cobas e 411 analyzer

Host Interface Manual

For use in the US

Document Version 2.3

1907-05-0816

Document information

Revision history

Manual version	Revision date	Changes
2.1	April 2011	Additional screenshots and remarks on page 5 → Host Test Code Setting.
2.2	November 2013	• Updated screenshots, on page 5 → Host Communication Setting. • Additional explanation, on page 8 → STAT Sample Result Upload Setting. • Note (*6) no sending of multiple orders from the same test, on page 37 ff – valid from Software version 02-04.
2.3	March 2016	Modified tip for test selection in real time in the Communication trace chapter.
2.3 for the US	August 2016	• Used global document version 2.3 as reference. • Corrected branding, as necessary. • Corrected English, as necessary.

Edition notice

This document is for users of the **cobas e** 411 analyzer.

Every effort has been made to ensure that the information is correct at the time of publishing. Not all functionality described in this manual may be available to all users. Roche Diagnostics reserves the right to change this publication as necessary and without notice as part of ongoing product development. Such changes may not immediately be reflected in this document.

Intended use

This document is intended for the US market only.
For prescription use only.

This document describes communication procedure related to communication method that enables intercommunication between Laboratory Host System, hereinafter referred to as HOST, and the **cobas e** 411 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 System

As **cobas e** 411 analyzer is a successor version of the Elecsys 2010 analyzer, it upholds Elecsys 2010 analyzer HOST communication protocol. Further, a new communication protocol is added to keep compatibility with **cobas**® analyzers. These two (2) communication protocols such as Elecsys type and **cobas** type are selectable. MSRs (Manufacturer Specific Records) that are the original protocol of Elecsys 2010 analyzer are not supported by **cobas e** 411 analyzer.

In case of communication problems between a host and the **cobas e** 411 analyzer please copy the trace file d:\e411\data\log\host_trace.log onto a removable media and contact the Customer Support Center at 1-800-428-2336.

Screenshots

Any screenshots in this publication are added exclusively for the purpose of illustration. Configurable and variable data such as parameters, results, path names etc. visible therein must not be used for laboratory purposes.

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Application Code Number (ACN) Disclaimer for US Customers

Due to the increasing complexity of laboratories and the increase in types of tests being run, it is critical to use unique host download codes for each test when mapping codes on your Laboratory Information System (LIS). It is also strongly recommended to use alpha or alphanumeric codes on your LIS. If unique LIS test codes are not used when mapping on the LIS, this could cause a test result from one test to be reported for a different test.

Required actions when using this host interface manual:

- ***Ensure that the LIS test codes mapped to your LIS are unique for each test.***
- ***Always identify the instrument source of the results on your LIS.***
- ***Please disregard any application code numbers in this host interface manual. Refer to the appropriate method sheet, package insert or application code numbers document for the most current application code number information.***

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Specification of interface

Specification of communication

Communication between the **cobas e** 411 analyzer and HOST is based on RS-232C connection.

Specification of serial interface is shown as follows:

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

Table 1: Specification of serial interface

Character configuration is selected from the table below

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

Table 2: Character configuration

Host communication setting

➔ **Utility >System > Host Communication Setting window**

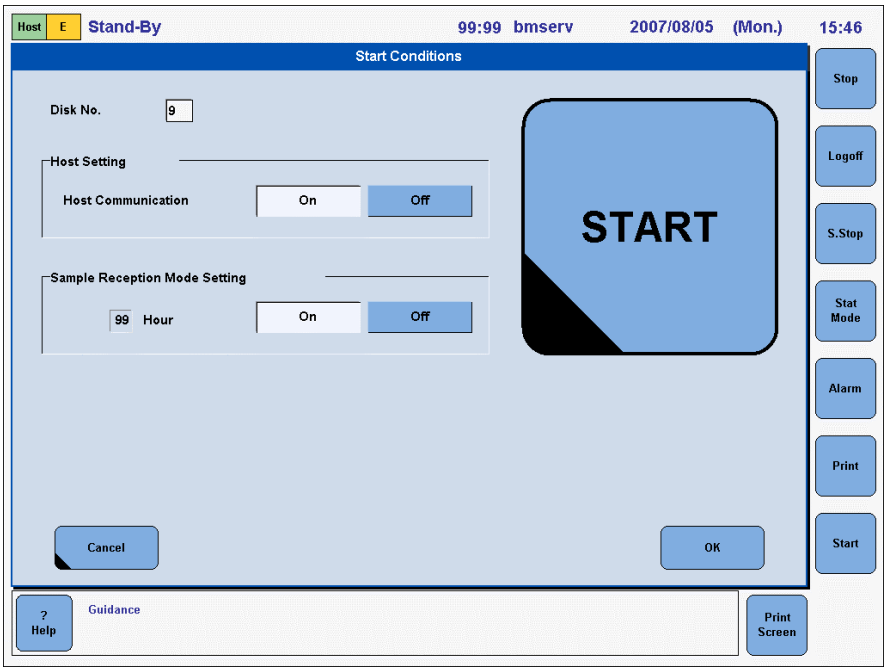


Figure 1: Host communication setting

1. Select **On** or **Off** at **Host Communication** window.

2 Select **Protocol Type**.

The setting is changeable when **Host Communication** is **OFF**.

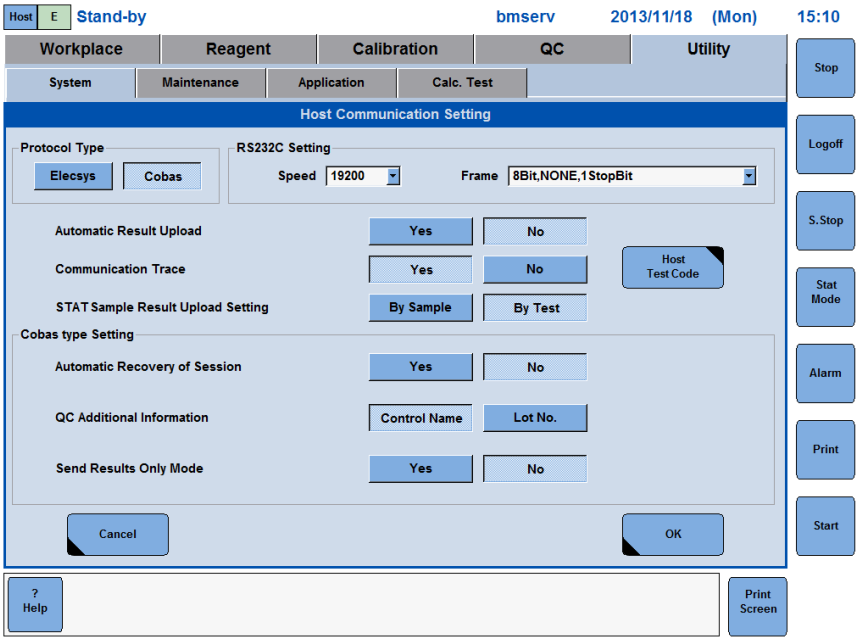


Figure 2: Protocol Type - Elecsys

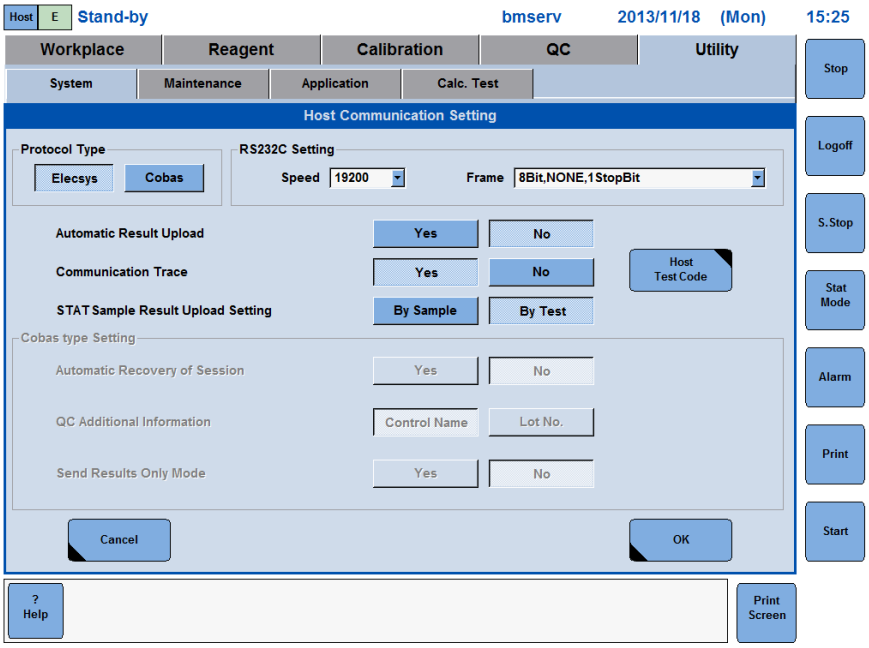


Figure 3: Protocol Type - **cobas**

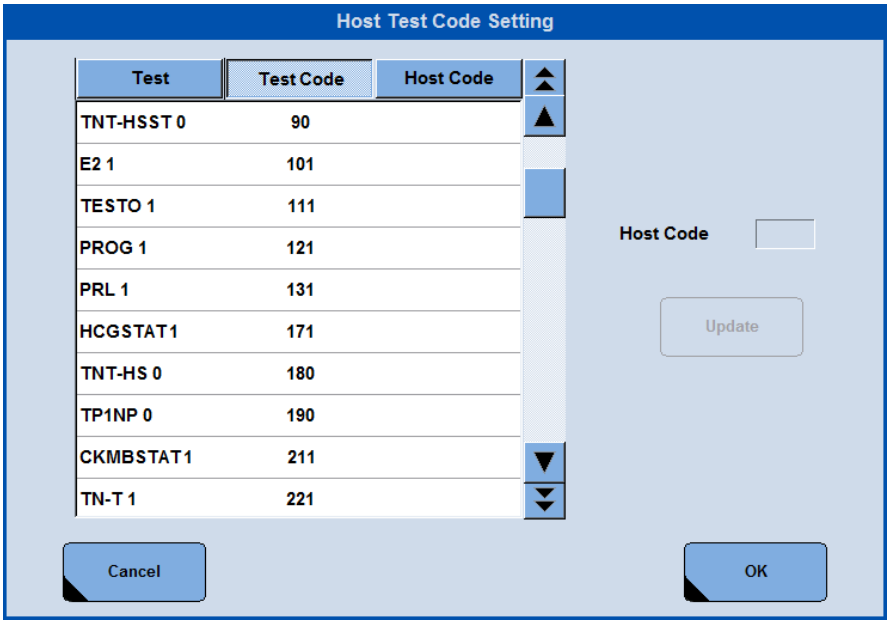


Figure 4: Test code

It is mandatory for the Elecsys and **cobas** mode to also enter the Host Code to upload results.

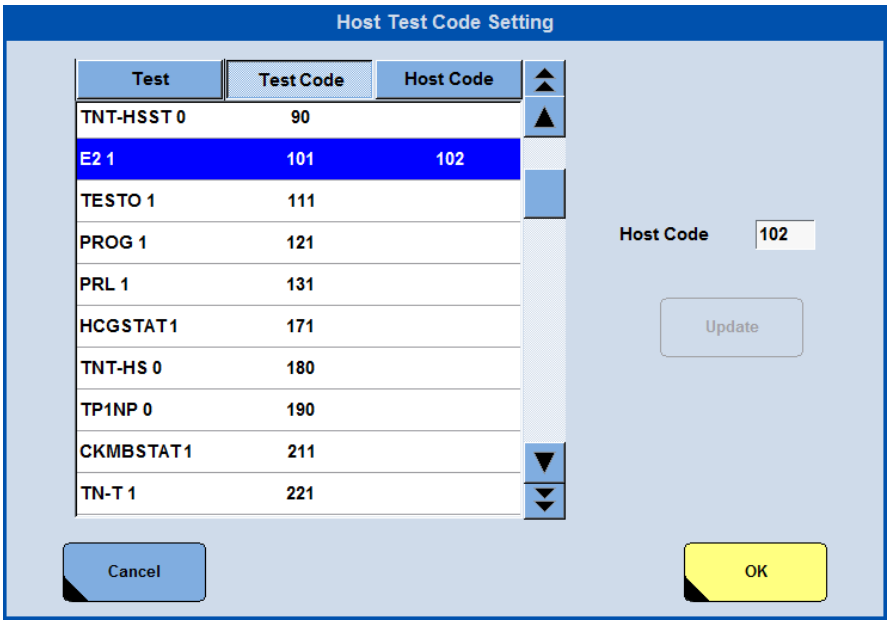


Figure 5: Test code selected

Transfer parameters are shown in in the table below.

Parameter	Option	
Protocol type	Elecsys / **cobas**	When selecting Elecsys, it communicates with HOST by Elecsys type. When selecting **cobas**, it communicates with HOST by **cobas** type.
RS232C setting		
Speed	19200/9600/4800	Select speed.
Frame	7 bit, EVEN, 2 stop bit/ 7 bit, ODD, 2 stop bit/ 7 bit, EVEN, 1 stop bit/ 7 bit, ODD, 1 stop bit/ 8 bit, NONE, 2 stop bit/ 8 bit, NONE, 1 stop bit/ 8 bit, EVEN, 1 stop bit/ 8 bit, ODD, 1 stop bit	Select frame.
Automatic result upload	Yes/No	When **YES** is selected, result data of a sample is sent to HOST in real time as soon as all such data are collected.
Communication trace	Yes/No	When **YES** is selected, communication detail with HOST is traced in the **cobas e** 411 analyzer.
STAT Sample Result Upload setting		
	By Sample	When all results are generated, these results are sent to the host.
	By Test	As soon as one test result is available it is sent to the host.
cobas type setting		**When Protocol Type is cobas, parameters are as follows.**
Automatic recovery of session	Yes/No	This is an automatic reconnection function in case of communication is disconnected, (HOST Communication Off) under error described ASTM1381-91 has occurred. When **Yes** is selected, the erroneous message and a message sent from HOST before the reconnection process completed are rejected.
QC additional information	Control name/Lot No.	When **ControlName** is selected, name of control is sent as sample ID. When **LotNo.** is selected the Control Name and the Lot number is sent to the host, Lot No. is sent as sample ID.
Send result only mode	Yes/No	Only result data is sent. Inquiry for order is not conducted. This function is not applied to Batch transfer.
Host test code	Host test code setting	Test code between **cobas e** 411 analyzer and Host defined in Host Test Code Setting in Utility/Host Communication Setting/Host Test Code. All used test codes must be entered. **Hint:** Also new test application has to be entered.

Table 3: Transfer parameters list

Communication cable

Connect RS-232C communication cable to the connector at the left side of **cobas e** 411 analyzer. The connector is D-SUB9.

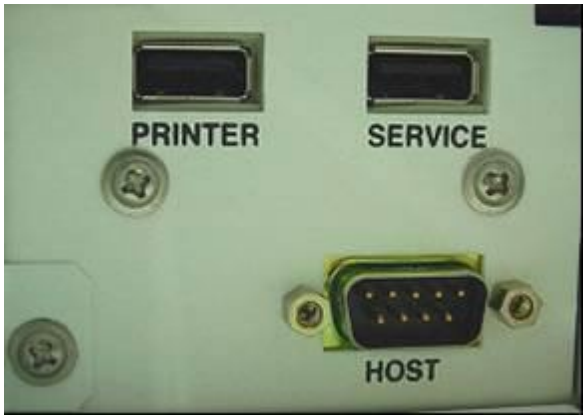


Figure 6: Connector and communication cable

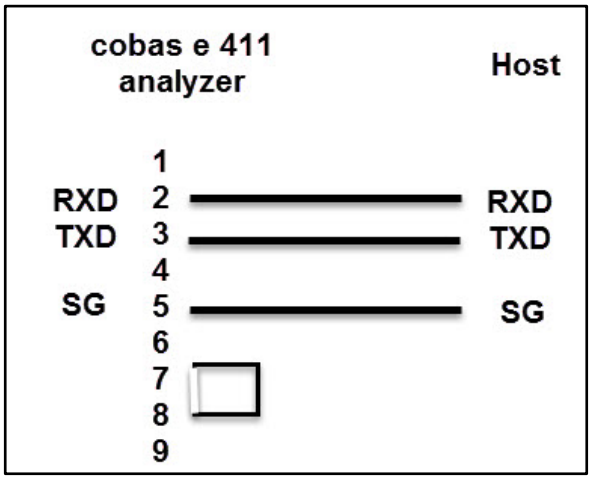


Figure 7: Connection diagram

Communication text

Communication text

The table below shows the communication text of the **cobas e** 411 analyzer.

Item	Direction	Elecsys type Real time	Batch	cobas type Real time	Batch
Inquiry for order	Upload e 411 > HOST	Yes	No	Yes	No
Order for test request	Download HOST > e 411	Yes	Yes	Yes	Yes
Result report	Upload e 411 > HOST	Yes	Yes	Yes	Yes
Inquiry of result	Download HOST > e 411	No	No	No	No

(yes: equipped, No: not equipped)

Table 4: List of communication text

Note

Patient sample and quality control sample are sent as result data, but not calibration result.

The **cobas e** 411 analyzer is not equipped with an auto-rerun function. Rerun sample can be manually defined.

There is no Inquiry for order of a control sample.

Causes of Communication text are shown in the table below.

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 replay 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 all test data of each sample is collected.
	Batch	Send result data of patient sample and quality control sample specified on **DataReview** window.

Table 5: Causes of communication text

ASTM communication protocol

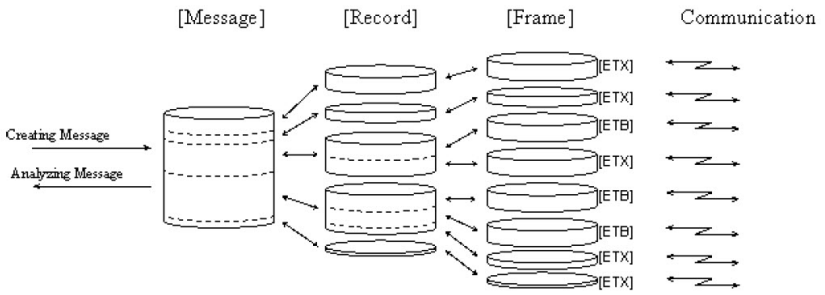
ASTM communication protocol

The **cobas e** 411 analyzer employs ASTM communication protocol.

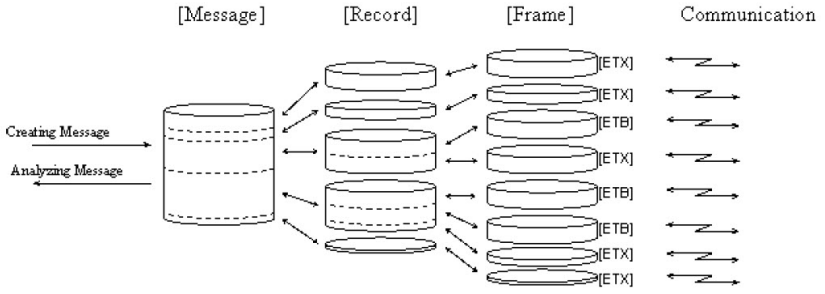
Communication data structure

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

(1) Elecsys type	A message consists of multiple records. A record consists of one or more frames. A frame comprises not more than one record. In case a record 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.



(2) cobas type	A message consists of several records. A record consists of one or more frames. A frame may comprise multiple records. In case of a record 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.



Frame structure

Frame structure is shown below.

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

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

When the last frame in a message or a frame is a single frame.

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

Field	ASCII Code	Content	Character	Note
[STX]	0x02	Start of text	1byte	
FN		Frame N	1byte	1
Text		Communication data	Max. 240 byte	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	

Table 6: Frame structure

Note

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	[ACK]0x06	[ACK]0x06	[ACK]0x06	[ACK]0x06
[DC3]0x13	[DC4]0x14	[NAK]0x15	[SYN]0x16	[ETB]0x17

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

4: Add each character code between and inclusive frame No.(FN) and [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**.

Example: Check sum calculation method

[STX]	1	T	e	s	t	[ETX]

Field	Character	Hex. format	Sum
[STX]	[STX]	02h	02h
FN	1	31h	31h
text	T	54h	54h
	e	65h	65h
	s	73h	73h
	t	74h	74h
[ETX]	[ETX]	03h	03h
		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 e** 411 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:

- Establishment Phase
- Transfer Phase
- Termination Phase

Establishment Phase

In data link layer, both sender and receiver go into one of the following statuses:

- Idle state: status waiting for becoming receiver.
- Starting Establishment Phase at the transmitting side (sender) by sending [ENQ].
- After receiving [ENQ] from the sender the receiver sends back [ACK].

Number of sender or receiver is one at a time. Without ongoing communication the **cobas e** 411 analyzer and the HOST are waiting in idle state. When a message is sent from one side and the presentation layer requires the data link layer to send record, one side changes its status from idle to sender. To determine the direction of communication the sender starts the Establishment Phase by sending ASCII Code 05h [ENQ] and turns into status sender. The receiver answers this request by sending ASCII Code 06h [ACK] and turns into status receiver. Transfer Phase starts when Establishment Phase is completed by receiving [ACK]. Reception other than [ENQ] is ignored in idle status.

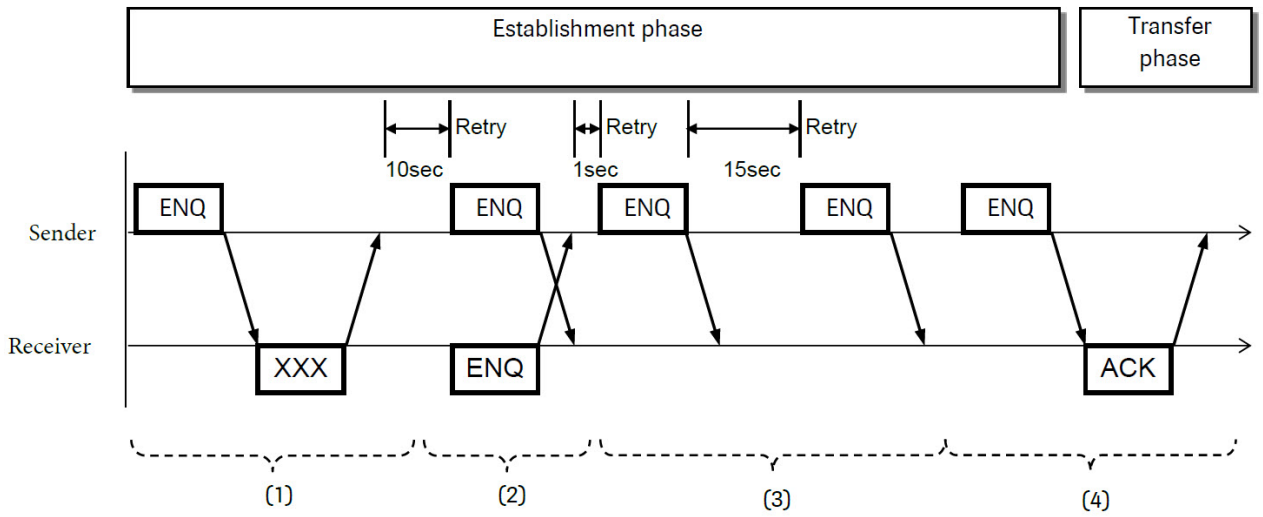


Figure 8: Establishment phase

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., the **cobas e** 411 analyzer waits for 10 seconds, and tries to establish with another [ENQ]. The **cobas e** 411 analyzer repeats this cycle until the number of retries after error reaches six.
(2) Receiver 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 the **cobas e** 411 analyzer has a priority. So that HOST **must** stop sending [ENQ] and **must** respond simultaneously by [ACK] or [NAK] when the Link Contention is detected. On the other hand, the **cobas e** 411 analyzer waits for 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.
(4) Successful procedure of Establishment Phase is mentioned above.	

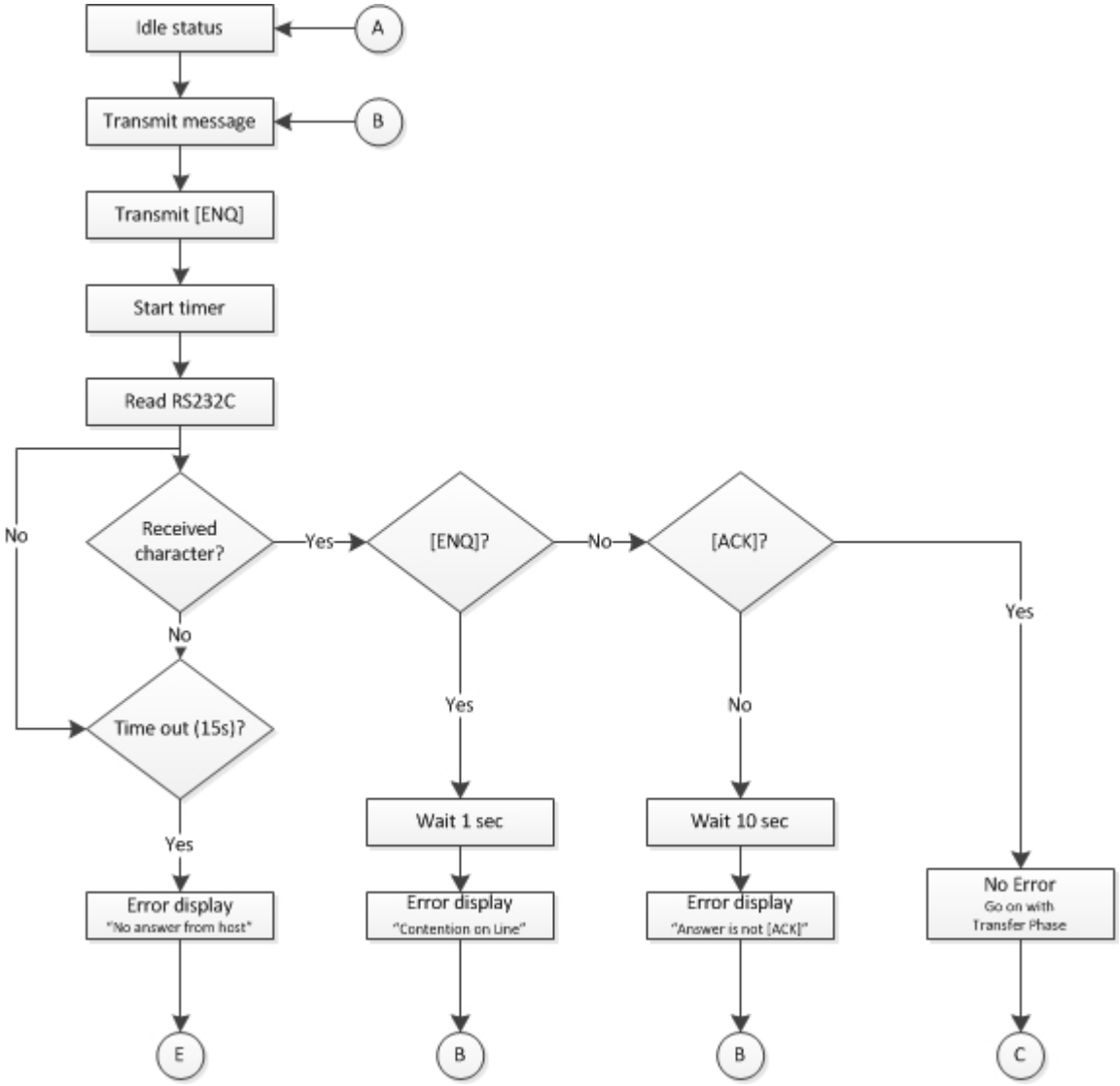


Figure 9: Establishment phase flow chart

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.

HOST in status receiver	According to the above, there are three options for HOST to respond the communication of the frame.
HOST sends [ACK]	The **cobas e** 411 analyzer sends the next frame. If the **cobas e** 411 analyzer has data to be communicated, the **cobas e** 411 analyzer continues to send frames.
HOST sends characters other than [ACK]	The **cobas e** 411 analyzer repeatedly sends the frame. This cycle is repeated until the number of retry in case of error reaches six. At this moment, the **cobas e** 411 analyzer starts Termination Phase and displays an error message by sending [EOT].
No response from HOST. (timeout)	The **cobas e** 411 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 the **cobas e** 411 analyzer.
HOST in status sender	When the **cobas e** 411 analyzer is in the receiving status and is waiting for 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, the **cobas e** 411 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 the **cobas e** 411 analyzer. The **cobas e** 411 analyzer changes to idle status by deleting the last incomplete message. The line is deemed to be neutral status.
HOST sends [EOT]	The **cobas e** 411 analyzer changes to idle status. Only completely received frame is deemed to be effective.

Chapter Transfer Phase shows the flowchart of three types of response against frame communication. An entry point C is selected when Establishment Phase is completed without any trouble. The entry point C is also the reentry point when the following frame communication is succeeded. An entry point D is for retrying when [ACK] is not responded. An entry point E shows change of the last Phase of this layer.

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 changes to idle and the line is required to be changed to neutral.

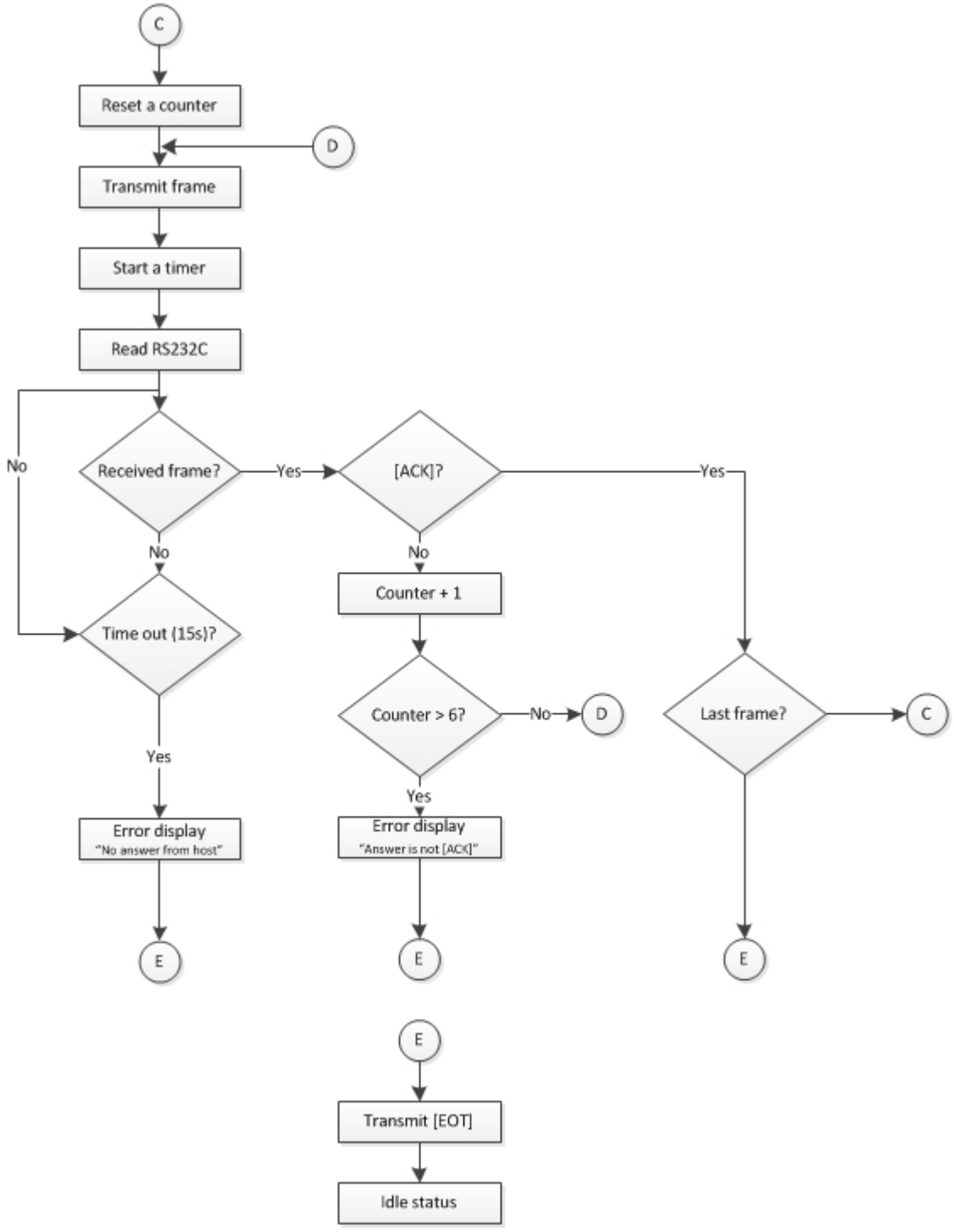


Figure 10: Termination phase flow chart

Record structure

Record structure

The **cobas e** 411 analyzer host protocol is compatible with the **cobas**® 6000 analyzer series protocol with some minor differences.

No.	Object	Remarks
1	Carrier no.	**cobas e** 411 rack analyzer: When rack no. is unknown, @ is attached in front of <CarrierNo> followed by a delivered value. **cobas e** 411 disk analyzer: The carrier no. is always available on a disk system.
2	Sample ID	When barcode read error occurs, the sample ID is generated as follows: **@<Sequence no.>** If a sample barcode read error occurs on a rack system and the rack no. is generated, the sample cannot be identified by the host.
3	Container Type	**MC** is not micro cup, but indicates reduced value.
4	Result Record	**cobas** type format transmits calculated tests. The host test code numbers can be defined.
5	Comment Record (following the order record)	The comment record, that follows the order record for patient demographic data is not used.
6	Comment Record (following the result record)	When no data alarm for message value is available, no comment record is transmitted to host.

Table 7: Record structure

Syntax

Syntax used in message (records) communicated by the **cobas e** 411 analyzer is shown below.

Communication text	Real/Batch	Message syntax Elecsys type	cobas type	
Inquiry for the requested tests (upload)	Real	H Q L	H Q L	TSREQ^REAL
Order for test request (download)	Real	H P O L	H P O L	TSDWN^REPLY
	Batch			TSDWN^BATCH
Result report (upload)	Real	H P O { R C-RES }	H P O { R C-RES }	RSUPL^REAL
	Batch			RSUPL^BATCH
		L	L	

Table 8: Message syntax

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

	cobas e 411 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)	→	

Table 9: Communication sequences

ASTM syntax is shown below.

(a)	Terminating and separating records character = **CR**:	Indicates completion of record. ASCII character [CR] (0Dhex) is required.
(b)	Field separator character = vertical bar |:	Depending on the second character of a message title record, 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*. The component separator separates the components in a field. 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 5, ASTM Communication Protocol*.

Column	Name of Attributes	Description	
1	Field position (Pos)	Field position. The number also increases by 1, if the field is not used.	
2	Order (No.)	Sequence of the field. Sequence of the fields in record.	
3	Name of Field (Field)	Name of relevant field.	
4	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), e.g., 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.
5	Maximum length (Max)	Maximum number of effective characters except escape characters in the relevant field.	
6	Elecsys format effective (EV)	Indicates if the field is effective or not in record. Fields without X is ignored when received though they are defined by ASTM.	
7	**cobas** format effective (CV)	R = Required field X = Effective field, if available	
8	Comment (Comments)	Field description	

Table 10: Attributes

Message header record

Elecsys type format (upload, download)

```
H|\^&|||xxx||||||P||[CR]
(1)  (2)  (3)  (6)
```

cobas type format (upload, download)

```
H|\^&|||cobas-e411^1|||||host|RSUPL^BATCH|P|1[CR]
(1) (2)     (3)              (4)      (5)      (6)(7)
```

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
1	(1)	Record Type ID	ST	1	X	R	**H** is fixed.	
2	(2)	Delimiter Definition	ST	4	X	R	Four characters, such as field separator character, repeat separator character, component separator character, and escape character are defined. The first character is a field separator character and Record Type ID separator as well. These four characters are "**|\^&**".	
3		Message Control ID						
4		Access Password						
5	(3)	Sender Name or ID	CM	36	X	X	Indicates sender name. (Can be omitted) Delete it when sending from **cobas e** 411 analyzer.	Setting is as follows. (Can be omitted) <Sender's device name>^<Communication program version> <Sender's device name> Type:TX Max: 30 Sending from **cobas e** 411 analyzer: **cobas e 411** is fixed. Sending from HOST: any characters within alphanumeric and "-". <Communication program version> Type: **NM** Max: 5 **1** is fixed.
6		Sender Street Address						
7		Reserved Field						
8		Sender Telephone Number						
9		Characteristics of Sender						
10	(4)	Receiver ID	ST	30		X		Receiver's name. (Can be omitted) Sending from **cobas e** 411 analyzer.: **host** is fixed. Sending from HOST: any characters within alphanumeric and "-".

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
11	(5)	Comment or Special Instructions						Setting is as follows: <Meaning of message>^<Cause> <Meaning of message> Type: ST Max: 5 **TSREQ**: TS inquiry. **RSUPL**: Transmitting results. **TSDWN**: Test request. <Cause of message> Type: ST Max: 5 **REAL**: communication in real time. **BATCH**: communication based on request from **cobas e** 411/HOST. **REPLY**: replay to the request.
12	(6)	Processing ID	ST	1	X	R	P is fixed.	
13	(7)	Version No.	NM	1		R		**1** is fixed.
14		Date and Time of Message						

Table 11: Message header record

Message termination record

Elecsys format (upload, download), **cobas** format (upload, download)

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

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
1	(1)	Record Type ID	ST	1	X	R	**L** is fixed.	
2	(2)	Sequence Number	NM	6	X	R	Indicates sequence No. Normally it is **1**.	
3	(3)	Termination Code	ST	1	X	R	Indicates the end of communication record. (Can be omitted) See table below.	**N**: Normal end **E**: Receiving error, hardware error, application error

Table 12: Message termination record

Message	Message Communication Status		Termination Code
Inquiry	Normal	With response data	F
		Without response data	I
	Abnormal	All data in record is not defined (inapplicable message error)	Q
		Receiving error Hardware error Application error	E
Response, upload download	Normal		- (*1)
	Abnormal	All data in record is not defined (inapplicable message error) Receiving error Hardware error Application error	E
Invalid Record	Abnormal	Receiving error Hardware error Application error	E

(*1) The device does not transmit Termination Code when response or receiving message at download is normal.

Table 14: Termination code list (Elecsys type format)

Request information record

Elecsys type (upload)

```
Q|1|^000663^32^@7^2^^SAMPLE^NORMAL||ALL|||||||O[CR]
(1) (2)              (3)                        (4)        (5)
```

cobas type (upload, download)

```
Q|1|^^000663^32^@7^2^^S1^SC||ALL|||||||O[CR]
(1)(2)               (3)           (4)       (5)
```

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
1	(1)	Record Type ID	ST	1	X	X	**Q** is fixed.	
2	(2)	Sequence Number	NM	6	X	X	Indicates sequence No. Normally it is **1**.	
3	(3)	Starting Range ID Number	CM	55/46	X	X	Indicates the end of communication record. ^<SampleID>^<SequenceNo>^<CarrierNo>^<PositionNo>^^<SampleType>^<ContainerType> <SampleID> Type: ST Max: 22 indicates Sample No. (Sample ID.) <SequenceNo> Type: NM Max: 4 indicates e411 internal sequence No. <CarrierNo> Type: ST Max: 5 indicates carrier No. (Disk/Rack) <PositionNo> Type: NM Max: 2 indicates position No. in carrier. <SampleType> Type: ST Max: 7 indicates sample type. **SAMPLE:** patients sample, static. <ContainerType> Type: ST Max: 7 indicates sample cup type. **NORMAL:** test tube or sample cup. **REDUCED:** sample cup, only.	Indicates the end of communication record. ^^<SampleID>^<SequenceNo>^<CarrierNo>^<PositionNo>^^<SampleType>^<ContainerType> <SampleID> Type: ST Max: 22 (*1) indicates Sample No. (Sample ID.) <SequenceNo> Type: NM Max: 4 indicates e411 internal sequence No. <CarrierNo> Type: ST Max: 5 (*2) indicates carrier No. (Disk/Rack.) <PositionNo> Type: NM Max: 2 indicates position No. in carrier. <SampleType> Type: ST Max: 2 (*3) indicates sample type. **S1:** blood serum. **S2:** urine. **S5:** others. <ContainerType> Type: ST Max: 7 (*4) indicates only sample cup type (SC). **SC:** test tube or sample cup. **MC:** reduced sample volume
4		Ending Range ID Number						
5	(4)	Universal Test ID	ST	3	X	X	**ALL** is fixed.	
6		Nature of Request Time Limits						
7		Beginning Request Results Data and Time						
8		Ending Request Results Data and Time						
9		Requesting Physician Name						
10		Requesting Physician Telephone Number						
11		User Field No. 1						
12		User Field No. 2						

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format
13	(5)	Request Information Status Codes	ST	1	X	X	Indicates the objective of the record. Setting is as follows: **O:** Order Query (to Host) **A:** Cancel the last request (to Host)

(*1) The device does not transmit Termination Code when response or receiving message at download is normal.

(*2) When rack No. of rack version is unknown, @ is attached in front of <CarrierNo> followed by a delivered value.

(*3) Sample Type S1, S2, S5 must be changed to S0 in the next software version because there is no rack type/sample type differentiation on the analyzer. The correct Sample Type is sent in the order record from the HOST.

(*4) MC indicates reduced volume not micro cup (like the **cobas** 6000 analyzer series).

Table 14: Request information record

Patient information record

Elecsys type (upload)

```
P|1|||||||||||||||||||||||||||||||||||[CR]
(1)(2)
```

Elecsys type (download); **cobas** type (upload, download)

```
P|1 [CR]
(1)(2)
```

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
1	(1)	Record Type ID	ST	1	X	X	**P** is fixed.	
2	(2)	Sequence Number	NM	6	X	X	Indicates sequence No. Normally it is **1**.	
3		Practice Assigned Patient ID						
4		Laboratory Assigned Patient ID						
5		Patient ID No. 3						
6		Patient Name						
7		Mother's Maiden Name						
8		Birthdates						
9		Patient Sex						
10		Patient Race						
11		Patient Address						
12		Reserved Field						
13		Patient Phone No						
14		Attending Physician ID						
15		Special Field 1						

Table 15: Patient information record

Test order record

Elecsys type (upload)

```
O|1|000663|36^0044^2^^SAMPLE^NORMAL|ALL|R|20050705093416|||||X||||||||||||||O [CR]
(1)(2)  (3)                (4)                (5)  (6)          (7)        (8)            (11)
```

Elecsys type (download)

```
                                              * 4,*6    *5                        *3
O|1|000663|36^0044^2^^SAMPLE^NORMAL|^^^10^2|R|20050705093416|||||N||||||||||||||Q [CR]
(1)(2)  (3)                (4)                  (5)   (6)          (7)        (8)            (11)
```

cobas type (upload)

```
                             * 4  *5                         *2
O|1|000663|6^44^2^^S1^SC|^^^10^2|R||20050705093416||||N||||1||||||20050705095504|||F[CR]
(1)(2)  (3)             (4)          (5)  (6)        (7)       (8)  (9)             (10)      (11)
```

cobas type (download)

```
O|1|000663|6^44^2^^S1^SC|^^^10^2|R||20050705093416||||A||||1||||||||||O[CR]
(1)(2)  (3)             (4)          (5)  (6)        (7)       (8)  (9)       (11)
```

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
1	(1)	Record Type ID	ST	1	X	R	**O** is fixed.	
2	(2)	Sequence Number	NM	6	X	R	Indicates sequence No. Normally it is **1**.	
3		Specimen ID	ST	22	X	R	Indicates sample No. (Sample ID.) For control sample, set name of control.	Indicate sample No. (Sample ID.) When barcode read error occurs, the sample id will be generated as follows: **@<Sequence no.>** For control sample, the *control name* or *control name^lot number* is sent to the host, according to the settings at the host communication setting screen.

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
4	(4)		CM	30/20	X	R	Indicates ordered sample. Setting is as follows: <SequenceNo>^<CarrierNo>^<PositionNo>^^<SampleType>^<ContainerType> <SequenceNo> Type: NM Max: 4 indicates **cobas e** 411 analyzer. internal sequence No. <CarrierNo> Type: ST Max: 5 indicates carrier No. (Disk/Rack.) <PositionNo> Type: NM Max: 2 indicates position No. in carrier. <SampleType> Type: ST Max: 7 indicates sample type. **SAMPLE**: patient sample. **CONTROL**: control sample. <ContainerType> Type: ST Max: 7 indicates type of sample cup. **NORMAL**: test tube or sample cup. **REDUCED**: sample cup, only.	Indicates ordered sample. Setting is as follows: <SequenceNo>^<CarrierNo>^<PositionNo>^^<SampleType>^<ContainerType> <SequenceNo> Type: NM Max: 4 indicates **cobas e** 411 analyzer. internal sequence No. <CarrierNo> Type: ST Max: 5 indicates carrier No. (Disk/Rack.) <PositionNo> Type: NM Max: 2 indicates position No. in carrier. <SampleType> Type: ST Max: 2 (*2) indicates sample type **S1:** blood serum. **S2:** urine. **S5:** others. **QC:** control sample. <ContainerType> Type: ST-Max: 7 (*1) indicates type of sample cup. **SC:** test tube or sample cup. **MC:** reduced sample volume.
5	(5)	Universal Test ID	CM	8	X	X	Indicates order. Repeats up to 60 orders. Only up to 18 for test selection information are avaiölable. Setting is as follows: ^^^<ApplicationCode>^<Dilution>\… Repeat delimiter \ for multiple test selection. For upload, **ALL** is fixed. <ApplicationCode> Type: NM Max: 3 (*4), (*6) indicates e411 Application No. <Dilution> Type: NM Max: 1 indicates automatic dilution factor. (*5) **0:** ratio=1 (not diluted). **1:** ratio=2 **2:** ratio=5 **3:** ratio=10 **5:** ratio =20 **7:** ratio=50 **9:** ratio=100	Indicates order. Repeats up to 60 orders. Only up to 18 for test selection information are available. Setting is as follows: ^^^<ApplicationCode>^<Dilution>\… Repeat delimiter **** for multiple test selection. <ApplicationCode> Type: NM Max: 3 (*4), (*6) indicates e411 host test No. The host test no. can be a test code or a calculated test no (only for upload). <Dilution> Type: NM Max: 1 (*5) indicates automatic dilution ratio. (also for no dilution attach "^" after Host Test No. like **^^^10^**) None or **1:** ratio=1 (not diluted) **2:** ratio=2 **5:** ratio=5 **10:** ratio=10 **20:** ratio=20 **50:** ratio=50 **100:** ratio=100
6	(6)	Priority	ST	1	X	R	Indicates priority of patient samples **R:** routine sample. **S:** stat sample	Indicates priority of patient samples Not used for control samples. **R:** routine sample. **S:** stat sample
7		Requested/Ordered Date and Time						
8	(7)	Specimen Collection Date and TIme	TS	14	X	X	Indicates reception date and time of request. Setting is as follows: Optional YYYYMMDDHHMMSS	
9		Collection End Time						
10		Collection Volume						
11		Collector ID						

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
12	(8)	Action Code	ST	2/1	X	R	Indicates current status of sample (*3) **X:** measured (upload) **N:** new sample order (download) **X\Q:** control sample (upload) **Q:** control sample (download) **A:** additional test order (upload)	Indicates type of information to be reported (*3) **N:** communication of patient sample result from analyzer. (upload) **Q:** communication of control sample result from analyzer (upload) **A:** test order from HOST. (download)
13		Danger Code						
14		Relevant Clinical Information						
15		Date/Time Specimen Received						
16	(9)	Specimen Descriptor	NM	1		R		Indicates sample type (*2) **1:** blood serum. **2:** urine. **5:** others.
17		Ordering Physician						
18		Physician's Telephone Number						
19		User Field No. 1						
20		User Field No. 2						
21		Laboratory Field No. 1						
22		Laboratory Field No. 2						
23	(10)	Data/Time Results Reported or Last Modified	TS	14		X		Indicates date when all test results are collected. Setting from HOST is not applicable. Setting is as follows: YYYYMMDDHHMMSS
24		Instrument Charge to Computer System						
25		Instrument Section ID						
26	(11)	Report Types	ST	1	X	R	Indicates report type. **Q:** response to inquiry. (download) **Z:** no response request to inquiry. (download) **O:** from e411 to HOST. (upload)	Indicates type of communication. **O:** test order. (download) **F:** communication of result. (upload)
27		Reserved Field						
28		Location or Ward of Specimen Collection						
29		Nosocomial Infection Flag						
30		Specimen Service						
31		Specimen Institution						

(*1) MC indicates reduced volume not micro cup (like the **cobas** 6000 analyzer series).

(*2) Except for quality controls, the Specimen Descriptor of Instrument Specimen ID for **cobas** type is prior to Sample Type when they are mismatched.

(*3) Action Code of already ordered sample for Elecsys type is N: When new order of sample is received, delete existing test information to order the receiving tests. Same for **cobas** type as its Action Code is "A" fixed (download).

(*4) Application Code in Universal Test ID.

(*5) See *Table 17* for automatic dilution factor/ratio for <Dilution> of Universal Test ID.

(*6) Sending of multiple orders for the same test in one sample record is not allowed.

Table 16: Test order record

Elecsys *type* The last digit of application no. is called *generation* and the host should handle application no with taking *generation* into account.. If the host downloads an order of TSH with application no. =10 and only a different generation of TSH (application no.=11) is on board then **cobas e** 411 analyzer uses TSH (application no.=11) for determination and sends back the result with application no.=11.

cobas *type* One host test code can be assigned to two or more test generations (e.g., TSH 0(10), TSH 1(11)). In this case, the latest generation on board is the highest priority for reagent pack selection.

Automatic dilution Factor (Elecsys)	Automatic dilution ration (cobas)	Pipetting volumes			
		1st dilution		2nd dilution	
		Sample volume	Diluent volume	Diluted sample volume	Diluent volume
0	1	No sample dilution			
1	2	50 µL	50 µL	-	-
2	5	40 µL	160 µL	-	-
3	10	20 µL	180 µL	-	-
4	20	20 µL	180 µL	100 µL	100 µL
5	50	20 µL	180 µL	40 µL	160 µL
6	100	20 µL	180 µL	20 µL	180 µL

Table 17: Automatic dilution factor/ratio list

Result record

Elecsys type (upload)

```
R|1|^^^10^^0|0.310|uIU/ml|0.270^4.20|N||F|||20050619094203|20050619101521[CR]
(1)(2)    (3)      (4)     (5)     (6)       (7) (8)         (10)              (11)
```

cobas type (upload)

```
R|1|^^^10//not|0.310|uIU/ml||N||F||admin|||E1[CR]
(1)(2)    (3)      (4)     (5)   (7) (8)   (9)
```

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
1	(1)	Record Type ID	ST	1	X	X	**R** is fixed.	
2	(2)	Sequence Number	NM	6	X	X	Indicates sequence No.	
3	(3)	Universal Test ID	CM	10/20	X	X	Indicates order. ^^^<ApplicationCode>^<Dilution>^<pre-dilution> <ApplicationCode> Type: NM Max: 3 indicates e411 Application No.	Indicates order. ^^^<ApplicationCode>/<Dilution>/<pre-dilution> <ApplicationCode> Type: NM Max: 3 indicates e411 host test no. The host test no. can be a test code or a calculated test no. Calculated tests can be defined on the **Calc. Test** screen. A total of 5 calculated tests can be set. When all tests requiring calculation are ordered and successfully measured, the analyzer automatically transmits the calculated tests. However, the host may not send a calculation test order.
							<Dilution> Type: NM Max: 1 indicates automatic dilution factor when ordering.	<Dilution> Type: ST Max: 1 indicates automatic dilution factor when ordering: 1, 2, 5, 10, 20, 50, 100
							< pre-dilution > Type: ST Max: 1 **0:** without pre-dilution. **1:** with pre-dilution.	< pre-dilution > Type: ST Max: 11 **not:** without pre-dilution. **pre-diluted:** with pre-dilution.

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
4	(4)	Data or Measurement Value	CM	10	X	X	Indicates measured value. Quantitative test format: <measurement value> Qualitative test format: <measurement value>^<cut off index> <measurement value> Type: NM Max: 7 for quantitative tests: seven numeric including symbol and decimal places. ">", "<"is attached to the top of the measured value when measuring range error occurred. Seven spaces (0x20) are communicated if no result. For qualitative tests: **1:** Positive **0:** Border line **-1:** Negative <cut off index> Type: NM Max: 7 seven numeric including symbol and decimal places. Seven spaces (0x20) are communicated if no result.	Indicates measured value. Quantitative test format: <measurement value>>^<message value> Qualitative test format: <qualitative value>^<cut off index> <measurement value> Type: NM Max: 7 measured value or 7 spaces if no result. ">", "<" is attached before the measured value when measuring range error occurred. 7 digit including symbol and decimal places. <qualitative value> Type: NM Max: 2 Result message **1:** Positive (reac.) **0:** Border line (border) **-1:** Negative (n-reac.) <message value> Type: NM Max 2 Result Message code (0～31) <cut off index> Type: NM Max: 7 Measured value or 7 spaces if no result. ">", "<" is attached before the measured value when measuring range error occurred. 7 digit including symbol and decimal places.
5	(5)	Units	ST	6	X	X	Indicates unit name of measurement results.	
6	(6)	Reference Ranges	CM		X		Indicates normal range. Indicates QC range when control sample. <Low>^<High> <Low> Type: NM Max: 7 indicates minimum of the normal range. <High> Type: NM Max: 7 indicates maximum of the normal range.	
7	(7)	Result Abnormal Flags	ST	2	X	X	Indicates normal/abnormal of measurement results. **L:** less than normal range. **H:** more than normal range. **<:** less than measured range. **>:** more than measured range. **N:** Normal **A:** Abnormal	Indicates normal/abnormal of measurement results. **L:** less than normal range. **H:** more than normal range. **LL:** less than measured range. **HH:** more than measured range. **N:** Normal **A:** Abnormal
8		Nature of Abnormality Testing						
9	(8)	Result Status	ST	1	X	X	Indicates the number of the tests conducted for the analytical data. **F:** last result. **X:** results cannot be done. **R:** the result communicated. **V:** released result by user. **Y:** blocked by system. **+:** blocked by user	Indicates the number of the tests conducted for the analytical data. **F:** initial result. **C:** rerun result.
10		Date of Change in Instrument Normative values Units						

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
11	(9)	Operator Identification	ST	6		X	Indicates operator ID who conducted measurement. HOST can't set this field.	
12	(10)	Date/Time Test Started	TS	14			Indicates time and date when starting measurement. Setting is as follows: YYYYMMDDHHMMSS	
13	(11)	Date/Time Test Completed	TS	14	X		Indicates time and date when completing measurement. Setting is as follows: YYYYMMDDHHMMSS	
14		Instrument Identification			X			**E1**

Table 18: Test order record

Note

cobas type format transmits calculated tests. Elecsys type format does not transmit calculated tests.

Elecsys type format has no *Review by exception* function.

cobas type format does not transmit tests specified by exception alarm, defined in the **Review by exception** screen.

Communication of batch results with review by exception alarm flags is based on option 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.

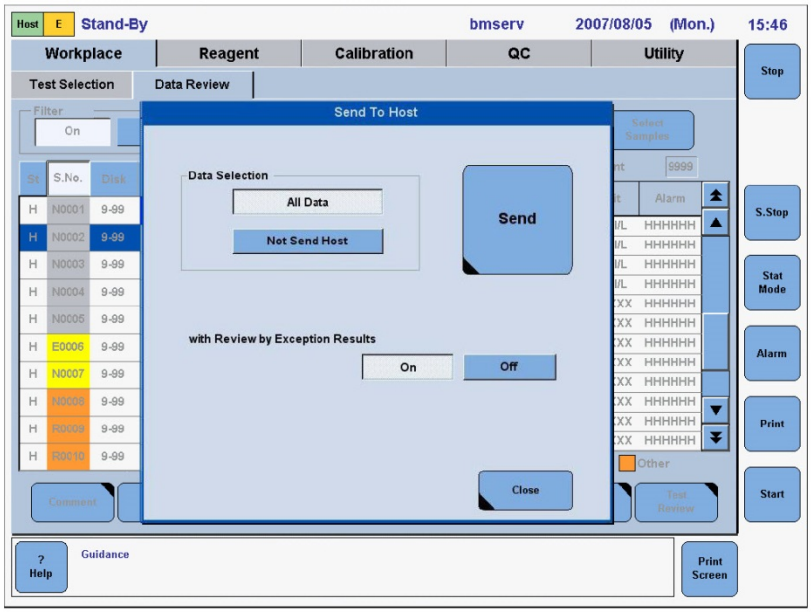


Figure 11: Data selection

When **Not Send Host** is selected on the window **Send to Host**, only samples which were not communicated to the host, are transmitted.

Comment record

The comment record, that follows the order record for patient demographic data is not used.

Result flag [C-RES] (Comment Record, that follows the Result Record)

Elecsys type (upload)

```
C|1|I|50^Below measuring range|I[CR]
(1)(2)(3)    (4)                  (5)
```

cobas type (upload)

```
C|1|I|50|I[CR]
(1)(2)(3)(4)(5)
```

Pos	No	Field	Type	Max	EV	CV	Comments Elecsys Type Format	cobas Type Format
1	(1)	Record Type ID	ST	1	X	X	**C** is fixed.	
2	(2)	Sequence Number	NM	6	X	X	Indicates sequence No. Normally it is **1**.	
3	(3)	Comment Source	ST	1	X	X	**I** is fixed.	
4	(4)	Comment Text	NM/ CM	53/3	X	X	Data alarm No, and message for the measured value is attached. <Alarm Flag>^<Alarm Messages> < Alarm Flag > Type: NM Max: 2 indicates alarm No. <AlarmMessages>Type: ST Max: 50 indicates alarm message.	Data alarm No for the measured value is attached. (*1)
5	(5)	Comment Type	ST	1	X	X	**I** is fixed.	

Table 19: Comment record

Skip this record when no data alarm for message value was produced.

Data alarm list

Flag	Data Alarm	Screen/Printer	Elecsys Type Host No.	cobas Type Host No.
1	Power Fail/Power Off Cancel	Cancel	1	-
2	E.STOP Cancel	Cancel	2	-
3	STOP Cancel	Cancel	3	-
4	P.STOP/A.STOP Cancel	Cancel	4	-
5	S.STOP Cancel	Cancel	5	-
6	Recovery Cancel	Cancel	6	-
7	Sample Short	Samp.S	7	3
8	Assay Reagent Short	Reag.S	8	4
9	Diluent Short	Reag.S	9	4
10	Pretreatment Reagent Short	Reag.S	10	4
11	<Not available>	-	-	-
12	Abnormal Reagent Disk Temperature	Reag.T	12	74
13	Abnormal Incubator Temperature	Inc.T	13	75
14	Abnormal Measuring Cell Temperature	Cell.T	14	77
15	Abnormal System Reagent Temperature	SysR.T	15	76
16	System Reagent Short	SysR.S	16	62
17	ADC abnormal	ADC.E	17	1
18	<Not available>	-	-	-
19	<Not available>	-	-	-
20	<Not available>	-	-	-
21	<Not available>	-	-	-
22	<Not available>	-	-	-
23	<Not available>	-	-	-
24	Calculation Error	Calc.?	24	39
25	No Calibration Data	Cal.E	25	43
26	Previous Calibration Data	Cal.E	26	43
27	<Not available>	-	-	-
28	<Not available>	-	-	-
29	<Not available>	-	-	-
30	<Not available>	-	-	-
31	Assay Reagent Hovering	Reag.H	31	69
32	Diluent Hovering	Reag.H	32	69
33	Pretreatment Hovering	Reag.H	33	69
34	<Not available>	-	-	-
35	Assay Reagent Film Detected	Reag.F	35	70
36	Diluent Film Detected	Reag.F	36	70
37	Pretreatment Film Detected	Reag.F	37	70
38	System Reagent Film Detected	Reag.F	38	70
39	<Not available>	-	-	-
40	AB Level Range Over	>AB	40	63
41	AB Level Check Error	AB.E	41	64
42	Current Range Over	>Curr	42	65
43	Current Range Check Error	Curr.E	43	66
44	System Reagent Temperature Unstable	SysR.U	44	120
45	Sample Clot Detected	Samp.C	45	72

Flag	Data Alarm	Screen/Printer	Elecsys Type Host No.	cobas Type Host No.
46	Potential microparticle carryover	CarOvr	46	71
47	Sample ID Error Cancel	Cancel	47	121
48	Below normal(expected)range	L	48	41
49	Above normal(expected)range	H	49	40
50	Below measuring range	<Test	50	27
51	Above measuring range	>Test	51	26
52	Expired RackPack	ReagEx	52	101
53	No Sample	Samp.S	53	3
54	Sample LLD Inexecution	SLLD.E	54	86
55	Sample LLD Noise	SLLD.N	55	87
56	Current Range Over(Operation)	>Curr	56	99
57	Instrument Factor A	FacA	57	122
58	Signal level below limit	<SigL	58	100
59	Calc Test Error	ClcT.E	-	37
-	Overflow (*)	Over.E	-	38

(*) Not in use.

Table 20: Data alarm list

Communication trace

Test selection information in real time

An example of communication trace is shown below.

The following trace is shown without Start ([STX][FN]), End ([CR][EXT][CS1[CS2][CR][LF]], and response from each receiver ([ENQ][ACK][EOT]).

The HOST is required to send back the SequenceNo, CarrierNo, and Position to the **cobas e** 411 analyzer without changing any of them.

If any information is changed, the analyzer sends a cancelation message to the HOST and the measurement is skipped.

Disk Type

Elecsys *type*

The **cobas e** 411 analyzer sends test selection information such as sample ID=000004, sequence No.=40, Disk No=0, and Position=5.

```
H|\^&|||||||||P|||[CR]
Q|1|^000004^40^0^5^^SAMPLE^NORMAL||ALL|||||||O[CR]
L|1|I [CR]
```

Example 1: HOST replies test selection information of sample ID=000004.

```
H|\^&|||||||||P|||[CR]
P|1 [CR]
O|1|000004|40^0^5^^SAMPLE^NORMAL|^^^10^\^^^30^2\^^^40^|R|||||N
||||||||||||||Q
L|1| [CR]
```

Example 2: HOST replies without order information of sample ID=000004.

```
H|\^&|||||||||P|||[CR]
P|1 [CR]
O|1|000004|40^0^5^^SAMPLE^NORMAL||R|||||N|||||||||||||Z[CR]
L|1| [CR]
```

The **cobas e** 411 analyzer sends a cancel to HOST when HOST does not reply within 15 seconds.

```
H|\^&|||||||||P|||[CR]
 Q|1|^000004^40^0^5^^SAMPLE^NORMAL||ALL|||||||A[CR]
L|1|I [CR]
```

cobas *type* The **cobas e** 411 analyzer sends test selection information such as sample ID=000004, sequence No.=40, Disk No=0, and Position=5.

```
H|\^&|||cobas-e411^1|||||host|TSREQ^REAL|P|1[CR]
Q|1|^^000004^40^0^5^^S1^SC||ALL|||||||O[CR]
L|1|N[CR]
```

Example 1: HOST replies test selection information of sample ID=000004.

```
H|\^&|||host^1|||||cobas-e411|TSDWN^REPLY|P|1[CR]
P|1 [CR]
O|1|000004|40^0^5^^S1^SC|^^^10^\^^^30^2\^^^40^|R|||||A
||||1|||||||||O[CR]
L|1|N[CR]
```

Example 2: HOST replies without order information of sample ID=000004 or the generated sample id=@<sequence no.>.

```
H|\^&|||host^1|||||cobas-e411|TSDWN^REPLY|P|1[CR]
P|1 [CR]
O|1|000004|40^0^5^^S1^SC||R|||||A||||1|||||||||O[CR]
L|1|N[CR
```

The **cobas e** 411 analyzer sends a cancel to HOST when HOST does not reply within 15 seconds.

```
H|\^&|||cobas-e411^1|||||host|TSREQ^REAL|P|1[CR]
Q|1|^^000004^40^0^5^^S1^SC||ALL|||||||A[CR]
L|1|N[CR]
```

Rack Type

Elecsys *type*

The **cobas e** 411 analyzer sends inquiry for sample ID=000002, sequence No.=3 Rack No.=@95 and Position=2.

```
H|\^&|||||||||P||[CR]
Q|1|^000002^3^@95^2^^SAMPLE^NORMAL||ALL|||||||O[CR]
L|1|I[CR]
```

HOST replies test selection information of sample ID=000002.

```
H|\^&|||||||||P||[CR]
P|1 [CR]
O|1|000002|3^@95^2^^SAMPLE^NORMAL|^^^10^|R|||||N|||||||||||||Q[CR]
L|1| [CR]
```

The **cobas e** 411 analyzer sends inquiry for sequence No.=3 Rack No.=0007, Position=2, and no sample ID.

```
H|\^&|||||||||P||[CR]
Q|1|^^3^0007^2^^SAMPLE^NORMAL||ALL|||||||O[CR]
L|1|I[CR]
```

Note Key information for a non-barcoded sample is Rack No and position. If barcode read error takes place for a barcoded sample, the key information is also Rack No and position. In such cases, the cobas e 411 analyzer inquires after reading Rack No.

cobas *type*

The **cobas e** 411 analyzer sends inquiry for sample ID=000002, sequence No.=3 Rack No.=@95 and Position=2.

```
H|\^&|||cobas-e411^1|||||host|TSREQ^REAL|P|1[CR]
Q|1|^^000002^3^@95^2^^S1^SC||ALL|||||||O[CR]
L|1|N[CR]
```

HOST replies test selection information of sample ID=000002.

```
H|\^&|||host^1|||||cobas-e411|TSDWN^REPLY|P|1[CR]
P|1 [CR]
O|1|000002|3^@95^2^^S1^SC|^^^10^|R|||||A||||1|||||||||O[CR]
L|1|N[CR]
```

The **cobas e** 411 analyzer sends inquiry for sequence No.=3 Rack No.=0007, Position=2 and a generated sample id=@3.

```
H|\^&|||cobas-e411^1|||||host|TSREQ^REAL|P|1[CR]
Q|1|^^@3^3^0007^2^^S1^SC||ALL|||||||O[CR]
L|1|N[CR]
```

Note When it is rack type without sample ID, incl. barcode read error, the **cobas e** 411 analyzer inquires after reading Rack No.

If a barcode read error occurs and the rack no. is generated, the sample cannot be identified by the host.

When the rack type communication for a rack does not complete within approximately 40 seconds, the **cobas e** 411 analyzer sends a cancel to HOST.

Real time test results

Result value is within normal range

Elecsys *type* The **cobas e** 411 analyzer sends test result of sample ID=000004, sequence No.=40, Disk No.=0 and Position=5.

```
H|\^&|||||||||P||[CR]
P|1|||||||||||||||||||||||||||||||| [CR]
O|1|000004|40^0^5^^SAMPLE^NORMAL|ALL|R|20051220095504|||||X
||||||||||||||O[CR]
R|1|^^^10^^0|1.25|ulU/ml|0.270^4.20|N||F|||20051220095534|
20051220101604|[CR]
R|2|^^^30^2^1|1.52|ng/dl|1.01^1.79|N||F|||20051220103034|
20051220105004|[CR]
R|3|^^^40^^0|1.17|ulU/ml|0.846^2.02|N||F|||20051220110034|
20051220112004|[CR]
L|1| [CR]
```

cobas *type* The **cobas e** 411 analyzer sends test result of sample ID=000004, sequence No.=40, Disk No.=0 and Position=5.

```
H|\^&|||cobas-e411^1|||||host|RSUPL^REAL|P|1[CR]
P|1 [CR]
O|1|000004|40^0^5^^S1^SC|^^^10^\^^^30^2\^^^40^|R|||||N
||||1|||||||20051220095504|||F[CR]
R|1|^^^10//not|1.25^|ulU/ml||N||F||admin|||E1[CR]
R|2|^^^30/2/pre-diluted|0.091^|ng/dl||N||F||admin|||E1[CR]
R|3|^^^40//not|1.17^|ng/ml||N||F||admin|||E1[CR]
L|1|N[CR]
```

Result value is less than normal range

Elecsys *type* The **cobas e** 411 analyzer sends a test result of sample ID=000002, sequence No.=3, Rack No.=0007, and Position=2.

```
H|\^&|||||||||P||[CR]
P|1|||||||||||||||||||||||||||||||| [CR]
O|1|000002|3^0007^2^^SAMPLE^NORMAL|ALL|R|20051220104418|||||X
||||||||||||||O[CR]
R|1|^^^10^^0|0.163|ulU/ml|0.270^4.20|L||F|||20051220103034|
20051220105004|[CR]
C|1|I|48^Below normal(expected) range|I[CR]
L|1| [CR]
```

cobas *type* The **cobas e** 411 analyzer sends a test result of sample ID=000002, sequence No.=3, Rack No.=0007, and Position=2.

```
H|\^&|||cobas-e411^1|||||host|RSUPL^REAL|P|1[CR]
P|1 [CR]
O|1|000002|3^0007^2^^S1^SC|^^^10^|R|||||N||||1|||||||
20051220104418|||F[CR]
R|1|^^^10//not|0.163|ulU/ml||L||F||admin|||E1[CR]
C|1|I|48|I[CR]
L|1|N[CR]
```

Result value is a qualitative test

Elecsys *type* The **cobas e** 411 analyzer sends a test result of sample ID=000010, sequence No.=442, Rack No.=0005, and Position=1.

```
H|\^&|||||||||P||[CR]
P|1|||||||||||||||||||||||||||||||||| [CR]
O|1|000010|442^0005^1^^SAMPLE^NORMAL|ALL|R|20051220104418|||||X
||||||||||||||O[CR]
R|1|^^^400^^0|-1^0.303|COI|^|N||F|||20051220110334|
20051220112404|[CR]
L|1| [CR]
```

cobas *type* The **cobas e** 411 analyzer sends a test result of sample ID=000010, sequence No.=442, Rack No.=0005, and Position=1.

```
H|\^&|||cobas-e411^1|||||host|RSUPL^REAL|P|1[CR]
P|1 [CR]
O|1|000010|442^0005^1^^S1^SC|^^^400^|R|||||N||||1|||||||
20051220104418|||F[CR]
R|1|^^^400//not|-1^0.303|COI||N||F||admin|||E1[CR]
L|1|N[CR]
```

Control sample

Elecsys *type*

```
H|\^&|||||||||P||[CR]
P|1|||||||||||||||||||||||||||||||||| [CR]
O|1|PC U2|96^0019^1^^CONTROL^NORMAL|ALL|R|20051220104418|||||X\Q
||||||||||||||O[CR]
R|1|^^^10^^0|1.45|ulU/ml|1.37^1.97|N||F|||20051220110334|
20051220112404|[CR]
L|1| [CR]
```

cobas *type*

```
H|\^&|||cobas-e411^1|||||host|RSUPL^REAL|P|1[CR]
P|1 [CR]
O|1|PC U2|96^0019^1^^QC^SC|^^^400^||||||Q||||1
||||||20051220104418|||F[CR]
R|1|^^^400//not|1.26^|ulU/ml||L||F||admin|||E1[CR]
L|1|N[CR]
```

Batch test selection information

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

```
H|\^&|||host^1|||||cobas-e411|TSDWN^BATCH|P|1[CR]
P|1 [CR]
O|1|000051|^^^^S1^SC|^^^10^/^^^30^2/^^^40^|R|||||A||||1
|||||||||O[CR]
L|1|N[CR]
```

Download of test selection information is new order only. Sequence No. is automatically numbered by the **cobas e** 411 analyzer.

The **cobas e** 411 analyzer can store 2000 tests, e.g., for 1000 samples with two tests. The older tests are overwritten with a new order if 2000 tests are already stored.

Communication error

Example

An example of communication error is shown below.

Content	Alarm Code
A try occurred at message transmission	44-01-01
Communication abort at mess. transmission	44-01-02
Communication abort at receiving message	44-01-03
Message retransmission was unsuccessful (others)	44-01-04
Message retransmission was unsuccessful (retry failed)	44-01-05
Timeout occurred at message transmission	44-01-06
Timeout occurred while receiving message	44-01-07
Communication format was incorrect	44-01-08
Update of a database was not allowed	44-01-09
A hardware error occurred	44-01-10
A software error occurred	44-01-11
Upload is defined but host com. is OFF	44-01-12

Table 21: Communication Error list

Alarm messages are recorded in host trace log.

```
*************************************************************************
  Roche Diagnostics     Immunoanalyzer cobas e 411    S/N 0703-37
 ************************************************************************
 System Communication Trace  Operator-ID: Admin     2005/05/23, 12:35
 -------------------------                 -----------------

YY/MM/DD HH:MM:SS.msec
-------------------------------------------------------------------------
06/02/20 13:48:32.187 S 001 <ENQ>
06/02/20 13:48:47.035 E 44-01-06 Timeout occurred at message transmission
06/02/20 13:48:47.277 E 44-01-12 Upload is defined but host com. is OFF
06/02/20 13:48:47.296 S 001 <EOT>
06/02/20 13:53:27.187 S 001 <ENQ>
06/02/20 13:53:27.296 R 001 <ACK>
06/02/20 13:53:27.377 S 041 <STX>1H|^~/&||||||||||A.2|'''<CR><ETX>38<CR><LF>
```

Figure 12: Host trace log

- S: Send
- R: Recv
- E: Error

Appendix

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 Tex
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	Bel
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	Binary	Dec	Hex	Char	Binary	Dec	Hex	Char
0010 0000	32	20	blank	0100 0000	64	40	@	0110 0000	96	60	`
0010 0001	33	21	!	0100 0001	65	41	A	0110 0001	97	61	a
0010 0010	34	22	"	0100 0010	66	42	B	0110 0010	98	62	b
0010 0011	35	23	#	0100 0011	67	43	C	0110 0011	99	63	c
0010 0100	36	24	$	0100 0100	68	44	D	0110 0100	100	64	d
0010 0101	37	25	%	0100 0101	69	45	E	0110 0101	101	65	e
0010 0110	38	26	&	0100 0110	70	46	F	0110 0110	102	66	f
0010 0111	39	27	'	0100 0111	71	47	G	0110 0111	103	67	g
0010 1000	40	28	(	0100 1000	72	48	H	0110 1000	104	68	h
0010 1001	41	29	)	0100 1001	73	49	I	0110 1001	105	69	i
0010 1010	42	2A	*	0100 1010	74	4A	J	0110 1010	106	6A	j
0010 1011	43	2B	+	0100 1011	75	4B	K	0110 1011	107	6B	k
0010 1100	44	2C	,	0100 1100	76	4C	L	0110 1100	108	6C	l
0010 1101	45	2D	-	0100 1101	77	4D	M	0110 1101	109	6D	m
0010 1110	46	2E	.	0100 1110	78	4E	N	0110 1110	110	6E	n
0010 1111	47	2F	/	0100 1111	79	4F	O	0110 1111	111	6F	o
0011 0000	48	30	0	0101 0000	80	50	P	0111 0000	112	70	p
0011 0001	49	31	1	0101 0001	81	51	Q	0111 0001	113	71	q
0011 0010	50	32	2	0101 0010	82	52	R	0111 0010	114	72	r
0011 0011	51	33	3	0101 0011	83	53	S	0111 0011	115	73	s
0011 0100	52	34	4	0101 0100	84	54	T	0111 0100	116	74	t
0011 0101	53	35	5	0101 0101	85	55	U	0111 0101	117	75	u
0011 0110	54	36	6	0101 0110	86	56	V	0111 0110	118	76	v
0011 0111	55	37	7	0101 0111	87	57	W	0111 0111	119	77	w
0011 1000	56	38	8	0101 1000	88	58	X	0111 1000	120	78	x
0011 1001	57	39	9	0101 1001	89	59	Y	0111 1001	121	79	y
0011 1010	58	3A	:	0101 1010	90	5A	Z	0111 1010	122	7A	z
0011 1011	59	3B	;	0101 1011	91	5B	[	0111 1011	123	7B	{
0011 1100	60	3C	<	0101 1100	92	5C	\	0111 1100	124	7C	|
0011 1101	61	3D	=	0101 1101	93	5D	]	0111 1101	125	7D	}
0011 1110	62	3E	>	0101 1110	94	5E	^	0111 1110	126	7E	~
0011 1111	63	3F	?	0101 1111	95	5F	_				

Table 23: Printable characters