Example "01"
Month	2	Zero-padded 2-digit month: Example "05"
Day	2	Zero-padded 2-digit day: Example "17"
Hour	2	Zero-padded 2-digit hour: Example "05"
Minute	2	Zero-padded 2-digit minute: Example "17"
Data ID	1	QC file number (from 1): Example "1"
Not used	1	0
RDW Switching Information	1	"S" or "C" RDW-CV: 'C', RDW-SD: 'S'
WBC	4	4 significant figures that is zero padded without a decimal point. Example: Data (76) --> "0076"
W-SCR	4	0325
W-MCR	4	0125
W-LCR	4	0550
W-SCC	4	0015
W-MCC	4	0006
W-LCC	4	0026
RBC	4	0456
HGB	4	0160
HCT	4	0398
MCV	4	0873
MCH	4	0351
MCHC	4	0402
RDW-SD/ RDW-CV	4	0338 Either SD or CV is output depending on the setting.
PLT	4	0213
PDW ^{*1}	4	0079
MPV	4	0094

Parameter	No. of characters	Example
P-LCR ^{*1}	4	0456
W-SMV	4	0482
W-LMV	4	2034
ETX	1	(03H)
	Total 99	

*1. When the PDW/P-LCR in the Service setting is set to Not used, "*****" is output.

4.1.4.3 Decimal Point

Since the decimal point varies with the unit that is set, host output omits the decimal point and outputs only 4 significant numeric values. Significant numeric values do not vary with the system of units, but are identical to screen indications. For details, refer to the external specifications. The order of transmission is from the top parameter in the table; the most significant digit first with zero-padding.

4.1.4.4 Analysis Status

Analysis status indicates the following data.

Code	Description
"0"	Whole blood mode analysis
"5"	Diluent mode analysis

4.1.4.5 Sample ID Number

The Sample number is a 15-digit number, but since this format outputs only 12 digits, and the 3 most significant digits are deleted. Depending on the direction for use, a hyphen "-" (2DH) may be inserted between numerals. This hyphen is included in the 12 digits.

4.1.4.6 Particle Size Distribution Analysis Data

Particle size distribution analysis data includes the following 6 types of data.

Parameter	No. of characters
WBC Particle Size Distribution Data	1
WBC Particle Size Distribution Flag	1
RBC Particle Size Distribution Data	1
RBC Particle Size Distribution Flag	1
PLT Particle Size Distribution Data	1
PLT Particle Size Distribution Flag	1

1) Particle Size Distribution Data

Particle size distribution data includes the following 3 types of data.

Code	Description
"0"	Normal particle size distribution
"1"	Abnormal particle size distribution

2) Particle Size Distribution Flag

There are 10 types of particle size distribution flags, each of which correspond to LCD screen and printer flagging characters.

Particle size distribution data that indicates normal particle size distribution is "0" while data that indicates abnormal particle size distribution is a number between "1" and "8" or "A."

Correspondence between Particle Size Distribution Flag and Flagging Characters

Particle Size Distribution Flag	LCD Screen and Printer Flagging Characters and HC Flagging Items			Remarks
	WBC	RBC	PLT	
"0"	Normal	Normal	Normal	Normal (WBC/RBC/PLT)
"1"	WL (1)	RL (1)	PL (1)	Degree of L discrete limit is high (WBC/RBC/PLT)
"2"	WU (6)	RU (2)	PU (2)	Degree of U discrete limit is high (WBC/RBC/PLT)
"3"		DW (4)	DW (4)	Analysis is impossible because there is no pair of intersections on the 20% degree level used for DW calculation (RBC/PLT)
"4"		MP (3)	MP (3)	There are 2 or more peaks in particle size distribution (RBC/PLT)
"5"	T1 (2)			T1 discrete cannot be determined (WBC)
"6"	T2 (3)			T2 discrete cannot be determined (WBC)
"7"	F1, F2 (4)			T1 discrete degree level is high, but the data reliability is low (WBC)
"8"	F2, F3 (5)			T1 or T2 discrete degree level is high, but the data reliability is low (WBC)
"A"	AG (7) ^{*1}			There are many particle counts that are below the L discrete limit (WBC)

The numbers in brackets () indicate flagging priority.

*1. On screen, "AG" is added to PLT, while in HC "A" is added to WBC.

4.1.4.7 RDW Switching Information

RDW switching information indicates whether RDW-CV or RDW-SD will be output.

“C”:
RDW-CV

“S”:
RDW-SD

4.1.4.8 Numeric Data

Numeric data is expressed in the following format.

Data is output as 4 significant digits without a decimal point and no zero suppression.

XXXX F

□ □ □ □ |

Data flag

Flag details

Code	Description	Priority ^{*1}
“0”	Normal	4
“1”	Abnormal value assessment is +	3
“2”	Abnormal value assessment is -	
“3”	Out of assured linearity	1
“4”	Low reliability	2

*1 Indicates flagging priority (lower numbers indicate higher priority).

4.1.4.9 Data Mask

Masked data is output according to the following fixed format.

Output format for masked data

Mask Indication	Output Format	Priority ^{*1}	Remarks
“++++”	“*0003”	1	Overflow data
“****”	“*0000”	2	Analysis error (instrument error)
“----”	“*0000”	3	Data error, data that cannot be analyzed, etc.

*1. Indicates masking priority.

*2. The output format for QC data is “****.”

4.1.5 ASTM Format

Refer to the ASTM Communication Specifications.

4.1.6 K-DPS Format

The K-DPS format is a format for connecting to K-DPS (overseas only).

4.1.6.1 Measurement Data Format (K-DPS)

ID	Item	Data Type	Character count (byte length)	Note
	STX	BYTE	1	02H
1	Date	ASCII	8	YY/MM/DD, fixed order. Zero suppression.
2	Time	ASCII	5	HH:MM, fixed order. Zero suppression for HH (hour).
3	PLT Suppression Information	ASCII	1	“ ” (fixed)
4	Last 12 Digits of Sample No.	ASCII	12	The last 12 digits of sample no., right-justification. Zero suppression.
5	Analysis Mode	ASCII	1	“Z” Whole Blood Mode “C” Pre-Diluted Mode “X” Quality Control Mode
6	Automatic Recount Information	UBYTE	9	00H, FFH, FFH repeated for 3 times (fixed)
7	QC File No.	UBYTE	1	QC File No. for quality control data, 00H (fixed) for other data
8	Background Check Information	UBYTE	1	00H (fixed)
9	Analysis Error Information	ASCII	1	“ ” (fixed)
10	Binary Results*1	WORD	42	No mask and decimal point adjustment. 21 items.
11	Results*1	ASCII	105	21 items (including W-SMV, W-LMV). Mask and decimal point adjusted ASCII character string. 5 characters/item, right-justification, zero suppression.
12	Patient Flags	ASCII	19	19 items (excluding W-SMV, W-LMV). 1 character/item.
13	Histogram Flags	ASCII	36	2 characters x 18 items (excluding HGB).
14	WBC Histogram Data	BYTE	50	Normalize data
15	RBC Histogram Data	BYTE	50	Normalize data
16	PLT Histogram Data	BYTE	40	Normalize data
17	WBC LD	BYTE	1	WBC lower discriminator
18	WBC T1	BYTE	1	WBC T1 discriminator
19	WBC T2	BYTE	1	WBC T2 discriminator
20	WBC UD	BYTE	1	49 (fixed)
21	RBC LD	BYTE	1	RBC lower discriminator
22	RBC UD	BYTE	1	RBC upper discriminator
23	PLT LD	BYTE	1	PLT lower discriminator
24	PLT UD	BYTE	1	PLT upper discriminator
25	W-UPP	float	4	0 (fixed)
26	W-RAW	float	4	0 (fixed)
27	R-RAW	float	4	0 (fixed)
28	H-RAW	float	4	0 (fixed)
29	P-RAW	float	4	0 (fixed)

ID	Item	Data Type	Character count (byte length)	Note
30	WBC Temperature Flags	ASCII	1	" " (fixed)
31	Reserved	ASCII	7	" " (fixed)
32	Unit Code	BYTE	1	0 Type1 1 Type2 2 Type3 3 Type4 4 Type5 5 Type6
33	Reserved	ASCII	1	" " (fixed)
34	RDW Switching Information	ASCII	1	"S" RDW-SD "C" RDW-CV
36	WBC Analysis Information	ASCII	1	"0" W-SCR "1" LYM%
37	PDW/P-LCR Output Information	ASCII	1	"0" Output "1" No output
38	Reserved	ASCII	1	" " (fixed)
39	Reserved	BYTE	4	0 (fixed)
40	Reserved	ASCII	22	" " (fixed)
41	Reserved	BYTE	2	0 (fixed)
42	Reserved	ASCII	1	"U" (fixed)
43	Reserved	BYTE	2	0 (fixed)
44	Checksum	BYTE	1	Checksum for ID1 - ID43
	ETX	BYTE	1	03H

*1. Binary results and results are output in the following order.

WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, WSCR, WMCR, WLCR, WSCC, WMCC, WLCC, RDW_CV, RDW_SD, PDW, MPV, PLCR, WSMV and WLMV

4.2 Serial 2

Connect a bar code reader to serial 2.

4.2.1 Sample Number Input Format

The format accepts up to 15-digit ASCII code (x20 to 0x7E) characters. Data that contains text longer than 15-digits or text other than alphanumeric characters and the [-] symbol are completely ignored and the system beeps an alarm that prohibits entry.

4.2.2 Control Blood Data Input Format

The format accepts strings up to 15 digits consisting of a 2-digit control data identifier (ST), a 2-digit item number (00 to 99) and up to a 10-digit set value. The identifier and item number are entered as a continuous string while the item number and the set value are separated by a [,] delimiter. Invalid identifiers, item numbers and set values are

ignored and the system beeps an alarm that prohibits entry.

Format: [ST] + [Item number] + [,] + [set value]

Item Number Relationship Table

Input Item	Item Number
Lot ID	51
Expiration Date	52
WBC	61
RBC	62
HGB	63
HCT	64
MCV	65
MCH	66
MCHC	67
PLT	68

Input Item	Item Number
W-SCR	71
W-MCR	72
W-LCR	73
W-SCC	74
W-MCC	75
W-LCC	76
W-SMV	77
W-LMV	78
RDW-SD	81
RDW-CV	82
PDW	83
MPV	84
P-LCR	85
PCT	86

4.2.2.1 Lot ID

The Lot ID is indicated in up to 10 alphanumeric characters and the [-] symbol following the "ST01" indicator and a "," delimiter.

Example: ST01,12345-ABcd

4.2.2.2 Expiration Date

The item is indicated in up to 10 alphanumeric characters and the / (slash) symbol following the "ST02" indicator and a "," delimiter.

The expiration date is indicated as a 4-digit year, 2-digit month and 2-digit day with a / (slash) delimiter and no zero suppression.

Example: ST02, 2000/05/17 (May 17, 2000)

4.2.2.3 Control Limit

The item is indicated as a 4-digit target value and a 4-digit limit width each without zero suppression following the "ST11" to "ST35" indicators and a ',' delimiter. Target values and limit widths are indicated as 4-digit significant digits without a decimal point regardless of unit setting.

Example: ST11,0148,0004 (WBC target value 148, limit width 4)

4.2.3 Calibrator Data Input Format

The format accepts 9-digit strings consisting of a 2-digit calibrator data identifier (CL), a 2-digit item number (00 to 99) and a 4-digit control value. The identifier and item number are entered as a continuous string while the item number and the set value are separated by the [,] delimiter. Invalid identifiers, item numbers and set values are ignored and the system beeps an alarm that prohibits entry.

Format: [CL] + [item number] + [,] + [control limit]

Item Number Relationship Table

Input Item	Item Number
WBC	51
RBC	52
HGB	53
HCT	54
MCV	55
PLT	58

4.2.3.1 Control Limit

The control limit accepts strings consisting of a 4-digit target value with zero padding following the “CL51” to “CL58” identifier, and a “,” delimiter. Target values are indicated as 4-digit significant digits without a decimal point regardless of unit setting.

Example: CL51,1480 (WBC target value 1480)

* Please note that the significant digits for analysis results for HGB contain 1 extra digit (14.5 g/dL --> 14.50 g/dL).

4.3 Ethernet

Same as serial 1.