TOSOH AUTOMATED
GLYCOHEMOGLOBIN ANALYZER

HLC-723 G8

HOST CONNECTION SPECIFICATIONS

（3 analysis mode version）

Rev.3

TOSOH CORPORATION

BIOSCIENCE DIVISION

Revision record

Rev.	Revision date	Revision content
0	Mar. 01, 2006	Created
1	June.14,2007	1.The time-out of ACK is changed to 20 seconds.
2	Nov.04,2008	2. Cable's pin assignment, writing errors of signal name are corrected.
3	Jan.14,2009	3. A1c% and IFCC became selectable value.

Contents

1. Introduction

This document describes the communication arrangements used when connecting the HLC-723G8(hereafter called analyzer) to a host computer (hereafter called host).

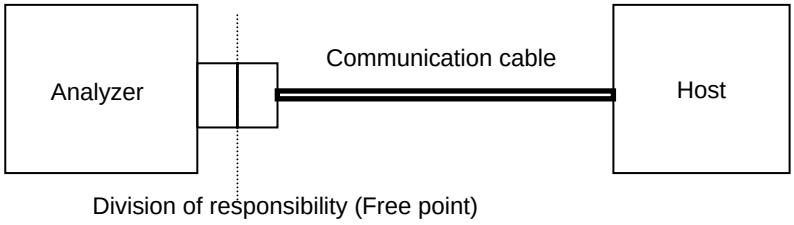
2. Hardware specifications

(1) Communication specifications

Item	Specification
Transmission method	EIA-574 (or EIA-232, RS-232C) Asynchronous (start-stop transmission), half-duplex
Transmission rate	1200, 2400, 4800, 9600 bps
Transmission code	ASCII
Data length	7 bit, 8 bit
Parity	Even, odd, none
Stop bit	1 bit, 2 bit

Note: When selecting transmission of raw data (RAW mode), be sure to select 9600 bps as the transmission rate (baud rate).

(2) Connections



(3) Connector

A D-SUB 9p (male) is used as the connector to the cable of the analyzer side.

(Connector which it is attached in the analyzer side of the communication cable is D-SUB 9s (female).)

(4) Pin assignment

Analyzer side (9 pin) Host side

Signal name	Pin No.	Pin No. 9pins	Pin No. 25pins	Signal name
		case	1	Frame GND (FG)
Receive data (RxD)	2	2	3	Receive data (RxD)
Transmit data (TxD)	3	3	2	Transmit data (TxD)
Data terminal ready (DTR)	4	4	20	Data terminal ready (DTR)
Signal GND (GND)	5	5	7	Signal GND (GND)
Data set ready (DSR)	6	6	6	Data set ready (DSR)
Request to send (RTS)	7	7	4	Request to send (RTS)
Clear to send (CTS)	8	8	5	Clear to send (CTS)

3. Communication mode

There are two communication modes, query mode, which analyzer queries test order to the host using sample ID after reading the bar-code, and result transmission mode which analyzer transmits result to host every time results are obtained. Various formats compatible with applications and the old models are available for result transmission mode. Non handshake and handshake protocol are available as the basic transmission method. In addition flow control can be available as an option using X-ON/OFF code for the non-handshake method.

3. 1. G8 format, G7 and GHbV compatible format

Three formats, G8 format (standard), G7 and GHbV(A1c2.2) compatible format are available as communication formats. Select the desired format using **TRANS G5/7 MODE** on the PARAMETER screen of the analyzer. The setting values are defined below.

Setting value **8**:	G8 format (default setting)
Setting value **7**:	G7 compatible format
Setting value **5**:	Model GHbV A1c2.2 compatible format (Standard use)
Setting value **6**:	Model GHbV A1c2.2 compatible format (When 5-digits is selected for sample number, if sample is except STAT and CALIB, sample number is extended by adding 0 to top digit of sample number. Refer to [5.2.3.GHbV compatible format] for details.)
Setting value **18**:	SA1c% is replaced by IFCC value. The others are the same as setting value 8.
Setting value **17**:	SA1c% is replaced by IFCC value. The others are the same as setting value 7.
Setting value **15**:	SA1c% is replaced by IFCC value. The others are the same as setting value 5.
Setting value **16**:	SA1c% is replaced by IFCC value. The others are the same as setting value 6.

3. 2. BASIC, Hi-LEVEL, and RAW modes

The BASIC and HI-LEVEL modes are available in G8, G7 and GHbV compatible formats. The primary difference in these modes is the transmission protocol. Non-handshake protocol is proceeded with BASIC mode and a handshake protocol is proceeded with HI-LEVEL mode. In addition, the RAW mode (chromatographic data transmission) is available in the G8 and G7 formats, and proceeded with the same protocol as the HI-LEVEL mode. The various modes correspond to the following selection keys in the RS-232C screen of the analyzer.

BM key:	BASIC mode
HM key:	HI-LEVEL mode
RAW key:	RAW mode (protocol is the same as HI-LEVEL mode)

3. 3. Flow control

XON/OFF flow control is provided with the BASIC mode protocol. On the host side, when data reception temporarily becomes impossible due to the reception buffer state or other condition, if XOFF is transmitted to the analyzer side, the analyzer will hold the next data transmission (holding timeout is 10 seconds).

XON is transmitted to the analyzer to release the hold. The hold is automatically released after a timeout. This control is enabled and disabled using the following keys in the RS232C screen of the analyzer.

X-ON key: Flow control ON
X-OFF key: Flow control OFF

4. Transmission protocol

No protocol and handshake protocols are available as transmission protocols.

The control codes used in communications are shown below.

Code (Hexadecimal)	Name	Item	Application
02	STX	Text start	HI-LEVEL, RAW
03	ETX	Text end	HI-LEVEL, RAW
04	EOT	Transmission end	HI-LEVEL, RAW
06	ACK	Normal reception response	HI-LEVEL, RAW
0D	CR	Text end	BASIC
11	XON	Transmission restart request	BASIC
13	XOFF	Transmission hold request	BASIC
15	NAK	Abnormal reception response	HI-LEVEL, RAW

4.1. No protocol

This protocol is used when BASIC mode has been selected.

Communication content

Text <CR> →

Note:

1. Characters from the beginning of the text to <CR> must be transmitted within 20 seconds.

Flow control (XON/XOFF) application

When this operation mode is selected, data units (divided by CR) can be held or released by XOFF/XON transmission. An example is shown below.

Text1 <CR> →

Text2 <CR> →

← XOFF (hold request for transmission of next data unit)

← XON (release hold)

Text3 <CR> →

Note:

1. Hold release must be requested within 10 seconds of the hold request. After 10 seconds has elapsed the hold will automatically be released.

4.2. Handshake

This protocol is used when HI-LEVEL mode or RAW mode are selected.

Communication content

<STX> text <ETX><BCC> →

← <ACK> or <NAK>

<EOT> →

Note:

1. <BCC> is the exclusion logic sum (exclusive OR), in character units, from the start of the text to <ETX> and consists of a 1 byte binary. Moreover, since <BCC> becomes the value of 00~7F by hexadecimal, please process not to mistake for the control code used in transmission procedure.

2. When <NAK> is returned transmission will be tried again up to 5 times. After 5 times <EOT> will be transmitted and the protocol will be reinitialized.
3. When multiple data sets exist, <EOT> will be transmitted at the end of each data set.
4. The string from the beginning of the text to <BCC> must be transmitted within 20 seconds. If this time limit is exceeded the protocol will be reinitialized.
5. If there is no <ACK> or <NAK> response within 20 seconds, <EOT> will be transmitted and the protocol will be reinitialized.

Example of 1 data set

<STX> text1 <ETX><BCC> →
← <ACK>
<EOT> →

Example of multiple data sets

<STX> text1 <ETX><BCC> →
← <ACK>
<STX> text2 <ETX><BCC> →
← <ACK>
:
:
<STX> text*n* <ETX><BCC> →
← <ACK>
<EOT> →

Example of retransmission success (1 retransmission)

<STX> text1 <ETX><BCC> →
← <NAK>
<STX> text1 <ETX><BCC> →
← <ACK>
<EOT> →

Example of retransmission failure (up to 5 retransmissions)

<STX> text1 <ETX><BCC> →
← <NAK>
<STX> text1 <ETX><BCC> →
← <NAK>
<STX> text1 <ETX><BCC> →
← <NAK>
<STX> text1 <ETX><BCC> →
← <NAK>
<STX> text1 <ETX><BCC> →
← <NAK>
<EOT> →

Example of ACK reception timeout

<STX> text1 <ETX><BCC> →
(20 second interval)
<EOT> →

5. Communication format

5.1. Query

Order requests are transmitted by the analyzer, which then waits for a response from the host. If no response is received within 30 seconds, the analyzer will consider there to be no orders.

Query settings, input as shown below, are made individually for the loader and LA line (transporter).

Loader samples: Turn the **QUERY** key on in the RS232C screen

LA line samples: Set 1 in the LINE QUERY of the LINE SETTING screen

If the transmission mode is BASIC (refer to "4.1 No protocol") there is no protocol. However, if HI-LEVEL or RAW mode are set then a handshake protocol will be used (refer to "4.2 Handshake").

Analyzer → host

Information	Number of characters	Content
G	1	Query code (Fixed as the character **G**)
,	1	Comma
[Sample ID]	20	Aligned left; characters to the right are filled with spaces when 20 characters are not used. No zero suppression

Host → analyzer

Information	Number of characters	Content
A	1	Order code (Fixed as the character **A**)
,	1	Comma
[Sample ID]	20	Aligned left; characters to the right are filled with spaces when 20 characters are not used. No zero suppression Set the sample ID that the analyzer has requested
,	1	Comma
[Sample type]	2	00 = Whole blood, 01 = Diluted (Refer to note)
[Container type]	2	00 = Primary tube, 01 = Sample cup (Refer to note)
[Reserved]	2	(Fixed as a space)
,	1	comma
[A1c item]	2	00 = No request 01 = Request
[Reserved]	6	(Fixed as a space)
,	1	Comma
[Reserved]	8	(Fixed as a space)

Note: Sample and container type designations follow the operation mode. Refer to "5.1.1 Sample and container type designation" for details.

Communication example

BASIC mode

(Analyzer) **(Host)**

```
G,ID-0123456789      <CR> →
 ← A,ID-0123456789      ,0001  ,01     ,       <CR>
```

With HI-LEVEL or RAW mode

(Analyzer) **(Host)**

```
<STX>G,ID-0123456789      <ETX><BCC> →
← <ACK>
<EOT>  →
← <STX>A,ID-0123456789      ,0001  ,01     ,       <ETX><BCC>
<ACK>  →
← <EOT>
```

5.1.1. Sample and container type designation

The sample type (diluted, whole blood) and container type (cup, primary tube) designated by the query are not used absolutely to control operation. Rather, the actual settings are determined by the operation mode designated within the analyzer. In addition, loader samples and transport samples (LA line samples) are input by the relevant mode settings.

< Loader samples >

The operation mode for determining the sample and container type of loader samples is designated in LOADER SMP MODE setting of the PARAMETER screen.

Normal samples

Operation mode	Sample type	Container type	Query
0	Sample sensors (SAMP1, SAMP2) evaluation is used. Cup samples are considered to be diluted and primary tube samples are considered to be whole blood	Sample sensors judgement	Yes
1	Fixed as whole blood	Sample sensors judgement	Yes
2	Fixed as diluted	Sample sensors judgement	Yes
3	Designated by host	Sample sensors judgement	Yes

Calibrator(see note-1 below)

Operation mode	Sample type	Container type	Query
Not referenced	Sample sensors (SAMP1, SAMP2) evaluation is used. Cup samples are considered to be diluted and primary tube samples are considered to be whole blood (see note-2 below)	Sample sensors judgement	No (see note-3 below)

Note:

1. When CALIB key is selected or the settings registered in CAL-L-ID and CAL-H-ID of the LINE SETTING screen match the ID, samples are handled as calibrators.
2. Since calibrators don't obey LOADER SMP MODE, they have to be set with cups.
3. Even if query is designated, no query will be made for calibrators.

Control (see note-1 below)

Operation mode	Sample type	Container type	Query
Not referenced	Sample sensors (SAMP1, SAMP2) evaluation is used. Cup samples are considered to be diluted and primary tube samples are considered to be whole blood (see note-2 below)	Sample sensors judgement	No (see note-3 below)

Note:

1. When the settings registered in QC-L1 ~ L3 and QC-H1 ~ H3 ID of the LINE SETTING screen match the ID, samples are handled as controls.
2. Controls don't obey LOADER SMP MODE.
3. Even when query is designated, no query will be made for controls.

STAT samples

Operation mode	Sample type	Container type	Query
Not referenced	Designed by STAT screen	Designed by STAT screen	No (see note below)

Note: Even if query is designated, no query will be made for STAT samples.

< Transport samples (Belt line samples) >

The operation mode for determining the sample and container type of transport samples (Belt line samples) is designated in SAMPLING MODE setting of the LINE SETTING screen.

Normal samples

Operation mode	Sample type	Container type	Query
0	Designated by host	Designated by host	Yes
1	Designated by host	Fixed as primary tube	Yes
2	Fixed as whole blood	Designated by host	Yes
3	Fixed as whole blood	Fixed as sample cup	Yes
4	Fixed as whole blood	Fixed as primary tube	Yes
5	Fixed as diluted	Designated by host	Yes
6	Fixed as diluted	Fixed as sample cup	Yes
7	Fixed as diluted	Fixed as primary tube	Yes

Calibrator (see note-1 below)

Operation mode	Sample type	Container type	Query
Not referenced	Fixed as diluted	Follows CAL-L D-POS and CAL-H D-POS setting of LINE SETTING screen	No (see note-2 below)

Note:

1. When the settings registered in CAL-L-ID and CAL-H-ID of the LINE SETTING screen match the ID, samples are handled as calibrators.
2. Even if query is designated, no query will be made for calibrators.

Control (see note-1 below)

Operation mode	Sample type	Container type	Query
Not referenced	Fixed as diluted	Follows QC-L1 ~ L3 D-POS and QC-H1 ~ H3 D-POS setting of LINE SETTING screen	No (see note-2 below)

Note:

1. When the settings registered in QC-L1 ~ L3 and QC-H1 ~ H3 ID of the LINE SETTING screen match the ID, samples are handled as controls.
2. Even when query is designated, no query will be made for controls.

5. 2. Measurement results

G8 format or G7 or GHbV compatible format may be selected as the data format.
G8 format is recommended for this analyzer.

5. 2. 1. G8 format

Within G8 format, BASIC, HI-LEVEL, or RAW mode may be selected.
HI-LEVEL mode is recommended for this analyzer.

5. 2. 1. 1. BASIC mode

No protocol is used as the transmission protocol (refer to "4.1 No protocol").

The data format is shown below.

Information	Number of characters	Content
[Operation mode]	1	0 = STD mode, 1 = VAR mode, 2 = β-thalassemia mode
[Sample position]	1	0 = STAT, 1 = transport (LA), 2 = loader
[Sample number]	3, 5, 8	Sample number (See note)
[1st component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[2nd component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[3rd component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[4th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[5th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[6th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[7th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[8th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[9th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[10th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Flag judgement]	2	00 ~ 99(00 = normal)
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces when 20 characters are not used. No zero suppression (See note)

Note:

1. The number of digits used for the sample number is set by the SMPx key in the RS232C screen of the analyzer.The various digit conversion rules are shown below.

Sample type	Actual sample number	3 digits	5 digits (0 inserted in second digit)	8 digits
Normal samples	0001 ~ 7999	001 ~ 999 (last 3 digits)	00001 ~ 70999	XXXX0001 ~ XXXX7999
STAT	8001 ~ 8999	001 ~ 999 (last 3 digits)	80001 ~ 80999	XXXX8001 ~ XXXX8999
CALIB	9001 ~ 9999	001 ~ 999 (last 3 digits)	90001 ~ 90999	XXXX9001 ~ XXXX9999

XXXX indicates ID number

Identified components 1 ~ 10: The values depend on the measurement mode, as shown below

	STD mode	VAR mode	β-thalassemia mode
1st component	FP%	A1a%	(HbF%)
2nd component	A1a%	A1b%	(A0%)
3rd component	A1b%	F%	(HbA2%)
4th component	F%	LA1c%	(HbD+%)
5th component	LA1c%	SA1c% or IFCC(*1)	(HbS+%)
6th component	SA1c% or IFCC(*1)	A0%	(HbC+%)
7th component	A0%	H-V0%	(Reserved)
8th component	(Reserved)	H-V1%	(Reserved)
9th component	(Reserved)	H-V2%	(Reserved)
10th component	Total A1%	Total A1%	(Reserved)

The various measurement values from the β-thalassemia mode are arranged in the sequence of the peak identification table (IDT) file.
The standard settings are shown here

(*1) When TRANS G5/7 MODE is set to 18, this value is IFCC as 0-99999 or 0-999999.

2. The number of digits used for each percent value obeys PERECNT DECIMAL of the PARAMETER screen.
3. Each percent value is transposed to the spaces of the number of characters corresponding to PERCENT DECIMAL, when the condition formula of level 1 of flags is satisfied. (The transposing to zero(0.0) from the spaces is available. Refer to [5.2.4.Flag level and communication] for details.
4. The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.
5. In this mode, the last data set is shown by filling it with 9 (all characters are 9 and the measurement value is 999.9).

Communication example: 1 data set

(Analyzer) (Host)

```
0208230001  0.0  0.8  0.9  0.9  2.4 10.1 86.2  0.0
  0.0 11.800BAR-CODE-ID          <CR>  →
9999999999999.9999.9999.9999.9999.9999.9999.9999.9
999.9999.99999999999999999999999<CR>  →
```

Communication example: 3 data sets

(Analyzer) (Host)

```
0208230001  0.0  0.8 ··· BAR-CODE-ID-001     <CR>  →
0208230002  0.0  0.8 ··· BAR-CODE-ID-002     <CR>  →
0208230003  0.0  0.8 ··· BAR-CODE-ID-003     <CR>  →
9999999999999.9999.9 ··· 99999999999999999999<CR>  →
```

Communication example: decimal place of percent value is two

(Analyzer) (Host)

```
0208230001  0.00  0.77  0.91  0.92  2.42 10.14 86.17  0.00
  0.00 11.8200BAR-CODE-ID         <CR>  →
9999999999999.99999.99999.99999.99999.99999.99999.99999.99
999.99999.99999999999999999999999<CR>  →
```

5. 2. 1. 2. HI-LEVEL mode

Handshake is used as the transmission protocol (refer to "4.2 Handshake").
The data format is shown below.

Information	Number of characters	Content
[Operation mode]	1	0 = STD mode, 1 = VAR mode, 2 = β-thalassemia mode
[Sample position]	1	0 = STAT, 1 = transport (LA), 2 = loader
[Sample number]	3, 5, 8	Sample number (See note)
[1st component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[2nd component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[3rd component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[4th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[5th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[6th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[7th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[8th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[9th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[10th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Flag judgement]	2	00 ~ 99 (00 = normal)
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces when 20 characters are not used. No zero suppression (See note)

Note:

1. The number of digits used for the sample number is set by the SMPx key in the RS232C screen of the analyzer.
   The various digit conversion rules are shown below.

Sample type	Actual sample number	3 digits	5 digits (0 inserted in second digit)	8 digits
Normal samples	0001 ~ 7999	001 ~ 999 (last 3 digits)	00001 ~ 70999	XXXX0001 ~ XXXX7999
STAT	8001 ~ 8999	001 ~ 999 (last 3 digits)	80001 ~ 80999	XXXX8001 ~ XXXX8999
CALIB	9001 ~ 9999	001 ~ 999 (last 3 digits)	90001 ~ 90999	XXXX9001 ~ XXXX9999

XXXX indicates ID number

Identified components 1 ~ 10: The values depend on the measurement mode, as shown below

	STD mode	VAR mode	β-thalassemia mode
1st component	FP%	A1a%	(HbF%)
2nd component	A1a%	A1b%	(A0%)
3rd component	A1b%	F%	(HbA2%)
4th component	F%	LA1c%	(HbD+%)
5th component	LA1c%	SA1c% or IFCC(*1)	(HbS+%)
6th component	SA1c% or IFCC(*1)	A0%	(HbC+%)
7th component	A0%	H-V0%	(Reserved)
8th component	(Reserved)	H-V1%	(Reserved)
9th component	(Reserved)	H-V2%	(Reserved)
10th component	Total A1%	Total A1%	(Reserved)

The various measurement values from the β-thalassemia mode are arranged in the sequence of the peak identification table (IDT) file.
The standard settings are shown here

(*1) When TRANS G5/7 MODE is set to 18, this value is IFCC as 0-99999 or 0-999999.

2. The number of digits used for each percent value obeys PERECNT DECIMAL of the PARAMETER screen.
3. Each percent value is transposed to the spaces of the number of characters corresponding to PERCENT DECIMAL, when the condition formula of level 1 of flags is satisfied. (The transposing to zero(0.0) from the spaces is available. Refer to [5.2.4.Flag level and communication] for details.
4. The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.
5. When multiple data sets are to be transmitted, EOT is transmitted after the last data set.

Communication example: 1 data set

(Analyzer) (Host)

```
<STX>0206270001 12.3 23.4 34.5 45.6 56.7 67.8 78.9  0.0
  0.0100.000BAR-CODE-ID          <ETX><BCC> →
← <ACK>
<EOT> →
```

Communication example: 3 data sets

(Analyzer) (Host)

```
<STX>0206270001 12.3 23.4 34.5 45.6 56.7 67.8 78.9  0.0
  0.0100.000BAR-CODE-ID-1        <ETX><BCC> →
← <ACK>
<STX>0206270002 12.3 23.4 34.5 45.6 56.7 67.8 78.9  0.0
  0.0100.000BAR-CODE-ID-2        <ETX><BCC> →
← <ACK>
<STX>0206270003 12.3 23.4 34.5 45.6 56.7 67.8 78.9  0.0
  0.0100.000BAR-CODE-ID-3        <ETX><BCC> →
← <ACK>
<EOT> →
```

Communication example: decimal place of percent value is two

(Analyzer) (Host)

```
<STX>0208230001  0.00  0.77  0.91  0.92  2.42 10.14 86.17
  0.00  0.00 11.8200BAR-CODE-ID          <ETX><BCC>  →
 ←  <ACK>
<EOT>  →
```

5. 2. 1. 3. RAW mode

Handshake is used as the transmission protocol (refer to "4.2 Handshake"). Data for a sample is divided into various records and transmitted as shown below.

Data record 1 (Sample information)
Data record 2 (Sample number)
Data record 3 (Measurement value)
Data record 4 (Data collection information)
Data record 5-1 (First peak data)
Data record 5-2 (Second peak data)
:
Data record 5-n (nth peak data)
Data record 6 (Peak information end)
Data record 7-1 (First raw data block)
Data record 7-2 (Second raw data block)
:
Data record 7-n (nth raw data block)
Data record 8 (calibration information)

The detailed format is shown below.

< Data record 1 (Sample information) >

Information	Number of characters	Content
1	1	Header (Fixed as number 1)
[Operation mode]	1	0 =STD mode, 1 = VAR mode, 2 = β-thalassemia mode
[Sample position]	1	0 = STAT, 1 = transport (LA), 2 = loader
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces. No zero suppression (See note)

Note: The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.

< Data record 2 (Sample number) >

Information	Number of characters	Content
2	1	Header (Fixed as number 2)
[Sample number]	3, 5, 8	Sample number (See note)

Note: The number of digits used for the sample number is set by the SMPx key in the RS232C screen of the analyzer.
The various digit conversion rules are shown below.

Sample type	Actual sample number	3 digits	5 digits (0 inserted in second digit)	8 digits
Normal samples	0001 ~ 7999	001 ~ 999 (last 3 digits)	00001 ~ 70999	XXXX0001 ~ XXXX7999
STAT	8001 ~ 8999	001 ~ 999 (last 3 digits)	80001 ~ 80999	XXXX8001 ~ XXXX8999
CALIB	9001 ~ 9999	001 ~ 999 (last 3 digits)	90001 ~ 90999	XXXX9001 ~ XXXX9999

XXXX indicates ID number

< Data record 3 (Measurement value) >

Information	Number of characters	Content
3	1	Header (Fixed as number 3)
[Flag judgement]	2	00 ~ 20 (00 = normal)
[Total A1%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (Aligned right) (Reserved when using β-thalassemia method)
[1st component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[2nd component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[3rd component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[4th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[5th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[6th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[7th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[8th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[9th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[10th component]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5	0 ~ 99999 (Aligned right) (TP for sample collection)

Note:

1. Identified components 1 ~ 10: The values depend on the measurement mode and are shown below

	STD mode	VAR mode	β-thalassemia mode
1st component	FP%	A1a%	(HbF%)
2nd component	A1a%	A1b%	(A0%)
3rd component	A1b%	F%	(HbA2%)
4th component	F%	LA1c%	(HbD+%)
5th component	LA1c%	SA1c% or IFCC(*1)	(HbS+%)
6th component	SA1c% or IFCC(*1)	A0%	(HbC+%)
7th component	A0%	H-V0%	(Reserved)
8th component	(Reserved)	H-V1%	(Reserved)
9th component	(Reserved)	H-V2%	(Reserved)
10th component	(Reserved)	(Reserved)	(Reserved)

The various measurement values from the β-thalassemia mode are arranged in the sequence of the peak identification table (IDT) file.
The standard settings are shown here.

(*1) When TRANS G5/7 MODE is set to 18, this value is IFCC as 0-99999 or 0-999999.

2. The number of digits used for each percent value obeys PERECNT DECIMAL of the PARAMETER screen.

3. Each percent value is transposed to the spaces of the number of characters corresponding to PERCENT DECIMAL, when the condition formula of level 1 of flags is satisfied. (The transposing to zero(0.0) from the spaces is available. Refer to [5.2.4.Flag level and communication] for details.

< Data record 4 (Data collection parameters) >

Information	Number of characters	Content
4	1	Header (Fixed as number 4)
[Collection start time]	4	0 ~ 9999 (X10mS, aligned right)
[Collection pitch]	1	0 ~ 9 (X100mS)
[Number of peaks]	2	0 ~ 20 (Aligned right)
[Number of raw data sets]	4	0 ~ 1000 (Aligned right)

< Data record 5 (Peak data) >

Information	Number of characters	Content
5	1	Header (Fixed as number 5)
[Peak number]	2	1 ~ 20 (Aligned right)
[Peak name]	5	(Aligned left, remaining characters filled with spaces) (See note)
[Peak shape]	1	B = Base peak, V = Valley peak, S=Skimming peak (See note)
[Base start point]	4	0 ~ 1000 (Aligned right) (See note)
[Base end point]	4	0 ~ 1000 (Aligned right) (See note)
[Peak start point]	4	0 ~ 1000 (Aligned right) (See note)
[Peak top]	4	0 ~ 1000 (Aligned right) (See note)
[Peak end point]	4	0 ~ 1000 (Aligned right) (See note)
[Peak area]	8	0.00 ~ 99999.99 (mV·sec, aligned right)
[Peak area %]	5, 6	0.0 ~ 100.0 or 0.00 ~ 100.00 (%, aligned right)

Note:

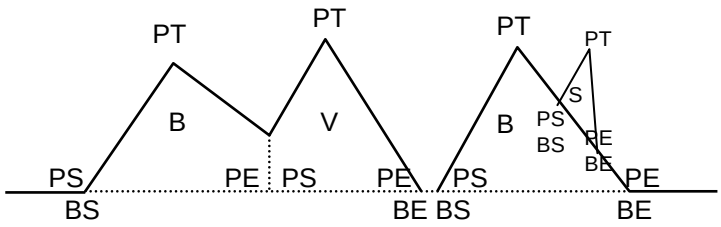
1. Although this record is transmitted for each peak, when there are no peaks, no record is transmitted.
2. The number of digits used for peak area % value obeys PERECNT DECIMAL of the PARAMETER screen.
3. Peak names depend on the measurement mode, as shown below.

	STD mode	VAR mode	β-thalassemia mode
1st identified component	FP	FP	F
2nd identified component	A1A	A1A	A0
3rd identified component	A1B	A1B	A2
4th identified component	F	F	D+
5th identified component	LA1C+	LA1C+	S+
6th identified component	SA1C	SA1C	C+
7th identified component	A0	A0	
8th identified component		H-V0	
9th identified component		H-V1	
10th identified component		H-V2	

The various peak names from the β-thalassemia mode are arranged in the sequence of the peak identification table (IDT) file.
The standard settings are shown here.

Peak shapes are categorized with the peaks starting from the baseline called “base peaks” and the peaks starting in valleys called “valley peaks”.

The various start, end, and top points are shown by the signal value sequence on the transmission time-line. The first data position is 0 and, if there a 720 sets of raw data, the last data will be expressed as 719.
The figure below shows peak shapes and corresponding definitions.



B: Base peak
V: Valley peak
S: Skimming peak
BS: Base start point
BE: Base end point
PS: Peak start point
PT: Peak top point
PE: Peak end point

Retention time of peak (min.) = (T0 + PT x TS) / 600
T0: Collection start time in data record 4
TS: Collection pitch in data record 4

< Data record 6 (peak data end) >

Information	Number of characters	Content
6	1	Header (Fixed as number 6)

Note: This record shows the end of peak data and is sent even when there are no peaks.

< Data record 7 (Raw data) >

Information	Number of characters	Content
7	1	Header (Fixed as number 7)
[Block number]	3	1 ~ 999 (Aligned right)
[1st block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[2nd block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[3rd block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[4th block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[5th block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[6th block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[7th block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[8th block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[9th block signal value]	9	–9999.999~9999.999 (mV, aligned right)
[10th block signal value]	9	–9999.999~9999.999 (mV, aligned right)

Note: 10 signal values in time sequence are defined as 1 block.
The raw data sets are divided into these blocks and transmitted.

When there are no raw data sets none are transmitted.

When the end number of the raw data sets appears in the last block the corresponding signal value is 0.000.

< Data record 8 (calibration information) >

Information	Number of characters	Content
8	1	Header (Fixed as number 8)
Rack No.	4	0000~9999
Position No.	2	00~10
Factor A of element-1 (see note-2 below)	8	-999.9999~999.9999 (aligned right)
Factor B of element-1 (see note-2 below)	8	-999.9999~999.9999(aligned right)
Factor A of element-2 (see note-2 below)	8	-999.9999~999.9999(aligned right)
Factor B of element-2 (see note-2 below)	8	-999.9999~999.9999(aligned right)

Note:

1. This record shows the end of raw data.
2. Element 1 and 2 are named by analysis mode as follows.

	STD mode	VAR mode	β-thalassemia mode
Element 1	A1C	A1C	F
Element 2	–	–	A2

Communication example : when peak and raw data are present

(Analyzer) (Host)

<STX>102BAR-CODE-ID <ETX><BCC> →
← <ACK>
<STX>206270001<ETX><BCC> →
← <ACK>
<STX>300100.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0
80.0 90.0100.0 123<ETX><BCC> →
← <ACK>
<STX>4 01 7 720<ETX><BCC> →
← <ACK>
<STX>5 1FP B 20 730 20 30 40 200.00 0.5<ETX><BCC> →
← <ACK>
<STX>5 2A1A V 20 730 40 50 60 800.00 2.0<ETX><BCC> →
← <ACK>
:
: (Omitted)

<STX>5 7A0 V 20 730 600 680 730 5000.00 50.0<ETX><BCC> →
← <ACK>
<STX>6<ETX><BCC> →
← <ACK>
<STX>7 1 11.000 12.000 13.000 14.000 15.000
16.000 17.000 18.000 19.000 20.000<ETX><BCC> →
← <ACK>
<STX>7 2 21.000 22.000 23.000 24.000 25.000
26.000 27.000 28.000 29.000 30.000<ETX><BCC> →
← <ACK>
:
: (Omitted)

<STX>7 72 721.000 722.000 723.000 724.000 725.000
726.000 727.000 728.000 729.000 730.000<ETX><BCC> →

```
← <ACK>
<STX>8000101  1.0000  0.0000  1.0000  0.0000<ETX><BCC>  →
← <ACK>
<EOT> →
```

Communication example : when there is no peak data or raw data

(Analyzer) (Host)

```
<STX>102BAR-CODE-ID        <ETX><BCC> →
← <ACK>
<STX>206270001<ETX><BCC> →
← <ACK>
<STX>300  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  0.0  0.0  0.0   0<ETX><BCC> →
← <ACK>
<STX>4   01 0   0<ETX><BCC> →
← <ACK>
<STX>6<ETX><BCC> →
← <ACK>
<STX>8000101  1.0000  0.0000  1.0000  0.0000<ETX><BCC>  →
← <ACK>
<EOT> →
```

Communication example: decimal place of percent value is two

(Analyzer) (Host)

```
<STX>102BAR-CODE-ID         <ETX><BCC>  →
← <ACK>
<STX>208230001<ETX><BCC>  →
← <ACK>
<STX>300100.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00
 80.00 90.00100.0012345<ETX><BCC>  →
← <ACK>
<STX>4   01 7 600<ETX><BCC>  →
← <ACK>
     : (Omitted)
<STX>8000101  1.0000  0.0000  1.0000  0.0000<ETX><BCC>  →
← <ACK>
<EOT>  →
```

5. 2. 2. G7 compatible format

This format is based on the format used with the G7.

5. 2. 2. 1. BASIC mode

No protocol is used as the transmission protocol (refer to "4.1 No protocol").

The data format is the same format as G8. (refer to “5.2.1.1 BASIC mode”)

But please read 17 for setting of TRANS G5/7 MODE when SA1c% is replaced with IFCC value.

5. 2. 2. 2. HI-LEVEL mode

Handshake is used as the transmission mode (refer to "4.2 Handshake").
The data format is the same format as G8. (refer to “5.2.1.2 HI-LEVEL mode”)

But please read 17 for setting of TRANS G5/7 MODE when SA1c% is replaced with IFCC value.

5. 2. 2. 3. RAW mode

Handshake is used as the transmission mode (refer to "4.2 Handshake").
The data format except the record 8 shown below is the same format as G8. (refer to “5.2.1.3 RAW mode”)

But please read 17 for setting of TRANS G5/7 MODE when SA1c% is replaced with IFCC value.

< Data record 8 (Raw data end) >

Information	Number of characters	Content
8	1	Header (Fixed as number 8)

Note: This record shows the end of raw data and is transmitted even when the number of raw data sets is 0.

Communication example : when peak and raw data are present

(Analyzer) (Host)

```
<STX>102BAR-CODE-ID        <ETX><BCC> →
←  <ACK>
<STX>206270001<ETX><BCC> →
←  <ACK>
<STX>300100.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0
 80.0 90.0100.0 123<ETX><BCC> →
←  <ACK>
<STX>4   01 7 720<ETX><BCC> →
←  <ACK>
<STX>5 1FP   B  20 730  20  30  40  200.00  0.5<ETX><BCC> →
←  <ACK>
<STX>5 2A1A  V  20 730  40  50  60  800.00  2.0<ETX><BCC> →
←  <ACK>
     :
     : (Omitted)
<STX>5 7A0   V  20 730 600 680 730 5000.00 50.0<ETX><BCC> →
←  <ACK>
<STX>6<ETX><BCC> →
←  <ACK>
<STX>7  1   11.000   12.000   13.000   14.000   15.000
   16.000   17.000   18.000   19.000   20.000<ETX><BCC> →
←  <ACK>
<STX>7  2   21.000   22.000   23.000   24.000   25.000
```

```
   26.000   27.000   28.000   29.000   30.000<ETX><BCC> →
←  <ACK>
     :
     : (Omitted)
<STX>7 72  721.000  722.000  723.000  724.000  725.000
  726.000  727.000  728.000  729.000  730.000<ETX><BCC> →
←  <ACK>
<STX>8<ETX><BCC> →
←  <ACK>
<EOT> →
```

Communication example (when there is no peak data or raw data)

```
(Analyzer)                                (Host)
<STX>102BAR-CODE-ID          <ETX><BCC> →
←  <ACK>
<STX>206270001<ETX><BCC> →
←  <ACK>
<STX>300  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  0.0  0.0  0.0   0<ETX><BCC> →
←  <ACK>
<STX>4   01 0   0<ETX><BCC> →
←  <ACK>
<STX>6<ETX><BCC> →
←  <ACK>
<STX>8<ETX><BCC> →
←  <ACK>
<EOT> →
```

Communication example: decimal place of percent value is two

```
(Analyzer)                                (Host)
<STX>102BAR-CODE-ID          <ETX><BCC>  →
←  <ACK>
<STX>208230001<ETX><BCC>  →
←  <ACK>
<STX>300100.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00
 80.00 90.00100.0012345<ETX><BCC>  →
←  <ACK>
<STX>4   01 7 600<ETX><BCC>  →
←  <ACK>
     : (Omitted)
<STX>8<ETX><BCC>  →
←  <ACK>
<EOT>  →
```

5. 2. 3. GHbV compatible format

This format is based on the format used with the GHbV.

5. 2. 3. 1. BASIC mode

No protocol is used as the transmission protocol (refer to "4.1 No protocol").

In this mode, the last data set is shown by filling it with 9 (all characters are 9 and the measurement value is 999.9).

The data format is shown below.

< STD mode >

Information	Number of characters	Content
[Sample number]	3, 5, 8	Sample number (See note)
[A1a%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[A1b%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[SA1c%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note) When TRANS G5/7 MODE is set to 15 or 16, this value is IFCC as 0-99999 or 0-999999.
[Total A1%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[F%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces when all characters are not used. No zero suppression. (See note)

< VAR mode >

Information	Number of characters	Content
[Sample number]	3,5,8	Sample number (See note)
[A1a%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[A1b%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[F%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[LA1c%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[SA1c%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note) When TRANS G5/7 MODE is set to 15 or 16, this value is IFCC as 0-99999 or 0-999999.
[A0%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[H-V1%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Total A1%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Sample ID]	0,13, 18,20	Aligned left; characters to the right are filled with spaces when all characters are not used. No zero suppression. (See note)

< β-thalassemia mode >

Information	Number of characters	Content
[Sample number]	3, 5, 8	Sample number (See note)
[HbF5]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[A0%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbA2%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbD+%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbS+%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbC+%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Flag judgement]	2	00 ~ 99 (00 = normal)
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces when all characters are not used. No zero suppression. (See note)

Note:

1. The number of digits used for the sample number is set by the SMPx key in the RS232C screen of the analyzer.
   The various digit conversion rules are shown below.

Sample type	Actual sample number	3 digits	5 digits (0 inserted in second digit)	8 digits
Normal samples	0001 ~ 7999	001 ~ 999 (last 3 digits)	00001 ~ 70999 (See note)	XXXX0001 ~ XXXX7999
STAT	8001 ~ 8999	001 ~ 999 (last 3 digits)	80001 ~ 80999	XXXX8001 ~ XXXX8999
CALIB	9001 ~ 9999	001 ~ 999 (last 3 digits)	90001 ~ 90999	XXXX9001 ~ XXXX9999

XXXX indicates ID number

When TRANS G5/7 MODE of PARAMETER screen of the analyzer is 6 or 16, only a normal sample is set to 00001-07999.

2. The various measurement values from the β-thalassemia mode are arranged in the sequence of the peak identification table (IDT) file.
   The standard settings are shown here.
3. The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.
4. The number of digits used for each percent value obeys PERECNT DECIMAL of the PARAMETER screen.

5. Each percent value is transposed to the spaces of the number of characters corresponding to PERCENT DECIMAL, when the condition formula of level 1 of flags is satisfied. (The transposing to zero(0.0) from the spaces is available. Refer to [5.2.4.Flag level and communication] for details.
6. In this mode, the last data set is shown by filling it with 9 (all characters are 9 and the measurement value is 999.9).

Communication example: 1 data set

(Analyzer) (Host)

```
08230001  0.7  0.8  9.9 11.5  1.1BAR-CODE-ID          <CR>
→
99999999999.9999.9999.9999.9999.99999999999999999999<CR>
→
```

Communication example: 3 data sets

(Analyzer) (Host)

```
08230001  0.7  0.8  9.9 11.5  1.1BAR-CODE-ID1         <CR>
→
08230002  0.8  0.9 10.1 11.8  0.9BAR-CODE-ID2        <CR>  →
08230003  0.7  1.0  9.9 11.6  1.0BAR-CODE-ID3        <CR>  →
99999999999.9999.9999.9999.9999.99999999999999999999<CR>
→
```

Communication example: decimal place of percent value is two

(Analyzer) (Host)

```
08230001  0.73  0.83  9.93 11.48  1.08
BAR-CODE-ID          <CR>  →
99999999999.99999.99999.99999.99999.99
99999999999999999999<CR>  →
```

5. 2. 3. 2. HI-LEVEL mode

Handshake is used as the transmission mode (refer to "4.2 Handshake").
The data format is shown below.

< STD mode >

Information	Number of characters	Content
[Sample number]	3, 5, 8	Sample number (See note)
[A1a%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[A1b%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[F%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[SA1c%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note) When TRANS G5/7 MODE is set to 15 or 16, this value is IFCC as 0-99999 or 0-999999.
[A0%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Flag judgement]	5	00 ~ 99(00 = normal) (Aligned left, remaining characters filled with spaces)
[Total A1%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces when all characters are not used. No zero suppression. (See note)

< VAR mode >

Information	Number of characters	Content
[Sample number]	3, 5, 8	Sample number (See note)
[A1a%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[A1b%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[F%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[LA1c%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[SA1c%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note) When TRANS G5/7 MODE is set to 15 or 16, this value is IFCC as 0-99999 or 0-999999.
[A0%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[H-V1%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[H-V0%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[H-V2%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Flag judgement]	5	00 ~ 99 (00 = normal) (Aligned left, remaining characters filled with spaces)
[Total A1%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces when all characters are not used. No zero suppression. (See note)

< β-thalassemia mode >

Information	Number of characters	Content
[Sample number]	3, 5, 8	Sample number (see note)
[HbF%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[A0%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbA2%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbD+%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbS+%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[HbC+%]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Reserved]	5, 6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (See note)
[Flag judgement]	2	00 ~ 99 (00 = normal)
[Sample ID]	0, 13, 18, 20	Aligned left; characters to the right are filled with spaces when all characters are not used. No zero suppression. (See note)

Note:

1. The number of digits used for the sample number is set by the SMPx key in the RS232C screen of the analyzer.
   The various digit conversion rules are shown below.

Sample type	Actual sample number	3 digits	5 digits (0 inserted in second digit)	8 digits
Normal samples	0001 ~ 7999	001 ~ 999 (last 3 digits)	00001 ~ 70999 (See note)	XXXX0001 ~ XXXX7999
STAT	8001 ~ 8999	001 ~ 999 (last 3 digits)	80001 ~ 80999	XXXX8001 ~ XXXX8999
CALIB	9001 ~ 9999	001 ~ 999 (last 3 digits)	90001 ~ 90999	XXXX9001 ~ XXXX9999

XXXX indicates ID number

When TRANS GHb5 MODE of PARAMETER screen of the analyzer is 6 or 16, only a normal sample is set to 00001-07999.

2. The various measurement values from the β-thalassemia method are arranged in the sequence of the peak identification table (IDT) file.
   The standard settings are shown here.
3. The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.
4. The number of digits used for each percent value obeys PERECNT DECIMAL of the PARAMETER screen.
5. Each percent value is transposed to the spaces of the number of characters corresponding to PERCENT DECIMAL, when the condition formula of level 1 of flags is satisfied. (The transposing to zero(0.0) from the spaces is available. Refer to [5.2.4.Flag level and communication] for details.
6. When multiple data sets are to be transmitted, EOT is transmitted after the last data set.

Communication example: 1 data set

(Analyzer) (Host)

```
<STX>08230001  0.7  0.8  1.1  9.9 86.2  2.6  0.0
  0.0  0.000   11.5BAR-CODE-ID          <ETX><BCC>  →
←  <ACK>
<EOT>  →
```

Communication example: 3 data sets

(Analyzer) (Host)

```
<STX>08230001  0.7  0.8  1.1  9.9 86.2  2.6  0.0
  0.0  0.000   11.5BAR-CODE-ID1        <ETX><BCC>  →
 ←  <ACK>
<STX>08230002  0.8  0.9  0.9 10.1 86.2  2.4  0.0
  0.0  0.000   11.8BAR-CODE-ID2        <ETX><BCC>  →
 ←  <ACK>
<STX>08230003  0.7  1.0  1.0  9.9 86.3  2.4  0.0
  0.0  0.000   11.6BAR-CODE-ID3        <ETX><BCC>  →
 ←  <ACK>
<EOT>  →
```

Communication example: decimal place of percent value is two

(Analyzer) (Host)

```
<STX>08230001  0.73  0.83  1.08  9.93 86.17  2.57  0.00
  0.00  0.0000   11.48BAR-CODE-ID         <ETX><BCC>  →
 ←  <ACK>
<EOT>  →
```

5. 2. 4. Flag level and communication

Each flag can set up the level 0 or 1 on FLAG screen. If the measurement result satisfied the condition formula of the flag level 0, the numeric value is transmitted to the host computer as result value. If level 1, the spaces value is transmitted. However, if #OPTION M of PARAMETER screen is set as 1XXXXXX(1st digit is 1,X=0 or 1), each percent value is transmitted as zero(0.0) instead of the spaces. (The number of characters obeys PERCENT DECIMAL of PARAMETER screen.) The transmitting example of the measurement result satisfied the condition formula of the Flag level 1 is shown below.

Communication example: BASIC mode, the 1st digit of #OPTION M is 0 (gray is spaces)

(Analyzer) (Host)

```
0208230001
          01BAR-CODE-ID          <CR>  →
9999999999999.9999.9999.9999.9999.9999.9999.9999.9
999.9999.99999999999999999999999<CR>  →
```

Communication example: BASIC mode, the 1st digit of #OPTION M is 1

(Analyzer) (Host)

```
0208230001  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  0.0  0.001BAR-CODE-ID          <CR>  →
9999999999999.9999.9999.9999.9999.9999.9999.9999.9
999.9999.99999999999999999999999<CR>  →
```

Communication example: HI-LEVEL mode, the 1st digit of #OPTION M is 0 (gray is spaces)

(Analyzer) (Host)

```
<STX>0208230001
                01BAR-CODE-ID          <ETX><BCC>  →
←  <ACK>
<EOT>  →
```

Communication example: HI-LEVEL mode, the 1st digit of #OPTION M is 1

(Analyzer) (Host)

```
<STX>0208230001  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  0.0  0.0  0.001BAR-CODE-ID          <ETX><BCC>  →
←  <ACK>
<EOT>  →
```

Communication example: RAW mode, the 1st digit of #OPTION M is 0 (gray is spaces)

(Analyzer) (Host)

```
<STX>102BAR-CODE-ID          <ETX><BCC>  →
←  <ACK>
<STX>208230001<ETX><BCC>  →
←  <ACK>
<STX>301
               12345<ETX><BCC>  →
←  <ACK>
       :
   (omitted)
```

Communication example: RAW mode, the 1st digit of #OPTION M is 1

(Analyzer) (Host)

```
<STX>102BAR-CODE-ID          <ETX><BCC>  →
←  <ACK>
<STX>208230001<ETX><BCC>  →
←  <ACK>
<STX>301  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  0.0  0.0  0.012345<ETX><BCC>  →
←  <ACK>
       :
   (omitted)
```