Host Manual

DxC 700 AU Laboratory Information System

For *In Vitro* Diagnostic Use

C01933AD
October 2019

Beckman Coulter, Inc.
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Host Manual
DxC 700 AU Laboratory Information System
PN C01933AD (October 2019)

Trademarks

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Rx Only
Original Instructions

Revision History

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released.

C01933AD, 10/2019

Software version 1.0

This document was created to:

- Add an explanatory note referencing the IP address row and mentioning setting the Host Communication destination system maintenance parameter to the Basic Communication Specification table in the Physical Level/Network Level section in Chapter 2.
- Add a new Security row with Windows Firewall information and an explanatory note for Windows 10 PCs to the Basic Communication Specification table in the Physical Level/Network Level section in Chapter 2.

C01933AC, 03/2019

Software version 1.0

This document was created to:

- Add an HbA1c measurement for whole blood samples sub-step in the Lower Layer Communication Protocol section in Chapter 1.
- Update all impacted Details of the alarm tables with **ΔW Whole blood First run sample** and **HW Whole blood Rerun sample** entries in Chapter 1, Appendix E: Alarm List related to Online Communication.
- Add **"W": Whole blood** entry in the Test order information message/Test order information message of auto rerun table in the Message Common Fields > Sample information section in Chapter 2.
- Add HbA1c and Whole blood information in the Message Common Fields > Test order information section in Chapter 2.
- Update all impacted Details of the alarm tables with **ΔW Whole blood First run sample** and **HW Whole blood Rerun sample** entries in Chapter 2, Appendix D: Alarm List.

C01933AB, 06/2018

Software version 1.0

This document was created to:

- Add a note in Chapter 1 to refer to P64 Appendix F: Comparison of AU680 and DxC 700 AU.
- Update the Transmission code table in the Basic Specification section.
- Update the Message configuration table in the Basic Specification section.
- Update Figure 1.42, Figure 1.48, and Figure 1.55.

- Update the Cup Position item in the Remarks column in the Communication Message Format section.
- Update the Type item in the Remarks column and add Whole blood in the Contents column in the Communication Message Format section.
- Update the AU680 column to Not available and the DxC 700 AU column to Available for No. 2 in Appendix F: Comparison of AU680 and DxC 700 AU.

Initial Issue, C01933AA, November 2016

Software version 1.0

Contents

CHAPTER 1

Program Online Parameters with RS232C Connection

Outline

1. This system can carry out the following in real-time mode (while the DxC 700 AU is in *MEASURE* mode):
   a. Receives sample information from the Laboratory Information System (LIS).
   b. Transmits analysis result data to the LIS.
2. This system can perform the following tasks in batch mode (on the screen of the DxC 700 AU):
   a. Receives sample information from the LIS (on the screen).
   b. Transmits saved analysis result data to the LIS (on the screen).
3. The system can select the following format and protocol on the screen of the DxC 700 AU:
   a. Upper and lower layer communication protocols.
   b. Sample information response message format.
   c. Data message format.
4. DxC 700 AU is compatible with an AU680 interface if the Rerun Date/Time and ISE Info. boxes are disabled in CONFIG. > Online > Format Configuration.

Note

For more information, refer to Appendix F: Comparison of AU680 and DxC 700 AU.

Basic Specification

1. Format of transmission

Item	Contents	
Line Type	RS-232C	
Synchronization Method	Asynchronous method	
Data Transfer Mode	Half-duplex	
Bit/Sec	4800 bps, 9600 bps	
Character Format	— Start Bit — Character Length — Parity Check — Stop Bit — Total	— 1 bit — 7 or 8 bits — None, odd, or even — 1 or 2 bits — 9 to 12 bits

Item	Contents
	You can select the above conditions on the **Online** screen.
Confirmation Method	Class A: Message transmission is conducted from the sender to the receiver at regular intervals.
	Class B: Message transmission is conducted by confirming with ACK (acknowledged) or NAK (not acknowledged) between the sender and the receiver.
Channel	1 channel (COM 1)
Retry	Class A: Nothing
	Class B: Retry times from 0 to 3 (you can select it on the **Online** screen)

2. Transmission code

Item	Contents		Value Range
Data Code	7 bit code		20H-7EH
	8 bit code		
		1-byte code (JIS code)	20H-7EH A1H-DFH
		2-byte code (Shift-JIS code)	(1st byte) 81H-9FH E1H-EAH
			(2nd byte) 40H-FCH (except 7FH)
Control Code	Message start/end code		01H-1FH
	ACK		06H
	NAK		15H
	BCC		00H-FFH

3. Message format

a. Message configuration

1)	2)	3)	4)	5)	6)

Name	No. of bytes	Contents		Remarks
		Value Range	Meaning	
1) Message start code	1 or 2	01H-1FH	Start of message	Default 1 byte 02H
2) Message identification code	2	R□	Sample information request-related message identifier	DxC 700 AU -> LIS

Name	No. of bytes	Contents		Remarks
		Value Range	**Meaning**	
		RB	Sample information request start	
		RΔ	First run sample (Routine/ Emergency/STAT) request	
		RH	Rerun sample (Routine/Emergency/ STAT) request	
		Rh	Automatic Rerun sample (Routine/ Emergency/STAT) request	
		RE	Sample information request end	
		S□	Sample information response-related message identifier	LIS -> DxC 700 AU
		SΔ	First run sample (Routine/ Emergency/STAT) information response	
		SH	Rerun sample (Routine/Emergency/ STAT) information response	
		Sh	Rerun sample (Routine/Emergency/ STAT) information response	
		SE	Sample information response stop	
		D□	Analysis data-related message identifier	DxC 700 AU -> LIS
		DB	Analysis data transmission start	
		DΔ	First Run sample (Routine/ Emergency/STAT) data	
		DH	Rerun sample (Routine/Emergency/ STAT) data	
		DR	Reagent blank sample data	
		DA	Calibration sample data	
		dΔ	Quick output data	
		dH	Rerun Emergency quick output data	
		DQ	Control sample data	
		DE	Analysis data transmission end	
3) System No.	0,2	00 to 99	No. to identify the message source system at the LIS	

Name	No. of bytes	Contents		Remarks
		Value Range	Meaning	
4) Message code	By message		Contents of message For variable length messages, message identification No. is added between the fixed (header) area and the variable area.	
5) Message end code	1 or 2	01H-1FH	End of messages	Default 1 byte 03H
6) BCC (Block Check Character)	0,1	00H-FFH	The sum with the exclusive OR logic, from 2} to 5}	

Note: Δ indicates a space

b. Blocking

a. Definitions of terms

Term	Definition
Message length	It shows total bytes from 1) to 6).
	4) (Message code) shows the number of bytes calculated.
Max message length	It shows the max length of a message in one phase.
	You can select the length of block (256, 512 or 1024) on the **Online** screen.
Fixed length message	It shows a message constantly transferred at a fixed length.
Variable length message	It shows a message whose length changes depending on the amount of data transferred. It includes the fixed area where the same information is always edited and the variable area where edited information changes by message. For the position to divide the variable area, refer to Communication Message Format.

<table>
<tr><th>Term</th><th colspan="3">Definition</th></tr>
<tr><td>Fixed length message</td><td>Sample information request start

Sample information request

Rerun sample request

Automatic Rerun sample request

Sample information response stop

Sample information request stop

Analysis data transmission start

Analysis data transmission end</td><td colspan="2">No blocking occurs.</td></tr>
<tr><td rowspan="2">Variable length message</td><td rowspan="2">First run sample information response

Rerun sample information response

Automatic Rerun sample information response

First run sample data message

Rerun sample data message

Control sample data message

Calibration sample data message

Reagent blank sample data message</td><td>Blocking Use Yes/No</td><td>Max message length < Message length</td></tr>
<tr><td>Block Identification No. (0-9, E)

Refer to Note 2.</td><td>First block --->

Block Identification No. = 0

Second block --->

Block Identification No. = 1

.

.

.

Last block --->

Block Identification No. = E</td></tr>
</table>

Term	Definition		
	Emergency quick output data	Message End Code	Message End Code = ETX (03H) — ETB (17H) Use = Yes. Refer to Note 1. — Block End Code = ETB — Message End Code = ETX
			Message End Code does not equal to ETX (03H) — ETB (17h) Use = No. Refer to Note 1. — Block End Code = Set value — Message End Code = Set value
			Whether to use ETB can be selected on the **Online** screen

Note 1:

— When Block Identification No. is set to 0, 1, ..., only Block End Code is added.
— When Block Identification No. is set to "E," only Message End Code is added.

Note 2:

— When Block Identification No. is set to 10 or higher, numbers starting from 0 again are set; 0, 1, ... 0, 1, ... , E.
— For the last block, Block Identification No. is set to E.

Communication Message Format

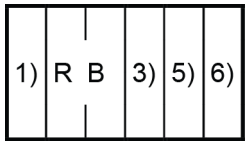
1. Common and changeable tests

   You can select the following on the **Online** screen of the DxC 700 AU:

   — Message start code 1)
   — System No. 3)
   — Message end code 5)
   — BCC 6)
2. Sample information request-related message identifier

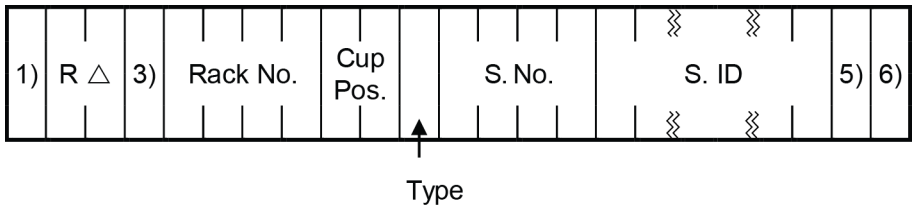
a. Sample information request start

Figure 1.1



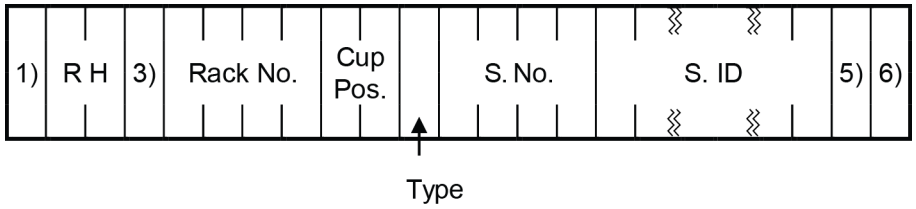
b. First run sample (Routine/Emergency/STAT) request

Figure 1.2



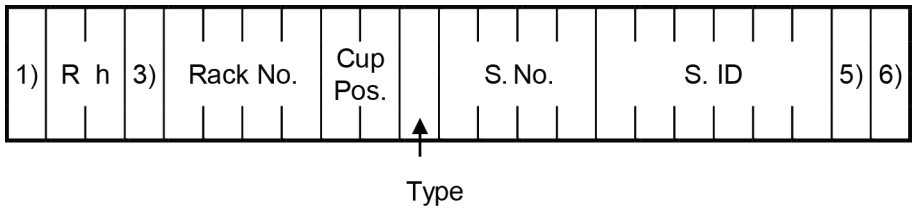
c. Rerun sample (Routine/Emergency/STAT) request

Figure 1.3



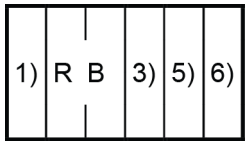
d. Automatic Rerun sample (Routine/Emergency/STAT) request

Figure 1.4



e. Sample information request end

Figure 1.5

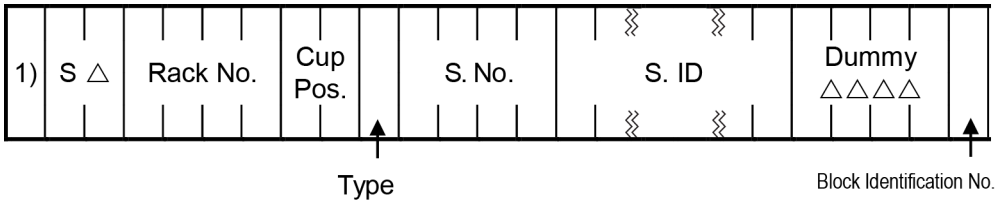


3. Sample information response

a. First run sample (Routine/Emergency/STAT) information response message

a. Format of fixed area

Figure 1.6



b. Format of variable area (‖ indicates blocking.)

Figure 1.7

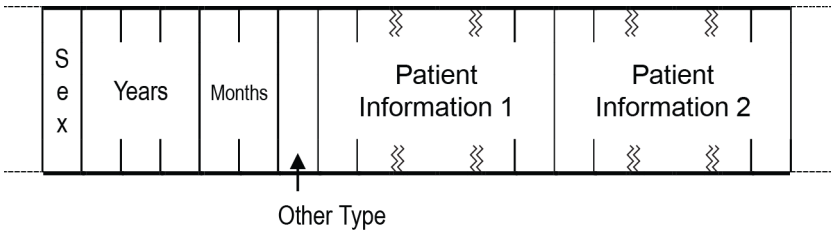


Figure 1.8

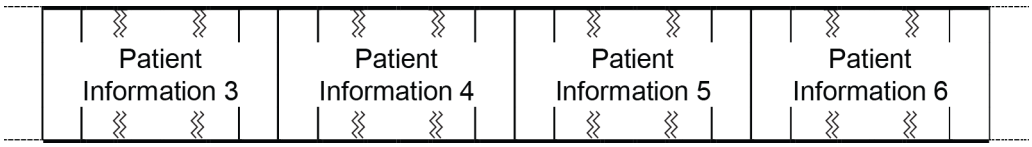
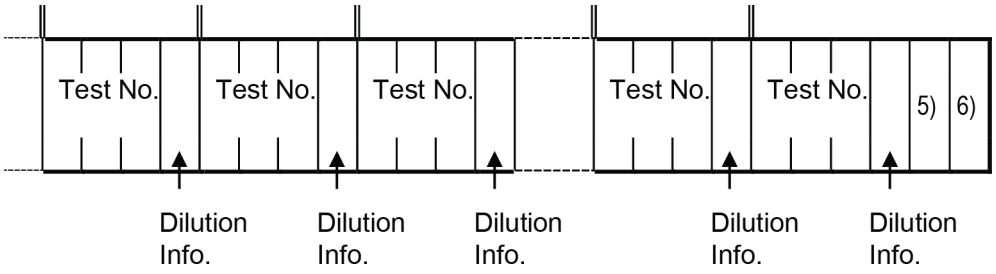


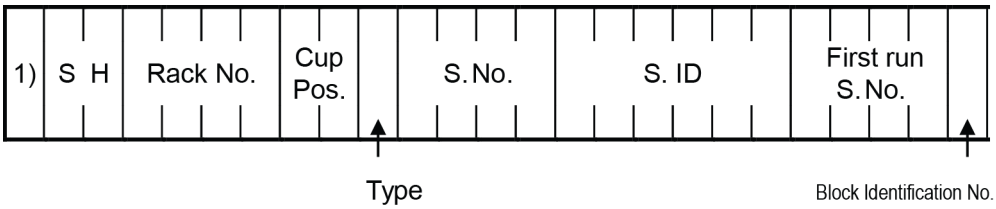
Figure 1.9



b. Rerun sample (Routine/Emergency/STAT) information response message

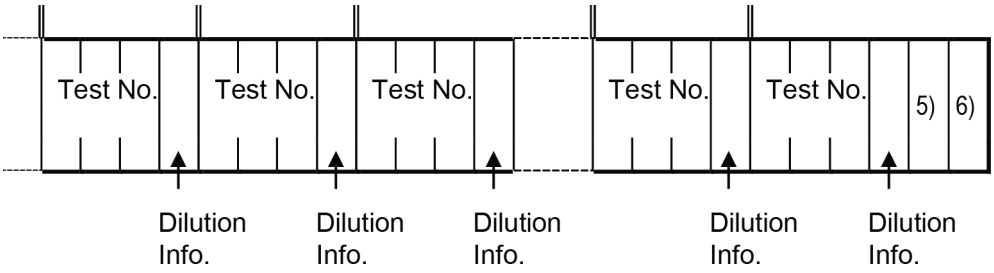
a. Format of fixed area

Figure 1.10



b. Format of variable area (‖ indicates blocking.)

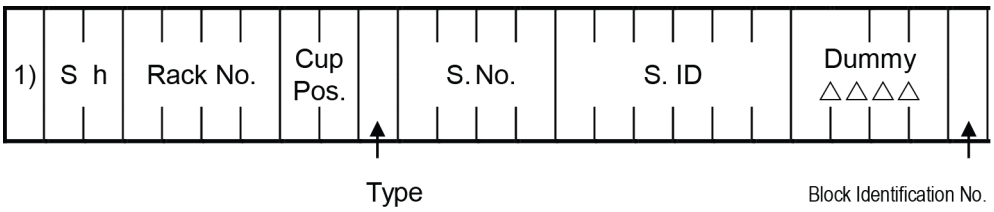
Figure 1.11



c. Rerun sample (Routine/Emergency/STAT) information response message

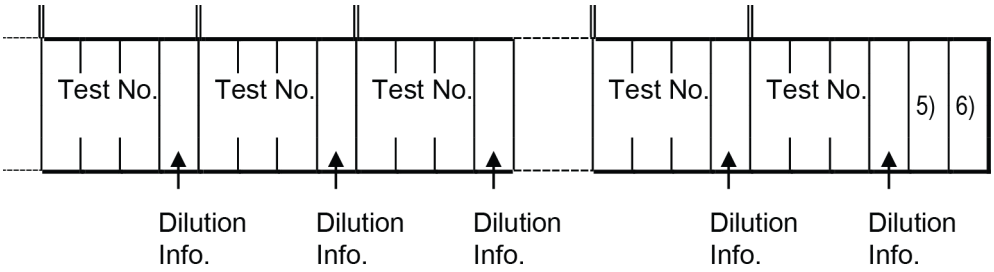
a. Format of fixed area

Figure 1.12



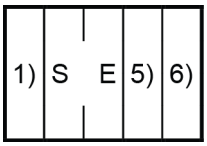
b. Format of variable area (‖ indicates blocking.)

Figure 1.13



d. Sample information response stop

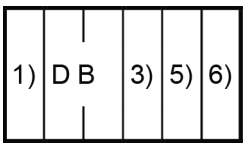
Figure 1.14



4. Analysis data-related message

   a. Analysis data transmission start

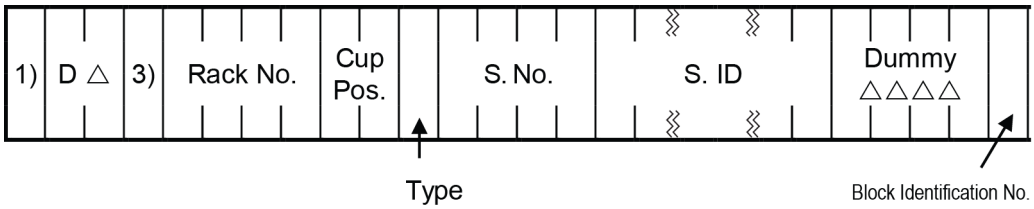
Figure 1.15



   b. First run sample data message - 1 (Routine/Emergency/STAT)

      a. Format of fixed area

Figure 1.16



      b. Format of variable area (‖ indicates blocking.)

Figure 1.17

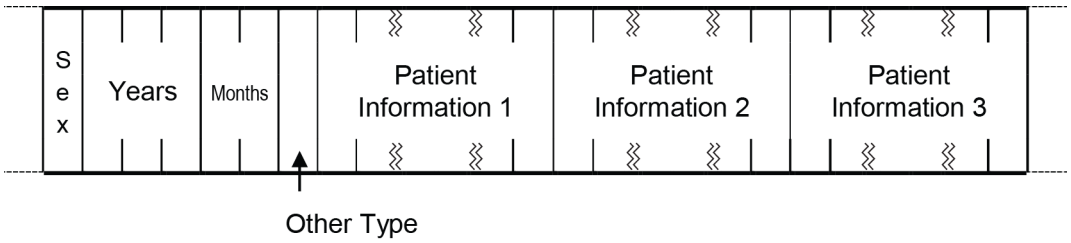


Figure 1.18

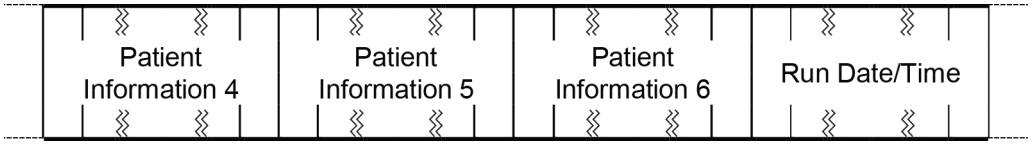


Figure 1.19

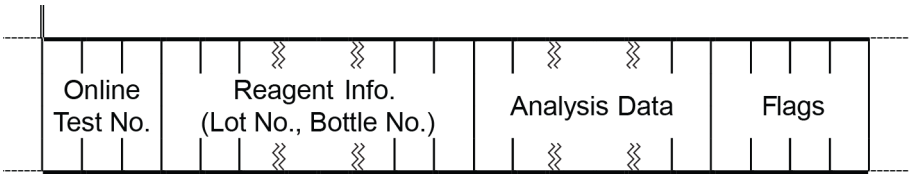


Figure 1.20

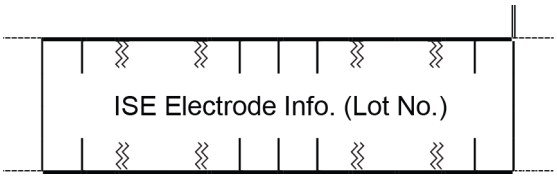


Figure 1.21

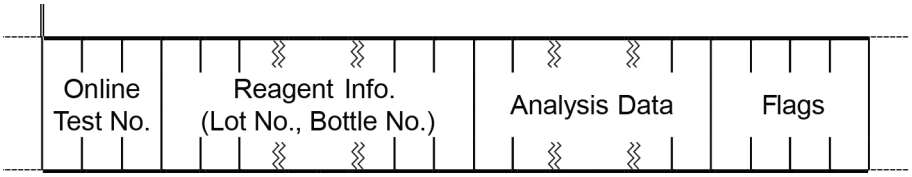
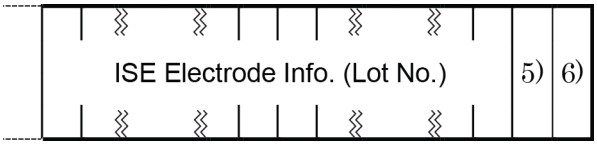


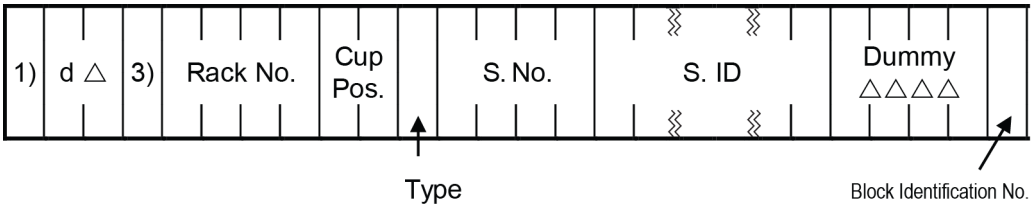
Figure 1.22



c. Quick data message - 2 (Emergency/STAT Quick)

a. Format of fixed area

Figure 1.23



b. Format of variable area (‖ indicates blocking.)

Figure 1.24

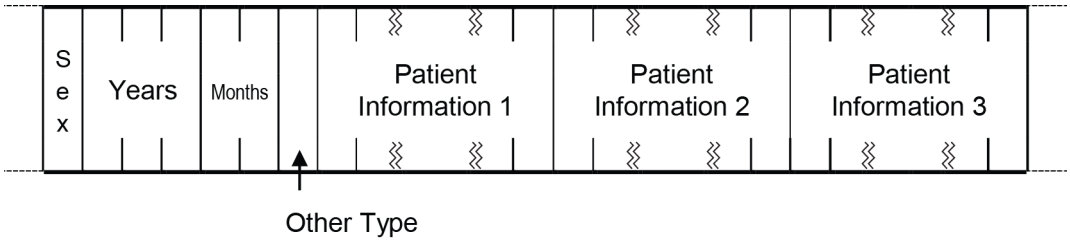


Figure 1.25

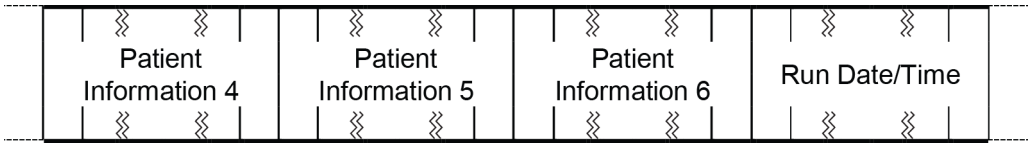


Figure 1.26

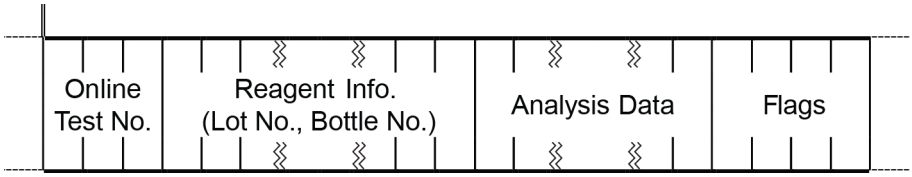


Figure 1.27

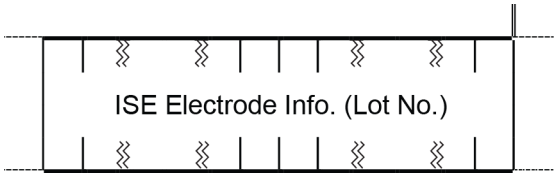


Figure 1.28

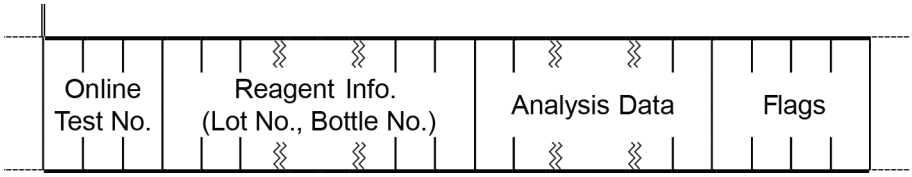
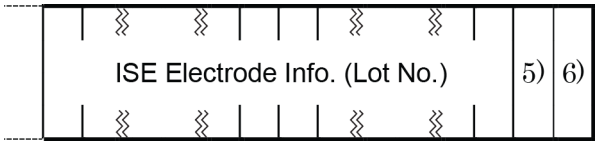


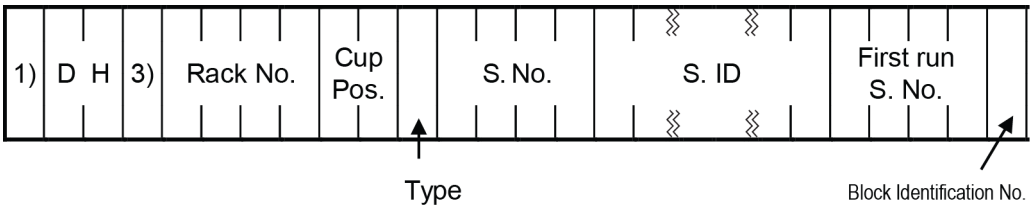
Figure 1.29



d. Rerun sample data message - 1 (Routine/Emergency/STAT)

a. Format of fixed area

Figure 1.30



b. Format of variable area (‖ indicates blocking.)

Figure 1.31

Figure 1.32

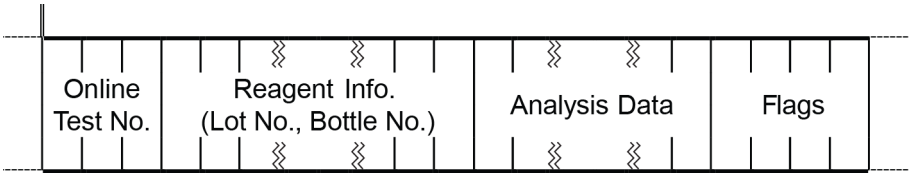


Figure 1.33

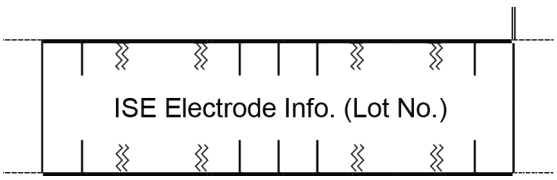


Figure 1.34

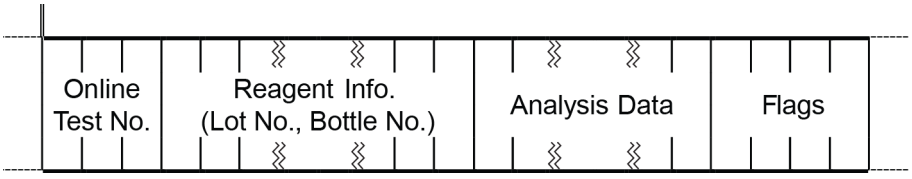
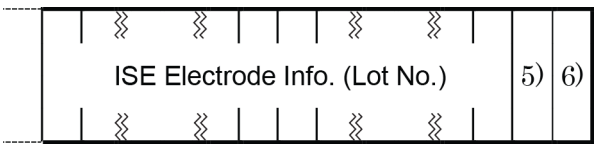


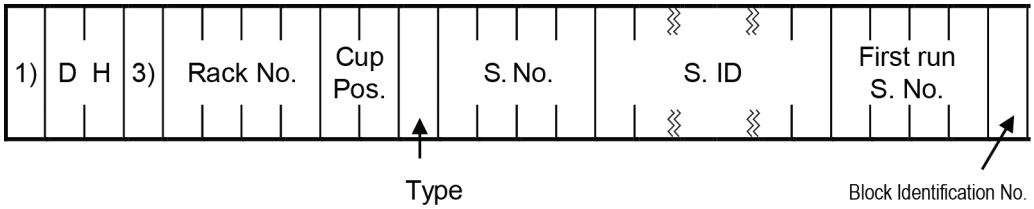
Figure 1.35



e. Rerun sample data message - 2 (Emergency/STAT Quick)

a. Format of fixed area

Figure 1.36



b. Format of variable area (‖ indicates blocking.)

Figure 1.37

Figure 1.38

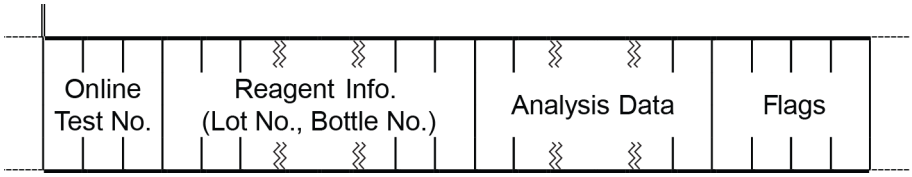


Figure 1.39

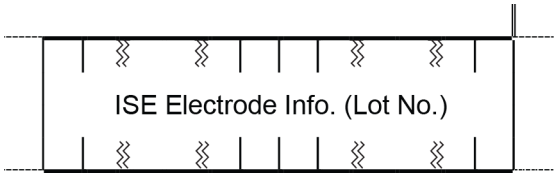


Figure 1.40

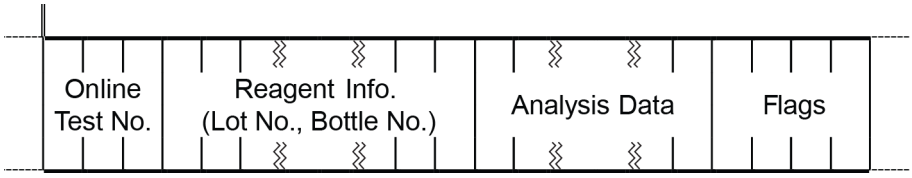
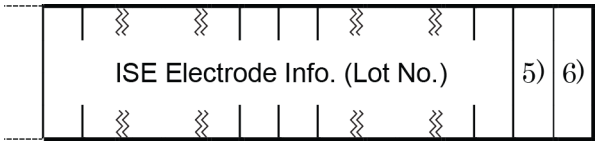


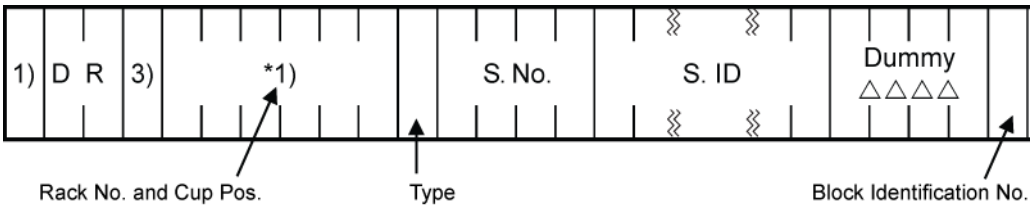
Figure 1.41



f. Reagent blank sample data message

a. Format of fixed area

Figure 1.42



* 1) The effectiveness of this area and its size depend on the setting of Rack No. Make the size by adding the cup position digits (2) to the rack No. digits. For example: When the rack No. is 4 digits, the size of this area is 6 digits.

b. Format of variable area (‖ indicates blocking.)

Figure 1.43

Figure 1.44

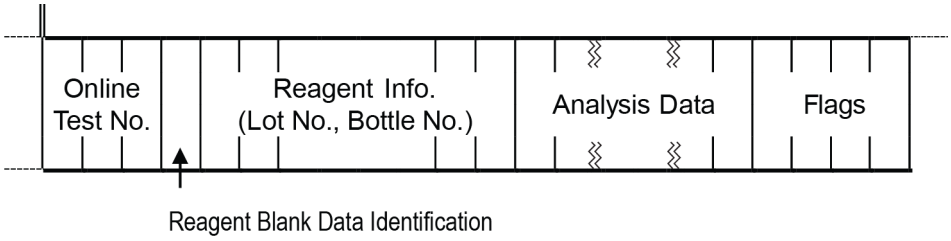


Figure 1.45

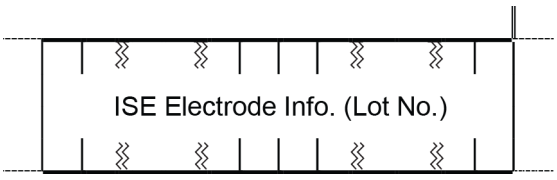


Figure 1.46

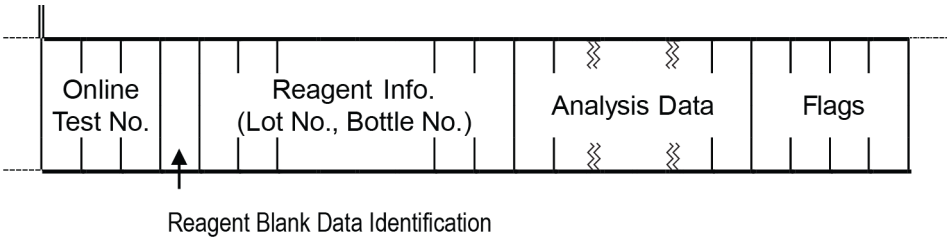
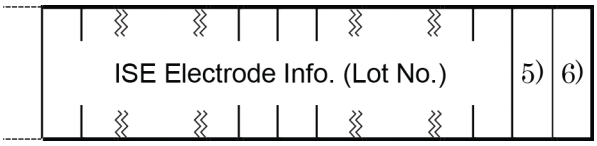


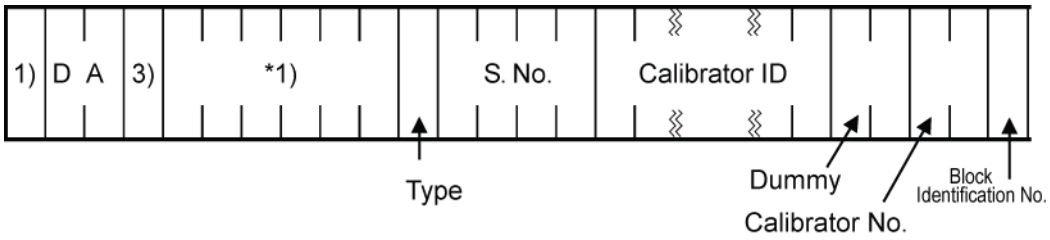
Figure 1.47



g. Calibration sample data message

a. Format of fixed area (when Calibrator No. is 2 digits)

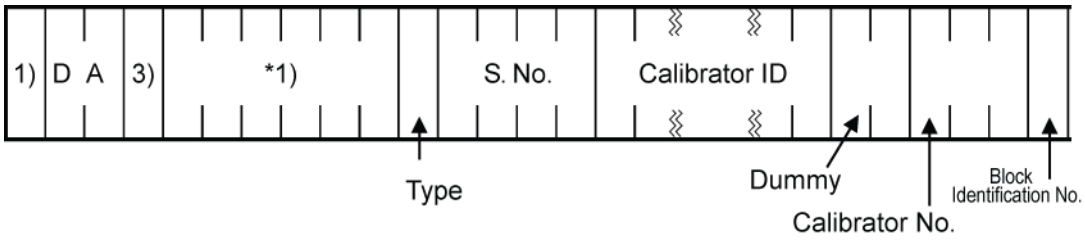
Figure 1.48



*1) The effectiveness of this area and its size depend on the setting of Rack No. Make the size by adding the cup position digits (2) to the rack No. digits. For example: When the rack No. is 4 digits, the size of this area is 6 digits.

Format of fixed area (when Calibrator No. is 3 digits)

Figure 1.49



*1) The effectiveness of this area and its size depend on the setting of Rack No. Make the size by adding the cup position digits (2) to the rack No. digits. For example: When the rack No. is 4 digits, the size of this area is 6 digits.

b. Format of variable area (‖ indicates blocking.)

Figure 1.50

Figure 1.51

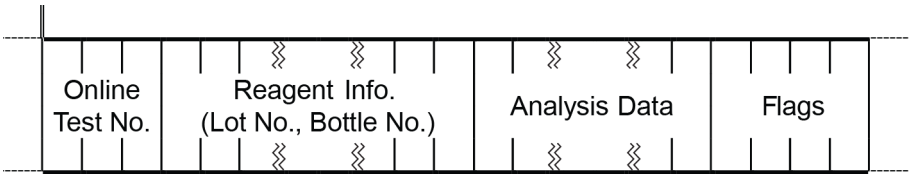


Figure 1.52

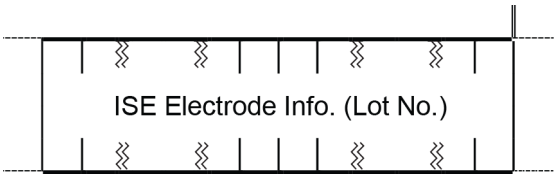


Figure 1.53

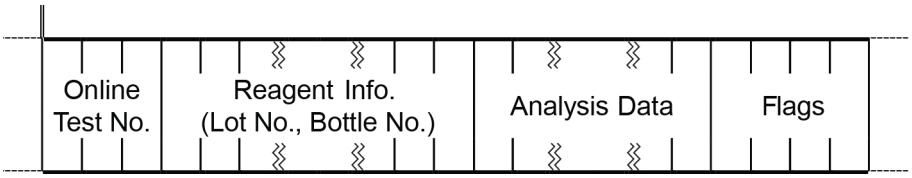
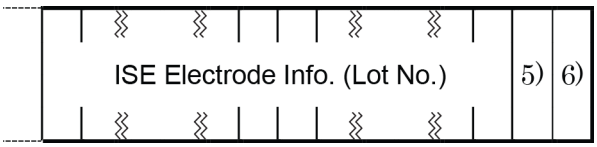


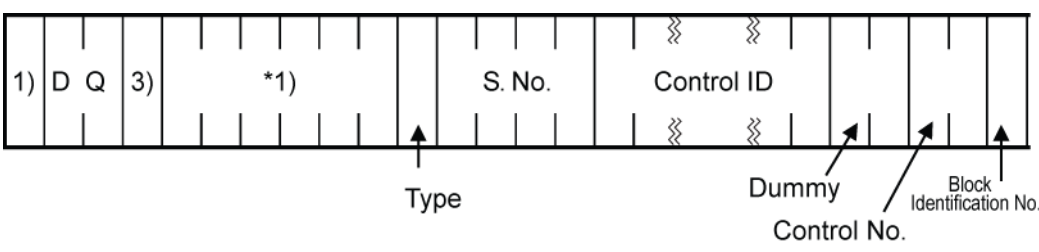
Figure 1.54



h. Control sample data message

a. Format of fixed area (when Control No. is 2 digits)

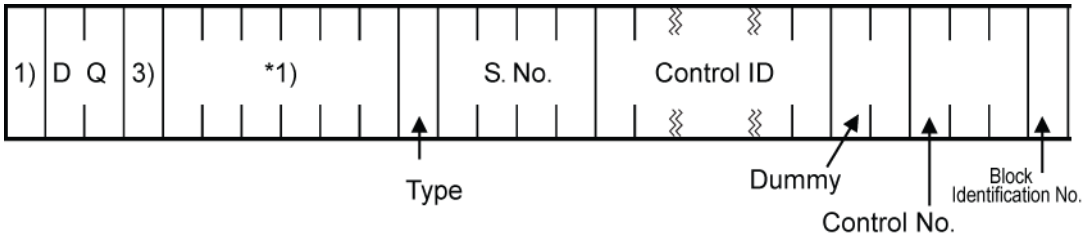
Figure 1.55



*1) The effectiveness of this area and its size depend on the setting of Rack No. Make the size by adding the cup position digits (2) to the rack No. digits. For example: When the rack No. is 4 digits, the size of this area is 6 digits.

Format of fixed area (when Control No. is 3 digits)

Figure 1.56



*1) The effectiveness of this area and its size depend on the setting of Rack No. Make the size by adding the cup position digits (2) to the rack No. digits. For example: When the rack No. is 4 digits, the size of this area is 6 digits.

b. Format of variable area (‖ indicates blocking.)

Figure 1.57

Figure 1.58

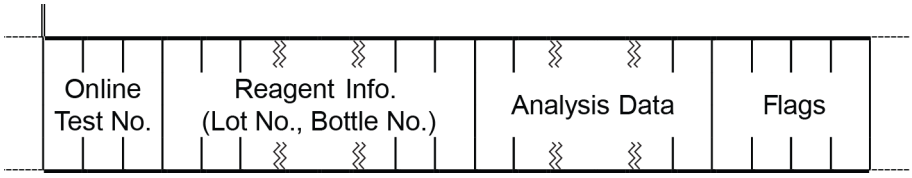


Figure 1.59

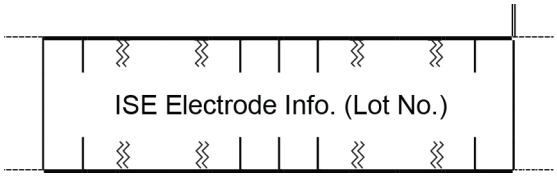


Figure 1.60

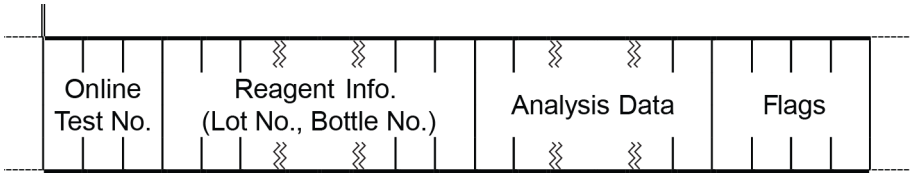
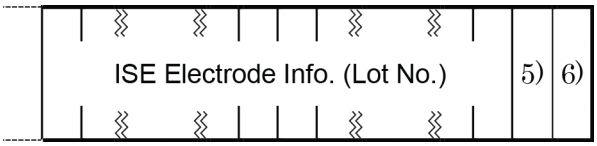
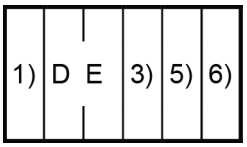


Figure 1.61



i. Analysis data transmission end

Figure 1.62



5. Relation between real-time/batch mode and messages to be exchanged

   — In real-time/batch settings, when realtime is selected, batch communications can be conducted.
   — When batch is selected, real-time communications cannot be conducted.
   — Batch transmission can be started while real-time transmission is performed.
   — Batch order cannot be started while real-time order is performed.

6. Others

   a. Contents and formats in message

Item	Digits	Contents	Remarks
Rack No.	4/5	Rack No. — 4 digits: '0001' to '9999' — 5 digits: '00001' to '99999'	Whether to use this area and the number of digits can be selected on the **Online** screen. — For RB samples and so forth. Where the rack No. has not been set, all digits become 0. — In case of STAT samples, all digits become Δ [20H]. — For all sample types of DxC 700 AU-DTS (the external feed line sampling directly), all digits become Δ [20H]. — For sample information request through batch online, all digits become Δ [20H] in each sample type. — For sample information response, copy the value set in sample information request message corresponding to the sample. — Selected digits > read digits: — Zero suppression is used. — Selected digits < read digits: — All following digits are dropped.
Cup Position	2	Rack: '01' to '10'	Whether to use this area depends on the selection of the rack No. on the **Online** screen. When RB, ACAL or Control sample is selected, all digits are blank.

Item	Digits	Contents	Remarks
Type	1	Space: Serum 'U': Urine 'X': Other 1 'Y': Other 2 'W': Whole blood 'N': Not specified	When DxC 700 AU transmits the sample type by selecting **Not specified: 'N'**, the LIS needs to specify the sample type other than **Not specified: "N"**. When DxC 700 AU specifies sample types, transmission is performed by selecting other than **Not specified: 'N'**. Response is performed by selecting same Type as the Type selected by DxC 700 AU on the LIS.
Sample No.	4	'0001' -'9999':Routine sample 'E001'-'E999': Emergency sample 'P001'-'P999': STAT sample 'R001'-'R999': Reagent blank sample 'A001'-'A999': Calibration 'Q001'-'Q999': Control sample	
Sample ID Calibrator ID Control ID	4-26	Numbers and characters	Number of digits can be changed on the **Sample Program Format** screen. Refer to Note 1. — Selected digits > read digits: The digits are right aligned and spaces are added to the remaining area. — Selected digits < read digits: All following digits are dropped.

Item	Digits	Contents	Remarks
First Run Sample No.	4	'0001'-'9999': Routine sample 'E001'-'E999': Emergency sample 'P001'-'P999': STAT sample	
Dummy	4	Space	
Block Identification No.	1	'0'-'9': 'E' is set for the last message.	For messages other than the last block message in the variable length message, digits are set, starting from 0 to 9. For the last block message, E is set. When blocking does not occur in the variable length message, E is set.
Sex	1	'M': Male 'F': Female Space: None sex '0': Not specified	— Whether to add it can be selected on the **Sample Program Format** screen. — In Automatic Rerun sample (Routine/Emergency/STAT) request message, this field does not exist.
Years	3	'000'-'150' Space: Not specified. Refer to Note 2.	
Months	2	'00'-'11' Space: Not specified. Refer to Note 2.	
Other Type	1	'0': Type1 '1': Type2 '2': Type3 '3': Type4 '4': Type5 '5': Type6 Space: Not specified	

Item	Digits	Contents	Remarks
Patient Information	Up to 20	Number or character string	Selected digits > read digits: The digits are right aligned and spaces are added to the remaining area. Selected digits < read digits: All following digits are dropped.
Run Date/Time	14	YYYYMMDDHHMMSS — YYYY : Year — MM : Month — DD : Day — HH : Hour — MM : Minute — SS : Second	Whether to use it can be selected on the **Online** screen. When Month, Day, Hour, Minute or Second is 1 digit, it is padded on the left with zero .
Online Test No.	2/3	2 digits: '01' to '99' 3 digits: '001' to '120'	The number of digits can be selected on the **Online** screen.
Dilution Info.	1	'0': Normal '1': Diluted '2': Concentrated	Whether to use it can be selected on the **Online** screen.

Item	Digits	Contents	Remarks
Reagent Lot No.	4x4	Reagent lot No. used (Δ is set to all unused reagent lot Nos.) For ISE: REF/BUF/MID reagent lot No. is used.	Whether to use it can be selected on the **Online** screen. Refer to Note 4. Selected digits > read digits: The digits are right aligned. Do not add spaces to the remaining area. Selected digits < read digits: Spaces for **4-Set** are added to the leading area, the lot No. is set starting from the leading area and all following excess is cut off. **Note** Set "R1-2 Use" as Selected in case "ISE Info." is Selected and "Reagent Info." is Selected in Online menu because ISE reagent Lot No. uses 32 digits.
Reagent Bottle No.	4x4	Reagent bottle No. used (Δ is set to all unused reagent bottle Nos.) For ISE: REF/BUF/MID reagent lot No. is used.	Whether to use it can be selected on the **Online** screen. Refer to Note 4. **Note** Set "R1-2 Use" as Selected in case "ISE Info." is Selected and "Reagent Info." is Selected in Online menu because ISE reagent Lot No. uses 32 digits.
Analysis Result	6/9	Analysis data: 6 digits / 9 digits. Refer to Note 4.	The following can be selected on the **Online** screen: — Whether to use zero suppression — Number of digits, 6 or 9

Item	Digits	Contents	Remarks
Flags	2/8	For set values, refer to Appendix A: List of Flags. The number of digits of the flag to be transferred varies depending on the max output value (2 or 4). For more information, refer to Flags.	The max output value can be selected on the **Online** screen.
ISE Electrode Lot No.	5x4	ISE Electrode Lot No. used	Whether to use it can be selected on the **Online** screen. Refer to Note 5.
Reagent Blank Data Identification	1	'1': 1st reagent blank sample data '2': 2nd reagent blank sample data	
Calibrator No.	2/3	'001' to '200'/'01' to 'K0'	The number of digits can be selected on the **Online** screen.
Control No.	2/3	'001' to '100'/'01' to 'A0'	The number of digits can be selected on the **Online** screen.

Note 1: For the ID shorter than the selected digits, spaces are added to the remaining area.

Note 2: When the space is set to Years and any value is set to Months when transmitting information from the LIS, the DxC 700 AU treats such status as an error. The criteria is listed below:

Table 1.7 LIS -> DxC 700 AU

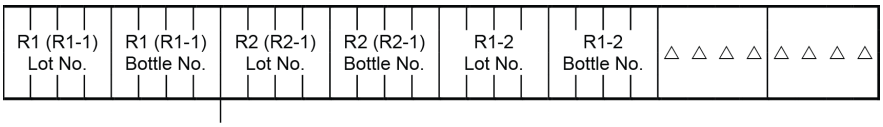
Pattern	Years	Months	Diagnosis
1	Space	Space	OK
2	***	Space	OK
3	Space	**	Error
4	***	**	OK

Note 3: When the parameters are changed in System Maintenance, the DxC 700 AU transfers analysis data as a space in the case concentration conversion causes an error or other than the analytical measuring range.

Note 4: The fields of the reagent lot Nos. and reagent bottle Nos. are as follows:

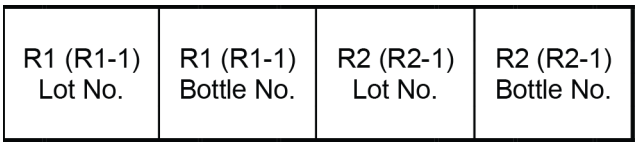
— R1-2 information is used:

Figure 1.63



— R1-2 information is not used:

Figure 1.64



— ISE analysis data and ISE Info. are used:

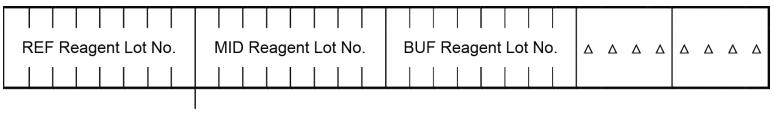
Note

Set "R1-2 Use" as Selected in case "ISE Info." is Selected and "Reagent Info." is Selected in Online menu because ISE reagent Lot No. uses 32 digits.

When ISE reagent lot No. is less than 8 digits, spaces are added to the remaining area.

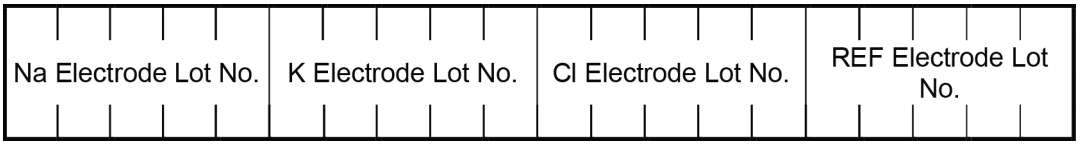
For example: REF Reagent Lot No. is A12345 ΔΔ , MID Reagent Lot No. is B12345 ΔΔ, BUF Reagent Lot No. is C12345 ΔΔ , A12345 ΔΔ, B12345 ΔΔ, and C12345 ΔΔΔΔΔΔΔΔΔΔ.

Figure 1.65



Note 5: The fields of the ISE Electrode Lot Nos. are as follows:

Figure 1.66



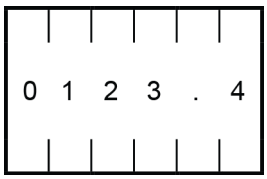
b. Data format

Δ indicates a space (20H)

1. Analysis data

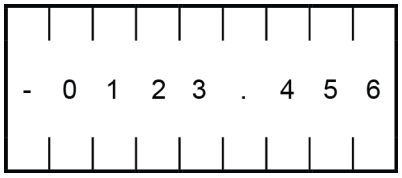
— The number of digits for transfer is 6 and zero suppression is not used:

Figure 1.67



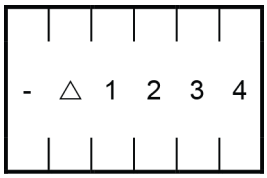
— The number of digits for transfer is 9 and zero suppression is not used:

Figure 1.68



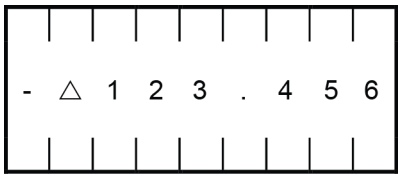
— The number of digits for transfer is 6 and zero suppression is used:

Figure 1.69



— The number of digits for transfer is 9 and zero suppression is used:

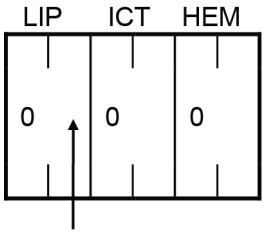
Figure 1.70



2. LIH analysis data

— The number of digits for transfer is 6 and zero suppression is not used:

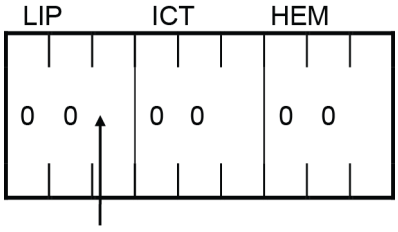
Figure 1.71



0: NORMAL
1: +
2: ++
3: +++
4: ++++
5: +++++
6: ABN
7: ABN H
8: ABN L
9: Not yet measured

— The number of digits for transfer is 9 and zero suppression is not used:

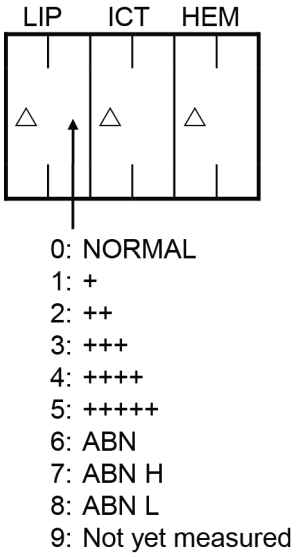
Figure 1.72



0: NORMAL
1: +
2: ++
3: +++
4: ++++
5: +++++
6: ABN
7: ABN H
8: ABN L
9: Not yet measured

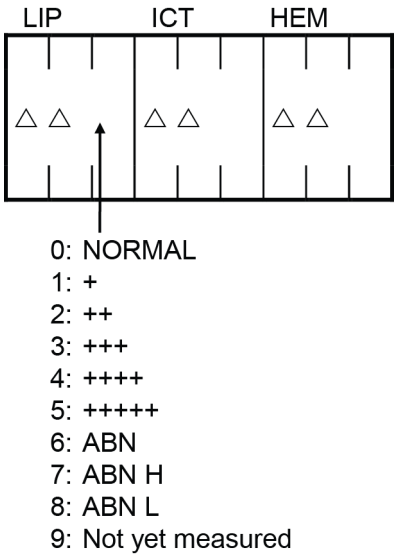
— The number of digits for transfer is 6 and zero suppression is used:

Figure 1.73



— The number of digits for transfer is 9 and zero suppression is used:

Figure 1.74

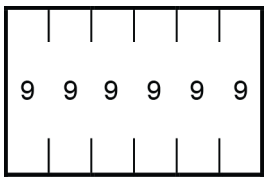


3. Analysis data exceeding the number of digits in the format

   — When the number of digits for transfer is 6 or 9 and analysis data exceeds the number, it is transferred in the following formats:

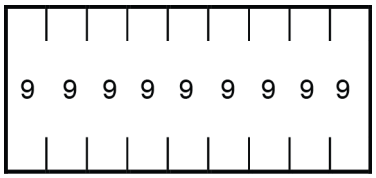
      — The number of digits for transfer is 6:

Figure 1.75



— The number of digits for transfer is 9:

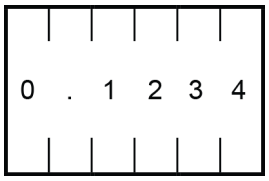
Figure 1.76



4. Analysis data equal to the OD-value are transferred in the following formats:

— The number of digits for transfer is 6:

Figure 1.77

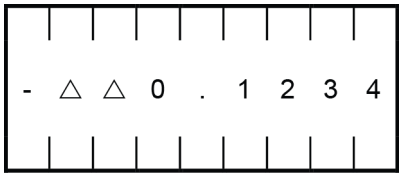


Note

When OD-value is negative, analysis data exceeding the number of digits are shown.

— The number of digits for transfer is 9:

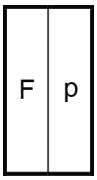
Figure 1.78



c. Flags

a. Two types of flags are transferred:

Figure 1.79

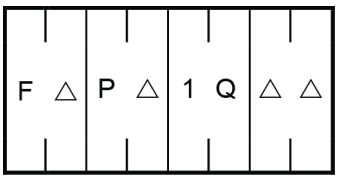


The flag is usually in two digits, however, when the number of digits for transfer is 2, only the first 1 digit is used.

For example: Flag: F_, ph and Transfer: Fp.

b. Four types of flags are transferred:

Figure 1.80



Up to four 2-digit flags are transferred.

d. Sample information for calculated tests

— When Test Order Information in the sample information response message transmitted from the LIS contains the calculated test No., DxC 700 AU ignores tests selected for calculated tests, and the flag is calculated and transferred according to the calculated test conditions specified by the DxC 700 AU. (Relevant screen: CONFIG. - Test Volume and Methods - Calculated Tests)

— When all analysis data for calculated tests selected on the calculated test screen are prepared for the sample, the calculated tests are calculated and transferred. When any one of the calculated tests has not been measured, or when they have been measured but data calculation is disabled (such as "?"), do not transfer the calculated tests.

e. Sample information for LIH tests

LIH reagent test name	LIH Selection	
LIH (dedicated reagent)	Select All	The LIH test is performed on all samples whether or not the LIH test is included in the test order from the LIS.
	Selectable	The LIH test is performed only if the LIH test is included in the test order from the LIS.
Other than LIH (non-dedicated reagent)	Select All	The LIH test is performed on all samples whether or not the LIH test is included in the test order from the LIS.
	Selectable	The LIH test is performed only if the LIH test is included in the test order from the LIS.

Note

These can be selected on the following screens:

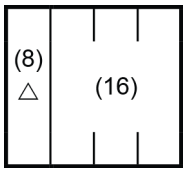
— LIH Reagent: CONFIG. - Common Test Parameters - Test Name Parameters
— LIH Selection: CONFIG. - Common Test Parameters - Group of Tests

f. Calibrator No. format

a. The number of digits of calibrator No./control No. is "3":

The calibrator No. (16) edits '001' to '200' and transmits those values.

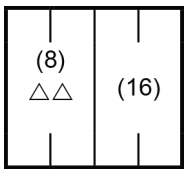
Figure 1.81



b. The number of digits of calibrator No./control No. is "2":

The calibrator No. (16) converts 001 to 200 into two-digit numbers as shown in the chart of (8), and transmits those values.

Figure 1.82

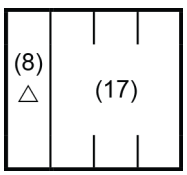


g. Control No. format

a. The number of digits of calibrator No./control No. is "3":

The control No. (17) edits '001' to '100' and transmits those values.

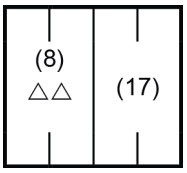
Figure 1.83



b. The number of digits of calibrator No./control No. is "2":

The control No. (17) converts 001 to 100 into two-digit numbers as shown in the chart of (8), and transmits those values.

Figure 1.84



h. 2-digit conversion chart for calibrator No./control No.

Calibrator No./Control No.	2-digit Number
1 to 99	'01' to '99'
100 to 109	'A0' to 'A9'
110 to 119	'B0' to 'B9'
120 to 129	'C0' to 'C9'
130 to 139	'D0' to 'D9'
140 to 149	'E0' to 'E9'
150 to 159	'F0' to 'F9'
160 to 169	'G0' to 'G9'
170 to 179	'H0' to 'H9'
180 to 189	'I0' to 'I9'
190 to 199	'J0' to 'J9'
200	'K0'

i. HbA1c measurement for whole blood samples

a. Test selection for sample information response

When A1c is selected as a test in the sample information response, only HbA1c is set as a test and transmitted in the message. The test number for T-Hb and A1c does not need to be set.

b. Data message output

For Routine/Emergency/STAT/QC samples, only the HbA1c measure result is transferred but no T-Hb and A1c results are transferred.

For HbA1c measure result transfer, pretreatment reagent information is set in the reagent lot No. and the reagent bottle No. fields. For RB and ACAL samples, only the T-Hb and A1c measure results are transferred but no HbA1c result are transferred. Since the HbA1c measure result does not exist for RB and ACAL samples, it cannot be transferred.

Lower Layer Communication Protocol

1. Message protocol (at DxC 700 AU)

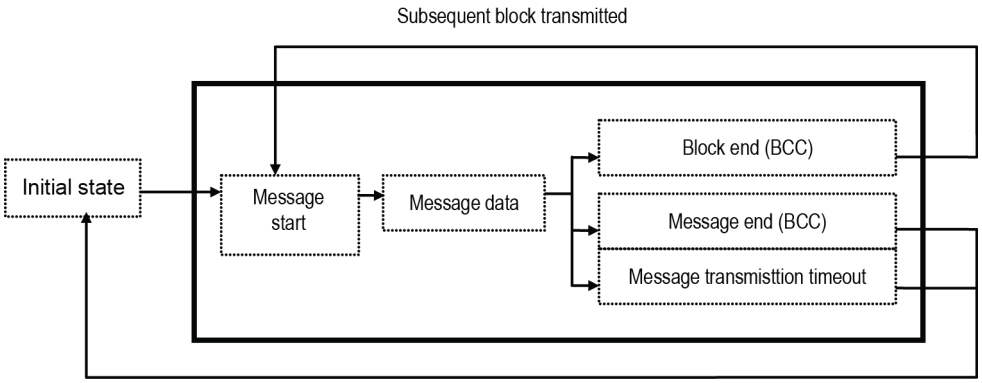
a. Class A without ACK/NAK protocol:

a. Transmission

Messages to be transmitted:

— Sample information request start
— Sample information request
— Sample information request stop
— Analysis data transmission start
— Analysis data transmission end
— Sample data message

Figure 1.85

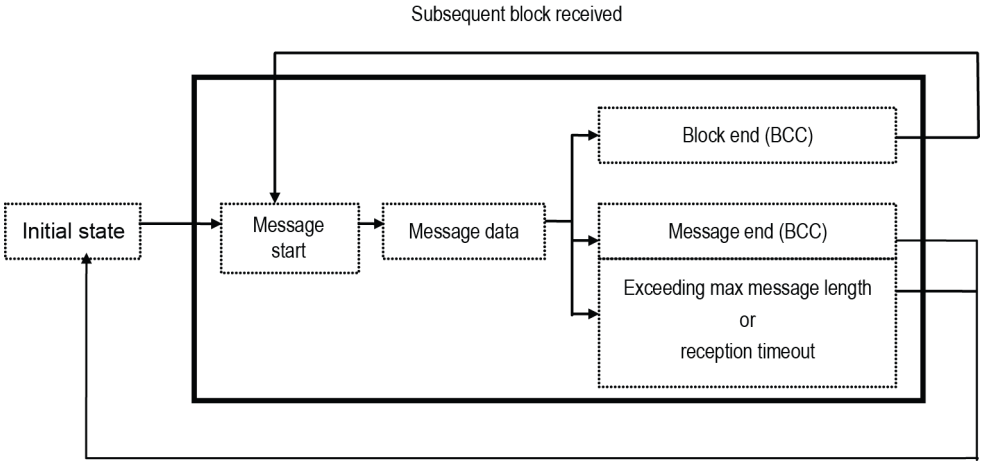


b. Reception

Messages to be received:

— First run sample information response message
— Rerun sample information response message
— Sample information response stop

Figure 1.86



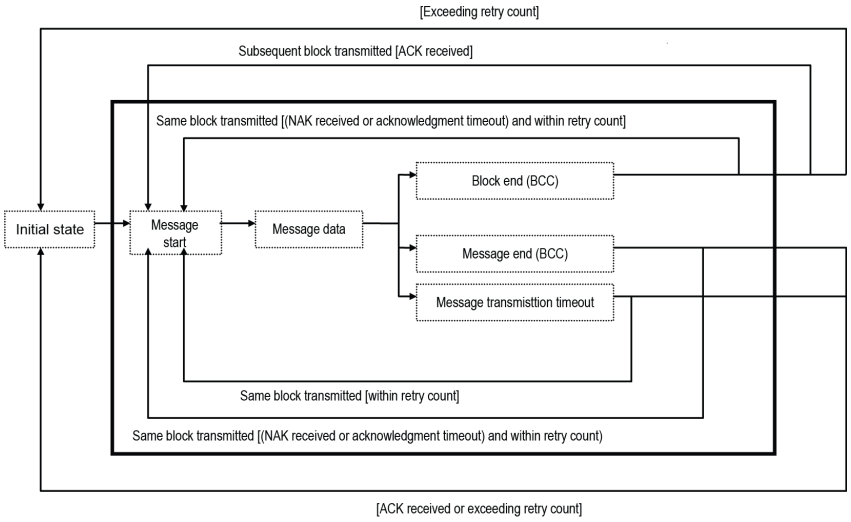
b. Class B with ACK/NAK protocol:

a. Transmission

Messages to be transmitted:

— Sample information request start
— Sample information request
— Sample information request stop
— Analysis data transmission start
— Analysis data transmission end
— Sample data message

Figure 1.87

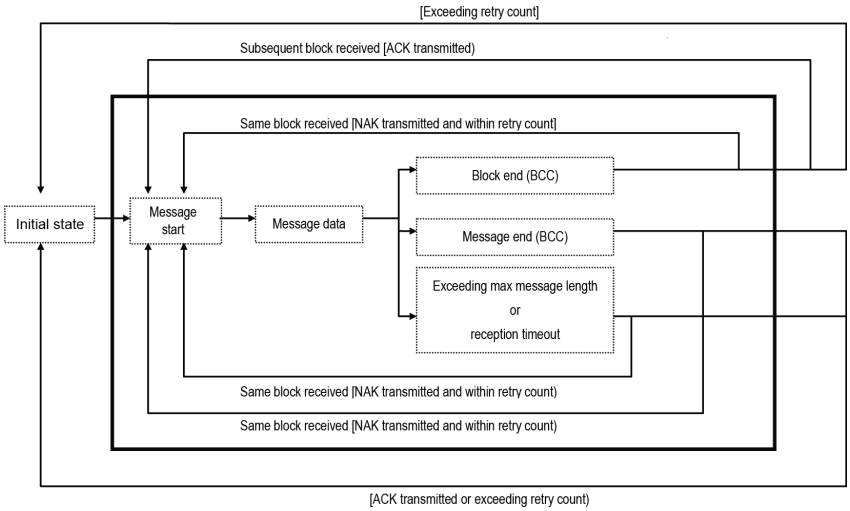


b. Reception

Messages to be received:

— First run sample information response message
— Rerun sample information response message
— Sample information response stop

Figure 1.88



2. Transmission timeout/timing

   a. Timeout/timing list

Type (Refer to Note 2)	Meaning	Standard Value	Range to be Set
T1	Time-out period from the completion of transmission/reception to the start of message reception	2 seconds	0.1 x n seconds n = 1 to 99
T2	Time-out period from the start to the end of message reception	Refer to Note 1	
T3	Time-out period from the start to the end of message transmission	2 seconds	
T4	Time-out period from the end of message transmission to response reception	2 seconds	
T5	Min period from the completion of message transmission/reception to the start of subsequent message transmission	2 seconds	
T6	Min period from NAC reception to the start of message retransmission	1 second	
T7	Time-out period from NAK transmission to the start of message retransmission	2 seconds	
t1	Min period from the completion of message transmission to the ready for start of subsequent message reception	0.5 seconds	Setting disabled
t2	Min period from the completion of message reception to the ready for start of subsequent message reception	0.5 seconds	

Type (Refer to Note 2)	Meaning	Standard Value	Range to be Set
t3	Min period from the end of message transmission to the ready for start of response reception	0.5 seconds	
t4	Min period from the end of message reception to response transmission	0.5 seconds	

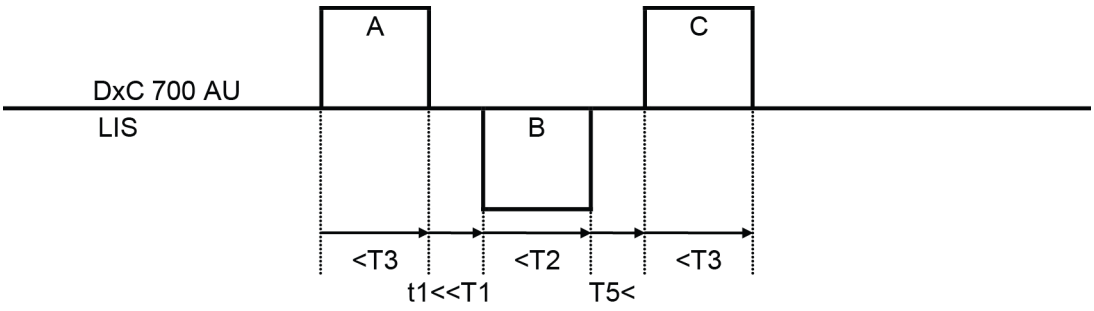
Note 1: ((Max message length x character length)/bit/sec) + 0.5 seconds

Note 2: Types from T1 to T7 can be selected on the **Online** screen.

b. Rules for class A

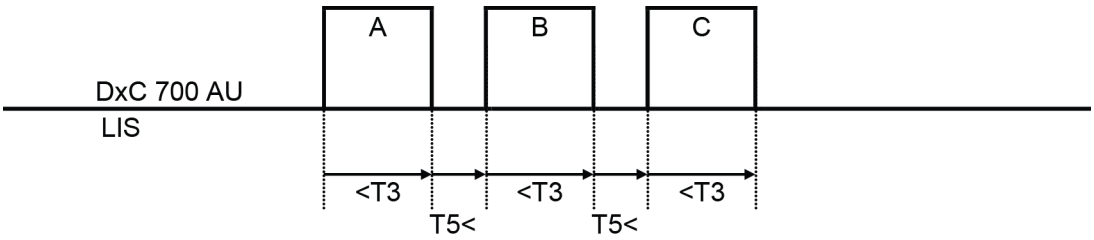
a. Case 1

Figure 1.89



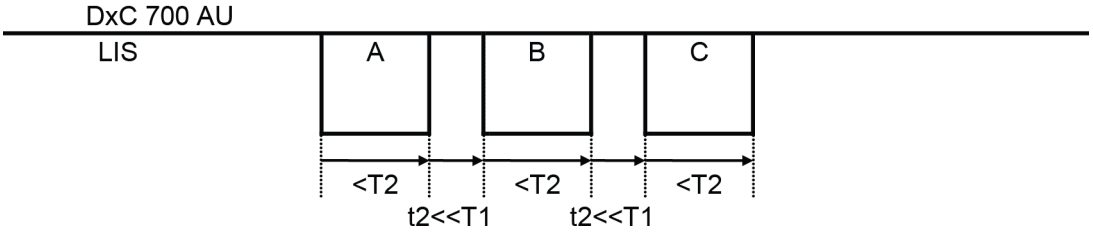
b. Case 2

Figure 1.90



c. Case 3

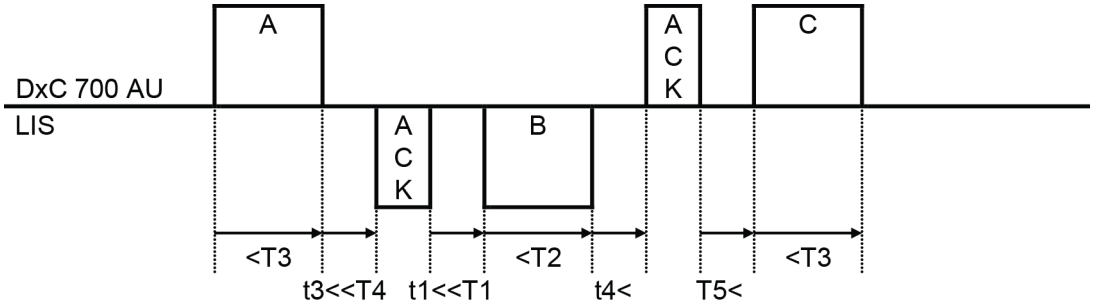
Figure 1.91



c. Rules for class B

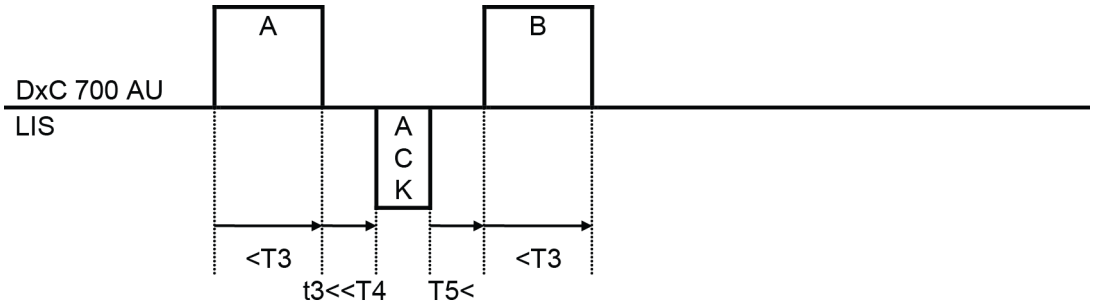
a. Case 1

Figure 1.92



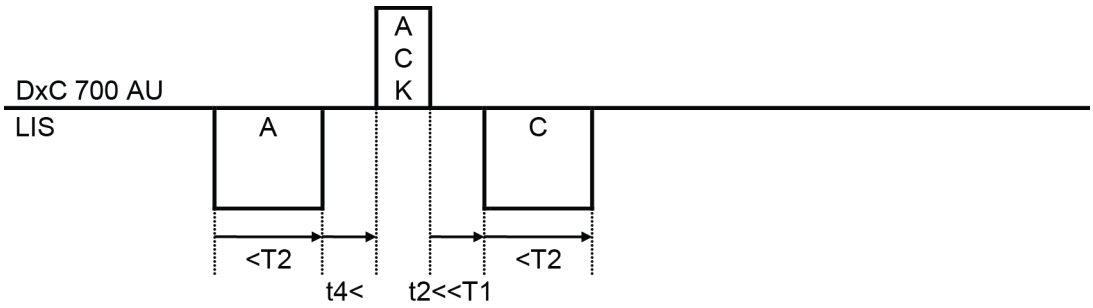
b. Case 2

Figure 1.93



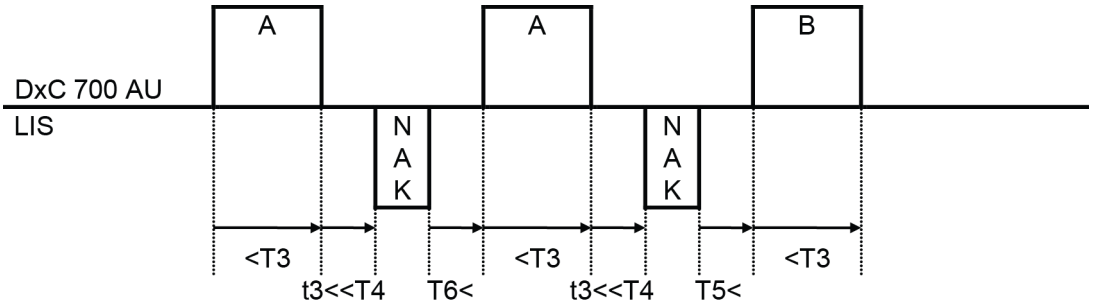
c. Case 3

Figure 1.94



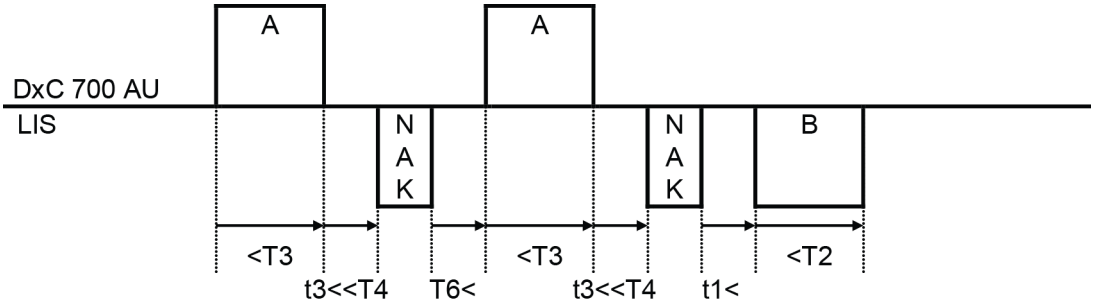
d. Case 4 (NAK response received - 1)

Figure 1.95



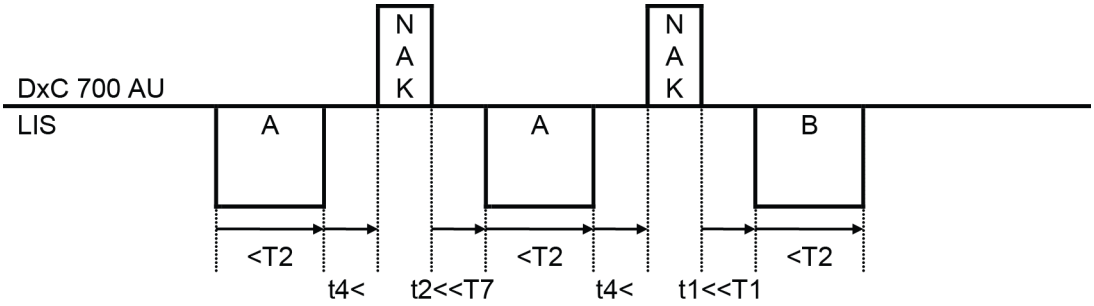
e. Case 5 (NAK response received - 2)

Figure 1.96



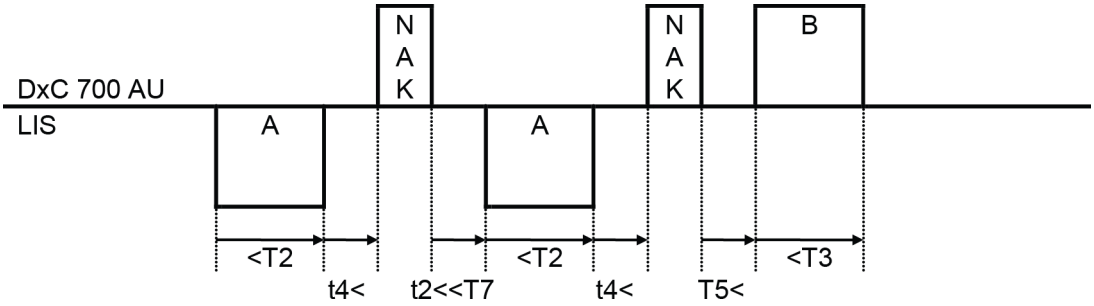
f. Case 6 (abnormal text received - 1)

Figure 1.97



g. Case 7 (abnormal text received - 2)

Figure 1.98

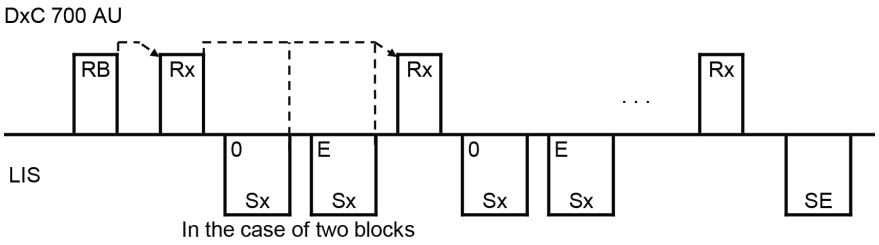


Upper Layer Communication Protocol

1. Test Order Information Receive processing
    a. Message transmission/reception sequence in one session (RB to RE messages)
        a. General sequence
            a. Example 1 (when you select **Continue** in Error Control)

            Subsequent Rx is continuously transmitted despite an online communication error.

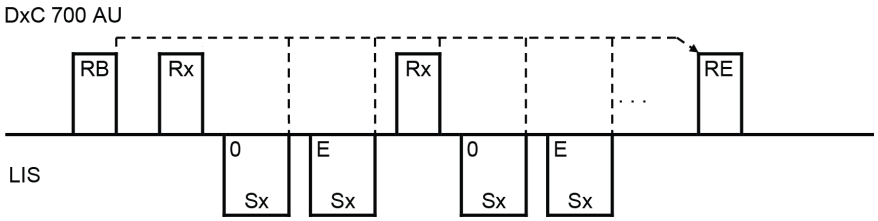
Figure 1.99



            b. Example 2 (when you select **Stop** in Error Control)

            The session is canceled because of an online communication error.

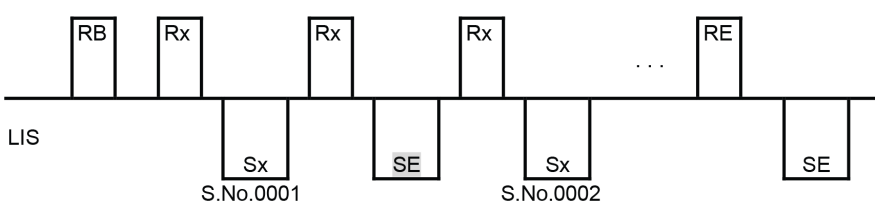
Figure 1.100



            c. Example 3 (when the LIS has no test order information)

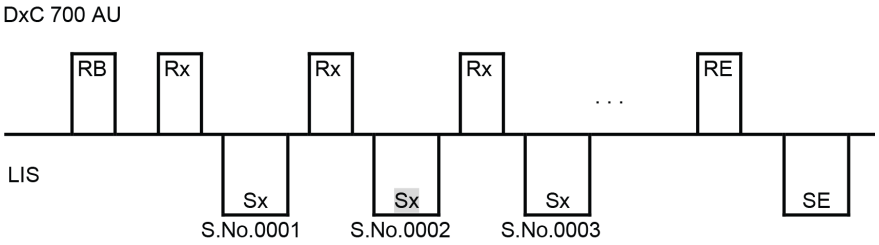
            — Response in SE message

Figure 1.101



            — Response without test code (no test No. in sample information response)

Figure 1.102



The sample of S.No.0002 (sample, to which response without test No. was returned) is registered as a sample without test order information by the analyzer. However, the system does not perform measurement or transfer data for this sample.

b. Detailed processing

Test Order Information Receive	Message Type	Transmission/Reception Timing/Conditions
Realtime	RB (Request start)	It is transmitted at measure start in STANDBY mode.
	RΔ (Request / Normal)	Refer to Note 1.
	— Sample No. request	It is transmitted depending on whether to enter sample information about the appropriate No., when a sample cup is detected.
	— Sample ID request	It is transmitted depending on whether to enter sample information about the appropriate ID, when a sample ID is correctly read on each cup.
	RH (Request / Rerun)	Refer to Note 3.
	— Sample No. request	It is transmitted regardless of whether to enter Rerun sample information about the appropriate sample, when a sample cup is detected.
	— Sample ID request	It is transmitted regardless of whether to enter Rerun sample information about the appropriate sample, when a sample ID is correctly read on each cup.
	Sx	It can be received within a specified time after Rx has been transmitted.
	SE	It can be received within a specified time after Rx has been transmitted. (The DXC 700 AU continuously inquires subsequent samples.)

Test Order Information Receive	Message Type	Transmission/Reception Timing/Conditions
	RE (Request end)	It is transmitted when the system shifts in either of the following operation modes: 1. From MEASURE mode to STANDBY mode 2. From MEASURE mode to STOP mode
		It is transmitted even when communications are disrupted because of an online communication error.
Batch	RB (Request start)	It is transmitted when Test Order Information Receive processing starts on the **Sample Program Format** screen.
	RΔ (Request / Normal)	
	— Sample No. request	It is transmitted for the sample No. in the range specified on the **Sample Program Format** screen, in series at certain intervals.
	RH (Request / Rerun)	
	— Sample No. request	It is transmitted for the sample No. in the range specified on the **Sample Program Format** screen, in series at certain intervals.
	Sx	It can be received within a specified time after Rx has been transmitted.
	SE	It can be received within a specified time after Rx has been transmitted. (The DxC 700 AU continuously inquires subsequent samples.)
	RE (Request end)	It is transmitted after the last sample No. specified on the **Sample Program Format** screen has been received, when SE has not been received.
		It is transmitted when the session is forcibly canceled on the **Sample Program Format** screen.
		It is transmitted even when communications are disrupted because of an online communication error.

Note 1: Δ indicates a space.

Note 2: Test Order Information Receive and whether to receive the information if an error can be set on the **Online** screen.

Note 3: RΔ (Request / Normal) and RH (Request / Rerun) are mixed in the same session and transmitted.

Note 4: RΔ (Request / Normal) and RH (Request / Rerun) are divided into different sessions and transmitted.

b. Sample information transmission type

a. First run sample information

Measurement Parameter Settings		**Sample Information Request Type**	**Sample Identification Information used for Transmission/Reception**	
Test Order Information Receive	**Sample Test Order**		**Sample information request**	**Sample information response**
Realtime	Sequential	Sample No. request	Sample No.	Sample No.
	Rack No.		Sample No. (It is calculated according to the rack No. and cup position in the rack.)	
	Sample ID	Sample ID request	Sample ID Sample No. Refer to Note 1.	Sample ID Sample No. Refer to Note 1.
Batch	Sequential	Sample No. request	Sample No.	Sample No.
	Rack No.			
	Sample ID			Sample ID Sample No. Refer to Note 1.

While Test Order Information Receive can be set on the **Online** or **Sample Program Format** screen, Test Order can be set on the **Analysis Mode** screen.

Note 1: Set the Sample No. in Sample information response message to the same value as Sample No. in Sample information request message.

b. Rerun sample information

Measurement Parameter Settings		Sample Information Request Type	Sample Identification Information used for Transmission/Reception	
Test Order Information Receive	**Sample Test Order**		**Sample information request**	**Sample information response**
Realtime	Sequential Rack No.	Sample No. request	Sample No.	Sample No.
	Sample ID	Sample ID request	Sample ID Sample No. Refer to Note 1.	Sample ID Sample No. Refer to Note 1.
Batch	Sequential Rack No.	Sample No. request	Sample No.	Sample No. Refer to Note 1.
	Sample ID			Sample ID

While Test Order Information Receive can be set on the **Online** or **Sample Program Format** screen, Test Order can be set on the **Analysis Mode** screen.

Note 1: Set the Sample No. and First run sample No. in Sample information response message to the same value as Sample No. in Sample information request message.

2. Result Transfer processing

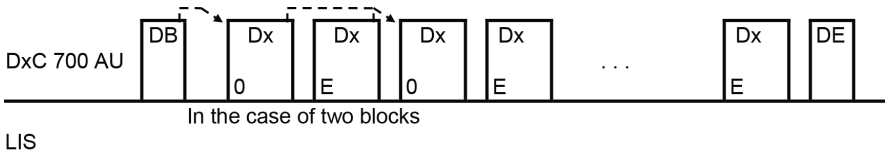
   a. Message transmission sequence in one session (DB to DE messages)

      a. General sequence

         a. Example 1 (when you select **Continue** in Error Control)

            Subsequent Dx is continuously transmitted despite an online communication error.

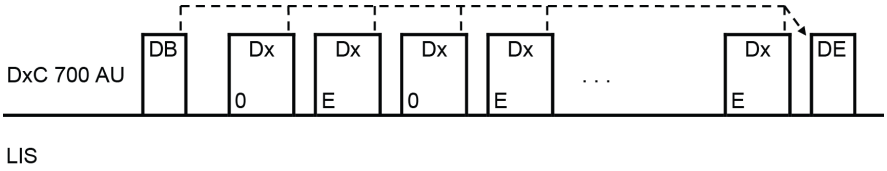
Figure 1.103



         b. Example 1 (when you select **Stop** in Error Control)

            The session is canceled because of an online communication error.

Figure 1.104



3. Detailed processing

Test Order Information Receive	Message Type	Transmission/ Reception Timing/ Conditions	Normal End Processing	Communication Error Control
Realtime	DB (Transmission start)	It is transmitted when the system shifts to "MEASURE 1" at measure start in STANDBY mode.	The Result Transfer session starts and Dx is continuously transmitted.	An alarm is generated and the following processing is done: Results Transfer Error Control *1: Stop -> DE is continuously transmitted and the session is canceled. Results Transfer Error Control *1 : Continue -> Subsequent Dx / DE is continuously transmitted.
	Dx (Data transmission)	For analyzed samples, when the analysis results for all accepted test items are ready and DxC 700 AU determines the analysis completion of applicable samples, the data is sequentially transmitted.	Subsequent Dx / DE is continuously transmitted.	
	DE (Transmission end)	It is transmitted when the DxC 700 AU shifts in either of the following operation modes or after judges all Dx messages to be transmitted have been transmitted: 1) From MEASURE mode to STANDBY 2) From MEASURE mode to STOP	The Result Transfer session is terminated.	An alarm is generated and the Result Transfer session is terminated.

Test Order Information Receive	Message Type	Transmission/ Reception Timing/ Conditions	Normal End Processing	Communication Error Control
		It is transmitted when the session is canceled because of an online communication error.		
Batch	DB (Transmission start)	It is transmitted when transmission starts on the **Online** screen.	The Result Transfer session starts and Dx is continuously transmitted.	An alarm is generated and the following processing is done: Results Transfer Error Control *1 : Stop -> DE is continuously transmitted and the session is canceled. Results Transfer Error Control *1: Continue -> Subsequent Dx / DE is continuously transmitted.
	Dx (Data transmission)	It is transmitted for the sample in the range specified on the **Online** screen, in series at certain intervals.	Subsequent Dx / DE is continuously transmitted.	
	DE (Transmission end)	It is transmitted for the sample in the range specified on the **Online** screen, at certain intervals after the last sample has been transmitted.	The Result Transfer session is terminated.	An alarm is generated and the Result Transfer session is terminated.
		It is transmitted when the session is forcibly terminated on the **Online** screen.		

Test Order Information Receive	Message Type	Transmission/ Reception Timing/ Conditions	Normal End Processing	Communication Error Control
		It is transmitted when the session is canceled because of an online communication error.		

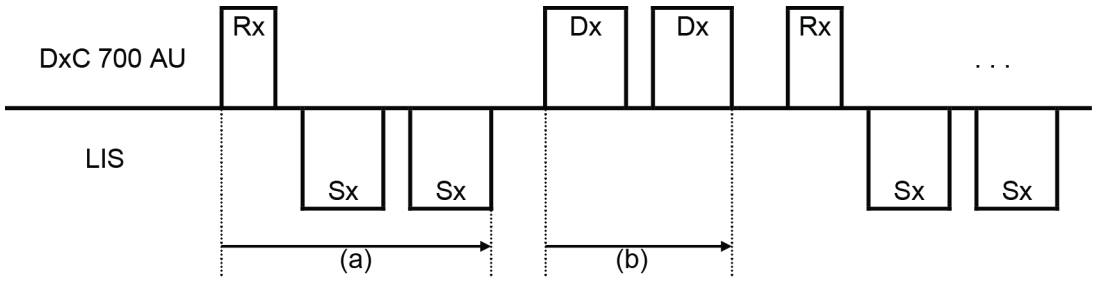
Note 1: You can select **Upper Protocol - Results Transfer Error Control** on the **Online** screen.

4. Other special instructions

   Mixing of the Test Order Information Receive and Result Transfer sessions.

   1. General sequence

Figure 1.105



   2. Detailed processing

Interval	Definition of Interval	Restriction
(a)	From the start of sample information request transmission to the completion of reception of all blocks composing the sample information response message for the applicable request	No data message is transmitted.
(b)	From the start of analysis data transmission to the completion of transmission of all blocks composing the applicable data message	No sample information request is transmitted.

Connection Specification

1. In/output signals and connection terminals

Signal Name	Abbreviation	DxC 700 AU Terminal No.	Direction
Security ground	FG	-	⟷
Transmission data	TxDATA	3	→
Reception data	RxDATA	2	←
Signal ground	SG	5	⟷
Transmission request	RTS	7	→ ⌐
Transmission enabled	CTS	8	←

Note 1: RTS and CTS are always short-circuited.

Note 2: Do not connect the terminals of Nos., which are not shown above.

2. Signal level

Signal/Signal Format	Signal Level
SPACE (ON)	+3V or higher (HIGH)
MARK (OFF)	-3V or lower (LOW)

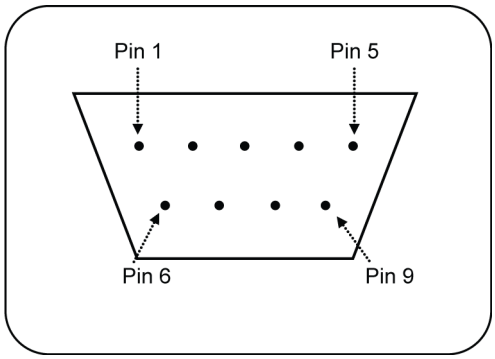
3. Connection cable

   a. The cable between the DxC 700 AU and LIS is not connected.
   b. A shielded cable is used for connection.
   c. A 15-m connection cable or shorter is used.

4. Connector shape

   Connector of the cable at DxC 700 AU: D-SUB 9-Pin female connector.

Figure 1.106



Appendix A: List of Flags

Priority	Flags	Description	Remarks
1	d_	QC result is excluded by operator	

Priority	Flags	Description	Remarks
2	e_	Data edited by operator.	
3	(_	Reagent probe cleaning solution is insufficient.	
4	Wa	Test has been analyzed with an erroneous cuvette.	
5	R_	Insufficient reagent.	
6	#_	Insufficient sample.	Refer to Note 1.
7	%_	Clot detected.	Refer to Note 1.
8	?_	Unable to calculate a result.	
9	M	Duplicate Sample ID is detected	Refer to Note 1.
10	n_	LIH test not performed.	
11	l[Level]	Result may be affected by lipemia (Levels in numbers from 1 to 5).	
12	i[Level]	Result may be affected by icterus (Levels in numbers from 1 to 5).	
13	h[Level]	Result may be affected by hemolysis (Levels in numbers from 1 to 5).	
14	Y_	Reagent Blank OD exceeds the high limit set at the last photometric read point.	
15	U_	Reagent Blank OD exceeds the lower limit set at the last photometric read point	
16	y_	OD at the first photometric point for reagent blank or patient sample is high.	
17	u_	OD at the first photometric point for reagent blank or patient sample is low.	
18	@_	OD is higher than 3.0.	
19	$_	Not enough data to determine linearity of reaction.	
20	D_	OD of reaction is higher than maximum OD range.	
21	B_	OD of reaction is lower than minimum OD range.	
22	*_	Linearity error in rate method.	
23	&_	Prozone test data is abnormal.	
24	Z_	Prozone error.	
25	E_	Error in reaction rate for rate assay.	
26	Fx	Result (OD) is higher than the analytical measuring range.	
27	Gx	Result (OD) is lower than the analytical measuring range.	
28	!_	Unable to calculate concentration.	

Priority	Flags	Description	Remarks
29	)_	Reagent lot number used for sample analysis is different from the lot number used for RB/Calibration.	
30	a_	Reagent expired.	
31	ba	No calibration data or calibration is expired.	
32	bh	Reagent blank or calibration failed, and the result was calculated with historical data.	
33	bn	Mastercurve used.	
34	bz	Calibration curve for Prozone data used.	
35	F_	Result is higher than the analytical measuring range.	
36	G_	Result is lower than the analytical measuring range.	
38	ph	Result is higher than the high critical limit.	
39	pl	Result is lower than the low critical limit.	
40	T_	Abnormality found in inter-chemistry check.	
41	P_	Positive.	
42	N_	Negative.	
43	H_	Result is higher than reference interval.	
44	L_	Result is lower than reference interval.	
45	J_	Result is higher than the rerun decision limit.	
46	K_	Result is lower than the rerun decision limit.	
47	fh	Result is higher than the Rerun reflex limit.	
48	fl	Result is lower than the Rerun reflex limit.	
49	Va	Deviation of multiple measurements check is out of range.	
50	8Q	QC deviation error.	
51	xQ	Multi-rule QC has detected failure on the other control sample.	
52	1Q	QC data exceeds the range entered in the Single Check Level field.	
53	2Q	QC data exceeds 1_{3S} control range.	
54	3Q	QC data exceeds 2_{2S} control range.	
55	4Q	QC data exceeds R_{4S} control range.	
56	5Q	QC data exceeds 4_{1S} control range.	
57	6Q	A preset number of consecutive QC results fall on one side of the mean.	
58	7Q	Consecutive QC results show steadily increasing or decreasing values.	
59	S_	First-run result replaced by rerun result.	

Priority	Flags	Description	Remarks
60	/_	Test pending or not analyzed.	
61	r_	Result has been transferred to the LIS through online communication.	
62	c_	Result corrected by the operator using data correction.	

Note 1: These flags indicate that there was an error associated with the sample. Auto rerun is disabled for samples resulting in these flags.

However, the system transmits an automatic Rerun sample request to the LIS to enter Rerun information. Therefore, be careful when making a response.

Appendix B: Character Code Table (8-bit Code)

Figure 1.107

High byte / Low byte	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	(SP)	0	@	P		p				-	タ	ミ		
1	SOH	DC1	!	1	A	Q	a	q			。	ア	チ	ム		
2	STX	DC2	“	2	B	R	b	r			「	イ	ツ	メ		
3	ETX	DC3	#	3	C	S	c	s			」	ウ	テ	モ		
4	EOT	DC4	$	4	D	T	d	t			、	エ	ト	ヤ		
5	ENQ	NAK	%	5	E	U	e	u			・	オ	ナ	ユ		
6	ACK	SYN	&	6	F	V	f	v			ヲ	カ	ニ	ヨ		
7	BEL	ETB		7	G	W	g	w			ァ	キ	ヌ	ラ		
8	BS	CAN	(	8	H	X	h	x			ィ	ク	ネ	リ		
9	HT	EM	)	9	I	Y	i	y			ゥ	ケ	ノ	ル		
A	LF	SUB	*	:	J	Z	j	z			ェ	コ	ハ	レ		
B	VT	ESC	+	;	K	[	k	{			ォ	サ	ヒ	ロ		
C	FF	FS	,	<	L	\	l	|			ャ	シ	フ	ワ		
D	CR	GS	-	=	M	]	m	}			ュ	ス	ヘ	ン		
E	SO	RS	.	>	N	^	n	~			ョ	セ	ホ	゛		
F	SI	US	/	?	O	_	o	DEL			ッ	ソ	マ	゜		

The codes in this area shall be invalid for 7-bit codes.

Appendix C: Online Parameters

Set up	Contents	Menu
Test Order Information Receive		
• Routine Normal • Routine Rerun • Emergency Normal • Emergency Rerun • STAT Normal • STAT Rerun	• Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None	Online
Result Transfer		

Set up	Contents	Menu
• Routine Normal • Routine Rerun • Emergency Normal • Emergency Rerun • STAT Normal • QC • Calibration • Reagent Blank • STAT Quick	• Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None	Online

Upper Protocol	Contents	Menu
Communication Error Control		
• T.R.I Receive Error Control • Result Transfer Error Control	• Continue / Stop • Continue / Stop	Online

Lower Protocol	Contents	Menu
Character Format		
• Character Length • Parity Bit • Stop Bit	• 7 / 8 • Odd / Even / None • 1 / 2	Online
Basic Data Format		
• Start Code 1 • Start Code 2 • End Code 1 • End Code 2 • Text Length • Device No. • ETB Control	• 01H to 1FH • 00H to 1FH • 01H to 1FH • 00H to 1FH • 256 / 512 / 1024 • 00-99 • Selected / Cleared	Online
Communication Control		
• Bit/Sec. • Class • BCC Check • Retry	• 4800 / 9600 • Class A / Class B • Selected / Cleared • 0 to 3	Online
Time Out [x 100msec.]		

Lower Protocol	Contents	Menu
• T1 • T2 • T3 • T4 • T5 • T6 • T7	• (1 to 99) (unit: 0.1 sec) • (1 to 99) (unit: 0.1 sec) • (1 to 99) (unit: 0.1 sec) • (1 to 99) (unit: 0.1 sec) • (1 to 99) (unit: 0.1 sec) • (1 to 99) (unit: 0.1 sec) • (1 to 99) (unit: 0.1 sec)	Online

Data Configuration	Contents	Menu
Rack ID/Cup pos.	Selected / Cleared	Online
Rack ID Digits	4/5	
Type	Selected / Cleared	Online. Refer to Note 1.
Dilution Info. Refer to Note 2.	Selected / Cleared	Online. Refer to Note 1.
Run Date/Time	Selected / Cleared	Online
Reagent Info.	Selected / Cleared	
R1-2 Use	Selected / Cleared	
ISE Info.	Selected / Cleared	
Sex. Refer to Note 2.	Selected / Cleared	Sample Program Format
Age. Refer to Note 2.	Selected / Cleared	
Other Type. Refer to Note 2.	Selected / Cleared	
Patient Information 1. Refer to Note 2.	Selected / Cleared, digits	
Patient Information 2. Refer to Note 2.	Selected / Cleared, digits	
Patient Information 3. Refer to Note 2.	Selected / Cleared, digits	
Patient Information 4. Refer to Note 2.	Selected / Cleared, digits	
Patient Information 5. Refer to Note 2.	Selected / Cleared, digits	
Patient Information 6. Refer to Note 2.	Selected / Cleared, digits	
Sample ID Digits	4 to 26	
Zero Suppress	Selected / Cleared	Online
Online Test No. Digit	2 / 3	Online
Result Digit	6 / 9	Online
No. of Flags	2 / 4	Online

Data Configuration	Contents	Menu
Cal. No./Control No. Digit	2 / 3	Online

Note 1: Messages to which parameter settings are applied are as follows:

	RB	RΔ	RH	RE	SΔ	SH	SE	DB	DΔ	dΔ	DH	dH	DR	DA	DQ	DE
Type	-			-		x	-	-	O	O	x	x	x	x	x	-
Dilution Info.	-	-	-	-		x	-	-	-	-	-	-	-	-	-	-

O: Corresponds to parameter changes

x: Does not correspond to parameter changes

-: Not applicable

Note 2: First run and Rerun sample data messages apply. Reagent blank, calibration, and Control sample data messages do not apply.

Appendix D: Online Parameter Sheet

Set Up	Content
Test Order Information Receive	
• Routine Normal • Routine Rerun • Emergency Normal • Emergency Rerun • STAT Normal • STAT Rerun	• □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None
Result Transfer	
• Routine Normal • Routine Rerun • Emergency Normal • Emergency Rerun • STAT Normal • STAT Rerun • QC • Calibration • Reagent Blank • STAT Quick	• □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ None

Upper Protocol	Contents
Communication Error Control	

Upper Protocol	Contents
• T.R.I Receive Error Control • Result Transfer Error Control	• □ Continue □ Stop • □ Continue □ Stop

Lower Protocol	Contents
Character Format	
• Character Length • Parity Bit • Stop Bit	• □ 7 □ 8 • □ Even □ Odd □ None • □ 1 □ 2
Basic Data Format	
• Start Code 1 • Start Code 2 • End Code 1 • End Code 2 • Text Length • Device No. • ETB Control	• [ ] (01 to 1F) • [ ] (00 to 1F) • [ ] (01 to 1F) • [ ] (00 to 1F) • □ 256 □ 512 □ 1024 • Selected / Cleared, [ ] (00 to 99/space) • Selected / Cleared
Communication Control	
• Bit/Sec • Class • BCC Check • Retry	• □ 4800 □ 9600 • □ Class A □ Class B • Selected / Cleared • [ ] (0 to 3)
Timeout	
• T1 • T2 • T3 • T4 • T5 • T6 • T7	• [ ] (1 to 99) • [ ] (1 to 99) • [ ] (1 to 99) • [ ] (1 to 99) • [ ] (1 to 99) • [ ] (1 to 99) • [ ] (1 to 99)

Format Configuration	Contents
Rack ID/Cup pos.	Selected / Cleared
Rack ID Digits	□ 4 □ 5
Type	Selected / Cleared
Dilution Info.	Selected / Cleared
Run Date/Time	Selected / Cleared

Format Configuration	Contents
Reagent Info.	Selected / Cleared
R1-2 Use	Selected / Cleared
ISE Info.	Selected / Cleared
Sex	Selected / Cleared
Age	Selected / Cleared
Other Type	Selected / Cleared
Patient Information 1	Selected / Cleared, [ ] digits
Patient Information 2	Selected / Cleared, [ ] digits
Patient Information 3	Selected / Cleared, [ ] digits
Patient Information 4	Selected / Cleared, [ ] digits
Patient Information 5	Selected / Cleared, [ ] digits
Patient Information 6	Selected / Cleared, [ ] digits
Sample ID Digits	[ ] digits (4 to 26)
Zero Suppress	Selected / Cleared
Online Test No. Digit	□ 2 □ 3
Result Digit	□ 6 □ 9
No. of Flags	□ 2 □ 4
Cal. No./Control No. Digit	□ 2 □ 3

Appendix E: Alarm List related to Online Communication

1. Alarm No. 6031: ONLINE ERROR (aa) (bb cc dddd ee)

   Processing on the system when this alarm is generated

   1. When you select **Stop** in T.R.I Receive Error Control on the **Online** screen, the system performs the following:

      a. The system stops subsequent Test Order Information Receive processing.

      b. When the system is performing real-time Test Order Information Receive processing during measure, the stopped Test Order Information Receive state remains until the measure is finished. However, when the next measure start is performed, the system clears the state and perform real-time Test Order Information Receive processing again.

   2. When you select **Continue** in T.R.I Receive Error Control on the **Online** screen, the system continuously performs Test Order Information Receive processing for subsequent samples:

   Details of the alarm

a. A communication error occurred when the system transmitted a sample information request or received a sample information response message online.

b. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Error type	01	Device name error
		02	Framing error
		03	Overrun error
		04	Parity error
		05	Timeout error
		06	NAK received during message transmission
		07	BCC error during message reception
		08	Other communication error
		09	Function error
		10	Unit name error
		11	Parameter error
		12	Request canceled
bb	Message type	R□	Sample information request-related
		S□	Sample information response-related
		D□	Analysis data-related
cc	Sample/body fluid type	Δ Δ	Serum Routine sample
		Δ E	Serum Emergency sample
		UΔ	Urine Routine sample
		UE	Urine Emergency sample
		XΔ	Other 1 Routine sample
		XE	Other 1 Emergency sample
dddd	Sample No. or sample ID		
ee	Timeout factor	T1	Time-out time from completion of transmission or reception until start of message reception
		T2	Reception time-out
		T3	Transmission time-out
		T4	Response reception time-out from transmission completion
		T7	Time-out until reception restart

2. Alarm No. 6032: ONLINE FORMAT ERROR (without Sample ID)

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

When a sample information response message is received online, necessary information is not set to **Yes** in parameters specifying the message format.

3. Alarm No. 6033: ONLINE INVALID TEXT CODE (aa)

[Processing on the system when this alarm is generated]

1. When you select **Stop** for "Test Order Information Receive" in "Error Control" on the **Online** screen, the system performs the following:
   a. The system discards the sample information response message received online.
   b. The system stops subsequent Test Order Information Receive processing.
   c. When the system is performing real-time Test Order Information Receive processing during measure, the stopped Test Order Information Receive state remains until the measure is finished. However, when the next measure start is performed, the system clears the state and perform real-time Test Order Information Receive processing again.
2. When you select **Continue** for "Test Order Information Receive" in "Error Control" on the **Online** screen, the system performs the following:
   a. The system discards the sample information response message received online.
   b. The system continuously performs Test Order Information Receive processing for subsequent samples.

[Details of the alarm]

1. When a sample information response message is received online, the message identification code is not within the specified range.
2. The code contents in brackets and their meanings are as shown below:

aa	Type of sample information request message DxC 700 AU transmitted before receiving a message	RΔ	First run sample request
		RH	Rerun sample request

4. Alarm No. 6034: ONLINE INVALID TEXT BLOCK No. (aa <-> bb)

[Processing on the system when this alarm is generated]

1. When you select **Stop** for "Test Order Information Receive" in "Error Control" on the **Online** screen, the system performs the following:
   a. The system discards the sample information response message received online.
   b. The system stops subsequent Test Order Information Receive processing.
   c. When the system is performing real-time Test Order Information Receive processing during measure, the stopped Test Order Information Receive state remains until the measure is finished. However, when the next measure start is

performed, the system clears the state and perform real-time Test Order Information Receive processing again.

2. When you select **Continue** for "Test Order Information Receive" in "Error Control" on the **Online** screen, the system performs the following:

   a. The system discards the sample information response message received online.

   b. The system continuously performs Test Order Information Receive processing for subsequent samples.

[Details of the alarm]

1. When a sample information response message is received online, the block identification No. contained in the message is determined not to be within the specified range.
2. The code contents in brackets and their meanings are as shown below:

Code	Details
aa	Block identification No. in the message received last time
bb	Block identification No. in the message last received

5. Alarm No. 6035: ONLINE INVALID SAMPLE NO. (aa bbbb) cccccc

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the sample No. contained in the message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample

Code	Classification	Details	
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
cccc	Sample ID		

6. Alarm No. 6036: ONLINE INVALID RACK NO. (aa bbbb : cccc-dd) eeeeee

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the rack No. or position in the rack contained in the message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
cccc	Rack No. in the message received		

Code	Classification	Details	
dd	Position in the rack in the message received		
eeeeee	Sample ID		

7. Alarm No. 6037: ONLINE INVALID SEX TEXT (aa bbbb : cc) dddddd

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the patient sex contained in the message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
cc	Patient sex in the message received		
dddddd	Sample ID		

8. Alarm No. 6038: ONLINE INVALID AGE/MONTH (aa bbbb : ccc dd) eeeeee

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.

2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the years or months contained in the message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
cc	Years in the message received		
dd	Months in the message received		
eeeeee	Sample ID		

9. Alarm No. 6039: ONLINE ANALYSIS METHOD MISMATCH (aa bbbb : cc <> dd) eeeeee

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the measure type contained in the message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
cc	Type of message transmitted	RΔ	First run sample request
		RH	Rerun sample request
dd	Type of message received	SΔ	First run sample information
		SH	Rerun sample information
eeeeee	Sample ID		

10. Alarm No. 6040: ONLINE SAMPLE NO. MISMATCH (aa bbbb <> cc dddd) eeeeee

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the sample No. contained in the message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type in the message transmitted	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample

Code	Classification	Details	
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
cc	Sample/body fluid type in the message received	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
dddd	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
eeeeee	Sample ID		

11. Alarm No. 6041: ONLINE RACK NO. MISMATCH (aa bbbb : cccc-dd <> eeee-ff) gggggg

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the rack No. or position in the rack contained in the message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
cccc	Rack No. in the message transmitted		
dd	Position in the rack in the message transmitted		
eeee	Rack No. in the message received		
ff	Position in the rack in the message received		
eeeeee	Sample ID		

12. Alarm No. 6042: ONLINE MISMATCH aaaaaa <> bbbbbb)

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the sample ID contained in the message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Details
aaaaaa	Sample ID in the message transmitted
bbbbbb	Sample ID in the message received

13. Alarm No. 6043: ONLINE TEST ITEM ERROR (aa bbbb) cccccc ddd

[Processing on the system when this alarm is generated]

1. Do not register the erroneous tests in the corresponding samples as test items.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, a test is determined to be an error for one of the following reasons:
   a. The test item No. in the message is not set in the online test No. (online parameters).
   b. For the tests in the Rerun sample information response message received, the value set for the sample measure method is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample

Code	Classification	Details	
cccccc	Sample ID		
ddd	Online test No.		

14. Alarm No. 6044: ONLINE RERUN ITEM ERROR (aa bbbb)

[Processing on the system when this alarm is generated]

1. The system discards the Rerun sample information response message received online.
2. The system continues online Rerun Test Order Information Receive processing.

[Details of the alarm]

1. When a Rerun sample information response message is received online, a Rerun sample is not registered for one of the following reasons:

   The rerun sample specified in the message is processing.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample

15. Alarm No. 6045: ONLINE INVALID OTHER TYPE (aa bbbb : c) dddddd

[Processing on the system when this alarm is generated]

1. The system discards the sample information response message received online.
2. The system continues online Test Order Information Receive processing.

[Details of the alarm]

1. When a sample information response message is received online, the other type contained in the message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Sample/body fluid type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001-9999	Routine sample
		E001-E999	Emergency sample
		P001-P999	STAT sample
c	Other Type in the message received		
dddddd	Sample ID		

Appendix F: Comparison of AU680 and DxC 700 AU

No.	Difference	AU680	DxC 700 AU	Remarks
1	Handling of rerun samples	1. When samples are run using orange racks, or samples already analyzed as STAT samples are rerun, they are handled as the message identification codes of ”RH” and ”SH." 2. Auto rerun samples are handled as ”Rh” and ”Sh”. 3. First run sample numbers and rerun sample numbers are not always identical. LIS computers need to memorize first run sample numbers, which need to be set for sample information messages of rerun samples.	1. When samples already analyzed using white racks or red racks, or as STAT samples are rerun, they are handled as the message identification codes of ”RH” and ”SH”. 2. Auto rerun samples are handled as ”Rh” and ”Sh”. 3. First run sample numbers and rerun sample numbers are always identical. LIS computers do not need to memorize any first run sample numbers. Set the same values for rerun sample numbers and first run sample numbers.	Both analyzers have the same message format.
2	Batch sending in real-time transit	Not available	Available	

No.	Difference	AU680	DxC 700 AU	Remarks
3	Sample Type	[System Maintenance] - [Setup Parameters] - [SystemParameter1] - [For Inquiry] - [Sample Kind Mix.] - "Unity" allowed is the default setting for the system. The system sets and sends specified sample type in "First run sample request message".	[System Maintenance] - [Setup Parameters] - [SystemParameter1] - [For Inquiry] - [Sample Kind Mix.] - "Mix" allowed is the default setting for the system. The system, when no sample types can be specified, sets and sends "Not specified: 'N'" in "First run sample request message". Reply with any one of other specified sample types than "Not specified" set on the LIS computer. When samples are analyzed using racks, the settings of "Mix" and "Unity" of [System Maintenance] - [Setup Parameters] - [SystemParameter1] - [For Inquiry] - [Sample Kind Mix.] allowed is selectable. However, when samples are analyzed as STAT samples, "Mix" allowed is fixed.	The LIS computer which was used with AU680 is unable to communicate with DxC 700 AU when [Online] - [Setup] - [Test Order Information Receive] - [STAT First-Run] is set to "Realtime".

No.	Difference	AU680	DxC 700 AU	Remarks
4	Other Type	Not used	If set to "used" on the **Sample Program Format** screen, it is required on sample information messages from LIS computers and it is output onto analysis data messages. The system, according to the information of the other type, conducts the set range checking on the **Range** screen of conditions per analysis item. If any abnormal checking result, an analysis data message with error flags added is sent to LIS computers. If any no abnormal checking result, an analysis data message containing the result with no error flags added is sent to LIS computers.	This information is used when range checking is desired per animal type at veterinary hospitals. By setting up [Sample Program Format] - [Other Type] to uncheck, it can communicate in the same format as AU680.
5	Run Date/Time	Not used	If set to "used" on the **Online** screen, it is output onto analysis data messages. The output descriptions include the termination time of sample measurements. All sample kinds are targeted.	By setting up [Online] - [Format Configuration] - [Run Date/Time] to uncheck, it can communicate in the same format as AU680.
6	ISE Info.	Not used	If set to "used" on the **Online** screen, it is output onto analysis data messages. The output descriptions include ISE reagent lot numbers and ISE electrode lot Numbers.	By setting up [Online] - [Format Configuration] - [ISE Info.] to uncheck, it can communicate in the same format as AU680.

CHAPTER 2

Program Online Parameters with TCP/IP Connection

Outline

This specification describes the specification to connect the automated analyzer, DxC 700 AU (the system hereafter) and the external data processing device (LIS hereafter) by TCP/IP communication.

ASTM E1394-91 Standard is used in this specification. And for those functions which cannot be conducted by ASTM E1394-91, the concept of HL7 is adopted.

DxC 700 AU is compatible with an AU680 interface with no change in CONFIG. > Online > Format Configuration. Any incompatible configurations will be discarded.

Terms

1. **ASTM Reference Position**

   It is the field position defined by ASTM E1394-91 Standard.

2. **ASTM Field Name**

   It is the field name defined by ASTM E1394-91 Standard.

3. **Message acknowledgment**

   It is a response message for a received message of whether it is received.

4. **Automation Ready**

   It signifies the transfer line system which can connect with the automated analyzer, DxC 700 AU.

Function Overview

This section outlines functions defined on the application level provided by the system.

1. **Realtime test order query function**

   The following processing can be done during measure on the system (realtime).The system transmits a message querying sample information, along with key information including a sample ID, to the LIS and the LIS returns a message containing sample information suited to the key information to the LIS.

   If the arbitrary by sample kind of [Online] - [Setup] - [Test Order Information Receive] is set at [Real Time], the function becomes effective. And for the cases of automated retesting, if the retesting arbitrary by sample kind of [Online] - [Setup] - [Test Order Information Receive] is at [Real Time] and the above mentioned first testing by sample kind of [Online] - [Setup] - [Result Transfer] is at [Real Time], the function becomes effective.

2. **Realtime result transfer function**

The following processing can be done during measure on the system (realtime).The system transmits result regarding an measured sample to the LIS.

Parameter settings determine whether to implement the realtime result transfer function at measure start. When you select **Realtime** in any of [Online] - [Setup] - [Result Transfer], the function is implemented.

3. **Batch result transfer function**

The following processing can be done on the **Sample Manager** screen of the system. An operation on the screen triggers transfer of a saved result to the LIS.

Parameter settings determine whether to enable the realtime result transfer function on the **Sample Manager** screen. When you select **Realtime** or **Batch** for the sample kind desired to be transferred in [Online] - [Result Transfer], the function is enabled.

4. **Sample information entry function according to LIS direction**

The following processing can be done while the system operates. This function is similar to the realtime test order query, and allow the system to enter sample information. The realtime test order query enables the LIS to return a sample information message in reply to a sample information query message transmitted from the system. However, this function allows the LIS to transmit sample information regarding the sample to be measured, at any time, without using a query.

When you select **LIS Direction** for the sample kind desired to be received in [Online] - [Setup] - [Test Order Information Receive], the function is enabled. However, you also need to select **Enable** in [Online] - [Setup] - [Other Transfer] - [Equipment State].

5. **System state transfer function**

The following processing can be done while the system operates. The system transmits a system state to the LIS.

When you select **Enable** in [Online] - [Setup] - [Other Transfer] - [Equipment State], this function is enabled.

The following table shows messages used for the functions. A message type is information specifying a message type. For more information about messages, Refer to Message Field Definition.

Table 2.1 List of Messages Used by Function

Function	Message name	Message type	Transmission direction
Realtime test order query / test order query of auto rerun function	Test order query start notification	RBΔ	System → LIS
	Test order query start notification acknowledgment	MSA	LIS → System
	Test order query	RΔΔ	System → LIS
	Test order query acknowledgment	MSA	LIS → System

Table 2.1 List of Messages Used by Function (Continued)

Function	Message name	Message type	Transmission direction
	Test order query of auto rerun	RhΔ	System → LIS
	Test order query acknowledgment	MSA	LIS → System
	Test order query end notification	REΔ	System → LIS
	Test order query end notification acknowledgment	MSA	LIS → System
	Test order information	SΔΔ	LIS → System
	Test order information acknowledgment	MSA	System → LIS
	Test order information of auto rerun	ShΔ	LIS → System
	Test order information acknowledgment	MSA	System → LIS
Realtime result transfer function	Result transfer start notification	DBΔ	System → LIS
	Result transfer start notification acknowledgment	MSA	LIS → System
	Result / Quick result	DΔΔ	System → LIS
	Result transfer acknowledgment	MSA	LIS → System
	Result transfer end notification	DEΔ	System → LIS
	Result transfer end notification acknowledgment	MSA	LIS → System
Batch result transfer function	Result transfer start notification	DBΔ	System → LIS
	Result transfer start notification acknowledgment	MSA	LIS → System
	Result	DMΔ	System → LIS
	Result transfer acknowledgment	MSA	LIS → System
	Result transfer end notification	DEΔ	System → LIS
	Result transfer end notification acknowledgment	MSA	LIS → System

Table 2.1 List of Messages Used by Function (Continued)

Function	Message name	Message type	Transmission direction
Sample information entry function according to LIS direction	Test order information	SMΔ	LIS → System
	Test order information acknowledgment	MSA	System → LIS
System state transfer function	System state	STΔ	System → LIS
	System state acknowledgment	MSA	LIS → System

Record configuration is determined for each message used. The following table shows a record configuration list. Table 2.3 Record List shows a list of records used in this specification.

Table 2.2 Message Record Configuration

Message name	Message record configuration
Test order query Test order query of auto rerun	Message header record (H) Request information record (Q) Message terminator record (L)
Test order information Test order information of auto rerun	Message header record (H) Patient information record (P), refer to Note 1 Test order record (O), refer to Note 1 Message terminator record (L)
Result Quick result	Message header record (H) Patient information record (P), refer to Note 1 Test order record (O), refer to Note 1 Result record (R), refer to Note 2 Message terminator record (L)
System state	Message header record (H) System state record (S) Message terminator record (L)
Test order query start notification	Message header record (H) Message terminator record (L)
Test order query end notification	
Result transfer start notification	
Result transfer end notification	

Table 2.2 Message Record Configuration (Continued)

Message name	Message record configuration
Acknowledgment	

Note 1: This record configuration can be used repeatedly. However, only one record is used in this specification.

Note 2: One result record is prepared for one result. As many result records as results are required.

Table 2.3 Record List

ASTM Reference	Record name	Record type ID	Description
7	Message header record	H	First record of a message. Contains sender/receiver information. A message type in this record specifies a message type.
8	Patient information record	P	Patient information such as a sample ID and patient name is set.
9	Test order record	O	Information regarding tests to be measured by the system is set.
10	Result record	R	Measured results are set.
12	Request information record	Q	Information identifying a patient, such as a sample ID, is set to query the LIS about test order information.
13	Message terminator record	L	Last record of a message. This record contains an acknowledgment code field, where information on whether normal reception has been performed is set.
Note 1	System state record	S	The system state is determined according to system operations and modes such as measure. For the sample information entry function according to LIS direction, the LIS judges whether test order can be transmitted to the system, determined by the system state.

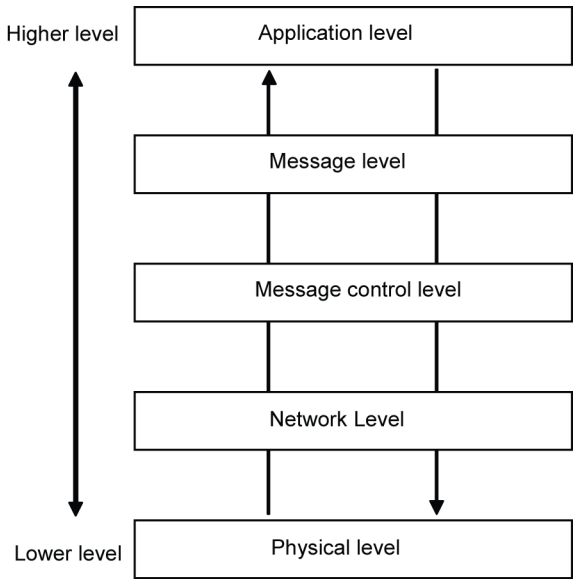
Note 1: ASTM 1394-91 does not specify this record. This record is specific to this specification and prescribed from the "EQU - System Detail Segment" for HL7.

Interface for the online functions overview

Hierarchical Structure for Online Functions

Interface for the online functions between the system and the LIS has a hierarchical structure explained in the following figure.

Figure 2.1 Hierarchical Structure for Online Functions



Overview of Levels

This section outlines each level defined for the online functions of the system.

1. **Physical level**

   This level defines physical connection between the system and the LIS, such as cables.

2. **Network level**

   This level defines a communication protocol to exchange data between the system and the LIS.

   This online function adopts TCP/IP.

3. **Message control level**

   This level defines a retry method and processing when a timeout or communication error occurs between the system and the LIS.

4. **Message level**

   This level defines messages used for the online functions, determined by ASTM 1394-91 and functions specific to this specification.

   The method to disassemble a message into components such as sample information and result is defined.

5. **Application level**

   This level defines functions such as sample information reception and result transfer, which are realized via message exchange between the system and the LIS.

Physical Level/Network Level

The physical level defines the following for communication between the system and the LIS.

- Transmission medium between the system and the LIS

The network level defines the following for communication between the system and the LIS:

- Transmission system
- Transmission protocol
- IP address and port number used
- Start and end of communication connection

Basic Communication Specification

TCP/IP is adopted as communication protocol between the system and the LIS. The following table shows the basic communication specification.

Table 2.4 Basic Communication Specification

Item		Description	
1	Transmission medium	10Base-T / 100Base-TX / 1000Base-T	
2	Transmission system	CSMA-CD	
3	Transmission protocol	TCP/IP	
4	IP address	System	Refer to Note 1.
		LIS	Any setting is available. (Setting is done in System Maintenance mode of the system.) Refer to Note 2.
5	Security	Windows Firewall. Refer to Note 3.	

Note 1: The same IP address as for PROService is used.

For information on how to set the IP address, refer to the Service Manual.

Note 2: The DxC 700 AU must have the IP address and port number of the LIS set in the system maintenance parameters. When you initially set the Host Communication destination or change the setting later, set the system maintenance parameter before you start communication.

For information on how to set the system maintenance parameter, refer to the Service Manual.

Note 3: When connected to a Windows 10 console PC, the DxC 700 AU only communicates with an IP address and port set in the Windows Firewall. When you initially set the Host

Communication destination or change the setting later, reconfigure the Windows Firewall. Windows 7 console PCs do not use a Windows Firewall.

For information on how to configure the Windows Firewall, refer to the Service Manual.

Ports depends on functions provided by the system. The following table shows functions and corresponding ports.

For relationship between the setting on the **Online** screen and ports used, refer to Table 2.6 Port Use Conditions.

Table 2.5 Functions and Corresponding Ports

Function	System	LIS	Communication port	Port number setting (Refer to Note 1 and Note 2)
Realtime online test order query	Client	Server	A	Any 5-digit number
Realtime online test order query of auto rerun	Client	Server	A	Any 5-digit number
Realtime online result transfer	Client	Server	A	Any 5-digit number
Batch online result transfer	Client	Server	B	Any 5-digit number
Sample information entry according to LIS direction	Client	Client	C	Any 5-digit number
System state transfer	Client	Server	D	Any 5-digit number

Note 1: Since PROService uses port number [80], set any other port number.

Note 2: The port A and the port B can be set the same port number.

Table 2.6 Port Use Conditions

Communication port	Port use conditions (Refer to Note 1)
A	Select **Realtime** in any of [Online] - [Setup] - [Test Order Information Receive], or [Realtime] is selected for any of result transfer.
B	Select any item other than **None** in any of [Online] - [Setup] - [Result Transfer].
C	Select **LIS Direction** in any of [Online] - [Setup] - [Test Order Information Receive].
D	Select **Enable** in [Online] - [Setup] - [Other Transfer] - [Equipment State].

Note 1: For information about online setting, refer to Appendix B: Online Parameters.

Connection Sequence

The following figure shows a connection sequence between the client and the server.

Connect or accept the port for the function selected to be used in Table 2.5 Functions and Corresponding Ports.

Connect the system and the LIS to each other continuously from the system start-up to system termination. When a communication error occurs and the connection is interrupted, reconnect the system and the LIS.

Message Control Level

The message control level defines the following for communication between the system and the LIS.

- Message start/end codes
- Message acknowledgment
- Timer used for communication
- Message retries

Message Start/End Codes

Select whether a start/end code is used for message transmission. When the LIS use start/end codes, 2 bytes must be set for each start and end code, depending on operation. However, it is impossible to set a start code only.

As an example to adapt the start/end codes to LIS operation, a LIS implemented using HL7 is thinkable. When the LIS uses HL7, start code [0x0B] and end codes [0x1C] and [0x0D] can be used from the "HL7 Implementation Support Guide C.4 MINIMAL LOWER LAYER PROTOCOL." In that case, set the similar start/end codes in **Online** when connecting to the system having this specification. This setting eliminates the need for implementing the start/end codes for the system.

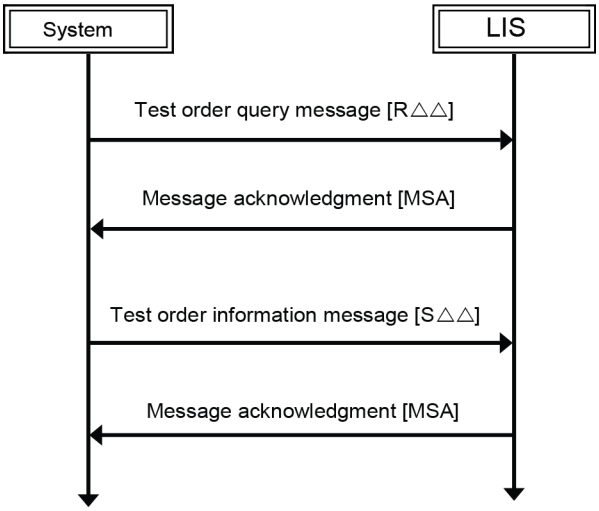
0x0B	Message	0X1C	0x0D

Message Acknowledgment

The message receiving side returns message acknowledgment to the transmitting side during communication between the system and the LIS. The message acknowledgment contains an acknowledgment code and the message receiving side returns acknowledgment after judging whether the message has been properly received or whether there is something wrong with the message. For message acknowledgment, refer to Message Acknowledgment.

The following figure shows an example of acknowledgment for the message, using a realtime online test order query sequence. A code in square brackets in the following figure indicates a message type. The message type in message acknowledgment used here is [MSA].

Figure 2.2 Message Acknowledgment



Timer Used for Communication

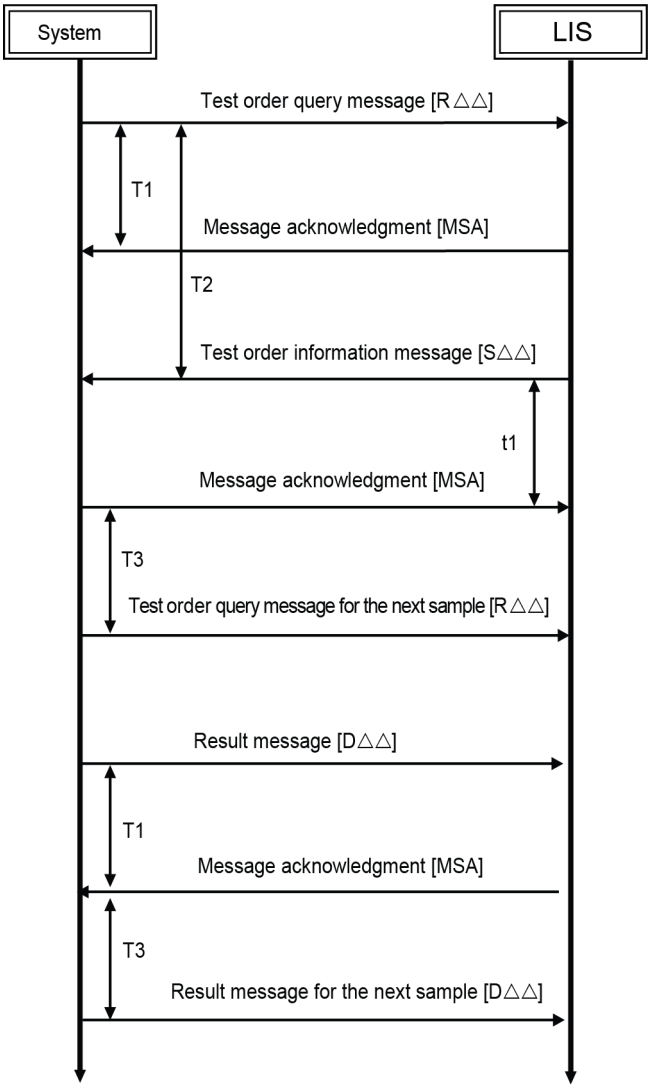
The following table shows a timer used in the communication sequence. The T1 (t1) round-trip timer functions until reception of message acknowledgment [MSA] in reply to messages transmitted by the system or the LIS (all messages other than message acknowledgment [MSA]). T2 is different from T1, and intended for specific messages. It serves from test order query message transmission to test order information reception. Set T1 and T2 so that T2 is greater than T1.

Timer set on	Type	Timer type	Application
System	T1	Round-trip timer	Timeout time from message transmission to message acknowledgment [MSA] reception by the system
	T2	Round-trip timer	Timeout time from test order query message transmission to test order information message reception by the system
	T3	Interval timer	Wait interval until next test order query message transmission Wait interval until next result message transmission
	T4	Sleep timer	Timeout time from test order information message transmission to message acknowledgment [MSA] reception by the LIS
LIS	t1	Round-trip timer	Timeout time from test order information message transmission to message acknowledgment [MSA] reception by the LIS
	t2		
	t3		
	t4	Sleep timer	Retransmission interval for acknowledgment code [AR (Refer to Note 1)] transmission from the system

Note 1: Acknowledgment code causing a retry. [AA] is set for normal reception. For information about acknowledgment codes, Refer to Message Acknowledgment.

The following figure shows an example of timer setting, using the realtime online test order query and realtime result transfer sequence. Retry shows an example of T4 (t4).

Figure 2.3 Timer Setting



Retry

When a message is not transmitted/received properly, a retry is performed. The specification defines two types of triggers to perform retries:

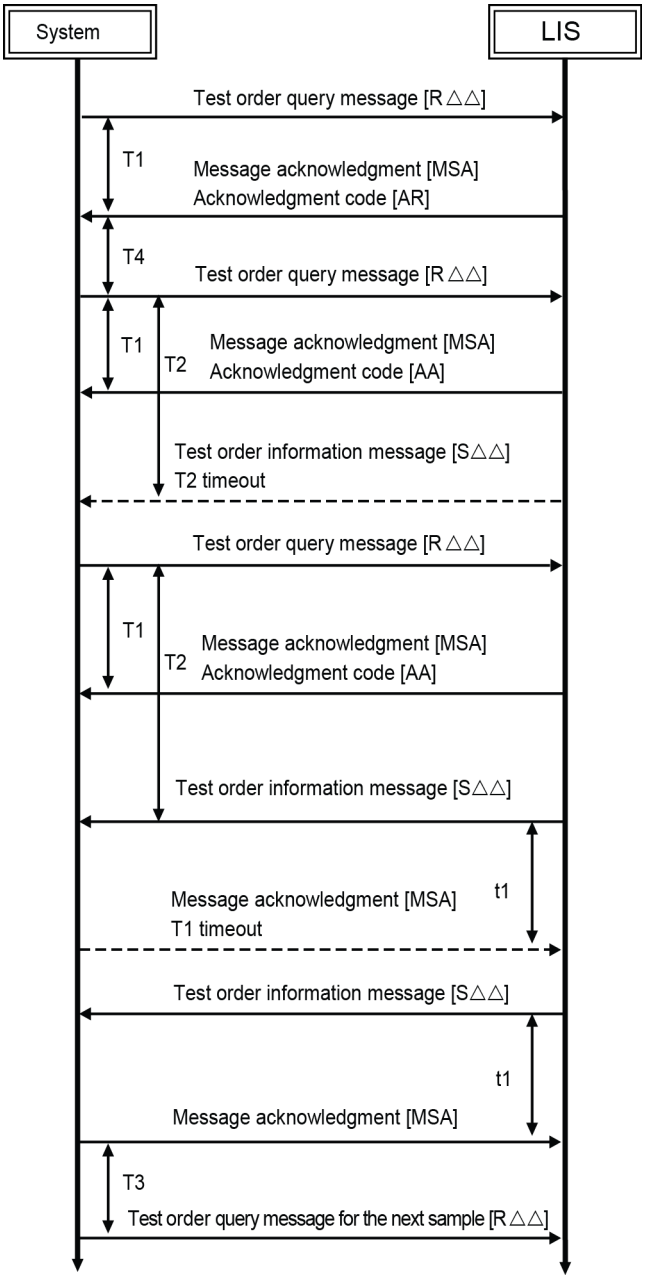
- A timeout occurs at the round-trip timer (T1, T2 or t1)
- The acknowledgment code in the received message acknowledgment [MSA] is [AR]

The following table shows messages to be retried in reply to the trigger. Only the date and time of message (Refer to Test Order Query Start Notification/Test Order Query End Notification Messages) is updated, and the message identical to the one transmitted on the

first attempt is retried. The message control IDs (refer to the same section as Date and time of message) are also be identical.

Trigger	Message to be retried
Timeout	Message transmitted when setting the timer
Acknowledgment code [AR]	Transmitted message corresponding to the received message acknowledgment

Figure 2.4 Retry Sequence Example



Message Level

This section explains messages of this specification which uses ASTM 1394-91.

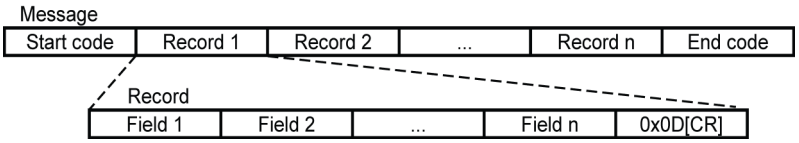
For functions which are not achieved only via ASTM 1394-91, messages are defined by introducing the HL7 concept.

Terms

1. **Message**

   A message is included of several records (Refer to Record), and a record contains several fields (Refer to Field). The following figure shows a concept of the message.

   Figure 2.5 Message Concept



2. **Record**

   A record contains several groups of fields, and each record contains specific information. For example, patient information is contained in the "Patient information record (P) and measured result is contained in the "Result record (R)." An alphabet in brackets is a record type ID. To delimit records, suffix 0x0D[CR] to the record.

   The message start/end records are determined. The first record is "Message header record (H)" and the last record is "Message terminator record (L)." Other records are contained between Records H and L.

   For information about records, refer to Table 2.3 Record List.

3. **Field**

   A field contains individual information composing a record, such as a patient name and result. When there is no information to be set, the field is called a null field. Where each field containing specific information is located in a record is uniquely determined for each record. Correlating fields in a record with individual information are done by counting the number of fields from the beginning of the record.

Character Code

As a character code, UNICODE UTF-8 is used.

Delimiter

The ASTM 1394-91 delimiters include a delimiter used for records and delimiters used for fields. Although the record delimiter is only 0x0D[CR], described in Record, there are four types of field delimiters. The field delimiters can be defined for each message, using a

message header record. However, ASTM 1394-91 recommends the use of delimiters shown in the following table.

Table 2.10 Delimiter List

Delimiter	Recommended characters
Field delimiter	0X7C[|]
Repeat delimiter	0X5C[\]
Component delimiter	0X5E[^]
Escape delimiter	0X26[&]

Message Field Definition

A field including each message is defined. The rightmost number of ASTM 1394 Reference indicates a field position of the record. Since only used fields are mentioned, the numbers are not sequential. Use null fields at missing number positions. When a field of a missing number contains information, this information is ignored. Field names in this specification are the names used on the system, with which "ASTM 1394 field names" defined in ASTM 1394-91 are replaced. The maximum number of characters indicates that of one-byte characters. When two-byte characters are used, the maximum number of characters is half of that of one-byte characters.

Realtime Test Order Query/Realtime Test Order Query of Auto Rerun

1. Test Order Query Start Notification/Test Order Query End Notification Messages

Transmission Direction									
System → LIS									
ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	The system and the LIS respectively set a control ID to identify a message. The message transmitting side is set "00001-65535": (cyclic) and the receiving side transmits the message acknowledgment (Refer to Message Acknowledgment) by copying the message control ID of the received message into the acknowledgment. All messages other than message acknowledgment are counted up whenever a message is transmitted.

Transmission Direction									
H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	The ID of the message transmitting side is set. Decision on whether to use the field and a character string to be set can be programmed on the **Online** screen. When the system transmits a message, the system instance identifier on the **Online** screen is set. When the LIS transmits a message, the character string identical to the LIS ID on the **Online** screen or any character string is set.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	The ID of the message receiving side is set. Decision on whether to use the field and a character string to be set can be programmed on the **Online** screen. When the system transmits a message, the LIS ID on the **Online** screen is set. When the LIS transmits a message, the character string identical to the system instance identifier on the **Online** screen or any character string is set.

Transmission Direction									
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"RBΔ": Test order query start notification and "RBΔ ": Test order query end notification is set.
H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Message terminator record (L)									
L	13	1	1	Record type ID	Record type ID	Character string	1	Fixed	"L" is set.
L	13	1	2	Sequence number	Sequence number	Character string	1	Fixed	"1" is set.
L	13	1	3	End code	End code	Character string	1	Fixed	"N" is set.
			4	Refer to Note 1	Acknowledgment code	Character string	2	Fixed	"AA" is set. For information about acknowledgment codes, refer to Message Acknowledgment.
			5	Refer to Note 1	Error message	Character string	80	Variable	"AA" is set.

Note 1: The system uniquely sets the message control ID for a message to be transmitted according to the following function combination and counts it up.

The following shows combination of functions at each port:

1. Realtime test order query

   Realtime test order query of auto rerun

   Realtime result transfer

2. Batch online result transfer
3. System state transfer

Supplementary explanation: Do not include the sample information entry function according to LIS direction in the above, since this function requires messages that the LIS actively transmits.

Note 2: This field is specific to Beckman Coulter and is not defined in ASTM 1394-91.

<Communication format example>

— Message header record (H)

H|\^&|00004||DEVICE NAME|||||LIS NAME|RB |||20090114153028<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

2. **Test Order Query Message/Test Order Query Message of Auto Rerun**

Transmission Direction
System → LIS

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	Refer Test Order Query Start Notification/Test Order Query End Notification Messages.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	Refer Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	Refer Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"RΔΔ ": Test order query of normal/rerun and "RhΔ": Test order query of auto rerun are set.
H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Message terminator record (Q)									
Q	12	1	1	Record type ID	Record type ID	Character string	1	Fixed	"Q" is set.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
Q	12	1	2	Sequence number	Sequence number	Value	4	Fixed	Number starting from "0001" indicating record repetition in the message. The maximum value indicates a number of samples to be queried in a message. *1 Counted up from "0001" for each request information record.
Q	12	1	3	Starting range ID number	Test order query start number	Refer to Test order query start number.			
Q	12	1	4	Ending range ID number	Test order query end number	Refer to Test order query end number.			
Q	12	1	13	Request information status code	Request information status code	N	1	Fixed	"N" is set. The test order query cannot be corrected.
Q	12	1	14		Sample information	Refer to Sample Information in Message Common Fields.			
Message terminator record (L)									
Refer to Test Order Query Start Notification/Test Order Query End Notification Messages									

Note 1: On the system, the number is fixed at "0001" since only one sample is queried in a message.

<Communication format example>

Example of routine normal serum sample:

— Message header record (H)

H|\^&|00004||DEVICE NAME|||||LIS NAME|R |||20090114153028<CR>

— Request information record (Q)

Q|0001|^01234567890^ 0001|^^^|||||||||N| ^ ^0001^^^01234567890^1234^8^ <CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

Example of emergency rerun urine sample:

— Message header record (H)

H|\^&|00015||DEVICE NAME|||||LIS NAME|R |||20090114153028<CR>

— Request information record (Q)

Q|0001|^01234567890^HE002|^^^|||||||||N|H^E^002^^^01234567890^1234^1^U<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

3. **Test Order Information Message/Test Order Information Message of Auto Rerun**

Transmission Direction
System → LIS

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"RΔΔ": Test order query of normal/rerun and "RhΔ": Test order query of auto rerun are set.
H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Patient information record (P)									
P	8	1	1	Record type ID	Record type ID	Character string	1	Fixed	"P" is set.
P	8	1	2	Sequence number	Sequence number	Value	4	Fixed	"0001" is set.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
P	8	1	4	Laboratory assigned patient ID	Sample ID	Character string	26	Variable	On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed. The sample ID in the sample information in the test order query/ test order query of auto rerun is copied and set.
P	8	1	5	Patient ID	Patient ID (PID)	Character string	20	Variable	PID is set (any character string). Refer to Note 1.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
				Patient name	Patient information 1 Refer to Note 2.	Character string	20	Variable	Any character string is set. When patient information includes a patient name, we recommend using this field. The patient name registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
				Mother's maiden name	Patient information 2 Refer to Note 2.				Any character string is set. When patient information includes a mother's maiden name, we recommend using this field. The mother's maiden name registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.
				Birthdate	Years/months (Birthdate)	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. Refer to Years/Months (Birthdate) in Message Common Fields.			
				Patient sex	Patient sex	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. Refer to Patient Sex in Message Common Fields.			

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
				Patient race-ethnic origin	Patient information 3 Refer to Note 2.	Character string	20	Variable	Any character string is set. When patient information includes patient race-ethnic origin, we recommend using this field. The patient race-ethnic origin registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.
				Reserved	Other Type	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. Refer to Other Type in Message Common Fields.			

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
				Patient height	Patient information 4 Refer to Note 2.	Character string	20	Variable	Any character string is set. When patient information includes patient height, we recommend using this field. The patient height registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
				Patient weight	Patient information 5 Refer to Note 2.	Character string	20	Variable	Any character string is set. When patient information includes patient weight, we recommend using this field. The patient weight registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
				Location	Patient information 6 Refer to Note 2.	Character string	20	Variable	Any character string is set. When patient information includes location, we recommend using this field. The location is information such as ward and bed data for the patient. The location registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.
Test order record (O)									
O	9	4	1	Record type ID	Record type ID	Character string	1	Fixed	"O" is set.
O	9	4	2	Sequence number	Sequence number	Value	4	Fixed	0001" is set.
O	9	4	3	Specimen ID	Specimen ID	Refer to Specimen ID in Message Common Fields.			
O	9	4	4	system specimen ID	system specimen ID	Refer to system Specimen ID in Message Common Fields.			
O	9	4	32	Universal test ID	Sample information	Refer to Sample Information in Message Common Fields.			

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
O	9	4	33		Test order information	Refer to Test Order Information in Message Common Fields.			
Message terminator record (L)									
Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.									

Note 1: Do not save the data to a database. In addition, this data is not added to the result message.

Note 2: In this specification, we recommend setting patient information 1 to 6 to the above information. However, a demand to set other information is intended. For example, Field 11 in Record P of ASTM 1394-91 defines a patient address. However, to set the patient address, do not set this information in Field 11 but set it in any field of information 1 to 6.

Ex.:To set the patient address instead of the location:

Set the patient address in Field 26.

<Communication format example>

— Message header record (H)

H|\^&|00004||LIS NAME|||||DEVICE NAME|S |||20090114153028<CR>

— Patient information record (P)

P|0001||01234567890|PatientID|name|family name|70^11^|M|JAPAN|||||||172cm|58kg|||||||Place<CR>

— Test order record (O)

O|0001|^01234567890|01234567890^0001|||||||||||||||||||||||||||| ^ ^0001^^^01234567890^1234^8^ |
001^2\096^0<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

4. **Message Acknowledgment**

Transmission direction								
This message is a message acknowledgment transmitted by the receiving side in reply to each message.								
ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**
Message header record (H)								
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
				Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.
				Message control ID	Message control ID	Value	5	Fixed	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
				Sender name or ID	Sender name or ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
				Receiver ID	Receiver ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
				Comment or special instructions	Message type	Character string	3	Fixed	"MSA" is set.

Transmission direction									
				Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Message terminator record (L)									
L	13	1	1	Record type ID	Record type ID	Character string	1	Fixed	"L" is set.
L	13	1	2	Sequence number	Sequence number	Value	1	Fixed	"1" is set.
L	13	1	3	End code	End code	Character string	1	Fixed	"N" is set.
			4		Acknowledgment code	Character string	2	Fixed	An acknowledgment code is determined by judging whether the message has been properly received and whether there is something wrong with the message after receiving the message. For more information, refer to the following table. "AA": Normal reception "AE": Received message illegal "AR": Retry request "CE": Message reception disabled

Transmission direction									
			5		Error message	Character string	80	Fixed	"AA" is set.

Acknowledgment code	Description
AA	Normal reception
AE	[AE] is set when the received message is illegal. The system checks each field according to (2) Alarm No. 6102: ONLINE FORMAT ERROR in Appendix A.5 Alarm List to confirm whether the received message is illegal. When the received message is illegal, alarm No. 6102 is generated.
AR	[AR] is returned in the following cases, if the transmitting side retransmits the message after T4 (t4) has passed. — Although a message is received, the received message cannot be processed as another process is being performed. — An application error has occurred on the message receiving side. The following cases are possible when the system sets acknowledgment code [AR]. — The test order information is received when the mode ID is [CNRS] while using the sample information entry function according to LIS direction (Refer to 8 .4). — An error has occurred while entering the test order information message in the database.
CE	This code is set when the sample information message cannot be entered. For example, the test order information format is not consistent with the system setting causing the entry to be disabled, or the retry count is exceeded. The system transmits acknowledgment code [CE] when any of the following alarms are generated. For more information about alarms, refer to Appendix D: Alarm List. Alarm No. 6101 (Error type: 64), 6103, 6104, 6111, 6112, 6113, 6114, 6115, 6116, 6117, 6118, 6119, 6131, 6132, 6133, 6134, 6135, 6136, 6152, 6161, 6162

<Communication format example>

- Message header record (H)

  H|\^&|00004||LIS NAME|||||DEVICE NAME|MSA|||20090114153028<CR>
- Message terminator record (L)

  L|1|N|AR|AA<CR>

Realtime Result Transfer

1. Result Transfer Start Notification/Result Transfer End Notification Messages

Transmission Direction									
System → LIS									
ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"DBΔ": Result transfer start notification and "DEΔ": Result transfer end notification is set.

Transmission Direction									
H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Message terminator record (L)									
Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.									

<Communication format example>

— Message header record (H)

H|\^&|14563||DEVICE NAME|||||LIS NAME|DB |||20090114153028<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

2. **Result Message**

Transmission direction									
System → LIS									
ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.

H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"DΔΔ": Result and is set
H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Patient information record (P)									
Refer to Test Order Information Message/Test Order Information Message of Auto Rerun.									
Test order record (O)									
Refer to Test Order Information Message/Test Order Information Message of Auto Rerun.									
Result record (R)									
R	10	1	1	Record type ID	Record type ID	Character string	1	Fixed	"R" is set.
R	10	1	2	Sequence number	Sequence number	Value	5	Fixed	The first sequence number in one message is "00001" and counted up in a range of "00001-65535" for one result.
R	10	1	4	Data or measurement value	Result	Refer to Message Common Fields.			

R	10	1	7	Result abnormal flag	Flag	Refer to Data Flag in Message Common Fields.			
R	10	1	9	Result status	Quick type	Refer to Quick Type in Message Common Fields.			
R	10	1	13	Date/time test completed	Date/time test completed	Date and time	14	Fixed	The test complete time is set in the YYYYMMDDhhmmss format.
R	10	1	15	Universal test ID	Sample information	Refer to Sample Information in Message Common Fields. The sample information in the test order query message/test order query message of auto rerun is copied and set.			
R	10	1	16		CAL/Control/RB number	Refer to CAL/Control/RB Number in Message Common Fields.			
R	10	1	17		Lot/bottle No.	Refer to Lot/Bottle No. in Message Common Fields.			
Message terminator record (L)									
Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.									

<Communication format example>

Example of routine normal serum sample:

— Message header record (H)

H|\^&|00004||DEVICE NAME|||||LIS NAME|D |||20090114153028<CR>

— Patient information record (P)

P|0001||01234567890||name|family name|70^11^|M|JAPAN|||||||172cm|58kg|||||||Place<CR>

— Test order record (O)

O|0001|^01234567890|01234567890^0001|||||||||||||||||||||||||||| ^ ^0001^^^01234567890^1234^8^ |
001^2\096^0<CR>

— Result record (R)

R|00001||001^142.4^C^|||H \i3||||||20090114152911||| ^ ^0001^^^01234567890^1234^8^ ||
1111^9870^1111^9875^^^^<CR>

R|00002||LIP^1^n^|||||||||2009011452930|| ^ ^0001^^^01234567890^1234^8^ ||1234^1234^^^^^^<CR>

R|00003||ICT^3^n^|||||||||20090114152930|| ^ ^0001^^^01234567890^1234^8^ ||1234^1234^^^^^^<CR>

R|00004||HEM^2^n^|||||||||20090114152930|| ^ ^0001^^^01234567890^1234^8^ ||1234^1234^^^^^^<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

* This is an example of setting test [096] as an LIH test item.

Example of calibrator:

— Message header record (H)

H|\^&|00004||DEVICE NAME|||||LIS NAME|D |||20090114153028<CR>

— Patient information record (P)

P|0001||01234567890<CR>

— Test order record (O)

O|0001|^01234567890|01234567890^A001|||||||||||||||||||||||||||^A^001^^^01234567890^^^ |001^1<CR>

— Result record (R)

R|00001||001^1.2345^O^|||||||||20090114153001||^A^001^^^01234567890^^^ > ||
1111^9870^1111^9875^^^^<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

3. **Message Acknowledgment**

Refer to Message Acknowledgment.

Batch Online Result Transfer

1. **Result Transfer Start Notification/Result Transfer End Notification Messages**

   Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.

2. **Result Message**

Transmission direction								
System → LIS								
ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.

ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**

Message header record (H)									
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"DMΔ": Result is set.
H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Patient information record (P)									
Refer to Test Order Information Message/Test Order Information Message of Auto Rerun.									
Test order record (O)									
Refer to Test Order Information Message/Test Order Information Message of Auto Rerun.									
Result record (R)									
R	10	1	1	Record type ID	Record type ID	Character string	1	Fixed	"R" is set.
R	10	1	2	Sequence number	Sequence number	Value	5	Fixed	The first sequence number in one message is "00001" and counted up in a range of "00001-65535" for one result.
R	10	1	4	Data or measurement value	Result	Refer to Result in Message Common Fields.			
R	10	1	7	Result abnormal flag	Data flag	Refer to Data Flag in Message Common Fields.			
R	10	1	9	Result status	Quick type	Refer to Quick Type in Message Common Fields.			

R	10	1	13	Date/time test completed	Date/time test completed	Date and time	14	Fixed	The test complete time is set in the YYYYMMDDhhmmss format.
R	10	1	15	Refer to Note 1	Sample information	Refer to Sample Information in Message Common Fields. The sample information for the sample to be transferred, registered on the system, is set.			
R	10	1	16	Refer to Note 1	CAL/Control/RB number	Refer to CAL/Control/RB Number in Message Common Fields.			
R	10	1	17	Refer to Note1	Lot/bottle No.	Refer to Lot/Bottle No. in Message Common Fields.			
Message terminator record (L)									
Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.									

Note 1: Do not save the data to a database. In addition, this data is not added to the result message.

<Communication format example>

Example of routine normal serum sample:

— Message header record (H)

H|\^&|00004||LIS NAME|||||DEVICE NAME|DM |||20090114153028<CR>

— Patient information record (P)

P|0001||01234567890||name|family name|70^11^|M|JAPAN|||||||172cm|58kg|||||||Place<CR>

— Test order record (O)

O|0001|^01234567890|01234567890^0001|||||||||||||||||||||||||| ^ ^0001^^^01234567890^1234^8^ | 001^2\096^0<CR>

— Result record (R)

R|00001||001^142.4^C^|||H \i3||||||20090114153004|| ^ ^0001^^^01234567890^1234^8^ || 1111^9870^1111^9875^^^^|1^1<CR>

R|00002||LIP^1^n^|||||||||20090114153004|| ^ ^0001^^^01234567890^1234^8^ ||1234^1234^^^^^^|1^0<CR>

R|00003||ICT^3^n^|||||||||20090114153004|| ^ ^0001^^^01234567890^1234^8^ ||1234^1234^^^^^^|1^0<CR>

R|00004||HEM^2^n^|||||||||20090114153004|| ^ ^0001^^^01234567890^1234^8^ ||1234^1234^^^^^^|1^0<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

* This is an example of setting test [096] as an LIH test item.

3. **Message Acknowledgment**

Refer to Message Acknowledgment.

Sample Information Entry Function according to LIS Direction

1. Test Order Information Message

Transmission direction									
System -> LIS									
ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\\^&" is set.
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"SM?": Test order information of normal/ rerun is set.

H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
Patient information record (P)									
P	8	1	1	Record type ID	Record type ID	Character string	1	Fixed	"P" is set.
P	8	1	2	Sequence number	Sequence number	Value	4	Fixed	"0001" is set.
P	8	1	4	Laboratory assigned patient ID	Sample ID	Character string	26	Variable	On the **Sample Program Format** screen, decision on whether or not to add this field and the number of digits can be programmed. The sample ID registered on the LIS for the sample to be measured is set.
P	8	1	5	Patient ID	Patient ID (PID)	Character string	20	Variable	PID is set (any character string). (*1)
P	8	1	6	Patient name	Patient information 1	Character string	20	Variable	Any character string is set. When patient information includes a patient name, we recommend using this field. The patient name registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.

P	8	1	7	Mother's maiden name	Patient information 2	Character string	20	Variable	Any character string is set. When patient information includes a mother's maiden name, we recommend using this field. The mother's maiden name registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
P	8	1	8	Birthdate	Years/months (Birthdate)	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. Refer to Years/Months (Birthdate) in Message Common Fields.			
P	8	1	9	Patient sex	Patient sex	On the **Sample Program Format** screen, decision on whether or not to add this field can be programmed. Refer to Patient Sex in Message Common Fields.			

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
P	8	1	10	Patient race-ethnic origin	Patient information 3	Character string	20	Variable	Any character string is set. When patient information includes patient race-ethnic origin, we recommend using this field. The patient race-ethnic origin registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.
P	8	1	12	Reserved	Other Type	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. Refer to Other Type in Message Common Fields.			

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
P	8	1	17	Patient height	Patient information 4	Character string	20	Variable	Any character string is set. When patient information includes patient height, we recommend using this field. The patient height registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.
P	8	1	18	Patient weight	Patient information 5	Character string	20	Variable	Any character string is set. When patient information includes patient weight, we recommend using this field. The patient weight registered on the LIS for the sample to be measured is set. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Message header record (H)									
P	8	1	26	Location	Patient information 6	Character string	20	Variable	Any character string is set. When patient information includes location, we recommend using this field. The location registered on the LIS for the sample to be measured is set. The location is information such as ward and bed data for the patient. On the **Sample Program Format** screen, decision on whether to add this field and the number of digits can be programmed.

ASTM E1394 reference position				ASTM E1394 field name	Field name in this specification	Set value	Maximum number of characters	Variable length	Description
Test order record (O)									
O	9	4	1	Record type ID	Record type ID	Character string	1	Fixed	"O" is set.
O	9	4	2	Sequence number	Sequence number	Value	4	Variable	"0001" is set.
O	9	4	3	Specimen ID	Specimen ID	Refer to Specimen ID in Message Common Fields. The sample ID registered on the LIS for the sample to be measured is set.			

O	9	4	4	System specimen ID	System specimen ID	Refer to system Specimen ID in Message Common Fields.
O	9	4	32	Universal test ID	Sample information	Refer to Sample Information in Message Common Fields. The sample information registered on the LIS for the sample to be measured is set.
O	9	4	33	?	Test order information	Refer to Test Order Information in Message Common Fields. The test order information registered on the LIS for the sample to be measured is set.
Message terminator record (L)						
Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.						

Note 1: Do not save the data to a database. In addition, this data is not added to the result message.

<Communication format example>

Example of routine normal serum sample:

— Message header record (H)

H|\^&|00004||LIS NAME|||||DEVICE NAME|SM |||20090114153028<CR>

— Patient information record (P)

P|0001||01234567890|Patient-1|name|family name|70^11^|M|JAPAN|||||||172cm|58kg|||||||Place<CR>

— Test order record (O)

O|0001|^01234567890|01234567890^|||||||||||||||||||||||||||| ^ ^^^^01234567890^^^ |001^2\002^1\100^0<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

2. **Message Acknowledgment**

Refer to Message Acknowledgment.

System State Transfer Function

1. System State Transfer Message

Transmission direction									
System → LIS									
ASTM E1394 reference position				**ASTM E1394 field name**	**Field name in this specification**	**Set value**	**Maximum number of characters**	**Variable length**	**Description**
Message header record (H)									
H	7	1	1	Record type ID	Record type ID	Character string	1	Fixed	"H" is set.
H	7	1	2	Delimiter definition	Delimiter definition	Character string	4	Fixed	"|\^&" is set.
H	7	1	3	Message control ID	Message control ID	Value	5	Fixed	Refer to Test Order Query Start Notification/ Test Order Query End Notification Messages.
H	7	1	5	Sender name or ID	Sender name or ID	Character string	32	Variable	Refer to Test Order Query Start Notification/ Test Order Query End Notification Messages.
H	7	1	10	Receiver ID	Receiver ID	Character string	32	Variable	Refer to Test Order Query Start Notification/ Test Order Query End Notification Messages.
H	7	1	11	Comment or special instructions	Message type	Character string	3	Fixed	"STΔ": System state is set.

H	7	1	14	Date and time of message	Date and time of message	Date and time	14	Fixed	The message transmission time is set in the YYYYMMDDhhmmss format.
System state record (S)									
			1	Record type ID	Record type ID	Character string	1	Fixed	"S" is set.
			2	System instance identifier	System instance identifier	Character string	32	Fixed	Reserved (null field)
			3	Event date/time	Event date/time	Date and time	14	Fixed	The event time is set in the YYYYMMDDhhmmss format. * This time is different from the message transmission time.
			4	System state	System state	Character string	Refer to Table 2.26 System State Field Configuration.		
			5	Local/remote control state	Mode	Character string	Refer to Table 2.28 Mode Field Configuration.		
			6	Alert level	Alert level	Character string	3	Variable	Reserved (null field)
Message terminator record (L)									
Refer to Test Order Query Start Notification/Test Order Query End Notification Messages.									

<Communication format example>

— Message header record (H)

H|\^&|00004||DEVICE NAME|||||LIS NAME|ST |||20090114153028<CR>

— System state record (S)

S||20090114153008|OP^Normal Operation|CNRS^CAN_NOT_RECEIVE_SAMPLE||<CR>

— Message terminator record (L)

L|1|N|AA|AA<CR>

Components: |<System state>^<System state text>|

Table 2.26 System State Field Configuration

Item Details	Set item	Set value	Maximum number of characters	Variable length	Description
	System state	Character string	2	Variable	Refer to the table below. For information about which system state is set depending on system conditions, refer to Table 2.27 System State.
	System state text	Character string	16	Variable	System state text described in the following table is set according to the system state.

Table 2.27 System State

System state	System state text	Description
'PU'	'Powered Up'	The system is not in the left state.
'IN'	'Initializing'	The system analyzer is initializing.
'ID'	'Idle'	The system is ready to start measure in STANDBY mode.
'CO'	'Configuring'	The system is editing parameters, in MAINTENANCE mode or saving data in external memory such as FD or CD.
'OP'	'Normal Operation'	The system is measuring, washing (W1/W2) or in PHOTOCAL mode.

Table 2.27 System State (Continued)

System state	System state text	Description
'CL'	'Clearing'	The system is replacing the index with another index. After the index is replaced, sample information entered in the index is in the same state as saved in the previous index. To measure the sample that has been entered but not been measured before the index is replaced, in the current index, retransmit the test order information message about the sample to be measured.
'PA'	'Pausing'	The system is shifting to PAUSE mode during measure.
'PD'	'Paused'	The system is in PAUSE mode.
'ES'	'E -stopped'	The system is in STOP mode or shifting to STOP mode during measure.
null	'No state change'	The system state in the previous transmission remains the same. Or the state is null and the mode ID is "EDPR" in END mode.

Components: |<Mode ID>^<Mode text>|

Table 2.28 Mode Field Configuration

	Set item	Set value	Maximum number of characters	Variable length	Description
Item Details	Mode ID	Character string	4	Fixed	Refer to the table below. For information about which mode ID is set depending on system conditions, refer to Table 2.29 Mode ID.
	Mode text	Character string	24	Variable	Mode text described in the following table is set according to the mode ID.

Table 2.29 Mode ID

Mode ID	Mode text	Description
'EDPR'	'END OF PROCESS'	The operation mode is END. It is a state where the system is not ready to receive the test order information message. The system turns off after receiving the system state message.
'CNRS'	'CANNOT RECEIVE SAMPLE'	It is a state where the system is not ready to receive the test order information message. For more information, refer to (4) Alarm No. 6104: ONLINE ORDER INFORMATION RECEIVE ERROR in Appendix D: Alarm List.
'ENRS'	'ENABLE TO RECEIVE SAMPLE'	It is a state where the system is ready to receive the test order information message.

2. **Message Acknowledgment**

   Refer to Message Acknowledgment.

Message Common Fields

Test order query start number

Components: |<null>^<Sample ID>^<Measure Type·Sample Kind·Sample No.>|

	Set item	Set value	Maximum number of characters	Variable length	Description
Item details	Sample ID	Character string	26	Variable	On the **Sample Program Format** screen, decision on whether to add this field and the number of digits (0 to 26) can be programmed.
	Measure type Sample kind Sample No.	Character string	5	Variable	Routine sample: "Δ0001" to "Δ9999" STAT sample: "ΔP001" to "Δ P999" Emergency sample: "ΔE001" to "ΔE999" Routine rerun sample: "H0001" to "H9999" STAT rerun sample: "H P001" to "HP999" Emergency rerun sample: "HE001" to "HE999" Control: "Q001" to "Q999" Reagent blank sample: "R001" to "R999" Calibrator: "A001" to "A999" For auto rerun, this field contains first run sample kind/first run sample No. as search keys.

Test order query end number

Components: |<null>^<null>^<null>^<Sample No.>|

	Set item	Set value	Maximum number of characters	Variable length	Description
Item details	Set item	Set value	Maximum number of characters	Variable length	Description

Sample Information

Components: |<Measure type>^<Sample kind>^<Sample No.>^<First run sample kind>^<First run sample No.>^<Sample ID>^<Rack No.>^<Cup position>^<Sample type>|

	Set Item		Set value	Maximum number of characters	Variable length	Description
Item details	Order sample information	Measure type	Character string	1	Variable	The LIS copies and sets the measure type contained in the test order query message when transmitting the test order information message. In the case of a calibrator, reagent blank sample or control, no information is set. "Δ": First run sample "H": Rerun sample "": Calibrator, reagent blank sample or control
		Sample kind	Character string	1	Variable	The LIS copies and sets the sample kind contained in the test order query message when transmitting the test order information message. In the case of auto rerun, no information is set. "Δ": Routine sample "P": STAT sample "E": Emergency sample "A": Calibrator "R": Reagent blank sample "Q": Control
		Sample No.	Value	4	Variable	The LIS copies and sets the sample No. contained in the test order query message when transmitting the test order information message. "0001" to "9999": Routine sample "001" to "999":STAT/ Emergency sample, control, reagent blank sample, calibrator "0000": Auto rerun sample

	Set Item		Set value	Maximum number of characters	Variable length	Description
Item details	First run sample information (Refer to Note 1)	First run sample kind	Character string	1	Variable	Set the sample kind of the first run sample for which rerun is conducted. Refer to Note 1. Set the value in this field to the same value as Sample kind. "Δ": Routine sample "P": STAT sample "E": Emergency sample for first run sample, no information is set. Only for auto rerun, the system sets the information.
		First run sample No.	Character string	4	Variable	Set the first run sample No. of the sample for which rerun is conducted. *1 Set the value in this field to the same value as Sample No. "0001" to "9999": Routine sample "001" to "999": STAT/Emergency sample for first run sample, no information is set. Only for auto rerun, the system sets the information.
		Sample ID	Character string	26	Variable	On the **Sample Program Format** screen, decision on whether to add this field and the number of digits (0 to 26) can be programmed. The LIS copies and sets the sample ID contained in the test order query when transmitting the test order information message.

	Set Item		Set value	Maximum number of characters	Variable length	Description
Item details		Rack No.	Value	5	Variable	The number of digits is the same as the value programmed in [System Maintenance] - [Digits of Rack ID]. Do not program this area for reagent blank samples, calibrators, controls or STAT samples when Automation Ready is connected. This area may not be set for first run samples/stat samples. The LIS copies and sets the rack No. contained in the test order query message when transmitting the test order information message. "0001" to "9999": For 4 digits "00001" to "99999": For 5 digits
		Cup position	Value	2	Variable	Whether to use this area depends on setting of whether to use the above rack No. The LIS copies and sets the cup position contained in the test order query message when transmitting the test order information message. "1" to "10": Rack sample "1" to "22": STAT sample

	Set Item		Set value	Maximum number of characters	Variable length	Description
Item details		Sample type	Character string	1	Fixed	When DxC 700 AU cannot specify sample types, transmission is performed by selecting **Not specified: 'N'**. Response is made after selecting a certain sample type other than **Not specified** on the LIS. When DxC 700 AU cannot specify sample types, transmission is performed by selecting other than **Not specified: 'N'**. Response is performed by selecting same Type as the Type selected by DxC 700 AU on the LIS. " r ": Serum "U": Urine "X": Other 1 "Y": Other 2 "N": Not specified

Note 1: How to program first run sample information for test order query of rerun sample:

The sample No. is used as key information for identifying sample information inside the system. When the LIS transmits the test order information message for a rerun sample, the sample No. and the sample kind of the first run sample are recorded on the LIS side to identify the rerun sample, and the sample No. and the sample kind of the rerun sample used for the normal test (hereinafter called a first run sample No. and a first run sample kind) is added when the message is transmitted. When you select nonuse of the sample No. in **Online**, the system uses the sample ID as key information. In that case, the LIS does not need to record the sample No. and the sample kind. The method for programming first run sample information varying depending on whether to use the sample No., is described below.

	Test order information message/Test order information message of auto rerun
	Description
Sample No. used	<In the case of first run sample> Copy and set the first run sample No. and the first run sample kind contained in the test order query message. <In the case of rerun sample>Set the first run sample No. and the first run sample kind for the rerun sample, recorded on the LIS.<In the case of auto rerun sample> Copy and set the first run sample No. and the first run sample kind contained in the test order query message.
No sample No. used	Copy and set the first run sample No. and the first run sample kind contained in the test order query.

When the LIS sets sample information using the sample information entry function according to LIS direction, the sample information in the test order query message from the

system cannot be copied, unlike the realtime test order query. Therefore, the following information is set.

	Set item		Description
Item details	Order sample information	Measure type	"Δ": First run sample "H": Rerun sample
		Sample kind	To transmit the test order information message of rerun sample, set the sample kind identical to the one for first run sample. "Δ": Routine sample "P": STAT sample "E": Emergency sample
		Sample No.	No information is set.
		Rack No.	No information is set.
		Cup position	No information is set.
		Sample ID	Set information.
		Sample type	The set value is as follows: "Δ": Serum "U": Urine "X": Other 1 "Y": Other 2 "W": Whole blood
	First run sample information	First run sample kind	No information is set.
		First run sample No.	No information is set.

Years/months (Birthdate)

Components: |<Years>^<Months>^<Birthdate>|

	Set item	Set value	Maximum number of characters	Variable length	Remarks
Item details	Years	Value	3	Variable	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. Set a value in a range of "0 to 150." For error criteria, refer to Note 1.
	Months	Value	2	Variable	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. Set a value in a range of "0 to 11." For error criteria, refer to Note 1.
	Birthdate	Value	8	Variable	Do not set the information in the system. Refer to Note 2.

Note 1: Error criteria for years/months

Pattern	Years	Months	Judgment
1	Null field	Null field	OK
2	***	Null field	OK
3	Null field	**	Not OK
4	***	**	OK

In the case of [Pattern 2], although this field is used, months is considered undefined and the system registers "0."

Note 2: The system does not save the data to a database. In addition, do not add this data to the result.

Patient sex

Components: |<Patient sex>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Patient sex	Character string	1	Variable	On the [Sample Program Format] screen, decision on whether to add this field can be programmed. "M": Male "F": Female "U": Unknown

Other Type

Components: |<Other Type>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Other Type	Value	1	Variable	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. "0": Type1 "1": Type2 "2": Type3 "3": Type4 "4": Type5 "5": Type6

Specimen ID

Components: |<Specimen ID (collected)>^<Sample ID>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Specimen ID (collected)	Character string	32	Variable	The specimen ID is set (any character string). Refer to Note 1.
	Sample ID	Character string	26	Variable	On the **Sample Program Format** screen, decision on whether to add this field can be programmed. The number of digits for the patient sample is programmed on the **Sample Program Format** screen (4 to 26 digits). For reagent blank samples, calibrators, or controls, the ID (26 digits max.) programmed in [Calibrat ion Setup] - [Calibrators] or [QC setup] - [Controls] is set.

Note 1: The system does not save the data to a database. In addition, do not add this data to the result.

System specimen ID

Components: |<Sample ID>^<Sample No.>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Sample ID	Character string	26	Variable	The sample ID is set in the same manner as that in O.9.4.3 Specimen ID.
	Sample No. (Rerun sample No.)	Character string	5	Variable	The LIS copies and sets the sample No. in Q.12.1.3 Test order query start number when transmitting test order information. However, only for auto rerun , "0000" is set. Routine sample: " r 0001" to " r 9999" STAT sample: " r P001" to " r P999" Emergency sample: " r E001" to " r E999" Routine rerun sample: "H0001" to "H9999" Routine rerun sample: "HP001" to "HP999" Emergency rerun sample: "HE001" to "HE999" Auto rerun sample: "0000" Refer to Note 1.

Note 1: When sample information is set using the sample information entry function according to LIS direction, you do not need to set sample No.

Test order information

Components: <Test item No. 1>^<Dilution inf. 1>\<Test item No. 2>^<Dilution inf. 2>\ . . . \<Test item No. n>^<Dilution inf. n>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Test item	Value	3	Variable	Set a value in a range of "001 to 999" determined by the setting in [Online]-[Online Test No.]. Refer to Note 1. The system is set the online test No. corresponding to transfer data in R. 10.1.4 Result, to the result message. For LIH tests, the online test No. instead of the character string is set.

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
	Dilution inf.	Value	1	Variable	Whether to add this field to the first run sample can be programmed on the **Online** screen. The rerun sample uses this field, regardless of the above parameter setting. "0": Normal "1": Diluted "2": Concentrated

Note 1: Supplementary explanation of test items

1. Sample information for calculated tests

   — When the test No. of calculated test is included in the test item in the test order information message transmitted by the LIS, the system ignores this test item. To measure calculated tests, measure all calculated tests programmed in [Specific Test Parameters] - [Calculated Tests]. When all measured data for calculated tests for the sample are prepared, calculation and transfer are done.
   — When any one of calculated tests has not been measured, or when a calculation-disabled data flag (such as "? r ") is attached although the measure is conducted, do not transfer a calculated test result.

2. Test items not to be measured

   When the system receives a test item in the test order information-related message under the following conditions, the test item is not measured.

   — An LIH test item exists for sample types (urine, whole blood, and so forth) for which LIH is not to be measured.
   — An ISE (Na, K, Cl) test item exists for sample types for which ISE is not to be measured.
   — An HbA1c test item exists for sample types for which HbA1c is not to be measured.
   — A test item which is not contained in online test Nos. in Online exists.
   — There is a test item which is not included in a group of tests in [Common Test Parameters] - [Group of Tests].
   — There is a test item for which **No** is selected for operation in each item in [Test Volume and Methods].
   — There is a sample blank test item which only contains a blank item but not a color item.
   — The dilution inf. is other than 0, 1 or 2.
   — The dilution inf. is other than 0 for LIH, ISE, and HbA1c tests.

3. LIH test

   Serial communication using RS-232C interface of the system allows LIH measure on the following basis, according to the "LIH Selection" settings in [Common Test Parameters] - [Group of Tests].

LIH Selection	Description
Select All	The LIH test is performed on all samples whether or not the LIH test is included in the test order from the LIS.

LIH Selection	Description
Selectable	The LIH test is performed only if the LIH test is included in the test order from the LIS.

4. HbA1c tests

   Please select HbA1c only when selecting normal sample, emergency sample, STAT sample, and QC sample. Even if T-Hb or A1c is selected and HbA1c is not selected, AU does not measure these samples.

   Conversely, when you select items for reagent blank sample and calibration sample, please select T-Hb and A1c as a set. Even if HbA1c is selected, AU does not measure these samples.

5. No Item Selection

   If a message without any item setting in "Test order information" field is received, samples are registered without any Item Selection Information by the system. No analysis or data input for these samples is conducted.

Result

Components: |<Test item>^<Result>^<Result type>^<RB result type>^|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Test item	Character string	3	Fixed	A value in a range of "001 to 999" is set determined by the setting in [Online]-[Online Test No.]. For LIH tests, the three result records are set to the following character string corresponding to lipemia, icterus and hemolysis. "LIP": Lipemia "ICT": Icterus "HEM": Hemolysis For HbA1c tests, output of normal samples, emergency samples, STAT samples, and QC samples is only HbA1c. There is no output of T-Hb and A1c. Conversely, there is no output of HbA1c for reagent blank samples and calibration samples, only T-Hb and A1c are output.
	Result	Value	10	Variable	Refer to the following supplementary explanation.

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
	Result type	Character string	1	Variable	Result types transferred from the system contain a CONC value (concentration value), OD value (absorbance value) and LIH test. When the test is unprocessed, such result can be transferred. The type is set as follows. "C": CONC value "O": OD value "n": LIH test "": Unprocessed
	RB result type	Value	1	Variable	For the reagent blank sample result, the measuring start point and the measuring end point are transferred. When the data to be transferred is a measuring start point, "1" is set and when the data is a measuring end point, "2" is set. "": Measure samples other than reagent blank sample "1": Measuring start point "2": Measuring end point

Supplementary explanation of results

1. Result format
   a. CONC value/OD value

      -123.456

      -123.45

      The result is set using up to 10 digits including numbers, a decimal point and a minus sign.

      However, do not put any spaces between a symbol and a number.

      A negative OD value can be transferred.

      The OD value uses all digits. (The maximum number of effective digits is expressed using up to 10 digits.)

   b. LIH data

      A value from 0 to 6 is set according to the LIH data result described in the right.

      Result value

      — "0": Normal
      — "1": +
      — "2": ++

— "3": +++
— "4": ++++
— "5": +++++
— "6": ABN
— "7": ABN H
— "8": ABN L
— "9":

Not yet measured

Flags

Components: |<Data flag 1>\<Data flag 2>\<Data flag 3>\<Data flag 4>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Flags	Character string	2×4	Variable	0 to 4 flags can be set. When two or more flags are present, a rerun delimiter is used between flags. When there is no data flag, the field is a null field. For information about flags, refer to Data Flag.

Quick Type

Components: |<Quick type>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Quick type	Character string	1	Variable	Quick result is output when the sample and the test are compliant with the quick result output. "Q": The result is a quick result. "": The result is other than a quick result.

CAL/Control/RB number

Components: |<CAL/Control/RB number>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	CAL/ Control/RB number	Value	3	Variable	The measured calibrator, control, or reagent blank sample No. is set. "1 to 200": Calibrator "1 to 100": Control "1 to 2": Reagent blank sample Reagent blank samples are reserved.

Lot/bottle No.

Components: |<R1(R1-1) Lot No.>^<R1(R1-1) Bottle No.>^<R2(R2-1) Lot No.>^<R2(R2-1) Bottle No.>^<R1(R1-2) Lot No.>^<R1(R1-2) Bottle No.>^<R2-2 Lot No.>^<R2-2 Bottle No.>|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Lot/bottle No.	Value	4×8	Variable	The reagent lot No. and the bottle No. used for measure are set. A value is set according to the above components depending on the used reagent kind. No information is set for unused reagent fields.

*Supplementary explanation of lot/bottle No.

For transmission of advanced RB/CAL/QC results in serial communication using RS-232C interface of the system, you can select one of the following depending on the system setup:

- Divide messages by measured lot/bottle No. and transmit a result message for RB/CAL/QC.
- Bring all measured lot/bottle Nos. into one message and transmit a result message for RB/CAL/QC.

This LAN-supported specification does not allow messages to be divided by lot/bottle No., depending on the system setup.

For ISE analysis data

Components: |<Na Electrode Lot No.>^<K Electrode Lot No.>^<Cl Electrode Lot No.>^<REF Electrode Lot No.>^<REF Reagent Lot No.>^<MID Reagent Lot No.>^<BUF Reagent Lot No.>^|

	Set item	Set Value	Maximum number of characters	Variable length	Remarks
Item details	Lot/bottle No.	Value	8×8	Variable	The ISE reagent lot No. and the electrode lot No. used for measure are set.

Sample No. handling of first run samples on normal racks:

No setting is conducted by DxC 700 AU at the point of RΔΔ message transmission without any by sample kind or sample No. determined.

In DΔΔ message, the determined by sample kind and sample No. are set and transmitted to an outside computer.

Message type	Field	Components	Set Value	Remarks
RΔΔ Test order query	Q.12.1.3 Test order query start number	null	Same as the normal operation	Same as the normal operation
		Sample ID		
		Measure type, Sample kind, Sample No.	"Δ" is set.	No by sample kind or sample No. is set. Only by analysis type (Δ:normal)is set.
	Q.12.1.14 Sample information	Measure type	Same as the normal operation	Same as the normal operation
		Sample kind	No setting	No by sample kind or sample No. is set.
		Sample No.		
		First run sample kind	Same as the normal operation	Same as the normal operation
		First run sample No.		
		Sample ID		
		Rack No.		
		Cup position		
		Sample type		
DΔΔ Result	Same as the normal operation			The determined sample No. is set and transmitted to an outside computer.

Samples are identified by the sample ID of RΔΔ message by the outside computer, and by sample kind (normal/STAT/ emergency) is determined and set. No sample No. is set.

Message type	Field	Components	Set Value	Remarks
SΔΔ Test order information	Sample information	Measure type	Same as the normal operation	Same as the normal operation
		Sample kind	"Δ": Routine sample "P": STAT sample "E": Emergency sample	By sample kind (normal/STAT/ emergency) is set. No sample No. is set.
		Sample No.	No setting	
		First run sample kind	Same as the normal operation0	Same as the normal operation

Message type	Field	Components	Set Value	Remarks
		First run sample No.		
		Sample ID		
		Rack No.		
		Cup position		
		Sample type		
	System specimen ID	Sample ID	Same as the normal operation	Same as the normal operation
		Sample No. (Measure type, Sample kind, Sample No.)	"ΔΔ": Routine sample "ΔP": STAT sample "ΔE": Emergency sample	By analysis type and by sample kind (normal/STAT/ emergency) are set. No sample No. is set.

< Precaution for this operation >

As sample IDs set in RΔΔ message vary, it is required that sample data be managed only by sample IDs outside the computer.

Delimiter Details

1. **Record Delimiter**

   0x0D[CR] is suffixed to each record, as described in Record.

2. **Field Delimiter**

   A field delimiter is used to delimit fields in a record. The following figure shows the record shown in Figure 2.5 Message Concept, which is expressed using field delimiters.

   Figure 2.6 Record using Field Delimiters

   ```
   P|1|0123456789|.....||||[CR]
   ```

   The first field of the record is a record type ID and fields which do not contain any information that is null. For example, when the 4th to the last fields are all null, these null fields can be omitted. The following figure shows an example. When information is set in a field, null fields before the field cannot be omitted.

   Figure 2.7 Null Field Omission

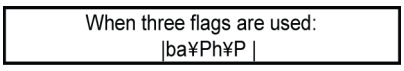
   ```
   P|1|0123456789[CR]
   ```

3. **Repeat Delimiter**

   When several data of the same type are contained in a field, repeat delimiters are used to delimit the data. For example, in a data flag field of this specification, any number

[from 0 to 4] of data can be set. The following figure shows an example of using rerun delimiters.

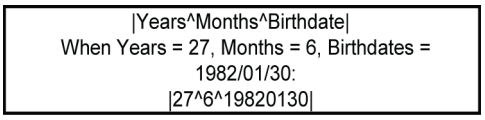
Figure 2.8 Example of Using Repeat Delimiters



4. **Component Delimiter**

When a field contains several information, component delimiters are used to delimit the information. For example, the birthdate field of this specification contains "years," "months," and "birthdate." The following figure shows an example of using component delimiters.

Figure 2.9 Example of Using Component Delimiters



5. **Escape Delimiter**

Use delimiters in a field as data like a usual character string by using escape delimiters. To do so, place characters corresponding to delimiters between escape delimiters. The following table shows a method of using escape delimiters when delimiters used in a message are any listed in Table 2.10 Delimiter List.

Table 2.51 Escape Delimiters

Delimiter	Character string to be used in a field	Escape delimiter used
Field delimiter	|	&F&
Repeat delimiter	\	&R&
Component delimiter	^	&S&
Escape delimiter	&	&E&

Application Level

This section defines the method for implementing the functions from messages defined on the message level.

Realtime Test Order Query/Test Order Query Function of Auto Rerun

You can implement this function during the MEASURE mode. The system transmits a test order query start notification message to the LIS and notifies the LIS of the start of realtime test order query at measure start. In this specification, a state where the realtime test order query is ready is called a state where the realtime test order query session is open.

In a state where the session is open, the system transmits a test order query message to the LIS, the LIS returns a test order information message to the system.

At measure end or when a communication error occurs, the system transmits a test order query end notification message to the LIS to terminate the session, and terminates the realtime test order query/test order query of auto rerun .

1. **Message Transmission/Reception Timing**

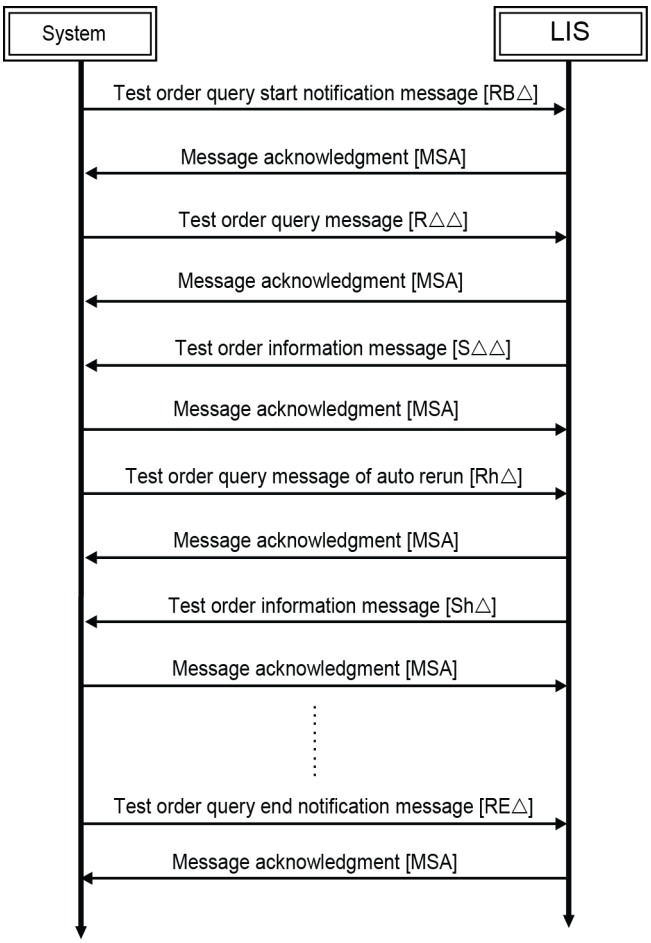
   This section describes the message transmission/reception timing and processing. The following table shows the message transmission/reception timing. Figure 2.10 Normal Sequence of Realtime Test Order Query/Test Order Query of Auto Rerun shows the normal sequence.

   Table 2.52 Message Transmission/Reception Timing

Message type	Message Transmission/ Reception Timing	Normal state processing
RBΔ [Sample information query start]	It is transmitted at measure start in STANDBY mode.	The test order query session starts and RΔΔ /RhΔ is continuously transmitted.
R rr *1[Test order query of first run sample (Routine/STAT/ Emergency)]	It is transmitted when a sample cup is detected.	Transferred to SΔΔ receiving process
RhΔ [Test order query of auto rerun (Routine/STAT/ Emergency)]	It is transmitted in the cup position order as soon as all results of the rack where the appropriate sample has been loaded are fixed.	Transferred to ShΔ receiving process.
SΔΔ *1[Test order of normal/ rerun sample information (Routine/STAT/Emergency)]	It can be received within a specified time (T2) after the RΔΔ message has been transmitted. Refer to Note 1.	Subsequent RΔΔ /RhΔ and REΔ are continuously transmitted.
Sh r [Test order of auto rerun sample information (Routine/ STAT/Emergency)]	It can be received within a specified time (T2) after the RhΔ message has been transmitted.	Subsequent RΔΔ /RhΔ and REΔ are continuously transmitted.
REΔ [Sample information query end]	It is transmitted when the system shifts in either of the following operation modes: — From MEASURE mode to STANDBY mode — From MEASURE mode to STOP mode	The test order query session is terminated.
	It is transmitted even when communications are disrupted due to an online communication error.	

Note 1: RΔΔ and RhΔ can be mixed in the same session and transmitted.

Figure 2.10 Normal Sequence of Realtime Test Order Query/Test Order Query of Auto Rerun



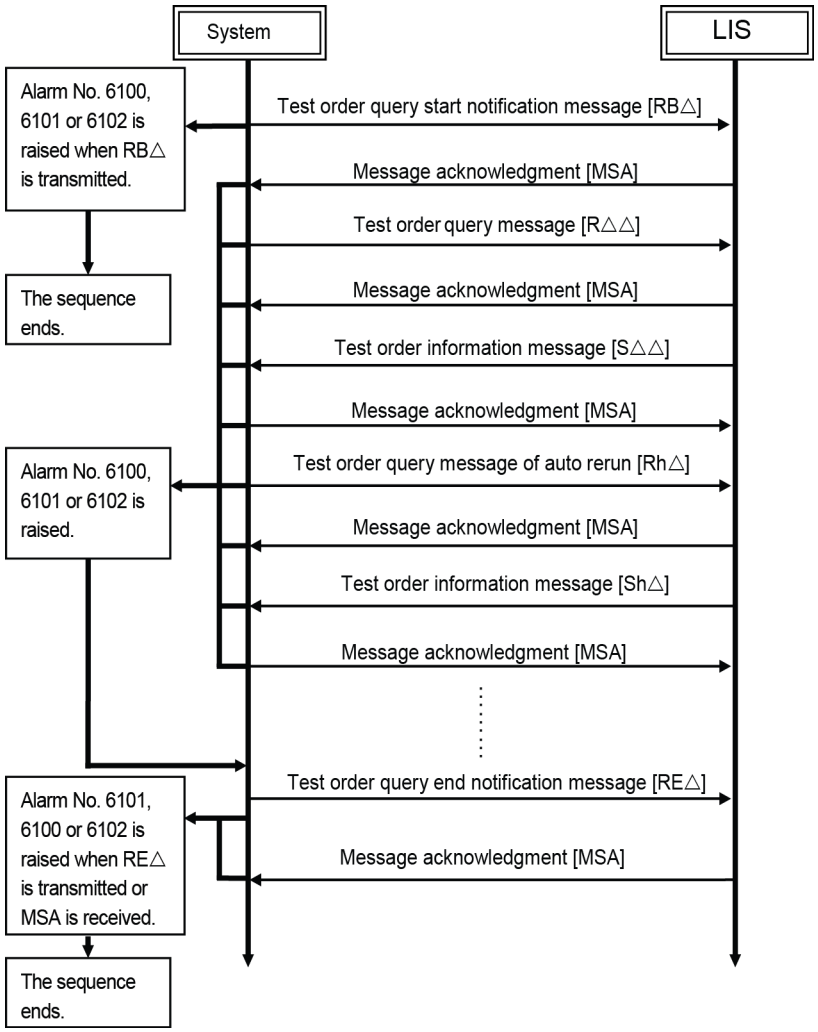
2. **Communication Error Control**

Whether to terminate or continue the session when a communication error occurs can be selected depending on the value set in [Online] - [Protocol] - [T.R.I Receive Error Control].

1. When you select **Stop** in T.R.I Receive Error Control

   When Alarm No. 6100: ONLINE CONNECTION ERROR, Alarm No. 6101: ONLINE ERROR or Alarm No. 6102: ONLINE FORMAT ERROR occurs in a state where the realtime test order query session is open, the system terminates the session and transmits the test order query end notification message to the LIS. However, when an error occurs while the test order query start notification message is transmitted, the system considers the session unopened and does not transmit the test order query start notification message. The following figure shows the sequence when an error occurs.

Figure 2.11 Sequence when you select **Stop** n T.R.I Receive Error Control



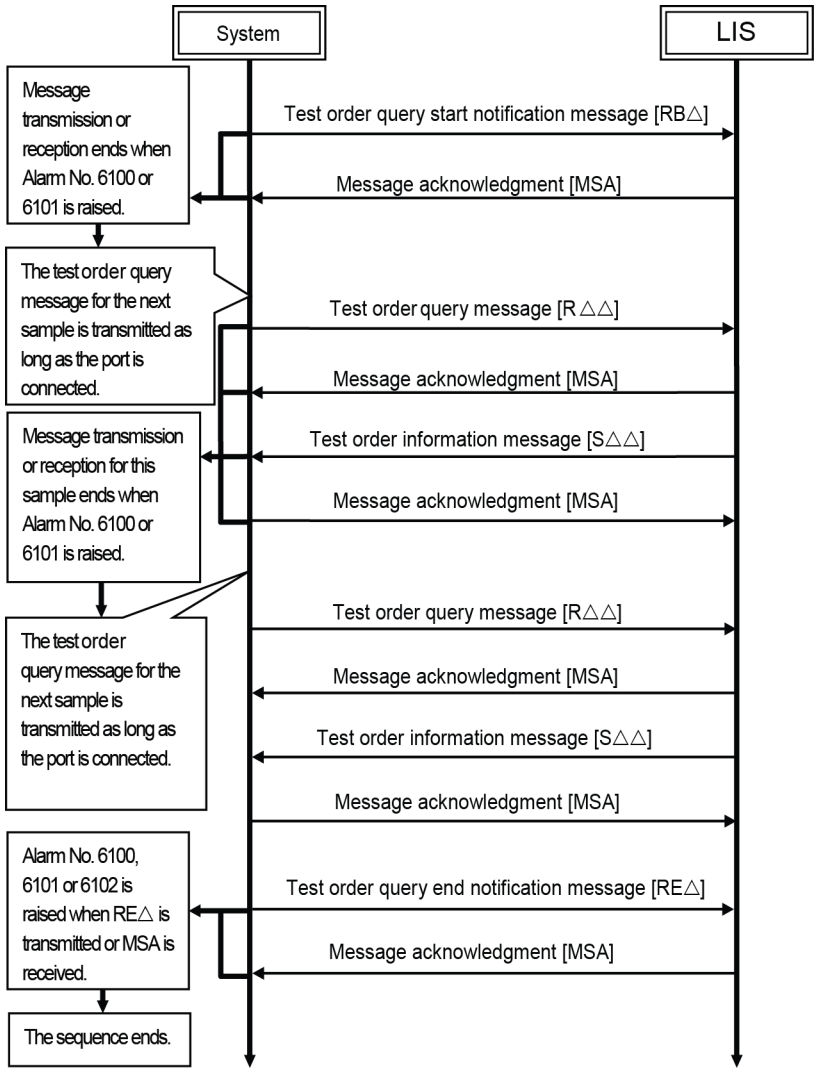
2. When you select **Continue** in T.R.I Receive Error Control

   Even when Alarm No. 6100: ONLINE CONNECTION ERROR or Alarm No. 6101: ONLINE ERROR occurs in a state where the realtime test order query session is open, the system does not terminate the session and transmit a message using a trigger to transmit the test order query message if the port is connected. In addition, when an error occurs while the system transmits the test order query start notification message or receives message acknowledgment, the system considers the session open and transmit the test order query message.

   Because no test order query messages can be sent with the port unconnected, the system shifts to MEASURE 2 after racks are supplied.

   However, when the error code for Alarm No. 6101: ONLINE ERROR is [62] or Alarm No. 6102: ONLINE FORMAT ERROR occurs, the system considers it as a grammatical error in the message and does not continue to transmit/receive messages. The system performs the same sequence as when you select **Stop** in Results Transfer Error Control. The following figure shows the sequence when an error occurs.

Figure 2.12 Sequence when you select **Continue** in T.R.I Receive Error Control



3. **Processing on the system when sample information is received**

   This section describes the message transmission timing and information to identify sample information.

   The test order query message transmitted by the system provides two types of key information to identify sample information.

   — Sample No.
   — Sample ID

   When barcode operation is selected as the sample test order, the sample No. and sample ID are transmitted. However, when nonuse of the sample ID is selected, only the sample No. is transmitted. The sample No. is information to manage a sample inside the system. When the LIS does not manage the sample ID with sample information, the system may not be able to properly transmit the test order information message. In this specification, we recommend using the sample ID. Hereinafter, when only the sample No. is used as key information, it is called "Sample No. request." When the sample ID is

used along with the sample No., it is called "Sample ID request." Table 2.52 Message Transmission/Reception Timingshows the message transmission/reception timing.

Measurement parameter settings select either the sample No. or sample ID as key information. Key information to identify sample information for each measurement parameter setting is shown for first run sample, rerun sample, and auto rerun .

While test order information receive can be set on the **Online** or **Sample Program Format** screen, test order can be set on the **Analysis Mode** screen.

Measurement parameter settings		**Key information**	**Sample identification information used for transmission/reception**	
Sample Type	**Test order**		**Test order query message**	**Test order information message**
First Run Sample	**Sequential (with ID reading)**	Sample No. request	Sample No, Sample ID	Sample No. (Refer to Note 1), sample ID (Refer to Note 2)
	Sequential (without ID reading)	Sample No. request	Sample No.	Sample No. (Refer to Note 1)
	Rack No.	Sample No. request	Sample No.	Sample No. (Refer to Note 1)
	Sample ID (sample No. used)	Sample ID request	Sample No, Sample ID	Sample No. (Refer to Note 1), sample ID (Refer to Note 2)
	Sample ID (no sample No. used)	Sample ID request	Sample No, Sample ID	Sample No. (Refer to Note 1), sample ID (Refer to Note 2)
Rerun Sample	**Sequential (with ID reading)**	Sample No. request	Sample No., Sample ID	Sample No. (Refer to Note 1),Sample ID (Refer to Note 2), First run sample No. (Refer to Note 1)
	Sequential (without ID reading)	Sample No. request	Sample No.	Sample No. (Refer to Note 1),First run sample No. (Refer to Note 1)
	Rack No.	Sample No. request	Sample No.	Sample No. (Refer to Note 1),First run sample No. (Refer to Note 1)

Rerun Sample (Continued)	**Sample ID (sample No. used)**	Sample ID request	Sample No., Sample ID	Sample No. (Refer to Note 1),Sample ID (Refer to Note 2), First run sample No. (Refer to Note 3)
	Sample ID (no sample No. used)	Sample ID request	Sample No., Sample ID	Sample No. (Refer to Note 1),Sample ID (Refer to Note 2)
Auto Rerun	**Sequential (with ID reading)**	Sample No. request	Sample No.	Sample No. (Refer to Note 1)
	Sequential (without ID reading)	Sample No. request	Sample No.	Sample No. (Refer to Note 1)
	Rack No.	Sample No. request	Sample No.	Sample No. (Refer to Note 1)
	Sample ID (sample No. used)	Sample ID request	Sample No., Sample ID	Sample No. (Refer to Note 1) , Sample ID (Refer to Note 2)
	Sample ID (no sample No. used)	Sample ID request	Sample No., Sample ID	Sample No. (Refer to Note 1) , Sample ID (Refer to Note 2)

Note 1: Set Sample No. and First run sample No. in Test order information message to the same vale as the Sample No. in Test order query message.

Note 2: Sample ID of Item Selection Request Message and sample ID of Item Selection Information Message are the same. Or for sample ID of response information, complete carry space [20h] is set. If neither is applicable, Alarm 6136 Online Mismatch is issued.

Realtime Result Transfer Function

You can implement this function during the MEASURE mode. The system transmits a result transfer start notification message to the LIS and notifies the LIS of the start of realtime result transfer at MEASURE START. In this specification, a state where the realtime result transfer is ready is called a state where the realtime result transfer session is open.

In a state where the session is open, the system transmits a result message to the LIS, and the LIS returns message acknowledgment to the system.

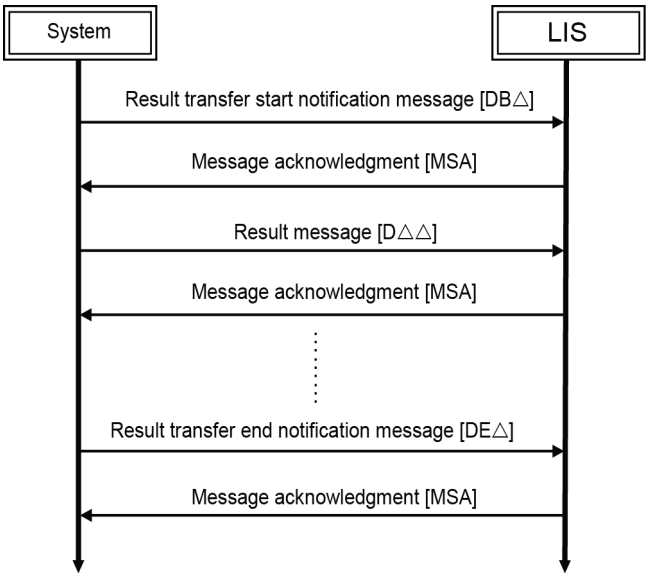
At measure end or when a communication error occurs, the system transmits a result transfer end notification message to the LIS to terminate the session, and terminate the realtime result transfer.

1. **Message Transmission/Reception Timing**

This section describes the message transmission/reception timing and processing. The following table shows the message transmission/reception timing. Figure 2.13 Normal Sequence of Realtime Result Transfer shows the normal sequence.

Message type	Transmission/reception timing/ conditions	Normal state processing
DBΔ [Result transfer start notification]	It is transmitted when the system shifts to "MEASURE 1" at measure start in STANDBY mode. However, when DBΔ has been transmitted and the result transfer session is open in Batch Online Result Transfer Function, the system considers it not necessary to retransmit DBΔ, and not transmit DBΔ at this time. The system continuously transmits the subsequent result message.	The result transfer session starts and DΔΔ is continuously transmitted.
DΔΔ [Result]	For analyzed samples, when the analysis results for all accepted test items are ready and DxC 700 AU determines the analysis completion of applicable samples, the data is sequentially transmitted.	Subsequent DΔΔ and DEΔ are continuously transmitted.
DEΔΔ [Result transfer end notification]	It is transmitted when the system shifts in either of the following operation modes or after judges all DΔΔ to be transmitted have been transmitted: — From MEASURE mode to STANDBY — From MEASURE mode to STOP It is transmitted when the session is canceled because of an online communication error.	The result transfer session is terminated.
	However, when DBΔ has been transmitted and the result transfer session is open in Batch Online Result Transfer Function, the system does not transmit DEΔ at this time because result transfer is not yet complete.	

Figure 2.13 Normal Sequence of Realtime Result Transfer



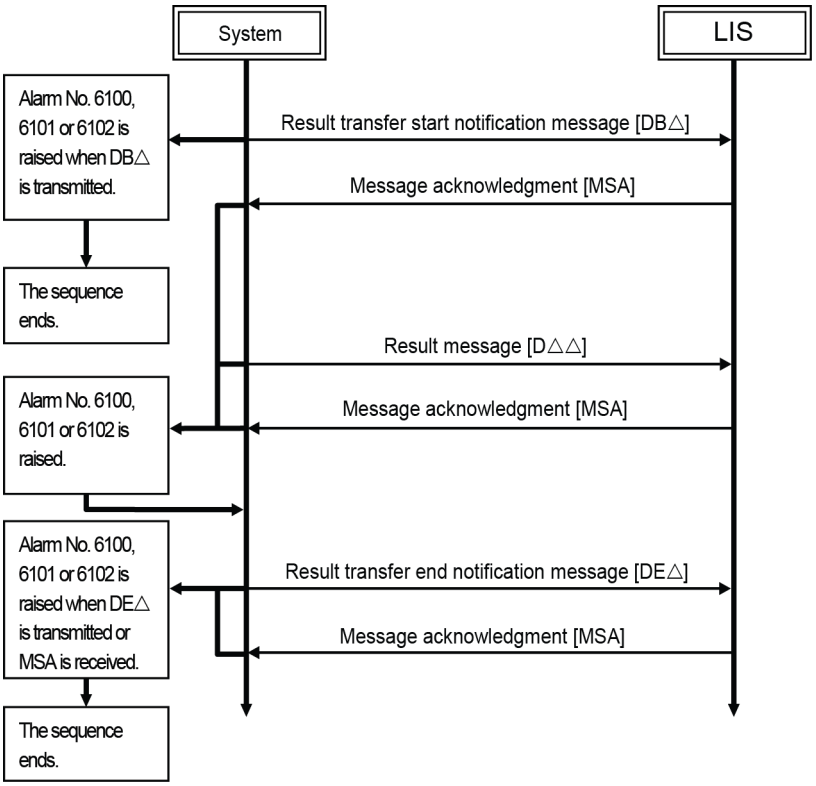
2. **Communication Error Control**

Whether to terminate or continue the session when a communication error occurs can be selected depending on the value set in [Online] - [Protocol] - [Results Transfer Error Control].

1. When you select **Stop** in Results Transfer Error Control

   When Alarm No. 6100: ONLINE CONNECTION ERROR, Alarm No. 6101: ONLINE ERROR or Alarm No. 6102: ONLINE FORMAT ERROR occurs in a state where the realtime result transfer session is open, the system terminates the session and transmits the result transfer end notification message to the LIS. However, when an error occurs while the result transfer start notification message is transmitted, the system considers the session unopened and not transmit the result transfer end notification message. The following figure shows the sequence when an error occurs.

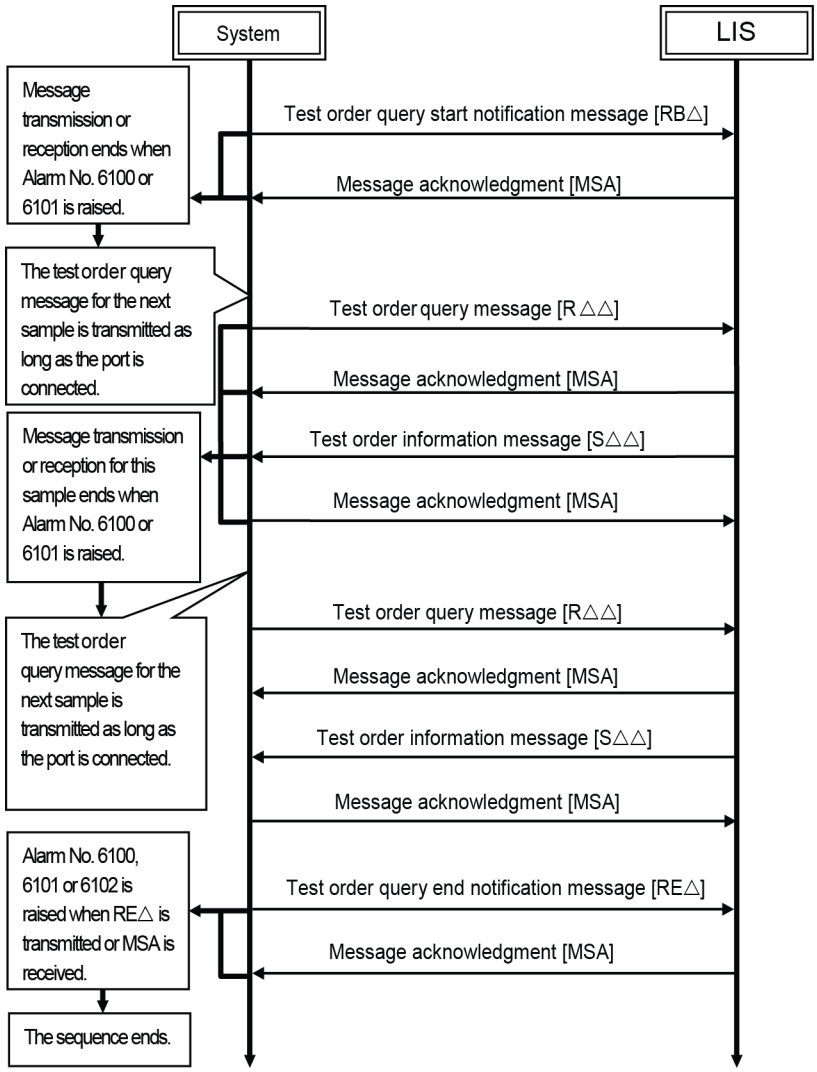
Figure 2.14 Sequence when you select **Stop** in Results Transfer Error Control



2. When you select **Continue** in Results Transfer Error Control

   Even when Alarm No. 6100: ONLINE CONNECTION ERROR or Alarm No. 6101: ONLINE ERROR occurs in a state where the realtime result transfer session is open, the system terminates the session and transmits a message using a trigger to transmit the result message as long as the port is connected. In addition, when an error occurs while the system transmits the result transfer start notification message or receives message acknowledgment, the system considers the session open and transmits the result message. However, when the error code for Alarm No. 6101: ONLINE ERROR is [62] or Alarm No. 6102: ONLINE FORMAT ERROR occurs, the system considers it as a grammatical error in the message and does not continue to transmit/receive messages. The system performs the same sequence as when you select **Stop** in Results Transfer Error Control.

Figure 2.15 Sequence when you select **Continue** in Results Transfer Error Control



Batch Online Result Transfer Function

This function can be implemented on the **Sample Manager** screen. You can implement this function regardless of the system mode. For the sequence other than when the message types vary, refer to Realtime Result Transfer Function because the sequence of batch online result transfer is like that of realtime result transfer.

1. Message Transmission/Reception Timing

This section describes the message transmission/reception timing and processing. The following table shows the message transmission/reception timing. For the batch online analysis result output normal sequence, refer to the realtime analysis result output normal sequence.

Message type	Transmission/reception timing/conditions	Normal state processing

DBΔ [Result transfer start notification]	It is transmitted when transmission starts on the **Sample Manager** screen. However, when DBΔ has been transmitted and the result transfer session is open in Realtime Result Transfer Function, the system considers it not necessary to retransmit DBΔ, and not to transmit DBΔ at this time. The system continuously transmits the subsequent result message.	The result transfer session starts and DMΔ is continuously transmitted.
DMΔ [Result]	It is transmitted in sequence, for the sample in the range specified on the **Sample Manager** screen.	Subsequent DMΔ and DEΔ are continuously transmitted.
DEΔ [Result transfer end notification]	It is transmitted for the sample in the range specified on the **Sample Manager** screen, after the final sample has been transmitted. It is transmitted when the session is forcibly terminated on the **Sample Manager** screen. It is transmitted when communications are disrupted because of an online communication error. However, when DBΔ has been transmitted and the result transfer session is open in Realtime Result Transfer Function, the system does not transmit DEΔ at this time because result transfer is not yet complete.	The result transfer session is terminated.

2. **Communication Error Control**

   Refer to Realtime Result Transfer Function because communication error control for batch online result transfer is as that of realtime result transfer.

Sample Information Entry Function according to LIS Direction

Unlike the realtime test order query function that enables the system to transmit the test order query message, this function allows the LIS to transmit the test order information message to the system at its discretion and the system to enter sample information. However, the LIS judges whether or not the system is ready to receive the test order

information message, from the system state transmitted by the system. The test order information message received in a state where the system is not ready to receive the message is discarded.

This function also applies to normal / rerun sample. To implement auto rerun, refer to Realtime Test Order Query/Test Order Query Function of Auto Rerun. Figure 2.16 Normal Sequence of Test Order Information Entry Function according to LIS Direction shows the normal sequence.

1. **Message Transmission/Reception Timing**

   The system notifies LIS the timing of Item Selection Information Message properly received by the system by transmitting Mode IDs to LIS in the system status output.

   The following table shows mode IDs where the system properly receives and enters the test order information message. The mode ID is a field for system state messages. For information about the system state, refer to System State Transfer Function .

   Although the system state is defined from [EQU - System Detail Segment] for HL7, the state where the system can receive the test order information message cannot be completely defined.

   Therefore, the mode ID is defined as a unique standard and shows the reception possibility state of the test order information message. For information about the mode ID, refer to Table 2.29 Mode ID.

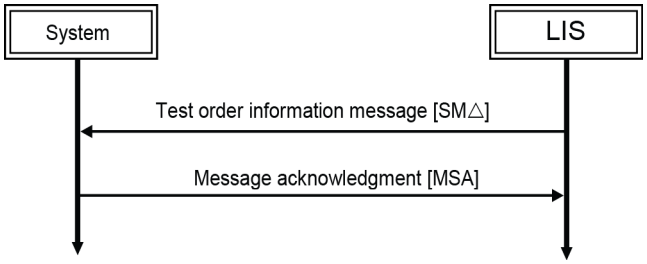
   Table 2.56 Reception Enabled Mode ID

Mode ID	Mode text	Yes: Reception enabled No: Reception disabled
"EDPR"	"END OF PROCESS"	No
"CNRS"	"CAN NOT RECEIVE SAMPLE"	No
"ENRS"	"ENABLE TO RECEIVE SAMPLE"	Yes

   Supplementary explanation

   As shown in the above table, the sample information entry function according to LIS direction determines whether to transmit the test order information message from the system state. When the system state port (refer to Table 2.5 Functions and Corresponding Ports) is disconnected, do not transmit the test order information message because the current system state is uncertain.

Figure 2.16 Normal Sequence of Test Order Information Entry Function according to LIS Direction



2. **Communication Error Control**

   Unlike the realtime functions with sessions, the LIS can transmit the test order information message even after an error occurs, as long as the system state/mode ID can be received, regardless of the value set in [Online] - [T.R.I Receive Error Control].

   When the LIS receives an acknowledgment code other than [AA] in message acknowledgment in reply to the test order information message, it shows the system cannot properly enter sample information. Remove the problem causing sample information not to be entered, and then retransmit the test order information message about the sample that failed to be entered.

   Supplementary explanation

   The system does not transmit the reason why sample information fails to be entered to the LIS. Refer to the alarm on the system screen and identify the problem. For more information about alarms, refer to Appendix D: Alarm List.

3. **Processing on the system when sample information is received**

   This function provides the following entry types of sample information when the test order information message is received:

   — New entry
   — Overwrite entry

When test order information is received	Entry method	Description
Sample information contained in the received test order information message is not entered in the current index.	New entry	The sample No. of which sample information has not been entered is used to determine the sample No. to be entered, and enter new information about the test order information message.
Sample information contained in the received test order information message is entered in the current index.	Overwrite entry	The sample No. to which sample information corresponds is overwritten with information about the test order information message.

   To correct the information after transmitted, transmit the corrected test order information message.

System State Transfer Function

This function determines and transmits the system operation mode or screen operations to the LIS from the system state defined from [EQU - System Detail Segment] for HL7. The LIS judges whether to allow the system to perform tasks from the received system state message. In addition, the mode ID defines whether the system is ready to receive the test order information message.

1. **Message Transmission/Reception Timing**

   Messages are transmitted at the time of system status or mode ID change.

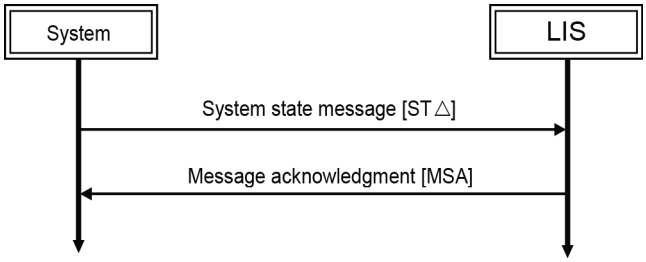
   The system state is determined from the system operation mode and screen operations. The following table shows system states and the method for determining the system state.

Operation mode	System state	Remarks
INITIAL	"IN"	The system state is basically determined according to the operation mode but determined by taking priority over the operation mode in the following operations: — States when the system is editing parameters. — When the system is outputting data on the **External data Management** screen. — When the system is loading/saving a file on the **File Management** screen, "CO" is prioritized. — "CL" is prioritized when the system is replacing the index to another index.
WARM-UP	"IN"	
STANDBY	"ID"	
WARM-UP to STANDBY	"ID"	
STANDBY to MEASURE 1	"ID"	
STANDBY to MEASURE 2	"ID"	
MEASURE 1	"OP"	
MEASURE 1 to MEASURE 2	"OP"	
MEASURE 1 to PAUSE	PA'	
MEASURE 1 to STOP	"ES"	
MEASURE 1 to MEASURE 1	"OP"	
MEASURE 2	"OP"	
MEASURE 2 to MEASURE 1	"OP"	
MEASURE 2 to PAUSE	"PA"	
MEASURE 2 to STOP	"ES"	
MEASURE 2 to MEASURE 2	"OP"	
PAUSE	"PD"	
PAUSE to MEASURE 1	"PD"	
PAUSE to MEASURE 2	"PD"	
STOP	"ES"	
RESET	"IN"	
END	null	
WARM-UP W1	"OP"	

Operation mode	System state	Remarks
STANDBY W1	"OP"	
WARM-UP W2	"OP"	
STANDBY W2	"OP"	
STANDBY PHOTOCAL	"OP"	
WARM-UP MAINTENANCE	"CO"	
STANDBY MAINTENANCE	"CO"	
STOP MAINTENANCE	"CO"	
STOP DIAG	"CO"	

The mode ID is determined from the system operation mode and sample entries.

Figure 2.17 Normal Sequence of System State Transfer Function



2. **Communication Error Control**

The system continuously transmits the system state message even after a communication error occurs, as long as the system state transfer function port (refer to Table 2.5 Functions and Corresponding Ports) is connected. To stop the transmission, select **None** in [Online] - [Setup] - [Other Transfer] - [Equipment State].

Supplementary explanation

— Although the LIS returns an acknowledgment code [AA] (retry factor) in message acknowledgment in reply to the system state message, the system acquires and transmits the latest system state instead of transmitting the same message as that before a retry is performed. In this case, note that the message control ID of the message header record is incremented.
— Although the LIS does not transmit message acknowledgment and the system in the message acknowledgment state causes a timeout, the system state message is continuously transmitted. However, in the WAIT state caused by timeout, the system does not transmit the latest system state even after the system state changes.

The system transmits the latest system state after a timeout occurs or message acknowledgment is received. Confirm that the LIS returns message acknowledgment to allow the system to reflect the latest system state to the LIS.

Operation Model

The system provides several methods for enabling normal/ rerun. Parameters or messages to be set vary according to the operation in which the facility that installs the system wants to enable normal/ rerun. This section supports the installation by providing several examples of operations. In this specification, we recommend using the sample ID; therefore, it is assumed to use the sample ID. The following table shows the normal/ rerun to be enabled and the recommended setting parameters.

To operate the system with several rerun types, contact the Beckman Coulter Technical Support.

Table 2.59 Normal/Rerun Type

Normal type	Setting parameters	Rerun type	Recommended setting parameters
Realtime test order query (Refer to Realtime Test Order Query/Test Order Query Function of Auto Rerun)	[Online] Test Order Information Receive (Normal) = Realtime	Rerun	[Online] Test Order Information Receive (Rerun) = Realtime [System Maintenance] Sample ID (Realtime Processing) = Pattern 1
		Multiple entries of the same sample as another first run sample	[Online] Test Order Information Receive (Rerun) = None [System Maintenance] Sample ID (Realtime Processing) = Pattern 2
		Auto rerun (Refer to Basic Communication Specification)	[Online] Test Order Information Receive (Rerun) = Realtime [System Maintenance] Sample ID (Realtime Processing) = Patterns 1 to 3
Sample information entry according to LIS direction (Refer to Sample Information Entry Function according to LIS Direction)	[Online] Test Order Information Receive (First run) = LIS Direction	Rerun	[Online] Test Order Information Receive (Rerun) = LIS Direction [System Maintenance] Sample ID (LIS Direction Processing) = Pattern 1
		Multiple entries of the same sample as another first run sample	[Online] Test Order Information Receive (Rerun) = None [System Maintenance] Sample ID (LIS Direction Processing) = Pattern 2

Table 2.59 Normal/Rerun Type (Continued)

Normal type	Setting parameters	Rerun type	Recommended setting parameters
		Auto rerun (Refer to Realtime Test Order Query/Test Order Query Function of Auto Rerun)	[Online] Test Order Information Receive (Rerun) = Realtime [System Maintenance] Sample ID (LIS Direction Processing) = Pattern 1.2

Table 2.60 Description of Rerun Type

Rerun type	Description
Rerun	The first run sample is measured by loading it on the white rack (for routine sample), on the red rack (for emergency sample), and on the STAT table. Rerun is a method for measuring the sample by reloading it as a rerun sample using the same sample No. Do not load the sample on another rack.
Multiple entries of the same sample as another first run sample	It is a method for measuring a first run sample, reentering the same sample ID for the first run sample and using the sample ID entered twice for the first run sample for the rerun test. Do not load the sample on another rack.
Auto rerun	(Refer to Realtime Test Order Query/Test Order Query Function of Auto Rerun.)

Supplementary explanation 1

To enter sample information, the system can select whether allow the same sample ID to be entered for the first run sample. When the same sample ID can be entered, the sample ID entered twice for the first run sample can be used for the rerun test. In contrast, when the same sample ID cannot be entered, the sample ID cannot be entered more than once but can be used to measure the sample as a rerun sample.

The operation method for rerun varies according to the setting as above. [Sample ID (Realtime Processing)] and [Sample ID (LIS Direction Processing)] provided as relevant parameters determine whether to enter the same sample ID according to the set value, or whether to inquire of the LIS about sample information when the sample ID for the sample loaded on the system is read.)

Supplementary explanation 2

When the same sample ID can be entered and the sample No. is not used for the first run sample, rerun cannot be enabled because the system cannot identify the first run sample for the rerun sample (auto rerun is enabled). The setting that enables the same sample ID to be entered is as follows:

Sample ID (Realtime Processing) = Pattern 2 or 3

Appendix A: List of Flags

Priority	Flags	Description	Remarks
1	d_	QC result is excluded by operator	
2	e_	Data edited by operator.	
3	(_	Reagent probe cleaning solution is insufficient.	
4	Wa	Test has been analyzed with an erroneous cuvette.	
5	R_	Insufficient reagent.	
6	#_	Insufficient sample.	Refer to Note 1.
7	%_	Clot detected.	Refer to Note 1.
8	?_	Unable to calculate a result.	
9	M	Duplicate Sample ID is detected	Refer to Note 1.
10	n_	LIH test not performed.	
11	l[Level]	Result may be affected by lipemia (Levels in numbers from 1 to 5).	
12	i[Level]	Result may be affected by icterus (Levels in numbers from 1 to 5).	
13	h[Level]	Result may be affected by hemolysis (Levels in numbers from 1 to 5).	
14	Y_	Reagent Blank OD exceeds the high limit set at the last photometric read point.	
15	U_	Reagent Blank OD exceeds the lower limit set at the last photometric read point	
16	y_	OD at the first photometric point for reagent blank or patient sample is high.	
17	u_	OD at the first photometric point for reagent blank or patient sample is low.	
18	@_	OD is higher than 3.0.	
19	$_	Not enough data to determine linearity of reaction.	
20	D_	OD of reaction is higher than maximum OD range.	
21	B_	OD of reaction is lower than minimum OD range.	
22	*_	Linearity error in rate method.	
23	&_	Prozone test data is abnormal.	
24	Z_	Prozone error.	
25	E_	Error in reaction rate for rate assay.	

Priority	Flags	Description	Remarks
26	Fx	Result (OD) is higher than the analytical measuring range.	
27	Gx	Result (OD) is lower than the analytical measuring range.	
28	!_	Unable to calculate concentration.	
29	)_	Reagent lot number used for sample analysis is different from the lot number used for RB/Calibration.	
30	a_	Reagent expired.	
31	ba	No calibration data or calibration is expired.	
32	bh	Reagent blank or calibration failed, and the result was calculated with historical data.	
33	bn	Mastercurve used.	
34	bz	Calibration curve for Prozone data used.	
35	F_	Result is higher than the analytical measuring range.	
36	G_	Result is lower than the analytical measuring range.	
38	ph	Result is higher than the high critical limit.	
39	pl	Result is lower than the low critical limit.	
40	T_	Abnormality found in inter-chemistry check.	
41	P_	Positive.	
42	N_	Negative.	
43	H_	Result is higher than reference interval.	
44	L_	Result is lower than reference interval.	
45	J_	Result is higher than the rerun decision limit.	
46	K_	Result is lower than the rerun decision limit.	
47	fh	Result is higher than the Rerun reflex limit.	
48	fl	Result is lower than the Rerun reflex limit.	
49	Va	Deviation of multiple measurements check is out of range.	
50	8Q	QC deviation error.	
51	xQ	Multi-rule QC has detected failure on the other control sample.	
52	1Q	QC data exceeds the range entered in the Single Check Level field.	
53	2Q	QC data exceeds 1_{3S} control range.	
54	3Q	QC data exceeds 2_{2S} control range.	
55	4Q	QC data exceeds R_{4S} control range.	
56	5Q	QC data exceeds 4_{1S} control range.	

Priority	Flags	Description	Remarks
57	6Q	A preset number of consecutive QC results fall on one side of the mean.	
58	7Q	Consecutive QC results show steadily increasing or decreasing values.	
59	S_	First-run result replaced by rerun result.	
60	/_	Test pending or not analyzed.	
61	r_	Result has been transferred to the LIS through online communication.	
62	c_	Result corrected by the operator using data correction.	

Note 1: These flags indicate that there was an error associated with the sample. Auto rerun is disabled for samples resulting in these flags.

However, the system transmits an automatic Rerun sample request to the LIS to enter Rerun information. Therefore, be careful when making a response.

Appendix B: Online Parameters

Set Up	Content	Menu
Test Order Information Receive		Online
• Routine First-Run • Routine Rerun • STAT First-Run • STAT Rerun • Emergency First-Run • Emergency Rerun	• Realtime / LIS Direction / None • Realtime / LIS Direction / None • Realtime / LIS Direction / None • Realtime / LIS Direction / None • Realtime / LIS Direction / None • Realtime / LIS Direction / None	
Result Transfer		Online
• Routine First-Run • Routine Rerun • STAT First-Run • STAT Rerun • Emergency First-Run • Emergency Rerun • Reagent Blank • Calibration • QC • STAT Quick	• Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / Batch / None • Realtime / None	

Upper Protocol	Contents	Menu
T.R.I Receive Error Control	Continue / Stop	Online

Upper Protocol	Contents	Menu
Results Transfer Error Control	Continue / Stop	

Lower Protocol		Contents	Menu
Communication Control			Online
	Retry	0 to 3	
Basic Data Format			
	Start Code 1	None / 01H to 1FH	
	Start Code 2	None / 01H to 1FH	
	End Code 1	None / 01H to 1FH	
	End Code 2	None / 01H to 1FH	
	Device ID	Selected / Cleared, digits (32 digits)	
	LIS ID	Selected / Cleared, digits (32 digits)	
Time Out [x 100msec.]			
	T1	1 to 99 (unit: 0.1 sec)	
	T2	1 to 99 (unit: 0.1 sec)	
	T3	1 to 99 (unit: 0.1 sec)	
	T4	1 to 99 (unit: 0.1 sec)	

Format Configuration		Contents	Menu
Used / Unused			
	Sex	Selected / Cleared	Sample Program Format
	Age	Selected / Cleared	
	Other Type	Selected / Cleared	
	Patient Information 1	Selected / Cleared, digits (1 to 20 digits)	
	Patient Information 2	Selected / Cleared, digits (1 to 20 digits)	
	Patient Information 3	Selected / Cleared, digits (1 to 20 digits)	
	Patient Information 4	Selected / Cleared, digits (1 to 20 digits)	
	Patient Information 5	Selected / Cleared, digits (1 to 20 digits)	
	Patient Information 6	Selected / Cleared, digits (1 to 20 digits)	
	Sample ID Digits	Selected / Cleared, digits (4 to 26 digits)	

Format Configuration		Contents	Menu
	Sample No.	Selected / Cleared	Online
	Dilution Info.	Selected / Cleared (Refer to Note 1)	

Note 1: Dilution Info. is enabled only for the test order information message of the first run sample (Routine/STAT/Emergency).

System Maintenance		Contents	Menu
Digits of Rack ID		4 digits / 5 digits	System Maintenance
OD Output		Disabled / Enabled	
Sample Kind Mix.		Unity / Mix	
LIS LAN Option		Disabled / Enabled	
Connection			
	IP Address	15 digits	
	Port Number(×4)	4 digits	
Digit number check of Sample ID		Yes / No	
Not Analysis Data Search Process2		Pattern 1/2	
Sample ID (RealTime Processing)		Pattern 1/2/3	
Sample ID (LIS Direction Processing)		Pattern 1/2	
Processed Sample LIS Inquiry		Pattern 1/2	
Sample ID Read Error		Pattern 1/2	

Appendix C: System Online Parameter Sheet

Set Up	Contents
Test Order Information Receive	
• Routine First-Run • Routine Rerun • STAT First-Run • STAT Rerun • Emergency First-Run • Emergency Rerun	• □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None
Result Transfer	

Set Up	Contents
• Routine First-Run • Routine Rerun • STAT First-Run • STAT Rerun • Emergency First-Run • Emergency Rerun • Reagent Blank • Calibration • QC • STAT Quick	• □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ Batch □ None • □ Realtime □ None
Other Transfer	
• Equipment State	• □ Enable □ None

Upper Protocol	Contents
T.R.I Receive Error Control	□ Continue □ Stop
Result Transfer Error Control	□ Continue □ Stop

Lower Protocol	Contents
Communication Control	
• Retry	• [ ] 0 to 3
Basic Data Format	
• Start Code 1 • Start Code 2 • End Code 1 • End Code 2 • Device ID • LIS ID	• [ ] (01 to 1F) • [ ] (00 to 1F) • [ ] (01 to 1F) • [ ] (00 to 1F) • Selected / Cleared, [ ] digits (32 digits) • Selected / Cleared, [ ] digits (32 digits)
Time Out [x 100msec.]	
• T1 • T2 • T3 • T4	• [ ] (1 to 99) • [ ] (1 to 99) • [ ] (1 to 99) • [ ] (1 to 99)

Format Configuration	Contents
Used/Unused	

Format Configuration	Contents
• Sex • Age • Other Type • Patient Information 1 • Patient Information 2 • Patient Information 3 • Patient Information 4 • Patient Information 5 • Patient Information 6 • Sample ID Digits • Sample No. • Dilution Info.	• Selected / Cleared • Selected / Cleared • Selected / Cleared • Selected / Cleared, [ ] digits (1 to 20 digits) • Selected / Cleared, [ ] digits (1 to 20 digits) • Selected / Cleared, [ ] digits (1 to 20 digits) • Selected / Cleared, [ ] digits (1 to 20 digits) • Selected / Cleared, [ ] digits (1 to 20 digits) • Selected / Cleared, [ ] digits (1 to 20 digits) • Selected / Cleared, [ ] digits (4 to 26 digits) • Selected / Cleared • Selected / Cleared

[System Maintenance]	Contents
Digits of Rack ID	□ 4 digits □ 5 digits
OD Output	Disabled / Enabled
Sample Kind Mix.	Unity / Mix
LIS LAN Option	Disabled / Enabled
Connection	
• IP Address • Port Number(×4)	• [ ] digits (15 digits) • [ ] digits (4 digits)
Digit number check of Sample ID	Disabled / Enabled
Not Analysis Data Search Process2	□ Pattern 1 □ Pattern 2
Sample ID (RealTime Processing)	□ Pattern 1 □ Pattern 2 □ Pattern 3
Sample ID (LIS Direction Processing)	□ Pattern 1 □ Pattern 2
Processed Sample LIS Inquiry	□ Pattern 1 □ Pattern 2
Sample ID Read Error	□ Pattern 1 □ Pattern 2

Appendix D: Alarm List

1. Alarm No. 6100: ONLINE CONNECTION ERROR (aa)(bbbbbbbbbbbbbbb c dddd)

   [Processing on the system when this alarm is generated]

   1. When you select **Stop** in T.R.I Receive Error Control on the **Online** screen

      — The system stops subsequent test order information receive processing.
      — When you perform the next MEASURE START after realtime test order information receive processing, the system clears the stopped test order information receive state and performs realtime test order information receive processing again.

2. When you select **Continue** in T.R.I Receive Error Control on the Online screen

   — When the connection is successfully made again, the system continuously performs subsequent test order information receive processing.
   — The system shifts to MEASURE 2 with rack supplies stopped if it is unable to reconnect during MEASURE 1.
   — When the error type is [52], the system performs the same processing as when you select **Stop** in [T.R.I Receive Error Control].

[Details of the alarm]

1. A communication error occurs during online message transmission/reception.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Error type	50	Connection failure
		51	Abnormal connection
		52	Wait failure
bbb	IP address		
c	Port type	0	Realtime input/output
		1	Batch output
		2	LIS direction
		3	Other 1
dddd	Port No.		

2. Alarm No. 6101: ONLINE ERROR (aa)(bbb cc dddd) eeeee

[Processing on the system when this alarm is generated]

1. When you select **Stop** in T.R.I Receive Error Control on the **Online** screen

   — The system stops subsequent test order information receive processing.
   — When you perform the next MEASURE START after realtime test order information receive processing, the system clears the stopped test order information receive state and performs realtime test order information receive processing again.

2. When you select **Continue** in T.R.I Receive Error Control on the **Online** screen

   — The system continuously performs subsequent test order information receive processing.
   — When the error type is [62], the system performs the same processing as when you select **Stop** in [T.R.I Receive Error Control].

[Details of the alarm]

1. A communication error occurs during online message transmission/reception.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Error code	53	Transmission failure
		54	Reception failure
		55	Query timeout (Excess retries)
		60	Abnormal sequence
		61	Abnormal upper system data format (Acknowledgment code [AE])
		62	Abnormal lower system data format (Acknowledgment code [AE])
		63	Upper system retry cause (Acknowledgment code [AR])
		64	Lower system retry cause (Acknowledgment code [AR])
		65	Upper system test order information receive disabled (Acknowledgment code [CE])
		66	Lower system test order information receive disabled (Acknowledgment code [CE])
bbb	Message type	RΔΔ	Related to test order query
		SΔΔ	Related to test order information
		DΔΔ	Related to result
		ST	System state
		MSA	Message acknowledgment
cc	Measure type/ sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
dddd	Sample No. or sample ID		
eeeee	Message control ID		

3. Alarm No. 6102: ONLINE FORMAT ERROR (aa bb)(ccc) ddddd

[Processing on the system when this alarm is generated]

1. The system discards the message received online.
2. The system stops subsequent test order information receive processing.

[Details of the alarm]

1. The system fails to convert the message received online into readable information because of its format error.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Conversion error type		Refer to C.
bb	Conversion sub error code	0	Normal
		1	Null denied and absent data error
		2	Unused and data present data error
		3	Data character count error
		4	Error inconsistent with specified data
		5	Error with absent data
		6	Error with non-numeric data for numeric data fields
		7	Unauthorized use of delimiters
ccc	Message type	RΔΔ	Related to test order query
		SΔΔ	Related to test order information
		DΔΔ	Related to result
		STΔ	System state
		MSA	Message acknowledgment
ddddd	Message control ID		

3. The conversion error types are as follows:

0	Normal	**O Record**	
6	STX error	400	Record type ID error
7	ETX error	401	Sequence number error
H Record		402	Specimen ID (collected) error
100	Record type ID error	403	Sample ID error for specimen ID
101	Delimiter definition error	404	Sample ID error for system specimen ID
102	Message control ID error	405	Sample No. error for system specimen ID

103	System No. error	406	Measure type error
104	LIS recognition ID error	407	Sample kind error
105	Message type code error	408	Sample No. error
106	Date and time of message error	409	First run sample kind error
107	<CR> error during reception	410	First run sample No. error
Q Record		411	Sample ID error
200	Record type ID error	412	Rack No. error
201	Sequence number error	413	Cup position error
202	Dummy 1 error	414	Sample type error
203	Sample ID error for test order query start number	415	Test item No. error
204	Sample No. error for test order query start number	416	Dilution Inf. error
205	Dummy 3 error	417	<CR> error during reception
206	Dummy 4 error	**R Record**	
207	Dummy 5 error	500	Record type ID error
208	Test information query end number error	501	Sequence number error
209	Request information status code error	502	Test item error
210	Measure type error	503	Result error
211	Sample kind error	504	Result type error
212	Sample No. error	505	RB result type error
213	First run sample kind error	506	Data flag error
214	First run sample No. error	507	Quick recognition flag error
215	Sample ID error	508	Measure type error
216	Rack No. error	509	Sample kind error
217	Cup position error	510	Sample No. error
218	Sample type error	511	First run sample kind error
219	<CR> error during reception	512	First run sample No. error
P Record		513	Sample ID error
300	Record type ID error	514	Rack No. error
301	Sequence number error	515	Cup position error
302	Sample ID error	516	Sample type error

303	Patient ID (PID) error	517	CAL/Control/RB number error
304	Patient information 1 error	518	Lot/bottle No. error
305	Patient information 2 error	519	<CR> error during reception
306	Years error	**L Record**	
307	Months error	600	Record type ID error
308	Birthdate error	601	Sequence number error
309	Patient sex error	602	End code error
315	Other Type error	603	Acknowledgment code error
310	Patient information 3 error	604	Error message error
311	Patient information 4 error	605	<CR> error during reception
312	Patient information 5 error	**S Record**	
313	Patient information 6 error	700	Record type ID error
314	<CR> error during reception	701	Sequence number error
		702	Event date/time error
		703	System state error
		704	System state string error
		705	Mode error
		706	Mode string error
		707	Alert level error
		708	<CR> error during reception

4. Alarm No. 6103: ONLINE SET UP ERROR (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the message received according to LIS direction.
2. The system continues test order information receive processing according to LIS direction

[Details of the alarm]

1. The sample kind contained in the test order information message received online is not to be received according to LIS direction in [Online].
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample

Code	Classification	Details	
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole Blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

5. Alarm No. 6104: ONLINE ORDER INFORMATION RECEIVE ERROR (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the message received according to LIS direction.
2. The system continues test order information receive processing according to LIS direction.

[Details of the alarm]

1. When receiving the test order information message online, the system is not ready to receive the message. Refer to Note 1.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample

Code	Classification	Details	
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

Note 1: In the following cases, the system cannot receive the test order information message because the alarm has been generated:

— The operation mode is END.
— The system state is [CL].
— The system state is [IN] and the operation mode is INITIAL or RESET. (In this case, the mode ID is [CNRS].)
— The acknowledgment code [AR] in message acknowledgment is returned to the test order information message and the retry count is exceeded.

The acknowledgment code [CE] sample entry disabled is returned in message acknowledgment when the retry count is exceeded.

The acknowledgment code [AR] is returned when a database error occurs and the system state is [CO].

6. Alarm No. 6111: ONLINE INVALID ANALYSIS METHOD (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The measure type contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Received measure type/ sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample

Code	Classification	Details	
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

7. Alarm No. 6112: ONLINE INVALID SAMPLE KIND (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Received sample kind/ sample type	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

8. Alarm No. 6113: ONLINE INVALID SAMPLE TYPE (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/received sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

9. Alarm No. 6114: ONLINE INVALID SAMPLE NO. (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample

Code	Classification	Details	
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

10. Alarm No. 6115: ONLINE INVALID RACK NO. (aa bbbb:cccc-dd) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample

Code	Classification	Details	
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccc	Received rack No.		
dd	Position in the received rack		
eeeeee	Sample ID		
fffff	Message control ID		

11. Alarm No. 6116: ONLINE INVALID SEX TEXT (aa bbbb:c) dddddd, eeeee

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
c	Received patient sex		

Code	Classification	Details
dddd	Sample ID	
eeeee	Message control ID	

12. Alarm No. 6117: ONLINE INVALID AGE/MONTH (aa bbbb:ccc dd) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
ccc	Received years		
dd	Received months		
eeeeee	Sample ID		
fffff	Message control ID		

13. Alarm No. 6118: ONLINE INVALID PATIENT INFORMATION (aa bbbb:cccccc d) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.

2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Received patient information		
dd	Patient information No. not within the specified range		
eeeeee	Sample ID		
fffff	Message control ID		

14. Alarm No. 6119: ONLINE INVALID SAMPLE ID (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		ΔY	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Received sample ID		
dddddd	Message control ID		

15. Alarm No. 6120: ONLINE SAMPLE ID MIXED (aaaaaa bbbbbb) ccccc

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details
aaaaaa	Received sample ID	
bbbbbb	Received sample ID	
ccccc	Message control ID	

16. Alarm No. 6121: ONLINE INVALID OTHER TYPE (aa bbbb:c) dddddd, eeeee

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not within the specified range.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
Aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
Bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
c	Received other type		
dddddd	Sample ID		
eeeee	Message control ID		

17. Alarm No. 6131: ONLINE ANALYSIS METHOD MISMATCH (aa bbbb<>cc dddd) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The measure type contained in the received test order information message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Transmitted measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample

Code	Classification	Details	
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Transmitted sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cc	Received measure type/ sample type	See Transmitted measure type/sample type.	
dddd	Received d sample No.	See Transmitted sample No.	
eeeeee	Sample ID		
fffff	Message control ID		

18. Alarm No. 6132: ONLINE SAMPLE KIND MISMATCH (aa bbbb<>cc dddd) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Transmitted measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample

Code	Classification	Details	
		HW	Whole blood Rerun sample
bbbb	Transmitted sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cc	Received measure type/ sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
dddd	Received sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
eeeeee	Sample ID		
fffff	Message control ID		

19. Alarm No. 6133: ONLINE SAMPLE TYPE MISMATCH (aa bbbb<>cc dddd) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The sample kind contained in the received test order information message is not consistent with the requested data.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Transmitted measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample

Code	Classification	Details	
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Transmitted sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cc	Received measure type/ sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
dddd	Received sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
eeeeee	Sample ID		
fffff	Message control ID		

20. Alarm No. 6134: ONLINE SAMPLE NO. MISMATCH (aa bbbb<>cc dddd) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The sample kind contained in the received test order information message is not consistent with the requested data.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample kind contained in the received test order information message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Transmitted measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Transmitted sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cc	Received measure type/ sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
dddd	Received sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
eeeeee	Sample ID		
fffff	Message control ID		

21. Alarm No. 6135: ONLINE RACK NO. MISMATCH (aa bbbb:cccc-dd<>eeee-ff) gggggg, hhhhh

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The rack No. or cup position contained in the received test order information message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/received sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Transmitted sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccc	Transmitted rack No.		
dd	Position in the received rack		
eeee	Transmitted rack No.		
ff	Position in the received rack		
gggggg	Sample ID		
hhhhh	Message control ID		

22. Alarm No. 6136: ONLINE MISMATCH (aaaaaa<>bbbbbb) ccccc

[Processing on the system when this alarm is generated]

1. The sample kind contained in the received test order information message was not consistent with the requested data.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample ID contained in the received test order information message is not consistent with the requested data.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details
aaaaaa	Transmitted sample ID	
bbbbbb	Received sample ID	
ccccc	Message control ID	

23. Alarm No. 6151: ONLINE TEST ITEM ERROR (aa bbbb:ccc d) eeeeee, fffff

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. An error was detected in the settings in online test No. and dilution inf. contained in the received test order information message.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
ccc	Received online test No.		
d	Received dilution inf.		
eeeeee	Sample ID		
fffff	Message control ID		

24. Alarm No. 6152: ONLINE RERUN ITEM ERROR (aa bbbb) ccccc

[Processing on the system when this alarm is generated]

1. The sample kind contained in the received test order information message was not consistent with the requested data.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. When the test order information message of rerun sample is received, a rerun item fails to be entered because the rerun sample specified in the message is processing.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
ccccc	Message control ID		

25. Alarm No. 6153: ONLINE SAME SAMPLE ID ERROR (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The sample kind contained in the received test order information message is not consistent with the requested data.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. The sample ID contained in the received test order information message is already registered as RB, ACAL, or Control sample ID.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

26. Alarm No. 6161: ONLINE MAXIMUM SAMPLE NO. ERROR (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The sample kind contained in the received test order information message is not consistent with the requested data.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. When the test order information message is received, the new maximum value fails to be entered for the sample No.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample

Code	Classification	Details	
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

27. Alarm No. 6162: ONLINE SAMPLES REMAINING ERROR (aa bbbb) cccccc, ddddd

[Processing on the system when this alarm is generated]

1. The system discards the test order information message received online.
2. The system continues online test order information receive processing.

[Details of the alarm]

1. When the test order information message is received, zero (0) fails to be entered for the number of samples remaining.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

28. Alarm No. 6181: ONLINE PENDING TRANSFERS (aaaaaaaaaaaaaaaa,bb cccc)

[Details of the alarm]

1. When the batch online result is transferred, some samples fail to be transferred. Refer to Note 1.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aaaaa	Index name		
bb	Measure type/received sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
cccc	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample

Note 1: Up to 5 samples that fail to be transferred are displayed for each alarm.

29. Alarm No. 6182: SAMPLE REGISTRATION WAS DONE FOR LIS DIRECTION (aa bbbb) cccccc, ddddd

[Details of the alarm]

1. The test order message is received according to LIS direction, sample information is entered. Refer to Note 1.
2. The following table shows the code contents in brackets and their meanings:

Code	Classification	Details	
aa	Measure type/sample type	ΔΔ	Serum First run sample
		ΔU	Urine First run sample
		ΔX	Other 1 First run sample
		ΔY	Other 2 First run sample
		ΔW	Whole blood First run sample
		HΔ	Serum Rerun sample

Code	Classification	Details	
		HU	Urine Rerun sample
		HX	Other 1 Rerun sample
		HY	Other 2 Rerun sample
		HW	Whole blood Rerun sample
bbbb	Sample No.	0001 - 9999	Routine sample
		P001 - P999	STAT sample
		E001 - E999	Emergency sample
cccccc	Sample ID		
ddddd	Message control ID		

Note 1: When receiving the test order information message according to LIS direction and overwriting the sample No. with the message while editing sample information about the sample No. on the **Rack Order** screen, the system overwrites the sample No. based on the test order information message and shifts to the screen for the next sample No. This is a notification alarm in that case.

30. Alarm No. 6183: THERE IS UNPROCESSED SAMPLE AT CURRENT INDEX

    [Details of the alarm]

    A sample that has not been measured is included in the current index. Refer to Note 1.

    Note 1: When the sample information entry function according to LIS direction is used, do not measure the sample that has been previously entered but not been measured after the index is replaced, because the index becomes old. Therefore, a reminder alarm is generated when the index is replaced.

    To measure the sample after replacing the index, retransmit the test order information message about the sample to be measured.

    When the index is replaced, the [CL] system state is transmitted to the LIS.

Appendix E: Comparison of AU680 and DxC 700 AU

No.	Difference	AU680	DxC 700 AU	Remarks
1	Port Number Setting	You cannot use the same port number for port A (Real-time online port) and port B (Batch Online port).	You can use the same port number for port A (Real-time online port) and port B (Batch Online port).	

No.	Difference	AU680	DxC 700 AU	Remarks
2	Handling of rerun samples	1. The system handles rerun samples placed in an orange rack or on the STAT table as measure type "H". 2. The system handles auto rerun samples as measure type "H". 3. First run sample numbers and rerun sample numbers are not always the same value. LIS computers need to memorize the first run sample numbers. Set the sample numbers for sample information messages of rerun samples.	1. The system handles rerun samples placed in a white or red rack or on the STAT table as measure type "H". 2. The system handles auto rerun samples as measure type ”H”. 3. First run sample numbers and rerun sample numbers are always the same value. LIS computers do not need to memorize any first run sample numbers. Set the same values for rerun sample numbers and first run sample numbers.	There are no differences in the message format from the AU680.

No.	Difference	AU680	DxC 700 AU	Remarks
3	Sample Type	[System Maintenance] - [Setup Parameters] - [SystemParameter1] - [For Inquiry] - [Sample Kind Mix.] - "Unity" allowed is the default setting for the system. The system sets and sends specified sample type in "First run sample request message".	[System Maintenance] - [Setup Parameters] - [SystemParameter1] - [For Inquiry] - [Sample Kind Mix.] - "Mix" allowed is the default setting for the system. If no sample type is specified, the system sets and sends "Not specified: 'N'" in "First run sample request message". Reply with any one of other specified sample types than "Not specified" set on the LIS computer. When samples are analyzed using racks, the settings of "Mix" and "Unity" of [System Maintenance] - [Setup Parameters] - [SystemParameter1] - [For Inquiry] - [Sample Kind Mix.] allowed are selectable. However, when samples are analyzed as STAT samples, "Mix" allowed is fixed.	The LIS computer which is used with AU680 may not be able to communicate with DxC 700 AU when you set [Online] - [Setup] - [Test Order Information Receive] - [STAT First-Run] to "Realtime".

No.	Difference	AU680	DxC 700 AU	Remarks
4	Other Type	Not used	If set to "used" on the **Sample Program Format** screen, it is required on sample information messages from LIS computers, and it is output onto the analysis data messages. The system, according to the information of the other type, conducts the set range checking on the **Range** screen of conditions per analysis item. If there are abnormal checking results, an analysis data message with error flags is sent to the LIS computers. If there are no abnormal checking results, an analysis data message containing the result with no error flags is sent to the LIS computers.	This information is used when range checking is desired per animal type at veterinary hospitals. If you uncheck [Sample Program Format] - [Other Type], it can communicate in the same format as AU680.
5	Run Date/Time	Not used	If set to "used" on the **Online** screen, it is output onto the analysis data messages. The output descriptions include the termination time of the test measurements. All sample kinds are affected.	
6	ISE Info.	Not used	If set to "used" on the **Online** screen, it is output onto analysis data messages. The output descriptions include the ISE reagent lot numbers and the ISE electrode lot numbers.	

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