

TOSOH AUTOMATED GLYCOHEMOGLOBIN ANALYZER

HLC-723G11

HOST CONNECTION SPECIFICATIONS

Rev.1

TOSOH CORPORATION

BIOSCIENCE DIVISION

Revision record

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0	July 30, 2014	Created
1	Nov. 26, 2014	Note for NP Protocol is added. Description for unrecommended communication mode is deleted. Description for parameters is changed to match operator's manual.

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1. Introduction

This document describes the communication arrangements used when connecting the HLC-723G11(hereafter called analyzer) to a host computer (hereafter called host).

2. Notes

Refer to the Operator's Manual of the analyzer as well for the handling of the analyzer. Refer to the Operator's Manual of TOSOH DM products for the connections when using the TOSOH Data Management Program (*1) (hereinafter referred to as TOSOH DM products).

*1 Please contact Tosoh Technical Service for TOSOH DM products that can be connected to the HLC-723G11.

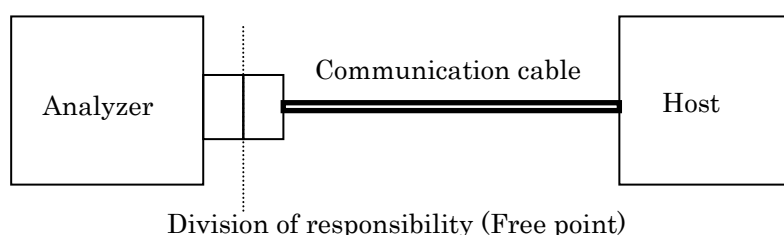
Since the No Protocol mode does not use handshaking communication, the communication contents are not checked by an exclusive logical sum of the transmission character string. In order to perform more reliable communication, refrain from using the No Protocol mode as much as possible.

3. Hardware specifications

(1) Communication specifications

Item	Specifications
Transmission method	EIA-574 (or EIA-232, RS-232C) Asynchronous(start-stop transmission) half-duplex
Transmission rate	1200,2400,4800,9600,19200 BPS
Transmission code	ASCII
Data length	7bit,8bit
Parity	even, odd, none
Stop bit	1bit, 2bit

(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.		Signal name
----	----	1	9pins	25pins	
Receive data	RXD	2	case	1	Frame GND
Transmit data	TXD	3	2	3	Receive data
Data terminal ready	DTR	4	3	2	Transmit data
Signal GND	SG	5	4	20	Data terminal ready
Data set ready	DSR	6	5	7	Signal GND
Request to send	RTS *	7	6	6	Data set ready
Clear to send	CTS *	8	7	4	Request to send
			8	5	Clear to send

* The analyzer performs RTS/CTS flow control according to the RTS-CTS CTRL setting on the "FULL PARAMETER" screen, except for when the parameter is set to NONE. RTS/CTS flow control will not be performed with NONE.

4. Communication Settings

Perform the communication settings of the analyzer in order of the RS232C screen (MAIN screen → MENU → UTILITY → RS 232C).

Screen 3-1: RS232C Screen of Analyzer

○ Baud rate settings

- 1200: Sets the baud rate to 1200 bps
- 2400: Sets the baud rate to 2400 bps
- 4800: Sets the baud rate to 4800 bps
- 9600: Sets the baud rate to 9600 bps
- 19200: Sets the baud rate to 19200 bps

○ Parity settings

- NONE: Sets the parity to none
- ODD: Sets the parity to an odd number
- EVEN: Sets the parity to an even number

○ Data length settings

- 8 BIT: Sets the data length 8 bit
- 7 BIT: Sets the data length to 7 bit

○ Stop bit settings

- 1 BIT: Sets the stop bit to 1 bit
- 2 BIT: Sets the stop bit to 2 bit

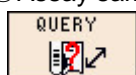
○ No. of digits for sample ID (Barcode)

- BC 13: Transmits sample ID in 13 digits
- BC 18: Transmits sample ID in 18 digits
- BC 20: Transmits sample ID in 20 digits (**Recommended**)
- BC NO: Does not transmit sample ID

○ No. of digits for sample number

- SMP 3: Transmits sample number in 3 digits
- SMP 5: Transmits sample number in 5 digits
- SMP 8: Transmits sample number in 8 digits (**Recommended**)

○ Assay sample queue query setting



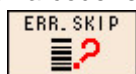
: Press this key to highlight the key. The assay sample queue will be transmitted to the host during the reading of the sample ID (barcode), and performs an assay only for the requested sample.

○ Assay results auto transmission setting



: Press this key to highlight the key. The assay results will be transmitted automatically to the host each time the assay of one sample is completed.

○ Barcode reading error skip setting



: Press this key to highlight the key. When the barcode could not be recognized during the reading of the barcode, the assay will be skipped.

5. Communication Modes

The following communication modes are available, and are compatible for the purpose of use and Tosoh's conventional analyzer. There are two communication modes, query mode, on which the analyzer queries an assay order to the host using sample ID after reading the barcode on the sample, and result transmission mode on which the analyzer transmits the assay results to the host. These communications are performed according to the transmission mode.

The transmission mode can be changed as follows by the "TRANS MODE" parameter on the "FULL PARAMETER" screen of the analyzer.

TRANS MODE	Communication Modes	Description
STANDARD	G11 standard communication mode	G11 standard communication. Recommended setting
C-MODE A	Classical mode A	G7, G8 and G9 standard Hi-Level communication compatible
C-MODE B	Classical mode B	GX standard Hi-Level communication compatible
C-MODE C	Classical mode C	GHb V standard Hi-Level communication compatible

■Notes■

Refer to the Operator's Manual of the TOSOH DM products for the connections with TOSOH DM products.

When connecting to a host computer, set the TRANS MODE setting to a mode other than RP+MODE and CDS MODE for use.

Screen 5-1: G11 FULL PARAMETER Screen (TRANS MODE)

The screenshot shows the 'FULL PARAMETER' screen of a G11 analyzer. At the top, it displays 'P.15' and the date/time '2015/02/26 10:54'. The user is identified as 'F. Engineer FE'. The screen contains a table with the following parameters:

#ERR	TRANS FORM	SPACE
→	TRANS MODE	STANDARD
	TRANS COMPONENT	234567-----

At the bottom, there is a navigation bar with buttons: 'PARAMETER' (with a list icon), a left arrow, a right arrow, an up arrow, and an 'EXIT' button (with a door icon).

6. Transmission Protocol

Handshaking is used as the transmission protocols of communication modes except for the No Protocol mode.

The control codes used for communication are as follows.

Code (Hexadecimal)	Names	Meaning	Application
02	STX	Beginning of text	Modes except for No Protocol mode
03	ETX	End of text	Modes except for No Protocol mode
04	EOT	End of transmission	Modes except for No Protocol mode
06	ACK	Acknowledgement of normal receiving	Modes except for No Protocol mode
15	NAK	Acknowledgement of abnormal receiving	Modes except for No Protocol mode

■Note■

If defective data is received due to the turning ON/OFF of the main power of the analyzer, noise or etc., take the appropriate measures on the host side.

6.1. Handshaking

Handshaking is a communication protocol that is used when a mode other than the No Protocol mode is selected.

Communication contents

<STX>text<ETX><BCC> →
 ← <ACK>or<NAK>
 <EOT> →

■Notes■

1. <BCC> is the exclusive logical sum in the character unit from the head character of the text to <ETX>. In the G11 standard communication mode, the <BCC> is composed of a character string of two characters. In Classical mode A, Classical mode B and Classical mode C, the <BCC> is composed of one byte binary. In this case, since the value becomes 00-7F in hexadecimal, make sure not to confuse it with the control code used for the transmission protocol during the procedure.

As an example, when the sample ID is "2000000," the value becomes as follows in the sample queue query from the analyzer to the host. The yellow portion is the target of the exclusive logical sum.

<Example when BCC is composed of a character string of two characters>
 <BCC> becomes a character string of "7A."

<BCC> becomes a character string of 7A.																									
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Chr	<STX>	G	,	2	0	0	0	0	0	0														<ETX>	0x7A
Ascii	0x02	0x47	0x2C	0x32	0x30	0x30	0x30	0x30	0x30	0x30	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x03	0x7A
Content	Start of text	G [Query code]	, [Comma]	2000000 [Sample ID]																			End of text	BCC 0x7A	

<Example when BCC is one byte binary>

<BCC> becomes binary of "0x7A."

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Chr	<STX>	G	.	2	0	0	0	0	0	0														<ETX>	7	A
Ascii	0x02	0x47	0x2C	0x32	0x30	0x30	0x30	0x30	0x30	0x30	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x03	0x37	0x41
Content	Start of text	G [Query code]	. [Comma]	2000000 [Sample ID]																			End of text	BCC 0x7A		

- 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.
- When multiple data sets exist, <EOT> will be transmitted at the end of each data set.
- 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.
- 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> textn <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> →
```

7. Communication format

7.1. 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 the LINE QUERY to YES in the LINE SETTING screen.

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 spaces)
,	1	Comma
[A1c item]	2	00=No request, 01=Request
[Reserved]	6	(Fixed as spaces)
,	1	Comma
[Reserved]	8	(Fixed as spaces)

Note: Sample type and Container type designations follow parameter: LOADER SMP MODE. "7.1.1 Sample type and Container type designation" for details.

Communication example

Except for No Protocol mode

(Analyzer)

<STX>G, ID-0123456789

← <ACK>

<EOT> →

← <STX>A, ID-0123456789

<ACK> →

← <EOT>

(Host)

<ETX><BCC> →

,0001 ,01 , <ETX><BCC>

7.1.1. Sample type 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 type and container type of loader samples is designed in LOADER SMP MODE setting.

Normal samples

Operation mode	Sample type	Container type	Query
STANDARD	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 judgment	YES
WHOLE BLD	Fixed as whole blood	Sample sensors judgment	YES
DILUTED	Fixed as diluted	Sample sensors judgment	YES
HOST	Designated by host	Sample sensors judgment	YES

Calibrator (see note-1 below)

Operation mode	Sample type	Container type	Query
<i>Not referenced</i>	Fixed as diluted	Fixed as cup	No (see note-3 below)

Note:

- 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.
- Even if query is designated, no query will be made for calibrators.

Control (see note-1 below)

Operation mode	Sample type	Container type	Query
<i>Not referenced</i>	Fixed as diluted (see note-2 below)	Sample sensors judgment	No (see note-3 below)

Note:

- When the settings registered in LD QC-ID1 ~ LD QC-ID4 of PARAMETER screen, QC-L1 ~ L3 ID and QC-H1 ~ H3 ID of the LINE SETTING screen match the ID, samples are handled as controls.
- Controls don't obey LOADER SMP MODE.
- Even when query is designated, no query will be made for controls.

STAT samples

Operation mode	Sample type	Container type	Query
<i>Not referenced</i>	Designated by STAT screen	STAT sample sensor judgment	No (see note below)

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

<Transport samples (Belt line samples)>

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

Normal samples

Operation mode	Sample type	Container type	Query
HOST , HOST	Designated by host	Designated by host	Yes
HOST , TUBE	Designated by host	Fixed as primary tube	Yes
W_BLD, HOST	Fixed as whole blood	Designated by host	Yes
W_BLD, CUP	Fixed as whole blood	Fixed as cup	Yes
W_BLD, TUBE	Fixed as whole blood	Fixed as primary tube	Yes
DIL , HOST	Fixed as diluted	Designated by host	Yes
DIL , CUP	Fixed as diluted	Fixed as cup	Yes
DIL , TUBE	Fixed as diluted	Fixed as primary tube	Yes

Calibrator (see note-1 below)

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

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 when query is designated, no query will be made for calibrators.

Control (see note-1 below)

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

Note:

1. When the settings registered in QC-L1 ~ L3-ID 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.

7.2. Measurement results

Data formats are designed for each communication mode.

G11 standard communication mode is recommended for this analyzer.

7.2.1. G11 standard communication mode

The data format for G11 standard communication mode is shown below.

Information	Number of characters	Content
[Analyzer name]	12	"HLC-723G11 "
[Analysis mode]	1	0 = STD mode
[Sample position]	1	0 = STAT, 1 = transport(LA), 2 = loader
[Sample type]	1	0 = normal sample, 1 = calibrator, 2 = control
[Decimal setting for result]	1	1 = percent value:1 decimal place IFCC value: integer (PERCENT DECIMAL = PD1) 2 = percent value:2 decimal place IFCC value: integer (PERCENT DECIMAL = PD2) 8 = percent value:2 decimal place IFCC value: 1 decimal place (PERCENT DECIMAL = PD2+ID1) (see note-2)
[Measurement date]	12	YYYYMMDDhhmm YYYY:year, MM:month, DD:date, hh:hour, mm:minute
[Rack number]	4	0001 ~ 9999
[Position number]	2	01 ~ 10
[Sample number]	8	Sample number (see note-1)
[1st component]	6	spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00(aligned right)(see note-2, -3 and -4)
[2nd component]	6	
[3rd component]	6	
[4th component]	6	
[5th component]	6	
[6th component]	6	
[7th component]	6	
[8th component]	6	
[9th component]	6	
[10th component]	6	
[11th component]	6	
[12th component]	6	
[HbA1c (JDS)%]	6	
[HbA1c (NGSP)%]	6	
[HbA1c (Mono S)%]	6	
[Reserved]	6	
[Reserved]	6	
[Reserved]	6	
[Reserved]	6	
[HbA1c(IFCC) mmol / mol]	6	spaces or 0 ~ 999999 or 0.0 ~ 9999.9 (aligned right)(see note-2, -3 and -4)
[CALIB type]	2	01 = NGSP, 03 = IFCC(NGSP), 04 = Mono S, 05 = IFCC(Mono S), 06 = NGSP(JDS)

[Reserved]	2	(spaces, fixed)
[1st flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[2nd flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[3rd flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[4th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[5th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[6th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[7th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[8th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[9th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[10th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[11th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[12th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[13th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[14th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[15th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[16th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[17th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[18th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[19th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[20th flag judgment]	2	00 ~ 99 (00=normal) (see note-6)
[Reserved]	4	(spaces, fixed)
[Sample ID]	20	Aligned left; characters to the right are filled with spaces. No zero suppression

Note

- The sample number is transmitted as shown below.

Sample type	Actual sample number	8 digits
Normal sample	0001 ~ 7999	HHMM0001 ~ HHMM7999
STAT	8001 ~ 8999	HHMM8001 ~ HHMM8999
CALIB	9001 ~ 9999	HHMM9001 ~ HHMM9999

*HHMM is measurement time (HH:hour, MM:minute)

- The number of digits used for each component value obeys PERCENT DECIMAL of the FULL PARAMETER screen as below.

PERCENT DECIMAL	Percent value	IFCC value
PD1	0.0 ~ 100.0	0 ~ 999999
PD2	0.00 ~ 100.00	0 ~ 999999
PD2+ID1	0.00 ~ 100.00	0.0 ~ 9999.9

Fig. 7-1 FULL PARAMETER screen (PERCENT DECIMAL)

The screenshot shows the 'FULL PARAMETER' screen for 'P.10'. The title bar includes 'FULL PARAMETER', 'F. Engineer FE', and the date/time '2015/02/26 10:55'. The main area contains a table of parameters:

PERCENT DECIMAL	PD1
TIME DECIMAL	2
MIN-AREA	2.0
SENSE	300.0
SLOPE	0.0

At the bottom, there is a navigation bar with buttons: 'PARAMETER' (with a list icon), a left arrow, a right arrow, an up arrow, and an 'EXIT' button (with a cursor icon).

- The arrangement of the percentage of each peak area from the 1st component to the 12th component can be specified by setting the "TRANS COMPONENT" parameter on the "FULL PARAMETER" screen of the analyzer. In the case of the G11 standard communication mode, "234567 -----" can only be set for the TRANS COMPONENT.

Fig. 7-2 FULL PARAMETER screen (TRANS COMPONENT)

The screenshot shows the 'FULL PARAMETER' screen for 'P.15'. The title bar includes 'FULL PARAMETER', 'F. Engineer FE', and the date/time '2015/02/26 10:54'. The main area contains a table of parameters:

#ERR TRANS FORM	SPACE
TRANS MODE	STANDARD
TRANS COMPONENT	234567-----

At the bottom, there is a navigation bar with buttons: 'PARAMETER' (with a list icon), a left arrow, a right arrow, an up arrow, and an 'EXIT' button (with a cursor icon).

The arrangement of the percentage of each peak area by the settable TRANS COMPONENTS is as follows.

Information	TRANS COMPONENT :
	2 3 4 5 6 7 — — — — —
1st component	A1a%
2nd component	A1b%
3rd component	F%
4th component	LA1c%
5th component	SA1c%
6th component	A0%
7th component	Reserved
8th component	Reserved
9th component	Reserved
10th component	Reserved
11th component	Reserved
12th component	Reserved

- Each percent value is transposed to the spaces of the number of characters, when the condition formula of level 1 of flags is satisfied. (The transposing to zero(0.0) from the spaces is available. Refer to [7.3 Flag level and communication] for details.)
- When multiple data sets are to be transmitted, EOT is transmitted after the last data set.
- When the measurement result satisfies two or more criteria conditions of the flag set in the "FLAG" screen, the criteria code will be transmitted in the order of priority of the flags. Flag level 1 is given priority over flag level 0 for transmission. If two or more criteria conditions of the same level flag are satisfied, a higher priority is given to the flag set the highest in the table on the FLAG screen. (Refer to [7.3 Flag Level and Communication] for details.)

=== Communication example : 1 data set ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11 020120140417132700010113270001 0.9 1.0 0.
9 1.7 10.5 86.6 0.0 0.0 0.0 0.0 0.0 0.0 10.0
0.0 0.0 10.5 0.0 0.0 0.0 91 000000000000000000000000
000000000000000000 BAR-CODE-ID <ETX>
<BCC> →
← <ACK>
<EOT> →

```

=== Communication example : 3 data sets ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11 020120140417132700010113270001 0.9 1.0 0.
9 1.7 10.5 86.6 0.0 0.0 0.0 0.0 0.0 0.0 10.0
0.0 0.0 10.5 0.0 0.0 0.0 91 000000000000000000000000
000000000000000000 BAR-CODE-ID1 <ETX>
<BCC> →
← <ACK>
<STX>HLC-723G11 020120140417132700010213270002 0.8 1.0 1.
0 1.7 10.5 86.6 0.0 0.0 0.0 0.0 0.0 0.0 10.0
0.0 0.0 10.5 0.0 0.0 0.0 91 000000000000000000000000
000000000000000000 BAR-CODE-ID2 <ETX>
<BCC> →
← <ACK>
<STX>HLC-723G11 020120140417132800010313280003 0.9 1.0 0.
9 1.8 10.5 86.5 0.0 0.0 0.0 0.0 0.0 0.0 10.0
0.0 0.0 10.5 0.0 0.0 0.0 91 000000000000000000000000
000000000000000000 BAR-CODE-ID3 <ETX>
<BCC> →
← <ACK>
<EOT> →

```

=== Communication example : decimal place of percent value is two ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11 020120140417132700010113270001 0.86 0.95 0.9
3 1.67 10.48 86.64 0.00 0.00 0.00 0.00 0.00 0.00 10.03 0
.00 0.00 10.48 0.00 0.00 0.00 91 000000000000000000000000
000000000000000000 BAR-CODE-ID <ETX>
<BCC> →
← <ACK>
<EOT> →

```

=== Communication example : percent value is transposed to spaces ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11 020120140417132700010113270001AA0.86110.951A0.9
3111.67110.48186.64AA0.00AA0.00AA0.00AA0.00AA0.00AA0.00A10.03AA0
.00AA0.00A10.48AA0.00AA0.00AA0.00AAA91AA0100000000000000000000
000000000000000000 BAR-CODE-ID <ETX>
<BCC> →
← <ACK>
<EOT> →

```

```

=== Communication example : result satisfied two condition formula
                                     of flags(AREA LOW and TP LOW) ===
(Analyzer)                                     (Host)
<STX>HLC-723G11  020120140417132700010113270001  0.9  1.0  0.
9  1.7  10.5  86.6  0.0  0.0  0.0  0.0  0.0  0.0  10.0
0.0  0.0  10.5  0.0  0.0  0.0  91  010700000000000000000000
00000000000000000000  BAR-CODE-ID  <ETX>
<BCC>  →
←  <ACK>
<EOT>  →

```

7. 2. 2. Classical mode A

The data format for classical mode A is shown below.

Information	Number of characters	Content
[Analysis mode]	1	0 = STD mode
[Sampling position]	1	0 = STAT, 1 = transport (LA), 2 = loader
[Sample number]	3,5,8	Sample number (see note-1) (Recommended : 8)
[1st component]	5,6	Spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (see note-2, -3 and -4)
[2nd component]	5,6	
[3rd component]	5,6	
[4th component]	5,6	
[5th component]	5,6	
[6th component]	5,6	
[7th component]	5,6	
[8th component]	5,6	
[9th component]	5,6	
[10th component]	5,6	
[Flag judgment]	2	00 ~ 99 (00=normal) (see note-7)
[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-5) (Recommended:20)

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	HHMM0001 ~ HHMM7999
STAT	8001 ~ 8999	001 ~ 999 (last 3 digits)	80001 ~ 80999	HHMM8001 ~ HHMM8999
CALIB	9001 ~ 9999	001 ~ 999 (last 3 digits)	90001 ~ 90999	HHMM9001 ~ HHMM9999

*HHMM is measurement time (HH:hour, MM:minute)

- The number of digits used for each component value obeys PERCENT DECIMAL of the FULL PARAMETER screen as below. (Refer to Fig. 7-1)

PERCENT DECIMAL	Percent value	IFCC value
PD1	0.0 ~ 100.0	0 ~ 999999
PD2	0.00 ~ 100.00	0 ~ 999999
PD2+ID1	0.00 ~ 100.00	0.0 ~ 9999.9

- The arrangement of the percentage of each peak area from the 1st component to the 10th component can be specified by setting the "TRANS COMPONENT" parameter on the "FULL PARAMETER" screen of the analyzer. (Refer to Screen 7-2). In the case of Classical mode A, "1234567-S ---" can only be set for the TRANS COMPONENT.

The arrangement of the percentage of each peak area by the settable TRANS COMPONENTS is as follows.

Information	TRANS COMPONENT :
	1 2 3 4 5 6 7 - S - - -
1st component	FP%
2nd component	A1a%
3rd component	A1b%
4th component	F%
5th component	LA1c%
6th component	SA1c%
7th component	A0%
8th component	Reserved
9th component	IFCC value
10th component	Reserved

- 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 [7.3 Flag level and communication] for details.)
- The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.
- When multiple data sets are to be transmitted, EOT is transmitted after the last data set.
- When the measurement result satisfies two or more criteria conditions of the flag set in the "FLAG" screen, the **flag criteria to be transmitted to the host is only one criteria code set for the flag with the highest priority**. Flag level 1 is given priority over flag level 0 for transmission. If two or more criteria conditions of the same level flag are satisfied, the highest priority is given to the flag set the highest in the table on the FLAG screen. (Refer to [7.3 Flag Level and Communication] for details.)

=== Communication example : 1 data set ===

(Analyzer)	(Host)
<STX>0213510001 0.0 0.6 0.8 0.8 2.2 5.8 90.3	
0.0 5.4 0.000BAR-CODE-ID	<ETX><BCC> →
← <ACK>	
<EOT> →	

=== Communication example : 3 data sets ===

(Analyzer)	(Host)
<STX>0213510001 0.0 0.6 0.8 0.8 2.2 5.8 90.3	
0.0 5.4 0.000BAR-CODE-ID1	<ETX><BCC> →
← <ACK>	
<STX>0213510002 0.0 0.6 0.8 0.7 2.2 5.8 90.4	
0.0 5.4 0.000BAR-CODE-ID2	<ETX><BCC> →
← <ACK>	
<STX>0213520003 0.0 0.6 0.7 0.8 2.3 5.8 90.3	
0.0 5.4 0.000BAR-CODE-ID3	<ETX><BCC> →
← <ACK>	
<EOT> →	

=== Communication example : decimal place of percent value is two ===

(Analyzer)	(Host)
<STX>0213510001 0.00 0.61 0.82 0.76 2.17 5.78 90.33	
0.00 5.42 0.0000BAR-CODE-ID	<ETX><BCC> →
← <ACK>	
<EOT> →	

=== Communication example : percent value is transposed to spaces ===

(Analyzer)	(Host)
<STX>0213510001110.0110.6110.8110.8112.2115.8190.3	
110.0115.4110.001BAR-CODE-ID	<ETX><BCC> →
← <ACK>	
<EOT> →	

7. 2. 3. Classical mode B

The data format for classical mode B is shown below.

Information	Number of characters	Content
[Analyzer name]	12	"HLC-723G11 "
[Analysis mode]	1	0 = STD mode
[Sample position]	1	0 = STAT, 1 = transport (LA), 2 = Loader
[Sample type]	1	0 = normal sample, 1 = calibrator, 2 = control
[Decimal setting for result]	1	1 = percent value: 1 decimal place IFCC value: integer (PERCENT DECIMAL = PD1) 2 = percent value: 2 decimal place IFCC value: integer (PERCENT DECIMAL = PD1) 8 = percent value: 2 decimal place IFCC value: integer (PERCENT DECIMAL = PD1)
[Sample number]	3,5,8	Sample number (see note) (Recommended: 8)
[1st component]	6	Spaces or 0.0 ~ 100.0 or 0.00 ~ 100.00 (aligned right) (see note)
[2nd component]	6	
[3rd component]	6	
[4th component]	6	
[5th component]	6	
[6th component]	6	
[7th component]	6	
[8th component]	6	
[9th component]	6	
[10th component]	6	
[11th component]	6	
[12th component]	6	
[Reserved]	6	
[HbA1c (JDS)%]	6	
[HbA1c (NGSP)%]	6	
[HbA1c (Mono S)%]	6	
[Reserved]	6	
[Reserved]	6	
[Reserved]	6	
[Reserved]	6	
[HbA1c(IFCC) mmol / mol]	5	Spaces or 0~99999 or 0.0 ~ 999.9 (aligned right) (see note)
[CALIB type]	2	01 = NGSP, 03=IFCC(NGSP), 04=Mono S, 05 = IFCC(Mono S), 06 = NGSP(JDS)
[Reserved]	2	(spaces, fixed)
[Flag judgment]	2	00 ~ 99 (00=normal) (see note)
[Reserved]	4	(spaces, fixed)
[Sample ID]	0,13, 18,20	Aligned left; characters to the right are filled with spaces when all characters are used. No zero suppression. (see note) (Recommended: 20)

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	HHMM0001 ~ HHMM7999
STAT	8001~8999	001~999 (last 3 digits)	80001~80999	HHMM8001 ~ HHMM8999
CALIB	9001~9999	001~999 (last 3 digits)	90001~90999	HHMM9001 ~ HHMM9999

*HHMM is measurement time (HH:hour, MM:minute)

- The number of digits used for each component value obeys PERCENT DECIMAL of the FULL PARAMETER screen as below. (Refer to Fig. 7-1)
- The arrangement of the percentage of each peak area from the 1st component to the 12th component can be specified by setting the "TRANS COMPONENT" parameter on the "FULL PARAMETER" screen of the analyzer. (Refer to Screen 7-2). In the case of Classical mode B, "1234567-----" can only be set for the TRANS COMPONENT.

The arrangement of the percentage of each peak area by the settable TRANS COMPONENTS is as follows.

Information	TRANS COMPONENT : 1 2 3 4 5 6 7 — — — — —
1st component	FP%
2nd component	A1a%
3rd component	A1b%
4th component	F%
5th component	LA1c%
6th component	SA1c%
7th component	A0%
8th component	Reserved
9th component	Reserved
10th component	Reserved
11th component	Reserved
12th component	Reserved

- 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 [7.3 Flag level and communication] for details.)
- The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.
- When multiple data sets are to be transmitted, EOT is transmitted after the last data set.
- When the measurement result satisfies two or more criteria conditions of the flag set in the "FLAG" screen, the **flag criteria to be transmitted to the host is only one criteria code set for the flag with the highest priority**. Flag level 1 is given priority over flag level 0 for transmission. If two or more criteria conditions of the same level flag are satisfied, the highest priority is given to the flag set the highest in the table on the FLAG screen. (Refer to [7.3 Flag Level and Communication] for details.)

=== Communication example : 1 data set ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11  020113270001  0.0  0.9  1.0  0.9  1.7  10.
5  86.6  0.0  0.0  0.0  0.0  0.0  0.0  10.0  0.0  0.0  1
0.5  0.0  0.0  0.0  9106  00  BAR-CODE-ID  <ETX>
<BCC>  →
←  <ACK>
<EOT>  →

```

=== Communication example : 3 data sets ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11  020113270001  0.0  0.9  1.0  0.9  1.7  10.
5  86.6  0.0  0.0  0.0  0.0  0.0  0.0  10.0  0.0  0.0  1
0.5  0.0  0.0  0.0  9106  00  BAR-CODE-ID1  <ETX>
<BCC>  →
←  <ACK>
<STX>HLC-723G11  020113270002  0.0  0.8  1.0  1.0  1.7  10.
5  86.6  0.0  0.0  0.0  0.0  0.0  0.0  10.0  0.0  0.0  1
0.5  0.0  0.0  0.0  9106  00  BAR-CODE-ID2  <ETX>
<BCC>  →
←  <ACK>
<STX>HLC-723G11  020113280003  0.0  0.9  1.0  0.9  1.8  10.
5  86.5  0.0  0.0  0.0  0.0  0.0  0.0  10.0  0.0  0.0  1
0.5  0.0  0.0  0.0  9106  00  BAR-CODE-ID3  <ETX>
<BCC>  →
←  <ACK>
<EOT>  →

```

=== Communication example : decimal place of percent value is two ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11  020113270001  0.00  0.86  0.95  0.93  1.67  10.5
4  86.64  0.00  0.00  0.00  0.00  0.00  0.00  10.03  0.00  0.00  10
.48  0.00  0.00  0.00  9106  00  BAR-CODE-ID  <ETX>
<BCC>  →
←  <ACK>
<EOT>  →

```

=== Communication example : percent value is transposed to spaces ===

```

(Analyzer)                                     (Host)
<STX>HLC-723G11  020113270001AA0.00110.86110.95110.93111.67110.5
4A86.64AA0.00AA0.00AA0.00AA0.00AA0.00AA0.00A10.03AA0.00AA0.00A10
.48AA0.00AA0.00AA0.00AAA9106  01  BAR-CODE-ID  <ETX>
<BCC>  →
←  <ACK>
<EOT>  →

```

7. 2. 4. Classical mode C

The data format for classical mode A is shown below.

Information	Number of characters	Content
[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	
[3rd component]	5,6	
[4th component]	5,6	
[5th component]	5,6	
[6th component]	5,6	
[7th component]	5,6	
[8th component]	5,6	
[9th component]	5,6	
[Flag judgment]	5	00~99 (00=normal) (aligned left; remaining characters filled with spaces) (see note)
[10th component]	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)

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	HHMM0001 ~ HHMM7999
STAT	8001 ~ 8999	001 ~ 999 (last 3 digits)	80001 ~ 80999	HHMM8001 ~ HHMM8999
CALIB	9001 ~ 9999	001 ~ 999 (last 3 digits)	90001 ~ 90999	HHMM9001 ~ HHMM9999

*HHMM is measurement time (HH:hour, MM:minute)

- The number of digits used for each component value obeys PERCENT DECIMAL of the FULL PARAMETER screen as below. (Refer to Fig. 7-1)

PERCENT DECIMAL	Percent value	IFCC value
PD1	0.0 ~ 100.0	0 ~ 999999
PD2	0.00 ~ 100.00	0 ~ 999999
PD2+ID1	0.00 ~ 100.00	0.0 ~ 9999.9

- The arrangement of the percentage of each peak area from the 1st component to the 10th component can be specified by setting the "TRANS COMPONENT" parameter on the "FULL PARAMETER" screen of the analyzer. (Refer to Screen 7-2). In the case of Classical mode C, "23467---S---" can only be set for the TRANS COMPONENT.

The arrangement of the percentage of each peak area by the settable TRANS COMPONENTS is as follows.

Information	TRANS COMPONENT : 2 3 4 6 7 — — — S — — —
1st component	A1a%
2nd component	A1b%
3rd component	F%
4th component	SA1c%
5th component	A0%
6th component	Reserved
7th component	Reserved
8th component	Reserved
9th component	IFCC value
10th component	Reserved

- 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 [7.3 Flag level and communication] for details.)
- The number of digits used for the sample ID is set by the BCxx key in the RS232C screen of the analyzer.
- When multiple data sets are to be transmitted, EOT is transmitted after the last data set.
- When the measurement result satisfies two or more criteria conditions of the flag set in the "FLAG" screen, the **flag criteria to be transmitted to the host is only one criteria code set for the flag with the highest priority**. Flag level 1 is given priority over flag level 0 for transmission. If two or more criteria conditions of the same level flag are satisfied, the highest priority is given to the flag set the highest in the table on the FLAG screen. (Refer to [7.3 Flag Level and Communication] for details.)

=== Communication example : 1 data set ===

(Analyzer)	(Host)
<STX>14520001 0.7 0.8 1.1 10.5 86.2 0.0 0.0 0.0	
0.000 10.0BAR-CODE-ID	<ETX><BCC> →
← <ACK>	
<EOT> →	

=== Communication example : 3 data sets ===

(Analyzer)	(Host)
<STX>14520001 0.7 0.8 1.1 10.5 86.2 0.0 0.0 0.0	
0.000 10.0BAR-CODE-ID1	<ETX><BCC> →
← <ACK>	
<STX>14520002 0.7 0.9 1.0 10.5 86.2 0.0 0.0 0.0	
0.000 10.0BAR-CODE-ID2	<ETX><BCC> →
← <ACK>	
<STX>14530003 0.6 0.8 1.1 10.5 86.3 0.0 0.0 0.0	
0.000 10.0BAR-CODE-ID3	<ETX><BCC> →
← <ACK>	
<EOT> →	

=== Communication example : decimal place of percent value is two ===

(Analyzer)	(Host)
<STX>14520001 0.73 0.83 1.08 10.48 86.17 0.00 0.00 0.00	
0.0000 10.03BAR-CODE-ID	<ETX><BCC> →
← <ACK>	
<EOT> →	

=== Communication example : percent value is transposed to spaces ===

(Analyzer)	(Host)
<STX>14520001110.7110.8111.1110.5186.2110.0110.0110.0	
110.001111110.0BAR-CODE-ID	<ETX><BCC> →
← <ACK>	
<EOT> →	

7.3. Flag level and communication

7.3.1. Flag level

Each flag can be set as level 0 flag or level 1 flag on the FLAG screen.。

Fig. 7-3 FLAG screen

Root SP

2014/12/10 16:01

P.01

01 <	300.00	1	15
AREA TOO LOW			
01 >	1800.00	1	14
AREA TOO HIGH			
01 <	400.00	0	13
AREA LOW			
01 >	1700.00	0	12
AREA HIGH			
07 =	0.00	1	11
TP TOO LOW			

Flag level 1

Flag level 0

EDIT MSG

EXIT

In modes **other than** the G11 standard communication mode, when the measurement result satisfies the criteria conditions in two lines or more, the **flag criteria to be transmitted to the host is only one criteria code set for the flag with the highest priority**. Flag level 1 is given priority over flag level 0 for transmission. If two or more criteria conditions of the same level flag are satisfied, the highest priority is given to the flag set the highest in the table on the FLAG screen.

In the setting of Screen 7-3, when the measurement result satisfies the 1st and 5th lines at the same time, the flag criteria is transmitted to the host as "01."

If you want to change the priority of the flag criteria to be transmitted, edit the criteria on the FLAG screen to change the arrangement order of the flags.

In the G11 standard communication mode, when the same sample satisfies the criteria conditions of two lines or more, the criteria code set for the flag will be transmitted in the order of priority of the flags to the host.

In the G11 standard communication mode, when the same sample satisfies the 1st and 5th lines at the same time in the setting of Screen 7-3, the flag criteria is transmitted to the host as "0107000000000000000000000000000000."

7.3.2. Flag level and #ERR TRANS FORM

If the measurement result satisfied the condition formula for the level 0 flag, the numeric value is transmitted to the host computer as the result value. But, if the measurement result satisfied the condition formula for the level 1 flag, spaces or zero value is transmitted as the result. It is defined by #ERR TRANS FORM on the FULL PARAMETER screen of the analyzer which, spaces or zero, is transmitted in this case.

Fig. 7-4 FULL PARAMETER screen (#ERR TRANS FORM)

#ERR TRANS FORM ZERO : When the result satisfied the condition formula for the level 1 flag, zero is transmitted as the result value (percent value)

#ERR TRANS FORM SPACE : When the result satisfied the condition formula for the level 1 flag, spaces are transmitted as the result value (percent value)

The number of digits used for each percent value is subject to the set value by PERCENT DECIMAL on the FULL PARAMETER screen. A communication example

Communication example, #ERR TRANS FORM set to "SPACE" (The part shown in gray: filled with spaces)

(Analyzer)	(Host)
<STX>HLC-723G11 020120140417132700010113270001	AA0.86110.951A0.9
3111.67110.48186.64AA0.00AA0.00AA0.00AA0.00AA0.00AA0.00A10.03AA0	
.00AA0.00A10.48AA0.00AA0.00AA0.00AAAA91AA	010000000000000000000000
000000000000000000000000 BAR-CODE-ID	<ETX>
<BCC> →	
← <ACK>	
<EOT> →	

Communication example, #ERR TRANS FORM set to "ZERO"

(Analyzer)	(Host)
<STX>HLC-723G11 020120140417132700010113270001	0.0 0.0 0.
0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
0.0 0.0 0.0 0.0 0.0 0.0 0 010000000000000000000000	
000000000000000000000000 BAR-CODE-ID	<ETX>
<BCC> →	
← <ACK>	
<EOT> →	