cobas c 311 analyzer

Host Interface Manual
New Mode

Document Information

Manual Version	Software Version	Revision Date	Changes
Draft Version 0.1		2007/09/14	All Based on the “cobas e411 HostCommunication_Version_1.0.doc” and “HOST-MAN_V01_c311_3c.DOC”
Version 1.0		2007/10/22	
Version 1.1		2008/02/25	Revised.
Version 1.2		2008/06/10	Revised.
Version 1.3		2011/05/24	Function addition of Host Communication setting. Change by function addition of Host Communication setting. Change of result data flags.
Version1.4		2013/07/24	Communication Text "Note" for the case that no inquiry is sent in sequence number mode is added. Test order record Field: Universal Test ID "Note" for the limitation of the dilution for HbA1c full blood is added. Result record Field: instrument identification Module "ISE11" is changed into "ISE1".
Version 1.5		2014/07/01	(1)Layout modification to Roche corporate design (2)Comment Record, that follows the order record (3)Note for the characters to send from Host is added. (4)Note for S.B.S Mode is added. (5)Naming of Table 20 and reference adapted (6)Figure 3: Text Settings Screen is improved. New Mode check box is "checked".
Version 1.6		2015/09/30	Correction of the description for "How to store a host communication trace file" Press "Floppy Disk Write" -> Press "Backup Disk Write" Insert Floppy Disk to store the trace -> Insert DVD or USB media to store the trace
Version 1.7		2015/10/23	Correction of the host flag code on List of Result Data Flags(Data Alarm List). The code for "Serum index multiple interference" was modified from 59 to 58.
Version 1.8		2017/02/20	The List of Result Data Flags (Data

	Alarm List) was updated as follows. 1) Seven new flags of serum index for LCP3 are added. 2) Wrong alarm code for "Detergent short" was corrected from 71 to 73.

Edition notice

This Users Guide is for users of **cobas c** 311 analyzer.

Every effort has been made to ensure that all the information contained in this document is correct at the time of printing. However, Roche Diagnostics International Ltd reserves the right to make any changes necessary without notice as part of ongoing product development.

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Intended use

This document describes communication procedure related to communication method that enables intercommunication between Laboratory Host System, hereinafter referred to as HOST, and **cobas c** 311 analyzer. Specification and software described herein comply with the following ASTM communication protocol: (HOST communication ASTM higher-layer: High-Level, lower-layer: Low-Level I/F specification)

Specification X12 of ASTM (American Society of Testing and Materials)

ASTM E1381-91: Specification for Low-Level Protocol to Transfer Messages Between Clinical

Laboratory Instruments and Computer System

ASTM E1394-91: Standard Specification for Transferring Information between Clinical Instruments and Computer Systems based dependency of sample results from calibration- and control.

Table of Content

Specification of interface

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Specification of Communication

Communication between **cobas c** 311 analyzer and HOST is based on RS-232C connection.

Item	Specification	Recommendation	Note
Communication Protocol	ASTM	-	
Communication Speed	19200bps/9600bps/4800bps	9600bps	Selectable from GUI
Character Configurations	See Table B-2.	8bit,NONE,1Stopbit	Selectable from GUI
Protocol Type	**cobas** type	**cobas** type	Selectable from GUI
Frame Length	247 bytes	-	
Communication Port	1 port	-	
Cable Length	15m	-	
Communication method	Half duplex		

Table 1: Specification of Serial Interface

Character Configuration is selected from table 2.

No.	Data bit	Parity bit	Stop bit
1	7bit	EVEN	2Stopbit
2	7bit	ODD	2Stopbit
3	7bit	EVEN	1Stopbit
4	7bit	ODD	1Stopbit
5	8bit	NONE	2Stopbit
6	8bit	NONE	1Stopbit
7	8bit	EVEN	1Stopbit
8	8bit	ODD	1Stopbit

Table 2: Character Configuration

Host Communication Setting

Select *Yes/No* at "Host Communication" on Start Conditions screen.

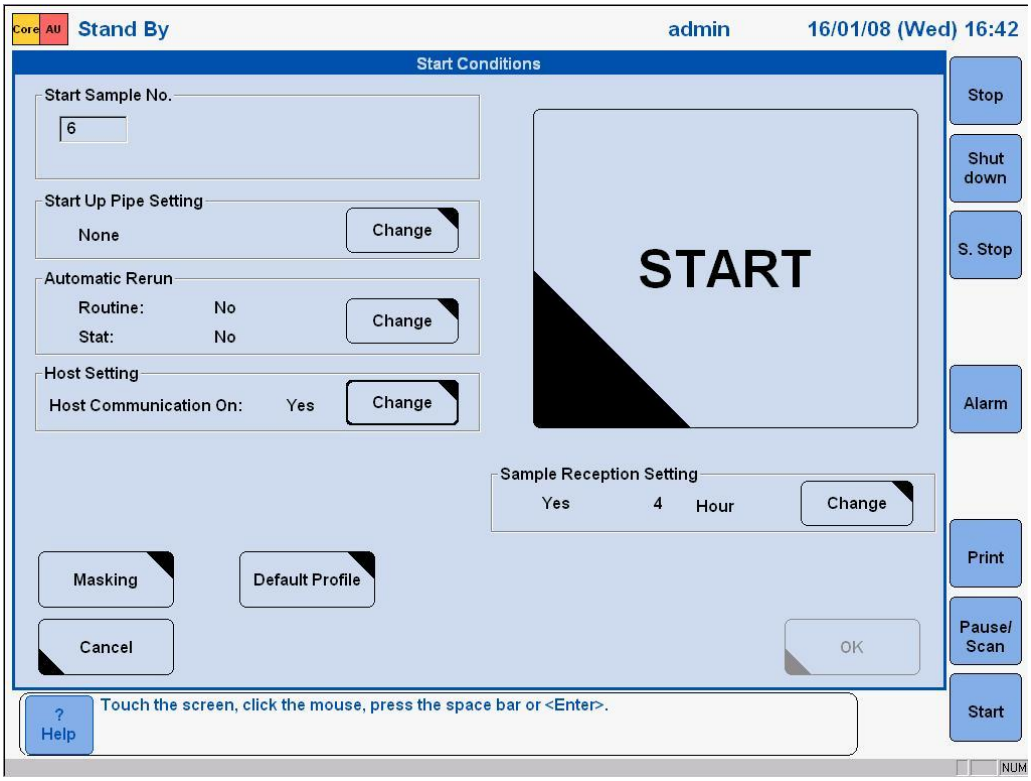


Figure 1: Start Conditions Screen

Select condition of HOST communication on the **Utility > System > Host Communication Setting** window. The setting is only changeable when "Host Communication" is off.

Communication Setting

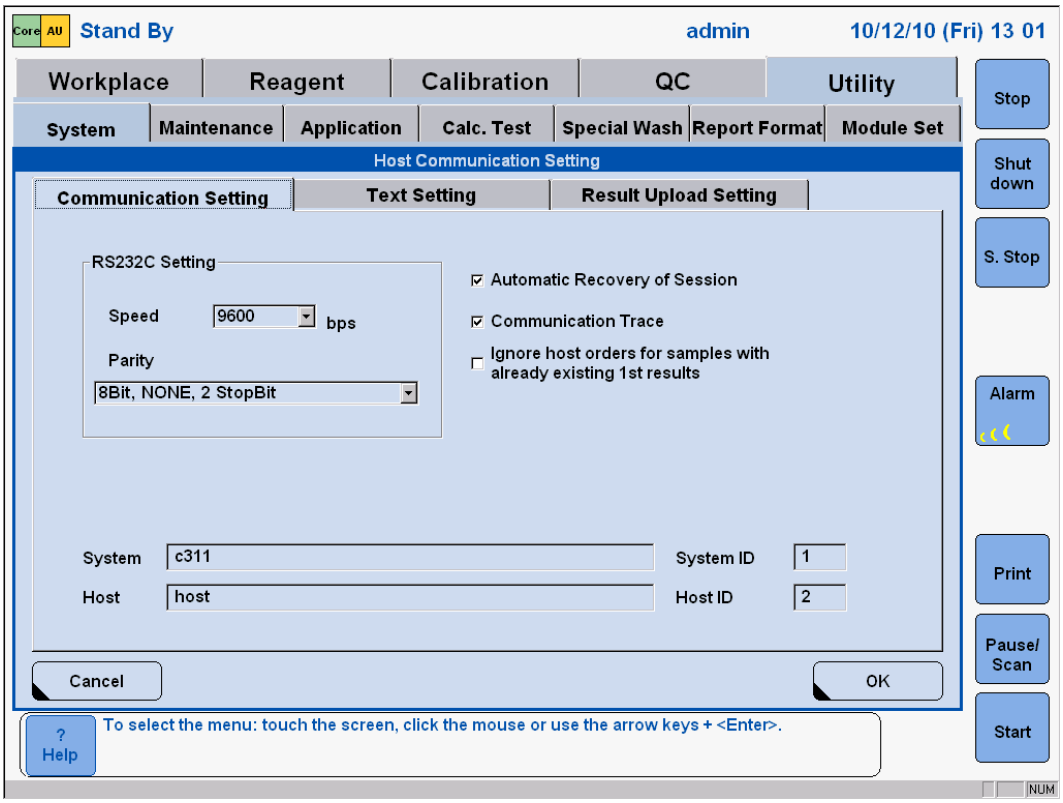


Figure 2: Communication Setting Screen

RS232C Setting

Speed	**19200/9600/4800**	**Select speed.**
	Parity	7bit, EVEN,2Stopbit/
	7bit, ODD,2Stopbit/	
	7bit, EVEN,1Stopbit/	
	7bit, ODD,1Stopbit/	
	8bit, NONE,2Stopbit/	
	8bit, NONE,1Stopbit/	
	8bit, EVEN,1Stopbit/	
	8bit, ODD,1Stopbit	Select Parity.

Automatic Recovery of Session Check box **On/Off**

During the initial setup of the host, it is recommended that this function not be enabled so errors can be detected. After the host interface has been successfully established, this function can be enabled, and can help resolve occasional interface errors without requiring operator intervention.

Communication Trace Check box **On/Off**

This function applies to all host communications. When this function is enabled, the content of the communication with the host can be stored at the analyzer. The Communication Trace report can be

printed from the global Print screen. This report can be used as an analysis tool if a problem occurs.

Note Due to the trace file size, it is recommended that the Communication Trace report not be routinely used. When enabled for troubleshooting purposes, it is recommended that the print buffer be printed prior to printing this report, as the size of it might overwrite other buffered printouts.

How to store a host communication trace file.

- It is possible to get a host communication trace by the following procedure.
- Touch the Print button.
- Select Utility tab.
- Select the Communication Trace in the list box.
- Select the radio button „Print“
- Press View
- Press " Backup Disk Write"
- Enter Filename for Tracefile
- Select Page Range
- Insert DVD or USB media to store the trace
- Touch OK button.

Ignore host orders for samp with already existing 1st results Check box **On/Off**

If this function is enable, when orders are sent from Host, orders for tests with already existing 1st run results are ignored and not measured again.

Additional orders are detected and processed and Automatic rerun triggered by system instrument is possible.

Rerun and 3rd result orders from host are not possible.

If this function is disabled, all orders are detected and measured even if not necessary.

For example, during S.B.S. mode, the inquiry of orders to Host is performed repeatedly. When this function is enable, orders sent from Host which have 1st result are not measured.

Note S.B.S means "scan before sample stop".
The S.B.S mode is activated on the Barcode Setting window(Utility>System).
In case of SBS mode is activated, at the end of the run, when all first and rerun results are available, the analyzer checks the internal sample database to collect open test requests.The database can be checked up to six times.
So even if the first database check has already been performed, additional tests or samples will be measured in the next cycle

System Name used on reports and in communications for the **cobas c** 311 analyzer.

Host Name used on reports and in communications for the host system.

System ID The ID number used to identify the system in communications with the host.

Host ID The ID number used to identify the host in communications with the analyzer.

Text Setting

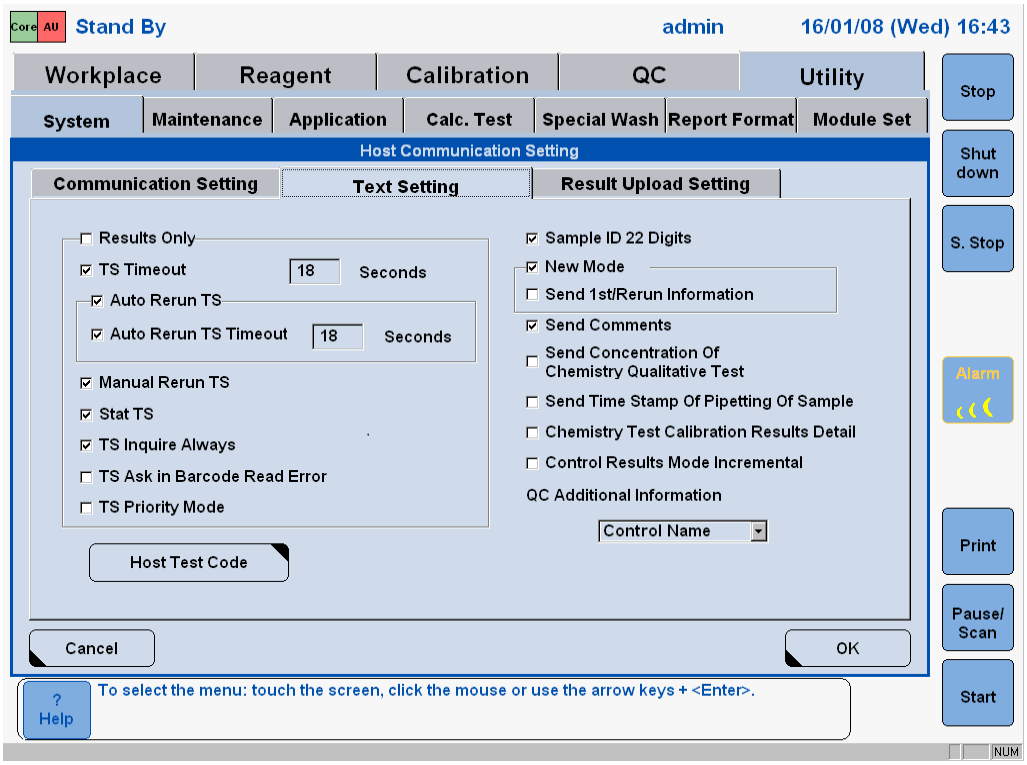


Figure 3: Text Settings Screen

Result Only Check box **On/Off**

This function applies to all Realtime Communications. This does not apply to the Batch Mode. When this function is enabled, communication during analysis is limited only to the analytical data transmissions. Inquiries for the Test Selection Information or Auto Rerun Selection Information are not made. Test selections would need to be made either manually by the operator at the analyzer, by Batch Mode from the host, or by use of the Default Profile.

TS Timeout Check box **On/Off** and input 10-9999

This function allows the operator to set a timeout interval for Test Selection Information Inquiry for Realtime Communications and for routine, Stat and rerun samples. The specified timeout interval determines how long the analyzer will wait for a 'Response from the host'. The range is 10-9999 seconds (depending on TS Priority Mode), with a default of 18 seconds. Enabling this function optimizes the throughput of the system. If the function is not enabled, the analyzer will wait indefinitely for Test Selection Information.

Auto Rerun TS Check box **On/Off**

This function applies to Auto Rerun TS inquiry within the Realtime Communications if the upload setting is not "by sample. When this

function is enabled in the Auto Rerun mode during analysis, an inquiry is made for the Auto Rerun selections. When this function is not enabled, no inquiry for the Auto Rerun Selection is made.

Auto Rerun TS Timeout Check box **On/Off** and input 10-9999

This function applies to the reception of Auto Rerun Test Selection Information in Realtime Communications. The range is 10-9999 seconds, with a default of 18 seconds (depending on TS Priority Mode). If the function is not enabled, the analyzer waits indefinitely for Rerun Test Selection Information.

Manual Rerun T S Check box **On/Off**

This function applies to the Test Selection Information inquiry for Manual Rerun samples in Realtime Communication. When this function is enabled, an inquiry is made for the test selections for rerun samples during analysis. Any samples that have previously been processed create a TS inquiry to the host. When this function is not enabled, no TS inquiry for Manual Rerun samples is made.

Stat TS Check box **On/Off**

This function applies to the Test Selection Information inquiry for Stat samples in Realtime Communications. When this function is enabled, an inquiry is made for the test selections for Stat samples during analysis. When this function is not enabled, no TS inquiry for Stat samples is made.

TS Inquire Always Check box **On/Off**

This function applies to the Test Selection Information inquiry for routine and Stat samples in Realtime Communications. This does not apply to TS information inquiry for rerun samples, Auto Rerun and Manual Rerun. When this function is enabled, an inquiry is made whether the TS information is in the analyzer or not. When not enabled, an inquiry is made only for the samples that do not have test selections.

TS Ask in Barcode Read Error Check box **On/Off**

If this function is enabled, and the analyzer cannot read a sample barcode, "***..." (13 or 22 characters of '*') is sent as the sample ID, and the rack ID and position are sent to the host as key information to identify the sample. If the host has the table of the rack ID, position and Sample ID, the host can send back to the analyzer the correct Sample ID instead of '***...'

Note Because Host protocol and text field is same as cobas6000, Rack ID field is used in **cobas c** 311 analyzer communication text.

The only currently known use for this function is with a Sample Handling System that 'manufactures' sample aliquots for the analyzer. This type of system would track samples by position on S.Disk. Unless the Sample Handling System can perform this function, it is strongly recommended that it not be used

This function is not visible, if the Sample Barcode Reader is switched off.

TS Priority Mode Check box **On/Off**

If this function is enabled, after a Test Selection inquiry the analyzer will stop sending any information, i.e. result data, until the analyzer receives the answer to the inquiry from the host or the TS timeout period passes. This option applies to both the inquiry at the bar code reader and the implied inquiry after Result upload in “By Sample” setting.

The range of the TS Timeout and Auto Rerun TS Timeout is from 1 to 18 seconds with this mode on. With this mode off the TS Timeout options remain at 10 to 9999 seconds. If this mode is enabled and the TS Timeout checkbox is off, TS timeout is handled as 18 seconds.

Sample ID 22 Digits Check box **On/Off**

The maximum length of the sample ID is increased from 13 to max. 22 characters.

New Mode Check box **On/Off**

The host interface protocol description in this manual is based on this 'New Mode' setting enabled.

If disabled the protocol is identical with the protocol of the CC Modular software for purpose of 100% compatibility with already connected Analyzer systems.

Concerning detail of the CC Modular host interface specification refer to

Roche/Hitachi MODULAR System Host Interface Document Version 1.0 Ident. No. 011632701 (US ID)

Send 1st/Rerun Information Check box **On/Off**

With this mode enabled additional information that shows whether a query is 1st or rerun measurement is added to Request Information Record. This mode is applied to only “Inquiry for the Requested Tests” message from the analyzer to the host, but not applied to “Inquiry of Result” from the host to the analyzer.

If the function is not enabled, no information is added to Request Information Record.

Send Comments Check box **On/Off**

This function applies to host communications. When this function is enabled, the host can send patient comments to the analyzer. Patient comments stored in the analyzer can also be transmitted to the host along with analytical data and Reaction Monitor data. When this function is not enabled, no patient comments are accepted or sent.

S*end Concentration Of* Check box **On/Off**

*Chemistry Qualitative Tes*t

This function is available for Result transfer and Reaction Monitor transfer.

When this function is selected, measurement results are also send to Host with Qualitative result in photometric test result record.

Send Time stamp of pipetting of Sample Check box **On/Off**

When this function is enabled, pipetting date and time for each test result is sent to the host.

Chemistry Test Calibration Results Detail Check box **On/Off**

When this function is enabled, the detail information (reagent lot number, reagent bottle sequence number, expired flag, calibrator lot number and pipetting date and time) corresponding to the calibration result is sent to the host.

Control Results Mode Incremental Check box **On/Off**

With this mode enabled, the control results are sent test oriented; i.e. as soon as one test result is available it is sent to the host.

QC Additional Information Control **Name/Lot No**

With this function it is possible to select if 'Control Name' or 'Lot Number' shall be sent in field 3 of the Test Order record within a control result message.

Host Test Code Use the **Host Test Code Setting** window to edit the test code sent to the host

Host Text Code Setting

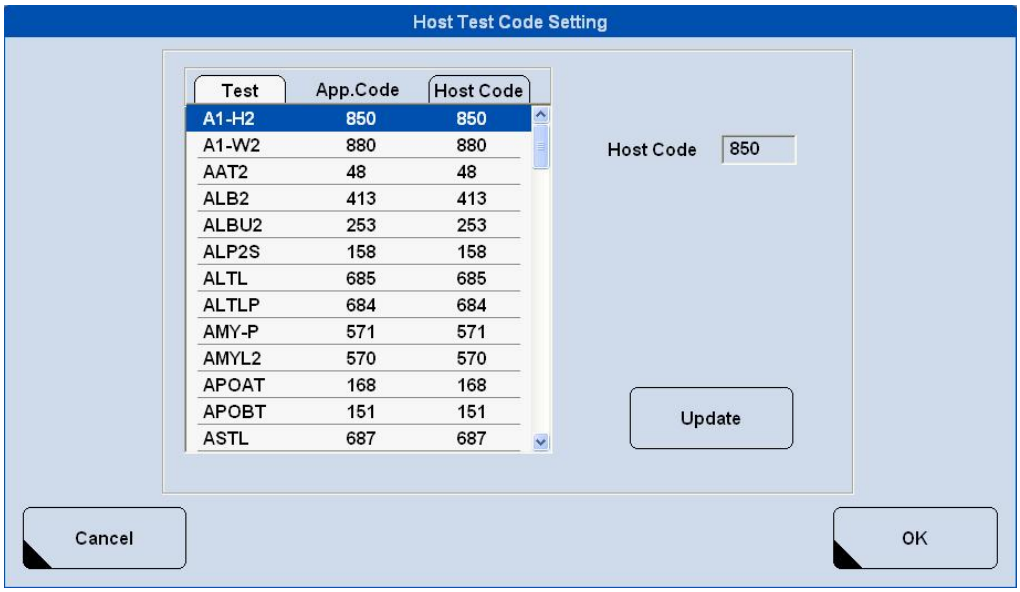


Figure 4: Host Text Code Setting

Host Code Input 1-99999

Use this text box to edit the host code for the test selected in the Test list. After editing the code, touch Update to save the change.

Update Changes are saved and the updated contents of the list are displayed.

Result Upload Settings

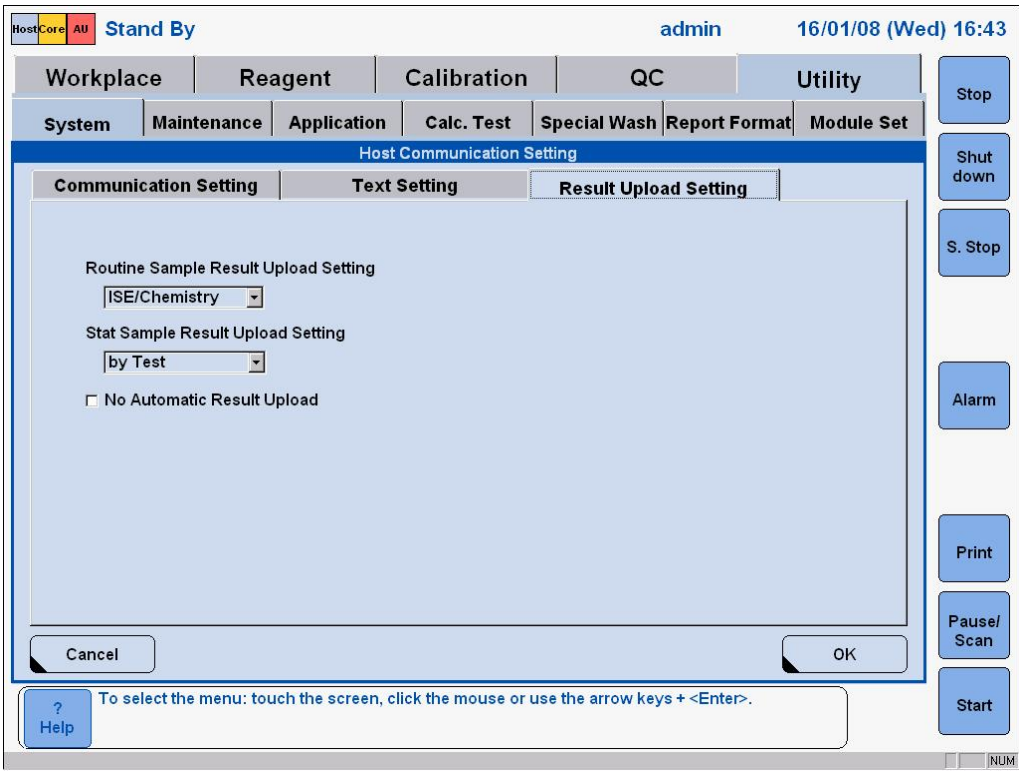


Figure 5: Result Upload Settings

Routine Sample Result upload setting — *By Sample / ISE/Chemistry*

With this function it is possible to select how the routine sample results are uploaded to the host in real time. When *By Sample* is selected, all results of routine sample are uploaded by round.

When *ISE/Chemistry* is selected, ISE results and Chemistry results of routine sample are uploaded separately. And to indicate the last result upload an automatic Query is sent to the host and to indicate the last result upload an automatic Query is sent to the host.

STAT Sample Result upload setting — *By Sample / ISE/Chemistry / By Test*

With this function it is possible to select how the stat sample results are uploaded to the host in real time. When [By Sample] is selected, all results of STAT sample are uploaded by round.

When *ISE/Chemistry* is selected, ISE results and Chemistry results of Stat sample are uploaded separately. And when *By Test* is selected, as soon as one test result is available it is sent to the host. In the modes *ISE/Chemistry* and *By Test* an automatic Query is sent to the host, to indicate the last result upload.

No Automatic Result Upload — *By Sample / ISE/Chemistry / By Test*

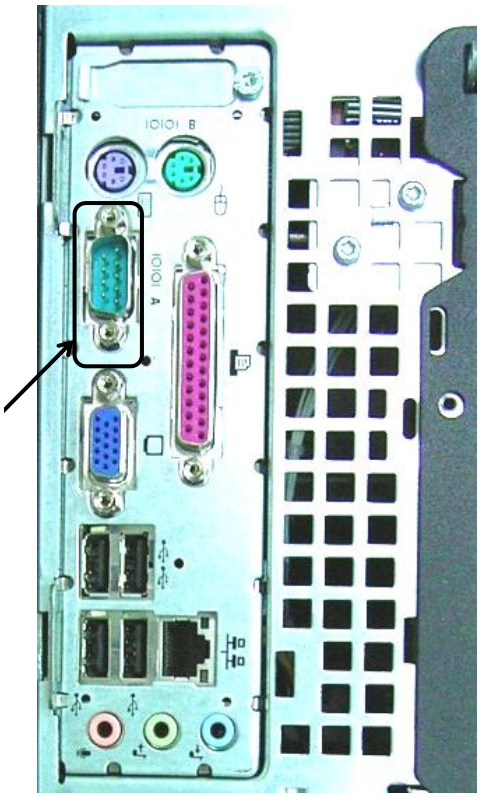
This function is applied to Realtime communication for routine and Stat samples.

When this function is enabled, no result is uploaded in real time. In this case, the results can be uploaded manually by selecting samples from the Workplace/Data Review screen.

Communication Cable

Connect RS-232C communication cable to the connector at the **cobas c** 311 analyzer. The connector is D-SUB9.

Figure 6 shows connector and communication cable. Figure 7 shows connection diagram.



Connector for external communication

Figure 6: Connector

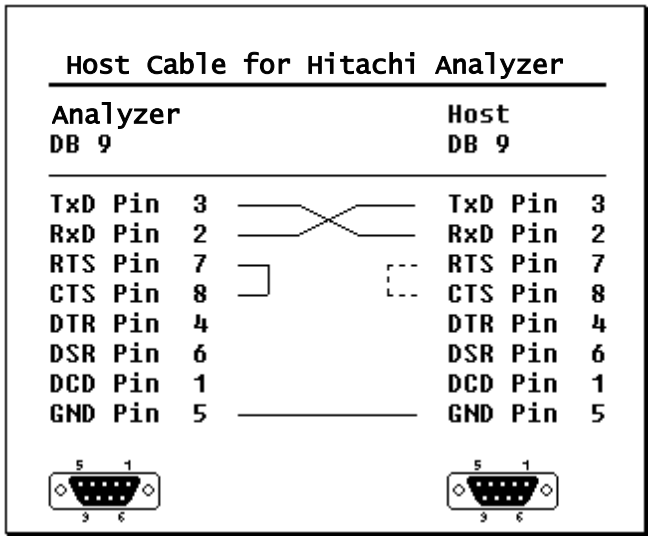


Figure 7: Connection Diagram

Communication text

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Communication Text

Text	Direction	cobas type	
		Real Time	Batch
Inquiry for Order	Upload **cobas c** 311->HOST	Yes	No
Order for Test Request	Download HOST-> **cobas c** 311	Yes	Yes
Result Report	Upload **cobas c** 311 ->HOST	Yes	Yes
Inquiry of Result	Download HOST-> **cobas c** 311	No	Yes

Yes: equipped

No: not equipped

Table 3: List of Communication Text

Note Patient sample and quality control sample and calibration result are sent as result data..

There is no Inquiry for Order of a control sample and Calibration..

In sequence number mode, there is no inquiry for Patient samples whose sequence numbers and positions are not registered on the Test Selection screen.

Text	Real/Batch	Cause
Inquiry for the Requested Tests (Upload)	Real	• After sample ID is read, inquire of HOST for test selection information of patient sample to which test selection information is not registered. • Wait for reply from HOST for test selection information for a certain length of time after the inquiry. If not replied even after a certain length of time, cancel the inquiry.
Order for Test Request (Download)	Real	• Specify the test selection information for a sample when the test selection information is inquired.
	Batch	• HOST specifies the test selection information of a patient sample at a given timing. Register test selection information before reading sample ID to use this function.
Result Report (Upload)	Real	Send result data of patient sample and quality control sample when test data of the sample is collected.
	Batch	• Send result data of patient sample and quality control sample specified on [Data Review] window.
Inquiry for result	Batch	• Send result data of patient sample requested by Host. It is not possible to select result from Host if 1st and rerun result exists, because the selection is done at the Analyzer on Test Review screen. (Workplace / Data Review / Test Review-Test result list). The result is selected by the rules below from (1) to (3). (1) There is a result. (2) The result does not have alarm, which is listed on Review by Exception screen. (3) Result is selected if 1st and rerun result is existed in Data Review screen or the only one result exists for a test.

Table 4: Causes of Communication Text

ASTM communication protocol 3

Communication Data Structure

cobas c 311 analyzer employs ASTM communication protocol.

ASTM communication protocol consists of three layered data structure such as message, record, and frame. In the application layer, data is communicated by message. Further, data is communicated by frame actually in the data link layer. Data structure of a frame varies by protocol.

A message consists of several records. A record consists of one or more frames. If a message exceeds 240 bytes, a frame is divided into middle frames and a last frame. [ETB] is used for the middle frame and [ETX] is used for the last frame.

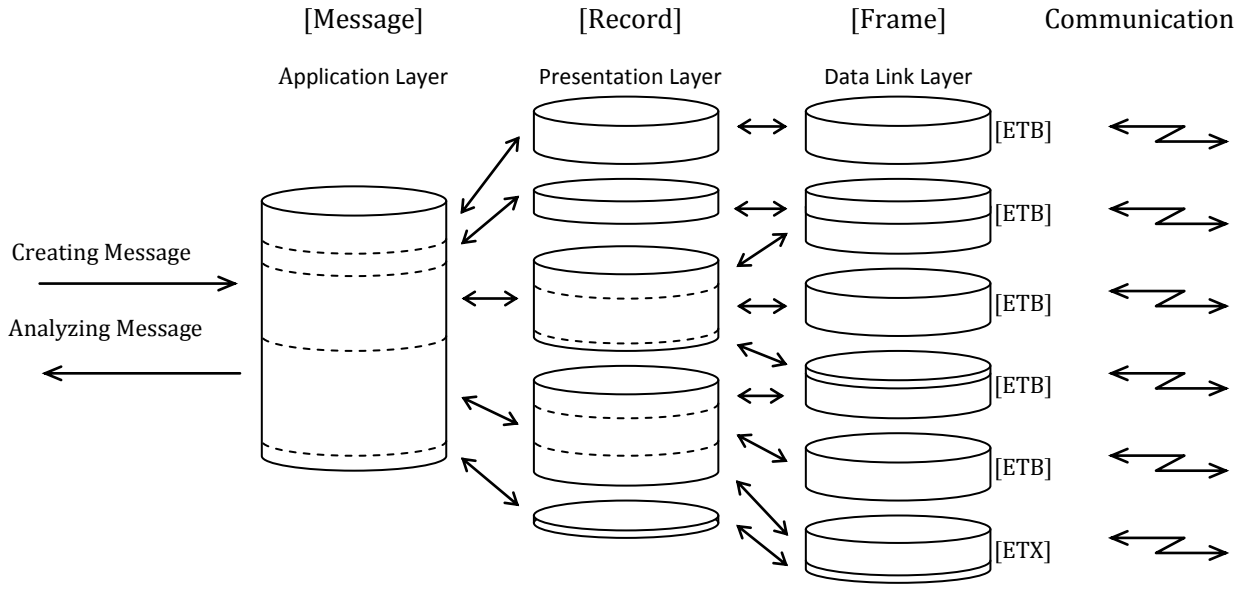

Figure 8: Data Structure

Frame Structure

Frame structure is shown below.

Middle frame when a frame is divided into more than one.

[STX]	FN	text	**[ETB]**	CS1	CS2	[CR]	[LF]

When the last frame or a frame is single frame.

[STX]	FN	text	**[ETX]**	CS1	CS2	[CR]	[LF]

Field	ASCII Code	Content	character	Note
[STX]	0x02	Start of Text	1byte	
FN	-	Frame No.	1byte	1
text	-	Communication data	Max240byte	2
[ETX]/[ETB]	0x03/0x17	End of Text/ End of Communication Block	1byte	3
CS1	-	Check Sum	1byte	4
CS2	-		1byte	
[CR]	0x0d	Carriage Return	1byte	
[LF]	0x0a	Line Feed	1byte	

Notes 1: Way to assign frame No. (FN) is starting from No.1 to No.7. When exceeding No. 7, start from No.0 to No.7.

2: Codes except the following ASCII code are available for text.

Code	Code	Code	Code	Code
[SOH]0x01	[STX]0x02	[ETX]0x03	[EOT]0x04	[ENQ]0x05
[ACK]0x06	[LF]0x0A	[DLE]0x10	[DC1]0x11	[DC2]0x12
[DC3]0x13	[DC4]0x14	[NAK]0x15	[SYN]0x16	[ETB]0x17

Notes 3: When a frame is 240 bytes or less, use [ETX].
When exceeding 240 bytes, use [ETB].

4: Add each character code which frame No. is (FN) to [ETB] or [ETX]. Display the sum in hexadecimal format. Convert the last two digits into ASCII code. Code used for Check Sum is '0' to '9' and 'A' to 'F.'

Ex. Check Sum Calculation Method

[STX]	'1'	'T'	'e'	's'	't'	[ETX]

Field	Character	Hex. format	Sum
[STX]	[STX]	02h	-
FN	'1'	31h	31h
text	'T'	54h	85h
	'e'	65h	EAh
	's'	73h	15Dh
	't'	74h	1D1h
[ETX]	[ETX]	03h	1**D4**h
			Last two digits of the sum. **D4h**
CS1	**'D'**	**44h**	
CS2	**'4'**	**34h**	
[CR]		0Dh	
[LF]		0Ah	

[STX]	'1'	'T'	'e'	's'	't'	[ETX]	**'D'**	**'4'**	[CR]	[LF]

Definition of Communication Protocol

Low-Level Protocol of ASTM communication protocol is one-way. Response is generated after the information is sent. Response is not generated simultaneously with communication. Unlike the other communication protocols, it does not have master-slave relation. Both **cobas c** 311 analyzer and HOST enable to initialize the communication.

When establishing send system and receive system, or when having the action of both the sender and the receiver arranged properly, the information is communicated by the following three phases.

- Establish phase
- Transfer phase
- Termination phase

Establish phase

In Data/Link layer, both sender and receiver go into one the following status.

- Idle state: status waiting for becoming receiver.
- Starting Establish phase at the transmitting side, transmitting record information by frame, and completing by Termination phase.
- Receiving receiver's frame, and sending [ACK].

Number of sender or receiver is one at a time. Both sender and receiver enable to be in idle status. When the presentation layer requires the data link layer to send record, one need to change its status from idle to sender. To have one been sender and the other been waited, or receiver, the sender needs to start Establish phase.

Therefore inform that the other changed its status from idle to receiver by sending ASCII code 05h[ENQ] from the sender and sending ASCII code 06h[ACK] from the receiver.

Transfer phase starts when Establish phase is completed by receiving [ACK]. Reception other than [ENQ] is ignored in idle status. Reception of [ENQ] is replied by [ACK] and receiver is turned to receiving status.

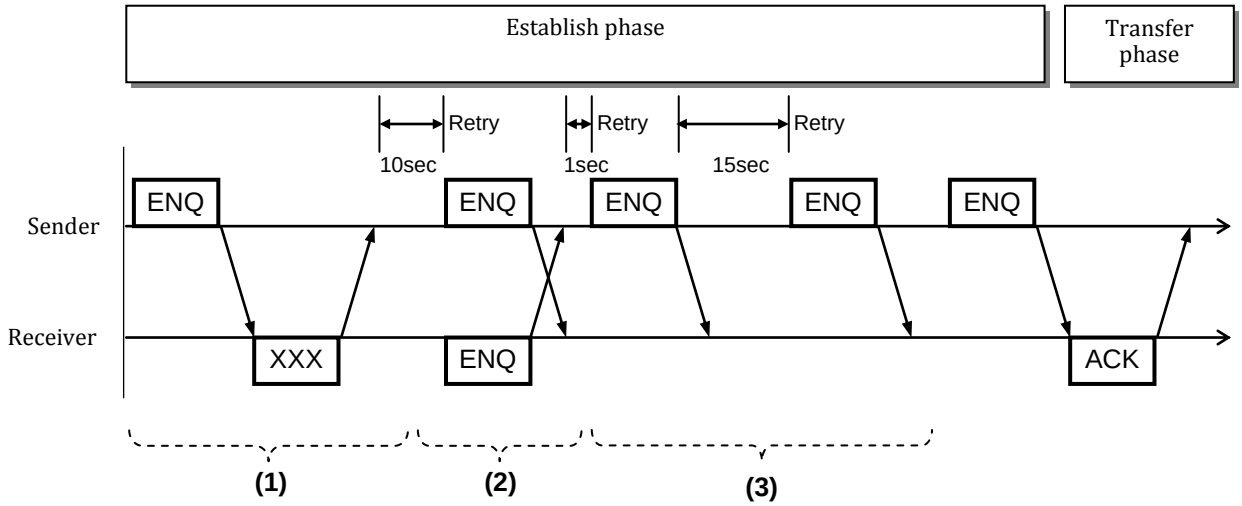

Figure 9: Establish Phase

Normal procedure of Establish phase is mentioned above. In case of error, there are additionally three options for the receiver to respond [ENQ].

(1) Receiver sends characters other than [ACK].	These characters are normally sent by using ASCII code 15hex [NAK] when the receiver is busy. The sender waits for a certain length of time, e.g., **cobas c** 311 analyzer waits for 10 seconds, and tries to establish with the other [ENQ]. The **cobas c** 311 analyzer repeats this cycle until the number of retries after error reaches six.
(2) Sender sends [ENQ].	The status in which both sender and receiver are trying to change their status to the sender is called “Link contention” in ASTM. When in link contention, it is defined that communication information of **cobas c** 311 analyzer **has a priority.** So that HOST has to stop sending [ENQ] and has to respond simultaneously by [ACK] or [NAK] when the link contention is detected. On the other hand, the **cobas c** 311 analyzer waits for more than 1 second and replies [ENQ]. The sender repeats this cycle until receiving characters such as [ACK] or [NAK].
(3) No response from receiver.	The sender starts Termination phase by sending ASCII code 04hex [EOT] after waiting for 15 seconds, and displays an error message.

Transfer phase

After receiving frame, sender discontinues communication until receiving the response or occurrence of time-out. Usually the receiver notifies by sending [ACK] that it successfully received the last frame and completes its preparations to receive the next frame. The receiver notifies by sending [NAK] that the last frame was not received and it is waiting for receiving the frame. According to the above, there are three options for HOST to respond the communication of the frame.

HOST sends [ACK] or [EOT].	**cobas c** 311 analyzer sends the next record. **cobas c** 311 analyzer has data that is to be communicated. **cobas c** 311 analyzer continues to send records. (It is started with Establish phase.)
HOST sends characters other than [ACK] or [EOT].	**cobas c** 311 analyzer repeatedly sends record. This cycle is repeated until "number of retry in case of error" reaches six. At this moment, **cobas c** 311 analyzer starts Termination phase and displays an error message by sending [EOT].
No response from HOST	**cobas c** 311 analyzer starts Termination phase by sending [EOT] after 15 seconds and displays an error message.

Response depends on how HOST responds to frame communication from **cobas c** 311 analyzer. When **cobas c** 311 analyzer is in the receiving status and is waiting communication from HOST, there are the following three scenarios.

HOST sends frame characters.	After the complete frame is received, the frame No. and the checksum are checked if they are correct. When the frame is correct, **cobas c** 311 analyzer responds by [ACK]. When the frame is incorrect, the incorrect frame is rejected and [NAK] is returned.
HOST does not complete frame communication.	Time-out occurs when receiving unfinished frame and at the same time [EOT] is not received after 15 seconds counted from the last communication of [ACK] or [NAK] from **cobas c** 311 analyzer. **cobas c** 311 analyzer is turned into idle status by deleting the last incomplete message. The line is deemed to be neutral status.
HOST sends [EOT].	The **cobas c** 311 analyzer is turned into idle status. Only completely received frame is deemed to be effective.

Termination phase

Both sender and receiver change their status into idle in Termination phase. This phase only starts when the sender sends [EOT]. Response from the receiver to this message is none. When [EOT] is detected at the receiver, it is turned to be idle and the line is required to be changed to neutral.

Record structure

4

Syntax

Syntax used in message (records) communicated by **cobas c** 311 analyzer is shown below.

Communication Text	Real/Batch	Message Syntax cobas Type Comment or Special Instructions	
Inquiry for the Requested Tests (Upload)	Real	H Q L	TSREQ^REAL
Order for Test Request (Download)	Real	H P O C-CMM L	TSDWN^REPLY
	Batch		TSDWN^BATCH
Result Report (Upload)	Real	H P O C-CMM { R C-RES } n L	RSUPL^REAL
			RSUPL^REPLY
	Batch		RSUPL^BATCH
Inquiry of Result	Real	H Q L	RSREQ ^REAL
Photometry Calibration Result Report	Real	H M-PCR L	PCUPL^REAL
ISE Calibration Result Report	Real	H M-ICR L	ICUPL^REAL
Photometric Raw Data Report	Batch	H P O C-CMM R C-RES M-ABS L	ABUPL^BATCH

Table 5: Message Syntax

Communication sequences (message flow) of communication message by application layer are shown below.

	cobas c 311 **analyzer**		**[HOST]**
(1) Order for Test Request: real-time	Inquiry for the Requested Tests (TSREQ^REAL)	->	
		<-	Order for Test Request (TSDWN^REPLY)
(2) Order for Test Request: batch		<-	Order for Test Request (TSDWN^BATCH)
(3) Result Report: real-time	Result Report (RSUPL^REAL)	->	
(4) Result Report: batch	Result Report (RSUPL^BATCH)	->	
(5) Inquiry of Result: real-time		<-	Inquiry of Result (RSREQ^ REAL)
	Result Report (RSUPL^REAL)	->	
(6) Photometric Calibration Result Report: real-time	Photometric Calibration Result Report (RCUPL^REAL)	->	
(7) ISE Calibration Result Report: real-time	ISE Calibration Result Report (ICUPL^REAL)	->	
(8) Photometric Raw Data Report: Batch	Photometric Raw Data Report (ABUPL^BATCH)	->	

Table 6: Communication Sequences

ASTM syntax is shown below.

(a) Terminating character of record:	Indicates completion of record. ASCII CR character (0Dhex) is required.
(b) Field separator character = vertical bar ' | ':	Separates adjacent fields in record. Also separates the first record ID, the character appeared at the top of record, and the next field. Depending on the second character of message title record, a record appeared at the top of the message, it enables to define the field separator character randomly. However ' |' is recommended.
(c) Repetition field separator character = backslash ' \ ':	When fields consist of repetition of the same data, it is called "repeated field." Repeated field separator character is a separator between tests of repeated field. Depending on the message title code, it enables to define the repeated field separator character randomly. However ' \ ' is recommended.
(d) Component separator character = caret ' ^ ':	When fields consist of multiple components, it is called "component field." Component separate or character is a separator between the components. Depending on the message title code, it enables to define the component separator character randomly. However ' ^ ' is recommended.
(e) Escape character = ampersand ' & ':	Escape character is defined to represent a separator character in the field including normal text. Appearance of this character in such field indicates that the following character has special meaning. Depending on the message title code, it enables to define the escape character randomly. However ' & ' is recommended.

(f) Expression of special characters by escape characters:	Escape sequence, character string starts and ends with &, is defined as follows. When these sequences are detected in the field, it is interpreted the corresponding character string. &F& Field separator character &S& Component separator character &R& Repetition separator character &E& Escape character

Escape sequences other than the above are skipped and handled as null value.

The table below describes attributes of each field in each record shown in chapter Patient Information Record.

No	Name of Attributes	Description	
1	Order (No.)	Sequence of the field. Sequence of the fields in record.	
2	Name of Field (Field)	Name of relevant field.	
3	Type (Type)	Typing characters for the fields are any of the following.	
		ST	Character string.
		TX	Character string group that end is printable.
		NM	Numeric value. '+' or '-' is attached at the top. If not, the value is deemed to be '+.' When without decimal point, the value is deemed to be integer. Prefix attached to '0,' and suffix attached to '0' of numeric value with decimal point can be anything.
		DT	Date. Four digits of dominical year. YYYYMMDD (YYYY: dominical year, MM: month, DD: day) Ex. September 5, 1995 is displayed as "19950905."
		TM	Set time in 24 hours. HHMMSS (HH: hour, MM: minute, SS: second)
		TS	Time stamp. Display DT and TM together such as "YYYMMDDHHMMSS."
		CM	Field of combined multiple data by component section separator character.
4	Maximum length (Max)	Maximum number of effective characters except escape characters in the relevant field.	

Table 7: Field description

Message Header Record

cobas type (Upload, Download)

H|\^&|||**cobas c** 311^1|||||host|RSUPL^BATCH|P|1[CR]
(1) (2) (3) (4) (5) (6) (7)

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'H' fixed.
(2)	2	Delimiter Definition	ST	4	Four characters such as field separator character, repeat separator character, component separator character, and escape character are defined. The first character is defines as a field separator character and Record Type ID separator as well. These four characters are '|\^&.'
	3	Message Control ID			*Field does not contain data*
	4	Access Password			*Field does not contain data*
(3)	5	Sender Name or ID	CM	36	. Setting is as follows: <Sender's device name>^<Communication program version> <Sender's device name> Type:TX Max: 30 Any characters within alphanumeric and '-.' <Communication program version> Type: NM Max: 5 '1' fixed.
	6	Sender Street Address			*Field does not contain data*
	7	Reserved Field			*Field does not contain data*
	8	Sender Telephone Number			*Field does not contain data*
	9	Characteristics of Sender			*Field does not contain data*
(4)	10	Receiver ID	ST	30	Receiver's name. Sending from **cobas c** 311 analyzer. Sending from HOST: any characters within alphanumeric and '-.'
(5)	11	Comment or Special Instructions	CM	11	Setting is as follows: <Meaning of message>^< Mode of message > <Meaning of message> Type: ST Max: 5 'TSREQ': TS inquiry. 'TSDWN': Test selection download. 'RSUPL': Result report 'PCUPL': Photometry calibration report 'ICUPL': ISE calibration report 'ABUPL': Absorbance report 'RSREQ': Inquiry for the result <Mode of message> Type: ST Max: 5 'REAL': communication in real time. 'BATCH': communication based on request from **cobas c** 311/HOST. 'REPLY': reply to the request.
(6)	12	Processing ID	ST	1	'P' fixed.
(7)	13	Version No.	NM	1	'1' fixed.
	14	Date and Time of Message			*Field does not contain data*

Table 8: Message Header Record

Message Termination Record

cobas type (Upload, Download)

L|1|N [CR]
(1)(2) (3)

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'L' fixed.
(2)	2	Sequence Number	NM	1	Indicates sequence No. Normally it is '1'
(3)	3	Termination Code	ST	1	'N' fixed. (normal end)

Table 9: Message Termination Record

Request Information Record

cobas type (Upload, Download)

Q|1|^^ 000663^32^50002^002^^S1^SC||ALL|||||||O[CR] (1)(2) (3) (4) (5)

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'Q' fixed.
(2)	2	Sequence Number	NM	6	Indicates sequence No. Normally it is '1'
(3)	3	Starting Range ID Number	CM	45	Indicates inquired sample. Setting is as follows: ^^<SampleID>^<SequenceNo>^< Rack ID No >^ <PositionNo>^^<SampleType>^<ContainerType>^ <SampleID> Type: ST Max: 22 indicates Sample No. (Sample ID.) <SequenceNo> Type: NM Max: 5 indicates **cobas c** 311 analyzer internal sequence No. The range is 1-60000 < Rack IDNo> Type: ST Max: 5 indicates carrier No. (Disk/Rack.) At the c311 analyzer, Rack ID contains two kinds of information: Type of sample - 2 digits 20: Calibration 30: Control 40: STAT 50: Routine + Disk Position - 3 digits **Note** Because Host protocol and text field is same as cobas6000, Rack ID field is used in **cobas c** 311 analyzer communication text. <PositionNo> Type: NM Max: 3 Position range is 001 to 110. indicates position No. in carrier. <SampleType> Type: ST Max: 2 indicates sample type. Position type is identified by S0 ~ S5. S1: Blood Serum/Plasma S2: Urine S3: CSF S4: Suprnt S5: Others S0: None type sample (for TS inquiry) QC: Control (only for Control Result Inquiries from Host) S0 is used only in Sample ID mode. . <ContainerType> Type: ST Max: 7 indicates sample cup type. 'SC': test tube or sample cup. 'MC' : Microcup <Kind> R1: For 1st measurement R2: For rerun measurement This information is sent to the host only when an option of "Send 1st / Rerun Information" is specified
	4	Ending Range ID Number			*Field does not contain data*
(4)	5	Universal Test ID	ST	3	'ALL' fixed.
	6	Nature of Request Time Limits			*Field does not contain data.*

No	Field No.	Field	Type	Max	Comments cobas Type
	7	Beginning Request Results Date and Time			*Field does not contain data.*
	8	Ending Request Results Date and Time			*Field does not contain data.*
	9	Requesting Physician Name			*Field does not contain data.*
	10	Requesting Physician Telephone Number			*Field does not contain data.*
	11	User Field No.1			*Field does not contain data*
	12	User Field No.2			*Field does not contain data*
(5)	13	Request Information Status Codes	ST	1	Indicates the objective of the record. Setting is as follows: 'O': Order query (to Host) 'A': Cancel the last request (to Host) 'F': The final result

Table 10: Request Information Record

Patient Information Record

cobas type (Upload, Download)

```
P|1||||||20070921|M||||||35^Y[CR]
(1)(2)        (3)     (4)   (5)
```

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'P' fixed.
(2)	2	Sequence Number	NM	6	Indicates sequence No. Normally it is '1'
	3	Practice Assigned Patient ID			*Field does not contain data.*
	4	Laboratory Assigned Patient ID			*Field does not contain data.*
	5	Patient ID No. 3			*Field does not contain data.*
	6	Patient Name			*Field does not contain data.*
	7	Mother's Maiden Name			*Field does not contain data.*
(3)	8	Birthdates	DT	8	Date as defined by ASTM 6.6.2
(4)	9	Patient Sex	ST	1	**Field Value** **Description** M Male F Female U Unknown
	10	Patient Race			*Field does not contain data.*
	11	Patient Address			*Field does not contain data.*
	12	Reserved Field			*Field does not contain data.*
	13	Patient Phone No			*Field does not contain data.*
	14	Attending Physician ID			*Field does not contain data.*
(5)	15	Special Field 1	CM	5	**Format** <Age>^<Age Unit> **Element** **Max Length** **Format** Age 3 NM Age Unit 1 ST **Element** **Description** Age Age of the Patient from whom the sample was collected. Range 1-200 Age Unit Specify 'Y', 'M' or 'D'. Indicates unit of the age. 'Y' is the year, 'M' is the month, and 'D' is the day.

Table 11: Patient Information Record

Test Order Record

cobas type (Upload)

```
O|1|                000663|6^50002^002^^S1^SC|^^^10^3|R||20050705093416
(1)(2)  (3)             (4)                          (5)   (6)       (7)
||||N||||1|||||||20050705095504|||F[CR]
   (8)  (9)    (10)             (11)
```

cobas type (Download)

```
O|1|                000663|6^50002^002^^S1^SC|^^^10^3|R||20050705093416
(1)       (2)       (3)       (4)       (5)       (6)       (7)
||||A||||1|||||||||O[CR]
   (8)  (9)    (11)
```

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'O' fixed.
(2)	2	Sequence Number	NM	6	Indicates sequence No. Normally it is '1' Indicates the sequence number of the Test Order Record at the current layer. This record is in the layer following the Patient Information Record and is reset to 1 for each occurrence of a new Patient Information Record. It is numbered consecutively; 1, 2, etc., for each occurrence of this record.
(3)	3	Specimen ID	ST	13 or 22	Indicates sample No. (Sample ID.) For control sample, set name or lot No. of control on communication setting screen. Note: In S.No. mode, becomes patient comment Control: Control name or Lot-Number

No	Field No.	Field	Type	Max	Comments cobas Type
(4)	4	Instrument Specimen ID	CM	22	Indicates ordered sample. Setting is as follows: < SequenceNo>^<Rack ID>^<PositionNo>^ ^ <SampleType>^<ContainerType> <SequenceNo> Type: NM Max: 5 indicates **cobas c** 311 analyzer. internal sequence No. Confirmation number when samples are numbered in sequence in order of input. In case of QC material, 'Control Number * 1000+ Sequence No. sample' is used. ex. Control No. = 1, Sequence No. = 2 is written as 1002 In ID mode, the number is reserved. In S. No. mode, the range is 1 – 60000. Control No. range is 1-100. Control Seq. No. range is 1-150 <Rack ID> Type: ST Max: 5 indicates carrier No. (Disk/Rack.) At the c311 analyzer, Rack ID contains two kinds of information: Type of sample - 2 digits 20: Calibration 30: Control 40: STAT 50: Routine + Disk Position - 3 digits **Note** Because Host protocol and text field is same as cobas6000, Rack ID field is used in cobas c 311 analyzer communication text <PositionNo> Type: NM Max: 3 indicates position No. in carrier. Values 001 ~ 110 <SampleType> Type: ST Max: 2 indicates sample type. S1: Serum / Plasma S2: Urine S3: CSF S4: Suprnt S5: Others QC: Control <ContainerType> Type: ST Max: 7 indicates type of sample cup. 'SC': Standerd cup. 'MC':Micro cup. no value Priority is given to the information inputted on the instrument

No	Field No.	Field	Type	Max	Comments cobas Type
(5)	5	Universal Test ID	CM	12	Indicates order. Repeats up to 100. Setting is as follows: ^^^<ApplicationCode>^<Dilution>\... Repeat \ (delimiter) for multiple test selection. <ApplicationCode> Type: NM Max: 5 indicates **cobas c** 311 analyzer Host Test No. <Dilution> Type: ST or MN Max: 3 indicates automatic dilution factor. None: not diluted. (attach '^' after User Test No. like '^^^10^') 'clr', 'Dec', "Inc", '3', '5', '10', '20', '50' **NOTE**: Dilution '3', and '5' cannot be selected for HbA1c full blood because of the limitation of the sample volume.
(6)	6	Priority	ST	1	Indicates priority of patient samples. Not used for control samples. 'R': routine sample. 'S': stat sample.
	7	Requested/Ordered Date and Time			*Field does not contain data.*
(7)	8	Specimen Collection Date and Time	TS	14	Indicates reception date and time of request. Setting is as follows. Deletable. YYYYMMDDHHMMSS
	9	Collection End Time			*Field does not contain data.*
	10	Collection Volume			*Field does not contain data.*
	11	Collector ID			*Field does not contain data.*
(8)	12	Action Code	ST	1	Indicates type of information to be reported. 'N': communication of patient sample result from analyzer. (Upload) 'Q': communication of control sample result from analyzer (Upload) 'A': test order form HOST. (Download) 'C': Transmit by the host, to cancel an order
	13	Danger Code			*Field does not contain data.*
	14	Relevant Clinical Information			*Field does not contain data.*
	15	Date/Time Specimen Received			*Field does not contain data.*
(9)	16	Specimen Descriptor	NM	1	This field indicates the type of sample **Field Value** — **Description** 1 — Serum/Plasma 2 — Urine 3 — CSF 4 — Suprnt 5 — Others
	17	Ordering Physician			*Field does not contain data.*
	18	Physician's Telephone Number			*Field does not contain data.*
	19	User Field No.1			*Field does not contain data.*

No	Field No.	Field	Type	Max	Comments cobas Type
	20	Users Field No.2			*Field does not contain data.*
	21	Laboratory Field No.1			*Field does not contain data.*
	22	Laboratory Field No.2			*Field does not contain data.*
(10)	23	Date/Time Results Reported or Last Modified	TS	14	Indicates date and time when the measuring schedule for the sample is decided internally. Setting from HOST is not applicable. Setting is as follows: YYYYMMDDHHMMSS
	24	Instrument Charge to Computer System			*Field does not contain data.*
	25	Instrument Section ID			*Field does not contain data.*
(11)	26	Report Types	ST	1	Indicates type of communication. 'O': test order. (Download) 'F': communication of result. (Upload)
	27	Reserved Field			*Field does not contain data.*
	28	Location or Ward of Specimen Collection			*Field does not contain data.*
	29	Nosocomial Infection Flag			*Field does not contain data.*
	30	Specimen Service			*Field does not contain data.*
	31	Specimen Institution			*Field does not contain data.*

Table 12: Test Order Record

Note Specimen Descriptor of Instrument Specimen ID for **cobas** type prior to Sample Type when they are mismatched.

Comment Record, that follows the order record (used for patient demographic data)

cobas type (Upload, Download)

C|1|I|·····^HSP1·····^·····^·····^·····|G [CR]
(1)(2)(3) (4) (5)

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'C' fixed.
(2)	2	Sequence Number	NM	6	Indicates sequence No. Normally it is '1' Record in the current layer. Since this record is in the layer following the Test Request Record, it is reset to '1' each time a new Test Request Record is presented and then numbered consecutively; 1, 2, etc
(3)	3	Comment Source	ST	1	If comment is sent from Host, "L" is displayed. If comment is send from analyzer, "I" is displayed.
(4)	4	Comment Text	CM	104	Indicates comment for sample. It is possible to display it on the screen and edit it. If there is no comment, '^^^^' is needed to send using with no comment mode. <Comment1>^<Comment2>^<Comment3>^Comment4>^<Comment5> Element / Max / Length Format Comment1 30 ST Comment2 25 ST Comment3 20 ST Comment4 15 ST Comment5 10 ST **Note:** In the case of analyzer to host, each comment is a fixed length string. If the length of the comment is less than the specified number, the string must be right-filled with an adequate number of spaces. **Note :**Only ASCII characters are allowed for Comment Text. Refer to Apendix B ASCII Table.
(5)	5	Comment Type	ST	1	"G" fixed.

Table 13: Comment Record (after order record)

Result Record

cobas type (Upload)

R|1|^^^2/|8.60|nmol/L||N||F||BMSERV|20050912165312||P1[CR]
(1)(2) (3 (4) (5) (6) (7) (8) (9) (10)

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'R' fixed.
(2)	2	Sequence Number	NM	6	Indicates sequence No. Record in the current layer. Since this record is the layer that follows the Test Request Record, it resets to 1 for each occurrence of a new Test Request Record. It is numbered consecutively; 1, 2, etc., for each occurrence of this record.
(3)	3	Universal Test ID	CM	24	Indicates order. ^^^<ApplicationCode>/<Dilution>/<pre-dilution>/… <ApplicationCode> Type: NM Max: 5 indicates **cobas c** 311 analyzer Host Test No. The analyzer identifies the test with 3-digit numbers. Specify these 3-digit numbers. The range of application code is expanded to 5-digit. Photometrics: 1-910, ISEs: Na=989, K=990, Cl=991 Serum Index: L=992, H=993, I=994, Calculated Tests: 961-968 <Dilution> Type: ST Max: 3 Indicates automatic dilution factor when ordering. Inc, Dec,3,5,10,20,50 When not specified, pipetting and testing is done using the standard analysis parameters
(4)	4	Data or Measurement Value	CM	13	Quantitative: <measurement value> Qualitative: <qualitative value> ^< measurement value> or <qualitative value> It depends on the setting in Host Communication Setting/Text Setting screen. <measurement value> Type:NM Max:6 6-digit measurement value or 6 spaces if no result (or data has overflowed) <qualitative value> -2, -1, 0, 1, 2, 3 or 6 spaces if no result In case that qualitative value is 0 and concentration is 8.60, example is as follows. Example : 0^8.60 See Table 15: Qualitative Analysis Transmission Data below for qualitative
(5)	5	Units	ST	6	Indicates unit name of measurement results.
	6	Reference Ranges	CM		*Field does not contain data.*

No	Field No.	Field	Type	Max	Comments cobas Type
(6)	7	Result Abnormal Flags	ST	2	Indicates normal/abnormal of measurement results. 'L': less than normal range. 'H': more than normal range. 'LL': less than Technical Limit range. 'HH': more than Technical Limit range. 'N': Normal. 'A': Abnormal.
	8	Nature of Abnormality Testing			*Field does not contain data.*
(7)	9	Result Status	ST	1	Indicates the number of the test conducted for the analytical data. 'F': initial result. 'C': rerun result.
	10	Date of Change in Instrument Normative Values Units			*Field does not contain data.*
(8)	11	Operator Identification	ST	6	Indicates operator ID who conducted measurement. HOST is not allowed to do setting.
(9)	12	Data/Time Test Started	TS	14	Date and time corresponding the test was pipetted is designated by YYYYMMDDHHMMSS. This data is sent to the host only when an option of "Send Time stamp of pipetting of Sample" is selected.
	13	Date/Time Test Completed	TS	14	*Field does not contain data.*
(10)	14	Instrument Identification	ST	4	Indicates the ID of the analytical unit (module) that performed the analysis. Module — Description P1 — **cobas c** 311 analyzer Module ISE1 — ISE Test Non — Calculate Test or Not measured test

Table 14: Result Record

Note **cobas** Type transmits calculated tests.

Qualitative result format for **cobas c** 311 analyzer tests can be activated on the Utility/Application/Range screen.

Analytical Result Range	Transmission Data
Analytical Result =< Qualitative Analysis Concentration 1	-2
Qualitative Analysis Concentration 1 < Analytical Result =< Qualitative Analysis Concentration 2	-1
Qualitative Analysis Concentration 2 < Analytical Result =< Qualitative Analysis Concentration 3	0
Qualitative Analysis Concentration 3 < Analytical Result =< Qualitative Analysis Concentration 4	1
Qualitative Analysis Concentration 4 < Analytical Result =< Qualitative Analysis Concentration 5	2
Qualitative Analysis Concentration 5 < Analytical Result	3

Table 15: Qualitative Analysis Transmission Data

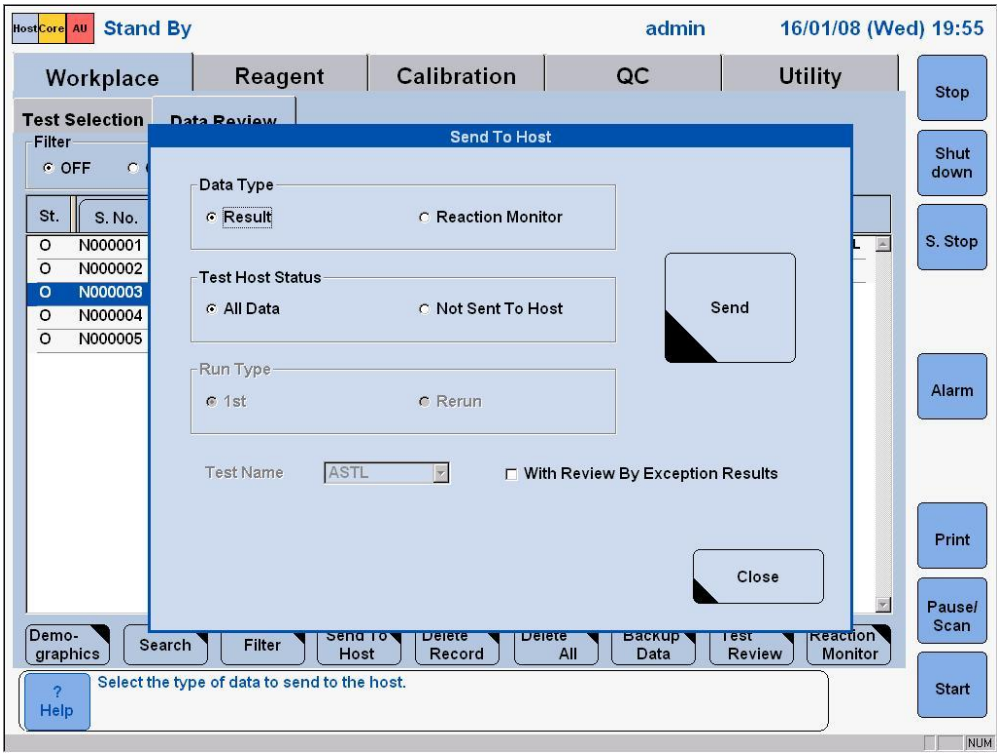

Figure 10: Sent to Host screen

Note Communication of batch results is based on option of "with Review by Exception Results" on [Send to Host] window shown below.

On: tests specified by Exception Alarm are communicated.

Off: tests specified by Exception Alarm are not communicated.

Comment Record, that follows the result record (result data flag)

cobas type (Upload)

C|1|I|16|I[CR]
(1)(2)(3)(4)(5)

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'C' fixed.
(2)	2	Sequence Number	NM	6	Indicates sequence No. Normally it is '1'
(3)	3	Comment Source	ST	1	Comment is send from analyzer. "I" is displayed.
(4)	4	Comment Text	NM	3	
(5)	5	Comment Type	ST	1	'I' fixed.

Table 16: Comment Record (after result record)

Note Skip this record when no data alarm for measured value.
See Table 20: for data alarm No. and alarm message..

Photometric Calibration Result Record

cobas type (Upload)

An example in case that Chemistry Test Calibration Results Detail mode is disabled.

```
M|1|PCR|BMSERV|^^^714|P1|||2782^2805^2839^2860^^\6119^6577^6134^6592^^|[CR]
(1)(2)(3)  (4)              (5)      (6)  (7)  (8) (9)
```

An example in case that Chemistry Test Calibration Results Detail mode is enabled.

```
M|1|PCR|BMSERV|^^^714|P1|||2782^2805^2839^2860^^\6119^6577^6134^6592^^\
(1)(2)(3)  (4)              (5)      (6)  (7)  (8) (9)
^^^^^\^^^^^\^^^^^\^^^^^|649252^^649252^|24615^^10363^|1|
                                    (10)            (11)                (12)
18689700^16627800^^^^|20051016144610|[CR]
  (13)                      (14)
```

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	'M' fixed.
(2)	2	Sequence Number	NM	6	This record appears as the next layer of the Message Header Record. For one record, the field value is '1'; for specifying several, sequence numbers starting from 1 are assigned
(3)	3	Record Type Sub ID	ST	3	Use 'PCR'.
(4)	4	Operator ID	ST	6	ID of the operator who performed the calibration at the analyzer
(5)	5	Test Code	CM	8	Format ^^^<Application Code> **Element** **Max Length** **Format** Application Code 5 NM
(6)	6	Module ID	ST	4	Indicates the ID of the analytical unit (module) that performed the analysis. **Module** **Description** P1 **cobas c** 311 analyzer Module Non Calculate Test or Not measured test
(7)	7	Calibration Alarm	NM	3	Calibration alarm.
(8)	8	SD Data Field	NM	6	SD value data.

No	Field No.	Field	Type	Max	Comments cobas Type
(9)	9	STD Data	CM	38	Repeat Field. Repeated from STD1 to STD6 for as many as there are. Format<Absorbance Data for the first time>^<First time for the first one or the final absorbance data>^<Absorbance Data of the second time>^<Second time for the first one or the final absorbance data>^<Data Alarm>^<Prozone Value> Detail specification is shown below; **Element** / **Max Length** / **Format** <Absorbance Data for the first time> 6 NM <First time for the first one or the final absorbance data> 6 NM <Absorbance Data of the second time> 6 NM <Second time for the first one or the final absorbance data> 6 NM <Data Alarm> 3 NM (See Table 20: .) <Prozone Value> 6 NM .
(10)	10	Reagent lot number	NM	8	R1 Reagent bottle sequence number 1 to 99999999 This data is sent to the host only when an option of “Chemistry Test Calibration Results Detail” is selected.
(11)	11	Reagent bottle number	NM	5	R1 Reagent bottle sequence number 1 to 199999 This data is sent to the host only when an option of “Chemistry Test Calibration Results Detail” is selected.
(12)	12	Expired Flag	NM	1	Expired Flag 0:Calibration performed with “Not Expired Bottle” 1:Calibration performed with “Expired Bottle” This data is sent to the host only when an option of “Chemistry Test Calibration Result Detail” is selected.
(13)	13	Calibrator lot number	NM	8	1 to 99999999 This data is sent to the host only when an option of “Chemistry Test Calibration Result Detail” is selected.
(14)	14	Pipetting Date and Time	ST	14	Date and time corresponded the calibrator was scheduled measuring is designated by YYYYMMDDHHMMSS. This data is sent to the host only when an option of “Chemistry Test Calibration Result Detail” is selected.

le 17: Photometric Calibration Result Record

ISE Calibration Result Record

cobas type (Upload)

```
M|1|ICR|adm…|ISE11||||^^^^^^^|^^^^^^^|^^^^^^^|-32.4^-35.1^-28.1
(1)(2)(3)  (4)  (5)(6)(7)(8)(9)            (10)          (11)       (12)
^-32.2^56.0^134.2^135.2^-0. 7|-34.9^-46.3^-25.8^-33.7^55.7^4.8^5
                                    (13)
.04^-0.06|121.4^125.8^118.4^121.9^-42.0^102.0^99.5^-3.7[CR]
            (14)
```

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	Use 'M'.
(2)	2	Sequence Number	NM	6	This record appears as the next layer of the Message Header Record. The field value is '1' for one record. To specify several records, a sequence number starting from 1 is assigned.
(3)	3	Record Type Sub ID	ST	3	Use 'ICR'.
(4)	4	Operator ID	ST	6	ID of the operator that performed the calibration at the analyzer.
(5)	5	Module ID	ST	5	ISExy x : Module Number (1 only) y : Calibration Type '1' : Type A , '2' : Type B
(6)	6	Na Calibration Alarm	NM	3	Na test calibration alarm.
(7)	7	K Calibration Alarm	NM	3	K test calibration alarm.
(8)	8	Cl Calibration Alarm	NM	3	Cl test calibration alarm.
(9)	9	Na Data Alarm	CM	31	Na test data alarm. <Internal standard solution electromotive force data alarm>^<Low solution electromotive force data alarm>^<High solution electromotive force data alarm>^<Calibrator solution electromotive force data alarm>^<Slope for display data alarm>^<Internal standard solution concentration data alarm>^<Calibrator solution concentration data alarm>^<Numbers for compensation data alarm> Detail specification is shown below: **Element** — **Max Len** — **Format** <Internal standard solution electromotive force data alarm> — 3 — NM <Low solution electromotive force data alarm> — 3 — NM <High solution electromotive force data alarm> — 3 — NM <Calibrator solution electromotive force data alarm> — 3 — NM <Slope for display data alarm> — 3 — NM <Internal standard solution concentration data alarm> — 3 — NM <Calibrator solution concentration data alarm> — 3 — NM <Numbers for compensation data alarm> — 3 — NM

No	Field No.	Field	Type	Max	Comments cobas Type
(10)	10	K Data Alarm	CM	31	K test data alarm. Refer to Na data alarm.
(11)	11	Cl Data Alarm	CM	31	CI test data alarm. Refer to Na data alarm.
(12)	12	Na Data	CM	55	Na test calibration analytical data. (All Elements: Max Length = 6, Type =NM) <Internal standard solution electromotive force data>^<Low solution electromotive force data>^<High solution electromotive force data>^<Calibrator solution electromotive force data>^<Slope for display data>^<Internal standard solution concentration data>^<Calibrator solution concentration data>^<Numbers for compensations data>
(13)	13	K Data	CM	55	K test calibration analytical data. Refer to Na data.
(14)	14	Cl Data	CM	55	Cl test calibration analytical data. Refer to Na data.

Table 18: ISE Calibration Result Record

Photometric Absorbance Data Record

cobas type (Upload)

```
M|1|ABS|P1|1||10|50|0\1497\1499\1499|13140\12828\12760\12699
(1)(2))(3)(4) (5) (6) (7)        (8)
\12646\12605\12571\12545\12526\12504\12495\12481\12474\12472\124
65\12463\12459\12454\12453\12449\12448\12442\12594\12986\12993
\12992\12987\12987\12980\12982\12975\12973\12974\12970\12972\129
70\12969\12969\12965\12970\12966\12970\12971\12974\12972\12977\1
2976\12982[CR]
     (9)
```

No	Field No.	Field	Type	Max	Comments cobas Type
(1)	1	Record Type ID	ST	1	Use 'M'.
(2)	2	Sequence Number	NM	6	This record appears as the next layer of the Message Header Record. The field value is '1' for one record. To specify several records, sequence numbers starting from 1 are assigned.
(3)	3	Record Type Sub ID	ST	3	Use 'ABS'.
(4)	4	Module ID	ST	4	ID of the analytical unit (module) the test belongs to. The ID gives the first character of the module that performed the analysis. **Module** **Description** P1 **cobas c** 311 analyzer Module ISE1 ISE Test Non Calculate Test or Not measured test
(5)	5	Cell No	NM	3	Number of the Reaction Cell. Input value: 1-66
	6	In Out Information	NM	1	*Field does not contain data.*
(6)	7	Reaction Time	NM	2	Reaction time (Unit: minutes). Input values 3 to 10.
(7)	8	Point Num	NM	2	Reaction point number. Input values 1 to 57.
(8)	9	Cell Blank Data	NM	6	Repeat field. Cell blank absorbance. The difference between the main wavelength and sub-wavelength absorbance data [(main wavelength absorbance data) - (sub-wavelength absorbance data)] can be repeated up to 4 points.1st data is '0' fixed.
(9)	10	Delta ABS Data	NM	6	Repeat field. The difference between the main wavelength and the sub-wavelength absorbance data [(main wavelength absorbance data) - (sub-wavelength absorbance data)] repeated up to the value indicated by Point Num.

Table 19: Photometric Absorbance Data Record

List of Result Data Flags (Data Alarm List)

Alarm code	Alarm	Result Data *	Photo-metry	ISE	Printer	Screen	Host
	no alarm						0
1	ADC abnormal		X	X	ADC.E	ADC.E	1
2	Cell blank abnormal		X		>Cuvet	>Cuvet	2
3	Sample short	SPACE*	X	X	Samp.S	Samp.S	3
4	Reagent short	SPACE*	X	X	Reag.S	Reag.S	4
5	ABS over		X		>Abs	>Abs	5
6	Prozone error		X		>Proz	>Proz	6
7	Reaction limit over(all photometry points)		X		>React	>React	7
8	Reaction limit over(second and subsequent photometry points)		X		>React	>React	8
9	Reaction limit over(third and fourth and subsequent photometry points)		X		>React	>React	9
10	Linearity abnormal(nine or more)		X		>Lin	>Lin	10
11	Linearity abnormal(eight or less)		X		>Lin	>Lin	11
12	Standard Solution 1 Absorbance Abnormal		X		S1A.E	S1A.E	12
13	Duplicate Error		X		Dup.E	Dup.E	13
14	STD Error		X	X	Std.E	Std.E	14
15	Sensitivity Error		X		Sens.E	Sens.E	15
16	Calibration Error		X	X	Cal.E	Cal.E	16
17	Convergence Error		X		SD.E	SD.E	17
18	Noise error			X	ISE.N	ISE.N	18
19	Level error			X	ISE.E	ISE.E	19
20	Slope Error			X	Slop.E	Slop.E	20
21	ISE Slope Marginal			X	Prep.E	Prep.E	21
22	Internal Concentration Abnormal			X	Istd.E	IStd.E	22
23	Sample range over			X	<>Test	<>Test	23
24	Data error in Compensate test		X	X	CmpT.E	CmpT.E	24
25	Unable to calculate compensate test	SPACE	X	X	CmpT.?	CmpT.?	25
26	PANIC value over (upper)		X	X	>Test	>Test	26
27	PANIC value over (lower)		X	X	<Test	<Test	27
28	Random Error [R-4s]		X	X	R4SD	R4SD	28
29	System Error 1 [2-2sA]		X	X	S2-2Sa	S2-2Sa	29
30	System Error 2 [2-2sW]		X	X	S2-2Sw	S2-2Sw	30
31	System Error 3 [4-1sA]		X	X	S4-1Sa	S4-1Sa	31
32	System Error 4 [4-1sW]		X	X	S4-1Sw	S4-1Sw	32
33	System Error 5 [10xA]		X	X	S10Xa	S10Xa	33
34	System Error 6 [10xW]		X	X	S10Xw	S10Xw	34
35	QC Error 1		X	X	Q3SD	Q3SD	35
36	QC Error 2		X	X	Q2.5SD	Q2.5SD	36
37	Calculated test error		X	X	ClcT.E	ClcT.E	37
38	Overflow	SPACE	X	X	Over.E	Over.E	38

Alarm code	Alarm	Result Data *	Photo-metry	ISE	Printer	Screen	Host
39	Calculation not possible	SPACE	X	X	Calc.?	Calc.?	39
40	Outside of expected value(upper)		X	X	H	n.a.	
41	Outside of expected value(lower)		X	X	L	n.a.	
42	Edited test		X	X	Edited	Edited	42
43	Calibration result abnormal	SPACE*	X	X	Cal.E	Cal.E	43
44	Repeat limit over(upper)		X	X	>Rept	>Rept	44
45	Repeat limit over(lower)		X	X	<Rept	<Rept	45
46	ABS maximum over	SPACE	X		Samp.?	Samp.?	46
51	Response Error 1			X	Rsp1.E	Rsp1.E	51
52	Response Error 2			X	Rsp2.E	Rsp2.E	52
53	Conditioning Error			X	Cond.E	Cond.E	53
55	ISE Range over			X	>ISE	>ISE	55
56	Kinetic unstable (Prozone error 2)		X		>Kin	>Kin	56
57	Serum index 1 interference		X	X	>Index	>Index	57
58	Serum index multiple interference		X	X	>Index	>Index	58
59	Mixing abnormal		X	X	Mix.E	Mix.E	59
60	Drop in ultrasonic output		X	X	<Mix	<Mix	60
~~71~~	~~Detergent short~~		~~X~~		~~Det.S~~	~~Det.S~~	~~71~~
72	Sample Clot	SPACE		X	Samp.C	Samp.C	72
73	Detergent short		X		Det.S	Det.S	73
101	Expired reagent			X	ReagEx	ReagEx	101
103	Serum index check lipemic		X	X	>I.L	>I.L	103
104	Serum index check hemolitic		X	X	>I.H	>I.H	104
105	Serum index check icteric		X	X	>I.I	>I.I	105
106	Serum index check lipemic & hemolitic		X	X	>I.LH	>I.LH	106
107	Serum index check lipemic & icteric		X	X	>I.LI	>I.LI	107
108	Serum index check hemolitic & icteric		X	X	>I.HI	>I.HI	108
109	Serum index check lipemic, hemolitic & icteric		X	X	>I.LHI	>I.LHI	109

Table 20: List of Result Data Flags

*Result Data

In case a column of “Result Data” is blank, result is output as value.
In case a column of “Result Data” is “SPACE”, result is output as space.
In case a column of “Result Data” is “SPACE*”, it is dependent on a case whether a result is output as a value or it is output as a space.

NOTE:
">Index" (code57, 58) is still available for reading data that was generated on older software versions.
But it will not be issued any more from 01-10 on.

Communication trace

5

Test Selection Information in Real Time

The following trace is shown without:

- Start ([STX][FN]),
- End ([CR][EXT][CS1[CS2][CR][LF]],
- and response from each receiver ([ENQ][ACK][EOT]).

HOST is required to send Sequence No, Rack ID, and Position asked by **cobas c** 311 analyzer.

Sequence No communicated from **cobas c** 311 analyzer may not be sequential number depending on **cobas c** 311 analyzer status. As they are different from on-line sample No. (work sheet operation), Sequence No is not allowed to be on-lined for key information.

cobas c 311 analyzer sends inquiry for sample ID=000002, sequence No.=3 and Position=2.

Rack ID is with Position and Sample Type.

```
H|\^&|||cobas c 311^1|||||host|TSREQ^REAL|P|1[CR]
   Q|1|^^              000002^3^50002^002^^S1^SC||ALL|||||||O[CR]
L|1|N[CR]
```

HOST replies test selection information of sample ID=000002.

```
H|\^&|||host^1|||||cobas c 311|TSDWN^REPLY|P|1[CR]
   P|1 [CR]
       O|1|              000002|3^50002^002^^S1^SC|^^^10^|R
       ||||||A||||1|||||||||O[CR]
L|1|N[CR]
```

cobas c 311 analyzer sends inquiry for sequence No.=3, Position=2, and no sample ID.

```
H|\^&|||cobas c 311^1|||||host|TSREQ^REAL|P|1[CR]
    Q|1|^^                ^3^50002^002^^S1^SC||ALL|||||||O[CR]
L|1|N[CR]
```

Real Time Test Results

(1) When the result value is within normal range.

cobas c 311 analyzer sends test result of sample ID=000004, sequence No.=40, and Position=5.

```
H|\^&|||cobas c 311^1|||||host|RSUPL^REAL|P|1[CR]
 P|1 [CR]
 O|1|            000004|40^50005^005^^S1^SC|^^^10^\^^^30^3\^^^40^|
 R||||||N ||||1|||||||20051220095504|||F[CR]

 C|1|I|                                        ^
  ^                          ^                 ^        |G[CR]
    R|1|^^^10/|1.25|uIU/ml||N||F||admin|||P1[CR]
    C|1|I|0|I[CR]
    R|2|^^^30/2|0.091|ug/dL||N||F||admin|||P1[CR]
    C|1|I|0|I[CR]
    R|3|^^^40/inc|1.17|ng/mL||N||F||admin|||P1[CR]
    C|1|I|0|I[CR]
L|1|N[CR]
```

(2) When the result value is less than normal range.

cobas c 311 analyzer sends a test result of sample ID=000002, sequence No.=3, and Position=2.

```
H|\^&|||cobas c 311^1|||||host|RSUPL^REAL|P|1[CR]
 P|1 [CR]
 O|1|            000002|3^50002^002^^S1^SC|^^^10^|R||||||N||||1|||||||
 20051220104418|||F[CR]
    R|1|^^^10/|0.163|mIU/ml||L||F||admin|||P1[CR]
    C|1|I|45|I[CR]
L|1|N[CR]
```

(3) When the result value is a qualitative test.

cobas c 311 analyzer sends a test result of sample ID=000010, sequence No.=442, and Position=1.

```
H|\^&|||cobas c 311^1|||||host|RSUPL^REAL|P|1[CR]
 P|1 [CR]
 O|1|            000010|442^50001^001^^S1^SC|^^^672^|R||||||
 N||||1|||||||
 20051220104418|||F[CR]
    R|1|^^^400/|-1^0.303|umol/l||N||F||admin|||P1[CR]
 C|1|I|45|I[CR]
L|1|N[CR]
```

(4) When it is a control sample.

```
H|\^&|||cobas c 311^1|||||host|RSUPL^REAL|P|1[CR]
 P|1 [CR]
 O|1| 17222200          |10096^30085^085^^QC^SC|^^^672^|||||||Q||||1
 |||||||20051220104418|||F[CR]C|1|I|^^
 ^^|G [CR]R|1|^^^10/|1.26|uIU/mL||L||F||admin|||P1[CR]
 C|1|I|45|I[CR]
L|1|N[CR]
```

Batch Test Selection Information

Download test selection information of sample ID=000051 from HOST.

```
H|\^&|||host^1|||||cobas c 311|TSDWN^BATCH|P|1[CR]
 P|1 [CR]
 O|1|          000051|^^^^S1^SC|^^^10^/^^^30^
 3/^^^40^|R||||||A||||1
 |||||||||O[CR]
 C|1|I|                              ^
 ^                ^                      ^       |G[CR]
L|1|N[CR]
```

Appendix

6

Appendix A: Instrument Alarms

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
110	001	Abnormal Receiving Text from Host	Abnormal Text has been received from Host.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
111	002	Abnormal TS from Host	No response for the inquiry within a set time in GUI: [Utility]-[System]-[Host Communication].	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. Resume operation; if alarm recurs, call Technical Support.
111	003	Abnormal TS from Host	No response for the inquiry within 10 minutes.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
111	005	Abnormal TS from Host	Application code requested by the host is not registered in the analyzer; or received application code other than Photometric test, ISE test or serum index test.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
111	007	Abnormal TS from Host	Received request for increased or decreased quantity for other than Sample Type 2 (Urine) of ISE test.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
111	008	Abnormal TS from Host	Received request for ISE test is wrong.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. Resume operation; if alarm recurs, call Technical Support.
111	009	Abnormal TS from Host	Received request for serum index test is wrong.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
111	010	Abnormal TS from Host	Received comment even though the mode was set for no transmission of comments.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
112	002	Abnormal Automatic Rerun TS from Host	No response for the inquiry within a set time in GUI: [Utility]-[System]-[Host Communication].	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
112	003	Abnormal Automatic Rerun TS from Host	No response for the inquiry within 10 minutes.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
112	005	Abnormal Automatic Rerun TS from Host	Application code requested by the host is not registered in the analyzer; or received application code other than Photometric test, ISE test or serum index test.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
112	007	Abnormal Automatic Rerun TS from Host	Received request for increased or decreased quantity for other than Sample Type 2 (Urine) of ISE test.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
112	008	Abnormal Automatic Rerun TS from Host	Received request for ISE test is wrong. Received request for other than pair of Na, K or Na, K, Cl for ISE test.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
112	009	Abnormal Automatic Rerun TS from Host	Received request for serum index test is wrong. Received request for increased or decreased quantity.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
112	010	Abnormal Automatic Rerun TS from Host	Received comment even though the mode was set for no transmission of comments.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	001	Host Communication Error	The analyzer failed to open session.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
126	004	Host Communication Error	When analyzer has sent <ENQ> but Host sent <NAK>. Analyzer stop transmission.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	005	Host Communication Error	When analyzer has sent <ENQ>, but host did not send <ACK> nor <NAK>. (Link Time Out)	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	006	Host Communication Error	When analyzer has sent <STX> with text frame, but host sent <NAK>. Analyzer sent again.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	007	Host Communication Error	When analyzer has sent <STX> with text frame, but host did not send <ACK> or <NAK>. (Receiving time out) 15 Seconds	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
126	008	Host Communication Error	Re-transmission has gone over the limit (6 times).	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	009	Host Communication Error	When analyzer has sent <ENQ> as transmission request, host sent <ENQ> as transmission request (Link Contention).	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. Resume operation; if alarm recurs, call Technical Support.
126	011	Host Communication Error	When the analyzer has received <ACK> or <NAK> as a reception request from the host and has become ready for reception, but the host did not transmit <STX> nor <EOT> in 30 sec. (Reception Timeout).	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	012	Host Communication Error	Analyzer received reception request from host, but not in condition to receive.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
126	016	Host Communication Error	Buffer Over Flow Over Flow occurred in the receiving buffer during message receiving. Communication stopped between analyzer and host.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	017	Host Communication Error	Retry Over in Error message receiving When the analyzer received incorrect message and sent <NAK> to host. Analyzer retried this process more than 12 times (Upper Retry Limit). Communication stopped between analyzer and host.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	018	Host Communication Error	Undefined Error is detected in MBSI	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	019	Host Communication Error	Although '7 Bit' format is selected in Utility/System/Host Setting screen, transmitted data contain the character that can only be represented in '8 bit' format. The character is converted into '#' in 7 bit code.	a. Check the host communication setting in Utility/System/Host Setting screen. b. Verify the characters sent to the host. c. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
126	020	Host Communication Error	Automatic recovery of connection between host and the analyzer occurs 5 times consecutively. Host communication has stopped.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	021	Host Communication Error	No valid Record.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	022	Host Communication Error	First Record is not a Header Record.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	023	Host Communication Error	Undefined Record.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
126	024	Host Communication Error	Data other than specified.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
126	025	Host Communication Error	Data other than specified.	a. Check the host computer. Is it ON? b. Verify Host Communication on Start Conditions. c. Check cable connections between the analyzer and host computer. d. Check the host computer transmit condition. e. Ensure that the host and the analyzer are utilizing the same communication configuration. f. Resume operation; if alarm recurs, call Technical Support.
340	1	Host Receiving Text Error	A field pause of L record is insufficient.	Please check L record.
340	2	Host Receiving Text Error	There is no record end of L record.	Please check whether '<CR>' (0x0d) is in the terminus of L record.
340	3	Host Receiving Text Error	Termination Code of L record is not effective value.	Please check Termination Code of L record.
340	4	Host Receiving Text Error	There is no record end of P record.	Please check whether '<CR>' (0x0d) is in the terminus of P record.
340	7	Host Receiving Text Error	A field pause of O record is insufficient.	Please check O record.
340	8	Host Receiving Text Error	Sequence Number of O record is not effective value.	Please check Sequence Number of O record.
340	18	Host Receiving Text Error	There is no record end of O record.	Please check whether '<CR>' (0x0d) is in the terminus of O record.
340	19	Host Receiving Text Error	Report Type is not effective value.	Please check Report Type.
340	20	Host Receiving Text Error	A field pause of Q record is insufficient.	Please check Q record.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
340	21	Host Receiving Text Error	Sequence Number of Q record is not effective value.	Please check Sequence Number of Q record.
340	22	Host Receiving Text Error	Starting Range ID Number is not effective value.	Please check Starting Range ID Number.
340	23	Host Receiving Text Error	There is no record end of Q record.	Please check whether '<CR>' (0x0d) is in the terminus of Q record.
340	24	Host Receiving Text Error	Request Information Status Code is not effective value.	Please check Request Information Status.
340	25	Host Receiving Text Error	Specimen ID is not effective value.	Please check Specimen ID.
340	26	Host Receiving Text Error	Sample No. is not effective value.	Please check Sample No.
340	28	Host Receiving Text Error	Sample Type is not effective value.	Please check Sample Type.
340	30	Host Receiving Text Error	Rack Position No. is not effective value.	Please check Rack Position No.
340	31	Host Receiving Text Error	A component pause of Universal Test ID is insufficient.	Please check Universal Test ID.
340	32	Host Receiving Text Error	Action Code & Value is not effective value.	Please check Action Code & Value.
340	33	Host Receiving Text Error	A component pause of User Field No. 2 is insufficient.	Please check User Field No. 2.
340	34	Host Receiving Text Error	Instrument Specimen ID is not effective value.	Please check Instrument Specimen ID.
340	35	Host Receiving Text Error	A component pause of Comment or Special Instructions.	Please check Comment or Special Instructions.
340	36	Host Receiving Text Error	Comment or Special Instructions is not effective value.	Please check Comment or Special Instructions.
340	37	Host Receiving Text Error	A field pause of H record is insufficient.	Please check H record.
340	38	Host Receiving Text Error	Comment or Special Instructions is not effective value.	Please check Comment or Special Instructions.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
340	39	Host Receiving Text Error	There is no record end of H record.	Please check whether '<CR>' (0x0d) is in the terminus of H record.
340	40	Host Receiving Text Error	A field pause of P record is insufficient.	Please check P record.
340	41	Host Receiving Text Error	Sequence Number of P record is not effective value.	Please check Sequence Number of P record.
340	44	Host Receiving Text Error	There is no record end of P record.	Please check whether '<CR>' (0x0d) is in the terminus of P record.
340	45	Host Receiving Text Error	Application Code is not effective value.	Please check Application Code.
340	47	Host Receiving Text Error	A field pause of O record is insufficient.	Please check O record.
340	48	Host Receiving Text Error	Sequence Number of O record is not effective value.	Please check Sequence Number of O record.
340	50	Host Receiving Text Error	Instrument Specimen ID is not effective value.	Please check Instrument Specimen ID.
340	57	Host Receiving Text Error	There is no record end of O record.	Please check whether '<CR>' (0x0d) is in the terminus of O record.
340	59	Host Receiving Text Error	Sample ID is not effective value.	Please check Sample ID.
340	60	Host Receiving Text Error	Sample No. is not effective value.	Please check Sample No.
340	62	Host Receiving Text Error	Rack Position is not effective value.	Please check Rack Position.
340	63	Host Receiving Text Error	A field pause of Q record is insufficient.	Please check Q record.
340	64	Host Receiving Text Error	Sequence Number of Q record is not effective value.	Please check Sequence Number of Q record.
340	65	Host Receiving Text Error	Specimen ID is not effective value.	Please check Specimen ID.
340	67	Host Receiving Text Error	There is no record end of Q record.	Please check whether '<CR>' (0x0d) is in the terminus of Q record.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
340	68	Host Receiving Text Error	A field pause of C record is insufficient.	Please check C record.
340	69	Host Receiving Text Error	Sequence Number of C record is not effective value.	Please check Sequence Number of C record.
340	73	Host Receiving Text Error	There is no record end of C record.	Please check whether '<CR>' (0x0d) is in the terminus of C record.
340	101	Host Receiving Text Error	Sample No. is outside the range.	Please check Sample No.
340	102	Host Receiving Text Error	Class is outside the range.	Please check Class.
340	104	Host Receiving Text Error	Cup Position is outside the range.	Please check Cup Position.
340	105	Host Receiving Text Error	First run/rerun is not specified.	Please confirm whether to be the First run or rerun.
340	106	Host Receiving Text Error	Application Code is outside the range.	Please check Application Code.
340	107	Host Receiving Text Error	Sample Volume is outside the range.	Please check Sample Volume.
340	108	Host Receiving Text Error	Draw Time (Year) is outside the range.	Please check Draw Time (Year).
340	109	Host Receiving Text Error	Draw Time (Month) is outside the range.	Please check Draw Time (Month).
340	110	Host Receiving Text Error	Draw Time (Day) is outside the range.	Please check Draw Time (Day).
340	111	Host Receiving Text Error	Draw Time (Hour) is outside the range.	Please check Draw Time (Hour).
340	112	Host Receiving Text Error	Draw Time (Min) is outside the range.	Please check Draw Time (Min).
340	113	Host Receiving Text Error	Draw Time (Second) is outside the range.	Please check Draw Time (Second).
340	114	Host Receiving Text Error	Age is outside the range.	Please check Age.

Alarm Type	Alarm No	Alarm Message	Alarm Description	Alarm Remedy
340	115	Host Receiving Text Error	Age Unit is outside the range.	Please check Age Unit.
340	116	Host Receiving Text Error	Sex is outside the range.	Please check Sex.
340	117	Host Receiving Text Error	Cup size is outside the range.	Please check Cup size.
340	118	Host Receiving Text Error	Sample ID is outside the range.	Please check Sample ID.
340	120	Host Receiving Text Error	The number of TS exceeds the number of the regulations.	Please check number of TS.
340	121	Host Receiving Text Error	Sample ID is not effective value.	Please check Sample ID.
340	122	Host Receiving Text Error	Dilution Rate is outside the range.	Please check Dilution Rate.
340	123	Host Receiving Text Error	Sample Type is not Routine or Stat.	Please check Sample Type.
340	124	Host Receiving Text Error	Sample ID is outside the range.	Please check Sample ID.
340	133	Host Receiving Text Error	Application Code is not effective value.	Please check Application Code.
340	134	Host Receiving Text Error	Dilution Rate is outside the range.	Please check Dilution Rate.
341	XX	App. Code Conversion Error. (To HOST)	An application code is not convertible at the time of HOST communication. * Subcode "XX" indicates the application code in [Utility]-[Application] screen.	Please check whether the application code for HOST is set up correctly.
342	1	App. Code Conversion Error. (From HOST)	An application code is not convertible at the time of HOST communication.	Please check whether the application code for HOST is set up correctly.

Table 21: Instrument Alarms

Appendix B: ASCII Table

Control Characters

Binary	Dec	Hex	Abbreviation	Description
0000 0000	0	00	NUL	Null character
0000 0001	1	01	SOH	Start of Header
0000 0010	2	02	STX	Start of Text
0000 0011	3	03	ETX	End of Text
0000 0100	4	04	EOT	End of Transmission
0000 0101	5	05	ENQ	Enquiry
0000 0110	6	06	ACK	Acknowledgment
0000 0111	7	07	BEL	Bell
0000 1000	8	08	BS	Backspace
0000 1001	9	09	HT	Horizontal Tab
0000 1010	10	0A	LF	Line feed
0000 1011	11	0B	VT	Vertical Tab
0000 1100	12	0C	FF	Form feed
0000 1101	13	0D	CR	Carriage return
0000 1110	14	0E	SO	Shift Out
0000 1111	15	0F	SI	Shift In
0001 0000	16	10	DLE	Data Link Escape
0001 0001	17	11	DC1	Device Control 1
0001 0010	18	12	DC2	Device Control 2
0001 0011	19	13	DC3	Device Control 3
0001 0100	20	14	DC4	Device Control 4
0001 0101	21	15	NAK	Negative Acknowledgement
0001 0110	22	16	SYN	Synchronous Idle
0001 0111	23	17	ETB	End of Trans. Block
0001 1000	24	18	CAN	Cancel
0001 1001	25	19	EM	End of Medium
0001 1010	26	1A	SUB	Substitute
0001 1011	27	1B	ESC	Escape
0001 1100	28	1C	FS	File Separator
0001 1101	29	1D	GS	Group Separator
0001 1110	30	1E	RS	Record Separator
0001 1111	31	1F	US	Unit Separator
0111 1111	127	7F	DEL	Delete

Table 22: Control Characters

Printable Characters

Binary	Dec	Hex	Char
0010 0000	32	20	blank
0010 0001	33	21	!
0010 0010	34	22	"
0010 0011	35	23	#
0010 0100	36	24	$
0010 0101	37	25	%
0010 0110	38	26	&
0010 0111	39	27	'
0010 1000	40	28	(
0010 1001	41	29	)
0010 1010	42	2A	*
0010 1011	43	2B	+
0010 1100	44	2C	,
0010 1101	45	2D	-
0010 1110	46	2E	.
0010 1111	47	2F	/
0011 0000	48	30	0
0011 0001	49	31	1
0011 0010	50	32	2
0011 0011	51	33	3
0011 0100	52	34	4
0011 0101	53	35	5
0011 0110	54	36	6
0011 0111	55	37	7
0011 1000	56	38	8
0011	57	39	9

Binary	Dec	Hex	Char
0100 0000	64	40	@
0100 0001	65	41	A
0100 0010	66	42	B
0100 0011	67	43	C
0100 0100	68	44	D
0100 0101	69	45	E
0100 0110	70	46	F
0100 0111	71	47	G
0100 1000	72	48	H
0100 1001	73	49	I
0100 1010	74	4A	J
0100 1011	75	4B	K
0100 1100	76	4C	L
0100 1101	77	4D	M
0100 1110	78	4E	N
0100 1111	79	4F	O
0101 0000	80	50	P
0101 0001	81	51	Q
0101 0010	82	52	R
0101 0011	83	53	S
0101 0100	84	54	T
0101 0101	85	55	U
0101 0110	86	56	V
0101 0111	87	57	W
0101 1000	88	58	X
0101	89	59	Y

Binary	Dec	Hex	Char
0110 0000	96	60	`
0110 0001	97	61	a
0110 0010	98	62	b
0110 0011	99	63	c
0110 0100	100	64	d
0110 0101	101	65	e
0110 0110	102	66	f
0110 0111	103	67	g
0110 1000	104	68	h
0110 1001	105	69	i
0110 1010	106	6A	j
0110 1011	107	6B	k
0110 1100	108	6C	l
0110 1101	109	6D	m
0110 1110	110	6E	n
0110 1111	111	6F	o
0111 0000	112	70	p
0111 0001	113	71	q
0111 0010	114	72	r
0111 0011	115	73	s
0111 0100	116	74	t
0111 0101	117	75	u
0111 0110	118	76	v
0111 0111	119	77	w
0111 1000	120	78	x
0111	121	79	y

1001			
0011 1010	58	3A	:
0011 1011	59	3B	;
0011 1100	60	3C	<
0011 1101	61	3D	=
0011 1110	62	3E	>
0011 1111	63	3F	?

1001			
0101 1010	90	5A	Z
0101 1011	91	5B	[
0101 1100	92	5C	\
0101 1101	93	5D	]
0101 1110	94	5E	^
0101 1111	95	5F	_

1001			
0111 1010	122	7A	z
0111 1011	123	7B	{
0111 1100	124	7C	|
0111 1101	125	7D	}
0111 1110	126	7E	~

Table 23: Printable Characters