

# **cobas<sup>®</sup> 8000 data manager**

*Host Interface Manual, v.14  
Software Version 1.05*



## Revision history

Manual version	Software version	Revision date	Main changes
1.00.00 (revision 1)	1.00.00	August 2009	First version
1.00 r2	1.00.01	December 2009	Updated with enhancements and corrections. (Revision 2)
1.01 (revision 1)	1.01.00	June 2010	Support for e602, calibration results, result query, order query, EP17-A.
1.01 (revision 2)	1.01.00	June 2010	Branding and trademark corrections.
1.01 (revision 3)	1.01.01	August 2010	Enhanced support for acknowledgment messages.
1.01 (revision 4)	1.01.01	September 2010	Revised description of Analytical Unit ID, and other minor revisions.
1.02 (revision 1)	1.02.00	March 2011	<ul style="list-style-type: none"> <li>• Further enhanced support for acknowledgment messages.</li> <li>• Full Analytical Unit ID editing permitted.</li> <li>• Support for c702</li> </ul>
1.02.03 (revision 1)	1.02.03	August 2011	<ul style="list-style-type: none"> <li>• Sequence mode: identifying samples by sequence number.</li> <li>• Caution as regards serum index tests.</li> </ul>
1.02.05 (revision 1)	1.02.05	April 2012	<ul style="list-style-type: none"> <li>• Data added to quality control and calibration results to improve traceability. (HL7 only.)</li> </ul>
1.03.00 (revision 1)	1.03.00	February 2013	<p>Minor corrections.</p> <ul style="list-style-type: none"> <li>• In Result Queries and Order Queries, the rack type in ASTM Q-3.2 and HL7 QPD-10 is specified as mandatory, to ensure consistent responses.</li> <li>• For calibration results, MSH-7 and H-14 contain the time of calibration, not time of message creation.</li> <li>• Warning on network security and resetting sample priority.</li> <li>• Updated manufacturer address.</li> <li>• Recommendation to use “By test” setting.</li> <li>• Notice that instrument alarms are not sent to host.</li> </ul> <p>Additional functionality.</p> <ul style="list-style-type: none"> <li>• Sample IDs can be assigned a lifetime, after which they can be re-used. If sample lifetimes are used, query messages must include the sample's rack type / specimen type.</li> <li>• C-module supports additional dilution factors: 3, 5, 10, 20, 50.</li> <li>• Support for Generation-6 (G6) servers, and the FortiGate-40C firewall.</li> </ul>
1.03.01 (revision 1)	1.03.01	August 2013	<p>Minor corrections.</p> <ul style="list-style-type: none"> <li>• More information on codes used for qualitative results on e-modules.</li> </ul> <p>( For details, see:</p> <ul style="list-style-type: none"> <li><i>Result Record</i> (p. 126)</li> <li><i>Observation Result Segment - OBX (for patient results)</i> (p. 173)</li> <li><i>Observation Result Segment - OBX (for QC results)</i> (p. 178)</li> </ul> <p>Additional functionality.</p> <ul style="list-style-type: none"> <li>• Limited STAT handling, to deal with delays caused by too many STAT samples from a cobas® 8100 instrument.</li> </ul> <p>( For details, see <i>STAT masking mode</i> (p. 69))</p> <p>Data alarms</p> <ul style="list-style-type: none"> <li>• New alarms 47, 100, plus corrections.</li> </ul> <p>( For details, see <i>Data Alarms</i> (p. 217))</p>

**Table 1**

Revision history

Manual version	Software version	Revision date	Main changes
12			(Internal draft, not externally released.)
13	1.04	May 2014	<ul style="list-style-type: none"> <li>Upgraded data alarms, numbers 23, 26, 55, 59, and 60. ☞ <i>Data Alarms</i> (p. 217)</li> <li>STAT masking mode may assist certain busy systems with many STAT samples. ☞ <i>STAT masking mode</i> (p. 69)</li> <li>Generation 8 server. Before upgrading to a generation 8 server, consult your Roche Diagnostics Field Service Representative or the <i>cobas® 8000 data manager Service Manual</i>. ☞ <i>Connecting a Generation 8 server</i> (p. 91)</li> </ul>
14	1.05	January 2015	<ul style="list-style-type: none"> <li>Forward instrument status mode enables the data manager to forward instrument status and test availability information to the host upon receipt from the control unit. ☞ <i>Forward instrument status mode (HL7 only)</i> (p. 69)</li> <li>Support for false bottom and non-standard tubes.</li> <li>Support for data point values in ASTM &amp; HL7 result upload messages. ☞ <i>Data points</i> (p. 323)</li> <li>Enhanced support for order messages which contain invalid test codes.</li> <li>Enhanced handling of sample container type values. ☞ <i>Sample container types</i> (p. 29)</li> <li>Empty container type values no longer default to standard cup type. ☞ <i>Sample container types</i> (p. 29)</li> <li>Upgrading from version 1.04.00 to version 1.05.00 (p. 325)</li> </ul>

**Table 1**

Revision history

- ☞ For guidance about changes to the interface, see:  
*Upgrading from version 1.03.xx to version 1.04.00* (p. 324)  
*Upgrading from version 1.04.00 to version 1.05.00* (p. 325)

#### Check the changes to the host interface before performing the upgrade

- Before you upgrade from an earlier version, check everything in the list of differences to the previous versions. Make sure that the host can correctly read the messages from, and construct messages for, the *data manager*.



CAUTION

## Editor's note

Every effort has been made to ensure that the information contained in this manual is accurate at the time of printing.

Roche Diagnostics International Ltd. reserves the right to make any further required changes to software without prior notice. Such changes may not immediately be reflected in this document.

*Intended use* This document is intended for the users of cobas® 8000 data manager application, 1.05.

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*Feedback* Every effort has been made to ensure that this guide fulfils its intended purpose as mentioned above. All feedback on any aspect of this guide is welcome and will be considered during updates. Please contact your Roche representative, should you have any such feedback.



Complies with the IVD Directive 98/79/EC.

## Contact addresses

*Manufacturer*



Roche Diagnostics GmbH Sandhofer Strasse 116  
68305 Mannheim  
Germany  
Made in Switzerland

*US Distribution*

Roche Diagnostics Corporation  
9115 Hague Road  
PO Box 50457  
Indianapolis, IN 46250-0457  
USA

# Table of contents

Revision history	2	<b>5 Physical layer specifications</b>	
Editor's note	4	Text encodings	89
Contact addresses	4	Host communication settings and cables	90
Table of contents	5		
Using this manual	7		
Conventions used in this manual	7		
Safety information classification	9		
Safety information	10		
<b>Introduction</b>			
<b>1 Overview</b>		<b>ASTM reference</b>	
Purpose and scope	17	Background to the ASTM protocol	99
Who this manual is for	18	Communication processing layers	100
Content	19	ASTM lower layer	101
		ASTM syntax	103
		Checksum calculation / message frame	106
<b>2 System architecture</b>		<b>6 ASTM protocol (LIS2 - A2)</b>	
Overview	23	Record levels	111
LIS communications	25	Messages used in host communication	112
Sample types	26	Record description	115
Processing samples	27	Message Header Record	117
Repeat, rerun, and reflex tests	31	Patient Information Record	119
		Order Record	120
		Comment Record (following Order Record)	125
		Result Record	126
		Comment Record (following Result Record)	132
		Query Record (Request Information Record)	134
		Photometric Calibration Result M(PCR)	138
		ISE Calibration Result Record - M(ICR)	139
		E-module (immunology) Calibration Result	
		Record - M(ECR)	141
		Message Termination Record	143
<b>Interface description</b>			
<b>3 Sample Processing</b>		<b>7 ASTM text content (LIS2 - A2)</b>	
Batch and realtime processing	37	Record levels	111
Identifying samples on the instrument	41	Messages used in host communication	112
Returning results to the host	42	Record description	115
Communication types	44	Message Header Record	117
Message flow batch download from host	52	Patient Information Record	119
Message flow for TS Inquiry from instrument / data manager	54	Order Record	120
Message flow for batch sample, upload by sample	56	Comment Record (following Order Record)	125
		Result Record	126
		Comment Record (following Result Record)	132
		Query Record (Request Information Record)	134
		Photometric Calibration Result M(PCR)	138
		ISE Calibration Result Record - M(ICR)	139
		E-module (immunology) Calibration Result	
		Record - M(ECR)	141
		Message Termination Record	143
<b>4 Host Communication Settings</b>		<b>HL7 reference</b>	
Starting and stopping the host connection	59	<b>8 HL7 protocol</b>	
Configuring the data manager	61	HL7 protocol lower level	149
Configuring the data manager host interface options	62	Overview of HL7	150
Identifier of the analytical unit sent to host	71	Physical communication	151
Getting a trace file from the data manager	73		
Configuring the control unit	74		
Getting a trace file from the Control Unit	82		
Identifying patient samples by sequence number	85		
Chart of configuration settings	86		

<b>9 HL7 text content</b>	
HL7 messages	155
HL7 segment description	159
Message Header Segment - MSH	161
Message Acknowledgment Segment - MSA	163
Patient Identification Segment - PID	164
Specimen Segment - SPM	165
Specimen Container Detail Segment - SAC	169
Observation Request Segment - OBR	170
Timing Quantity Segment - TQ1	172
Observation Result Segment - OBX (for patient results)	173
Observation Result Segment - OBX (for QC results)	178
Observation Result Segment - OBX (for calibration results)	181
Test Code Detail Segment - TCD	189
Substance Identifier Segment - SID	190
Comment Segment - NTE	191
Query Parameter Segment - QPD (for a test selection inquiry)	193
Query Parameter Segment - QPD (for a Result Query)	195
Query Parameter Segment - QPD (for an Order Query)	197
Response Control Parameter Segment - RCP	199
Equipment Detail Segment - EQU (from host to data manager)	200
Equipment Detail Segment - EQU (from data manager to host)	201
Equipment Command Segment - ECD	203
Inventory Detail Segment - INV	204
<b>10 HL7 acknowledgment handling</b>	
HL7 acknowledgment messages	207
Messages from the <i>data manager</i>	208
Sending messages from host to the data manager	212
<b>14 Identifying patient samples by sequence number</b>	
Identifying samples	261
Identifying patient samples by sequence number	262
Important information for using sequence numbers	264
Using sample sequence numbers in ASTM	265
Using sample sequence numbers in HL7	267
<b>15 Communication examples</b>	
Example communication trace files	273
ASTM trace files	273
HL7 trace files	287
<b>16 Preparing the host communication</b>	
Differences to the MODULAR ANALYTICS	
EVO analyzer / cobas® 6000 analyzer series	309
Upgrading from version 1.03.xx to version 1.04.00	324
Upgrading from version 1.04.00 to version 1.05.00	325
<b>17 Text encoding tables</b>	
ASCII table	331
Western European characters in UTF-8	332
<b>Index</b>	
Index	339

## Appendices

<b>11 Data Alarms</b>	
The meaning of the data alarms	219
Alarms for Routine or STAT samples	226
Alarms for Control and Calibration samples	230
Alarm priorities	234
<b>12 Instrument alarms</b>	
Instrument alarms	239
<b>13 Using MODULAR PRE-ANALYTICS</b>	
Using a MODULAR PRE-ANALYTICS	255

## Using this manual

The cobas® 8000 data manager is a core component of the cobas® 8000 modular analyzer series, which supports several analytical modules. The analytical modules installed may vary from installation to installation. The functionality available may depend in some cases on which modules are currently installed.

## Conventions used in this manual

The manual uses the following symbols and conventions.

*Symbols* The following symbols draw your attention to important information:

Symbol	Meaning
	Cross reference
	Note

**Table 2** Symbols used in the manual

*Abbreviations* The following abbreviations are used:

Abbreviation	Definition
A	
ADC	apparent diffusion coefficient
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASTM	ASTM International, originally known as the American Society for Testing and Materials (ASTM), in particular the LIS2-A2 standards E1381-91 (Specification for Low-Level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems) and E1394-91 (Standard Specifications for Transferring Information Between Clinical Instruments and Computer Systems).
C	
cc	cubic centimeter
Cl	Chlorine
CLSI	Clinical and Laboratory Standards Institute (formerly NCCLS)
COI	Cut-off index
CU	control unit
D	
<i>data manager</i>	Used as a synonym for cobas® 8000 data manager.
DIL	Diluent
E	
EC	European community
e.g.	exempli gratia – for example
E.I.U.	essential information upload
EMF	electromotive force

**Table 3** Abbreviations used in the manual

Abbreviation	Definition
EP17-A	Protocols for Determination of Limits of Detection and Limits of Quantitation; Approved Guideline (NCCLS standard)
F	
FIFO	First in first out
H	
HIS	Hospital Information System
HL7	Health Level 7
I	
i.e.	id est – that is to say
IS	Internal Standard (ISE module)
ISE	ion selective electrode
K	
K	Potassium
L	
LIS	Laboratory Information System
LoB	Limit of Blank
LoD	Limit of Detection
LoQ	Limit of Quantitation
LLD	liquid level detection
N	
n/a	not applicable
Na	sodium
NB	<i>Nota bene</i> (note well)
NCCLS	National Committee for Clinical Laboratory Standards (former name for CLSI)
Q	
QC	Quality control
R	
REF	Reference solution for ISE module
S	
SD	standard deviation
SID	Sample ID
SOP	Standard operating procedure
STAT	short turn-around time
T	
TCP/IP	Transmission Control Protocol/Internet Protocol
TS	Test Selection
U	
UTF-8	8-bit Unicode Transformation Format
W	
WAM	Work Area Manager
X	

**Table 3** Abbreviations used in the manual

Abbreviation	Definition
XML	Extensible Markup Language
XSL	Extensible Stylesheet Language
XSLT	Extensible Stylesheet Language Transformation

**Table 3** Abbreviations used in the manual

## Safety information classification

Safety messages are classified according to ANSI Z535.6. The following classifications are used, according to the level of seriousness of the hazard:

The safety alert symbol by itself (without a signal word) is used to promote awareness to hazards which are generic or to direct the reader to safety information provided elsewhere in the document.

The following symbols and signal words are used for specific hazards:



**NOTICE**

### Warning

- ▶ Indicates a potentially dangerous situation which, if ignored, may lead to fatal or severe injuries.

### Caution

- ▶ Indicates a potentially dangerous situation which, if ignored, may lead to injuries and/or damage to property.

### Notice

- ▶ Indicates a message not related to personal injury.

According to ANSI Z536.6 there is an additional hazard level: DANGER. Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury. This level is not used in Roche Diagnostics Operator's Manuals. In line with the Roche Diagnostics Product Risk Management Policy, a risk of this degree or level of hazard seriousness is not accepted.

# Safety information

Pay careful attention to the following safety information.

## System safety

Failure to observe the following safety information may result in incorrect results, data corruption, and data losses.



### Incorrect or corrupt data resulting from incorrect operation, the use of wrong components, or poor security measures



- Use only computers, monitors, printers, and accessories recommended by the manufacturer.
- Service your computer regularly (defragment the hard disk; and check for system error entries in the event display).
- Install and run a firewall and anti-virus software; keep them up-to-date. This will require third-party software.



### Incorrect or corrupt data due to unauthorized access



- ▶ Access to your data and the configuration should only be granted to authorized experts.



### Separate the *data manager* - LIS network from the laboratory network



- ▶ Separate the *data manager* - LIS network from the laboratory network and use a protected design of server software including a multi-layer defence network setup.

## Data security



### Data loss



- ▶ Back up your data at regular intervals (ideally every day).

## Maintenance



### Data loss or damage to the system due to power failure.



- ▶ Ensure regular maintenance of the uninterruptible power supply.

## Laboratory workflows



### Incorrect results due to lack of calibration and quality control



- ▶ Interrupt the analysis of patient samples if you change the reagent until the instrument has been recalibrated and quality-controlled.



### Incorrect results due to expired calibration and quality controls



- ▶ Perform regular quality controls and calibrations.



## Third-party software



### Incorrect results due to incorrect entry

- ▶ Ensure that manually entered data is correct.

### Danger of samples being mixed up due to use of tubes not labeled with barcodes

- ▶ If possible, always use primary and secondary tubes labeled with barcodes in connection with barcode readers, and instruct the laboratory staff as to correct handling.

### Danger of samples being mixed up due to incorrect assignment of the barcode to the tube

- ▶ Ensure that assignment of the barcode to the tube is correct during aliquoting. Use the SOP function to alert the laboratory staff to this obligation. For details of the SOP function, see the *cobas® 8000 data manager Operator's Manual* and the *cobas® 8000 modular analyzer series Operator's Manual*.

### Incorrect results due to lack of knowledge of the Standard Operating Procedures

- ▶ Use the SOP function of the system to give laboratory staff access to written instructions (SOP) while they work. For details of the SOP function, see the *cobas® 8000 data manager Operator's Manual* and the *cobas® 8000 modular analyzer series Operator's Manual*.

### Incorrect results due to incomplete patient data

- ▶ Patient results can only be correctly validated if all relevant patient data is stored in the system. In case of incomplete transmission of patient data through the HIS Hospital Information System, tests may have to be repeated.

### Unreliable validation due to unauthorized changes to the validation and calculation rules.

- ▶ The manufacturer shall not be liable for any consequences whatsoever resulting from subsequent, unauthorized modifications to accepted medical validation and calculation rules included in the system upon customer request.

### Malfunctions and incorrect results due to third-party software

- ▶ The installation of third-party software that has not been approved by Roche Diagnostics may lead to malfunctions. Do not install any unapproved software.



# **Introduction**

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1	<i>Overview</i> .....	15
2	<i>System architecture</i> .....	21



# Overview

This section gives a basic overview of the purpose and scope of this manual.

## In this chapter

Chapter

1

Purpose and scope .....	17
Who this manual is for .....	18
Content .....	19



## Purpose and scope

This document details the specifications for the **cobas® 8000 data manager** host interface. This interface regulates data transmissions between the *data manager* and the hospital and laboratory information system.

Therefore, this manual gives programmers a description of the basic operational features of the *data manager*, in order to enable them to connect to a host system, such as Laboratory Information Systems, Hospital Information Systems or Work Area Manager.

Questions concerning this document should be referred to Technical Support. Please refer to the *cobas® 8000 data manager Operator's Manual* for more detailed information on the use of **cobas® 8000 data manager**.

The main part of this document consists of a series of tables that show the information needed to successfully interface to the system. The basic concept of data transfer in this interface is the exchange of data and control frames between the host system and the analyzer.

This manual is written for:

- Developers of Hospital Information Systems / Laboratory Information Systems (HIS/LIS), who need to create programs that connect to the **cobas® 8000 data manager**.
- Authorized Roche Diagnostics personnel who need to configure or troubleshoot the host communications of the **cobas® 8000 data manager**.

## Content

This document gives the reader a basic understanding of the system operation with a host, and describes the following:

- Basic System Architecture
- Sample Processing
- Sample Types
- Rerun Modes
- Test Selections
- Operational Modes
- Types of messages sent and received
- ASTM and HL7 protocol support



# System architecture

## *Overview of the cobas® 8000 data manager and cobas® 8000 modular analyzer series instrument*

This chapter describes the basic system architecture of the cobas® 8000 modular analyzer series, and the role that cobas® 8000 data manager plays in it. This includes how samples are identified and handled, and how test information is supplied by the host.

### In this chapter

### Chapter 2

Overview .....	23
System overview .....	23
Overview of modules.....	24
LIS communications .....	25
Sample types.....	26
Processing samples.....	27
Introducing sample tubes and racks .....	27
Barcodes .....	28
Test selection.....	29
Sample container types.....	29
Repeat, rerun, and reflex tests.....	31
Repeat test .....	31
Rerun test .....	31
Reflex test .....	31
Request for rerun or reflex tests .....	31
Handling multiple test results.....	32



## Overview

The cobas® 8000 data manager is an integral part of the cobas® 8000 modular analyzer series. The cobas® 8000 modular analyzer series performs medical tests on sample material taken from patients. It measures the concentration of certain compounds or other substances in the samples. It sends the results of the medical tests back to the host, which could be a Laboratory Information System (LIS) or a Work Area Manager (WAM).

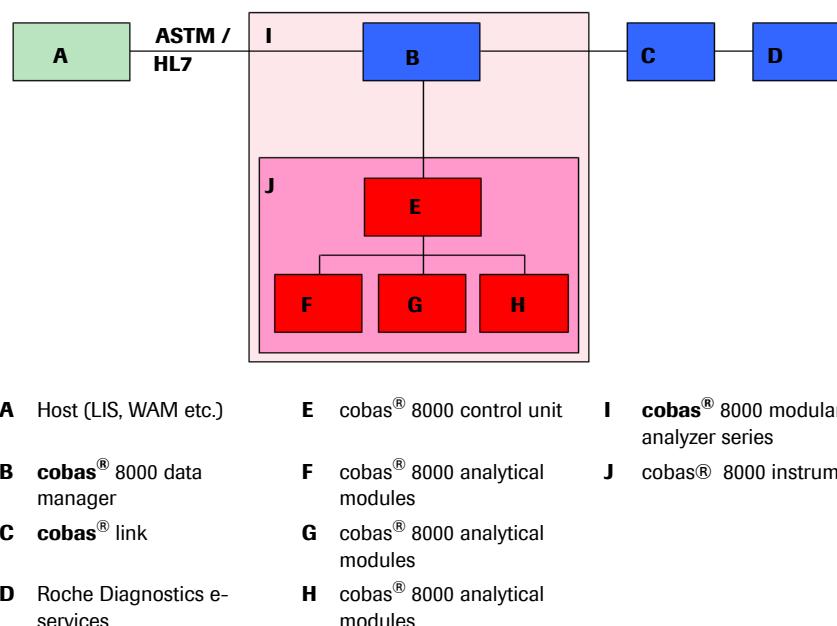
This section provides an overview of the basic architecture of the cobas® 8000 modular analyzer series, and discusses some specialized items of interest pertaining to the analytical system.

## System overview

The cobas® 8000 modular analyzer series consists of two types of devices:

- The *data manager*. This is software which runs on a PC. It allows operators to view and edit the results of analysis, allows remote operator interaction with the system, including configuration. The *data manager* also handles communication with an external host system such as a LIS.
- An instrument that consists of:
  - Several analytical modules, that physically measure the samples using various reagents
  - A *control unit*. This is software, running on a PC, that controls the operation of the analytical modules. This has a graphical user interface that an operator or administrator can use to control and configure the instrument and its modules.

The *data manager* is also connected to Roche Diagnostics' e-services via cobas® link.



**Figure 2-1** Overview of the cobas® 8000 data manager system

## Overview of modules

The **cobas® 8000** modular analyzer series supports several types of analyzer modules, as outlined below. Each installation may contain one, none, or several of each type of module.

*ISE module* The ISE module, or Ion-Sensitive-Diode module, performs clinical chemistry tests for analyzing levels of the electrolytes Na, Cl, and K.

*C-module* The c-modules, c502, c701, and c702, perform clinical chemistry tests using photometry.

*E-module* The e-modules, e602 or Elecsys, perform immunological tests.

## LIS communications

The LIS and *data manager* can communicate by

- HL7 over a TCP/IP network connection
- ASTM over a TCP/IP network connection
- ASTM over a serial connection

*Details*  For details of how to select a connection, see *Starting and stopping the host connection* (p. 59).

 For details of the connections, see *Host communication settings and cables* (p. 90).

 For details of the HL7 protocol used, see *HL7 protocol* (p. 147) and *HL7 text content* (p. 153).

 For details of the ASTM protocol used, see *ASTM protocol (LIS2 - A2)* (p. 97) and *ASTM text content (LIS2 - A2)* (p. 109).

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### **HL7 over a network connection gives best performance**

Using HL7 over a network connection gives the best performance. Especially for existing ASTM host implementations, an ASTM connection over a network also gives an acceptable outcome.

However, the serial interface via ASTM is performance-limited and is not recommended for the cobas® 8000 modular analyzer series and high-throughput systems. Even though smaller instruments will still work via ASTM over serial connection, this might lead to potential conflicts of query / request download and result upload.

Network connection is required for systems with more than two c701 or c702 (including ISE) modules, where the number of samples per hour and tests per sample is very high.

---

*Text encoding* Messages are sent using UTF-8 encoding.

## Sample types

The cobas® 8000 data manager supports the use of several types of samples, including serum, urine, cerebrospinal fluid, and supernatant. For full information on supported sample types, see the *cobas® 8000 data manager Operator's Manual* and the *cobas® 8000 modular analyzer series Operator's Manual*.

Where required, the sample type is passed in the communication between the HIS/LIS and *data manager*.

## Processing samples

Sample material is supplied to the instrument in “sample containers”.

**Sample cups, tubes and racks** Sample containers are available in different shapes: tubes or cups. These are mounted, if necessary, on sample tubes of a standard 16mm size. The sample tubes are placed in racks, which hold up to 5 sample tubes each. These racks allow the instrument to automate the movement and processing of the samples. The instrument identifies the cup or container type from the rack ID.

False bottom and non-standard tubes are also supported.

Rack ranges for all types of tubes are defined on the Control Unit. For more information, see the Rack assignment section of the *cobas® 8000 modular analyzer series Operator's Manual*.

If necessary, the sample's actual container or cup size is indicated in communications between the host and the *data manager*.

 For more information, see *Sample container types* (p. 29)

**Dilution** As part of the pre-analytical process, some samples are diluted before being loaded onto the instrument, or are automatically diluted by the instrument before testing. Depending on the tests and the results, some samples are diluted before the tests are repeated. Where necessary, the sample's dilution factor is passed in communications between the LIS and the *data manager*.

## Introducing sample tubes and racks

The sample tubes are placed in 5-position racks, which laboratory staff place in the instrument.

There are different kinds of color-coded racks for routine samples, STAT (Short Turn Around Time) samples, Quality Control samples, and so on. Complete information on the types of tubes used, and the types of racks they are mounted in, is given in the *cobas® 8000 data manager Operator's Manual* and the *cobas® 8000 modular analyzer series Operator's Manual*.

**Routine sample racks** Routine sample tubes or cups are placed on gray barcoded racks, which are then loaded into the loader located on the side of the *cobas® 8000* instrument. This loader consists of two trays, each of which can hold up to 15 5-position racks. Each tray feeds into a buffer area of the same size. This gives a theoretical maximum of (5 tubes x 15 racks x 2 trays x 2 in the loading and waiting area =) 300 waiting tubes.

**STAT sample racks** STAT sample tubes are placed on red barcoded racks, then loaded onto the STAT port, beside the loader. These racks take a higher priority in the *cobas® 8000 modular analyzer series* instrument than the racks on the loader.

**Other sample racks** Other rack types, such as for Quality Control samples, Calibration samples, and manual rerun samples, have their own rack types, which are introduced in the same way as routine sample racks.

## Barcodes

The **cobas**® 8000 modular analyzer series reads the barcode of each sample immediately after the tube is put into the instrument. It identifies the sample from the combination of the barcode and the sample type (serum, urine etc.). Therefore if any two samples have the same sample type, they must have different barcodes, even if they are for the same patient, or they are put onto the instrument at different times.

**Barcodes** All the racks are passed one-by-one to the input buffer, which feeds them sequentially into the system. The **cobas**® 8000 modular analyzer series instrument reads the sample's barcode, which contains an alphanumeric string up to 22-characters long. The instrument, host and *data manager* use the barcode string as a unique identifier for the sample, called the sample ID (SID).

**Missing barcodes** By default, if the **cobas**® 8000 modular analyzer series instrument cannot read a sample's barcode, it generates an error. The operator of the **cobas**® 8000 modular analyzer series instrument can manually enter information identifying the sample and its sample ID. For more information on this, see the *cobas® 8000 modular analyzer series Operator's Manual*.

**Sequence numbers** On request, Roche Diagnostics service personnel can reconfigure the **cobas**® 8000 modular analyzer series instrument to give each sample a sequential number instead of a barcode. By default the first sample is then 1, the next 2, and so on up to 60,000. The number of the first sample is configurable.

- ⓘ For more information on how to use this function, see *Identifying patient samples by sequence number* (p. 259).

**MODULAR PRE-ANALYTICS** If a **MODULAR PRE-ANALYTICS** is used, the samples may lack barcodes. In this situation, the **cobas**® 8000 modular analyzer series instrument identifies the sample by its position on the rack, and the rack identifier. The host needs to identify the sample from this information, and send the Test Selection, including the rack ID and the sample's position on the rack, as well as the sample ID.

- ⓘ For more information on how to use this function, see *Using a MODULAR PRE-ANALYTICS* (p. 255).
- ⓘ To configure the **cobas**® 8000 modular analyzer series instrument to process samples coming from a **cobas**® 8000 modular analyzer series instrument without barcodes, enable the option on the Control Unit in **Utility > System > Data Manager > Test Selection Inquiry Settings > Test Selection Ask in Barcode Read Error**. This is described in *Test Selection Ask in Barcode Read Error* (p. 79).

## Test selection

The instructions telling the cobas® 8000 modular analyzer series instrument which test to perform on each sample (the Test Selection) can come from several sources, depending on the configuration of the system:

- The host (LIS or WAM), prior to the sample being loaded onto the cobas® 8000 modular analyzer series instrument. (“Batch Download.”)
- The host, in response to a query (Test Selection Information Inquiry) initiated by the cobas® 8000 modular analyzer series instrument via *data manager*. (“Realtime Download.”)
- The cobas® 8000 modular analyzer series instrument, as a result of a manually-programmed Test Selection on the cobas® 8000 modular analyzer series instrument by the operator. The test results can be uploaded to the host.
- The cobas® 8000 modular analyzer series instrument, as a result of a manually-programmed Test Selection on *data manager* by the operator. The test results can be uploaded to the host.

As users can reconfigure the cobas® 8000 modular analyzer series instrument and *data manager*, the host must be able to send test selections in response to a query, and handle results from tests that it has not ordered. Also, it is best to allow a “Batch Download” host configuration, which downloads test selections without waiting for a query.

 For more details about the order of messages, see *Sample Processing* (p. 35).

## Sample container types

Both the host and the Control Unit send values which tell the *data manager* the type of container used by a sample in an order. These values are sent in fields SPM-27 and QPD-11 (HL7), or fields O-4.6 and Q-3.9 (ASTM). Users can also define these values on the *data manager* itself (if, for example, the host is unavailable).

The *data manager* handles these values as follows.

*When received from the host* The *data manager* stores values received from the host in test selection information messages, and forwards them to the Control Unit. The Control Unit will reject an order if the container type value sent from the *data manager* is different to the container type of the corresponding sample on the instrument.



### If a rack contains transferred samples

The RFM module of the cobas® 8100 automated workflow series transfers samples from rack to rack.

The Control Unit accepts any container type values from the host for racks that contain transferred samples. However, if the *data manager* sends no container type value for a rack that contains transferred samples, the Control Unit rejects the order.



### If an order contains no container type value

The Control Unit accepts orders which contain no container type value, unless the order is for a rack which contains transferred samples.

Note that, if the host sends no container type value to *data manager* 1.05, then *data manager* 1.05 sends no value to the Control Unit. In previous versions of *data manager*, empty container type values defaulted to the standard cup type.

*When received from the Control Unit* The *data manager* forwards values received in test selection inquiry messages from the Control Unit to the host. However, the *data manager* does not store these values.

The *data manager* ignores values received in test selection information messages and result report messages from the Control Unit, unless they correspond with the values received from the host.

## Repeat, rerun, and reflex tests

In many cases, the results of a test need to be checked, and in some cases this check leads to an order of further tests. The cobas® 8000 data manager can be configured to order such add-on tests automatically. Also, medical staff operating the Control Unit or the *data manager* might order add-on tests manually. The LIS can also order any of these kinds of tests, if required.

- For details of how to set repeat, rerun or reflex tests, see the *cobas® 8000 modular analyzer series Operator's Manual*.

### Repeat test

Test measurement is done again under the same conditions. A test result will be verified by repetition of the test by the same methods or a reference method. This may be done on the cobas® 8000 modular analyzer series instrument or on the *data manager* manually or automatically.

### Rerun test

Test measurement is done again under different conditions. Typically a dilution factor is changed automatically or manually. This may be ordered by the instrument or *data manager* automatically.

### Reflex test

Request to perform additional test(s), based on sample test results by customer-defined algorithms. The *data manager* may be configured to order the extra tests automatically. Also the LIS/HIS can send orders for Reflex tests via *data manager* to the cobas® 8000 modular analyzer series instrument, if corresponding rules are programmed at the LIS.



#### Use reflex rules either only on the *data manager* or only on the host

- Reflex rules should only be entered either at the *data manager* or at the host. Do not use Reflex Rules on both the *data manager* and the host. Using reflex rules on both may cause abnormal instrument behavior.

### Request for rerun or reflex tests

The Control Unit can be configured so that after it completes a test, it automatically sends an inquiry to *data manager*, asking for rerun tests.

#### ► To enable requests for rerun or reflex tests

- 1 On the *Start* page, set automatic rerun for routine and STAT samples to “Yes”.
- 2 Navigate to **Utilities > Application**, and make sure that for the relevant test the checkbox *Automatic Rerun* is selected.

- 3** Navigate to Utility > System > Data Manager > Test Selection Inquiry Settings, and make sure Automatic Rerun Test Selection is selected.



## Handling multiple test results

Results for the original test and the rerun are reported separately to the LIS. The database on the *data manager* stores all the results for a test, including the original result and any results for a repeated or rerun test.

# Interface description

---

3	<i>Sample Processing</i> .....	35
4	<i>Host Communication Settings</i> .....	57
5	<i>Physical layer specifications</i> .....	87



# Sample Processing

## *Samples and message flow*

This chapter explains how samples are processed in the cobas® 8000 data manager, and shows the message flow between the cobas® 8000 modular analyzer series instrument, cobas® 8000 data manager and the host.

### In this chapter

### Chapter **3**

Batch and realtime processing .....	37
Batch and realtime and the data manager .....	37
Batch and realtime messages .....	37
Batch and realtime modes .....	37
Multiple test selection messages .....	38
Re-using sample IDs and sample lifetimes .....	39
Sample ID used with different sample types .....	39
Identifying samples on the instrument .....	41
Returning results to the host .....	42
Passing results automatically to the host .....	42
System time and result handling .....	42
EP17-A and the result abnormal flags .....	42
Communication types .....	44
Communication and message types .....	44
List of messages .....	44
Communication scenarios .....	44
Details of message types .....	46
Query message .....	47
Sending test selections .....	47
Sending patient test results .....	47
Result query .....	47
Order query .....	48
Order and result queries with limited sample lifetime .....	50
Sending quality control results .....	51
Calibration Data Results .....	51
Masking .....	51

Instrument status and test availability.....	51
Message flow batch download from host.....	52
Message flow for TS Inquiry from instrument / data manager.....	54
Message flow for batch sample, upload by sample.....	56

## Batch and realtime processing

This section gives an overview of the message flow between the cobas® 8000 modular analyzer series instrument, *data manager* and the host, when they send each other information about samples.

### Batch and realtime and the data manager

For each sample, the *data manager* must have a list of tests to do on the sample. This is a “Test selection”.

The *data manager* can send a message to the host to ask for a test selection for a sample. This message is called a “test selection inquiry” or a “query message”.

### Batch and realtime messages

*Batch message* The host can, at any time, send an unsolicited test selection message for a sample, even if the *data manager* has not previously sent a query message for that sample. An unsolicited test selection message is called a *Batch message*, *Batch order*, *Batch test selection*, or *Batch download*.

*Realtime message* When a host sends a test selection in response to a query message, this message is called a *Realtime message*, *Realtime order*, *Realtime test selection* or *Realtime download*.

### Batch and realtime modes

Host systems handle messages test selection downloads in one of three ways:

- *Batch mode*: all test selection downloads are batch downloads.
- *Realtime mode*: and all test selection downloads are realtime downloads.
- *Mixed mode*: the host can send either batch or realtime test selection downloads.

*Batch mode* A host in batch mode does not respond to test selection queries, and all test selections are batch downloads. The host has to download the test selections for the samples before they arrive at the analyzer’s Barcode Reader. This configuration is not recommended if auto-rerun or reflex tests are needed.

*Realtime mode* A host in realtime mode always waits for a test selection query. All test selection download messages are a reaction to previous inquiry and have to be downloaded within a timeout. Configure the *data manager* so that it sends a test selection inquiry:

- whenever the *data manager* receives a test selection request from the cobas® 8000 modular analyzer series,
- or
- whenever an operator enters a manual test selection for a sample at the *data manager*.

However the *data manager* is configured, it always accepts batch downloads without an error message.

*Mixed mode* A host in mixed mode can either batch test selection downloads or realtime downloads in response to a test selection query.

To work with mixed mode, configure the *data manager* to send a query to the host when:

- the *data manager* receives a test selection request from the Analyzer, and
- it can not find any open test selections for the sample in its internal database.

Therefore, if the operator has previously input a manual test selection, or if the host has previously sent via batch download a test selection for that sample, then the *data manager* will not send a query to the host. In mixed mode, some test selections may be batch downloads, and some may be realtime downloads.

*Configuring the data manager for the host modes* To work in these modes, some settings have to be configured in *data manager* under **Service > Service-related configuration > Interface Options**.

 For details of setting the modes, see *Inquiring for the test selections* (p. 65).

The **cobas® 8000** modular analyzer series instrument also has a similar configuration. It can also be independently configured so that it always sends a query to *data manager*, whether or not there is any information on the sample in its internal database.

 For information on this setting, see *Test Selection Inquire Always* (p. 78).

No parameter is passed to the host to indicate which mode *data manager* and **cobas® 8000** modular analyzer series instrument are configured in. Also, it is possible for operators with configuration privileges to reconfigure *data manager* and the instruments to use a different mode. If the mixed mode is requested, the host must support in parallel batch and realtime downloads.

 Detailed examples of the order of messages in specific cases is given in *Message flow batch download from host* (p. 52), and *Message flow for TS Inquiry from instrument / data manager* (p. 54).

#### Multiple test selection messages

In realtime mode or the mixed mode, it is possible that the *data manager* will have test selections for an active sample ID in its internal database, and then receive further test selections from the host for the same sample ID. In this situation, the *data manager* adds the new test selections from the host to those in its internal database. The patient data is overwritten, if patient data is sent with the new test selections.

If the *data manager* has no test selections for an active sample ID in its internal database, and receives none from the host in the specified time or receives an empty test selection, then the *data manager* sends an empty test selection to the **cobas® 8000** modular analyzer series. This informs the **cobas® 8000** modular analyzer series about this status.

If the sample's lifetime has expired, it is no longer active, and you can reuse the sample ID without combining the two.

 For configuring sample lifetimes, see the *cobas® 8000 data manager Operator's Manual*.

## Re-using sample IDs and sample lifetimes

You can set a “sample lifetime” in **System Configuration > System configuration > Cleanup options**. Specify the sample lifetime in hours.

*Sample lifetime = 0* If the samples have an indefinite lifetime (sample lifetime = 0), then *data manager* stores each sample ID until the database is cleared. In this situation, you can only use a sample ID once until the database is cleared again. If the host sends a test selection for an existing sample ID, the *data manager* adds the tests to the existing sample, and overwrites the previous patient data with the new patient data.

*Sample lifetime > 0* If the samples have a limited lifetime, you can reuse a sample ID after it has expired. The old sample ID is no longer active, and the tests, results and patient data are separate.

- ☞ For configuring sample lifetimes, see the *cobas® 8000 data manager Operator's Manual*.
- ☞ For clearing the database, see the *cobas® 8000 data manager Service Manual*.

### If using sample IDs with limited lifetimes, identify samples also by timestamp.

- If your sample IDs have a limited lifetime, then there may be several samples in the *data manager* database with the same sample ID. In an answer to an order or result query, the test selection upload will include the test orders or results for all samples with that ID, including expired samples.
  - The orders for expired samples might be confused with orders or results for current samples. Avoid this, and identify samples, orders and results by timestamp, as well as by ID.
- 
- ☞ For using sample ID lifetimes with result and order queries, see *Order and result queries with limited sample lifetime* (p. 50).



## Sample ID used with different sample types

The *data manager* treats two samples with the same sample ID, but different sample types (or “rack types”), as different samples. Therefore it treats the following as two separate samples:

Sample ID	Sample type (Rack type)
101234	S1
101234	S2

**Table 3-1** Two samples with the same sample ID but different sample types

This sample, with rack type S1:

```
MSH|^~\&|c8k||host||20121020091052||TSREQ|15161||2.5||||ER||UNICODE UT
F-8|
QPD|TSREQ|15161|321070||50094|2||||S1|SC|R1|R|
RCP|I|1|R|
```

is treated as a different sample from this one, with rack type S2:

```
MSH|^~\&|c8k||host||20121020091052||TSREQ|15161||2.5||||ER||UNICODE UT
F-8|
QPD|TSREQ|15161|321070||50650|2||||S2|SC|R1|R|
RCP|I|1|R|
```



**CAUTION**

#### Always give rack types if using sample lifetime

- ▶ If you set sample lifetime to a number greater than zero, always send the rack type (“specimen type” or “sample type”) with an order or result query. Otherwise, the *data manager* does not reply.

## Identifying samples on the instrument

Samples are placed on the loader, either in 2 trays each with up to 15 5-position racks, or inserted into the STAT port. Each rack is passed on to the input buffer, which consists of two trays. The trays feed racks onto the system sequentially until they are empty.

**Barcodes and sample IDs** By default, the cobas® 8000 modular analyzer series instrument reads the barcodes on the sample tubes, and uses the number on the barcode as a sample ID. The sample ID uniquely identifies the sample in the databases of the Control Unit and the *data manager*, and uniquely identifies the sample in messages to and from the host.

**Samples missing a barcode** If the sample tube's barcode is missing or unreadable, the cobas® 8000 modular analyzer series instrument generates an error, and the instrument operator gives the sample a barcode or sample ID. There is no interaction in this case with the *data manager* or the host. See the information in the *Barcode read error window* in cobas® 8000 modular analyzer series instrument, described in the *cobas® 8000 modular analyzer series Operator's Manual*.

For a general overview of barcodes and Test Selection queries, see *Processing samples* (p. 27).

One exception to this rule is when working with aliquoted samples from **MODULAR PRE-ANALYTICS**. Then the connected host needs to know the original Sample ID, and the Rack ID and position of the correspondent aliquoted sample.

For a description of how to implement a connection to a **MODULAR PRE-ANALYTICS**, see *Using a MODULAR PRE-ANALYTICS* (p. 255).

**Sequence numbers** If it is not possible to use barcodes, the cobas® 8000 modular analyzer series instrument can give each sample a number. This number increases by 1 for each sample. The host must then know the sequence of samples, and respond with the test orders.

To learn how to use this functionality, see *Identifying patient samples by sequence number* (p. 259).

## Returning results to the host

This section describes important aspects of how the *data manager* can be configured to pass test results back to the host.

### Passing results automatically to the host

The *data manager* can be configured to simply “pass through” the result information that the cobas® 8000 modular analyzer series instrument sends to it. This is called *pass-through mode*.

In this mode, *data manager* automatically validates patient results, and then passes them immediately to the host, including any flags. Otherwise, *data manager* waits for an operator to release the results before passing them up to the host. This option can be set independently for patient, quality control, and calibration results.

Calibration results do not wait for validation, but if not set to “pass-through mode”, they are not uploaded to the host. Even if calibration results are not passed to the host, they are available from the TraceDoc.

- To see how to set “pass-through mode”, see *Pass through results automatically to the host* (p. 67).

### System time and result handling

The *data manager* uploads results to the host as soon as they arrive from the instrument, and have passed any technical validation.

- If results are not being sent to host immediately after they are available, check your Result Upload Settings in the Control Unit. See *Configuring the uploading of results* (p. 80).

### EP17-A and the result abnormal flags

As well as the numerical result and any qualitative result, such as “positive” or “negative”, the *data manager* also passes “result abnormal” flags, which state whether the result is unusually high or low, or otherwise needs attention.

These flags follow the ASTM and HL7 standards, except for an enhancement for specific values defined according to the CLSI EP17-A standard.

*The EP17-A flags* The *data manager* provides three flags, *Limit of Blank*, *Limit of Detection*, and *Limit of Quantitation*, which follow the CLSI standard EP17-A. The meanings of these are given, in brief, below. Note that these values are not part of the ASTM nor the HL7 definitions for the report abnormal flags, but an enhancement provided by the *data manager*.

- For complete details of the EP17-A standards, if required, see NCCLS *Protocols for Determination of Limits of Detection and Limits of Quantitation; Approved Guideline*. NCCLS document EP17-A (ISBN 1-56238-551-8). NCCLS, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2004.

**Limit of Blank** The “limit of blank” (LoB) is the highest value we expect to see in a series of results on a sample that contains no analyte. This is calculated as the 95th percentile value from at least 60 measurements of analyte-free samples over several independent series.

**Limit of Detection** The “limit of detection” (LoD) is determined based on the limit of blank and the standard deviation of low concentration samples. The limit of detection is the lowest actual concentration at a level such that the 5th percentile of the distribution of the sample concentration measurements equals the limit of blank.

The limit of detection corresponds to the lowest analyte concentration which can be detected (value above the limit of blank with a probability of 95%).

**Limit of Quantitation** The “limit of quantitation” (LoQ) is the lowest actual concentration at which the analyte is reliably detected and at which the uncertainty of the observed test result is less than or equal to the goal set by the laboratory, or by the manufacturer of the method. Depending on the analyte and the goal, it may be equal to or higher than the limit of detection.

This provides laboratories with a more sophisticated way of defining the lowest level of meaningful quantitation of an analyte, in the case of analytes for which the simple limit of detection measurement is inadequate for any reason.

**Configuring the EP17-A flags** The EP17-A limits for each analyte are configurable in the *data manager*. For details, see the *cobas® 8000 Operators Manual*.

- For details of the flags passed to the host in ASTM, see *Result Record* (p. 126).
- For details of the flags passed to the host in HL7, see *Observation Result Segment - OBX (for patient results)* (p. 173).

## Communication types

This section discusses the different types of communications between the host and *data manager*.

### Communication and message types

This section describes the types of messages that the cobas® 8000 data manager sends to the host and receives from the host, and the types of communication those messages occur in.

#### List of messages

The *data manager* sends information to the connected host, such as a LIS or Work Area Manager (WAM), and receives information from the host.

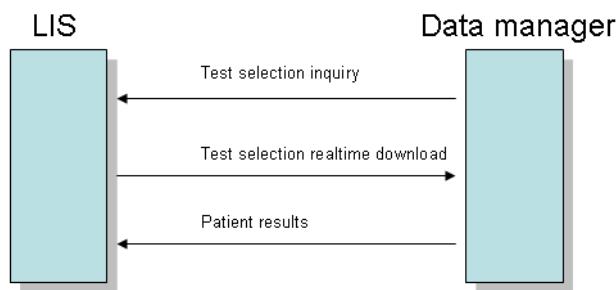
	Message type	Direction
Results	Patient results	<i>data manager</i> to host
	Patient results (realtime)	<i>data manager</i> to host in response to a result query
	Quality control results	<i>data manager</i> to host
	Calibration results	<i>data manager</i> to host
Inquiry	Test selection inquiry	<i>data manager</i> to host
Test selections	Test selections (batch)	host to <i>data manager</i>
	Test selection (realtime)	host to <i>data manager</i>
	Test selection (realtime)	<i>data manager</i> to host in response to an order query
Query	Result queries	host to <i>data manager</i>
	Order queries	host to <i>data manager</i>
	Instrument status query (only HL7)	host to <i>data manager</i>
	Test availability query (only HL7)	host to <i>data manager</i>
Masking	Command to mask or unmask tests (only HL7)	host to <i>data manager</i>
Status	Instrument status update (only HL7)	<i>data manager</i> to host
	Test availability update (only HL7)	<i>data manager</i> to host

Table 3-2 Message types

### Communication scenarios

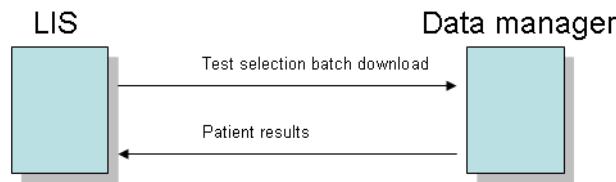
This section describes the types of communication scenarios that occur between the host and the *data manager*.

*Realtime test selection download* The host sends a realtime test selection download in response to a *data manager* test selection query. After receiving the test selection download, the *data manager* replies with the relevant patient results once they are available and released.



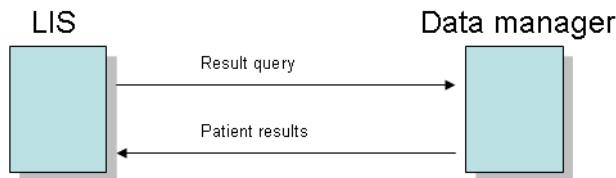
**Figure 3-1** Communication scenario for a realtime test selection download

**Batch test selection download** The host can send a batch test selection download at any time. After receiving the test selection download, the *data manager* uploads the relevant patient results once they are available and released.



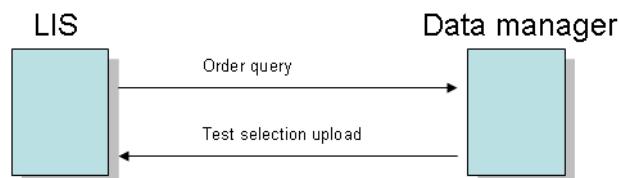
**Figure 3-2** Communication scenario for a batch test selection download

**Result query** The host can send a result query at any time. The *data manager* replies with the relevant patient results, if any. If the sample ID does not exist, or if there are no results, the *data manager* does not reply.



**Figure 3-3** Communication scenario for a result query

**Order query** The host can send an order query, the *data manager* replies with the relevant test selection describing the order.

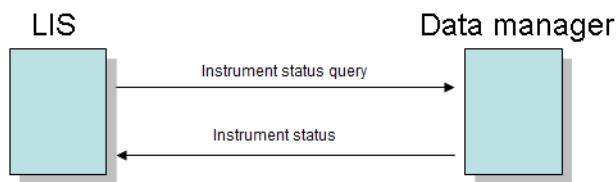


**Figure 3-4** Communication scenario for an order query

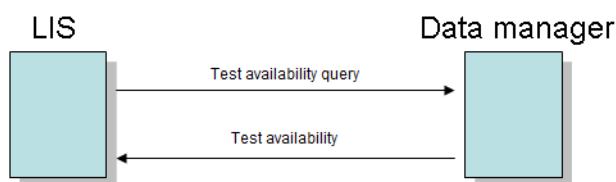
Only orders on the *data manager* are returned. The *data manager* cannot return details of orders that are only on the Control Unit. If the sample ID does not exist, the *data manager* replies, but without any test selections.

## Communication types

**Instrument status and test** The data manager can send instrument status and test availability information to the *availability messages* host. (Only supported in HL7.)

**Figure 3-5**

Communication scenario for an instrument status query

**Figure 3-6**

Communication scenario for a test availability query

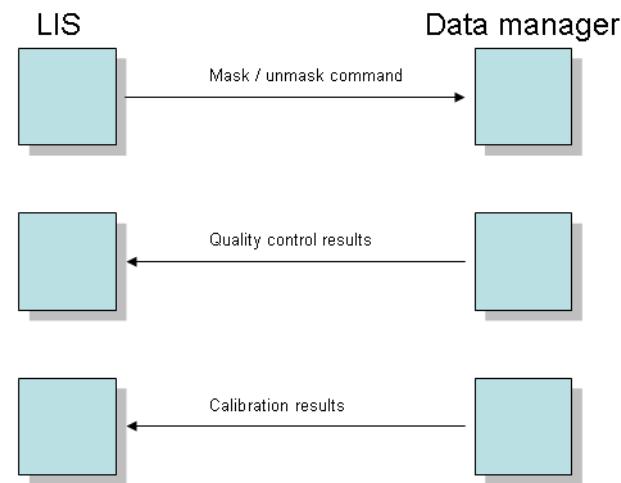
If forward instrument status mode is enabled, the data manager will automatically forward this information to the host as soon as it is received from the control unit.

If forward instrument status mode is disabled, the data manager will only send this information in response to requests from the host.

For more information, see *Forward instrument status mode (HL7 only)* (p. 69)

**Other message scenarios** The host can send a masking or unmasking request at any time, independent of other communication. (Only supported in HL7.)

The *data manager* can send quality control or calibration results independently of other messages.

**Figure 3-7**

Communication scenarios for independent messages

## Details of message types

This section describes the important types of message in a little more detail.

## Query message

The cobas® 8000 data manager sends a query message to the connected host for a sample's test selection. The host must respond with a realtime test selection download message, detailing the tests to be performed on the sample.

## Sending test selections

The host can send test selections to the *data manager* at any time (unsolicited test selections or “batch mode”). The received test selections are stored in the *data manager* database.

When the cobas® 8000 data manager's **Send query to LIS** option is selected, it may send a test selection inquiry to the host. This depends on the *data manager*'s interface settings.

( To see how to set these options, see *Inquiring for the test selections* (p. 65).

The query sent to the host contains always the rack ID and the sample's position on the rack and may also contain the sample identifier and specimen information if provided by the cobas® 8000 modular analyzer series instrument.



### You must request all three types of serum index tests together.

- The order sent by host has to request either all 3 serum index tests (Lipemic, Icteric, Hemolytic), or none. Otherwise the test is not performed, and the following alarm is displayed on the Control Unit: **994-000013 ‘Data Manager Communication Error, The orders of the serum index tests (L/H/I) are illegal’**. It is easier to create a test profile for all three tests. See the cobas® 8000 modular analyzer series Operators Manual for details on test profiles.

## Sending patient test results

For results to be sent to the host, they must first pass validation. Validation adds information, including the validator's name, used reference values and flags.

Validation can be done manually or automatically. The manual validation is done by the user on the *data manager*. Automatic validation is done in two ways: on a system level, by setting **Pass-through mode** for patient results, or on a test level by configuring the test for automatic validation.

- ( The term “pass-through mode” only refers to sending results to the host and is not related in retrieving test selection information from the host. For more information, see *Pass through results automatically to the host* (p. 67).
- ( For details of setting a test to automatic validation, see the *cobas® 8000 data manager Operator's Manual*.

The Control Unit can send raw data points to the *data manager* (for example, for troubleshooting purposes). The Control Unit sends data points only when explicitly requested to do so by the user. The values are sent in field OBX-5.

## Result query

The host can send a result query message to the cobas® 8000 data manager to inquire for all the measurement test results for a given sample. The cobas® 8000 data manager replies with a Send result message.

The host can ask for all test results for a sample, or only for all that sample's results whose status is “final”.

When the host sends a result query, the *data manager* returns the results for the most recent unique sample that matches the sample ID and rack type, if supplied.

In the chart, “S1” (serum/plasma) and “S2” (urine) are given as example rack types.

Samples in DM	Results which the <i>data manager</i> returns to a result query, for a given sample ID, and rack type:		
Sample ID lifetime status / rack type	S1	S2	(no rack type sent) <sup>(1)</sup>
No results for given sample ID	no response	no response	no response
current / S1	current / S1	no response	If sample lifetime set: • no response Otherwise: • current / S1
current / S1	current / S1	current / S2	no response
current / S2			
current / S1	expired / S1	current / S2	no response
current / S2	current / S1		
expired / S1 <sup>(2)</sup>			
current / S1	expired / S1	expired / S2	no response
current / S2	current / S1	current / S2	
expired / S1 <sup>(2)</sup>			
expired / S2 <sup>(2)</sup>			

**Table 3-3** Result query response for a specific sample ID

(1) Rack type is mandatory if sample lifetime is set. Even if not set, it is recommended to include it.

(2) “Expired” sample IDs are possible when a sample ID lifetime is set. Take care to use the timestamp to distinguish expired from current samples.



#### If using sample IDs with limited lifetimes, identify samples also by timestamp.

- ▶ If your sample IDs have a limited lifetime, then there may be several samples in the *data manager* database with the same sample ID. In an answer to a result query, the test selection upload will include the test results for all samples with that ID, including expired samples.
- ▶ The results for expired samples might be confused with results for current samples. Avoid this, and identify samples and results by timestamp, as well as by ID.

- ☞ For details of sample ID lifetimes and expired sample IDs, see *Re-using sample IDs and sample lifetimes* (p. 39).
- ☞ For details of using result queries in systems where sample ID lifetimes are set, see *Order and result queries with limited sample lifetime* (p. 50).

#### Order query

The host can send an order query message to the cobas® 8000 data manager to inquire for all the test selections, with or without results, that include a given sample. The cobas® 8000 data manager replies with a Send test selection message.

The host may ask for all test selections for a sample, or only for open orders with no results for that sample. The *data manager* sends only the orders that are available to it, at the status they have at the *data manager* (as opposed to the status or availability at the Control Unit.)

When the host sends an order query, the *data manager* returns the orders for the most recent unique sample that matches the sample ID and rack type, if supplied.

In the chart, “S1” (serum/plasma) and “S2” (urine) are given as example rack types.

Samples in DM	Test selection which the <i>data manager</i> returns to an order query, for a given sample ID and rack type:		
Sample ID lifetime status / rack type	S1	S2	(no rack type sent) <sup>(1)</sup>
No orders for given sample ID	empty test selection/ S1	empty test selection / S2	empty test selection / (no rack type)
current / S1	current / S1	no orders / S2	If sample lifetime set: <ul style="list-style-type: none"> <li>empty test selection / (no rack type)</li> </ul> Otherwise: <ul style="list-style-type: none"> <li>empty test selection / S1</li> </ul>
current / S1 current / S2	current / S1	current / S2	empty test selection / (no rack type)
current / S1 current / S2	current / S1	current / S2	empty test selection / (no rack type)
expired / S1 <sup>(2)</sup>			
current / S1 current / S2	current / S1	current / S2	empty test selection / (no rack type)
expired / S1 <sup>(2)</sup>			
expired / S2 <sup>(2)</sup>			

**Table 3-4** Order query response for a specific sample ID

(1) Rack type is mandatory if sample lifetime is set. Even if not set, it is recommended to include it.

(2) “Expired” sample IDs are possible when a sample ID lifetime is set. Take care to use the timestamp to distinguish expired from current samples.

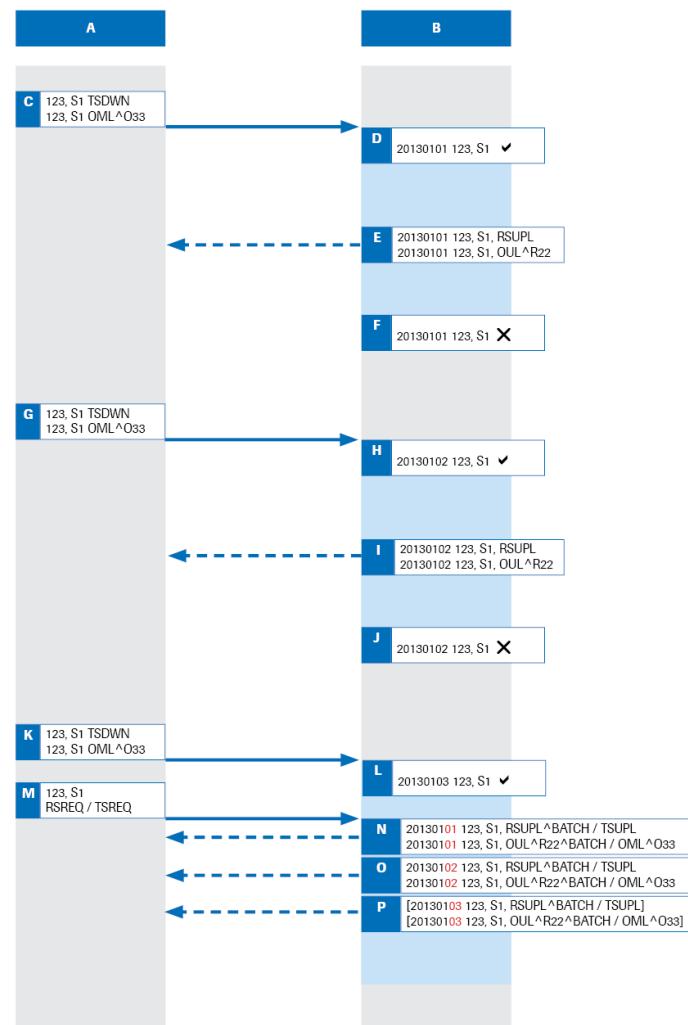


#### If using sample IDs with limited lifetimes, identify samples also by timestamp.

- ▶ If your sample IDs have a limited lifetime, then there may be several samples in the *data manager* database with the same sample ID. In an answer to an order query, the test selection upload will include the test orders for all samples with that ID, including expired samples.
  - ▶ The orders for expired samples might be confused with orders for current samples. Avoid this, and identify samples and orders by timestamp, as well as by ID.
- 
- ⓘ For details of sample ID lifetimes and expired sample IDs, see *Re-using sample IDs and sample lifetimes* (p. 39).
  - ⓘ For details of using sample IDs with limited lifetimes with order queries, see *Order and result queries with limited sample lifetime* (p. 50).

### Order and result queries with limited sample lifetime

If you use order and result queries with samples that have a limited lifetime, you must identify the samples by a sample or result timestamp. This is because the *data manager* answers a query with the order and result details of all samples, even expired samples.



- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A</b> Host: HIS, LIS<br><b>B</b> cobas® 8000 data manager<br><b>C</b> New sample ID 123, type S1: test selection download<br><b>D</b> Sample: ID 123, type S1, created with timestamp day 1.<br><b>E</b> Results uploaded for sample ID 123.<br><b>F</b> Sample 123 expires<br><b>G</b> New sample ID 123, type S1: test selection download.<br><b>H</b> Sample: ID 123, type S1, created with timestamp day 2.<br><b>I</b> Results uploaded for sample ID 123.<br><b>J</b> Sample 123 expires<br><b>K</b> New sample ID 123, type S1: test selection download.<br><b>L</b> Sample: ID 123, type S1, created with timestamp day 3.<br><b>M</b> Result query / order query downloaded.<br><b>N</b> Result upload / test selection upload for expired sample.<br><b>O</b> Result upload / test selection upload for expired sample.<br><b>P</b> Result upload / test selection upload for current sample. (Results uploaded only if available.) | <b>I</b> Results uploaded for sample ID 123.<br><b>J</b> Sample 123 expires<br><b>K</b> New sample ID 123, type S1: test selection download.<br><b>L</b> Sample: ID 123, type S1, created with timestamp day 3.<br><b>M</b> Result query / order query downloaded.<br><b>N</b> Result upload / test selection upload for expired sample.<br><b>O</b> Result upload / test selection upload for expired sample.<br><b>P</b> Result upload / test selection upload for current sample. (Results uploaded only if available.) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Figure 3-8** Result and order queries with sample lifetimes: identifying sample by timestamp

## Sending quality control results

The measured quality control results are sent from the *data manager* to the host. To send quality control results automatically to the host, enable QC pass-through mode.

 For more information, see *Pass through results automatically to the host* (p. 67).

## Calibration Data Results

The *data manager* can send unsolicited calibration data results to the connected host. The *data manager* can send photometric, ISE and Elecsys calibration result types.

## Masking

The host can send an instruction to the *data manager* to mask results from a certain test on a certain submodule. There are two different types of masking supported:

- Patient masking. If activated, only patient samples are masked. Quality control and calibration are still performed.
- Test masking, where the entire test is masked, and no patient sample, quality control or calibration tests are performed.

The host can also send an instruction to remove masking from masked tests.



Masking messages are only available in HL7.

## Instrument status and test availability

The *data manager* can send instrument status and test availability information to the host.



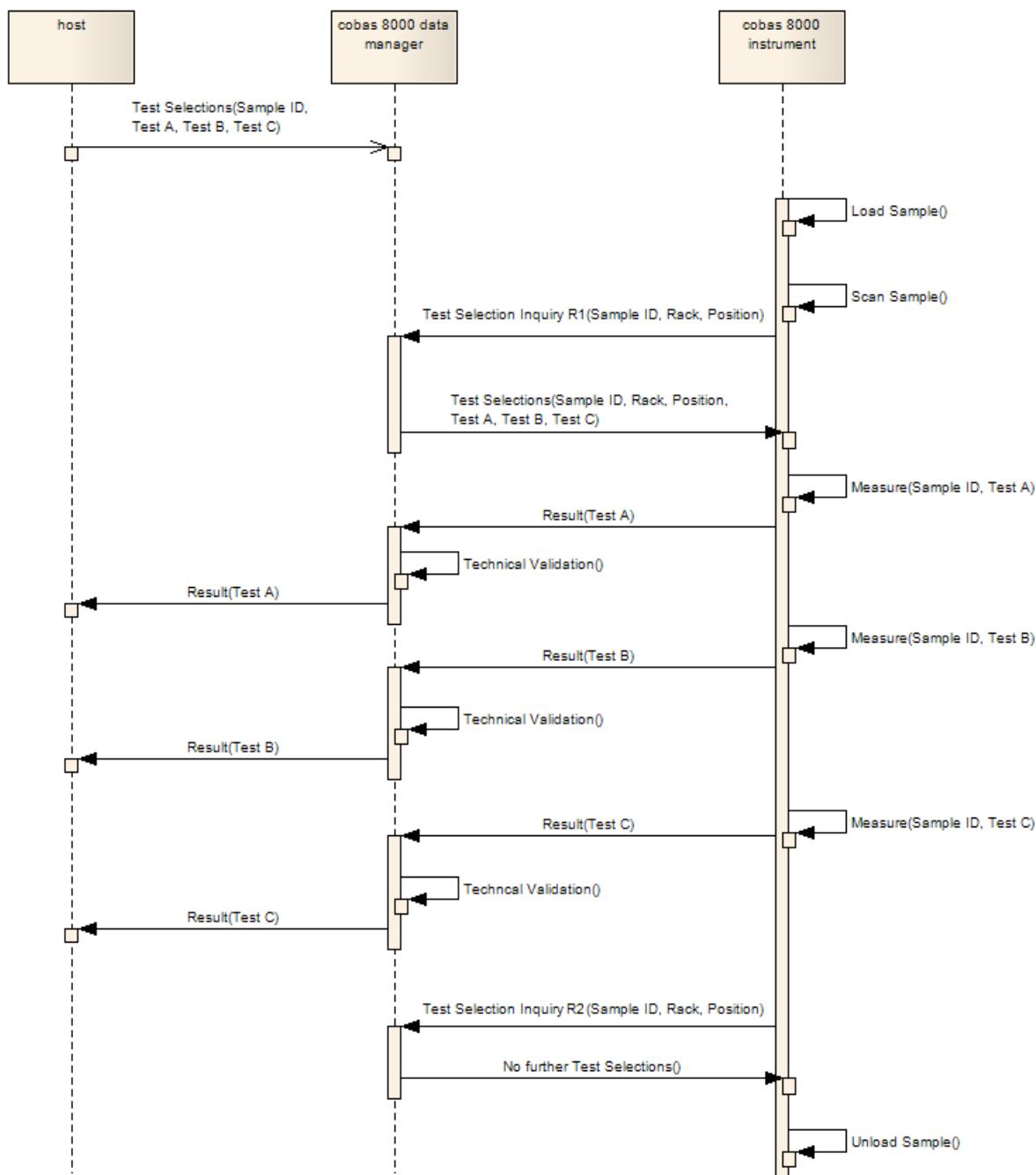
Instrument status and test availability messages are only available in HL7.



For more information, see *Forward instrument status mode (HL7 only)* (p. 69)

## Message flow batch download from host

The following diagram shows an example of message flow (from top down) for ASTM communications for a batch order of three test applications in the rerun mode.



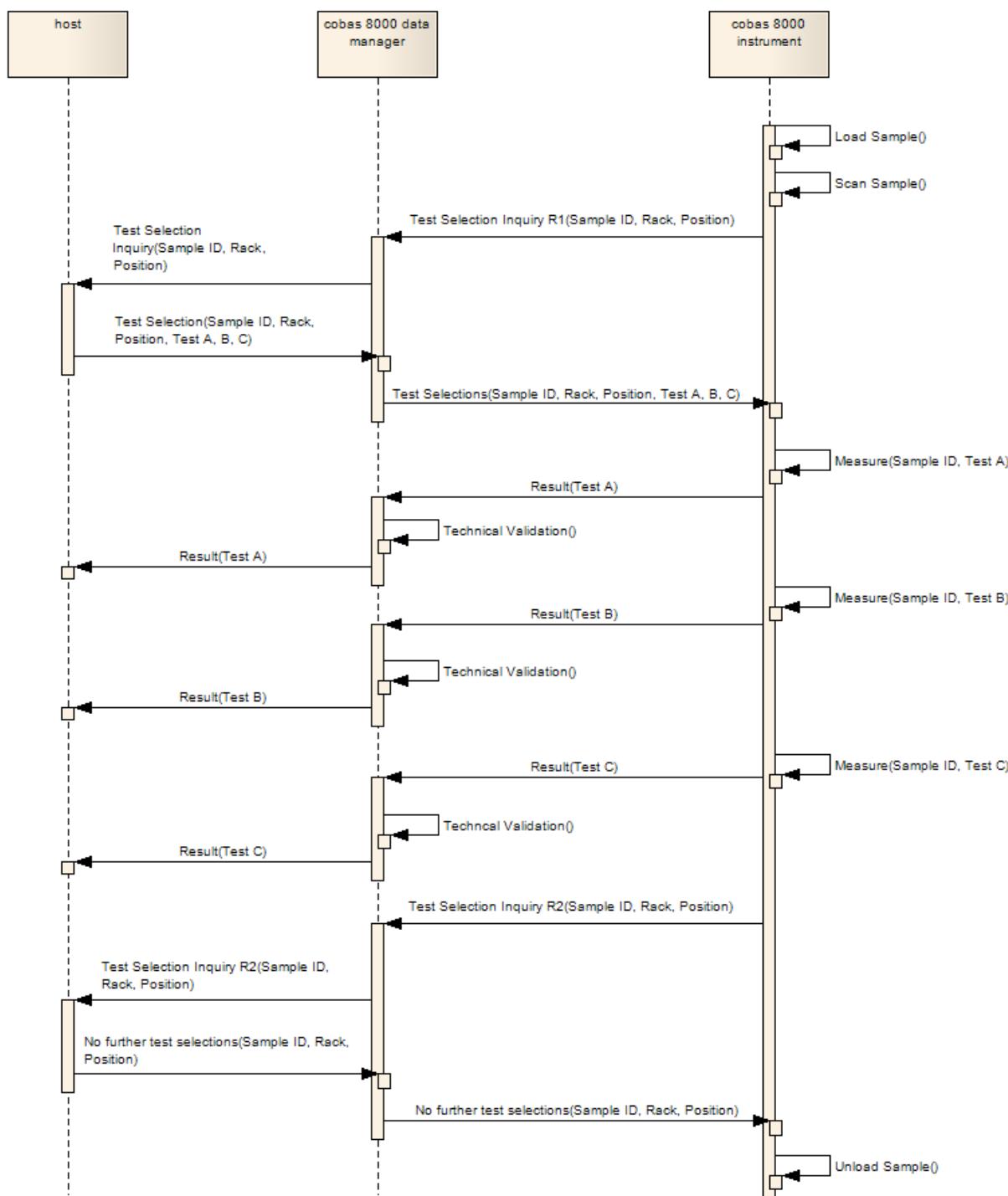
**Figure 3-9** ASTM messages for a batch order of three samples

The host sends unsolicited orders to the *data manager*, which waits for a Test Selection inquiry from the Control Unit. When the cobas® 8000 modular analyzer series has read the barcodes of the samples, it sends a Test Selection inquiry to the *data manager*, which then replies with the details of the Test Selection. The cobas® 8000 modular analyzer series performs the tests on the first sample, according to the instructions in the test Selection, and sends every measured result to the *data manager*, which performs technical validation, and then sends the results immediately to the host (assuming pass-through mode is enabled). The cobas® 8000 modular analyzer series performs the required tests on the other samples, and sends the results automatically to the *data manager*, which handles them in the same way as the first.

This workflow means that once the Control Unit is ready, the test data is sent to *data manager* without delay, and the data is returned to the host as soon as possible.

## Message flow for TS Inquiry from instrument / data manager

The following diagram shows an example of message flow for a test selection download from the host in response to a Test Selection inquiry from the Control Unit via *data manager*, in rerun mode.



**Figure 3-10** Message flow for a Test Selection Inquiry from instrument / data manager

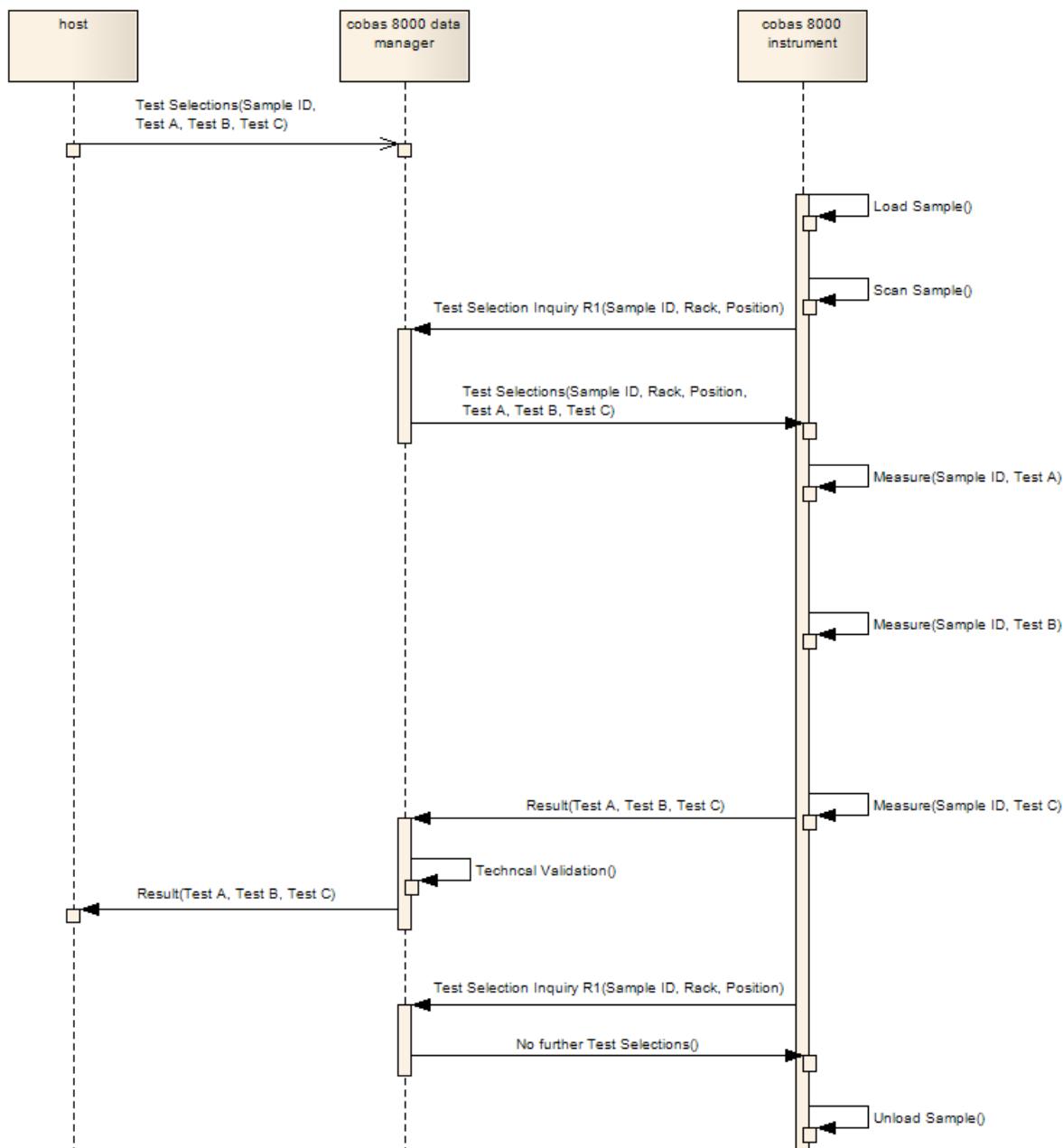
Here, the barcode reader at the instrument reads the sample ID before the Test Selection data has been downloaded to the *data manager*. Once the host replies with

the test selection data, the workflow proceeds as normal, with the results being processed and returned to the host as fast as possible. After the instrument has completed all the tests, it inquires for any rerun/reflex tests, if the instrument is in rerun/reflex mode, and the function “**Automatic Rerun Test Selection**” is activated at the Control Unit. In the example above, no rerun/reflex tests were required.

## Message flow for batch sample, upload by sample

The following diagram shows an example of message flow (from top down) for:

- the host sends a batch order of three tests
- the Control Unit is in the rerun mode
- the Control Unit uploads results by sample
- the *data manager* option **Send query to LIS** is off.



**Figure 3-11** Batch download, with upload by sample

# Host Communication Settings

*Setting up data manager and control unit for host communications*

This chapter describes how to set up *data manager* and the control unit to enable host communications.

## In this chapter

## Chapter 4

Starting and stopping the host connection .....	59
Starting and stopping the connection .....	59
Using the data manager without a host connection .....	60
Configuring the data manager.....	61
Configuring the data manager host interface options.....	62
Identifying the data manager application to the host.....	63
Setting the test selection inquiry timeout .....	64
Inquiring for the test selections.....	65
Choosing the connection protocol .....	65
Configuring HL7 acknowledgment handling .....	66
Uploading messages one-by-one (Throttle instrument).....	67
Pass through results automatically to the host .....	67
Setting logging levels .....	68
Rack and position mode.....	68
STAT masking mode.....	69
Forward instrument status mode (HL7 only) .....	69
Identifier of the analytical unit sent to host.....	71
Getting a trace file from the data manager .....	73
To get a host communication file.....	73
Other useful logs .....	73
Configuring the control unit .....	74
Enabling communication to data manager.....	74
Configuring the control unit's communications with data manager .....	76
Configuration of text settings.....	77

*Table of contents*

Test selection inquiry settings .....	78
Configuring the uploading of results .....	80
Upload by test or sample.....	80
Automatic rerun timing .....	81
Getting a trace file from the Control Unit .....	82
Identifying patient samples by sequence number.....	85
Chart of configuration settings.....	86

## Starting and stopping the host connection

This section explains how to start and stop the host connection on a configured cobas® 8000 data manager system.

### Starting and stopping the connection

Control and configuration of the host connection is done in **c8000 DM Service > Service-related configuration > Interface options**.

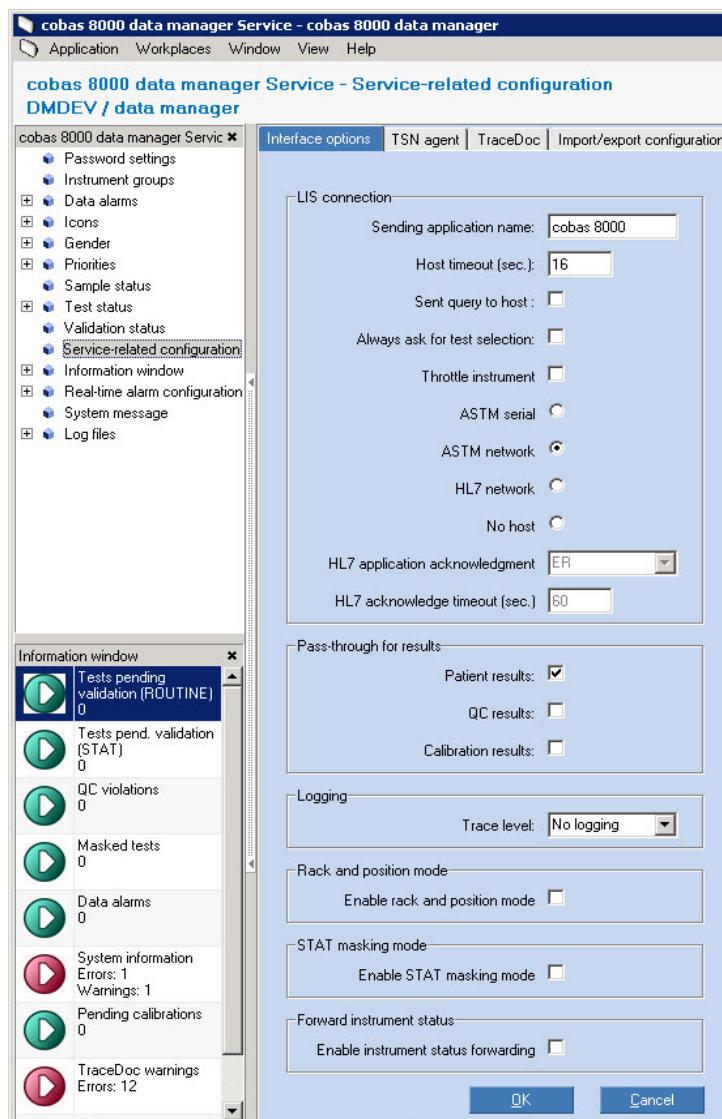


Figure 4-1 data manager: Service-related configuration > Interface options

Starting and stopping the host connection

► **To connect to a host**

- 1 In c8000 DM Service > Service-related configuration > Interface options, select your communication protocol (HL7 network, ASTM network, ASTM serial), and select **OK**. The *data manager* opens the requested connection to the host.
- 2 The *data manager* remembers this setting, and reopens the connection on restart.



► **To stop a host connection**

- 1 In c8000 DM Service > Service-related configuration > Interface options, select, **No host**, and then click **OK**. The *data manager* closes any host connection.



## Using the data manager without a host connection

You can still use the *data manager* even when you have stopped the host connection. Messages are then transferred as files. In this case, service personnel can access the messages in **C:/data/in** and **C:/data/out**. HL7 files end with the suffix **.hl7**, and ASTM files end with **.dat**.

## Configuring the data manager

This section describes the steps you need to take to set up and configure the host interface in the *data manager* and the control unit.

### ► To set up the data manager for host communications

- 1 If you can, first complete the host interface questionnaire. This collects useful information for the next steps. You can obtain the questionnaire from your Authorized Roche Diagnostics personnel or technical support.
- 2 Make sure the necessary cables and network settings for host communication are available and configured. This is described in *Physical layer specifications* (p. 87).
  - For details of how the cables and network must be configured, see *Text encodings* (p. 89) and *Host communication settings and cables* (p. 90).
- 3 Log into the *data manager* as a user with configuration privileges, who can see the **Service-related configuration** workplace.
- 4 Navigate to **c8000 DM Service > Service-related configuration > Interface options**.
- 5 Work through the sections of this manual that describe the settings in the **Interface options** tab. Make sure the settings meet your needs.
  - For details of the interface options for the *data manager*, see *Configuring the data manager host interface options* (p. 62).
- 6 Log onto the control unit, and make sure its settings meet your needs.
  - For details of how the control unit must be configured, see *Configuring the control unit* (p. 74). This continues from the previous section.
- 7 Start host communications on the *data manager* in **c8000 DM Service > Service-related configuration > Interface options**.
  - For details of starting and stopping host communications, see *Starting and stopping the host connection* (p. 59).
- 8 The *data manager* is now configured for host communications.



Configuring the data manager host interface options

## Configuring the data manager host interface options

When configuring the host interface, ensure that the settings in **c8000 DM Service > Service-related configuration > Interface options** implement the functionality that you need. You can work through all these sections in turn to prepare the *data manager* for host communications.

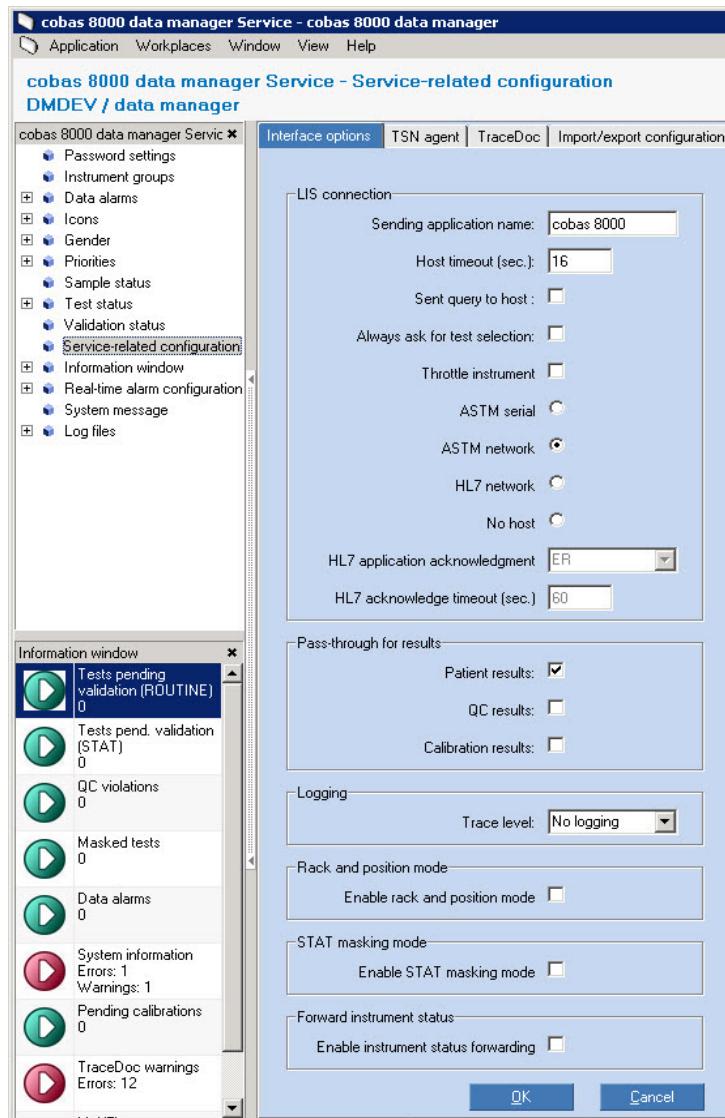


Figure 4-2 data manager: Service-related configuration > Interface options

## Identifying the data manager application to the host

In the header of every message, the *data manager* sends an identification string to the host. The user can edit this string in **c8000 DM Service > Service-related configuration > Interface options**.

*Sending application name* This field holds the name that the *data manager* uses to identify itself. In ASTM this is the Sender Name or ID, and in HL7, the Sending Application. The *data manager* sends this to the host in the header of each message, in ASTM H-5 or HL7 MSH-3. The default is `cobas 8000`.



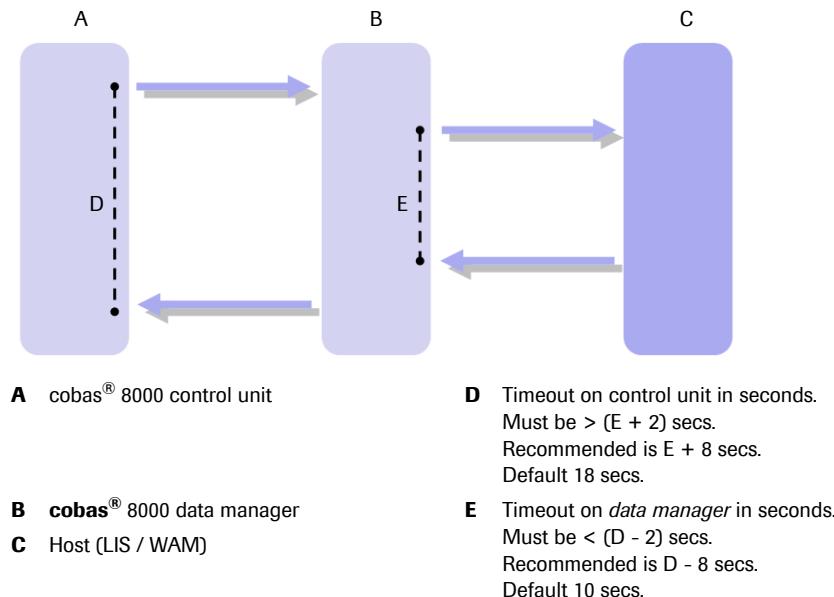
### Do not enter ASTM or HL7 reserved characters in the sending application name

- ▶ Make sure that users never enter characters that are reserved in either communication protocol.
- ▶ Reserved characters in ASTM are:
  - | Field delimiter = vertical bar [ascii 124]
  - \ Repeat delimiter = backslash [ascii 92]
  - ^ Component delimiter = caret [ascii 94]
  - & Escape character = ampersand [ascii 38]
- ▶ Reserved characters in HL7 are:
  - | Field delimiter = vertical bar [ascii 124]
  - ~ Repeat delimiter = tilde [ascii 126]
  - ^ Component (or sub-field) delimiter = caret [ascii 94]
  - \ Escape character = backslash [ascii 92]
  - & Sub-component (or sub-sub-field) delimiter = ampersand [ascii 38]

## Setting the test selection inquiry timeout

This section describes how to determine the best setting for the timeout on test selection inquiry (TSREQ) messages sent to the host. This is configurable in **c8000 DM Service > Service-related configuration > Interface options**.

**LIS Timeout** This is the timeout between *data manager* and the host, in seconds. More specifically, it is the timeout to the test selection inquiry for realtime communications and for Routine, STAT and Rerun samples.



**Figure 4-3**              Timeouts on control unit and data manager.

The default setting here on *data manager* is 10 seconds, and the timeout on the control unit is by default 18 seconds. Depending on the communication speed, the *data manager* timeout should be at least 2 seconds shorter than the control unit timeout. However, 8 seconds shorter is recommended. This gives enough time for a message to make the round-trip from the control unit to the host and back.



### Optimum response time is less than 1.5 seconds

- ▶ The host must send a test selection to *data manager* in response to a test selection inquiry on average in less than 1.5 seconds. If it takes the host longer to reply to inquiries, the performance of the system will gradually degrade.
- ▶ In addition, for optimum performance, the host must send the low-level ASTM protocol ACK control characters within 10 milliseconds.

If the *data manager*'s inquiry for a test selection times out, then *data manager* sends an empty Test Selection message to the control unit, indicating that there are no Test Selections for that sample.

## Inquiring for the test selections

This section describes how you can configure the test selection inquiry messages. This is configurable in **c8000 DM Service > Service-related configuration > Interface options**.

The options Send query to LIS and Always inquire for test selection configure the *data manager* to work with hosts in realtime, batch or mixed mode.

- ☞ For details of host in batch, realtime or mixed mode, see *Batch and realtime and the data manager* (p. 37).

The table below shows how the query and inquiry settings interact with each other.

Send query to LIS	Always Inquire	Behavior
Y	Y	The host may send unsolicited test selections, nevertheless the <i>data manager</i> always sends an inquiry message to the host. (Host in Realtime mode)
Y	N	The host may send unsolicited test selections. The <i>data manager</i> sends a query to the host: <ul style="list-style-type: none"> <li>• if it has no open test selections for the sample.</li> <li>• if the control unit queries the <i>data manager</i> for rerun tests.</li> </ul> (Host in "Mixed" mode)
N	Y	<i>Not possible</i>
N	N	Host has to send unsolicited test selections, the <i>data manager</i> never sends a query to the host. (Host in Batch mode)

**Table 4-1** Settings for test selection inquiries

**Send query to LIS** With Send query to LIS selected, when the control unit send a query to the *data manager*, then the *data manager* check its database for relevant test orders. If it finds none, it queries the host for test orders.

**Always inquire for test selection** With Always inquire for test selection selected, whenever the *data manager* receives an inquiry from the control unit, then the *data manager* always sends an inquiry to the host for tests, even if it already has test orders for that sample in its database.

Always inquire for test selection can only be enabled if Send query to LIS is also selected.

## Choosing the connection protocol

These options set the communication protocol used in messages between the host and *data manager*, and start and stop communications.

**ASTM Serial** The **ASTM Serial** option specifies serial communications over the ASTM protocol.

- ☞ For technical details of the ASTM protocol, see *ASTM protocol (LIS2 - A2)* (p. 97).
- ☞ For details of the data fields *data manager* supports over the ASTM protocol, see *ASTM text content (LIS2 - A2)* (p. 109).

**ASTM Network** The **ASTM Network** option specifies TCP/IP communications over the ASTM protocol.

- ☞ For technical details of the ASTM protocol, see *ASTM protocol (LIS2 - A2)* (p. 97).

Configuring the data manager host interface options

- ☞ For details of the data fields *data manager* supports over the ASTM protocol, see *ASTM text content (LIS2 - A2)* (p. 109).

*HL7 Network* The **HL7 Network** option specifies TCP/IP communications over the HL7 protocol.

- ☞ For technical details of the HL7 protocol, see *HL7 protocol* (p. 147).
- ☞ For details of the data fields *data manager* supports over the HL7 protocol, see *HL7 text content* (p. 153).

*No host* If the *data manager* is running without a host, select **No host**.

*Changing the communication protocol* Consult your Authorized Roche Diagnostics service personnel before changing the communication protocol.

- ☞ For details of the cables and other low-level settings required by communication protocols, see *Host communication settings and cables* (p. 90).
- ☞ For details of configuring the control unit for communications, see *Configuring the control unit* (p. 74).



#### Change the communication protocol only with the buttons

- When you change the connectivity type (Network / Serial) or protocol (ASTM/HL7) use these buttons. Do not edit lower-level configuration files.
- To change the connectivity type (Network / Serial) further configuration might be necessary. This will be set up by Authorized Roche Diagnostics service personnel.

## Configuring HL7 acknowledgment handling

The *data manager* supports a limited range of the HL7 application acknowledgment messages. For result messages sent to the host, the user can set the level of acknowledgment that the *data manager* should request from the host. These settings apply to patient, quality control and calibration results. This is configurable in **c8000 DM Service > Service-related configuration > Interface options**.

- ☞ For more details on HL7 application acknowledgment messages, see *HL7 acknowledgment handling* (p. 205).

Cod e	Meaning	Required host action
<b>AL</b>	Always	Send an acknowledgment to every message.
<b>SU</b>	Success	Send an Accept (AA) acknowledgment if the message is successfully processed, otherwise send no acknowledgment.
<b>ER</b>	Error	Send an Error (AE) acknowledgment if the message could not be processed successfully, otherwise send no acknowledgment.
<b>NE</b>	Never	Never send an acknowledgment.

*HL7 Application acknowledgment* From the **HL7 Application acknowledgment** drop-down list, choose the level of application acknowledgment that the *data manager* should request from the host.

*HL7 acknowledge timeout (secs.)* In the **HL7 acknowledge timeout (secs.)** field, enter the timeout required. This field is used only with the **AL** and **SU** options. The default is 60 seconds.

## Uploading messages one-by-one (Throttle instrument)

In production environments, navigate to **c8000 DM Service > Service-related configuration > Interface options**, and select **Throttle instrument**. Turn this off if the *data manager* is connected to the control unit but not to a host, for example if only auto-printing reports.

**Throttle instrument** tells the **cobas® 8000 data manager** to upload result report messages from the instrument one at a time. Then, if **Test selection priority mode** is selected on the instrument's control unit (mandatory), the instrument prioritizes Test Selection queries over a queue of result report messages. This means that test selection queries are not lost.

With **Throttle instrument** selected, the *data manager* uploads a result report message from the instrument, and then sends it to the host. The *data manager* then waits:

- *ASTM serial or network connection*. The *data manager* waits up to 10 seconds for the final low-level acknowledgment from the host before sending an acknowledgment to the instrument.
- *HL7 network connection with application acknowledgment set to AL or SU*. The *data manager* waits up to 10 seconds for the high-level acknowledgment from the host before sending an acknowledgment to the instrument.
- *HL7 network connection with application acknowledgment set to ER or NE*. The *data manager* sends an acknowledgment to the instrument immediately after sending the result report message to the host. If the message cannot be sent to the host, the acknowledgment is sent to the instrument at the latest after 10 seconds.

## Pass through results automatically to the host

You can configure the *data manager* to automatically validate all results, and pass them immediately to the host, including any flags. This is configurable in **c8000 DM Service > Service-related configuration > Interface options > Pass-through mode**.

Note that pass-through mode is not a by-pass mode. The *data manager* processes the data, but sends the results to the host irrespective of its processing. See below for details and exceptions.

*Patient results* If selected, all patient results are forwarded from the data manager to the host irrespective of data manager functionality, except for:

- results that have been entered manually
- results blocked by QC errors

If deselected, the *data manager* holds results back for manual validation, if the tests are so configured.

 For details on configuring validation in the *data manager*, see the *cobas® 8000 data manager Operator's Manual*.

**QC results** If the host does the QC analysis, select **Pass-through mode > QC Results**. If the *data manager* does the QC analysis, unselect it.

With the QC results checkbox selected, quality control results are forwarded to the host automatically. Then the host can do QC analysis: Westgard, Rilibäk etc. If this checkbox is not selected, the QC results are not forwarded to the host, and QC analysis is done by data manager.

For more details on the configuration of quality control analysis, see the Data Manager section of the *cobas® 8000 data manager Operator's Manual*.

**Calibration results** With the **Calibration results** checkbox selected, calibration results are forwarded to the host automatically.

For more details on the configuration of calibration settings, see the *cobas® 8000 data manager Operator's Manual*.

## Setting logging levels

You can configure what information the *data manager* logs about host communications in **c8000 DM Service > Service-related configuration > Interface options**, from the **Trace level** drop-down menu. In increasing quantity of information, the options are **No logging**, **Error**, **Warning**, **Information**, **Debug**. For troubleshooting, **Information** is recommended. In a production environment, **Error** or **No logging** is recommended. Use other settings only if requested by Roche Diagnostics technical support.

## Rack and position mode

To process samples using the rack ID and position of the tube, navigate to **c8000 DM Service > Service-related configuration > Interface options**, and enable the option **Enable rack and position mode**.

For a more detailed description of how to implement this option, and other related options, see *Handling batch test selections with strict rack and position* (p. 257), and for an example of use, see *Using a MODULAR PRE-ANALYTICS* (p. 255).

## STAT masking mode

If you are using a cobas® 8100 automated workflow series instrument, and more than 5% of your samples have STAT tests on them, navigate to **c8000 DM Service > Service-related configuration > Interface options**, and select the option **STAT masking mode**.

If you are using the cobas® 8100 automated workflow series instrument to sort samples, some of the routine samples may be upgraded to STAT samples. If there is an upgraded sample in a rack, all the samples on the rack are upgraded to STAT. In some installations, if there are many STAT samples, the routine samples may be delayed.

When you select the option **STAT masking mode**, all upgraded samples are handled as routine on the instrument. However, the *data manager* still handles upgraded samples as STAT, and the instrument still handles samples on STAT racks as STAT.

STAT Masking Mode	Priority according to Rack ID	CU query to DM + DM query to host	Host TS download / Manual order to DM	DM downloads TS to CU	Handled on Instrument	CU uploads results to DM	DM uploads results to LIS
Off	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Off	Routine	Routine	STAT	STAT	STAT	Routine	STAT
Off	STAT	STAT	Routine	Routine	STAT	STAT	Routine
Off	STAT	STAT	STAT	STAT	STAT	STAT	STAT
On	Routine	Routine	Routine	Routine	Routine	Routine	Routine
On	Routine	Routine	STAT	Routine	Routine	Routine	STAT
On	STAT	STAT	Routine	Routine	STAT	STAT	Routine
On	STAT	STAT	STAT	STAT	STAT	STAT	STAT
Notes		Identical to Rack ID		SMM Off: STAT upgrade. SMM On: No STAT upgrade	Identical to Rack ID	Identical to TS download	

**Table 4-2** STAT masking mode sample priorities (Red outline shows differences with STAT masking mode on / off)

## Forward instrument status mode (HL7 only)

The *data manager* can be told to automatically forward instrument status and test availability information to the host whenever it receives updated information from the Control Unit. The Control Unit sends this information whenever the status of the instrument changes, and whenever the masking status of a test changes.

To enable this feature, navigate to **c8000 DM Service > Service-related configuration > Interface options**, and select the check box **Enable instrument status forwarding**. (This mode is disabled by default.)



Forward instrument status mode is not supported by the ASTM protocol. If you are using the ASTM protocol, the check box will be unavailable.

When forward instrument status mode is disabled, the data manager sends instrument status and test availability information only in response to requests from the host.

The *data manager* sends instrument status and test availability information to the host in the following HL7 messages:

- Instrument status: Equipment Status Update (ESU)
- Test availability: Inventory Status (INU)

The host requests this information from the *data manager* in the following HL7 messages:

- Instrument status query: Equipment Status Update Request (ESR)
  - Test availability query: Inventory Status Update Request (INR)
- ☞ For more information on these messages, see:  
*HL7 messages* (p. 155)  
*Instrument status and test availability messages* (p. 304)

## Identifier of the analytical unit sent to host

The *data manager* holds a unique ID for each module in your cobas® 8000 modular analyzer series configuration. This ID is editable.

**Viewing and editing the ID** You can freely edit the analytical unit IDs in the *data manager* in **Workplaces > System Configuration > Instrument** > [Select instrument] > [Shortcut menu] > **Edit instrument** > [field] **ID for Host**.

Instrum...	Name	Instru...	Def ...	Locati...	Serial No.	Instrument ID for host	Barc...	Rac...
0	DataManage	DM	Hitachi	LAB1	DM-00-0000	DM#DM#0#0	<input type="checkbox"/>	
1	MU1	c8000	Hitachi	LAB1	0000-07	MU1#c8000#0#0	<input checked="" type="checkbox"/>	5
2	ISE	ISE	Hitachi	LAB1	ISE#0800-09	MU1#ISE#1#0	<input checked="" type="checkbox"/>	5
3	ISE(1)	ISE	Hitachi	LAB1	ISE#0800-09#1	MU1#ISE#1#1	<input checked="" type="checkbox"/>	5
4	ISE(2)	ISE	Hitachi	LAB1	ISE#0800-09#2	MU1#ISE#1#2	<input checked="" type="checkbox"/>	5
5	C7-1	c701	Hitachi	LAB1	c701#0800-08	MU1#c701#1#0	<input checked="" type="checkbox"/>	5
6	C7-1(A)	c701	Hitachi	LAB1	c701#0800-08#1	MU1#c701#1#1	<input checked="" type="checkbox"/>	5
7	C7-1(B)	c701	Hitachi	LAB1	c701#0800-08#2	MU1#c701#1#2	<input checked="" type="checkbox"/>	5
8	c502	c502	Hitachi	LAB1	c502#0900-04	MU1#c502#2#0	<input checked="" type="checkbox"/>	5
9	c502(A)	c502	Hitachi	LAB1	c502#0900-04#1	MU1#c502#2#1	<input checked="" type="checkbox"/>	5
10	e602	e602	Hitachi	LAB1	e602#0900-07	MU1#e602#3#0	<input checked="" type="checkbox"/>	5
11	e602(1)	e602	Hitachi	LAB1	e602#0900-07#1	MU1#e602#3#1	<input checked="" type="checkbox"/>	5
12	e602(2)	e602	Hitachi	LAB1	e602#0900-07#2	MU1#e602#3#2	<input checked="" type="checkbox"/>	5

**Figure 4-4** The analytical unit IDs (or instrument ID for host) in the data manager



### This field is used by both result and masking messages (HL7)

- In HL7, this field is used by both result and masking messages. If you edit this field, make sure the host is updated so that it reads the new identifier in result upload message, and it sends the new identifier in masking messages, if used.

**Using the ID** The *data manager* sends the ID in ASTM in:

- In ASTM Result record, Field 14, component 3. It identifies the module and instrument that performed the test.
- In the ASTM calibration records M(PCR) Field 6, M(ICR) Field 5, M(ECR) Field 7. It identifies the module and instrument that performed the test.

The *data manager* sends the ID in HL7 in:

- In HL7 segment OBX-18, component 3. It identifies the module and instrument that performed the test. For calibration results from an ISE module, the analytical unit ID is the only component in the field.

The *data manager* reads the ID in HL7 in:

- In HL7 segment ECD-5, component 3. Here it identifies the module and instrument to perform masking on.

**Default value** The whole field is freely editable. The default values follow the format:

*Instrument#ModuleType#Position#SubModule*

<b>Instrument</b>	<b>String</b>	Currently default to MU1, which identifies the first cobas® 8000 modular analyzer series connected to the data manager. In future, there may be more analyzers connected.
-------------------	---------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*Identifier of the analytical unit sent to host*

<b>ModuleType</b>	<i>String</i>	c502, c701, e602, ISE, c702, DM or c8000.
<b>Position</b>	<i>Number</i>	The position of the module on the cobas® 8000 modular analyzer series, as an integer.
<b>Submodule</b>	<i>Number</i>	0, 1 or 2

Examples of default values:

MU1#e602#1#1

MU1#c8000#0#0

The reserved values in ASTM or HL7 cannot be used: | or ^ or \ or ~ or &. Otherwise, any unique string can be used as the identifier, for example, the serial number of the module, such as:

1048-12

In such a case an HL7 OBX segment, this might look like:

```
OBX|1||991||109.1|mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||
20101012074509|bmuser^DMUSER||63|ISE^1^1048-12^3|2010101
2074525|
```

In an ASTM Result record, this might look like:

```
R|1|^^^999/1/not|2.3^|mmol/L|0.5 - 7.5^TECH\^NORM\^CRIT\
^USER|N||F||bmsrv^DMROUTINE|20100711163455|2010071116345
5|ISE^2^1048-12^4|
```



### The Analytical Unit ID is unique

To uniquely identify the module or analytical unit that performed the test, it is recommended to use the analytical unit ID and nothing else.

## Getting a trace file from the data manager

Authorized Roche Diagnostics service personnel can collect a set of log files to send with an issue report.

### To get a host communication file

Instead of a whole issue report, it is possible to obtain the communication logs on their own.

#### ▶ How to get a data manager host communication trace file

- 1 Navigate to c:\data\log
- 2 Select all the logs in the folder, which may include:
  - astm-serial.log
  - hl7-network.log
  - astm-network.log
  - ASTM-message.log
  - HL7-message.log
- 3 If you are sending them to a support engineer, save them in a zip archive or similar convenient compressed format.

The important files for the host communication in c:\data\log are: ASTM-message.log and HL7-message.log. These files contain the host communication messages between the data manager and the host, correspondent to the used protocol (ASTM or HL7). These files may also contain a datestamp in the filename. Logs from the current day do not have a timestamp.



### Other useful logs

Log information on the communication between the *data manager* and the control unit is in: c :\data\log\InstrumentAdapter\All.yyyy-mm-dd.log

Configuring the control unit

## Configuring the control unit

This section tells you how to configure the control unit for communication with *data manager* and the host (LIS / WAM). A user with appropriate permissions needs to be logged into the Control Unit to change these settings.

### Enabling communication to data manager

#### ► To enable the control unit to communicate with data manager

- 1 Navigate to the initial screen: Overview > System Overview

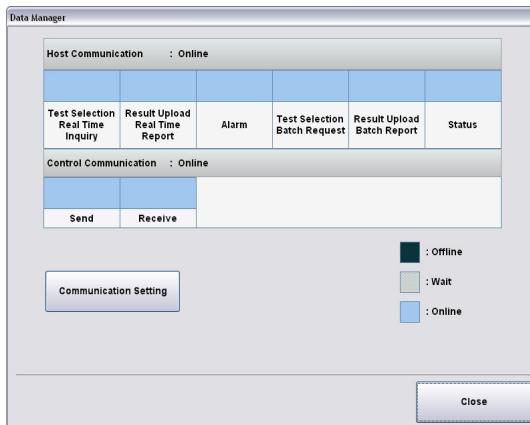


**A** Data Manager button

**B**

**Figure 4-5** The control unit screen at Overview > System Overview

- 2** In the section Module Overview, select the button Data Manager. The Data Manager Host Communication dialog appears.



**Figure 4-6** The Data Manager Host Communication Status dialog on the control unit, at Overview > System Overview > Module Overview > Data Manager

This dialog shows the status of the communications with the *data manager*, and what communication channels are currently online.

- 3** To activate communications between the control unit and the *data manager*, select the button Communication Setting. The Communication Setting dialog appears.



**Figure 4-7** The Communication Setting dialog on the control unit, at Overview > System Overview > Module Overview > Data Manager > Communication Setting

- 4** Activate communications by setting the Host Communications and Control Communications both to Online. Then select OK, to return to the Data Manager Host Communication dialog.

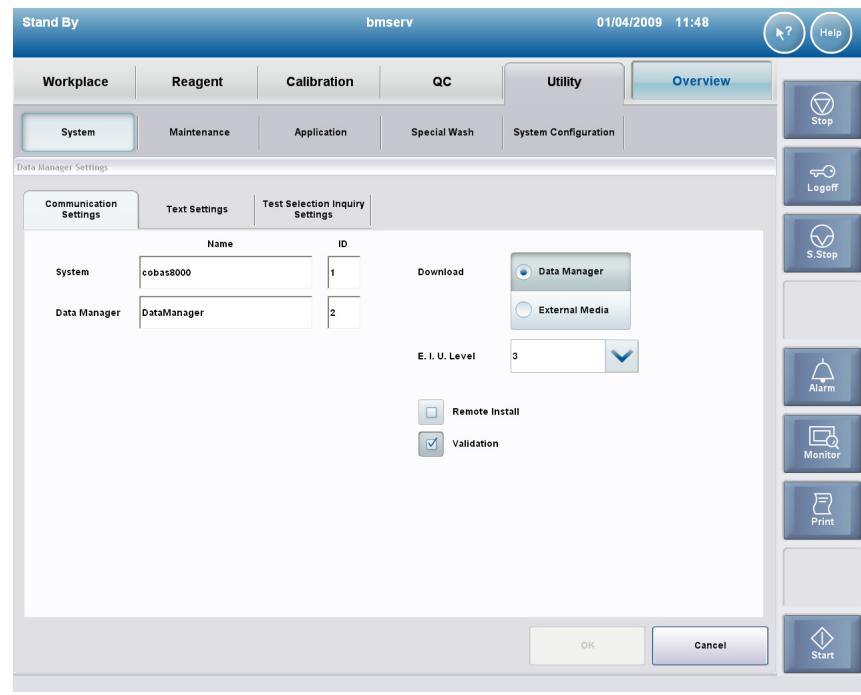
If every setting in the Data Manager Host Communication dialog is not light blue, meaning “Online”, check the network connections, or contact your technical support.



Configuring the control unit

## Configuring the control unit's communications with data manager

To configure the settings that control the control unit's communications with *data manager*, go to Utility > System > Data Manager Settings > Communication Settings.



**Figure 4-8** Utility > System > Data Manager Settings > Communication Settings

In a production environment, set:

	Name	ID
<b>System</b>	cobas8000	1
<b>Data Manager</b>	DataManager	2

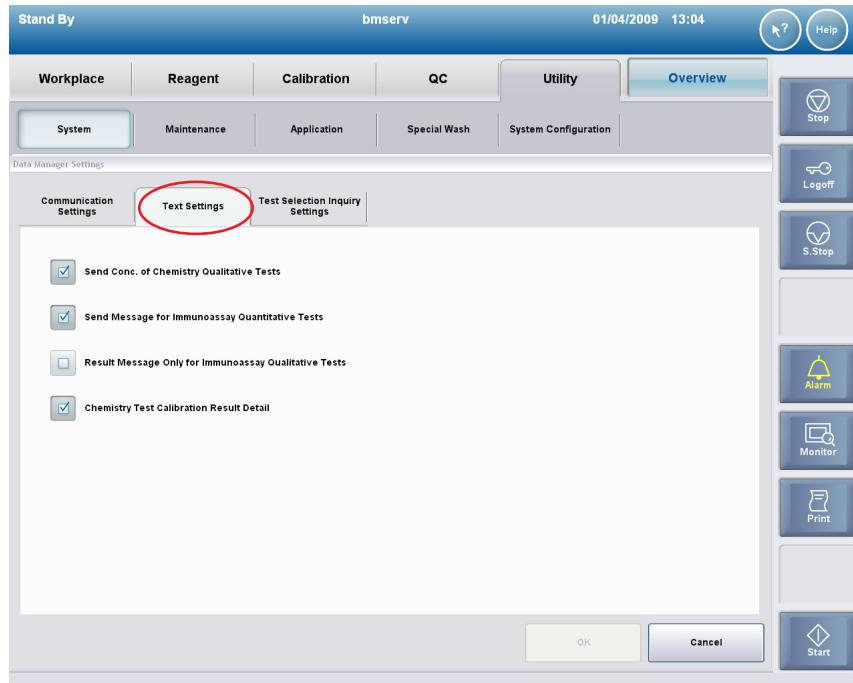
Keep your current settings for the other options, unless Authorized Roche Diagnostics service personnel or technical support instruct you otherwise.

Authorized Roche Diagnostics service personnel can reconfigure the E.I.U. level (Essential Information Upload). **E.I.U. Level** determines which kind of data (for example, "Get Log Data") can be sent to the *data manager* via a pipe upload to be stored and further used for troubleshooting (for example, including into the issue report).

For further details of these settings, see the control unit's online help.

## Configuration of text settings

To configure the settings of text information sent to *data manager*, go to **Utility > System > Data Manager Settings > Text Settings**.



**Figure 4-9** Mandatory settings in Utility > System > Data Manager Settings > Text Settings

**Send conc. of chemistry qualitative tests** In a production environment, select **Send conc. of chemistry qualitative tests**.

**Send message for Immunoassay Quantitative tests** In a production environment, select **Send message for Immunoassay Quantitative tests**.

**Result message only for Immunoassay Qualitative tests** In a production environment, clear the **Result message only for Immunoassay Qualitative tests** checkbox.



### Unselect ‘Result message only’ to get all data

- To get all data in a production environment, the option **Result message only for Immunoassay Qualitative tests** must be unselected.

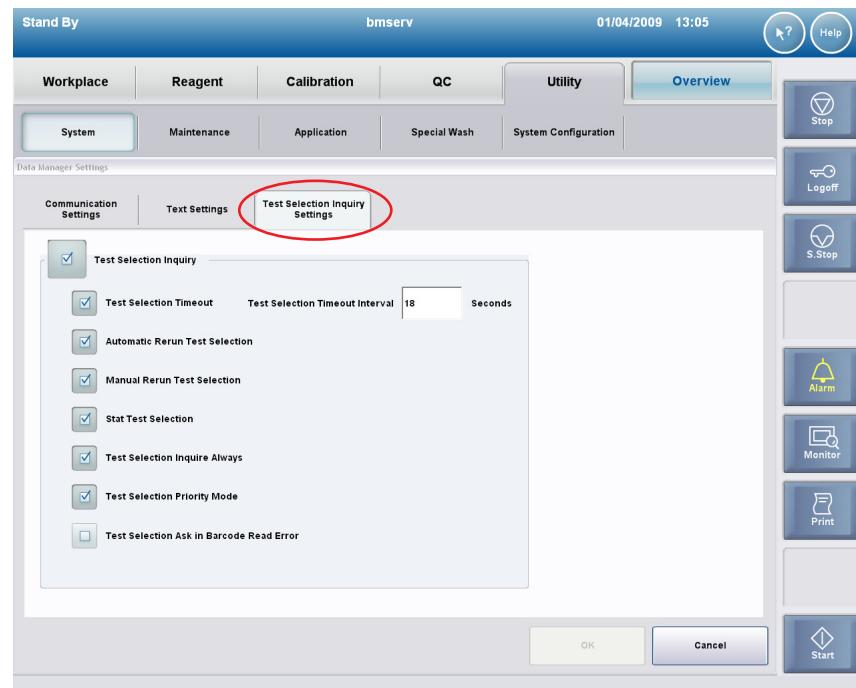
**Chemistry Test Calibration Result Detail** In a production environment, select **Chemistry Test Calibration Result Detail**.

**Further details** For further details of these options, see the control unit’s online help.

Configuring the control unit

## Test selection inquiry settings

The Control Unit can be configured as regards how and when it sends inquiries about samples, (in other words, Test Selection Inquiries) in Utility > System > Data Manager Settings> Test Selection Inquiry Settings.



**Figure 4-10** Test Selection Inquiry Settings tab in the Data Manager Settings section of the control unit, in Utility > System > Data Manager.

**Test Selection Inquiry** In a production environment, select **Test Selection Inquiry**.

**Test Selection Timeout** In a production environment, select **Test Selection Timeout**.

Default is 18 seconds. In production environments, it is recommended to use the default, and handle host communications timeouts on the *data manager*.

- ( For details of how the *data manager* handles timeouts from the host and control unit, see *Setting the test selection inquiry timeout* (p. 64).

**Automatic Rerun Test Selection** In a production environment, select **Automatic Rerun Test Selection**.

Automatic Rerun Test Selection must be checked, if Rerun and/or Reflex Orders from *data manager* or host are used.

- ( To enable requests for rerun / reflex tests, other settings have to be done, see *Request for rerun or reflex tests* (p. 31).

**Manual Rerun Test Selection** In a production environment, select **Manual Rerun Test Selection**.

**Manual Rerun Test Selection** must be checked, if Rerun and Reflex Orders are used.

**STAT Test Selection** In a production environment, select **STAT Test Selection**.

**Test Selection Inquire Always** In a production environment, select **Test Selection Inquire Always**.

**Test Selection Priority Mode** In a production environment, select **Test Selection Priority Mode**.

**Test Selection Ask in Barcode Read Error** If your sample tubes have barcodes, keep **Test Selection Ask in Barcode Read Error** unselected.

When **Test Selection Ask in Barcode Read Error** is unselected, an unreadable barcode triggers an error on the analyzer. See cobas® 8000 data manager Operator's Manual for details on how the analyzer operator will handle a barcode read error.

Only select this option if you are using samples without a barcode, for example if using aliquots from a **MODULAR PRE-ANALYTICS**.

-  For a more detailed description of how to implement this option, see *Using a MODULAR PRE-ANALYTICS* (p. 255).

When **Test Selection Ask In Barcode Read Error** is selected, rerun by gray racks (racks for 1st run) is not permitted, as the analyzer cannot tell if this is the first or second presentation of the rack.

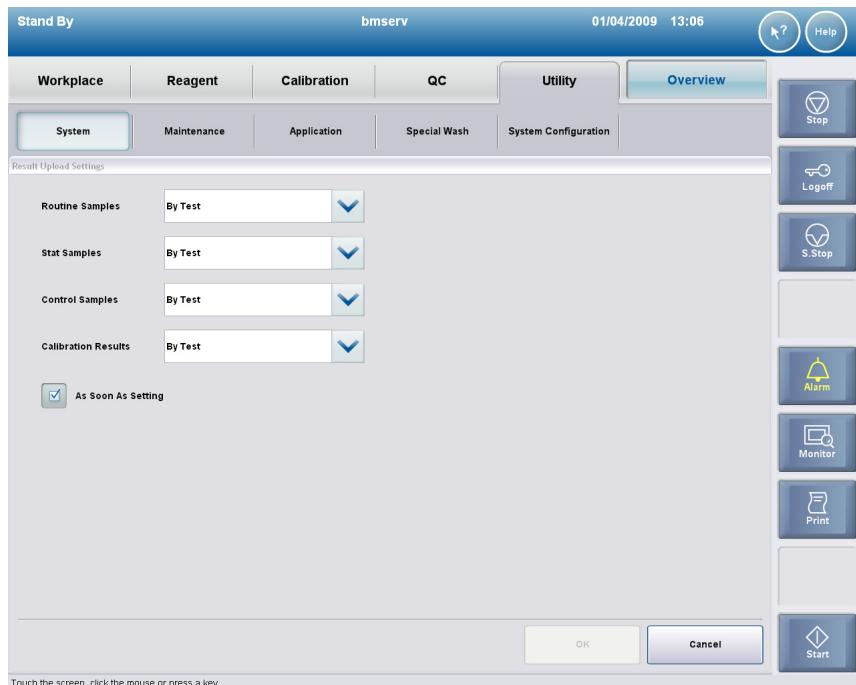
When the barcode readers are deactivated on the cobas® 8000 modular analyzer series instrument, this option is hidden.

-  The barcode readers are deactivated, for example, when identifying samples by sequence number. For details, see *Identifying patient samples by sequence number* (p. 259).

**Further details** For further details of these options, see the control unit's online help.

## Configuring the uploading of results

This section describes how to configure the rules for uploading results. These are set in **Utility > System > Result Upload Settings**.



**Figure 4-11** Utility > System > Result upload settings

### Upload by test or sample

You can set the Control Unit to upload results *by sample* or *by test*. Other options are not supported in version 1.05.

- **By test** means that the Control Unit uploads each result as soon as it is ready. Calibration results are always uploaded by test.
- **By sample** means that the Control Unit waits until all the results for a sample are ready, and then uploads all of them together.



#### Other options are not supported in version 1.05.00

In version 1.05.00, only the options **By test** and **By sample** are supported.



#### To configure how the Control Unit uploads results

- 1 Navigate to Utility > System > Result Upload Settings.
- 2 From the drop-down list for type of result you want to configure, select “**By Test**” or “**By Sample**”. You can separately configure Routine sample results, STAT sample results or quality control results. Calibration results can only be uploaded “**By Test**”.
- 3 Check the **As Soon As Setting** checkbox.



## Automatic rerun timing

The *data manager* forwards all rerun queries immediately to the host as soon as it gets them from the control unit.

To set the Control Unit to upload the results to the *data manager* and to request reruns as soon as possible, select the **As Soon As Setting** check box. This can help prevent overloading on a busy system.

The **As Soon As Setting** sets the automatic rerun start timing.

Result output setting	As Soon As Setting	The Control Unit sends a result to the <i>data manager</i> , when the sample has:	The Control Unit marks the test for Automatic Rerun, and sends a rerun inquiry (R2) to the <i>data manager</i> <sup>(1)</sup> , when the sample has:
By sample	<input checked="" type="checkbox"/> Selected	A result for every "Autorerun enabled" test.	
	<input type="checkbox"/> Cleared	A result for every test.	
Chem ISE / Immuno <sup>(2)</sup>	<input checked="" type="checkbox"/> Selected	A result for every "Autorerun enabled" test in the corresponding cluster.	
	<input type="checkbox"/> Cleared	A result for every test in the corresponding cluster.	
By cluster <sup>(2)</sup>	<input checked="" type="checkbox"/> Selected	A result for every "Autorerun enabled" test in the corresponding cluster.	
	<input type="checkbox"/> Cleared	A result for every test in the corresponding cluster.	
By test	<input checked="" type="checkbox"/> Selected	A result for a test.	A result for every "Autorerun enabled" test in the corresponding cluster.
	<input type="checkbox"/> Cleared	A result for a test.	A result for every test.
No upload <sup>(2)</sup>	<input checked="" type="checkbox"/> Selected	(Not sent)	A result for every "Autorerun enabled" test.
	<input type="checkbox"/> Cleared	(Not sent)	A result for every test.

**Table 4-3** Timing Automatic Rerun requests with **As Soon As Setting**

(1) The Control Unit only sends a rerun inquiry (R2) to the data manager if "Autorerun enabled" is set for a test.

(2) Not supported by the data manager version 1.05



If the **As Soon As Setting** check box is selected, the analyzer sends the rack to the output buffer after the Control Unit has sent the first results to the *data manager*. The "Autorerun enabled" setting does not affect this. This allows the *data manager* to make additional requests after the first results are sent.

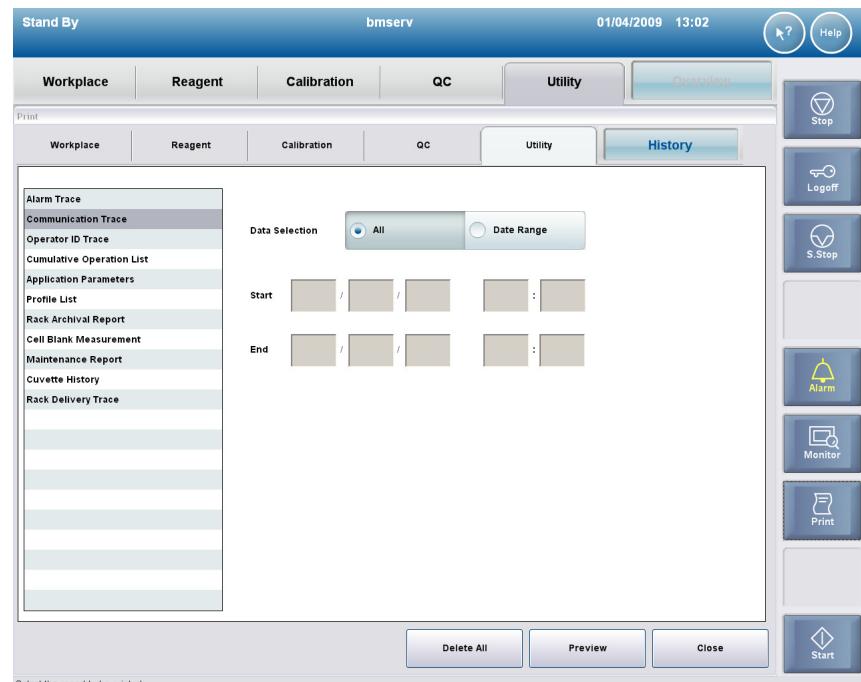
If the **As Soon As Setting** check box is cleared, the analyzer sends the rack to the output buffer after it has performed the tests, and determined that no rerun is required, but before sending the results to the *data manager*.

Getting a trace file from the Control Unit

## Getting a trace file from the Control Unit

Authorized Roche Diagnostics service personnel can access trace files on the Control Unit. The communication trace file records data sent from or received by the Control Unit. This information is particularly useful for support or debugging purposes. The Control Unit saves this information internally, and can print it out to a PDF file or a physical printer.

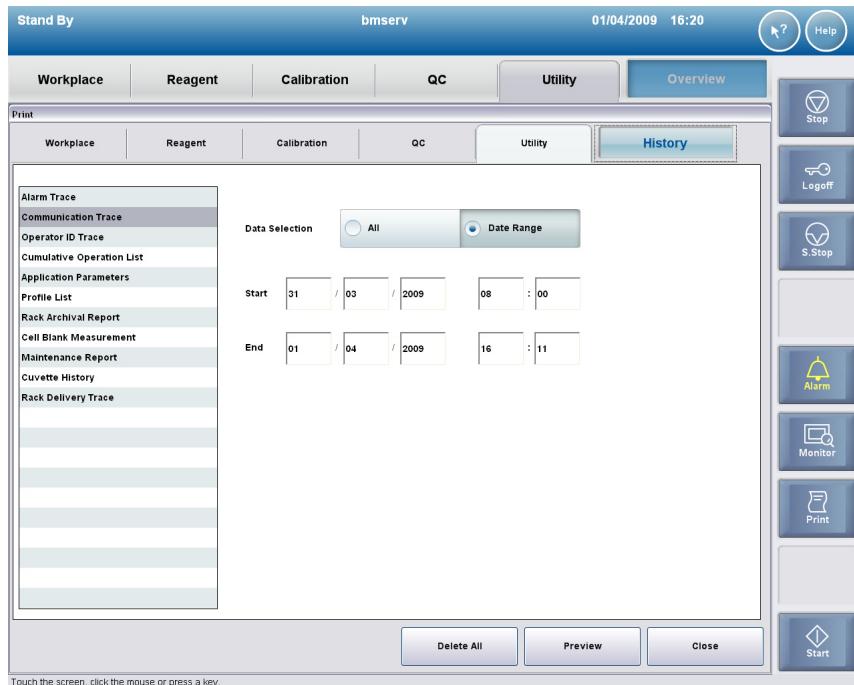
The Communication Trace file options are available from the **Print > Utility > Communication Trace**.



**Figure 4-12** Print > Utility > Communication Trace

 **To get a communication trace file from the control unit**

- 1 From the buttons on the right of the Control Unit screen, select Print. The Utility screen displays.
- 2 From the list on the left of the Utility screen, select Communication Trace. The Communication Trace options screen displays.



**Figure 4-13** Print > Utility > Communication Trace with a Date Range selected

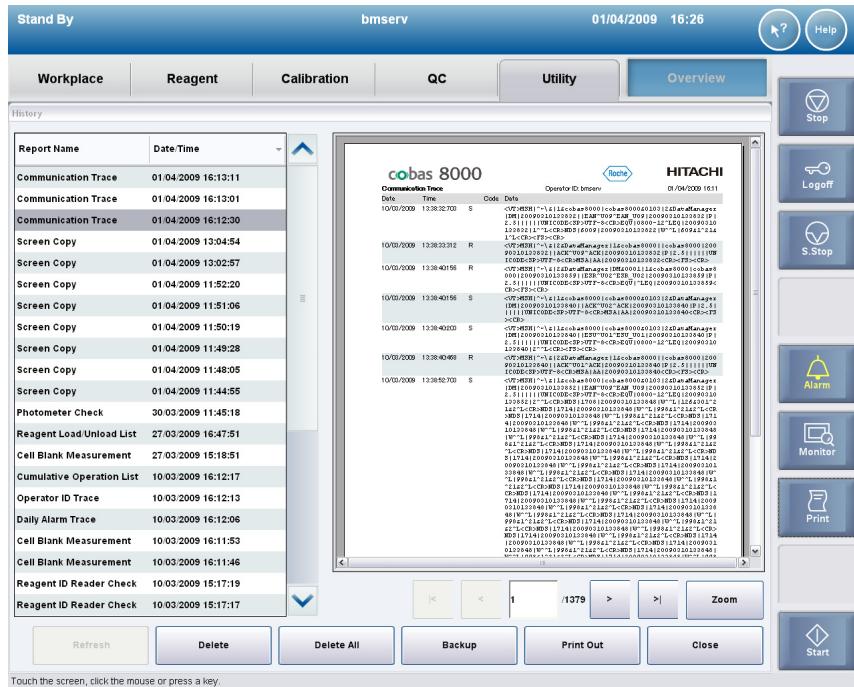
- 3 Select the radio button **Date Range**.
- 4 Consider the date and time range for which you want to see the Communication Trace. Then enter the start date and time, and the end date and time, for the Communication Trace data you wish to collect.
- 5 Select the button **Preview**. It may take a few seconds for the Control Unit to generate the file.

## 4 Host Communication Settings

Getting a trace file from the Control Unit

**cobas® 8000 data manager**

- To display the file in the Control Unit, select the **History** tab.



**Figure 4-14** Print > Utility > Communication Trace > Preview > History > Communication Trace

- On the left of the screen, in the list of Reports, select the Communication Trace Report that you created. It displays in the main window on the right.
- You can view the Report in a number of ways.

Button	View
Zoom	Zooms in or zooms out of view in the main window on the right. There are 3 different levels of zoom.
Backup	Saves to a PDF file.
Print Out	Prints out to a physical printer.

**Table 4-4** Options for viewing reports

### When to use trace files

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.

### Sending a trace file

If you are sending a trace file by email to support engineers, be aware it can be very large. Compress it to, for example, a zip file, and consider if possible putting on a shared drive from where it can be downloaded. You can also save it to a memory stick or similar device, as with any other file.

## Identifying patient samples by sequence number

By default, the patient samples are identified by a sample ID, which is encoded on the barcode on the sample tube. One alternative in the situation where samples lack barcodes, is to configure the instrument to number the samples in sequence: starting with 1 or another number, and increasing the number by 1 for each sample, up to a maximum of 60,000.

The Roche Diagnostics service personnel can configure this on the cobas® 8000 modular analyzer series instrument, the Control Unit, and on the *data manager*. This requires a dedicated configuration tool.

To implement this, ask for assistance from the Roche Diagnostics service personnel, and refer to the relevant service bulletins from August 2011, and the *cobas® 8000 data manager Service Manual* from version 1.02.04 (available 2012).

-  For details of how to identify patient samples by sequence number, see *Identifying patient samples by sequence number* (p. 259).

## Chart of configuration settings

This chart shows the possible configuration settings of specific options.

<i>data manager sequence number support installed</i>	<b>Control Unit STAT / Routine barcode reader</b>	<b>Control Unit TS Ask in Barcode read Error</b>	<b>Barcode mode</b>	<b>Sequence Mode</b>	<b>Aliquots without barcodes from <i>data manager</i></b>
Installed	ON	ON	OK	Not working	OK
		OFF	OK	Not working	Not working
	OFF	N/A	Not working	OK	Not working
Not Installed	ON	ON	OK	Not working	OK
		OFF	OK	Not working	Not working
	OFF	N/A	Not working	Not working	Not working

**Table 4-5** Table describing setup of data manager infrastructure to work in different modes

Other combinations are not supported.

To set these options:

- Sequence mode in *data manager*, Control Unit, and the cobas® 8000 modular analyzer series instrument: ask the authorized Roche Diagnostics service personnel to implement this.
- STAT / Routine barcode reader on Control Unit: on the Control Unit, navigate to **Utility > System > Barcode Settings > Routine/Stat**.
- Test selection ask in barcode read error on the Control Unit:  
  For details, see *Test Selection Ask in Barcode Read Error* (p. 79).

# Physical layer specifications

## *Cables and low-level protocol configuration*

This chapter explains how to configure the base and low-level communication protocol, and gives restrictions on which cables to use.

### In this chapter

Chapter **5**

Text encodings .....	89
Host communication settings and cables.....	90
Network connection .....	91
Serial connection.....	93



## Text encodings

The data within the message has to be Unicode encoded as UTF-8 characters. UTF-8 and ASCII is similar between 32-127. If characters are used outside this range care should be taken, and only UTF-8 encoding is supported.



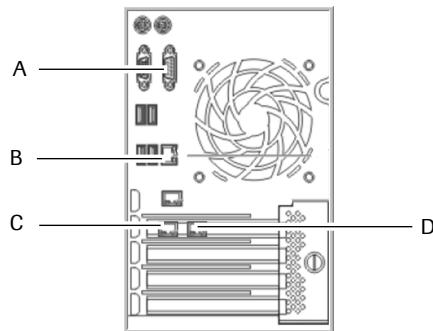
### The host needs to handle UTF-8

- ▶ In situations where the *data manager* operators will be able to enter UTF-8 characters, the host will have to support UTF-8, or be able to recognize and translate from UTF-8. If necessary, it is possible to prevent operators from entering UTF-8 characters by running the *data manager* in pass-through mode.
- 
- ⓘ For the UTF-8 codes of common Western European characters, see *Western European characters in UTF-8* (p. 332).

## Host communication settings and cables

Connect the cables to the *data manager* server, as described below for a G5 (Generation 5), a G6 (Generation 6), and a G8 (Generation 8) server.

*Connecting a Generation 5 server*

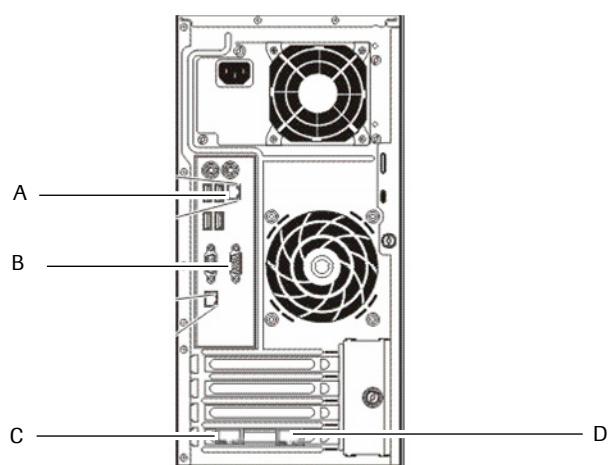


**A** COM / Serial RS232 connection to LIS or host (if used)  
**B** Network connection control unit

**C** Network connection to LIS or host (if used)  
**D** Network connection to cobas® Link

**Figure 5-1** Cables for connecting a Generation 5 PC running data manager

*Connecting a Generation 6 server*

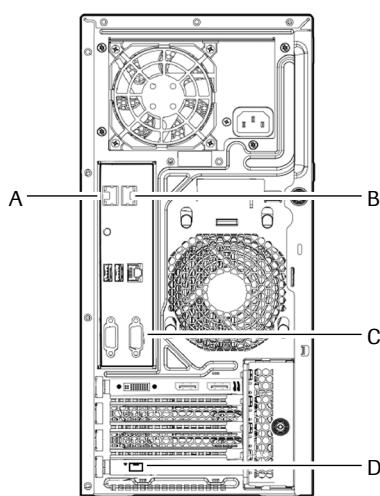


**A** Network connection control unit  
**B** COM / Serial RS232 connection to LIS or host (if used)

**C** Network connection to cobas® Link  
**D** Network connection to LIS or host (if used)

**Figure 5-2** Cables for connecting a Generation 6 PC running data manager

## Connecting a Generation 8 server



- |          |                                                                                                |          |                                                                                       |
|----------|------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------|
| <b>A</b> | Network connection control unit Internal HP Ethernet 1Gb 2-port Ethernet Adapter 1             | <b>C</b> | COM / Serial RS232 connection to LIS or host (if used)                                |
| <b>B</b> | Network connection to LIS or host (if used) Internal HP Ethernet 1Gb 2-port Ethernet Adapter 2 | <b>D</b> | Network connection to <b>cobas®</b> Link HP NC112T PCI Express Gigabit Server Adapter |

**Figure 5-3** Cables for connecting a Generation 8 PC running data manager

Before upgrading to a generation 8 server, consult your Roche Diagnostics Field Service Representative or the **cobas® 8000 data manager Service Manual**.

## Network connection

An ethernet cable Cat.5e or better can be used for the connection to the customer host system. Cat.5e is currently defined in TIA/EIA-568-B, and provides performance of up to 100 MHz, and is frequently used for both 100 MBit/s and 1000BASE-T Gigabit Ethernet networks. A crossover cable and straight-through cable are both supported.



**Figure 5-4** Cat.5e ethernet cable

By default the *data manager* works as a TCP/IP client, so the connected system (*cobas® IT firewall* or host) must act as the TCP/IP server. To configure the *data manager* to act as a TCP/IP server, please consult your Roche Diagnostics service personnel, or see the *cobas® 8000 data manager Service Manual*.

*With cobas® IT firewall* When using *cobas® IT firewall* with *data manager*, these defaults are recommended:

- The IP address (172.20.1.31), the Subnetmask (255.255.255.0) and the default gateway (172.20.1.1) are fixed
- For ASTM, the TCP port number is fixed to 50001
- For HL7, the TCP port number is fixed to 50002

*With FortiGate-40C firewall* When using FortiGate-40C firewall with *data manager*, these defaults are recommended:

- The IP address (162.132.241.80), the Subnetmask (255.255.255.0) and the default gateway (162.132.241.1) are fixed
- For ASTM, the TCP port number is fixed to 50001
- For HL7, the TCP port number is fixed to 50002

If there is a non-Roche firewall between the *data manager* and host, the firewall must not block the TCP-port for ASTM and HL7 (by default 50001 or 50002 respectively).

*Running data manager as a server* If you have multiple instances of the *data manager*, or wish to set up the *data manager* as a server, consult your Roche Diagnostics Field Service Representative or the **cobas® 8000 data manager Service Manual**.

*Ethernet standard* All network and hardware devices between the host and *data manager* must support at least 100MBit/s, including the firewall, routers, switches, cables and network adapters.

If either the host or *data manager* run on a PC which is connected to a network via a serial-to-network adapter, the connection is not a supported network connection, but performs as a serial connection.

( For details of serial connections, see *Serial connection* (p. 93).)



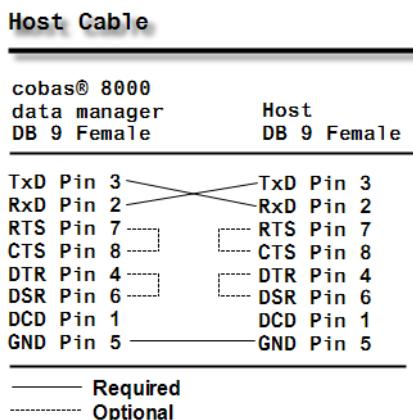
#### Restart the host task and driver after network problems

► If problems occur on the network, or the network connection is lost for some reason, for example if the firewall is rebooted, you may need to restart the host connection on the *data manager* and the driver on the host, in order to establish the network connection again.

( For details of restarting the host connection on the *data manager*, see *Starting and stopping the connection* (p. 59).)

## Serial connection

For a serial connection, use a cable RS232c, configured as follows.



**Figure 5-5** Typical serial host interface connection cable for cobas® 8000 data manager

The dashed line indicates that the cable might have these bridges, if the communication partners are using these signals.

### For serial connection, short shielded cable required.

- For a serial connections, use a shielded RS232c cable, not longer than 15m.



*Communication settings* The following diagram shows the recommend default communication settings.

Item	Recommend default communication settings
<b>Communication Port</b>	1
<b>Electrical Signal</b>	In accordance with EIA-232-D-1986
<b>Cable Length</b>	Maximum 15m
<b>Communication speed (Baud rate)</b>	19200
<b>Parity</b>	N
<b>Databits</b>	8
<b>Stopbits</b>	1

### Some sites might reconfigure the communication settings

- The default settings are as given, and these are recommended for best performance. If a host or LIS cannot use these parameters, it may be possible in certain cases for Authorized Roche Diagnostics service personnel to reconfigure the communication settings on individual sites according to individual requirements.



### HL7 over a serial connection is not supported

- ASTM over a serial connection is supported, but not HL7. For HL7, a network connection is required.



### Network connection is recommended

For either ASTM or HL7 protocol, a fast network connection (100 MBit/s or faster) between the *data manager* and the host is highly recommended.



# ASTM reference

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6	<i>ASTM protocol (LIS2 - A2)</i> .....	97
7	<i>ASTM text content (LIS2 - A2)</i> .....	109



# ASTM protocol (LIS2 - A2)

This chapter presents the lower layers of the ASTM (or LIS2-A2) protocol, as used by cobas® 8000 data manager.

## In this chapter

## Chapter 6

Background to the ASTM protocol.....	99
Communication processing layers.....	100
ASTM lower layer.....	101
ASTM syntax.....	103
Coding rules for the messages.....	103
End of record character.....	103
Field delimiter = vertical bar ‘ ’ .....	103
Repeat delimiter = backslash ‘\’ .....	104
Component delimiter = caret ‘^’ .....	104
Escape character = ampersand ‘&’ .....	104
Special characters with escape character .....	104
Message transmission phases .....	105
Checksum calculation / message frame .....	106

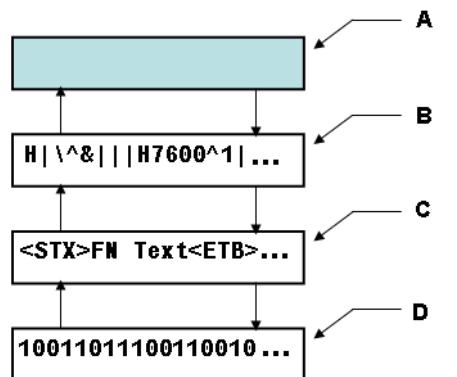


## Background to the ASTM protocol

The ASTM (American Society of Testing and Materials) provides a standard for communication between automatic analyzers and host computers for standards E1381-91 (Specification for Low-Level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems) and E1394-91 (Standard Specifications for Transferring Information Between Clinical Instruments and Computer Systems). The basic specifications of the standards are regulated on X12 of ANSI.

## Communication processing layers

The communication process between the *data manager* and the host is divided into four layers as shown below.



- |          |                                                                |          |                                 |
|----------|----------------------------------------------------------------|----------|---------------------------------|
| <b>A</b> | Application Layer. Server specification of host communication. | <b>C</b> | ASTM Lower Layer. ASTM E1381-91 |
| <b>B</b> | ASTM Upper Layer. ASTM E1394-91                                | <b>D</b> | Physical Layer.                 |

**Figure 6-1** Host Communication Processing Layers

Details of the ASTM protocol can be found in the *Annual Book of ASTM Standards*. Copyright American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA.

- ASTM E1381-91 Low Level Protocol  
Specification for Low Level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems
- ASTM E1394-91 High Level Protocol  
Standard Specification for Transferring Information Between Clinical Instruments and Computer Systems

## ASTM lower layer

ASTM lower layer receives messages for a transmission request from the upper layer. These messages are then split into frames and sent to a communication medium to be transmitted to other parties. ASTM lower layer also constructs frames received from a communication medium to recreate messages to be transferred to the ASTM upper layer as reception messages.



### ASTM frame maximum size 240 char + 7 control char

For one frame, maximum of 240 characters for text, plus 7 characters for frame control characters.

Messages equal to or less than 240 characters are transmitted as one final frame. Messages greater than 240 characters are split into frames that have character lengths that fall within the 240-character limit. The only or final remaining frame becomes the last frame and is indicated by <ETX>. All others are intermediate (middle) frames and are indicated by <ETB>.

Configuration and communication procedures for transmission and reception of frames are explained in the following sections.

ASTM frame	Item	Method	Explanation
Frame Configurations	For Middle Frame  C1 C2 <CR><LF>	<STX> FN text <ETB>  <STX> is control character (HEX 02)  For Last Frame  <STX> FN text <ETX> C1 C2 <CR><LF>	<ETB> is control character (HEX 17)  <CR> is control character (HEX 0D)  <LF> is control character (HEX 0A)  <ETX> is control character (HEX 03)
Frame Character Configuration of Text			<ul style="list-style-type: none"> <li>• Control character (characters enclosed in &lt;&gt;):</li> <li>• FN: FN is a single ASCII number. FN indicates the sequence number for a frame (the frame number modulus 8). Frames of a single transmission phase are consecutively numbered beginning with 1, so FN runs from 1 to 7, then continues with 0, 1, and so on.</li> <li>• Text: the data content of a frame (maximum 240 characters). Records are sub-divided into intermediate (middle) frames with 240 or fewer characters. Text is part of a split message.</li> <li>• C1 and C2: When 1 byte resulting from adding each byte, FN to &lt;ETB&gt; for the middle frame and FN to &lt;EXT&gt; for the last frame, is expressed in hexadecimal, the upper character (161) is C1 and the lower character (160) is C2. Characters used are '0' to '9' or 'A' to 'F'.</li> </ul>
Maximum Length of the Frame	247 characters	<SOH> is control character (HEX 01)  <EOT> is control character (HEX 04)  <ENQ> is control character (HEX 05)  <ACK> is control character (HEX 06)  <DLE> is control character (HEX 10)  <NAK> is control character (HEX 15)  <SYN> is control character (HEX 16)  <DC1> ~ <DC4> are control characters (HEX 11 ~ 14)	<p>For one frame, maximum of 240 characters for text, plus 7 characters for frame control characters.</p> <p>Messages equal to or less than 240 characters are transmitted as one final frame. Messages greater than 240 characters are split into frames that have character lengths that fall within the 240-character limit. The only or final remaining frame becomes the last frame and is indicated by &lt;ETX&gt;. All others are intermediate (middle) frames and are indicated by &lt;ETB&gt;.</p>

Table 6-1

ASTM (LIS2-A2) message framing

## ASTM syntax

The structure of the sentences to be transferred, according to ASTM Communication Regulation, is explained in this section. Between the analyzer and the host, various data such as Test Requests and Results are transferred back and forth. All of these data conform to this syntax.

<b>Message</b>	A message is constructed with an arrangement of several records (refer to the next item). It is the smallest unit of information transferred between a host and an analyzer. Messages begin with a 'Message Header Record' that indicates the beginning of a message and end with a 'Message Termination Record' that indicates the end of a message.
<b>Record</b>	A record is constructed from several fields and expresses a single purpose (such as to specify result reports or test requests). A record may be repeated or used singularly in a message. Code that indicates the purpose of a record is noted in the first character of that record.
<b>Field</b>	A field is the ASTM's smallest element to construct information. Attributes for a field (name, format, and meanings) are defined in units in a record.

## Coding rules for the messages

This section deals with message coding rules as well as special characters, such as delimiters, used to develop messages provided by records and fields.

### End of record character

The ASCII CR character (HEX 0D) is always used to indicate the end of a record.

### Field delimiter = vertical bar ‘|’



#### Field delimiter ‘|’ supported, but no others

- The field delimiter ‘|’ is supported in the current version of cobas® 8000 data manager. Other field delimiters are not supported.

A Field delimiter is a character used to separate fields that are next to each other in a record. This is also a delimiter for the first Record ID (character that appears in the beginning of a record) and the next field. According to the 2nd character that appears in the Message Header Record (record that appears in the front of a message), a Field delimiter can be defined with an optional character through the Message Header Record; however, the *data manager* requires a vertical bar ‘|’.

**Repeat delimiter = backslash ‘\’****Repeat delimiter ‘\’ supported, but no others**

- The repeat delimiter ‘\’ is supported in the current version of **cobas®** 8000 data manager. Other repeat delimiters are not supported.

When a field is constructed by the same data repeated several times, it is referred to as a Repeated Field. The delimiter between the repeated items for the Repeated Field is called the Repeat delimiter. Repeat delimiters can be defined with an optional character through the Message Header Record; however, the *data manager* requires a backslash ‘\’.

**Component delimiter = caret ‘^’****Component delimiter ‘^’ supported, but no others**

- The component delimiter ‘^’ is supported in the current version of **cobas®** 8000 data manager. Other component delimiters are not supported.

When a field is constructed by several elements, it is referred to as a Component Field. The delimiter between these elements is the Component delimiter. The Component delimiter can be defined with an optional character through the Message Header Record; however, the *data manager* requires a caret ‘^’.

**Escape character = ampersand ‘&’****Escape character ‘&’ not supported**

- The escape character is not supported in the current version of **cobas®** 8000 data manager. This character is reserved for future use.

An Escape character is to be provided to indicate a delimiter for the fields that include general text. When this character occurs in a relevant field, the next character holds a special meaning (discussed below). An Escape character can be defined with an optional character through the Message Header Record, however, the *data manager* requires an ampersand ‘&’.

**Special characters with escape character****Special characters not supported**

- The special escape sequences are not supported with special character in the current version of **cobas®** 8000 data manager. This character is reserved for future use.

The following escape sequence (starting with & and ending with &) is defined. When this sequence is detected in a field, it is changed to a corresponding character and deleted.

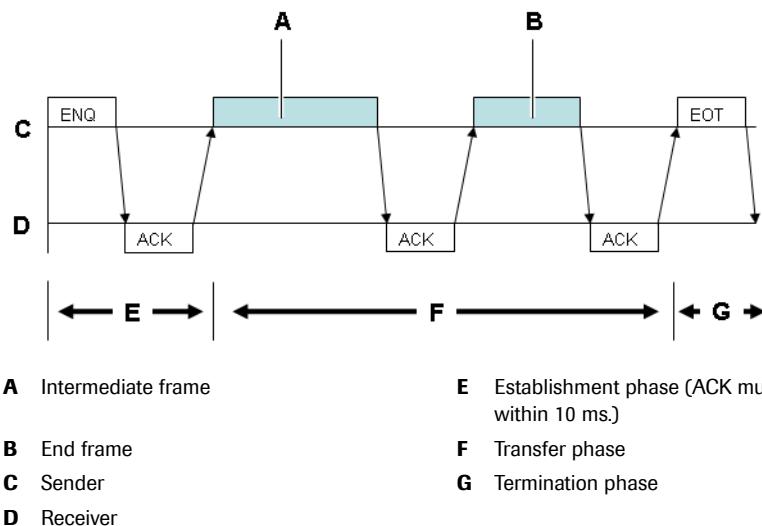
Escape sequences other than these are skipped and treated as NULL values.

<b>&amp;F&amp;</b>	Indicates field delimiter
<b>&amp;S&amp;</b>	Indicates component delimiter
<b>&amp;R&amp;</b>	Indicate repeat delimiter
<b>&amp;E&amp;</b>	Indicates escape

## Message transmission phases

To establish which system sends and which system receives information and to assure the actions of sender and receiver are well coordinated, there are three distinct phases in transferring information.

- Establishment phase
- Transfer phase
- Termination phase



**Figure 6-2** Message Transaction Phases



### Acknowledge must be received from the host within 10 ms

- The host must send an ACK reply to *data manager* within 10 ms. Otherwise the performance of the system degrades and cannot reach its maximum throughput.

Within the transfer phase, all records of the corresponding message are grouped into longer frames to increase speed. The records are separated through a [CR] character. Therefore, to obtain pure ASTM records again, the receiver must concatenate all the frames and wait for a [EOT] character. Then, the receiver can process the frame and split it into different records using the [CR] as the separator.

## Checksum calculation / message frame



**Figure 6-3** The intermediate frame



**Figure 6-4** The end frame

<b>[STX]</b>	The ASCII code 2, indicating the beginning of a frame transmission.
<b>FN</b>	The frame number modulus 8. Frames of a single Transmission Phase are consecutively numbered beginning with 1. So FN runs from 1 to 7, continues with 0, 1, and so on. Use ASCII codes for the digits '0' to '7' (48-55).
<b>Text</b>	The data content of a frame (max. 240 characters). Records are sub-divided into intermediate frames with 240 characters.  Maximum is indicated by [ETB]. The only or last remaining frame is indicated by [ETX]. Different records must be sent in different frames.
<b>[ETB]</b>	The ASCII code 23 (17hex), indicating the end of the text block of an intermediate frame.
<b>[ETX]</b>	The ASCII code 3, indicating the end of the text block of an end frame.
<b>CH, CL</b>	Represents the high nibble (= most significant 4 bit) respectively, the low nibble (=least significant 4 bit) of the 8-bit checksum. CH and CL are represented as two digits of hex numbers. The checksum is the modulus 8 of the sum of ASCII values of the frame characters starting with and including 'FN' and completing with [ETX] respectively [ETB].

Example for Checksum calculation [STX]1Test[ETX]

Character	Value (hex)	Sum
<b>[STX]</b>	02h	00h
'1'	31h	31h
'T'	+54h	85h
'e'	+65h	EAh
's'	+73h	15Dh
't'	+74h	1D1h
<b>[ETX]</b>	+03h = 1D4h Mod 100h = D4h	1D4h

Thus the message to be sent is:

[STX]1Test[ETX]D4[CR][LF]



# ASTM text content (LIS2 - A2)

## ASTM field definitions

This section describes all the ASTM fields used in messages transferred between cobas® 8000 data manager and the host HIS/LIS system.

### In this chapter

### Chapter

### 7

Record levels .....	111
Messages used in host communication .....	112
Messages transmitted by the data manager .....	113
Messages transmitted by the host .....	114
Record description .....	115
Field attributes .....	115
Text encodings.....	116
Message Header Record .....	117
Patient Information Record .....	119
Order Record .....	120
Comment Record (following Order Record) .....	125
Result Record .....	126
Comment Record (following Result Record) .....	132
Query Record (Request Information Record).....	134
Photometric Calibration Result M(PCR).....	138
ISE Calibration Result Record - M(ICR).....	139
ISE data alarms .....	140
ISE calibration analytical data .....	140
E-module (immunology) Calibration Result Record - M(ECR) .....	141
Message Termination Record .....	143



## Record levels

The following table shows the Standard Record types and levels specified by the protocol ASTM E1394-91.

 For details of ASTM E1394-91, see the information given in *Communication processing layers* (p. 100).

Level	Record Name	Identifier
0	Message Header Record	H
1	Patient Information Record	P
2	Test Order Record	O
3	Result Record	R
1 ... 3	Comment Record	C
1 ... 3	Manufacturer Specific Record	M
0	Message Termination Record	L
1	Request Information Record	Q

**Table 7-1** ASTM record types and levels

## Messages used in host communication

The following section shows detailed descriptions of each of message sent between the host and *data manager*, and the ASTM records used in each.

Communication text	Communication Direction	Realtime Communication (1)	Batch Communication
Test Selection Information	Host to <i>data manager</i>	o	o
Order Query	Host to <i>data manager</i>	x	o
Result Query	Host to <i>data manager</i>	x	o
Test Selection Inquiry	<i>data manager</i> to Host	x	o
Patient Sample Analytical Data	<i>data manager</i> to Host	o	o
Control Sample Analytical Data	<i>data manager</i> to Host	o	o
Calibration Analytical Data	<i>data manager</i> to Host	o	x

**Table 7-2**              Messages used in host communication (ASTM)

(1) o = available, x = not available

## Messages transmitted by the data manager

Messages transmitted from *data manager* to the host are shown in the table below. In the following charts:

- [ ] Square brackets indicate an optional segment. (0 - 1 times)
- { } Curly brackets indicate a segment or group of segments that may be repeated. (1 - n times.)

The identifier is set in the Comment or Special Instruction Field (H-11) in the Message Header Record with the reason for the message.

Messages	Syntax / Records	Comment or Special Instructions	Reasons
Inquiry for requested tests	H Q L	TSREQ	Inquiry is made for the requested test just after a rack has passed the ID reader.
Test Selection Information	H P O C L	TSUPL	Test selection upload for a sample as answer to an order query.
Result report	H P O C { R {C} } L	RSUPL RSUPL^REAL RSUPL^BATCH	Reports on the result at the point when the results for the sample have been accumulated, or when the results for the sample have been requested by the host. Transmits results of the selected sample(s) by instruction at the analyzer. First transmission of QC results, from <i>data manager</i> to host. Manual or repeat upload of QC results. Upload of patient sample results in reply to a result query.
Photometry Calibration Result Report	H M-PCR L	PCUPL^REAL	Reports at the point when the photometry calibration results are output.
ISE Calibration Result Report	H M-ICR L	ICUPL^REAL	Reports at the point when the ISE calibration results are output.
Elecsys Calibration Result Report	H M-ECR L	ECUPL^REAL	Reports at the point when the Elecsys calibration results are output.

**Table 7-3** Messages transmitted by the data manager

## Messages transmitted by the host

The *data manager* can receive the following message from a connected LIS.

Messages	Syntax / Records	Comment or Special Instructions	Reasons
Test Selection Information	H P O [C] L	TSDWN	Test selection download for a sample as an answer to a test selection inquiry or as unsolicited test selections send in batch mode by the host
Result Query	H Q L	RSREQ	Inquiry for test results for a given sample ID, sent from host.
Order Query	H Q L	TSREQ	Inquiry for a given sample ID's test selections known to the <i>data manager</i> , sent from host.

**Table 7-4** Messages transmitted by the host

- ⓘ For details of using result and order queries with limited sample lifetimes or expired sample IDs, see:  
*Result query* (p. 47)  
*Order query* (p. 48)  
*Order and result queries with limited sample lifetime* (p. 50).

## Record description

Each record of the ASTM message is divided into fields and subfields.

### Field attributes

Types of attributes held by a field are explained below.

Attribute	Description
Field	The number of the field in the record.
Reference	The paragraph in the ASTM definitions that describes the field. See NCCLS. <i>Specification for Transferring Information Between Clinical Laboratory Instruments and Information Systems: Approved Standard, Second Edition</i> . NCCLS document LIS2-A2 [ISBN 1-56238-550-X]. NCCLS, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2004.
Value	<p>This shows either:</p> <ul style="list-style-type: none"> <li>• The precise text to be sent.</li> <li>• The format of the field.</li> </ul> <p>The format of the field can take one of the following values:</p> <ul style="list-style-type: none"> <li>• <i>Character</i>: A single character.</li> <li>• <i>String</i>: A character string.</li> <li>• <i>Number</i>: A numeric value. Positive (+) or negative (-) is indicated before the numeric value. If it is not indicated, it is treated as positive (+).</li> </ul> <p>If a decimal point is not included, the numeric value is treated as an integer. There are no restrictions for placing '0' in the front and for '0s' placed at the end of numbers with decimal points.</p> <ul style="list-style-type: none"> <li>• <i>Date</i>: Always use the 4-digit Gregorian year. The format is YYYYMMDD (YYYY is the 4-digit Gregorian year, MM is the month, DD is the day). For example, September 5, 2009 is indicated 20090905.</li> <li>• <i>Time</i>: Military time. (24 hour)</li> </ul> <p>The format is HHMMSS (HH is the hour, MM is the minute, and SS is the second).</p> <ul style="list-style-type: none"> <li>• <i>DateTime</i>: A combination of Date and Time.</li> </ul> <p>The format is: YYYYMMDDHHMMSS.</p> <ul style="list-style-type: none"> <li>• <i>Complex</i>: A field in which multiple data components are combined, separated by a component delimiter. Each component may take one of the other formats.</li> </ul>
Host	If sent from the host or LIS, this field is either: <ul style="list-style-type: none"> <li>• R, required</li> <li>• O, optional</li> </ul>
DM	If sent from <i>data manager</i> , this field is either: <ul style="list-style-type: none"> <li>• R, required (in other words, always sent)</li> <li>• O, optional</li> </ul>
Length / Max. Size	If used, the maximum number of characters supported in the field.
Description	A description of the field, including use and permitted values. In the case of complex fields, this includes a description of individual components.

**Table 7-5**

Attributes of a field in an ASTM message

## Text encodings

The data within the message has to be Unicode encoded as UTF-8 characters. For characters from decimal 32 to 127 also ASCII can be used. Characters from 0 to 31 are control characters and therefore not allowed within the ASTM fields.



### The host needs to handle UTF-8

- ▶ In situations where the *data manager* operators will be able to enter UTF-8 characters, the host will have to support UTF-8, or be able to recognize and translate from UTF-8. If necessary, it is possible to prevent operators from entering UTF-8 characters by running the *data manager* in pass-through mode.

Escaping characters as defined for the delimiter characters is not supported (see Header Record, field no. 2). You should bear in mind, that future versions of **cobas**® 8000 data manager may implement further fields or manufacturer-defined records.

## Message Header Record

This record occurs at the front of every message, and shows the sender and receiver and other important general information about the message.

The Host and DM columns indicate whether the data is Required or Optional when sent from the Host or *data manager* respectively.

```
H|^\&|12345||cobas
8000^1.05||||host|TSREQ|P|1|20141026142034|
H|^\&|12345||cobas
8000^1.05||||host|TSUPL|P|1|20141026142034|
H|^\&|12345||cobas
8000^1.05||||host|RSUPL|P|1|20141026142034|
H|^\&|12345||cobas
8000^1.05||||host|RSUPL^REAL|P|1|20141026142034|
H|^\&|12345||cobas
8000^1.05||||host|RSUPL^BATCH|P|1|20141026142034|
H|^\&|12345||cobas
8000^1.05||||host|PCUPL^REAL|P|1|20141026142034|
H|^\&|12345||cobas
8000^1.05||||host|ICUPL^REAL|P|1|20141026142034|
H|^\&|12345||cobas
8000^1.05||||host|ECUPL^REAL|P|1|20141026142034|
H|^\&|12345||host||||cobas
8000^1.05|TSDWN|P|1|20141026142034|
H|^\&|12345||host||||cobas
8000^1.05|RSREQ|P|1|20141026142034|
H|^\&|12345||host||||cobas
8000^1.05|TSREQ|P|1|20141026142034|
```

Field	Ref.	Value	Host	DM	Description
1	6.1	H	R	R	Fixed value, identifying Header record
2	6.2	^\&	R	R	Delimiter definitions. Fixed values: <ul style="list-style-type: none"> <li>•   Field delimiter = vertical bar [ascii 124]</li> <li>• \ Repeat Delimiter = backslash [ascii 92]</li> <li>• ^ Component Delimiter = caret [ascii 94]</li> <li>• &amp; Escape character = ampersand [ascii 38]</li> </ul>
3	6.3	String	O	R	Message Control Identifier to uniquely identify the message. The cobas® 8000 data manager sends the internal message ID as integer number; the host can send any string or number for message identification or leave this field empty.
4	6.4	Field contains no data.			
5	6.5	Complex	-	R	Sender ID. From data manager: Sender^Version <ul style="list-style-type: none"> <li>• <i>Sender</i> is ID for the <i>data manager</i> installation, by default: cobas 8000</li> <li>• To edit the Sender ID, see <i>Configuring the data manager host interface options</i> (p. 62).</li> <li>• <i>Version</i> is the <i>data manager</i> version (numeric value).</li> </ul>
		O	-		Sender ID. If sent, used only for tracing purposes.

**Table 7-6** Message header record

### Roche Diagnostics

## Message Header Record

Field	Ref.	Value	Host	DM	Description																				
6	6.6	<i>Field contains no data.</i>																							
7	6.7	<i>Field contains no data.</i>																							
8	6.8	<i>Field contains no data.</i>																							
9	6.9	<i>Field contains no data.</i>																							
10	6.10	<i>String</i>	O	R	<p>Receiver ID. Fixed value. Sent from <i>data manager</i>, is:</p> <ul style="list-style-type: none"> <li>• Host</li> </ul> <p>Sent from host, it should match the value sent from the <i>data manager</i> in H-5. By default, this is cobas 8000. It is used only for tracing purposes.</p>																				
11	6.11	<i>Complex</i>	R	R	<p>Identifier for the message type and purpose. Format is two strings: <i>Type^Mode</i>.</p> <table> <tr> <td>TSREQ</td> <td>Test selection request, from <i>data manager</i> to host, or from host to <i>data manager</i>.</td> </tr> <tr> <td>TSDWN</td> <td>Test selection download, from host to <i>data manager</i>.</td> </tr> <tr> <td>TSUPL</td> <td>Test selection upload, from <i>data manager</i> to host.</td> </tr> <tr> <td>RSREQ</td> <td>Result request, from host to <i>data manager</i>.</td> </tr> <tr> <td>RSUPL</td> <td>Result upload, from <i>data manager</i> to host.</td> </tr> <tr> <td>RSUPL^REAL</td> <td>First transmission of QC results, from <i>data manager</i> to host (or Patient results in a realtime or batch upload, except as an answer to a result request).</td> </tr> <tr> <td>RSUPL^BATCH</td> <td> <ul style="list-style-type: none"> <li>• Repeat transmission of QC results, from <i>data manager</i> to host.</li> <li>• Patient sample result upload from <i>data manager</i> to host in reply to a result query.</li> </ul> </td> </tr> <tr> <td>PCUPL^REAL</td> <td>Photometry calibration report, from <i>data manager</i> to host.</td> </tr> <tr> <td>ICUPL^REAL</td> <td>ISE calibration report, from <i>data manager</i> to host.</td> </tr> <tr> <td>ECUPL^REAL</td> <td>Elecsys calibration report, from <i>data manager</i> to host.</td> </tr> </table>	TSREQ	Test selection request, from <i>data manager</i> to host, or from host to <i>data manager</i> .	TSDWN	Test selection download, from host to <i>data manager</i> .	TSUPL	Test selection upload, from <i>data manager</i> to host.	RSREQ	Result request, from host to <i>data manager</i> .	RSUPL	Result upload, from <i>data manager</i> to host.	RSUPL^REAL	First transmission of QC results, from <i>data manager</i> to host (or Patient results in a realtime or batch upload, except as an answer to a result request).	RSUPL^BATCH	<ul style="list-style-type: none"> <li>• Repeat transmission of QC results, from <i>data manager</i> to host.</li> <li>• Patient sample result upload from <i>data manager</i> to host in reply to a result query.</li> </ul>	PCUPL^REAL	Photometry calibration report, from <i>data manager</i> to host.	ICUPL^REAL	ISE calibration report, from <i>data manager</i> to host.	ECUPL^REAL	Elecsys calibration report, from <i>data manager</i> to host.
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ICUPL^REAL	ISE calibration report, from <i>data manager</i> to host.																								
ECUPL^REAL	Elecsys calibration report, from <i>data manager</i> to host.																								
12	6.12	P	O	R	Processing ID, fixed value P, meaning production.																				
13	6.13	1	O	R	Protocol version, fixed value 1. (Meaning LIS2-A2.)																				
14	6.14	<i>DateTime</i>	O	R	<p>Time and date the message was created.</p> <p>For a calibration message, the date and time of the calibration.</p>																				

**Table 7-6**

Message header record

## Patient Information Record

This record is used to transfer patient demographic data, such as age and sex.

P|1||SH25111965M||Doe^John||19651125|M|

P|||||^||||

Field	Ref.	Value	Host	DM	Description
1	7.1	P	R	R	Fixed value, identifying a Patient record.
2	7.2	1	R	R	Sequence number, fixed value, showing that only one Patient record is supported per message.
3	7.3	<i>Field contains no data.</i>			
4	7.4	<i>String</i>	O/R	O/R	Laboratory-assigned patient identifier. Max length 16 characters.  This field is mandatory only if some patient demographic data is sent, in other words, if one or more of fields 6, 8, or 9 contain data. If fields 6, 8 and 9 are empty, this field is blank.
5	7.5	<i>Field contains no data.</i>			
6	7.6	<i>Complex</i>	O	O	Patient surname and first name, in separate string components:  <i>Surname^Firstname</i>  Each component has a max length of 30 characters.
7	7.7	<i>Field contains no data.</i>			
8	7.8	<i>Date</i>	O	O	Patient's birthdate. (YYYYMMDD)
9	7.9	<i>Character</i>	O	O	Patient sex: <ul style="list-style-type: none"><li>• M Male</li><li>• F Female</li><li>• U Unknown. Any other value defaults to unknown, and is returned to the host as U.</li></ul>

All following patient record fields contain no data.

**Table 7-7** Patient information record



### The *data manager* supports only M, F, or U for patient sex.

- ▶ For male patients, the host must send M, for females, F. Otherwise the wrong reference range might be applied. The *data manager* reads any other value as U, and applies the reference ranges for a patient of unknown sex.
- ▶ Make sure the host sends only M, F or U, as required. Each new configuration must be tested to ensure the correct data transfer between the *data manager* and the host.

## Order Record

This record holds information regarding the analysis request and sample information. It is sent to the *data manager* within test selection message, and to the host within result message.

*Order record in TS Download* ○|1|500169|^50017^3^^S1^SC|^\*\*\*8706^|R|||||A||||1|||||||  
message |||O

*Order record in Result Upload* ○|1|10005|0^110005^2^^S1^SC^not|\*\*\*989^1\\*\*\*990^1\\*\*\*991  
message ^1|R|20100429161525|20100429161525||||N||||1|||||||||F|

*Order record in Quality Control result message* ○|1|HBCN^611490^1|0^30001^2^^QC^SC^not|\*\*\*870^1|R|||||Q  
result message ||||4|||||||F|

*Order record with sequence number in TS Download* ○|1||1013^50101^3^^S1^SC^not|\*\*\*8571^1\\*\*\*8413^1\\*\*\*8706  
number ^1\R|20110715093311|20110715093311||||A||||1|||||||||O

*Order record with sequence number in Result Upload* ○|1||1013^50101^3^^S1^SC^not|\*\*\*8413^1\\*\*\*8571^1\\*\*\*8706  
number ^1\R|20110715093311|20110715093311||||N||||1|||||||||F|

Field	Ref.	Value	Host	DM	Description
1	8.4.1	○	R	R	Fixed value, identifying an Order record.
2	8.4.2	1	O	R	Sequence number, fixed value, showing that only one Order record is supported per Patient record.
3	8.4.3	String, or for QC, Complex	R/O	R	<p>Identifier for the sample, (sample ID).            For patient results, this is the sample's barcode (string of max. 22 characters padding not allowed). This field is required, when using barcodes. If the patient sample is identified by the sequence number in O-4.1, this field must be empty.</p> <p>( For details of sequence numbers, see <i>Identifying patient samples by sequence number</i> (p. 259).</p> <p>For Quality Control material, <i>Name^Lot^ID</i></p> <ul style="list-style-type: none"> <li>• <i>Name</i> Control name, for example, PNU. (String)</li> <li>• <i>Lot</i> Control lot (Number)</li> <li>• <i>ID</i> Control identifier (a unique control ID contained in <i>data manager</i>). (Number)</li> </ul> <p>Ordering test selections for QC is not possible from host.</p>
4	8.4.4	Complex or Number	R	O/R	<p>Instrument sample identifier, with additional information for identifying the sample.</p> <p><i>Sequence_Number^Rack_ID^Position^^Rack_Type^Container^Diluted</i></p> <p>This field is optional in a message sent in response to an order or result query. Otherwise the field is mandatory.</p> <p>Note: When samples are identified by sequence number, in a Test selection upload from the <i>data manager</i> to the host in response to an order query, this is:</p> <ul style="list-style-type: none"> <li>• <i>Number</i> field, contains the sequence number.</li> </ul>

**Table 7-8**

Order record

Field	Ref.	Value	Host	DM	Description
4.1		Number	O	R	<i>Sequence_Number</i> For patient samples identified by sample ID (default), and QC samples, the <i>data manager</i> sends 0 (zero) in this field, and ignores any value the host sends. For patient samples identified by sequence number, this contains the sequence number. (Max. value = 60,000.) If the host sends a sample ID in O-3, the <i>data manager</i> ignores any value in this field. This field was previously known as "Sample number."
4.2		Number	R/O	R/O	<i>Rack_ID</i> ID of the sample rack with space for 5 samples. Not sent with result records with manually-entered results. Optional for messages from host to <i>data manager</i> , if the sample is identified by sequence number.
4.3		Number	R/O	R/O	<i>Position</i> Sample's position on the rack. Value 1 to 5. Not sent with result records with manually-entered results. Optional for messages from host to <i>data manager</i> , if the sample is identified by sequence number.
4.4		<i>Component contains no data.</i>			
4.5		String	R	R	<i>Rack_Type</i> A two character code, identifying the rack type. <ul style="list-style-type: none"><li>• S1 Serum / Plasma</li><li>• S2 Urine</li><li>• S3 Cerebrospinal Fluid</li><li>• S4 Supernatant</li><li>• S5 Other fluids</li><li>• S6 Whole blood</li><li>• S7 Oral fluids (Saliva)</li><li>• S8 Reserved</li><li>• S9 Reserved</li><li>• SA Reserved</li><li>• QC Quality Control</li></ul> (Note, that this field does not support the S0 used in the Query record.)
4.6		String	R	R	<i>Container</i> A code identifying the container. <ul style="list-style-type: none"><li>• SC Standard cup</li><li>• MC Micro cup</li><li>• NST0 Non-standard tube</li><li>• FBT1 False bottom tube 1</li><li>• FBT2 False bottom tube 2</li><li>• FBT3 False bottom tube 3</li><li>• &lt;Empty&gt; Unknown cup type</li></ul> If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.  For details on how these values are handled, see <i>Sample container types</i> (p. 29)
4.7		String	R	R	<i>Diluted</i> A flag indicating if the sample is diluted or not. <ul style="list-style-type: none"><li>• not Normal sample</li><li>• pre-diluted Prediluted sample</li><li>• (No value) Normal sample</li></ul>

Table 7-8

Order record

## Order Record

Field	Ref.	Value	Host	DM	Description
5	8.4.5	Complex	O	R/O	<p>Testcode with dilution factor.  <math>\wedge\wedge\wedge Testcode^\wedge Dilution</math></p> <p>If the host has no pending test, the host must send a Test Selection Download message with this field empty. In a test selection upload, if the <i>data manager</i> has no information on tests, it will leave this field empty.</p> <p>You can send multiple tests codes in one message by repeating this field, for example:</p> <pre>O 1 1234 0^00083^5^^S1^SC ^***989^1\***990^1\***991^1  S 20101026152611 20101026152611    A    1       O </pre> <p>For serum index tests, you must send all three test types together (lipemic, icteric, and hemolytic), or send a test profile that contains all three. Otherwise the test will not be run.</p> <p> For more details on sending serum index orders, see <i>Sending test selections</i> (p. 47).</p> <p>Orders with invalid (unknown) test codes are handled by the <i>data manager</i> as follows:</p> <ul style="list-style-type: none"> <li>• If an order contains both valid and invalid test codes, the <i>data manager</i> accepts the order but logs an error for each invalid test code.</li> <li>• If an order contains only invalid test codes, the <i>data manager</i> rejects the order.</li> <li>• The rejection of invalid test codes and/or orders is shown in the information window.</li> </ul>
5.1					<i>First component contains no data.</i>
5.2					<i>Second component contains no data.</i>
5.3					<i>Third component contains no data.</i>
5.4		String	R	R	<p>Testcode</p> <p>The fourth component contains the code to identify the test (in other words, the application code or analyte tested for). The maximum length is 5 digits: the <i>data manager</i> takes the last 5 digits and strips any leading zeros.</p> <p>The host can download the test numbers of calculated tests, if the test is programmed on the <i>data manager</i>. For details, see the cobas® 8000 data manager Operator's Manual.</p> <p>If this field contains an invalid code, the test selection will be ignored, and an error shown in the LIS Messages screen of the data manager.</p>
5.5		String (or number)	O	O	<p>Dilution</p> <p>Dilution factor. Sent also by the <i>data manager</i> if available, but the host has to take the dilution from the Result record for the test.</p> <p>The dilution factor is sent as a string:</p> <ul style="list-style-type: none"> <li>• By the host in the Order Record, field 5, component 5.</li> <li>• By the <i>data manager</i> in the Result Record, field 3, component four, in the second part.</li> </ul> <p>Permitted values are:</p> <ul style="list-style-type: none"> <li>• For an ISE module, the only value that can be used is: 1</li> <li>• For a c-module: 1, Inc, Dec, 3, 5, 10, 20, 50.</li> <li>• For an e-module: 1, 2, 5, 10, 20, 50, 100, 400</li> </ul> <p>The value 1 means no dilution. If the host sends an empty field, this defaults to 1.</p>

Table 7-8

Order record

Field	Ref.	Value	Host	DM	Description
6	8.4.6	<i>String</i>	R	O/R	<p>Priority.</p> <ul style="list-style-type: none"> <li>• R Routine</li> <li>• S STAT</li> </ul> <p>STAT samples must be placed in the STAT racks.</p> <p>This field is empty in a result or test selection upload message sent in response to an order or result query. Otherwise the field is mandatory.</p>
7	8.4.7	<i>DateTime</i>	O	O	Date and time of order creation
8	8.4.8	<i>DateTime</i>	O	O	Date and time of sample collection
9	8.4.9	<i>Field contains no data.</i>			
10	8.4.10	<i>Field contains no data.</i>			
11	8.4.11	<i>Field contains no data.</i>			
12	8.4.12	<i>Character</i>	R	R	<p>Action code. This is the action to take in response to the message.</p> <p>From the host:</p> <ul style="list-style-type: none"> <li>• A Add or rerun test</li> <li>• R Add or rerun test</li> <li>• C Cancel test (The test can only be canceled before it has been downloaded to the cobas® 8000 modular analyzer series instrument.)</li> </ul> <p>From the <i>data manager</i>:</p> <ul style="list-style-type: none"> <li>• N Patient result</li> <li>• Q Quality Control result</li> <li>• O Order query response (test selection upload)</li> </ul>
13	8.4.13	<i>Field contains no data.</i>			
14	8.4.14	<i>Field contains no data.</i>			
15	8.4.15	<i>Field contains no data.</i>			
16	8.4.16	<i>Character</i>	R	O/R	<p>Specimen type.</p> <p>The specimen type must match the second character of the rack type (field O-4.5), except for QC samples. Optional only when sent to the host in response to an order or result query. Otherwise mandatory.</p> <p>Note that depending on the version and the modules of the cobas® 8000 modular analyzer series, not all these types may be available on any particular system.</p> <ul style="list-style-type: none"> <li>• 1 Serum / Plasma</li> <li>• 2 Urine</li> <li>• 3 Cerebrospinal Fluid</li> <li>• 4 Supernatant</li> <li>• 5 Other fluids</li> <li>• 6 Whole blood</li> <li>• 7 Oral fluids (Saliva)</li> <li>• 8 Reserved</li> <li>• 9 Reserved</li> <li>• A Reserved</li> </ul> <p>For QC samples, the host should disregard any value in O-16.</p>
17	8.4.17	<i>Field contains no data.</i>			
18	8.4.18	<i>Field contains no data.</i>			
19	8.4.19	<i>Field contains no data.</i>			
20	8.4.20	<i>Field contains no data.</i>			
21	8.4.21	<i>Field contains no data</i>			
22	8.4.22	<i>Field contains no data.</i>			
23	8.4.23	<i>Field contains no data.</i>			

**Table 7-8** Order record

Order Record

Field	Ref.	Value	Host	DM	Description
24	8.4.24	<i>Field contains no data.</i>			
25	8.4.25	<i>Field contains no data.</i>			
26	8.4.26	<i>Character</i>	R	R	Report type, indicating source of message. <ul style="list-style-type: none"><li>• O Sent from host.</li><li>• F Sent from <i>data manager / cobas® 8000 modular analyzer series.</i></li></ul>

**Table 7-8** Order record

## Comment Record (following Order Record)

Record to transfer comments. This record is transmitted by the host (within test selection message) or the *data manager* (within result message or test selection upload). These comments are visible at the Control Unit.

C | 1 | L | Comment1^Comment2^Comment3^Comment4^Comment5 | G



### Special format of cobas® 8000 data manager comment records

- ▶ The format of the comment record is not totally in accordance with the LIS2-A2 standard, in order to keep backwards-compatibility with the cobas® 6000 comment record. The cobas® 6000 comment record was used to transfer patient demographic data.

Field	Ref.	Value	Host	DM	Description
1	10.1	C	R	R	Record Identifier, fixed value.
2	10.2	Number	R	R	Sequence number. Set to 1, as only one comment is permitted after an order record.
3	10.3	Character	R	R	Comment source. A single-character code. From the host, this is always set to L. From the cobas® 8000 data manager, it is set to I.
4	10.4	Complex	O	O	The format (when sent after an order record): <i>comment1^comment2^comment3^comment4^comment5</i> <ul style="list-style-type: none"> <li>• comment1 String with up to 30 characters</li> <li>• comment2 String with up to 25 characters</li> <li>• comment3 String with up to 20 characters</li> <li>• comment4 String with up to 15 characters</li> <li>• comment5 String with up to 10 characters</li> </ul> In HL7, this data is passed in SPM-14.
5	10.5	G	R	R	Code for qualifying the comment record type. Following an order record, this is a fixed value, G, indicating an order comment.

**Table 7-9** Comment record

## Result Record

The *data manager* uses the result record to upload the details of test results.

A quantitative patient result:

```
R|1|^999/1/not|2.3^mmol/L|0.5 - 7.5^TECH\^NORM\^CRIT\  
^USER|N||F||bmsrv^DMROUTINE|20100711163455|2010071116345  
5|ISE^2^MU1#ISE#1#2^4|
```

A qualitative patient result:

```
R|1|^101/1/not|1^2.68|mmol/L|^TECH/\^NORM/\^CRIT/\^USE  
R|N||F||bmsrv^DMROUTINE|20090311163455|20090311163455|IS  
E^2^MU1#ISE#1#2^4^104|
```

For an automatically-validated result, the operator is written as “SYSTEM”:

```
R|3|^991/Inc/not|5.5|mmol/L|4.0 - 44.0^TECH\2.0 - 22.0  
^NORM\3.0 - 33.0^CRIT\1.0 - 11.0^USER|N||F||bmserv^SYSTE  
M|20100718164600|20100729161525|ISE^2^MU1#ISE#1#2^4|
```

For an automatically-validated QC result:

```
R|1|^870/1/not|17.30|g/dL|||F||bmserv^SYSTEM|20100718  
164500|20100729165317|22^1^MU1#c502#2#1^9^0^Current|
```

This shows a result below the EP17-A level of detection:

```
R|1|^989/1/not|2.1|mmol/L|^TECH\9 - 144^NORM\^CRIT\^US  
ER|LoD||F||bmserv^SYSTEM|20100621084348|20100621084404|I  
SE^1^MU1#ISE#1#1^3^28|
```

This shows a result with data point values:

---

```
R|2|^64/1/not|1315^8427\8428\8435\8497\8504\8537\8604\8641\8680\8683\8650\8671\8653\8654\8681\8685  
\\8729\8794\8803\8834\8878\8880\8908\8912\8943\8939\8973\8965\8955\8964\8929\8926\8935\8938\8945\8964  
\\8949\9029\9008\9008\8992\8983\8997\9027\9025\9064\9047\9018\9099\9117\9071\9020\9046\9074\9067\9058  
\\9065\9053\9087\9053\9047\9016\9040\9015\9017\9001\9069\9084\9094\9126\9166\9127\9170\9170\9202\9216  
\\9178\9167\9184\9170\9241\10506\13668\17183\20213\22113\22997\22950\23041\23148\22863\22863\22635\22  
550\22661\22446\22387\22299\22260\22176\22092\21966\22012\21868\21855\21813\21757\21821\21846\21516\21  
21535\21651\21455\21439\21363\21436\21340\21303\21325\21432\21215\21271\21207\21094\21070\21148\2111  
3\21247\21186\21112\21069\21006\20992\20932\20833\20823\20714\20937\20854\20747\20723\20734\20699\20  
750\20928\20744\20704\20715\20654\20605\20639\20718\20455\20480\20411\20390\20578\20554\20572\20653\20  
535\20437\20473\20466\20324\20366\20376\20341\20546\20493\20565\20627\20508\20496\20589\20543\2050  
3\20468\20414\20299\20151\20230\20301\20301\20243\20277\20306\20206\20242\20130\20121\20133\20169\20  
069\20002\20195\20116\20116\20026\20079|count|^TECH\^NORM\^CRIT\^USER|||F||^|20140707092617|20140707  
092617|e602^2^MU1#e602#3#2^12^EFS|
```

---

Field	Ref.	Value	Host	DM	Description
1	9.1	R		R	Record identifier for Result record, fixed value.
2	9.2	<i>Number</i>		R	Sequence number The first result relating to the preceding Order record takes the sequence number 1. The sequence number increments by one for each further result for that Order record.
3	9.3	<i>Complex</i>		R	Test request ^/^/ <i>Testcode/Dilution/Pre-dilution</i> Note that the fourth component is separated into three parts with a forward-slash separator / .
3.1					<i>This component contains no data</i>
3.2					<i>This component contains no data</i>
3.3					<i>This component contains no data</i>
3.4			R	<i>Testcode</i>	<i>String</i> Identifier (or application code) for the test (analyte searched for), used by the cobas® 8000 modular analyzer series. (Max. 5 digits)
			R	<i>Dilution</i>	<i>String</i> Dilution factor, as sent by the cobas® 8000 modular analyzer series instrument. Permitted values are: <ul style="list-style-type: none"><li>• For an ISE module, the only value that can be used is: 1</li><li>• For a c-module: 1, Inc, Dec, 3, 5, 10, 20, 50.</li><li>• For an e-module test: 1, 2, 5, 10, 20, 50, 100, 400</li></ul>
			O	<i>Pre-dilution</i>	<i>String</i> Indicates whether sample is pre-diluted: <ul style="list-style-type: none"><li>• pre-diluted</li><li>• not</li></ul>

**Table 7-10**

Result record

## Result Record

Field	Ref.	Value	Host	DM	Description
4	9.4	<i>Complex</i>		R	Measurement value. The measurement values are only transmitted for patient and QC results. <i>ReportableResult^AdditionalResultValues</i>
<b>Quantitative results:</b>					
4.1		Number		R	<i>Reportable Result</i> The result. A missing result is sent as 7 spaces. (ASCII 32 / 0x20).
4.2		Number		O	<i>Additional Result Values</i> Empty or a qualitative flag.
<b>Qualitative results:</b>					
4.1		Number		R	<i>Reportable Result</i> • For c-module and ISE module: an integer code from -2 to 3 inclusive. • For e-module: an integer code -1 (non-reactive), 0 (border line), 1 (reactive). The codes can be configured on the cobas® 8000 modular analyzer series instrument, under <b>Utility &gt; Application &gt; Range</b> , see <i>cobas® 8000 modular analyzer series Operator's Manual</i> for details
4.2		Number		R	<i>Additional Result Values</i> The quantitative value, like <i>value</i> for a quantitative result. For e-module qualitative results this contains COI.
<b>Data point results:</b>					
4.1		Number		R	<i>Reportable Result</i> The result. A missing result is sent as 7 spaces. (ASCII 32 / 0x20).
4.2		Number		R/O	<i>Additional Result Values</i> Data points. Up to 200 data point values, separated by backslashes (\).
5	9.5	<i>String</i>		R	Units in which result is measured. (for example, mmol/L, etc.) For a data point result, this shows count or COUNT.

**Table 7-10** Result record

Field	Ref.	Value	Host	DM	Description																						
6	9.6	Complex		O	<p>For patient results, reference ranges, if defined. Empty for QC results. Patient results example:</p> <p>0.5 - 7.5^TECH\3.3 - 5.1^NORM\^CRIT\^USER</p> <p>These take the format:</p> <p><i>RangeDefinitionString</i><sup>^</sup><i>TypeOfRange</i></p>																						
	6.1	String		O	<p>The <i>RangeDefinitionString</i> string component can consist of any of the following:</p> <ul style="list-style-type: none"> <li>Two numbers (with or without decimal points) separated by space-hyphen-space, for example,</li> </ul> <p>0.5 - 7.5</p> <p>Note that either or both of these number may potentially be negative, for example,</p> <p>-10 - -7</p> <ul style="list-style-type: none"> <li>A “greater than” or “less than” value, for example,</li> </ul> <p>&lt; 0.1</p> <ul style="list-style-type: none"> <li>A comma-separated string of permissible values, for example,</li> </ul> <p>Y, N, U -, +, ++</p>																						
	6.2	String		O/R	<p>The <i>TypeOfRange</i> string component can consist of any of four values.</p> <ul style="list-style-type: none"> <li>TECH Hard-coded value to indicate “Technical Range”</li> <li>NORM Hard-coded value to indicate “Normal Range”</li> <li>CRIT Hard-coded value to indicate “Critical Range”</li> <li>USER Hard-coded value to indicate “User-defined Range”</li> </ul> <p>These four values can occur in the same record as a repeat field, for example:</p> <p>0.5 - 7.5^TECH\3.3 - 5.1^NORM\^CRIT\^USER</p> <p>Note that the different ranges are separated with the repeat delimiter, a backslash “\”. If a range is not defined, the <i>RangeDefinitionString</i> is blank.</p>																						
7	9.7	String		O	<p>Result abnormal flags for patient results. This is empty for manually-edited results.</p> <table> <tr><td>HH</td><td>Above high critical value</td></tr> <tr><td>H</td><td>Above high normal value</td></tr> <tr><td>N</td><td>Normal</td></tr> <tr><td>L</td><td>Below low normal value</td></tr> <tr><td>LL</td><td>Below low critical value</td></tr> <tr><td>A</td><td>Alphanumeric result out of normal range</td></tr> <tr><td>AA</td><td>Alphanumeric result out of critical range</td></tr> <tr><td>LoB</td><td>Below the Limit of Blank</td></tr> <tr><td>LoD</td><td>Below the Limit of Detection</td></tr> <tr><td>LoQ</td><td>Below the Limit of Quantitation</td></tr> <tr><td></td><td>No data signifies that no validation against ranges has been performed.</td></tr> </table> <p>If more than one flag is triggered, only the most extreme flag is sent. The EP17-A flags, LoB, LoD, and LoQ take precedence over the others.</p> <p> For further details on the EP17-A flags, see <i>EP17-A and the result abnormal flags</i> (p. 42).</p>	HH	Above high critical value	H	Above high normal value	N	Normal	L	Below low normal value	LL	Below low critical value	A	Alphanumeric result out of normal range	AA	Alphanumeric result out of critical range	LoB	Below the Limit of Blank	LoD	Below the Limit of Detection	LoQ	Below the Limit of Quantitation		No data signifies that no validation against ranges has been performed.
HH	Above high critical value																										
H	Above high normal value																										
N	Normal																										
L	Below low normal value																										
LL	Below low critical value																										
A	Alphanumeric result out of normal range																										
AA	Alphanumeric result out of critical range																										
LoB	Below the Limit of Blank																										
LoD	Below the Limit of Detection																										
LoQ	Below the Limit of Quantitation																										
	No data signifies that no validation against ranges has been performed.																										
8	9.8	Field contains no data.																									

**Table 7-10** Result record

## Result Record

Field	Ref.	Value	Host	DM	Description
9	9.9	<i>Character</i>		R	<p>Result status. This can take:</p> <ul style="list-style-type: none"> <li>• F = First run result, or QC result</li> <li>• C = Corrected result</li> <li>• M = Manually edited result</li> <li>• X = Calculated test, but test could not be calculated (for example, divided by zero)</li> </ul>
10	9.10	<i>Field contains no data.</i>			
11	9.11	<i>Complex</i>		R	<p>Active operators in the format:  <i>Instrument operator^Datamanager operator</i></p>
	11.1	<i>String</i>		R	<ul style="list-style-type: none"> <li>• <i>Instrument operator</i>            This is the username the operator used to log into the Control Unit. Empty in the case of a manual or calculated result.</li> </ul>
	11.2	<i>String</i>		R	<ul style="list-style-type: none"> <li>• <i>Datamanager operator</i>            This is the username the operator used to log into the <i>data manager</i>. If the result is automatically validated, or the <i>data manager</i> is in pass-through mode, this reads SYSTEM.</li> </ul>
12	9.12	<i>DateTime</i>		O	<p>Pipetting time. This is considered to be the time the test started. (Format: YYYYMMDDhhmmss.)</p> <p><b>Note:</b> For manual and calculated tests, this field is empty.</p>
13	9.13	<i>DateTime</i>		R	<p>Completion time. This is the time the result is available (in other words, time of validation at the <i>data manager</i>). (Format: YYYYMMDDhhmmss.)</p>

**Table 7-10** Result record

Field	Ref.	Value	Host	DM	Description
14	9.14	Complex		R	<p>Identifier of the measurement unit or module that performed the test.</p> <p><i>ModuleType^SubModule^AnalyticalUnitID^InstrumentID^CalID^Bottle^SBNo</i></p>
14.1		String		R	<p><i>ModuleType</i></p> <ul style="list-style-type: none"> <li>• c502, c701, e602, ISE, c702, for results from measuring modules, or manual results entered on behalf of a specific module.</li> <li>• DM for results calculated on the <i>data manager</i>, and for manual results entered on the <i>data manager</i>, but cannot be attributed to a module.</li> <li>• c8000 for results from the cobas® 8000 modular analyzer series that cannot be mapped to an actual measuring submodule, for example, sample short.</li> </ul>
14.2		Number		R	<p><i>SubModule</i></p> <ul style="list-style-type: none"> <li>• 1 or 2, for result from a submodule.</li> <li>• 0 (zero) otherwise.</li> </ul>
14.3		String		R	<p><i>AnalyticalUnitID</i></p> <p>Identifier for the module, as sent to the host. This setting is configurable in the cobas® 8000 data manager in the definition of the module, under the heading <b>ID sent to Host</b> (meaning the identifier that the instrument sends to the host). The default value is:</p> <p><i>Instrument#ModuleType#Position#SubModule</i></p> <p>Example: MU1#c502#2#1</p> <p>For details, see below, <i>Identifier of the analytical unit sent to host</i> (p. 71).</p>
14.4		Number		R	<p><i>InstrumentID</i></p> <p>Instrument number in <i>data manager</i> (A specific identifier inside the <i>data manager</i> which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)</p>
14.5		Number		R	<p><i>CalID</i></p> <p>Calibration ID. Identifier of the calibration the result refers to, set in the Control Unit. Sent only if available. It is empty for results that do not have a calibration, for example, calculated and manual results.</p> <p>For data point results, contains one of the following codes:</p> <ul style="list-style-type: none"> <li>• EFS Effective signal</li> <li>• EFV Effective voltage</li> <li>• EFC Effective current</li> <li>• PMT PMT spike</li> </ul>
14.6		String		R	<p><i>Bottle</i></p> <p>Used Reagent Set.</p> <ul style="list-style-type: none"> <li>• Current</li> <li>• Standby</li> <li>• (or empty)</li> </ul> <p>Reserved field, only for QC measurements, otherwise empty.</p>
14.7		Number			<p><i>SBNo</i></p> <p>An integer showing the standby bottle number, if used. The standby bottles are numbered sequentially, starting with 1.</p> <p>Reserved field, only for QC measurements, otherwise empty.</p>

**Table 7-10** Result record

## Comment Record (following Result Record)

Record to transfer comments regarding the measured result. This record is transmitted by the *data manager*, either by adding a comment to a result, or by passing on an instrument comment received from the Control Unit. The first record is an instrument flag, and is mandatory.

For a test that did not generate any instrument alarms, the instrument flag is:

C|1|I|0|I|

This is: "C-one-i-zero-i".

An instrument alarm flag is, for example:

C|1|I|23^ISE Sample range over|I|

A comment from the *data manager* is, for example:

C|2|L|Second comment^DMROUTINE^20101026164339|G|

C|3|L|Test done on instrument^DMROUTINE^20101026164238|G|



### Special format of cobas® 8000 data manager comment records

- ▶ The format of the comment record is not totally in accordance with the LIS2-A2 standard, in order to keep backwards-compatibility with the cobas® 6000 comment record.

Field	Ref.	Value	Host	DM	Description
1	10.1	C		R	Record Identifier, fixed value.
2	10.2	Number		R	<p>Sequence number.</p> <p>The first comment relating to the preceding Result record takes the sequence number 1. The sequence number increments by one for each further comment for that Result record. Multiple comment records for a result record are permitted.</p>
3	10.3	Character		R	<p>Comment source:</p> <ul style="list-style-type: none"> <li>• I</li> </ul> <p>Result flag, from the instrument or the <i>data manager</i>.</p> <ul style="list-style-type: none"> <li>• L</li> </ul> <p>The comment was added on the <i>data manager</i>.</p>

**Table 7-11** Comment record

Field	Ref.	Value	Host	DM	Description
4	10.4	Complex		O	This field contains the main part of the comment record. The contents of this field depend on what type of comment the record is sending. The comment type is specified in field 5 below.
<b>Comment Type I</b>					
If the instrument has returned an error flag, the details of the flag are returned in this field.					
<i>Flag^Description</i>					
4.1		Number		Flag	Number showing error status (or alarm status) <ul style="list-style-type: none"> <li>• 0 means no error</li> <li>• a number &gt;0 is an error number.</li> </ul> For details of the error flags, see <i>Data Alarms</i> (p. 217).
4.1		String		Desc	Description of error flag (blank if no error)
<b>Comment Type G after result record</b>					
<i>Text^User^Date</i>					
4.1		String		Text	Comment text
4.2		String		User	User who entered the comment
4.3		Datetime		Date	Creation date and time in datetime format
5	10.5	Character		R	Code for qualifying the comment record type. Comments sent by <i>data manager</i> can have the following types: <ul style="list-style-type: none"> <li>• I Result flag</li> <li>• G Result text comment created in <i>data manager</i>.</li> </ul> The content of the comment is passed in field 4.

**Table 7-11** Comment record

## Query Record (Request Information Record)

The *data manager* and the host both use the Query Record, or Request Information Record, to request a sample's open test selections, in a test selection inquiry message or a order query message (H-11 is TSREQ). It is also used to request test results in a Result Query message (H-11 is RSREQ).

From *data manager* to host:

```
Q|1|^123^0^10001^2^^S1^SC^R1||ALL||||||R|O||  
Q|1|^*****0^10001^2^^S1^SC^R1||ALL||||||R|O||
```

From host to *data manager*:

```
Q|1|^S1^10001|||||||||  
Q|1|^S2^10001|||||||||O|
```

From *data manager* to host with sample identified by sequence number:

```
Q|1|^1013^50101^3^^S1^SC^R1||ALL||||||R|O|
```

From host to *data manager* with sample identified by sequence number:

```
Q|1|^S1^1031|||||||||F|
```

Field	Ref.	Value	Host	DM	Max Size	Description
1	11.1	Q	R	R	1	Record identifier, fixed value.
2	11.2	1	R	R	1	Sequence number. Fixed value, showing that only one query record per message is supported.

**Table 7-12**      Query record

Field	Ref.	Value	Host	DM	Max Size	Description																						
3	11.3	Complex	R	R		Query parameters that identify the required information.																						
		From host to <i>data manager</i> (result or order query):				From host to <i>data manager</i> in a result or order query message: ^Rack_Type^Sample_ID^Sequence_Number Note: If sequence number is used, sample ID must be empty. Otherwise the <i>data manager</i> ignores the sequence number.																						
3.1		The first component contains no data.																										
3.2		String	R	-	2	<p><i>Rack_Type</i></p> <p>The rack type as assigned to a specific specimen type on <i>data manager</i>. Depending on the version and modules installed, not all of these types may be available on any particular system.</p> <table> <tr><td>S1</td><td>Serum</td></tr> <tr><td>S2</td><td>Urine</td></tr> <tr><td>S3</td><td>Cerebrospinal Fluid</td></tr> <tr><td>S4</td><td>Supernatant</td></tr> <tr><td>S5</td><td>Other fluids</td></tr> <tr><td>S6</td><td>Whole blood</td></tr> <tr><td>S7</td><td>Oral Fluids (Saliva)</td></tr> <tr><td>S8</td><td>Reserved</td></tr> <tr><td>S9</td><td>Reserved</td></tr> <tr><td>SA</td><td>Reserved</td></tr> <tr><td>S0</td><td>A rack with no specimen assigned. (Only supported for queries sent by the <i>data manager</i>.)</td></tr> </table>	S1	Serum	S2	Urine	S3	Cerebrospinal Fluid	S4	Supernatant	S5	Other fluids	S6	Whole blood	S7	Oral Fluids (Saliva)	S8	Reserved	S9	Reserved	SA	Reserved	S0	A rack with no specimen assigned. (Only supported for queries sent by the <i>data manager</i> .)
S1	Serum																											
S2	Urine																											
S3	Cerebrospinal Fluid																											
S4	Supernatant																											
S5	Other fluids																											
S6	Whole blood																											
S7	Oral Fluids (Saliva)																											
S8	Reserved																											
S9	Reserved																											
SA	Reserved																											
S0	A rack with no specimen assigned. (Only supported for queries sent by the <i>data manager</i> .)																											
3.3		String	R/-	-	22	<p><i>Sample_ID</i></p> <p>This is the barcode label attached to the sample tube, if used, or the system's sample ID.</p> <p>This must be blank if Q-3.4 contains the sequence number.</p> <p>For details of using result and order queries with limited sample lifetimes or expired sample IDs, see:</p> <ul style="list-style-type: none"> <li><i>Result query</i> (p. 47)</li> <li><i>Order query</i> (p. 48)</li> <li><i>Order and result queries with limited sample lifetime</i> (p. 50).</li> </ul>																						
3.4		Number	R/-	-	5	<p><i>Sequence_Number</i></p> <p>If the sample is identified by sample ID (default), the <i>data manager</i> ignores the value of this field.</p> <p>If the sample is identified by sequence number, this contains the sample's sequence number. (Max. value = 60,000.)</p> <p>To learn how to use this, see <i>Identifying patient samples by sequence number</i> (p. 259).</p> <p>Previously, this field was known as "Sample Number."</p>																						
		The further components contain no data.																										

**Table 7-12** Query record

Field	Ref.	Value	Host	DM	Max Size	Description
		From <i>data manager</i> to host: (test selection query)				From <i>data manager</i> to host in a test selection query message: ^ <sup>Sample_ID</sup> ^ <sup>Sequence_Number</sup> ^ <sup>Rack_ID</sup> ^ <sup>Position</sup> ^ Rack_Type^ <sup>Container</sup> ^ <sup>QueryType</sup>
3.1		<i>The first component contains no data.</i>				
3.2		<i>The second component contains no data.</i>				
3.3		String	-	R/O	22	<i>Sample_ID</i> This is the barcode label attached to the sample tube. This is blank if Q-3.4 contains the sequence number.
3.4		Number	-	R	5	<i>Sequence_Number</i> If the sample is identified by sample ID (default), always set to 0 (zero). If the sample is identified by sequence number, this contains the sample's sequence number. (Max. value = 60,000.)  To learn how to use this, see <i>Identifying patient samples by sequence number</i> (p. 259). Previously, this field was known as "Sample Number."
3.5		String	-	R	5	<i>Rack_ID</i> Identifier of the rack sent by cobas® 8000 modular analyzer series instrument.
3.6		Number	-	R	1	<i>Position</i> The sample's position on the rack sent by the instrument. Takes the value 1 to 5.
3.7		<i>The seventh component contains no data.</i>				
3.8		String	-	R	2	<i>Rack_Type</i> The rack type as assigned to a specific specimen type on <i>data manager</i> . Depending on the version and modules installed, not all of these types may be available on any particular system.
		S1				Serum
		S2				Urine
		S3				Cerebrospinal Fluid
		S4				Supernatant
		S5				Other fluids
		S6				Whole blood
		S7				Oral Fluids (Saliva)
		S8				Reserved
		S9				Reserved
		SA				Reserved
		S0				A rack with no specimen assigned. (Only supported for queries sent by the <i>data manager</i> .)

Table 7-12

Query record

Field	Ref.	Value	Host	DM	Max Size	Description														
3.9		String	-	O	2	<p><i>Container</i></p> <p>A code identifying the container:</p> <table> <tr><td>MC</td><td>Micro cup</td></tr> <tr><td>SC</td><td>Standard cup</td></tr> <tr><td>NSTO</td><td>Non-standard tube</td></tr> <tr><td>FBT1</td><td>False bottom tube 1</td></tr> <tr><td>FBT2</td><td>False bottom tube 2</td></tr> <tr><td>FBT3</td><td>False bottom tube 3</td></tr> <tr><td>&lt;Empty&gt;</td><td>Unknown cup type</td></tr> </table> <p>If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.</p> <p> For details on how these values are handled, see <i>Sample container types</i> (p. 29)</p>	MC	Micro cup	SC	Standard cup	NSTO	Non-standard tube	FBT1	False bottom tube 1	FBT2	False bottom tube 2	FBT3	False bottom tube 3	<Empty>	Unknown cup type
MC	Micro cup																			
SC	Standard cup																			
NSTO	Non-standard tube																			
FBT1	False bottom tube 1																			
FBT2	False bottom tube 2																			
FBT3	False bottom tube 3																			
<Empty>	Unknown cup type																			
3.10		String	-	R	2	<p><i>QueryType</i></p> <p>A two-character code:</p> <table> <tr><td>R1</td><td>Query for 1st measurement</td></tr> <tr><td>R2</td><td>Rerun query</td></tr> </table>	R1	Query for 1st measurement	R2	Rerun query										
R1	Query for 1st measurement																			
R2	Rerun query																			
4	11.4	<i>Field contains no data.</i>																		
5	11.5	ALL	-	R	3	Subselection criteria, fixed value														
6	11.6	<i>Field contains no data.</i>																		
7	11.7	<i>Field contains no data.</i>																		
8	11.8	<i>Field contains no data.</i>																		
9	11.9	<i>Field contains no data.</i>																		
10	11.10	<i>Field contains no data.</i>																		
11	11.11	<i>Field contains no data.</i>																		
12	11.12	Character	-	R	1	<ul style="list-style-type: none"> <li>• R for Routine samples</li> <li>• S for STAT samples (Short Turn-Around Time)</li> </ul>														
13	11.13	Character	-	R	1	<p>The request information status code.</p> <p>If sent from the <i>data manager</i> to the host:</p> <ul style="list-style-type: none"> <li>• O (capital letter O) for “Request for test selections”.</li> </ul> <p>Character      O      -      1      The request information status code.</p> <p>If sent from the host to the <i>data manager</i> in a result inquiry:</p> <ul style="list-style-type: none"> <li>• F = send final results</li> <li>• (empty) = send all results</li> </ul> <p>If sent from the host to the <i>data manager</i> in an order inquiry:</p> <ul style="list-style-type: none"> <li>• O = (capital letter O) send only open orders with no results</li> <li>• (empty) = send all orders</li> </ul>														

Table 7-12

Query record

## Photometric Calibration Result M(PCR)

The *data manager* sends calibration data from the c-module (or photometric module) in the manufacturer-defined Photometric Calibration Result M(PCR) record.

```
M|1|PCR|bmserv|^^^8685|MU1#c701#1#1|16|0|22851^4^22866^2^0^|\24786^-361
^24149^-362^0^|\^^^^^|\^^^^^|\^^^^^|\^^^^^|
```

Field	Ref.	Value	Host	DM	Max Size	Description
1	14	M	-	R	1	Record type ID, fixed value signifying manufacturer record.
2	14	Number	-	R	6	Sequence Number: This record appears as the next layer of the message. In the message's first M(PCR) record, the field value is '1'; the value increments by 1 in each subsequent M(PCR) record in the message.
3	14	PCR	-	R	3	Record Type Sub ID. Set to 'PCR'.
4	14	String	-	R	6	ID of the operator who performed the calibration at the analyzer.
5	14	Complex	-	R	5	Test Code (Application code). ^^^ <i>Testcode</i> The Test Code is a string type. The maximum length of the test code is 5 characters.
6	14	String	-	R	20	ID of the analytical unit (module) the test belongs to. For details, see <i>Identifier of the analytical unit sent to host</i> (p. 71).
7	14	Number	-	R	3	Calibration alarm. For details, see <i>Data Alarms</i> (p. 217).
8	14	Number	-	O	6	Standard deviation value data.
9	14	Complex	-	R		Repeat field of number types. Repeated from STD1 to STD6 for as many as there are.  Format: <i>First Initial Absorbance</i> ^ <i>First Absorbance</i> ^ <i>Second Initial Absorbance</i> ^ <i>Second Absorbance</i> ^ <i>Data Alarm</i> ^ <i>Prozone Value</i>
		Number		R	6	<i>First Initial Absorbance</i>
		Number		R	6	<i>First Absorbance</i>
		Number		R	6	<i>Second Initial Absorbance</i>
		Number		R	6	<i>Second Absorbance</i>
		Number		R	3	<i>Data Alarm</i>
		Number		-	6	<i>Prozone Value</i> Blank: not sent by the cobas® 8000 modular analyzer series. Reserved for future use.

The following fields contain no data.

**Table 7-13** Photometric Calibration Result M(PCR)

## ISE Calibration Result Record - M(ICR)

The *data manager* sends calibration data from the ISE module in the manufacturer-defined ISE Calibration Result M(ICR) record.

```
M|1|ICR|bmserv|MU1#ISE#1#1|Valid|Valid|Valid|0^0^0^0^0^0^0
^0^0^0^0|1^2^3^4^5^6^7^8^9^10|1^2^3^4^5^6^7^8^9^10|-_
32.7^-34.7^-28.4^-30.2^50.4^131.5^147.7^0.0^49.9^-4.7|-_
34.2^-45.5^-24.8^-34.5^56.3^4.76^4.70^0.0^56.2^-_
0.17|136.4^138.5^130.6^134.1^-44.9^89.0^100.3^0.0^-_
45.1^0.7|
```

Field	Ref.	Value	Host	DM	Max Size	Description
1	14	M	R	1		Record type ID, fixed value signifying manufacturer record.
2	14	Number	R	6		Sequence Number: 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	14	ICR	R	3		Record Type Sub ID: set to 'ICR'.
4	14	String	R	6		Operator ID: ID of the operator who performed the calibration at the Control Unit or analyzer.
5	14	String	R	20		Analytical unit ID: ID of the analytical unit (module) the test belongs to.  For details, see <i>Identifier of the analytical unit sent to host</i> (p. 71).
6	14	String	O	7		Na Calibration Alarm: Na test calibration status. <ul style="list-style-type: none"><li>Valid = the calibration was successful.</li><li>Invalid = the calibration was unsuccessful.</li></ul>
7	14	String	O	7		K Calibration Alarm: K test calibration status. <ul style="list-style-type: none"><li>Valid = the calibration was successful.</li><li>Invalid = the calibration was unsuccessful.</li></ul>
8	14	String	O	7		Cl Calibration Alarm: Cl test calibration status. <ul style="list-style-type: none"><li>Valid = the calibration was successful.</li><li>Invalid = the calibration was unsuccessful.</li></ul>
9	14	Complex	R			Na Data Alarm: Na test data alarm.  For details, see <i>ISE data alarms</i> (p. 140).
10	14	Complex	R			K Data Alarm: K test data alarm.  For details, see <i>ISE data alarms</i> (p. 140).
11	14	Complex	R			Cl Data Alarm: Cl test data alarm.  For details, see <i>ISE data alarms</i> (p. 140).
12	14	Complex	R			Na Data: Na test calibration analytical data.  For details, see <i>ISE calibration analytical data</i> (p. 140).
13	14	Complex	R			K Data: K test calibration analytical data.  For details, see <i>ISE calibration analytical data</i> (p. 140).
14	14	Complex	R			Cl Data: Cl test calibration analytical data.  For details, see <i>ISE calibration analytical data</i> (p. 140).

**Table 7-14** ISE Calibration Result Record - M(ICR)

## ISE data alarms

The data alarms from the ISE calibration are passed in the following fields.

<b>Na (Sodium)</b>	Field 9
<b>K (Potassium)</b>	Field 10
<b>Cl (Chlorine)</b>	Field 11

Each of these fields is a complex type, and contains 10 number type components.

Each component is a *Number* type, max. length 3.

*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^*  
*Carryover rate alarm^*  
*Calculation slope value alarm^*  
*Numbers for compensation data alarm*

## ISE calibration analytical data

The analytical data from the ISE calibration is passed in the following fields.

<b>Na (Sodium)</b>	Field 12
<b>K (Potassium)</b>	Field 13
<b>Cl (Chlorine)</b>	Field 14

Each of these fields is a complex type and contains 10 number type components.

Each component is a *Number* type, max. length 6.

*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^*  
*Carryover rate^*  
*Calculation slope value^*  
*Numbers for compensations data*

## E-module (immunology) Calibration Result Record - M(ECR)

The *data manager* sends calibration data from the Elecsys immunology e-module in the manufacturer-defined e-module Calibration Result M(ECR) record.

*Example* M|1|ECR|bmserv|^^^1|LotCalibration|MU1#e602#2#1|157328||0|158941|0|I^O^\\M^O^\\S^O^\\R^1.074^\\D^O^\\L^\\F^O^\\Y^O^\\B^O^\\936.337^888.767\\39609.680^39716.950|||||20101018175819|

Field	Ref.	Value	Host	DM	Max Size	Description
1	14	M		R	1	Record type ID, fixed value ‘M’ signifying manufacturer record.
2	14	Number		R	6	<p>Sequence Number:</p> <p>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.</p>
3	14	ECR		R	3	Record Type Sub ID: set to ‘ECR’.
4	14	String		R	6	Operator ID: ID of the operator who performed the calibration at the analyzer.
5	14	Complex		R		<p>Test Code (Application Code), the string identifying the analyte. ^^^<i>TestCode</i></p> <p>The <i>TestCode</i> is a String type, max. length 5.</p>
6	14	String		R	24	<p>Calibration method. Permitted values:</p> <ul style="list-style-type: none"> <li>• NoCalibration</li> <li>• LotCalibration</li> <li>• ContainerCalibration</li> <li>• InheritedLotCalibration</li> <li>• InheritedItemCalibration</li> <li>• UserModifiedCalibration</li> <li>• UnmaskedCalibration</li> <li>• FailedCalibration</li> </ul>
7	14	String	O	20		<p>ID of the analytical unit (module) the test belongs to.</p> <p>( For details, see <i>Identifier of the analytical unit sent to host</i> (p. 71).</p>
8	14	Number	O	8		e Pack Lot No. (Reagent lot number). 1 to 99999999
9	14	Field contains no data.				
10	14	Number	O	1		<p>Expired e Pack Flag</p> <ul style="list-style-type: none"> <li>• 0 Calibration performed with “Not Expired e Pack”</li> <li>• 1 Calibration performed with “Expired e Pack”</li> </ul>
11	14	String	R	8		Calibrator Lot No: although a string type, possible values are 1 to 99999999.
12	14	Character	O	1		<p>Result Status:</p> <ul style="list-style-type: none"> <li>• O OK (Capital letter O)</li> <li>• F Failed</li> </ul>

**Table 7-15** E-module (immunology) Calibration Result Record - M(ECR)

Field	Ref.	Value	Host	DM	Max Size	Description																		
13	14	<i>Complex</i>		O		<p>Result Characteristics. Format:  <math>CharacteristicID^Value^Detail</math></p> <p>This field is often repeated. Each record describes whether a certain calibration characteristic was violated or not. For some characteristics, the actual value is provided. In some cases, the value is empty, depending on whether a test is qualitative or quantitative.</p>																		
13.1		<i>Character</i>		O		<p><math>CharacteristicID</math> This can take one of the following values:</p> <table> <tr><td>I</td><td>Missing Values</td></tr> <tr><td>M</td><td>Monotony of Curve</td></tr> <tr><td>S</td><td>Minimum Signal</td></tr> <tr><td>R</td><td>Calibrator Factor</td></tr> <tr><td>D</td><td>Deviation of Duplicate Measurement</td></tr> <tr><td>F</td><td>Minimum Acceptance Difference</td></tr> <tr><td>Y</td><td>System Error</td></tr> <tr><td>L</td><td>Slope</td></tr> <tr><td>B</td><td>Min./Max. Signal</td></tr> </table>	I	Missing Values	M	Monotony of Curve	S	Minimum Signal	R	Calibrator Factor	D	Deviation of Duplicate Measurement	F	Minimum Acceptance Difference	Y	System Error	L	Slope	B	Min./Max. Signal
I	Missing Values																							
M	Monotony of Curve																							
S	Minimum Signal																							
R	Calibrator Factor																							
D	Deviation of Duplicate Measurement																							
F	Minimum Acceptance Difference																							
Y	System Error																							
L	Slope																							
B	Min./Max. Signal																							
13.2		<i>Number / Character</i>		O	<i>Value</i>	<p><math>Value</math> can have one of the following values:</p> <ul style="list-style-type: none"> <li>• a numeric value, showing the actual value of the result.</li> <li>• O, (Capital letter O) meaning no violation or no failure.</li> <li>• F, meaning a violation or failure.</li> </ul>																		
13.3		-			<i>Detail</i>	<p><i>Details</i> are the details for each calibrated level, but this is not supported in the <i>data manager</i>.</p>																		
14	14	<i>Complex</i>		R		<p>Calibration signal values repeated for two levels.</p> <p>Format:</p> $<Signal1Level1>^<Signal1Level1>\<Signal1Level2>^<Signal2Level2>$ <p>Each value is the numeric value sent by the analyzer.</p>																		
15	14	<i>Field contains no data.</i>																						
16	14	<i>Field contains no data.</i>																						
17	14	<i>Field contains no data.</i>																						
18	14	<i>Field contains no data.</i>																						
19	14	<i>DateTime</i>		O	14	Date and time measurement was performed (YYYYMMDDHHMMSS).																		

**Table 7-15** E-module (immunology) Calibration Result Record - M(ECR)

## Message Termination Record

Use this as the final record in every message, to show that the message is completed.

L | 1 | N

Field	Ref.	Value	Host	DM	Description
1	12.1	L	R	R	Record Identifier, fixed value
2	12.2	1	R	R	Sequence number, fixed value, as there is only ever one termination record in a message.
3	12.3	N	R	R	Termination code. In this case a fixed value, N, meaning normal termination.

**Table 7-16** Message termination record



# HL7 reference

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8	<i>HL7 protocol</i> .....	147
9	<i>HL7 text content</i> .....	153
10	<i>HL7 acknowledgment handling</i> .....	205



# HL7 protocol

This chapter presents the lower layers of the HL7 protocol, as used by cobas® 8000 data manager.

## In this chapter

Chapter **8**

HL7 protocol lower level .....	149
Overview of HL7 .....	150
Physical communication .....	151
Minimal Layer Protocol .....	151



## **HL7 protocol lower level**

This chapter gives a low-level description of the HL7 protocol used to communicate with cobas® 8000 data manager.

## Overview of HL7

HL7 or “Health Level 7” is one of the most comprehensive and widely-used protocols in the healthcare environment. Nevertheless, the standard is so wide and complex that **cobas® 8000 data manager** uses only a subset.

The HL7 Standard currently addresses the interfaces among various systems that send or receive patient admissions/registration, discharge or transfer (ADT) data, queries, resource and patient scheduling, orders, results, clinical observations, billing, master file update information, medical records, scheduling, patient referral, and patient care. It does not try to assume a particular architecture with respect to the placement of data within applications but is designed to support a central patient care system as well as a more distributed environment where data resides in departmental systems.

The **cobas® 8000 data manager** implementation of HL7 is based on v2.5.

## Physical communication

The standard HL7 refers to the highest level of the Open System Interconnection (OSI) model of the International Standards Organization (ISO). The HL7 Standard is primarily focused on the issues that occur within the seventh, or application, level. These are the definitions of the data to be exchanged, the timing of the exchanges, and the communication of certain application-specific errors between the applications. This chapter gives some recommendations for how to use HL7 with cobas® 8000 data manager.

### Minimal Layer Protocol

Data framing is done using the Minimal Layer Protocol (MLP) defined in the HL7 standard, (sometimes referred to as MLLP, Minimal Lower Layer Protocol).

HL7 messages are enclosed by special characters to form a block. The format is as follows:

<start\_block>data<end\_block><CR>

<b>&lt;start_block&gt;</b>	Start Block character (1 byte) ASCII <VT>, in other words, <0x0B>. This should not be confused with the ASCII characters SOH or STX.
<b>data</b>	Data (variable number of bytes) This is the HL7 data content of the block. The data can contain any displayable ASCII characters and the carriage return character, <CR>.
<b>&lt;end_block&gt;</b>	End Block character (1 byte) ASCII <FS>, in other words, <0x1C>. This should not be confused with the ASCII characters ETX or EOT.
<b>&lt;CR&gt;</b>	Carriage Return (1 byte) The ASCII carriage return character, in other words, <0x0D>.

The values used are <VT> for the start block and <FS> for the end block.



**Figure 8-1**

The HL7 data framed according to the HL7 standard.



# HL7 text content

## *HL7 field definitions*

This section describes all the HL7 fields used in messages sent to or from cobas® 8000 data manager.

In this chapter	Chapter
HL7 messages.....	155
Messages sent only by the data manager.....	155
Messages sent only by the host.....	156
Messages sent by either data manager or the host.....	158
HL7 segment description .....	159
HL7 field attributes .....	159
Text encodings.....	160
Message Header Segment - MSH.....	161
Message Acknowledgment Segment - MSA .....	163
Patient Identification Segment - PID.....	164
Specimen Segment - SPM .....	165
SPM in test selections, patient results and quality control results .....	165
SPM in calibration results .....	167
Specimen Container Detail Segment - SAC .....	169
Observation Request Segment - OBR.....	170
Timing Quantity Segment - TQ1 .....	172
Observation Result Segment - OBX (for patient results).....	173
Observation Result Segment - OBX (for QC results).....	178
Observation Result Segment - OBX (for calibration results) .....	181
Measurement of c-module photometric Calibration Results.....	184
Measurement of ISE Calibration Results .....	184
Measurement of e-module immunological Calibration Results.....	186
Calibration alarm flags .....	187
Test Code Detail Segment - TCD.....	189
Substance Identifier Segment - SID .....	190
Comment Segment - NTE .....	191
Types of comment segment .....	191

*Table of contents*

Query Parameter Segment - QPD (for a test selection inquiry) .....	193
Query Parameter Segment - QPD (for a Result Query) .....	195
Query Parameter Segment - QPD (for an Order Query) .....	197
Response Control Parameter Segment - RCP .....	199
Equipment Detail Segment - EQU (from host to data manager) .....	200
Equipment Detail Segment - EQU (from data manager to host) .....	201
Equipment Command Segment - ECD.....	203
Inventory Detail Segment - INV .....	204

## HL7 messages

This section describes the types of HL7 message transferred by the host or *data manager*. In the following charts:

- [ ] Square brackets indicate an optional segment. (0 - 1 times.)
- { } Curly brackets indicate a segment or group of segments that may be optionally repeated. (1 - n times.)

 For more details on message flow and how messages follow each other, see *Communication scenarios* (p. 44).

### Messages sent only by the data manager

Only *data manager* sends the following types of message.

Message	Segments	Message Type	Description
Inquiry for sending test selections	MSH QPD RCP	TSREQ	Inquiry for test selections is made after a rack has passed the ID reader.
Result report	MSH PID SPM SAC { OBR TQ1 { OBX TCD { [SID] } <sup>(1)</sup> { NTE } } <sup>(2)</sup> } <sup>(3)</sup>	OUL^R22 OUL^R22^REAL OUL^R22^BATCH	Reports on the sample results. QC results passed through <i>data manager</i> on reception Manual upload of QC results. Upload of patient sample results in reply to a result query.

**Table 9-1** Structure of HL7 messages sent by the *data manager*

Message	Segments	Message Type	Description
Calibration data	MSH { SPM OBR OBX SID } }	OUL^R22^PCUPL OUL^R22^ICUPL OUL^R22^ECUPL	Reports calibration results.
Equipment Status Update	MSH EQU	ESU^U01	Information about the status of an instrument, sent either unsolicited or in response to an Equipment Status Request.
Equipment Inventory Update	MSH EQU { INV }	INU^U05	Information about the availability of tests, sent in response to an Equipment Inventory Request.

**Table 9-1** Structure of HL7 messages sent by the *data manager*

- (1) For messages containing patient results from the ISE module, no SID segment is sent.
- (2) There may only be multiple OBX segments per OBR in data point result messages.
- (3) There may be multiple OBR segments per PID segment, and multiple SID and NTE segments per OBX segment.

## Messages sent only by the host

The host can send the following types of message.

Message	Segments	Message Type	Description
Result Query	MSH QPD RCP	RSREQ	Inquiry for test results for a given sample ID sent by the host.
Order Query	MSH QPD RCP	TSREQ	Inquiry for all test selections for a given sample ID sent by the host.

**Table 9-2** Structure of HL7 messages sent by the host

Message	Segments	Message Type	Description
Masking	MSH EQU { ECD }	EAC^U07	Instructs <i>data manager</i> to mask or unmask certain tests.
Equipment Status Request	MSH EQU	ESR^U02	Request for information about instrument status. The <i>data manager</i> responds to this message with an Equipment Status Update.
Equipment Inventory Request	MSH EQU	INR^U06	Request for information about test availability. The <i>data manager</i> responds to this message with an Equipment Inventory Update.

**Table 9-2** Structure of HL7 messages sent by the host

- For details of using result and order queries with limited sample lifetimes or expired sample IDs, see:  
*Result query* (p. 47)  
*Order query* (p. 48)  
*Order and result queries with limited sample lifetime* (p. 50).

## Messages sent by either data manager or the host

The *data manager* and a connected LIS can send an Acknowledge message, depending on their HL7 settings.

Either can send a test selection information message.

Message	Segments	Message Type	Description
Acknowledge	MSH MSA	ACK	HL7 Application Acknowledge for incoming orders
Test Selection Information (from host)	MSH PID SPM SAC [ { [TQ1] (1) OBR } }]	OML^O33	Test selection sent by the host for a sample as answer to a test selection inquiry or as unsolicited order.
Test Selection Information (from <i>data manager</i> if sample found)	MSH SPM [ SAC ] [ { [TQ1] (2) OBR } }]	OML^O33	Test selection sent by the <i>data manager</i> as response to an order query.
Test Selection Information (from <i>data manager</i> if sample not found)	MSH SPM	OML^O33	Test selection sent by the <i>data manager</i> as response to an order query.

**Table 9-3** Structure of HL7 messages sent by the *data manager* or the host

(1) TQ1 Segments must be identical for all OBR Segments.

(2) TQ1 Segments must be identical for all OBR Segments.

## HL7 segment description

This section describes the content of the HL7 fields used in communications between the host and the cobas® 8000 data manager.

### HL7 field attributes

Types of attributes held by a field in an HL7 message are explained below.

Attribute	Description
Field	The segment header, and the number of the field in the segment.
Value	<p>This shows either:</p> <ul style="list-style-type: none"> <li>• The precise text to be sent.</li> <li>• The format of the field.</li> </ul> <p>The format of the field can take one of the following values:</p> <ul style="list-style-type: none"> <li>• <i>Character</i>: A single character.</li> <li>• <i>String</i>: A character string.</li> <li>• <i>Number</i>: A numeric value. Positive (+) or negative (-) is indicated before the numeric value. If it is not indicated, it is treated as positive (+).</li> </ul> <p>If a decimal point is not included, the numeric value is treated as an integer. There are no restrictions for placing '0' in the front or for multiple '0' placed at the end of numbers with decimal points.</p> <ul style="list-style-type: none"> <li>• <i>Date</i>: Always use the 4-digit Gregorian year. The format is YYYYMMDD (YYYY is the 4-digit Gregorian year, MM is the month, DD is the day). For example, September 5, 2009 is indicated 20090905.</li> <li>• <i>Time</i>: 24-hour military time.</li> </ul> <p>The format is HHMMSS (HH is the hour, MM is the minute, and SS is the second).</p> <ul style="list-style-type: none"> <li>• <i>DateTime</i>: A combination of Date and Time.</li> </ul> <p>The format is: YYYYMMDDHHMMSS.</p> <ul style="list-style-type: none"> <li>• <i>Complex</i>: A field in which multiple data components are combined, separated by the component delimiter. Each component may take one of the other formats.</li> </ul>
Host	If sent from the host or LIS, this field is either:
	<ul style="list-style-type: none"> <li>• R, required</li> <li>• O, optional</li> </ul>
DM	If sent from <i>data manager</i> , this field is either:
	<ul style="list-style-type: none"> <li>• R, required (always sent)</li> <li>• O, optional</li> </ul>
Description	A description of the field, including use and permitted values. In the case of complex fields, this includes a description of individual components.

Table 9-4

HL7 field attributes

## Text encodings

The data within the message has to be Unicode encoded as UTF-8 characters. For characters from decimal 32 to 127 also ASCII can be used. Characters from 0 to 31 are control characters and therefore not allowed within the HL7 fields.



### The host needs to handle UTF-8

- ▶ In situations where the *data manager* operators will be able to enter UTF-8 characters, the host will have to support UTF-8, or be able to recognize and translate from UTF-8. If necessary, it is possible to prevent operators from entering UTF-8 characters by running the *data manager* in pass-through mode.

Escaping the characters as defined for the delimiter characters is not supported (see Header Segment, field no. 2).

## Message Header Segment - MSH

This segment occurs at the front of every message, and shows the sender and receiver and other important general information about the message.

Host and DM columns indicate whether the data is Required or Optional when sent from the Host or *data manager* respectively.

```
MSH|^~\&|cobas 8000||host||20090402173655||OUL^R22|13007
||2.5||||ER||UNICODE UTF-8|
```

Field	Value	Host	DM	Description
MSH-1		R	R	Field separator, fixed value = vertical bar [124]
MSH-2	^~\&	R	R	<p>Delimiter definitions, fixed value:</p> <ul style="list-style-type: none"> <li>• ^ Component (or sub-field) delimiter = caret [94]</li> <li>• ~ Repeat delimiter = tilde [126]</li> <li>• \ Escape character = backslash [92] (not supported)</li> <li>• &amp; Sub-component (or sub-sub-field) delimiter = ampersand [38]</li> </ul> <p>A carriage return (ASCII 13) marks the end of each segment.</p>
MSH-3	String	-	R	<p>Sending application, by default: cobas 8000</p> <p> To edit this, see <i>Identifying the data manager application to the host</i> (p. 63).</p>
		O	-	Sending identifier, if sent used only for tracing information
MSH-4	<i>Field contains no data.</i>			
MSH-5	String	-	R	Receiving application, fixed value: host
	O	-		Receiving identifier, sent by host for tracing information
MSH-6	<i>Field contains no data.</i>			
MSH-7	DateTime	O	O	<p>Date and time message created.</p> <p>For a calibration message, this contains the datetime of the calibration.</p>
MSH-8	<i>Field contains no data.</i>			
MSH-9	Complex	R	R	<p>Message Type. This is the code that defines the message type, according to the HL7 standard:</p> <ul style="list-style-type: none"> <li>• TSREQ</li> <li>• RSREQ</li> <li>• OML^O33</li> <li>• OUL^R22</li> <li>• EAC^U07</li> <li>• OUL^R22^PCUPL (c-module, or Photometric, Calibration Result)</li> <li>• OUL^R22^ICUPL (ISE Calibration Result)</li> <li>• OUL^R22^ECUPL (e-module, or Immunology, Calibration Result)</li> <li>• ESU^U01^ESU_U01 (Equipment Status Message)</li> <li>• ESR^U02^ESR_U02 (Automated Equipment Status Request)</li> <li>• INU^U05^INU_U05 (Inventory Update Message)</li> <li>• INR^U06^INR_U06 (Automated Equipment Inventory Request)</li> <li>• ACK</li> </ul> <p>In specific circumstances, the following message type codes are sent by the <i>data manager</i>:</p> <ul style="list-style-type: none"> <li>• OUL^R22^REAL (first transmission of the QC results)</li> <li>• OUL^R22^BATCH (repeat transmission of QC results)</li> <li>• OUL^R22^BATCH (patient sample results as a reply to result query)</li> </ul>
MSH-10	String	R	R	Message Control ID that uniquely identifies the message, for example, a sequence number or GUID string (as autogenerated by Microsoft programs to uniquely identify objects etc.).
MSH-11	<i>Field contains no data.</i>			

**Table 9-5** Message header segment - MSH

Message Header Segment - MSH

Field	Value	Host	DM	Description
MSH-12	2.5	O	R	Version ID for HL7 version used, fixed value string.
MSH-13	<i>Field contains no data.</i>			
MSH-14	<i>Field contains no data.</i>			
MSH-15	<i>Field contains no data.</i>			
MSH-16	String	O	R	<p>Application Acknowledgment Type. This field defines the conditions under which the receiver has to respond with an acknowledgment message.</p> <p>This field may contain:</p> <ul style="list-style-type: none"> <li>• AL Always send an acknowledgment message.</li> <li>• SU Send an acknowledgment message only after the message has been successfully processed.</li> <li>• ER Send in error/reject conditions only.</li> <li>• NE Never send an acknowledgment.</li> </ul> <p> The data manager does not support all these options in all situations. For details see <i>HL7 acknowledgment handling</i> (p. 205).</p>
MSH-17	<i>Field contains no data.</i>			
MSH-18	UNICODE UTF-8	O	R	String defining the character set. Fixed value.
<i>Further MSH fields contain no data.</i>				

**Table 9-5** Message header segment - MSH

## Message Acknowledgment Segment - MSA

The host and the *data manager* use the message acknowledgment segment in a acknowledgment message.

```
MSA|AE|38764|ORA-20001: Validation error|
MSA|AA|38764||
```

Field	Value	Host	DM	Description
MSA-1	<i>String</i>	R	R	Acknowledgment code <ul style="list-style-type: none"> <li>• AA Accept. This acknowledges the message is valid and was successfully processed.</li> <li>• AE Error. This indicates that the message sent was not valid in format or content, and could not be processed.</li> <li>• AR Reject. The <i>data manager</i> currently does not send this acknowledgment code.</li> </ul>  For details of acknowledgment handling, see <i>HL7 acknowledgment messages</i> (p. 207).
MSA-2	<i>String</i>	R	R	Message Control ID, from MSH-10 segment of the message that the <i>data manager</i> is acknowledging.
MSA-3	<i>String</i>	O	O	Text message providing potentially useful diagnostic information. This can be generated from various sources, including errors passed from databases or the operating system. The same message is written to the log, where there may be further information.  For details of logging, see <i>Setting logging levels</i> (p. 68).

**Table 9-6** Message acknowledgement segment - MSA

## Patient Identification Segment - PID

The *data manager* uses the patient identification segment to send patient information in a Result Report message. The host uses the patient identification segment to send patient information in a test selection download message.

PID|1|SH25111965M|||Doe^John||19651125|M

PID|1||||^|||

Field	Value	Host	DM	Description
PID-1	1	O	R	Set ID, fixed value number.
PID-2	String	O/R	O/R	Patient ID. This field is mandatory only if some patient demographic data is sent, in other words, if one or more of fields 5, 7, or 8 contain data.
PID-3	<i>Field contains no data.</i>			
PID-4	<i>Field contains no data.</i>			
PID-5	Complex	O	O	Patient last name and first name: Two string components, each max. 30 characters long: <i>Last_name^First_name</i>
PID-6	<i>Field contains no data.</i>			
PID-7	Date	O	O	Date of birth (YYYYMMDD)
PID-8	String	O	O	Sex of patient <ul style="list-style-type: none"> <li>• M Male</li> <li>• F Female</li> <li>• U Unknown. Any other value defaults to unknown, and is returned to the host as U.</li> </ul>

Table 9-7

Patient identification segment



**The *data manager* supports only M, F, or U for patient sex.**

- ▶ For male patients, the host must send M, for females, F. Otherwise the wrong reference range might be applied. The *data manager* reads any other value as U, and applies the reference ranges for a patient of unknown sex.
- ▶ Make sure the host sends only M, F, or U, as required. Each new configuration must be tested to ensure the correct data transfer between the *data manager* and the host.

## Specimen Segment - SPM

The specimen segment in calibration messages is quite different to the specimen segment in test selection messages and patient and quality control result messages.

- ⓘ For the use of the Specimen segment SPM with calibration results, see *SPM in calibration results* (p. 167).
- ⓘ For details of the use of the Specimen segment (SPM) with patient and quality control results, and with test selection downloads, see *Specimen Segment - SPM* (p. 165).

### SPM in test selections, patient results and quality control results

The *data manager* uses the specimen segment to send information about the specimen in a Result Report message, and in a test selection upload message. The host uses the specimen segment to send information about the specimen in a test selection download message.

- ⓘ For the use of the Specimen segment SPM with calibration results, see *SPM in calibration results* (p. 167).

When identifying the sample by sample ID (default):

```
SPM||10005||S1||not|||||P|||^++^|||20100503142217|||||||  
|||SC|
```

When identifying the sample by sequence number:

```
SPM||^1031||S1||not|||||P|||^++^|||20110715085411|||||||  
|||SC
```

For a quality control result:

```
SPM||PNU^123456^301^20111213||S1||not|||||Q|||^++^|||201  
11203142217|||||||SC|
```

Field	Value	Host	DM	Description
SPM-1	<i>Field contains no data.</i>			
SPM-2	<p><i>String</i></p> <p>For QC or sequence numbers: <i>Complex</i></p>	R	R	<p>Sample ID.</p> <p>Patient results when using sample IDs (default)</p> <p>For Patient Results, the number or alphanumeric string read from sample's barcode, (string of max. 22 characters padding not allowed).</p> <p>Note this is a simple string field in this situation.</p> <p>Patient results when the sample is identified by sequence number</p>
SPM-2.1	<i>String</i>	-	-	<i>SampleID</i> If the sample is identified by sequence number, and a sequence number is sent in SPM-2.2, this is empty.
SPM-2.2	<i>Number</i>	R	R	<p><i>Sequence_Number</i> If the sample is identified by sequence number, this contains the sequential number. (Max. value = 60,000.) If the host sends a sample ID in SPM-2.1, the <i>data manager</i> ignores this component.</p> <p> ⓘ For details of sequence numbers, see <i>Identifying patient samples by sequence number</i> (p. 262).</p>

Table 9-8

Specimen Segment - SPM, in test selections, patient results and quality control results

## Specimen Segment - SPM

Field	Value	Host	DM	Description
				Quality control material For Quality Control material, <i>Name^Lot^ID^ExpDate</i>
SPM-2.1	String	O/R	R	<i>Name</i> For Quality Control results, the control name, for example; PNU.
SPM-2.2	Number	-	O/R	<i>Lot</i> Control lot. QC only: not used for patient results.
SPM-2.3	Number	-	O/R	<i>ID</i> Control identifier (a unique control ID contained in <i>data manager</i> ). QC only: not used for patient results.
SPM-2.4	Date		O/R	<i>ExpDate</i> Expiry date of control lot. Format:YYYYMMDD.
				Ordering test solutions for QC is not possible from host. For details of how the sample identifier SPM-2 is used with calibration result messages, see <i>SPM in calibration results</i> (p. 167).
SPM-3	<i>Field contains no data.</i>			
SPM-4	String	R	R	<b>Specimen Type</b> This is a code that identifies the type of specimen. This field is blank for calibration results
	S1	Serum / Plasma		
	S2	Urine		
	S3	Cerebrospinal Fluid		
	S4	Supernatant		
	S5	Other fluids		
	S6	Whole blood		
	S7	Oral fluids (Saliva)		
	S8	Reserved for future use		
	S9	Reserved for future use		
	SA	Reserved for future use		
		Depending on the version and modules installed, not all of these types may be available on any particular system.		
		For QC samples, the host should disregard any value in this field.		
SPM-5	<i>Field contains no data.</i>			
SPM-6	String	O	O	<b>Specimen Additives.</b> <ul style="list-style-type: none"><li>• not</li><li>Not a prediluted sample</li><li>• pre-diluted</li><li>Prediluted sample</li><li>• Empty in a test selection upload in response to an order query.</li></ul>
SPM-7	<i>Field contains no data.</i>			
SPM-8	<i>Field contains no data.</i>			
SPM-9	<i>Field contains no data.</i>			
SPM-10	<i>Field contains no data.</i>			
SPM-11	Character	O	O	<b>Specimen role.</b> This is a code that identifies what purpose the specimen is used for. <ul style="list-style-type: none"><li>• P, meaning patient result.</li><li>• Q, meaning quality control result. (Only sent by <i>data manager</i>)</li><li>• Empty in a test selection upload in response to an order query.</li></ul>
SPM-12	<i>Field contains no data.</i>			
SPM-13	<i>Field contains no data.</i>			

**Table 9-8** Specimen Segment - SPM, in test selections, patient results and quality control results

Field	Value	Host	DM	Description
SPM-14	Complex	O	O	<p>Specimen description in format:  <math>C1^C2^C3^C4^C5</math></p> <ul style="list-style-type: none"> <li>• <math>C1</math> Sample Comment 1. String with up to 30 characters</li> <li>• <math>C2</math> Sample Comment 2. String with up to 25 characters</li> <li>• <math>C3</math> Sample Comment 3. String with up to 20 characters</li> <li>• <math>C4</math> Sample Comment 4. String with up to 15 characters</li> <li>• <math>C5</math> Sample Comment 5. String with up to 10 characters</li> </ul> <p>These comments are visible on the Control Unit.  In ASTM this data is transferred in the Comment Record that follows the Order record.</p>
SPM-15	<i>Field contains no data.</i>			
SPM-16	<i>Field contains no data.</i>			
SPM-17	DateTime	O	O	Specimen collection date / time. (YYYYMMDDHHMMSS)
SPM-18	<i>Field contains no data.</i>			
SPM-19	<i>Field contains no data.</i>			
SPM-20	<i>Field contains no data.</i>			
SPM-21	<i>Field contains no data.</i>			
SPM-22	<i>Field contains no data.</i>			
SPM-23	<i>Field contains no data.</i>			
SPM-24	<i>Field contains no data.</i>			
SPM-25	<i>Field contains no data.</i>			
SPM-26	<i>Field contains no data.</i>			
SPM-27	String	O	R	<p>Container type.</p> <ul style="list-style-type: none"> <li>• SC Standard cup</li> <li>• MC Micro cup</li> <li>• NST0 Non-standard tube</li> <li>• FBT1 False Bottom Tube 1</li> <li>• FBT2 False Bottom Tube 2</li> <li>• FBT3 False Bottom Tube 3</li> <li>• &lt;Empty&gt; Unknown cup type</li> </ul> <p>If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.</p> <p>( For details on how these values are handled, see <i>Sample container types</i> (p. 29))</p>

**Table 9-8** Specimen Segment - SPM, in test selections, patient results and quality control results

## SPM in calibration results

The *data manager* uses the specimen segment in a calibration result message to send information about the specimen.

SPM||1^888888^901^1^20111130|||||||C^P|

( For details of the use of the Specimen segment (SPM) with patient and quality control results, see *Specimen Segment - SPM* (p. 165).

Field	Value	Host	DM	Description
SPM-1	<i>Field contains no data.</i>			
SPM-2	<i>Complex</i>	-	O/R	Identifier for the sample.  For c-module and e-module calibration materials, <i>Level^Lot^Code^Count^ExpDate</i>
SPM-2.1	<i>Number</i>	-	O/R	<i>Level</i> Calibrator level
SPM-2.2	<i>Number</i>	-	O/R	<i>Lot</i> Calibrator lot
SPM-2.3	<i>Number</i>	-	O/R	<i>Code</i> Calibrator material code
SPM-2.4	<i>Number</i>	-	O/R	<i>Count</i> The calibrator bottle count number
SPM-2.5	<i>Date</i>	-	O/R	<i>ExpDate</i> Expiry date of control lot. Format: YYYYMMDD.  This is a required field, except for ISE calibration results, when it is always empty.
				It is not possible to order test selections for calibration material from the host.
SPM-3	<i>Field contains no data.</i>			
SPM-4	<i>Field contains no data</i>			
SPM-5	<i>Field contains no data.</i>			
SPM-6	<i>Field contains no data.</i>			
SPM-7	<i>Field contains no data.</i>			
SPM-8	<i>Field contains no data.</i>			
SPM-9	<i>Field contains no data.</i>			
SPM-10	<i>Field contains no data.</i>			
SPM-11	<i>Complex</i>	-	R	Specimen role. This is a code that identifies what purpose the specimen is used for.  C^P C-module (Photometric) Calibration C^I ISE module Calibration C^E E-module (Immunological) Calibration
SPM-12	<i>Field contains no data.</i>			
SPM-13	<i>Field contains no data.</i>			
SPM-14	<i>Field contains no data.</i>			
SPM-15	<i>Field contains no data.</i>			
SPM-16	<i>Field contains no data.</i>			
SPM-17	<i>DateTime</i>	-	O	Specimen collection date / time. (YYYYMMDDHHMMSS)  <i>Further SPM fields contain no data for calibration results.</i>

**Table 9-9** SPM in calibration results

## Specimen Container Detail Segment - SAC

The *data manager* uses the specimen container detail (SAC) segment to identify the location of the sample's container in a result report or in a test selection request message.

The host uses the specimen container detail (SAC) segment to identify the location of the sample's container in a test selection download message. The host sends this information if it has it, for example if a pre-analytic system is being used, or if it has received it from the *data manager*, for example in the response to a query.

SAC|||||||50042|2|

Field	Value	Host	DM	Description
SAC-1	<i>Field contains no data.</i>			
SAC-2	<i>Field contains no data.</i>			
SAC-3	<i>Field contains no data.</i>			
SAC-4	<i>Field contains no data.</i>			
SAC-5	<i>Field contains no data.</i>			
SAC-6	<i>Field contains no data.</i>			
SAC-7	<i>Field contains no data.</i>			
SAC-8	<i>Field contains no data.</i>			
SAC-9	<i>Field contains no data.</i>			
SAC-10	<i>String</i>	O	O	Rack ID as displayed on the Control Unit. (Uploaded to host only if known to <i>data manager</i> .)
SAC-11	<i>String</i>	O	O	Position in rack. (Last known position, where available.)

**Table 9-10** Specimen container detail segment - SAC

## Observation Request Segment - OBR

The *data manager* uses the observation request segment in a result report message or a test selection upload message. The host uses the observation request segment in a test selection download message.

OBR|1|||989^||||||A

OBR|4|||8717^Inc||||||A

Field	Value	Host	DM	Description
OBR-1	<i>Number</i>	O	O	Set ID. The first segment is 1, then increments by 1 for each subsequent OBR segment.
OBR-2	<i>Field contains no data.</i>			
OBR-3	<i>Field contains no data.</i>			
OBR-4	<i>Complex</i>	R	R	Universal service identifier (identifies the test or analyte tested for, often called the “testcode” or “application code”). If sent from the host, it also includes the dilution factor.  <i>Testcode^Dilution</i>
OBR-4.1	<i>String</i>	R	R	<p><i>Testcode</i> Test code (application code), that identifies the test. The host can download the test numbers of calculated tests, if the test is programmed on the <i>data manager</i>. For details, see the cobas® 8000 data manager Operator’s Manual.</p> <p>For serum index tests, you must send all three test types together (lipemic, icteric, and hemolytic), or send a test profile that contains all three. Otherwise the test will not be run.</p> <p> For more details on sending serum index orders, see <i>Sending test selections</i> (p. 47).</p> <p>Orders with invalid (unknown) test codes are handled by the <i>data manager</i> as follows:</p> <ul style="list-style-type: none"> <li>If an order contains both valid and invalid test codes, the <i>data manager</i> accepts the order but logs an error for each invalid test code.</li> <li>If an order contains only invalid test codes, the <i>data manager</i> rejects the order.</li> <li>The rejection of invalid test codes and/or orders is shown in the information window.</li> </ul>
OBR-4.2	<i>String</i>	O	-	<p><i>Dilution</i> Dilution factor.</p> <p>Permitted values are:</p> <ul style="list-style-type: none"> <li>For an ISE module, the only permitted factor is 1, meaning no dilution.</li> <li>For a c-module: 1, Inc, Dec, 3, 5, 10, 20, 50.</li> <li>For an e-module (immunoassay): 1, 2, 5, 10, 20, 50, 100, 400</li> </ul> <p>No dilution can also be indicated with an empty code.</p>
OBR-5	<i>Field contains no data.</i>			
OBR-6	<i>Field contains no data.</i>			
OBR-7	<i>Field contains no data.</i>			
OBR-8	<i>Field contains no data.</i>			
OBR-9	<i>Field contains no data.</i>			

**Table 9-11** Observation request segment - OBR

Field	Value	Host	DM	Description
OBR-10				<i>Field contains no data.</i>
OBR-11	<i>String</i>	R	-	Action code sent by host: <ul style="list-style-type: none"><li>• A Add test, or rerun test if it already exists.</li><li>• R Rerun test (NB: different from HL7 definitions), or add test, if it does not exist.</li><li>• C Cancel test</li></ul>

*The other OBR fields contain no data.*

**Table 9-11** Observation request segment - OBR

## Timing Quantity Segment - TQ1

The *data manager* uses this segment in a test selection message (optionally) and in a result report message. The host uses this segment in a test selection messages (optionally).

TQ1|1|||||||R|

Field	Value	Host	DM	Description
TQ1-1	1	O	R	Set ID. Fixed value number.
TQ1-2	<i>Field contains no data.</i>			
TQ1-3	<i>Field contains no data.</i>			
TQ1-4	<i>Field contains no data.</i>			
TQ1-5	<i>Field contains no data.</i>			
TQ1-6	<i>Field contains no data.</i>			
TQ1-7	<i>Field contains no data.</i>			
TQ1-8	<i>Field contains no data.</i>			
TQ1-9	String	R	R	Priority <ul style="list-style-type: none"> <li>• S STAT sample. STAT samples must be placed on a STAT rack.</li> <li>• R Routine sample (default)</li> </ul>

**Table 9-12** Timing quantity segment - TG1

## Observation Result Segment - OBX (for patient results)

This section describes how the *data manager* uses the observation result segment (OBX) in a result report message to send the results of patient tests.

- For details of how the *data manager* uses OBX with quality control results, see *Observation Result Segment - OBX (for QC results)* (p. 178).
- For details of how the *data manager* uses OBX with calibration results, see *Observation Result Segment - OBX (for calibration results)* (p. 181).

**Patient result examples** OBX|1||990||0.99|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101020095905|bmserv^SYSTEM||128|ISE^2^MU1#ISE#1#2^4|20101020095921|

OBX|3||8717||1^-0.02|mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101019175614|bmserv^SYSTEM||77|c701^1^MU1#c701#1#1^6|20101019180627|

An observation result segment for a result below the EP17-A level of detection:

OBX|1||989||2.1|mmol/L|^TECH~12 - 144^NORM~^CRIT~^USER|L|O||||F|||20100621084348|bmserv^SYSTEM||28|ISE^1^MU1#ISE#1#1^3|20100621084404|

An observation result segment with data point values:

OBX|2||64||1315^8427&8428&8435&8497&8504&8537&8604&8641&8680&8683&8650&8671&8653&8654&8681&8685&8729&8794&8803&8834&8878&8880&8908&8912&8943&8939&8973&8965&8955&8964&8929&8926&8935&8938&8945&8964&8949&9029&9008&9008&8992&8983&8997&9027&9025&9064&9047&9018&9099&9117&9071&9020&9046&9074&9067&9058&9065&9053&9087&9053&9047&9016&9040&9015&9017&9001&9069&9084&9094&9126&9166&9127&9170&9170&9202&9216&9178&9167&9184&9170&9241&10506&13668&17183&20213&22113&22997&22950&23041&23148&22863&22863&22635&22550&22661&22446&22387&22299&22260&22176&22092&21966&22012&21868&21855&21813&21757&21821&21846&21516&21535&21651&21455&21439&21363&21436&21340&21303&21325&21432&21215&21271&21207&21094&21070&21148&21113&21247&21186&21112&21069&21006&20992&20932&20833&20823&20714&20937&20854&20747&20723&20734&20699&20750&20928&20744&20704&20715&20654&20605&20639&20718&20455&20480&20411&20390&20578&20554&20572&20653&20535&20437&20473&20466&20324&20366&20376&20341&20546&20493&20565&20627&20508&20496&20589&20543&20503&20468&20414&20299&20151&20230&20301&20301&20243&20277&20306&20206&20242&20130&20121&20133&20169&20069&20002&20195&20116&20116&20026&20079|count|^TECH~^NORM~^CRIT~^USER||||F|||20140707092617|||EFS|e602^2^MU1#e602#3#2^12|20140707092617|

Field	Value	Host	DM	Description
OBX-1	Number	-	R	Set ID. The first segment in a set has the value 1. For each subsequent segment in the set, this value increments by 1.
OBX-2	Field contains no data.			
OBX-3	String	-	R	The test code. (Observation identifier, or Application code.) This identifies the test or analyte which this message relates to.
OBX-4	Field contains no data.			

**Table 9-13** Observation Result Segment - OBX (for patient results)

Observation Result Segment - OBX (for patient results)

Field	Value	Host	DM	Description
OBX-5	<i>Complex</i>	-	R	<p>Result value The result values are only transmitted for patient and QC results.</p> <p><i>ReportableResult</i><sup>^</sup><i>AdditionalResultValues</i></p> <p>Quantitative results:</p> <ul style="list-style-type: none"> <li>• <i>ReportableResult</i> The result. A missing result is sent as 7 spaces. (ASCII 32 / 0x20).</li> <li>• <i>AdditionalResultValues</i> Empty or a qualitative flag.</li> </ul> <p>Qualitative results:</p> <ul style="list-style-type: none"> <li>• <i>ReportableResult</i></li> </ul> <p>For c-module and ISE module: an integer code from -2 to 3 inclusive.</p> <p>For e-module: an integer code -1 (non-reactive), 0 (border line), 1 (reactive). The codes can be configured on the cobas® 8000 modular analyzer series instrument under <b>Utility &gt; Application &gt; Range</b>. See <i>cobas® 8000 data manager Operator's Manual</i> for details.</p> <ul style="list-style-type: none"> <li>• <i>AdditionalResultValues</i></li> </ul> <p>The quantitative result, like <i>value</i> for a quantitative result. For e-module qualitative results this contains COI.</p> <p>Data point results:</p> <ul style="list-style-type: none"> <li>• <i>ReportableResult</i> The result. A missing result is sent as 7 spaces. (ASCII 32 / 0x20).</li> <li>• <i>AdditionalResultValues</i> Data points. Up to 200 data point values, separated by ampersands (&amp;).</li> </ul>
OBX-6	<i>String</i>	-	R	<p>Units of measurement used for measuring the result For a data point result, this shows count or COUNT.</p>

**Table 9-13** Observation Result Segment - OBX (for patient results)

Field	Value	Host	DM	Description
OBX-7	Complex	-	R	<p>Reference ranges, if defined. For patient results, this consists of two strings:</p> <p><i>RangeDefinitionString</i><sup>~</sup><i>TypeOfRange</i></p> <p>These can occur as a repeated field, for example:</p> <p>0.5 ~ 7.5<sup>~</sup>TECH<sup>~</sup>3.3 ~ 5.1<sup>~</sup>NORM<sup>~</sup><sup>~</sup>CRIT<sup>~</sup><sup>~</sup>USER</p> <p>If a range is not defined, the <i>RangeDefinitionString</i> is blank.</p> <p>A required field for patient results.</p>
OBX-7.1	String	-	O	<p>The <i>RangeDefinitionString</i> string component can consist of any of the following:</p> <ul style="list-style-type: none"> <li>Two numbers (with or without decimal points) separated by space-hyphen-space, for example,</li> </ul> <p>0.5 ~ 7.5</p> <p>Note that either or both of these number may potentially be negative, for example,</p> <p>-10 ~ -7</p> <ul style="list-style-type: none"> <li>A “greater than” or “less than” value, for example,</li> </ul> <p>&lt; 0.1</p> <ul style="list-style-type: none"> <li>A comma-separated string of permissible values, for example,</li> </ul> <p>Y, N, U</p> <p>-,+,++</p>
OBX-7.2	String	-	O/R	<p>The <i>TypeOfRange</i> string component can consist of any of four values.</p> <ul style="list-style-type: none"> <li>TECH Hard-coded value to indicate “Technical Range”</li> <li>NORM Hard-coded value to indicate “Normal Range”</li> <li>CRIT Hard-coded value to indicate “Critical Range”</li> <li>USER Hard-coded value to indicate “User Range”</li> </ul> <p>Note that the different ranges are separated with the repeat delimiter, a tilde “~”. If a range is not defined, the <i>RangeDefinitionString</i> is blank.</p> <p> For QC and calibration results, see <i>Observation Result Segment - OBX (for QC results)</i> (p. 178) or <i>Observation Result Segment - OBX (for calibration results)</i> (p. 181).</p>

**Table 9-13** Observation Result Segment - OBX (for patient results)

Observation Result Segment - OBX (for patient results)

Field	Value	Host	DM	Description																				
OBX-8	String	-	O	<p>Abnormal flags. This gives a code that identifies if the result is normal or abnormal.</p> <p>This field is blank for manually-edited and QC results.</p> <table> <tr><td>HH</td><td>Above high critical value</td></tr> <tr><td>H</td><td>Above high normal value</td></tr> <tr><td>N</td><td>Normal</td></tr> <tr><td>L</td><td>Below low normal value</td></tr> <tr><td>LL</td><td>Below low critical value</td></tr> <tr><td>A</td><td>Alphanumeric result out of normal range</td></tr> <tr><td>AA</td><td>Alphanumeric result out of critical range</td></tr> <tr><td>LoB</td><td>Below the Limit of Blank. (Enhancement to HL7.)</td></tr> <tr><td>LoD</td><td>Below the Limit of Detection. (Enhancement to HL7.)</td></tr> <tr><td>LoQ</td><td>Below the Limit of Quantitation. (Enhancement to HL7.)</td></tr> </table> <p>No data signifies that no validation against ranges has been performed.</p> <p>If more than one flag is triggered, only the most extreme flag is sent. The EP17-A flags, LoB, LoD, and LoQ take precedence over the others.</p> <p>For further details on the EP17-A flags, see <i>EP17-A and the result abnormal flags</i> (p. 42).</p>	HH	Above high critical value	H	Above high normal value	N	Normal	L	Below low normal value	LL	Below low critical value	A	Alphanumeric result out of normal range	AA	Alphanumeric result out of critical range	LoB	Below the Limit of Blank. (Enhancement to HL7.)	LoD	Below the Limit of Detection. (Enhancement to HL7.)	LoQ	Below the Limit of Quantitation. (Enhancement to HL7.)
HH	Above high critical value																							
H	Above high normal value																							
N	Normal																							
L	Below low normal value																							
LL	Below low critical value																							
A	Alphanumeric result out of normal range																							
AA	Alphanumeric result out of critical range																							
LoB	Below the Limit of Blank. (Enhancement to HL7.)																							
LoD	Below the Limit of Detection. (Enhancement to HL7.)																							
LoQ	Below the Limit of Quantitation. (Enhancement to HL7.)																							
OBX-9	<i>Field contains no data.</i>																							
OBX-10	<i>Field contains no data.</i>																							
OBX-11	String	-	R	<p>Result status</p> <ul style="list-style-type: none"> <li>F First run result, or QC or calibration result</li> <li>C Corrected result</li> <li>M Manually-edited result</li> <li>X Calculated test, but test could not be calculated (for example, divided by zero)</li> </ul>																				
OBX-12	<i>Field contains no data.</i>																							
OBX-13	<i>Field contains no data.</i>																							
OBX-14	DateTime	-	R	<p>Pipetting time, in other words, the time that is considered to be when the test was started.</p> <p><i>Note:</i> For manually-performed and calculated tests, this field is empty.</p>																				
OBX-15	Complex	-	R	<p>Active operators in the format:  <i>Instrument operator^Datamanager operator</i></p> <p>Each component is a string.</p> <ul style="list-style-type: none"> <li><i>Instrument operator</i> This is the username the operator used to log into the Control Unit. Empty in the case of a manual or calculated result.</li> <li><i>Datamanager operator</i> This is the username the operator used to log into the <i>data manager</i>. If the result is automatically validated, or the <i>data manager</i> is in pass-through mode, this reads SYSTEM.</li> </ul>																				
OBX-16	<i>Field contains no data.</i>																							

**Table 9-13** Observation Result Segment - OBX (for patient results)

Field	Value	Host	DM	Description										
OBX-17	<i>String</i>	-	O	<p>Calibration ID as an integer number. This is a unique identifier of the calibration that the result refers to as it is sent by the instrument.</p> <p>Sent only if available. It is empty for results that do not have a calibration, for example, calculated and manual results.</p> <p>For data point results, contains one of the following codes:</p> <ul style="list-style-type: none"> <li>• EFS Effective signal</li> <li>• EFV Effective voltage</li> <li>• EFC Effective current</li> <li>• PMT PMT spike</li> </ul>										
OBX-18	<i>Complex</i>	-	R	<p>Measurement unit ID, identifying the module that performed the test.</p> <p><i>ModuleType^SubModule^AnalyticalUnitID^InstrumentID^Bottle^SBNo</i></p>										
OBX-18.1	<i>String</i>	-	R	<p><i>ModuleType</i> One of the following:</p> <table> <tr> <td>c502,</td> <td>Results from the specified measuring module, or manual results entered on behalf of that module.</td> </tr> <tr> <td>c701,</td> <td></td> </tr> <tr> <td>e602,</td> <td></td> </tr> <tr> <td>ISE, or</td> <td></td> </tr> <tr> <td>c702</td> <td></td> </tr> </table> <p><i>DM</i> Results calculated on the <i>data manager</i>, and for manual results entered on the <i>data manager</i>, but cannot be attributed to a module.</p> <p>c8000 Results from the <b>cobas® 8000 modular analyzer series</b> that cannot be mapped to an actual measuring submodule, for example, sample short.</p>	c502,	Results from the specified measuring module, or manual results entered on behalf of that module.	c701,		e602,		ISE, or		c702	
c502,	Results from the specified measuring module, or manual results entered on behalf of that module.													
c701,														
e602,														
ISE, or														
c702														
OBX-18.2	<i>Number</i>	-	R	<p><i>SubModule</i></p> <ul style="list-style-type: none"> <li>• 1 or 2, for result from a submodule.</li> <li>• 0 (zero) otherwise.</li> </ul>										
OBX-18.3	<i>String</i>	-	R	<p><i>AnalyticalUnitID</i> Identifier for the module, as sent to the host. This setting is configurable in the <b>cobas® 8000 data manager</b>. Default: <i>Instrument#ModuleType#Position#SubModule</i></p> <p>Example: MU1#c502#2#1</p> <p> For details, see <i>Identifier of the analytical unit sent to host</i> (p. 71).</p>										
OBX-18.4	<i>Number</i>	-	R	<p><i>InstrumentID</i> Instrument number in <i>data manager</i> (A specific identifier inside the <i>data manager</i> which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)</p>										
OBX-19	<i>Datetime</i>	-	R	Time at which result is available.										

**Table 9-13** Observation Result Segment - OBX (for patient results)

## Observation Result Segment - OBX (for QC results)

This section describes how the *data manager* uses the observation result segment (OBX) in a result report message to send the results of quality control tests.

- For details of how the *data manager* uses OBX with patient results, see *Observation Result Segment - OBX (for patient results)* (p. 173).
- For details of how the *data manager* uses OBX with calibration results, see *Observation Result Segment - OBX (for calibration results)* (p. 181).

*QC result example* OBX|1||8685||121|U/L|120^TARGET~25^SD||||F|||20111019111  
907|bmserv^SYSTEM||76|c701^1^MU1#c701#1#1^6^Standby^1|20  
111019112922|

Field	Value	Host	DM	Description
OBX-1	Number	-	R	Set ID. The first segment in a set has the value 1. For each subsequent segment in the set, this value increments by 1.
OBX-2	<i>Field contains no data.</i>			
OBX-3	String	-	R	The test code. (Observation identifier, or Application code) This identifies the test or analyte which this message relates to.
OBX-4	<i>Field contains no data.</i>			
OBX-5	Complex	-	R	<p>Result value</p> <p>The result values are only transmitted for patient and QC results.</p> <p><i>ReportableResult</i>^<i>AdditionalResultValues</i></p> <p>Quantitative results:</p> <ul style="list-style-type: none"> <li>• <i>ReportableResult</i> The result. A missing result is sent as 7 spaces. (ASCII 32 / 0x20).</li> <li>• <i>AdditionalResultValues</i> Empty or a qualitative flag.</li> </ul> <p>Qualitative results:</p> <ul style="list-style-type: none"> <li>• <i>ReportableResult</i></li> </ul> <p>For c-module and ISE module: an integer code from -2 to 3 inclusive.</p> <p>For e-module: an integer code -1 (non-reactive), 0 (border line), 1 (reactive).</p> <p>The codes can be configured on the cobas® 8000 modular analyzer series instrument, under <b>Utility &gt; Application &gt; Range</b>, see <i>cobas® 8000 modular analyzer series Operator's Manual</i> for details.</p> <ul style="list-style-type: none"> <li>• <i>AdditionalResultValues</i></li> </ul> <p>The quantitative result, like <i>value</i> for a quantitative result. For e-module qualitative results this contains <i>COI</i>.</p> <p>Data point results:</p> <ul style="list-style-type: none"> <li>• <i>ReportableResult</i> The result. A missing result is sent as 7 spaces. (ASCII 32 / 0x20).</li> </ul>
OBX-6	String	-	R	Units of measurement used for measuring the result

**Table 9-14** Observation Result Segment - OBX (for QC results)

Field	Value	Host	DM	Description
OBX-7	<i>Complex</i>	-	R	Reference ranges, if defined. For quality control results, this consists of two strings: <i>RangeDefinition</i> <sup>^</sup> <i>TypeOfRange</i> These occur as a repeated field, for example: 120 <sup>^</sup> TARGET~25 <sup>^</sup> SD
OBX-7.1	<i>Number</i>	-	O	The <i>RangeDefinition</i> is a decimal or integer value.
OBX-7.2	<i>String</i>	-	O/R	The <i>TypeOfRange</i> string components consist of: <ul style="list-style-type: none"> <li>• TARGET Hard-coded value to indicate “Expected target value”</li> <li>• SD Hard-coded value to indicate “Standard deviation”</li> </ul>
				Note that the different ranges are separated with the repeat delimiter, a tilde “~”. If a range is not defined, the <i>RangeDefinition</i> is blank.
OBX-8	<i>Field contains no data.</i>			
OBX-9	<i>Field contains no data.</i>			
OBX-10	<i>Field contains no data.</i>			
OBX-11	<i>String</i>	-	R	Result status <ul style="list-style-type: none"> <li>• F For QC result</li> </ul>
OBX-12	<i>Field contains no data.</i>			
OBX-13	<i>Field contains no data.</i>			
OBX-14	<i>DateTime</i>	-	R	Pipetting time, in other words, the time that is considered to be when the test was started. <i>Note:</i> For manually-performed and calculated tests, this field is empty.
OBX-15	<i>Complex</i>	-	R	Active operators in the format: <i>Instrument operator</i> <sup>^</sup> <i>Datamanager operator</i> Each component is a string. <ul style="list-style-type: none"> <li>• <i>Instrument operator</i> This is the username the operator used to log into the Control Unit. Empty in the case of a manual or calculated result.</li> <li>• <i>Datamanager operator</i> This is the username the operator used to log into the <i>data manager</i>. If the result is automatically validated, or the <i>data manager</i> is in pass-through mode, this reads SYSTEM.</li> </ul>
OBX-16	<i>Field contains no data.</i>			
OBX-17	<i>Number</i>	-	O	Calibration ID as an integer number. This is a unique identifier of the calibration that the result refers to as it is sent by the instrument. Sent only if available. It is empty for results that do not have a calibration, for example, calculated and manual results.

**Table 9-14** Observation Result Segment - OBX (for QC results)

Observation Result Segment - OBX (for QC results)

Field	Value	Host	DM	Description
OBX-18	<i>Complex</i>	-	R	Measurement unit ID, identifying the module that performed the test.  $ModuleType^SubModule^AnalyticalUnitID^InstrumentID^Bottle^SBNo$
OBX-18.1	<i>String</i>	-	R	<p><i>ModuleType</i> One of the following:</p> <ul style="list-style-type: none"> <li>c502, Results from the specified measuring module,</li> <li>c701, or manual results entered on behalf of that module.</li> <li>e602, ISE, or</li> <li>c702</li> </ul> <p><i>DM</i> Results calculated on the <i>data manager</i>, and for manual results entered on the <i>data manager</i>, but cannot be attributed to a module.</p> <p>c8000 Results from the <b>cobas® 8000</b> modular analyzer series that cannot be mapped to an actual measuring submodule, for example, sample short.</p>
OBX-18.2	<i>Number</i>	-	R	<p><i>SubModule</i></p> <ul style="list-style-type: none"> <li>• 1 or 2, for result from a submodule.</li> <li>• 0 (zero) otherwise.</li> </ul>
OBX-18.3	<i>String</i>	-	R	<p><i>Analytical UnitID</i> Identifier for the module, as sent to the host. This setting is configurable in the <b>cobas® 8000</b> data manager. Default:   <math>Instrument#ModuleType#Position#SubModule</math> Example: MU1#c502#2#1</p> <p> For details, see <i>Identifier of the analytical unit sent to host</i> (p. 71).</p>
OBX-18.4	<i>Number</i>	-	R	<p><i>Instrument ID</i> Instrument number in <i>data manager</i> (A specific identifier inside the <i>data manager</i> which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)</p>
OBX-18.5	<i>String</i>	-	R	<p><i>Bottle</i> Used Reagent Set.</p> <ul style="list-style-type: none"> <li>• Current</li> <li>• Standby</li> <li>• (or empty)</li> </ul>
OBX-18.6	<i>Number</i>	-	R	<i>SBNo</i> An integer showing the standby bottle number, if used. The standby bottles are numbered sequentially, starting with 1.
OBX-19	<i>Datetime</i>	-	R	Time at which result is available.

**Table 9-14** Observation Result Segment - OBX (for QC results)

## Observation Result Segment - OBX (for calibration results)

The *data manager* uses the observation result segment in a result report message to send the results of calibration results.

- For details of OBX with patient results, see *Observation Result Segment - OBX (for patient results)* (p. 173).
- For details of OBX with QC results, see *Observation Result Segment - OBX (for QC results)* (p. 178).

*Calibration result examples* Photometric Calibration Result Segment:

```
OBX|1||8685||0^3&4&22851&2&22866&|||16|||F||||bmserv||75
|c701^1^MU1#c701#1#1^6^Standby^1|20111019091421|
```

ISE Calibration Result Segment:

```
OBX|1||989||Type-A^0&0&0&0&0&0&0&0^~32.7~-34.7~-28.4
&-30.2&50.4&
131.5&147.7&0.0&49.9&-4.7|||Valid|||F||||bmserv||37|ISE^
1^MU1#ISE#1#1
^7|20100316105741|
```

Immunological Calibration Result Segment:

```
OBX|1||1||Valid^false^false^false^1.074^false^^false^fa
se^39609.680&39716.950^^^^|||LotCalibration|||F||||bmse
rv||25|e602^1^MU1#e602#2#1^9^Current|20101018175819|
```

Field	Value	Host	DM	Description
OBX-1	Number	-	R	Set ID. The first segment in a set has the value 1. For each subsequent segment in the set, this value increments by 1.
OBX-2	Field contains no data.			
OBX-3	String	-	R	The test code. (Application code) This identifies the test or analyte which this message relates to.
OBX-4	Field contains no data.			
OBX-5	String	-	R	Measurement values <ul style="list-style-type: none"> <li>• For photometric calibration results, see <i>Measurement of c-module photometric Calibration Results</i> (p. 184).</li> <li>• For ISE calibration results, see <i>Measurement of ISE Calibration Results</i> (p. 184).</li> <li>• For Immunological calibration results, see <i>Measurement of e-module immunological Calibration Results</i> (p. 186).</li> </ul>
OBX-6	Field contains no data (for calibration results).			
OBX-7	Field contains no data.			
OBX-8	String	-	O	Calibration alarm flags. <ul style="list-style-type: none"> <li>• For details see <i>Calibration alarm flags</i> (p. 187).</li> </ul>
OBX-9	Field contains no data (for calibration results).			
OBX-10	Field contains no data.			
OBX-11	F	-	O	Result status. <ul style="list-style-type: none"> <li>• F For calibration result</li> </ul>
OBX-12	Field contains no data.			
OBX-13	Field contains no data.			

**Table 9-15** Observation Result Segment - OBX (for calibration results)

**Roche Diagnostics**

Observation Result Segment - OBX (for calibration results)

Field	Value	Host	DM	Description
OBX-14	<i>Field contains no data (for calibration results).</i>			
OBX-15	<i>String</i>	-	R	This is the username the operator used to log into the Control Unit.
OBX-16	<i>Field contains no data.</i>			
OBX-17	<i>Number</i>	-	O	Calibration ID as an integer number. This is a unique identifier of the calibration that the result refers to as it is sent by the instrument. Sent only if available.

**Table 9-15** Observation Result Segment - OBX (for calibration results)

Field	Value	Host	DM	Description										
OBX-18	<i>Complex</i>	-	R	<p>For ISE module:</p> <p>Analytical unit ID, identifying the module that performed the test.</p> <p> ⓘ The components and values are the same as for patient and QC results, see <i>Identifier of the analytical unit sent to host</i> (p. 71).</p>										
	<i>Complex</i>	-	R	<p>For c-module (photometric) or e-module (immunological):</p> <p>Measurement unit ID, identifying the module that performed the test.</p> <p><i>ModuleType^SubModule^AnalyticalUnitID^InstrumentID^Bottle^SBNo</i></p>										
OBX-18.1	<i>String</i>	-	R	<p><i>ModuleType</i> One of the following:</p> <table> <tr> <td>c502,</td> <td>Results from the specified measuring module,</td> </tr> <tr> <td>c701,</td> <td>or manual results entered on behalf of that module.</td> </tr> <tr> <td>e602,</td> <td></td> </tr> <tr> <td>ISE, or</td> <td></td> </tr> <tr> <td>c702</td> <td></td> </tr> </table> <p><i>DM</i> Results calculated on the <i>data manager</i>, and for manual results entered on the <i>data manager</i>, but cannot be attributed to a module.</p> <p>c8000 Results from the <b>cobas® 8000</b> modular analyzer series instrument that cannot be mapped to an actual measuring submodule, for example, sample short.</p>	c502,	Results from the specified measuring module,	c701,	or manual results entered on behalf of that module.	e602,		ISE, or		c702	
c502,	Results from the specified measuring module,													
c701,	or manual results entered on behalf of that module.													
e602,														
ISE, or														
c702														
OBX-18.2	<i>Number</i>	-	R	<p><i>SubModule</i></p> <ul style="list-style-type: none"> <li>• 1 or 2, for result from a submodule.</li> <li>• 0 (zero) otherwise.</li> </ul>										
OBX-18.3	<i>String</i>	-	R	<p><i>Analytical UnitID</i> Identifier for the module, as sent to the host. This setting is configurable in the <b>cobas® 8000</b> data manager. Default: <i>Instrument#ModuleType#Position#SubModule</i></p> <p>Example: MU1#c502#2#1</p> <p> ⓘ For details, see <i>Identifier of the analytical unit sent to host</i> (p. 71).</p>										
OBX-18.4	<i>Number</i>	-	R	<p><i>Instrument ID</i> Instrument number in <i>data manager</i> (A specific identifier inside the <i>data manager</i> which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)</p>										
OBX-18.5	<i>String</i>	-	O (R for QC)	<p><i>Bottle</i> Used Reagent Set.</p> <ul style="list-style-type: none"> <li>• Current</li> <li>• Standby</li> <li>• (or empty)</li> </ul> <p>Reserved field for c-module (photometric) and e-module (immunology) results, empty for ISE results.</p>										
OBX-18.6	<i>Number</i>	-	R	<p><i>SBNo</i> An integer showing the standby bottle number, if used. The standby bottles are numbered sequentially, starting with 1.</p> <p>Reserved field, only for c-module (photometric) measurements, otherwise empty.</p>										
OBX-19	<i>DateTime</i>	-	R	Time at which result is available.										

**Table 9-15** Observation Result Segment - OBX (for calibration results)

## Measurement of c-module photometric Calibration Results

For a Photometric Calibration Result from a c-module, the measurement result field (OBX-5) contains the following components.

*SD^STD*

Subcomponent	Description
<i>SD</i>	<i>Number</i> Standard deviation value data.
<i>STD</i>	<i>Complex</i> Absorbance values, (number types). Format: <i>Absorbance&amp;FirstAbsorbance&amp;FirstInitialAbsorbance&amp;SecondAbsorbance&amp;SecondInitialAbsorbance&amp;Prozone Value</i>

**Table 9-16** Field OBX-5 for photometric calibration results from a c-module

*Complete example c-module calibration result message* The following is a complete example of a calibration from a c-module (photometry).

```
MSH|^~\&|cobas 8000||host||20101019091421||OUL^R22^PCUPL
|||2.5||||ER||UNICODE UTF-8|
SPM||1^999999^901^1^20120131|||||||C^P|
OBR||1|||8685|
OBX||1|||8685||0^3&4&22851&2&22866&|||16|||F||||bmserv||75
|c701^1^MU1#c701#1^6^Current|20101019091421|
SID|||
SPM||2^153314^401^1^20120131|||||||C^P|
OBR||2|||8685|
OBX||2|||8685||0^-362&-361&24786&-362&24149&|||16|||F||||b
mserv||75|c701^1^MU1#c701#1^6^Current|20101019091421|
SID||
```

## Measurement of ISE Calibration Results

For an ISE Calibration Result, measurement result field (OBX-5) contains three components.

*CalType^DataAlarm^Data*

Subcomponent	Description	
<i>CalType</i>	<i>String</i>	This states what kind of test has been done. Possible values are: <ul style="list-style-type: none"><li>• Type-A</li><li>• Type-B</li></ul>
<i>DataAlarm</i>	<i>Complex</i>	Data alarm.  For details, see <i>ISE data alarms</i> (p. 185).
<i>Data</i>	<i>Complex</i>	Test calibration analytical data.  For details, see <i>ISE calibration analytical data</i> (p. 185).

**Table 9-17** Measurement of ISE Calibration Results

*ISE data alarms* The data alarms from the ISE calibration contain the following subcomponents, separated with an ampersand (&). Each component is a Number type.

- *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*
- *Carryover rate alarm*
- *Calculation slope value alarm*
- *Compensation value data alarm*

*ISE calibration analytical data* The analytical data from the ISE calibration data contain the following subcomponents, separated with an ampersand (&). Each component is a Number type, with Maximum length 6.

- *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*
- *Carryover rate*
- *Calculation slope value*
- *Compensation value data alarm*

*Observation Result Segment - OBX (for calibration results)*

*Complete example ISE calibration result message* The following is a complete example of a calibration from an ISE module.

---

```
MSH|^~\&|cobas 8000||host||20100316105742||OUL^R22^ICUPL|270||2.5||||  
ER||UNICODE UTF-8|  
SPM|||||||C^I|  
OBR|1|||989|  
OBX|1||989||Type-A^0&0&0&0&0&0&0^32.7&-34.7&-28.4&-30.2&50.4&  
131.5&147.7&0.0&49.9&-4.7|||Valid|||F||||bmser|||37|ISE^1^MU1#ISE#1#1^  
3|  
20100316105741|  
SID||  
SPM|||||||C^I|  
OBR|2|||990|  
OBX|2||990||Type-A^0&0&0&0&0&0&0^34.2&-45.5&-24.8&-34.5&56.3&  
4.76&4.70&0.0&56.2&-0.17|||Valid|||F||||bmser|||38|ISE^1^MU1#ISE#1#1^3  
|  
20100316105742|  
SID||  
SPM|||||||C^I|  
OBR|3|||991|  
OBX|3||991||Type-A^0&0&0&0&0&0&0^136.4&138.5&130.6&134.1&-44.9&  
89.0&100.3&0.0&-45.1&0.7|||Valid|||F||||bmser|||39|ISE^1^MU1#ISE#1#1^3  
|  
20100316105742|  
SID||
```

---

## Measurement of e-module immunological Calibration Results

For an Immunological Calibration Result from an e-module, the measurement result field (OBX-5) field contains the following components.

*CalResultStatus^MissingValue^MinSignal^MaxSignal^CalibratorFactor^Deviation^Slope^MinAcceptDiff^SystemError^SignalVal1^SignalVal2^TargetValue^Unit^CUTOFF^BorderLineAreaUpperLimit^BorderLineAreaLowerLimit*

Subcomponent	Description
<i>CalResultStatus</i>	String      Result Status: • Valid • Invalid
<i>MissingValue</i>	String      • true if violation • false if no violation
<i>MinSignal</i>	String      • true if violation • false if no violation
<i>MaxSignal</i>	String      • true if violation • false if no violation
<i>CalibratorFactor</i>	Number     Decimal value
<i>Deviation</i>	String      • true if violation • false if no violation
<i>Slope</i>	String     Decimal value (used for qualitative tests)
<i>MinAcceptDiff</i>	String      • true if violation • false if no violation

**Table 9-18** Measurement of e-module immunological Calibration Results

Subcomponent	Description
<i>SystemError</i>	<i>String</i> • true if violation • false if no violation
<i>SignalVal1&amp;SignalVal2</i>	<i>Complex</i> Signal value, in two decimal subcomponents: <i>SignalVal1&amp;SignalVal2</i>
<i>TargetValue</i>	<i>Complex</i> Target Value (for quantitative tests). This can be empty <i>Level1&amp;Level2&amp;Level3&amp;Level4&amp;Level5</i> Note that the <i>data manager</i> does not send data for this component.
<i>Unit</i>	<i>String</i> Unit
<i>CUTOFF</i>	<i>String</i> CUT off (for qualitative tests). Note that the <i>data manager</i> does not send data for this component.
<i>BorderLineAreaUpperLimit</i>	<i>Number</i> (Used for qualitative tests). Note that the <i>data manager</i> does not send data for this component.
<i>BorderLineAreaLowerLimit</i>	<i>Number</i> (Used for qualitative tests). Note that the <i>data manager</i> does not send data for this component.

**Table 9-18**

Measurement of e-module immunological Calibration Results

*Complete example e-module calibration result message* The following is a complete example of a calibration from a e-module (immunology).

```
MSH|^~\&|cobas 8000||host||20111118175844||OUL^R22^ECUPL
|14268||2.5||||ER||UNICODE UTF-8|
SPM||2^158941^1^None^20111119|||||||C^E|
OBR||||1|
OBX|1||1||Valid^false^false^false^1.064^false^^false^false^38293.490&38596.120^^^^|||LotCalibration|||F||||bmse
rv||26|e602^2^MU1#e602#2#2^10^Current|20111118175844|
SID|1^^^ASY^18^0|157328|5|
SPM||1^158941^1^None^20111119000000|||||||C^E|
OBR|2||||1|
OBX|2||1||Valid^false^false^false^false^1.064^false^^false^false^839.413&797.173^^^^|||LotCalibration|||F||||bmserv|||26|e602^2^MU1#e602#2#2^10^Current|20111118175844|
SID|1^^^ASY^18^0|157328|5|
```

## Calibration alarm flags

This section describes the calibration alarms send in field OBX-8.

*ISE calibration alarm* For ISE calibration results, the OBX-8 field contains the calibration status sent by the instrument. Possible values are:

- Valid meaning the calibration was successful.
- Invalid meaning calibration failed.

*Observation Result Segment - OBX (for calibration results)*

*C-module (photometric)* For photometric calibration results, this field contains the calibration alarm. Zero (0) *calibration alarm* indicates that there is no alarm.

*E-module (immunological)* For Elecsys calibration results, this field contains the CalibrationMethod. This is a *calibration alarm* string with one of the following eight values.

NoCalibration
LotCalibration
ContainerCalibration
InheritedLotCalibration
InheritedItemCalibration
UserModifiedCalibration
UnmaskedCalibration
FailedCalibration

## Test Code Detail Segment - TCD

The *data manager* uses the test code detail segment in result report message to give dilution factors.

TCD|1|1

TCD|1|Inc|

TCD|1|50|

Field	Value	Host	DM	Description
TCD-1	<i>String</i>	-	R	Universal Service Identifier. (Testcode or Application Code, which identifies the test or analyte tested for.)
TCD-2	<i>String</i>	-	R	Auto-dilution factor. Permitted values are: <ul style="list-style-type: none"> <li>• For an ISE module, the dilution factor is always: 1</li> <li>• For a c-module: 1, Inc, Dec, 3, 5, 10, 20, 50.</li> <li>• For e-module (immunoassay): 1, 2, 5, 10, 20, 50, 100, 400</li> </ul>

**Table 9-19** Test code detail segment - TCD

## Substance Identifier Segment - SID

The *data manager* uses the substance identifier segment to identify the reagents used in a test, when sending the host a result report message.

Patient upload from a c-module (photometric):

SID|8706^^784648^R1^2^0|231478|5|

Calibration result from an e-module (Immunology):

SID|1^^^ASY^14^0|156369|

For messages containing patient results from the ISE module, no SID segment is sent.

Field	Value	Host	DM	Description
SID-1	<i>Complex</i>	-	O/R	Test code / Method Identifier. Takes the format: <i>Test^Type^Code^ReagentType^Position^Expiry</i> This field is empty for ISE calibration results.
SID-1.1	<i>String</i>	-	O/R	<i>Test</i> Testcode (or Application Code). This is the code number the host uses for identifying the test or analyte to test for.
SID-1.2	<i>String</i>	-	O/R	<i>Type</i> Type of the test, if available.
SID-1.3	<i>Number</i>	-	O/R	<i>Code</i> Reagent code. For calibration results from a c- or e-module, this is empty.
SID-1.4	<i>String</i>	-	O/R	<i>ReagentType</i> Reagent type. Empty for c-module calibration results. R1 Reagent 1 used for a patient or QC test on a c-module. R2 Reagent 2 used for a patient or QC test on a c-module. R3 Reagent 3 used for a patient or QC test on a c-module. SPR Special reagent ASY Assay, used on immunology (e) modules. An e-module test will have exactly one ASY segment. IS Inner standard (ISE - QC results) DIL Diluent (ISE - QC results) REF Reference (ISE - QC results)
SID-1.5	<i>Number</i>	-	O/R	<i>Position</i> Reagent Position on Disk
SID-1.6	<i>Number</i>	-	O/R	<i>Expiry</i> Expiration flag: <ul style="list-style-type: none"><li>• 0 = not expired</li><li>• 1 = expired</li></ul>
SID-2	<i>String</i>	-	O	Lot number of the reagent used. Not used for ISE-module calibration results, nor with non-Roche material.
SID-3	<i>String</i>	-	O	Serial number of the reagent used. Not used for ISE-module calibration results, nor with non-Roche material.

**Table 9-20** Substance identifier segment - SID



### Reagents on a c-module

Note that R1-R3 might not all be present on a c-module (photometric).

## Comment Segment - NTE

The *data manager* uses the comment segment in a result report message.

NTE|1|I|23^Sample Short|I|

NTE|2|L|This sample is haemolytic^DMROUTINE^200904021726  
05|G|

There will always be an instrument flag sent with the result report message. In the case of a result with no alarm flag (zero), the segment will be as follows:

NTE|1|I|0|I|

This is “NTE-one-i-zero-i”.

Field	Value	Host	DM	Description
NTE-1	Number	-	R	Set ID
NTE-2	Character	-	R	Source of comment text. Fixed string value. <ul style="list-style-type: none"><li>• I Result flag, from the instrument or the <i>data manager</i>.</li><li>• L The comment was added on the <i>data manager</i>.</li></ul>
NTE-3	Complex	-	O/R	Comment. Value depends on value of NTE-4. This is optional if NTE-4 is G. (Result comment)  For details of this field, see <i>Types of comment segment</i> (p. 191).
NTE-4	String	-	R	Code for qualifying the comment segment type. Comments sent by <i>data manager</i> can have the following types. <ul style="list-style-type: none"><li>• I Result flag. This is an extension to the HL7 specification.</li><li>• G Result comment.</li></ul>

**Table 9-21** Comment segment - NTE

### Types of comment segment

The content of the comment segment depends on the type of comment and where it comes from.

*User comments* If the user enters a comment, the field NTE-4 has the value G.

Field NTE-3 has details of the comment.

*Text*<sup>^</sup>*User*<sup>^</sup>*Date*

<b>Text</b>	<i>String</i>	Comment text
<b>User</b>	<i>String</i>	User who entered the comment
<b>Date</b>	<i>String</i>	Creation date and time in datetime format

*Instrument comments* If the instrument sends the *data manager* an data flag (alarm or “error flag”), the *data manager* passes this to the host in a comment segment. NTE-4 has the value I.

Field NTE-3 has details of the data flag.

*flag*<sup>^</sup>*desc*

Comment Segment - NTE

<b>flag</b>	<i>Number</i>	Number showing the data alarm code of the data flag. If there is no error, this value is zero: 0.
<b>desc</b>	<i>String</i>	Description of data flag. Blank if the flag is zero.

 For details of possible error flags, see *Data Alarms* (p. 217)

## Query Parameter Segment - QPD (for a test selection inquiry)

The *data manager* uses the query parameter segment in an inquiry for a test selection, to give details of the sample.

QPD|TSREQ|12896|000137||50042|2||||S1|SC|R1|R|

If the system is not using barcodes (with aliquots from a **MODULAR PRE-ANALYTICS**), and is requesting a sample ID from the host:

QPD|TSREQ|12897|\*\*\*\*\*|50045|1||||S1|SC|R1|R|

If samples are identified by sequence number:

QPD|TSREQ|563067|^1031|50203|3||||S1|SC|R1|R|

Field	Comp.	Value	Host	DM	Description
QPD-1		TSREQ	-	R	Message name, fixed string TSREQ.
QPD-2		String	-	O	Query tag to identify the query.
QPD-3		String / Complex	-	R	If using barcodes (default), this is a string field containing the Sample ID. If samples are identified by sequence number, this is a complex field:
QPD-3.1		String	-	R/O	Must be empty if samples are identified by sequence number, and a sequence number is sent in QPD-3.2.
QPD-3.2		String	-	O/R	Sequence number. (Max. value = 60,000.) Only used if samples are identified by sequence number, and the sample has no barcode.
					 For details of sequence numbers, see <i>Identifying patient samples by sequence number</i> (p. 259).
QPD-4		<i>Field contains no data.</i>			
QPD-5		String	-	R	Rack ID, as visible on Control Unit
QPD-6		String	-	R	Position on rack
QPD-7		<i>Field contains no data.</i>			
QPD-8		<i>Field contains no data.</i>			
QPD-9		<i>Field contains no data.</i>			
QPD-10		String	-	R	Rack type as assigned to a specific sample type on the <b>cobas® 8000 modular analyzer series instrument</b> . Depending on the version and modules installed, not all of these types may be available on any particular system.
		S1			Serum / Plasma
		S2			Urine
		S3			Cerebrospinal Fluid
		S4			Supernatant
		S5			Other fluids
		S6			Whole blood
		S7			Oral fluids (Saliva)
		S8			Reserved for future use
		S9			Reserved for future use
		SA			Reserved for future use
		S0			No specimen assigned (only used for messages from <i>data manager</i> ).

**Table 9-22** Query parameter segment - QPD - for a test selection inquiry

Query Parameter Segment - QPD (for a test selection inquiry)

Field	Comp.	Value	Host	DM	Description
QPD-11		<i>String</i>	-	R	<p>Sample container type.</p> <ul style="list-style-type: none"> <li>• SC Standard cup</li> <li>• MC Micro cup</li> <li>• NST0 Non-standard tube</li> <li>• FBT1 False bottom tube 1</li> <li>• FBT2 False bottom tube 2</li> <li>• FBT3 False bottom tube 3</li> <li>• &lt;Empty&gt; Unknown cup type</li> </ul> <p>If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.</p> <p> For details on how these values are handled, see <i>Sample container types</i> (p. 29)</p>
QPD-12		<i>String</i>	-	R	<p>Kind. A two-character code.</p> <ul style="list-style-type: none"> <li>• R1 Query for 1st measurement (Initial run)</li> <li>• R2 Rerun query</li> </ul>
QPD-13		<i>String</i>	-	R	<p>Code indicating the sample priority.</p> <ul style="list-style-type: none"> <li>• S STAT sample</li> <li>• R Routine sample</li> </ul>

**Table 9-22** Query parameter segment - QPD - for a test selection inquiry

## Query Parameter Segment - QPD (for a Result Query)

The host uses the query parameter segment (QPD) in a result query to inquire for the measurement results for a given sample.

QPD|RSREQ||12896|||||S1

QPD|RSREQ||12896|F|||||S1

If identifying samples by sequence number:

QPD|RSREQ||^1031|||||S1

Field	Comp.	Value	Host	DM	Description
QPD-1		RSREQ	R	-	Message name, fixed string RSREQ.
QPD-2		<i>Field contains no data.</i>			
QPD-3		<i>String / Complex</i>	R	-	<p>In the default mode using barcodes, this is a string field containing the Sample ID.</p> <p>If sample lifetime is set, the <i>data manager</i> returns results for all samples that match the combination of sample ID and rack type.</p> <ul style="list-style-type: none"> <li>• For details of sample ID lifetimes, see <i>Re-using sample IDs and sample lifetimes</i> (p. 39).</li> <li>• For details of using result and order queries with limited sample lifetimes or expired sample IDs, see:           <ul style="list-style-type: none"> <li><i>Result query</i> (p. 47)</li> <li><i>Order and result queries with limited sample lifetime</i> (p. 50).</li> </ul> </li> </ul>
					If samples are identified by sequence number, this is a complex field:
QPD-3.1		<i>String</i>	R/O	-	Must be empty if samples are identified by sequence number and a sequence number is sent in QPD-3.2.
QPD-3.2		<i>String</i>	O/R	-	Sequence number. (Max. value = 60,000.) Only used if samples are identified by sequence number, and the sample has no barcode.
					<ul style="list-style-type: none"> <li>• For details of sequence numbers, see <i>Identifying patient samples by sequence number</i> (p. 259).</li> </ul>
QPD-4		<i>String</i>	O	-	<p>Selection mode</p> <ul style="list-style-type: none"> <li>• (empty)</li> <li>All results</li> <li>• F</li> <li>Final results</li> </ul>
QPD-5		<i>Field contains no data.</i>			
QPD-6		<i>Field contains no data.</i>			
QPD-7		<i>Field contains no data.</i>			
QPD-8		<i>Field contains no data.</i>			
QPD-9		<i>Field contains no data.</i>			

**Table 9-23** Query parameter segment - QPD - for result query

## Query Parameter Segment - QPD (for a Result Query)

Field	Comp.	Value	Host	DM	Description																						
QPD-10		String	O/R	-	<p>Rack type as assigned to a specific sample type on the cobas® 8000 modular analyzer series instrument.</p> <p>This field is optional only if there is only one sample with the sample ID. If there is a sample in the database with the same sample ID but a different rack type, or an expired sample ID, this field is mandatory. It is recommended to always include it.</p> <p>If sample lifetime is set, the <i>data manager</i> returns results for all samples that match the combination of sample ID and rack type.</p> <ul style="list-style-type: none"> <li> ⓘ For details of sample ID lifetimes, see <i>Re-using sample IDs and sample lifetimes</i> (p. 39).</li> <li> ⓘ For details of using result and order queries with limited sample lifetimes or expired sample IDs, see:  <i>Result query</i> (p. 47)  <i>Order and result queries with limited sample lifetime</i> (p. 50).</li> </ul> <p>Depending on the version and modules installed, not all of these types may be available on any particular system.</p> <table border="1"> <tr><td>S1</td><td>Serum / Plasma</td></tr> <tr><td>S2</td><td>Urine</td></tr> <tr><td>S3</td><td>Cerebrospinal Fluid</td></tr> <tr><td>S4</td><td>Supernatant</td></tr> <tr><td>S5</td><td>Other fluids</td></tr> <tr><td>S6</td><td>Whole blood</td></tr> <tr><td>S7</td><td>Oral fluids (Saliva)</td></tr> <tr><td>S8</td><td>Reserved for future use</td></tr> <tr><td>S9</td><td>Reserved for future use</td></tr> <tr><td>SA</td><td>Reserved for future use</td></tr> <tr><td>S0</td><td>No specimen assigned (only used for messages from <i>data manager</i>).</td></tr> </table>	S1	Serum / Plasma	S2	Urine	S3	Cerebrospinal Fluid	S4	Supernatant	S5	Other fluids	S6	Whole blood	S7	Oral fluids (Saliva)	S8	Reserved for future use	S9	Reserved for future use	SA	Reserved for future use	S0	No specimen assigned (only used for messages from <i>data manager</i> ).
S1	Serum / Plasma																										
S2	Urine																										
S3	Cerebrospinal Fluid																										
S4	Supernatant																										
S5	Other fluids																										
S6	Whole blood																										
S7	Oral fluids (Saliva)																										
S8	Reserved for future use																										
S9	Reserved for future use																										
SA	Reserved for future use																										
S0	No specimen assigned (only used for messages from <i>data manager</i> ).																										

Subsequent fields contain no data.

**Table 9-23**      Query parameter segment - QPD - for result query

## Query Parameter Segment - QPD (for an Order Query)

The host uses the query parameter segment (QPD) in an order query to inquire for all test selections with and without results for a given sample.

QPD|TSREQ||12896|O|||||S1

QPD|TSREQ||12896|||||S1

If identifying samples by sequence number:

QPD|TSREQ||^1031|||||S1|

Field	Value	Host	DM	Description
QPD-1	TSREQ	R	-	Message name, fixed string TSREQ.
QPD-2	<i>Field contains no data.</i>			
QPD-3	<i>String / Complex</i>	R	-	<p>In the default mode using barcodes, this is a string field containing the Sample ID.</p> <p>If sample lifetime is set, the <i>data manager</i> returns the test selection for the most recent order that matches the combination of sample ID and rack type.</p> <ul style="list-style-type: none"> <li>• For details of sample ID lifetimes, see <i>Re-using sample IDs and sample lifetimes</i> (p. 39).</li> <li>• For details of using result and order queries with limited sample lifetimes or expired sample IDs, see:           <ul style="list-style-type: none"> <li><i>Order query</i> (p. 48)</li> <li><i>Order and result queries with limited sample lifetime</i> (p. 50).</li> </ul> </li> </ul> <p>If samples are identified by sequence number, this is a complex field:</p>
QPD-3.1	<i>String</i>	R/O	-	Empty if samples are identified by sequence number and a sequence number is sent in QPD-3.2.
QPD-3.2	<i>String</i>	O/R	-	<p>Sequence number. (Max. value = 60,000.) Only used if samples are identified by sequence number, and the sample has no barcode.</p> <ul style="list-style-type: none"> <li>• For details of sequence numbers, see <i>Identifying patient samples by sequence number</i> (p. 259).</li> </ul>
QPD-4	<i>String</i>	O	-	<p>Selection mode</p> <ul style="list-style-type: none"> <li>• (empty)</li> <li>All requested tests</li> <li>• ○</li> </ul> <p>(Capital O) Open. (Only test selections with no results yet)</p>
QPD-5	<i>Field contains no data.</i>			
QPD-6	<i>Field contains no data.</i>			
QPD-7	<i>Field contains no data.</i>			
QPD-8	<i>Field contains no data.</i>			
QPD-9	<i>Field contains no data.</i>			

**Table 9-24** Query parameter segment - QPD - for an order query

Query Parameter Segment - QPD (for an Order Query)

Field	Value	Host	DM	Description
QPD-10	String	R	-	<p>Rack type as assigned to a specific sample type on the cobas® 8000 modular analyzer series.</p> <p>If sample lifetime is set, the <i>data manager</i> returns the test selection for the most recent order that matches the combination of sample ID and rack type.</p> <ul style="list-style-type: none"> <li>▶ For details of sample ID lifetimes, see <i>Re-using sample IDs and sample lifetimes</i> (p. 39).</li> <li>▶ For details of using result and order queries with limited sample lifetimes or expired sample IDs, see:           <ul style="list-style-type: none"> <li><i>Result query</i> (p. 47)</li> <li><i>Order and result queries with limited sample lifetime</i> (p. 50).</li> </ul> </li> </ul> <p>Depending on the version and modules installed, not all of these types may be available on any particular system.</p>
<hr/>				
S1                    Serum / Plasma				
S2                    Urine				
S3                    Cerebrospinal Fluid				
S4                    Supernatant				
S5                    Other fluids				
S6                    Whole blood				
S7                    Oral fluids (Saliva)				
S8                    Reserved for future use				
S9                    Reserved for future use				
SA                    Reserved for future use				
S0                    No specimen assigned (only used for messages from <i>data manager</i> ).				

Subsequent fields contain no data.

**Table 9-24**      Query parameter segment - QPD - for an order query

## Response Control Parameter Segment - RCP

The *data manager* and the host use the response control parameter segment (RCP) with a query message (test selection inquiry, result query, order query) to specify the priority of the message.

RCP | I | 1 | R |

Field	Value	Host	DM	Description
RCP-1	I	R	R	Query priority (immediate), fixed string I.
RCP-2	1	O	R	Query limited request, fixed value 1.
RCP-3	R	O	R	Response modality, fixed character value R.

**Table 9-25** Response control parameter segment - RCP

## Equipment Detail Segment - EQU (from host to data manager)

The host uses the Equipment Detail Segment to instruct the *data manager* to apply the instructions in the following ECD segments, in a masking message.

EQU|1|20090402173655|

Field	Value	Host	DM	Description
EQU-1	1	R	-	Identifier for the equipment. This is the identifier from an institution's master list of equipment. Fixed value "1".
EQU-2	Datetime	R	-	The date and time that the masking or unmasking request is sent.

**Table 9-26** Equipment detail segment - EQU

## Equipment Detail Segment - EQU (from data manager to host)

The *data manager* uses the Equipment Detail Segment to tell the host the current instrument status and the date/time of a masking or unmasking request.

EQU | DM#DM#0#0|20140630123849|PU^POWERED\_UP^LECIS^1^Power up^Hitachi|

EQU | DM#DM#1#2|20140405091052|OP^NORMAL\_OPERATION^LECIS^7^Operation^Hitachi|

EQU | DM#DM#1#2|20130217075453|ES^E-STOPPED^LECIS^21^Shutdown^Hitachi|

Field	Value	Host	DM	Description
EQU-1	<i>String</i>	-	R	Identifier for the equipment. Takes the format: Instrument#ModuleType#Position#SubModule
EQU-2	<i>Datetime</i>	-	R	The date and time that the masking or unmasking request is sent.
EQU-3	<i>Complex</i>	-	R/O	Instrument status. Contains a state value defined by the HL7 protocol, and an additional state value defined by the instrument.  <i>State value^State description^Coding system^Instrument state^Instrument state description^Instrument coding system</i>  Required for ESU messages, optional for all others.
EQU-3.1	<i>String</i>	-		<i>State value</i> Instrument state value. Values in this field are defined by the HL7 protocol and based on LECIS.  Possible values are: <ul style="list-style-type: none"><li>• PU Powered up</li><li>• IN Initializing</li><li>• ID Idle</li><li>• CO Configuring</li><li>• OP Normal operation</li><li>• CL Clearing</li><li>• PA Pausing</li><li>• PD Paused</li><li>• ES E-stopped</li></ul>
EQU-3.2	<i>String</i>	-		<i>State description</i> Description of current instrument state.
EQU-3.3	LECIS	-		<i>Coding system</i> State value coding system. Fixed value.
EQU-3.4	<i>String</i>	-		<i>Instrument state</i> Instrument-defined state value.  For a complete list of instrument-defined state values, see <i>Instrument-defined states</i> (p. 202)
EQU-3.5	<i>String</i>	-		<i>Instrument state description</i> Description of instrument-defined state value.  For a complete list of instrument-defined state values, see <i>Instrument-defined states</i> (p. 202)
EQU-3.6	Hitachi	-		<i>Instrument coding system</i> Coding system of instrument-defined state value. Fixed value.

**Table 9-27** Equipment detail segment - EQU

*Instrument-defined states* Below are listed all possible instrument-defined state values (EQU-3.4), with the corresponding instrument-defined state descriptions (EQU-3.5).

Instrument state (EQU-3.4)	Instrument state description (EQU-3.5)
1	Power up
2	Initialize
3	Stand by
4	Stop
5	Emergency stop
6	Preparation
7	Operation
8	Rack supply complete
9	Rack collection complete (restart disabled)
10	Rack supply complete (restart disabled)
11	Rack collection complete (restart disabled)
12	Line stop
13	S.Stop
14	TM with rack supply
15	TM without rack supply
16	Reagent registration
17	Pipe
18	Powerup pipe
19	Startup pipe
20	Reconnection
21	Shutdown
22	Pipe interrupted
26	Rack Reception
27	Operation(CLAS)
28	Backup Operation
29	Start
30	Post Operation

**Table 9-28**

Instrument-defined state and state description values

## Equipment Command Segment - ECD

The host uses the Equipment Command Segment to instruct the *data manager* what masking to perform.

```
ECD||UC|||989^^MU1#c701#1#1^ALL|
ECD||LK|||989^P^MU1#e602#1#1^ALL|
ECD||LK|||989^T^MU1#ISE#1#1^ALL|
```

Field	Value	Host	DM	Description
ECD-1	<i>This field contains no data.</i>			
ECD-2	<i>String</i>	R	-	The instruction specifying masking or unmasking. <ul style="list-style-type: none"> <li>• LK (for “lock”) to implement masking.</li> <li>• UC (for “unlock”), to unmask.</li> </ul>
ECD-3	<i>This field contains no data.</i>			
ECD-4	<i>This field contains no data.</i>			
ECD-5	<i>Complex</i>	R	-	This field specifies the parameters of the command.  $TestCode^MaskType^Unit\_ID^ALL$
ECD-5.1	<i>String</i>	R	-	<i>TestCode</i> The code identifying the analyte or test. Required field: masking only possible by test.
ECD-5.2	<i>Character</i>	O	-	<i>MaskType</i> A character flag instructing <i>data manager</i> which kind of masking to perform: <ul style="list-style-type: none"> <li>• P Mask only patient results. The <i>data manager</i> uploads quality control and calibration results to the host.</li> <li>• T Mask all results, including patient, quality control and calibration results.</li> <li>• This field is empty if ECD-2 is UC (unmask).</li> </ul>
ECD-5.3	<i>String</i>	R	-	<i>Unit_ID</i> This is the user-editable identifier for the instrument and module.  <span style="border: 1px solid black; border-radius: 50%; padding: 2px;"> ⓘ </span> For details, see <i>Identifier of the analytical unit sent to host</i> (p. 71).
ECD-5.4	ALL	R	-	Hard-coded to ALL.

**Table 9-29** Equipment command segment - EQU

## Inventory Detail Segment - INV

The data manager uses the Inventory Detail Segment to communicate the availability of a test to the host. Within an equipment inventory update message, an INV segment is sent for each test installed on the *data manager*.

```
INV|18571|OK^OK_STATUS|
INV|8707|NW^NOT_AVAILABLE_WARNING|
INV|8433|OK^OK_STATUS|
```

Field	Value	Host	DM	Description
INV-1	<i>String</i>	-	R	Test code. Identifies the test or analyte this segment relates to.
INV-2	<i>Complex</i>	-	R	Test status. Specifies whether the test is masked (unavailable) or unmasked (available). Takes the following format: <i>Value^Description</i> Can contain the following values: <ul style="list-style-type: none"><li>• NW^NOT_AVAILABLE_WARNING</li><li>• OK^OK_STATUS</li></ul>

**Table 9-30** Inventory detail segment - INV

# HL7 acknowledgment handling

This chapter explains how cobas® 8000 data manager implements HL7 acknowledgment messages.

## In this chapter

## Chapter 10

HL7 acknowledgment messages.....	207
Messages from the data manager .....	208
Inquiry for test selections.....	209
If the host cannot find a test selection.....	209
Result report patient .....	209
Result report quality control.....	210
Result report calibration data .....	210
Test selection upload from data manager to host .....	211
If the data manager cannot find a test selection .....	211
Acknowledgment message from data manager to host .....	211
Sending messages from host to the data manager .....	212
Result query .....	212
If the data manager cannot find a test selection with that sample ID.....	212
Order query .....	212
If the data manager cannot find a test selection .....	212
If the data manager receives an invalid test selection .....	212
Masking.....	213
Test Selection download.....	213
Acknowledgment message.....	213



## HL7 acknowledgment messages

This chapter explains how to handle HL7 acknowledgment messages when sending and receiving messages to **cobas® 8000 data manager**.

## Messages from the *data manager*

HL7 messages send a flag instructing the receiver under what conditions to send an acknowledgment. You can define which flag the *data manager* sends. This setting applies to the flag sent in the following messages:

- Result upload messages (patient, QC, or calibration) and
- Test selection uploads.

This is configured in **c8000 DM Service > Service-related configuration > Interface options**.

 For details of how to configure the application acknowledge level of the *data manager*, see *Configuring HL7 acknowledgment handling* (p. 66).

The code in MSH-16 instructs the receiver whether to send an application acknowledgment reply. Four levels of acknowledgment are supported, as described below.

MSH-16 Code	Meaning	Required host response	Timeout (for patient and QC results)
AL	Always	Send an acknowledgment to every message.	Defaults to 60 seconds. The <i>data manager</i> expects Accept (AA) or Error (AE). Data is marked in <b>Upload Status</b> as "Pending" in <i>data manager</i> until acknowledgment received or timeout.
SU	Success	If message processed, send Accept (AA). If message cannot be processed, send no acknowledgment.	Defaults to 60 seconds. The <i>data manager</i> expects Accept (AA). Data is marked in <b>Upload Status</b> as "Pending" in <i>data manager</i> until acknowledgment received or timeout.
ER	Error	If message processed, send no acknowledgment. If message cannot be processed, send Error (AE).	The <i>data manager</i> assumes success, unless it receives an Error (AE) or Reject (AR) at any time before the uploaded message is deleted.
NE	Never	Never send an acknowledgment.	The <i>data manager</i> expects no response.

**Table 10-1** Codes for level of application acknowledgment, sent in MSH-16

For acknowledgment message, the level of application acknowledgment is set to Never (NE).

For other messages from the *data manager* (inquiry for test selections or test selection upload), the level of application acknowledgment is set to Error (ER).

If the *data manager* cannot send a result report message because of a low-level error, such as a disconnected cable, the results are marked in the column **Host Upload Status** as "Failed".

The *data manager* only displays the outcome of the most recent attempt to send results.

## Inquiry for test selections

The *data manager* always sends an Error (ER) code with an inquiry for a test selections.

<b>The data manager sends in MSH-16:</b>	<b>The host returns in MSA-1</b>			
	<b>AA (Accept)</b>	<b>AE (Error)</b>	<b>AR (Reject)</b>	<b>no response</b>
Always (AL)	<i>Not sent</i>			
Success (SU)	<i>Not sent</i>			
Error (ER)		ER always sent. The <i>data manager</i> currently does not respond to any value returned.		
Never (NE)	<i>Not sent</i>			

**Table 10-2** Acknowledgment codes responding to a test selection inquiry

### If the host cannot find a test selection

If the host cannot find a test selection or if the sample ID is unknown, it should send a test selection download message with no tests ordered.

## Result report patient

The *data manager* can send AL/SU/ER/NE in a result report.

<b>The data manager sends in MSH-16:</b>	<b>The host returns in MSA-1</b>			
	<b>AA (Accept)</b>	<b>AE (Error)</b>	<b>AR (Reject)</b>	<b>no response</b>
Always (AL)	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	After timeout, the <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.
Success (SU)	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.	<i>Not allowed</i>	<i>Not allowed</i>	After timeout, the <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.
Error (ER)	<i>Not allowed</i>	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.
Never (NE)	<i>Not allowed</i>	<i>Not allowed</i>	<i>Not allowed</i>	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.

**Table 10-3** Acknowledgment codes responding to a patient result report

If the host sends an Error (AE) or Reject (AR) response, or the message times out:

- the *data manager* reports an error in **Service > Communication messages**.
- the *data manager* writes an error to logs in **System Configuration > Log files**.
- the *data manager* writes an error to logs in **Routine > System alarms**.
- the *data manager* marks the results in “Upload status” as “Failed”.

## Result report quality control

The *data manager* can send AL/SU/ER/NE in a Quality Control result report.

<b>The data manager sends in MSH-16:</b>	<b>The host returns in MSA-1</b>			
	<b>AA (Accept)</b>	<b>AE (Error)</b>	<b>AR (Reject)</b>	<b>no response</b>
Always (AL)	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	After timeout, the <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.
Success (SU)	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.	<i>Not allowed</i>	<i>Not allowed</i>	After timeout, the <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.
Error (ER)	<i>Not allowed</i>	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Failed”.	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.
Never (NE)	<i>Not allowed</i>	<i>Not allowed</i>	<i>Not allowed</i>	The <i>data manager</i> marks the results in <b>Upload Status</b> as “Sent”.

**Table 10-4** Acknowledgment codes responding to a quality control result report

If the host sends an Error (AE) or Reject (AR) response, or the message times out:

- the *data manager* reports an error in **Service > Communication messages**.
- the *data manager* writes an error to logs in **System Configuration > Log files**.
- the *data manager* writes an error to logs in **Routine > System alarms**.
- the *data manager* marks the results in “Upload status” as “Failed”.

## Result report calibration data

The *data manager* can send AL/SU/ER/NE in a result report.

<b>The data manager sends in MSH-16:</b>	<b>The host returns in MSA-1</b>			
	<b>AA (Accept)</b>	<b>AE (Error)</b>	<b>AR (Reject)</b>	<b>no response</b>
Always (AL)	Message considered sent successfully.	Error logged in <i>data manager</i> .	Error logged in <i>data manager</i> .	After timeout, error logged in <i>data manager</i> .
Success (SU)	Message considered sent successfully.	<i>Not allowed</i>	<i>Not allowed</i>	After timeout, error logged in <i>data manager</i> .
Error (ER)	<i>Not allowed</i>	Error logged in <i>data manager</i> .	Error logged in <i>data manager</i> .	Message considered sent successfully.
Never (NE)	<i>Not allowed</i>	<i>Not allowed</i>	<i>Not allowed</i>	Message considered sent successfully.

**Table 10-5** Acknowledgment codes responding to a calibration result report

If the host sends an Error (AE) or Reject (AR) response, or the message times out:

- the *data manager* reports an error in **Service > Communication messages**.
- the *data manager* writes an error to logs in **System Configuration > Log files**.
- the *data manager* writes an error to logs in **Routine > System alarms**.

## Test selection upload from data manager to host

The *data manager* can send AL/SU/ER/NE in a test selection upload.

<b>The data manager sends in MSH-16:</b>	<b>The host returns in MSA-1</b>			
	<b>AA (Accept)</b>	<b>AE (Error)</b>	<b>AR (Reject)</b>	<b>no response</b>
Always (AL)	Message considered sent successfully.	Error logged in <i>data manager</i> .	Error logged in <i>data manager</i> .	After timeout, error logged in <i>data manager</i> .
Success (SU)	Message considered sent successfully.	<i>Not allowed</i>	<i>Not allowed</i>	After timeout, error logged in <i>data manager</i> .
Error (ER)	<i>Not allowed</i>	Error logged in <i>data manager</i> .	Error logged in <i>data manager</i> .	Message considered sent successfully.
Never (NE)	<i>Not allowed</i>	<i>Not allowed</i>	<i>Not allowed</i>	Message considered sent successfully.

**Table 10-6** Acknowledgment codes responding to a test selection upload

If the host sends an Error (AE) or Reject (AR) response, or the message times out:

- the *data manager* reports an error in cobas® 8000 data manager Service > **Communication messages**.
- the *data manager* writes an error to logs in **System Configuration > Log Files**.
- the *data manager* writes an error to logs in **Routine > System alarms**.

### If the data manager cannot find a test selection

If the *data manager* cannot find the requested test selection, it returns a test selection upload message with a sample ID and sample type, but no orders, containing only the MSH and SPM segments.

## Acknowledgment message from data manager to host

The *data manager* always sends an NE code in an acknowledgment message.

## Sending messages from host to the data manager

The *data manager* responds, as detailed in this section, according to the setting of MSH-16 in the host messages. The *data manager* sends either an Accept (AA) or an Error (AE) response, but does not currently the Reject (AR) response.

### Result query

The *data manager* sends no acknowledgment message or segment in response to a result query. If the query is successful, the *data manager* responds with a result upload. (OUL^R22^BATCH).

For result queries, the *data manager* only supports the acknowledgment code NE.

#### If the data manager cannot find a test selection with that sample ID

If the *data manager* cannot find a test selection that has the sample ID given in the host's query, it makes no reply.

### Order query

The *data manager* sends no acknowledgment message or segment in response to an order query. If the message is successful, the *data manager* sends a test selection upload (OML^O33).

For an order query, the *data manager* only supports the acknowledgment code NE.

#### If the data manager cannot find a test selection

If the *data manager* cannot find a test selection with the requested sample ID, it returns a test selection upload message containing the sample ID and sample type as requested, but containing no orders, using only the MSH and SPM segments.

 For an example, see *No tests found* (p. 303).

#### If the data manager receives an invalid test selection

If the *data manager* receives a test selection from the host which does not have a valid application number, it sends an acknowledgement message if requested:

The host sends in MSH-16:	The <i>data manager</i> returns in MSA-1 in an ACK message			
	AA (Accept)	AE (Error)	AR (Reject)	no response
Always (AL)	Not sent	Indicates a validation error.	Not sent	Not sent
Success (SU)	Not sent	Not sent	Not sent	Indicates a validation error.
Error (ER)	Not sent	Indicates a validation error.	Not sent	Not sent
Never (NE)	Not sent	Not sent	Not sent	Indicates a validation error.

**Table 10-7** Acknowledgment codes sent in response to an invalid test selection

## Masking

In reply to a masking or unmasking request, the *data manager* sends an acknowledgment message if requested.

The host sends in MSH-16:	The <i>data manager</i> returns in MSA-1 in an ACK message			
	AA (Accept)	AE (Error)	AR (Reject)	no response
Always (AL)	Indicates success.	Indicates an error, specified in the MSA segment.	<i>Not sent</i>	<i>Not sent</i>
Success (SU)	Indicates success.	<i>Not sent</i>	<i>Not sent</i>	Indicates unspecified error.
Error (ER)	<i>Not sent</i>	Indicates an error, specified in the MSA segment.	<i>Not sent</i>	Indicates success.
Never (NE)	<i>Not sent</i>	<i>Not sent</i>	<i>Not sent</i>	Supported.

**Table 10-8** Acknowledgment codes sent in response to a masking command

## Test Selection download

In reply to a test selection download, the *data manager* sends an acknowledgment message if requested.

The host sends in MSH-16:	The <i>data manager</i> returns in MSA-1			
	AA (Accept)	AE (Error)	AR (Reject)	no response
Always (AL)	Indicates success.	Indicates an error, specified in the MSA segment.	<i>Not sent</i>	<i>Not sent</i>
Success (SU)	Indicates success.	<i>Not sent</i>	<i>Not sent</i>	Indicates unspecified error.
Error (ER)	<i>Not sent</i>	Indicates an error, specified in the MSA segment.	<i>Not sent</i>	Indicates success.
Never (NE)	<i>Not sent</i>	<i>Not sent</i>	<i>Not sent</i>	Supported.

**Table 10-9** Acknowledgement codes sent in response to a test selection download

## Acknowledgment message

The *data manager* never replies to an acknowledgment message.



# Appendices

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11	<i>Data Alarms</i> .....	217
12	<i>Instrument alarms</i> .....	237
13	<i>Using MODULAR PRE-ANALYTICS</i> .....	253
14	<i>Identifying patient samples by sequence number</i> .....	259
15	<i>Communication examples</i> .....	269
16	<i>Preparing the host communication</i> .....	307
17	<i>Text encoding tables</i> .....	329



# Data Alarms

## *Data alarms and error codes*

This chapter gives a reference to the data alarms that cobas® 8000 data manager and the Control Unit can generate.

### In this chapter

### Chapter **11**

The meaning of the data alarms .....	219
Alarms for Routine or STAT samples .....	226
Alarms for Control and Calibration samples .....	230
Alarm priorities .....	234



## The meaning of the data alarms

This table presents a brief description and output character of each data alarm.

 For alarm priorities, see *Alarm priorities* (p. 234).

No.	Name	Meaning	Output character		
			HOST	UI	PRN
Output character	SCR				
0	(No Alarm)				
1	ADC abnormal	<ul style="list-style-type: none"> <li><i>Photometry</i>: The ADC value of the primary or secondary wavelength is zero (in monochromatic measurement, the primary wavelength only).</li> <li><i>ISE</i>: The system cannot read the ADC data properly.</li> <li><i>Immunoassay</i>: The ADC data is abnormal. e602: alarm is not generated.</li> </ul>	1	ADC.E ✓	
2	ABS Cell blank abnormal	The cell blank value used for measurement exceeds or less than the reference value by more than 0.1Abs.	2	>Cuvet ✓	
3	Sample short	<p>Before sample aspiration, the liquid level cannot be detected in the sample container.</p> <p><i>Immunoassay</i>:</p> <ul style="list-style-type: none"> <li>Sample short was detected.</li> <li>No sample was placed.</li> </ul>	3	Samp.S ✓	
4	Reagent short	<p>The liquid level cannot be detected in the reagent container.</p> <ul style="list-style-type: none"> <li>c701/e601: Alarm is generated when reagent pipetted by LLD check</li> <li>c501: Alarm is NOT generated because reagent probe does not have LLD.</li> </ul>	4	Reag.S ✓	
5	ABS over	The absorbance value to be used for calculation after cell blank correction exceeded 3.3. (Check is done for each wavelength)	5	>Abs ✓	
6	Prozone Error	The prozone check value exceeds the specified limit value. (Antigen readdition method)	6	>Proz ✓	
7	Reaction limit over	<p>In a rate assay, the main wavelength absorbance in measure points exceeds the specified reaction limit value (the value after the automatic correction). Depending on the number of measure points within the limit, there are three types:</p> <ol style="list-style-type: none"> <li>All measure points exceed the reaction limit.</li> </ol>	7	>React ✓	
8	Reaction limit over (2nd ..)	<ol style="list-style-type: none"> <li>The second and subsequent points exceed the reaction limit.</li> </ol>	8	>React ✓	
9	Reaction limit over (3rd ..)	<ol style="list-style-type: none"> <li>The third and subsequent points exceed the reaction limit.</li> </ol>	9	>React ✓	
10	Linearity abnormal 1	<p>In rate assay, the reaction linearity exceeds the specified limit value. There are two types of checks depending on the number of measure points:</p> <ol style="list-style-type: none"> <li>When there are 9 or more measure points for c701, 17 or more for c502.</li> </ol>	10	>Lin ✓	
11	Linearity abnormal 2	<ol style="list-style-type: none"> <li>When there are 4-8 measure points for c701, 6 to 16 for c502.</li> </ol>	11	>Lin ✓	
12	S1ABS abnormal	During calibration, expected absorbance is outside the S1 Abs Limit.	12	S1A.E ✓	

**Table 11-1** Meaning of data alarms

The meaning of the data alarms

No.	Name	Meaning	Output character			
			HOST	UI	PRN	SCR
13	DUPLICATE error	<ul style="list-style-type: none"> <li><i>Photometry:</i> The difference between the first and second measurement (absorbance) of a calibrator is outside the specified range.</li> <li><i>Immunoassay:</i> The difference between the first and second measured signals of the calibrator is out of the range specified in the assay.</li> </ul>	13	Dup.E		✓
14	STANDARD error	<p>During photometric calibration, any one of the following alarms was encountered:</p> <ul style="list-style-type: none"> <li>ADC abnormal</li> <li>cell blank abnormal</li> <li>sample short</li> <li>reagent short</li> <li>absorbance over</li> <li>reaction limit over</li> <li>linearity abnormal</li> <li>prozone error</li> <li>duplicate error</li> <li>calculation not possible</li> <li>standard 1 absorbance abnormal.</li> </ul> <p>Otherwise one of the following errors occurred:</p> <ul style="list-style-type: none"> <li>During calibration, calculation was disabled.</li> <li>During nonlinear calibration, an extreme value appeared.</li> </ul>	14	Std.E		✓
15	SENSITIVITY error	<p>Sensitivity is checked for linear (2 to 6 points) or nonlinear calibration. The alarm is issued if the following is smaller than the sensitivity limit:</p> <p>Mean Abs of Std (N)* - Mean Abs of Std (1)</p> <p>Mean Conc of Std (N) - Mean Conc of Std (1)</p> <p>*N: = Std 2 for 2 Point = span calibrator for multipoint calibration</p>	15	Sens.E		✓
16	CALIB error	<p>The current calibrator concentration value or slope value differs from the previous one by more than the specified Compensated Limit.</p> $ (\text{previous value} - \text{current value}) / \{(\text{previous value} + \text{current value}) / 2\}  * 100 < \text{Compensated limit}$	16	Cal.E		✓
17	SD limit error	During nonlinear or multipoint linear calibration, the SD value was larger than the specified SD limit.	17	SD.E		✓
18	ISE Noise error	<p>The fluctuation in electromotive force exceeds the following value:</p> <ul style="list-style-type: none"> <li>Na+: 0.7 mV</li> <li>K+: 1.0 mV</li> <li>Cl-: 0.8 mV</li> </ul>	18	ISE.N		✓
19	ISE Voltage Level error	<p>During measurement of internal reference, the mean of the EMF values was not within the following ranges (Internal standard solution):</p> <ul style="list-style-type: none"> <li>Na+: -90.0 to -10 mV</li> <li>K+: -90.0 to -10 mV</li> <li>Cl-: 80.0 to 160 mV</li> </ul>	19	ISE.E		✓
20	Slope abnormal	The slope value is less than 45.0 mV for Na+ or K+ electrodes, or greater than -35 mV for the Cl- electrode.	20	Slop.E		✓
21	Preparation abnormal	<p>The slope value is within the following range:</p> <ul style="list-style-type: none"> <li>Na+ or K+ electrodes: 45.0 to 49.9 mV</li> <li>Cl- electrode: -39.9 to -35.0 mV</li> </ul>	21	Prep.E		✓

**Table 11-1** Meaning of data alarms

No.	Name	Meaning	Output character		
			HOST	UI	PRN
22	IS concentration abnormal	The concentration of the Internal Standard solution (ISE IS) was not within the following ranges* <ul style="list-style-type: none"><li>• Na+: 120.0-160.0 mmol/L,</li><li>• K+: 3.0-7.0 mmol/L</li><li>• Cl-: 80.0-120.0 mmol/L</li></ul>	22	IStd.E	✓
23	ISE Sample range over	The sample concentration was outside the following range: Serum/Pl etc., for 15µl sample volume: <ul style="list-style-type: none"><li>• <math>10 \leq \text{Na} &lt; 250</math> mmol/L</li><li>• <math>1 \leq \text{K} &lt; 100</math> mmol/L</li><li>• <math>10 \leq \text{Cl} &lt; 250</math> mmol/L</li></ul> Urine for 10µl sample volume: <ul style="list-style-type: none"><li>• <math>10 \leq \text{Na} &lt; 350</math> mmol/L</li><li>• <math>1 \leq \text{K} &lt; 100</math> mmol/L</li><li>• <math>10 \leq \text{Cl} &lt; 350</math> mmol/L</li></ul> Urine for 15µl sample volume: <ul style="list-style-type: none"><li>• <math>20 \leq \text{Na} &lt; 60</math> mmol/L</li><li>• K: always flagged</li><li>• <math>20 \leq \text{Cl} &lt; 60</math> mmol/L</li></ul> Higher priority than "Technical Limit over" (no. 26, 27)	23	<>Test	✓
24	Data error in comp. Test	<ul style="list-style-type: none"><li>• In test-to-test compensation calculation, a data alarm for the compensation test data is indicated.</li><li>• Calculation not possible, test-to-test compensation disabled, overflow, random error, systematic error, QC error and outside of expected value.</li></ul>	24	CmpT.E	✓
25	Unable to calculate comp. Test	<ul style="list-style-type: none"><li>• During test-to-test compensation calculation, the denominator became zero.</li><li>• The test used for test-to-test compensation has not been measured yet.</li><li>• Any test used for test-to-test compensation has data alarm not possible (Calc.?) or test-to-test compensation error (CmpT.E).</li><li>• Any test used in the compensation formula has a data alarm that leaves the result blank.</li></ul>	25	CmpT.?	✓
26	Technical Limit over (upper)	<i>Photometry/ISE:</i> The concentration exceeds the specified technical limit range. <i>Immunoassay:</i> The concentration exceeds the measuring range. Measurement data is displayed as Upper Limit Value.	26	>Test	✓
27	Technical Limit over (lower)	<i>Photometry/ISE:</i> The concentration is below the specified technical limit range. <i>Immunoassay:</i> The concentration is below the measuring range. Measurement data is displayed as Lower Limit Value.	27	<Test	✓
28		Reserved for former alarm (Random error in real-time QC)			
29		Reserved for former alarm (Systematic error 1 in real-time QC)			
30		Reserved for former alarm (Systematic error 2 in real-time QC)			
31		Reserved for former alarm (Systematic error 3 in real-time QC)			
32		Reserved for former alarm (Systematic error 4 in real-time QC)			
33		Reserved for former alarm (Systematic error 5 in real-time QC)			
34		Reserved for former alarm (Systematic error 6 in real-time QC)			
35		Reserved for former alarm (QC error 1)			

**Table 11-1** Meaning of data alarms

The meaning of the data alarms

No.	Name	Meaning	Output character		
			HOST	UI	PRN
					SCR
36		Reserved for former alarm (QC error 2)			
37	Calculation test error	A data alarm has occurred for the test needed in the calculation.	37	ClcT.E	✓
38	Overflow	Display is not possible because the output figure exceeds the defined number of digits.	38	Over.E	✓
39	Calculation not possible	<ul style="list-style-type: none"> <li>The denominator becomes zero in calculation.</li> <li>An overflow occurred in logarithmic or exponential calculation.</li> <li>Result was left blank.</li> </ul>	39	Calc.?	✓
40		Reserved for former alarm (Outside of expected value (upper))			
41		Reserved for former alarm (Outside of expected value (lower))			
42	Edited test	The data has been edited. Effective when "Edited Data Check" is ON.	42	Edited	✓
43	Calibration result abnormal (Sample Flag)	No calibration data or previous calibration data used (The last calibration failed due to an Std. or Sens alarm). This alarm is attached to routine/rerun/STAT/control samples.	43	Cal.E	✓
44	Repeat limit over (upper)	The quantitative result exceeds the upper limit of the specified repeat limit range. <ul style="list-style-type: none"> <li>Effective when "Repeat Limit Check" is ON.</li> <li>Auto rerun ON/OFF is depending on the setting.</li> </ul>	44	>Rept	✓
45	Repeat limit over (lower)	The quantitative result falls below the lower limit of the specified repeat limit range. <ul style="list-style-type: none"> <li>Effective when "Repeat Limit Check" is ON.</li> <li>Auto rerun ON/OFF is depending on the setting.</li> </ul>	45	<Rept	✓
46	ABS maximum over (nonLin curve)	The absorbance of a sample is found equal or greater than the theoretical maximum absorbance (for infinite analyte concentration).	46	Samp.?	✓
47	Calibration result invalid	Result was generated with an invalid calibration. For example, the calibration may not be done yet.	47	Cal.I	✓
48					
49					
50					
51	Response(ISE) abnormal 1	The A Factor is outside the following limits: <ul style="list-style-type: none"> <li>Na+: A &gt; 0.154</li> <li>K+: A &gt; 0.107</li> <li>Cl-: A &gt; 0.330</li> </ul>	51	Rsp1.E	✓
52	Response(ISE) abnormal 2	The A Factor is outside the following limits: <ul style="list-style-type: none"> <li>Na+: A &gt; 0.232</li> <li>K+: A &gt; 0.160</li> <li>Cl-: A &gt; 0.490</li> </ul>	52	Rsp2.E	✓
53	Conditioning(ISE) abnormal	The slope value is 68.1 mV or greater for Na+ or K+ electrodes, or it is -68.1 mV or less for the Cl- electrode.	53	Cond.E	✓
54					
55	ISE range over	For urine, 10µL sample volume, the result is inside the following range: <ul style="list-style-type: none"> <li>Na+: 10 - 60 mmol/L</li> <li>K+: alarm not issued</li> <li>Cl-: 10 - 60 mmol/L</li> </ul> The cause is that the sample concentration is too low.	55	<>ISE	✓

**Table 11-1** Meaning of data alarms

No.	Name	Meaning	Output character		
			HOST	UI	PRN
					SCR
56	Kinetic unstable (Prozone error 2)	The prozone check value exceeds the specified limit value. (reaction rate method)	56	>Kin	✓
57		Reserved for former alarm (Serum index 1 interference)			
58		Reserved for former alarm (Serum index multiple interference)			
59	Stop mixing		59	MIXSTP	✓
60	Mixing current low		60	MIXLOW	✓
61					
62	System reagent short	Shortage in ProCell/CleanCell is detected.	62	SysR.S	✓
63	AB level range over (Assay Buffer) run start	No data alarm could be attached because the detection channel is masked.	63	>AB	✓
64	AB level check error	No data alarm could be attached because the detection channel is masked.	64	AB.E	✓
65	Current range over (run start)	No data alarm could be attached because the detection channel is masked.	65	>Curr	✓
66	Current range check error	No data alarm could be attached because the detection channel is masked.	66	Curr.E	✓
67	Sample hovering	The sample probe hovers over the sample. Not used. SLDD.N(87) occurs instead of this.	67	Samp.H	✓
68	Sample air bubble	Air bubble is detected in the sample syringe flow path when the sample is aspirated.	68	Samp.B	✓
69	Reagent hovering	The reagent probe hovers over the reaction disk (over reagent / dilution / pretreatment).	69	Reag.H	✓
70	Reagent film detection	The reagent probe detects a film on the reagent (reagent / dilution / pretreatment / ProCell / CleanCell).	70	Reag.F	✓
71	Potential carry over	The signal level of this sample is low (a carryover may have occurred).	71	CarOvr	✓
72	Sample clot	The specified volume of sample is not aspirated: Clogging was detected in the sample probe.	72	Samp.C	✓
73	Carry over detergent short	Shortage of detergent for reagent carryover evasion is detected.	73	Det.S	✓
74	Reagent disk temperature	Reagent disk temperature is out of range.	74	Reag.T	✓
75	Incubator temperature	Incubator temperature is out of range.	75	Inc.T	✓
76	System reagent temperature	ProCell/CleanCell temperature is out of range.	76	SysR.T	✓
77	Cell temperature	Measuring cell temperature is out of range.	77	Cell.T	✓
78	Missing value	One or more of the calibration results is invalid.		-----	
79	System errors	An error occurs on the system during measurement.	(79)	Sys.E	✓
80	Monotony of curve	The working curve is not monotonically increasing or monotonically decreasing.	(80)	Mono.E	✓
81	Minimum signal	One or two of the calibrator signal values is lower than the specified lower limit value.	(81)	<Sig	✓
82	Maximum signal	One or two of the calibrator signal values is higher than the specified upper limit value.	(82)	>Sig	✓
83	Sample carry over for modules	After pipetting on c-module, the required special wash for additional test(s) was not performed.	(83)	Samp.O	✓

**Table 11-1** Meaning of data alarms

*The meaning of the data alarms*

No.	Name	Meaning	Output character		
			HOST	UI	PRN
					SCR
84	Minimum/Maximum signal	If one or more effective signal values falls out of the allowable minimum/maximum signal range.	(84)	Sig.E	✓
85	Minimum acceptable difference	The difference of the signals between each level of calibrators is below the permissible value.	(85)	Diff.E	✓
86	Sample LLD abnormal	The sample probe does not start LLD or LLD is not completed (because of dirt on the tip etc.)	86	SLLD.E	✓
87	Sample LLD noise	The sample probe did not detect the liquid surface properly because of air bubbles on the sample or static electricity.	87	SLLD.N	✓
88					
89					
90					
91					
92					
93	Washing buffer temperature	PreClean temperature is out of range.	93	WB.T	✓
94	Washing buffer short	The remaining volume for PreClean is 0, or liquid short signal is detected.	94	WB.S	✓
95	Clot pressure sensor ADC (underflow)	In checking the pressure sensor, underflow data is detected.	95	Clot.E	✓
96	Clot pressure sensor ADC (overflow)	In checking the pressure sensor, overflow data is detected.	96	Clot.E	✓
97	Clot pressure abnormal	The clot pressure value is abnormal.	97	Clot.E	✓
98	Sample pipettor air bubble	Air bubble is detected in the sample syringe flowpath when the sample is aspirated.	98	Samp.B	✓
99	Current range over (operation)	The measuring cell current is out of range in the determination cycle during operation.	99	>Curr	✓
100	Low level signal	The effective signal of test is lower than the specified lower limit value.	100	<SigL	✓
101	Reagent Expired Date	The alarm indicates that an expired reagent was used; the test result is not guaranteed.	101	ReagEx	✓
102	QC error	There is an error related to QC.	102	QCErr	✓
103	Serum index interference lipaemia	The lipaemia value exceeds the specified limit value. <ul style="list-style-type: none"> <li>• Flag is attached to the data which is assigned Serum Index check in the Utility -Application -Range" screen.</li> </ul>	103	>I.L	✓
104	Serum index interference hemolysis	The hemolysis value exceeds the specified limit value. <ul style="list-style-type: none"> <li>• Flag is attached to the data which is assigned Serum Index check in the Utility -Application -Range" screen.</li> </ul>	104	>I.H	✓
105	Serum index interference icteric	The icteric value exceeds the specified limit value. <ul style="list-style-type: none"> <li>• Flag is attached to the data which is assigned Serum Index check in the Utility -Application -Range" screen.</li> </ul>	105	>I.I	✓
106	Serum index interference lipaemia / hemolysis	Both of the lipaemia value and hemolysis value exceed the specified limit value. <ul style="list-style-type: none"> <li>• Flag is attached to the data which is assigned Serum Index check in the Utility -Application -Range" screen.</li> </ul>	106	>I.LH	✓

**Table 11-1** Meaning of data alarms

No.	Name	Meaning	Output character		
			HOST	UI	PRN
107	Serum index specific interference lipaemia / icteric	Both of the lipaemia value and icteric value exceed the specified limit value.  • Flag is attached to the data which is assigned Serum Index check in the Utility -Application -Range" screen.	107	>I.LI	✓
108	Serum index interference hemolysis / icteric	Both of the hemolysis value and icteric value exceed the specified limit value.  • Flag is attached to the data which is assigned Serum Index check in the Utility -Application -Range" screen.	108	>I.HI	✓
109	Serum index interference lipaemia / hemolysis / icteric	All of lipaemia, hemolysis and icteric values exceed the specified limit value.  • Flag is attached to the data which is assigned Serum Index check in the Utility -Application -Range" screen.	109	>I.LHI	✓
110	Serum index measurement not performed	Serum index measurement could not be performed	110	na.LHI	✓
111	On board stability limit over on Reagent Manager	On-board stability limit was exceeded on Reagent Manager  • This data alarm is attached to results with the reagents which exceed on board stability limit 30 minutes or more.	111	OBS.RM	✓
112	On board stability limit over on Reagent Rotor	On board stability limit was exceeded on Reagent Rotor	112	OBS.RR	✓

**Table 11-1** Meaning of data alarms

## Auxiliary Alarms for Routine or STAT samples

This section tells you how to interpret data alarms when generated with regard to routine or STAT samples.

The following symbols are used in the chart.

D	Data	A	Alarm	R	Rerun TS	A R	Auto Rerun
✓	With result	●	AU	=	Same volume	A	Auto rerun
✗	Without result	○	Core/PC	↓	Decrease	N	No auto rerun
☒	Without result in specified conditions	◎	Core/PC, AU	↑	Increase	+	Either
≥	Upper limit	D	<i>data manager</i>	-	No order		
≤	Lower limit						

**Table 11-2** Symbols used in chart of data alarms for routine and STAT samples

No.	Name	Routine / STAT <sup>(1)</sup>												Immuno-assay	
		Clinical Chemistry													
		Photometry			LHI			ISE			Calc. Test				
		D	A	R	D	A	R	A	D	A	R	A	D	A	R
				R			R				R				R
0	(No Alarm)														
1	ADC abnormal	✓	●	=	A	✓	●	=	A	✓	●	=	A		✗ ● = A
2	ABS Cell blank abnormal	✓	●	=	A	✓	●	=	A						
3	Sample short	☒	●	=	N	☒	●	=	N	☒	●	=	N		☒ ● = N
4	Reagent short	☒	●	=	N	☒	●	=	N	☒	●	=	N		☒ ● = N
5	ABS over	✓	●	↓	A	✓	●	=	A						
6	Prozone Error	✓	●	↓	A										
7	Reaction limit over	✓	●	↓	A										
8	Reaction limit over (2nd ..)	✓	●	↓	A										
9	Reaction limit over (3rd ..)	✓	●	↓	A										
10	Linearity abnormal 1	✓	●	=	A										
11	Linearity abnormal 2	✓	●	=	A										
12	S1ABS abnormal														
13	DUPLICATE error														
14	STANDARD error														
15	SENSITIVITY error														
16	CALIB error														
17	SD limit error														
18	ISE Noise error									✓	●	=	A		
19	ISE Voltage Level error									✓	●	=	A		
20	Slope abnormal														
21	Preparation abnormal														
22	IS concentration abnormal														
23	ISE Sample range over									✓	●	=	N		

**Table 11-3** Data alarms for routine and STAT samples

No.	Name	Routine / STAT <sup>(1)</sup>											
		Clinical Chemistry						Immuno-assay					
		Photometry		LHI		ISE		Calc. Test		D		A	
		D	A	D	A	R	A	D	A	R	A	D	A
24	Data error in comp. Test	✓	● = A	✓	●			✓	● = A				
25	Unable to calculate comp. Test	✓	● = A	✗	●			✗	● = A				
26	Technical Limit over (upper)	✓	● ↓ A					✓	● = A			≥ ● ↓ A	
27	Technical Limit over (lower)	✓	● ↑ A					✓	● = A			≤ ● - N	
28													
29													
30													
31													
32													
33													
34													
35													
36													
37	Calculation test error									✓	● = A		
38	Overflow	✗	● N	✗	●			✗	● N	✗	● N	✗	● N
39	Calculation not possible	✗	● = A	✗	●			✗	● = A	✗	● = A	✗	● = A
40													
41													
42	Edited test	✓	● N	✓	●			✓	● N	✓	● N	✓	● N
43	Calibration result abnormal (Sample Flag)	✓	● = N	✓				✓	● = N			✗	● = N
44	Repeat limit over (upper)	✓	● = +					✓	● = +	✓	● = +	✓	● = +
45	Repeat limit over (lower)	✓	● = +					✓	● = +	✓	● = +	✓	● = +
46	ABS maximum over (nonLin curve)	✗	● ↓ A										
47	Calibration result invalid	✓	● = N	✓				✓	● = N			✗	● = N
48													
49													
50													
51	Response(ISE) abnormal 1												
52	Response(ISE) abnormal 2												
53	Conditioning(ISE) abnormal												
54													
55	ISE range over							✓	● ↑ A				
56	Kinetic unstable (Prozone error 2)	✓	● ↓ A										
57													
58													
59	Stop mixing	✓	● = A	✓	● = A								
60	Mixing current low	✓	● = A	✓	● = A								
61													
62	System reagent short										✗	● = A	

Table 11-3 Data alarms for routine and STAT samples

Alarms for Routine or STAT samples

No.	Name	Routine / STAT <sup>(1)</sup>											
		Clinical Chemistry											
		Photometry			LHI			ISE			Calc. Test		
		D	A	R	D	A	R	A	D	A	R	A	D
		R	R	R	R	R	R	R	R	R	R	R	R
63	AB level range over (Assay Buffer) run start												✓ ● = A
64	AB level check error												✓ ● = A
65	Current range over (run start)												✓ ● = A
66	Current range check error												✓ ● = A
67	Sample hovering												x ● = A
68	Sample air bubble												x ● = N
69	Reagent hovering												x ● = A
70	Reagent film detection												x ● = A
71	Potential carry over												✓ ● = A
72	Sample clot	☒	● = N		☒	● = N	☒	● = N					x ● = N
	• ☒: If in the user interface software 99 is set-up, then a result is printed out.												
73	Carry over detergent short	✓	● = N	✓	● = N								
74	Reagent disk temperature												✓ ● = A
75	Incubator temperature												✓ ● = A
76	System reagent temperature												✓ ● = A
77	Cell temperature												✓ ● = A
78	Missing value												
79	System errors												
80	Monotony of curve												
81	Minimum signal												
82	Maximum signal												
83	Sample carry over for modules	✓	○ - N					✓	○ - N				✓ ○ - N
84	Minimum/Maximum signal												
85	Minimum acceptable difference												
86	Sample LLD abnormal												x ● = A
87	Sample LLD noise												x ● = A
88													
89													
90													
91													
92													
93	Washing buffer temperature												x ● = A
94	Washing buffer short												x ● = A
95	Clot pressure sensor ADC (underflow)												x ● = A
96	Clot pressure sensor ADC (overflow)												x ● = A
97	Clot pressure abnormal												x ● = A
98	Sample pipettor air bubble												x ● = A
99	Current range over (operation)												✓ ● = A
100	Low level signal												x ● = A

Table 11-3 Data alarms for routine and STAT samples

No.	Name	Routine / STAT <sup>(1)</sup>																	
		Clinical Chemistry																	
		Photometry			LHI			ISE			Calc. Test								
		D R	A R	A R	D R	A R	A R	D R	A R	A R	D R	A R	A R						
101	Reagent Expired Date	✓	●	N	✓	●	N				✓	●	N						
102	QC error																		
103	Serum index interference lipaemia	✓	●	-	N			✓	●	-	N		✓	●	-	N			
104	Serum index interference hemolysis	✓	●	-	N			✓	●	-	N		✓	●	-	N			
105	Serum index interference icteric	✓	●	-	N			✓	●	-	N		✓	●	-	N			
106	Serum index interference lipaemia / hemolysis	✓	●	-	N			✓	●	-	N		✓	●	-	N			
107	Serum index specific interference lipaemia / icteric	✓	●	-	N			✓	●	-	N		✓	●	-	N			
108	Serum index interference hemolysis / icteric	✓	●	-	N			✓	●	-	N		✓	●	-	N			
109	Serum index interference lipaemia / hemolysis / icteric	✓	●	-	N			✓	●	-	N		✓	●	-	N			
110	Serum index measurement not performed	✓	●	-	N			✓	●	-	N		✓	●	-	N			
111	On board stability limit over on Reagent Manager	✓	●	-	N	✓	●	-	N			✓	●	-	N				
112	On board stability limit over on Reagent Rotor	✓	●	-	N	✓	●	-	N			✓	●	-	N	✓	●	-	N

**Table 11-3** Data alarms for routine and STAT samples

(1) Legend:

D Data: ✓ With result / ✗ Without result / □ Without result in specified conditions / ≥ Upper limit / ≤ Lower limit

A Alarm: ● AU / ○ Core/PC, AU / ⊖ Core/PC / D data manager

R Rerun test selection: = Same volume / ↓ Decrease / ↑ Increase / - No order

AR Auto rerun: A Auto rerun / N No auto rerun / + Either

## Alarms for Control and Calibration samples

This section tells you how to interpret data alarms when generated by quality control or calibration samples.

The following symbols are used in the chart.

D	Data	A	Alarm
✓	With result	●	AU
✗	Without result	○	Core/PC
☒	Without result in specified conditions	◎	Core/PC, AU
≥	Upper limit	D	<i>data manager</i>
≤	Lower limit		

**Table 11-4** Symbols used in control and calibration alarms chart

No.	Name	Control <sup>(1)</sup>						Calibration <sup>(1)</sup>						
		Clin Chem				Imm		Clin Chem				Imm		
		Photo		ISE		Calc		Photo		ISE		Calc		
		D	A	D	A	D	A	D	A	D	A	D	A	
0	(No Alarm)													
1	ADC abnormal	✓	●	✓	●			✗	●	✓	●	✓	●	
2	ABS Cell blank abnormal	✓	●							✓	●			
3	Sample short	☒	●	☒	●			☒	●	☒	●	☒	●	
4	Reagent short	☒	●	☒	●			☒	●	☒	●	☒	●	
5	ABS over	✓	●							✓	●			
6	Prozone Error													
7	Reaction limit over	✓	●							✓	●			
8	Reaction limit over (2nd ..)	✓	●							✓	●			
9	Reaction limit over (3rd ..)	✓	●							✓	●			
10	Linearity abnormal 1	✓	●							✓	●			
11	Linearity abnormal 2	✓	●							✓	●			
12	S1ABS abnormal									✓	●			
13	DUPLICATE error									✓	●		✓	●
14	STANDARD error									✓	●	✓	●	
15	SENSITIVITY error									✓	●			
16	CALIB error									✓	●	✓	●	
17	SD limit error									✓	●			
18	ISE Noise error			✓	●					✓	●			
19	ISE Voltage Level error			✓	●					✓	●			
20	Slope abnormal									✓	●	✓	●	
21	Preparation abnormal									✓	●			
22	IS concentration abnormal									✓	●			
23	ISE Sample range over			✓	●									
24	Data error in comp. Test	✓	○	✓	○									
25	Unable to calculate comp. Test	✗	○	✗	○									

**Table 11-5** Control and calibration alarms

No.	Name	Control <sup>(1)</sup>						Calibration <sup>(1)</sup>					
		Clin Chem				Imm		Clin Chem				Imm	
		Photo		ISE				Photo		ISE			
		D	A	D	A	D	A	D	A	D	A	D	A
26	Technical Limit over (upper)							≥	●				
27	Technical Limit over (lower)							≤	●				
28													
29													
30													
31													
32													
33													
34													
35													
36													
37	Calculation test error							✓	○				
38	Overflow	x	○	x	○	x	○	x	○	x	○	x	○
39	Calculation not possible	x	○	x	○	x	○	x	●	x	●	x	●
40													
41													
42	Edited test												
43	Calibration result abnormal (Sample Flag)	✓	●	✓	●			☒	●				
44	Repeat limit over (upper)												
45	Repeat limit over (lower)												
46	ABS maximum over (nonLin curve)	x	●										
47	Calibration result invalid	✓	●	✓	●			☒	●				
48													
49													
50													
51	Response(ISE) abnormal 1									✓	●		
52	Response(ISE) abnormal 2									✓	●		
53	Conditioning(ISE) abnormal									✓	●		
54													
55	ISE range over												
56	Kinetic unstable (Prozone error 2)												
57													
58													
59	Stop mixing	✓	●	✓	●					✓	●	✓	●
60	Mixing current low	✓	●	✓	●					✓	●	✓	●
61													
62	System reagent short							☒	●				
63	AB level range over (Assay Buffer) run start							✓	●				
64	AB level check error							✓	●				

Table 11-5 Control and calibration alarms

Roche Diagnostics

No.	Name	Control <sup>(1)</sup>						Calibration <sup>(1)</sup>					
		Clin Chem				Imm		Clin Chem				Imm	
		Photo		ISE				Photo		ISE			
		D	A	D	A	D	A	D	A	D	A	D	A
65	Current range over (run start)							✓	●				
66	Current range check error							✓	●				
67	Sample hovering					x	●						
68	Sample air bubble					x	●						
69	Reagent hovering					x	●						
70	Reagent film detection					x	●						
71	Potential carry over							✓	●				
72	Sample clot	☒	●	☒	●			x	●	☒	●	☒	●
	• ☒: If Clot Check count is 99 (in other words, no check), data will not be <Space>												
73	Carry over detergent short	✓	●							✓	●		
74	Reagent disk temperature							✓	●				
75	Incubator temperature							✓	●				
76	System reagent temperature							✓	●				
77	Cell temperature							✓	●				
78	Missing value											●	
79	System errors											●	
80	Monotony of curve									●			●
81	Minimum signal											●	
82	Maximum signal											●	
83	Sample carry over for modules	✓	○	✓	○			✓	○				
84	Minimum/Maximum signal											●	
85	Minimum acceptable difference											●	
86	Sample LLD abnormal							x	●				
87	Sample LLD noise							x	●				
88													
89													
90													
91													
92													
93	Washing buffer temperature							x	●				
94	Washing buffer short							x	●				
95	Clot pressure sensor ADC (underflow)							x	●				
96	Clot pressure sensor ADC (overflow)							x	●				
97	Clot pressure abnormal							x	●				
98	Sample pipettor air bubble							x	●				
99	Current range over (operation)							✓	●				
100	Low level signal							x	●				
101	Reagent Expired Date	✓	○			✓	○	✓	○				
102	QC error	✓	D	✓	D	✓	D	✓	D				

Table 11-5 Control and calibration alarms

No.	Name	Control <sup>(1)</sup>						Calibration <sup>(1)</sup>					
		Clin Chem			Imm	Clin Chem			Imm				Imm
		Photo	ISE	Calc		Photo	ISE	Calc		Photo	ISE	Calc	
		D	A	D	A	D	A	D	A	D	A	D	A
103	Serum index interference lipaemia												
104	Serum index interference hemolysis												
105	Serum index interference icteric												
106	Serum index interference lipaemia / hemolysis												
107	Serum index specific interference lipaemia / icteric												
108	Serum index interference hemolysis / icteric												
109	Serum index interference lipaemia / hemolysis / icteric												
110	Serum index measurement not performed												
111	On board stability limit over on Reagent Manager	✓	●			✓	●						
112	On board stability limit over on Reagent Rotor	✓	●			✓	●	✓	●				

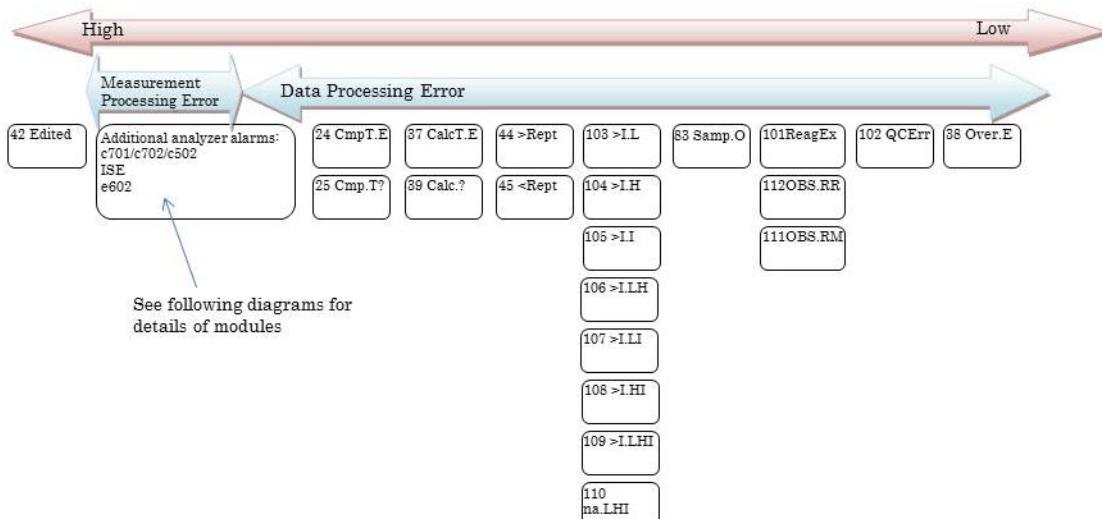
**Table 11-5** Control and calibration alarms

(1) Legend: D Data: ✓ With result / ✗ Without result / ☐ Without result in specified conditions / ≥ Upper limit / ≤ Lower limit  
 A Alarm: ● AU / ● Core/PC, AU / ○ Core/PC / D data manager

Alarm priorities

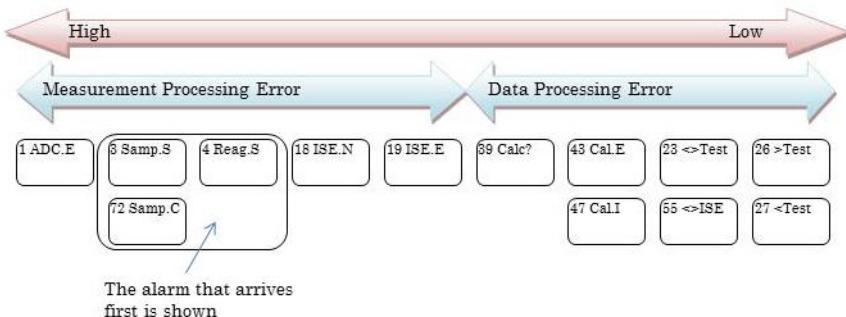
## Alarm priorities

If more than one alarm exists for a result, the analyzer displays the alarm with the highest priority, and sends it to the *data manager*. The *data manager* forwards this alarm to the host.

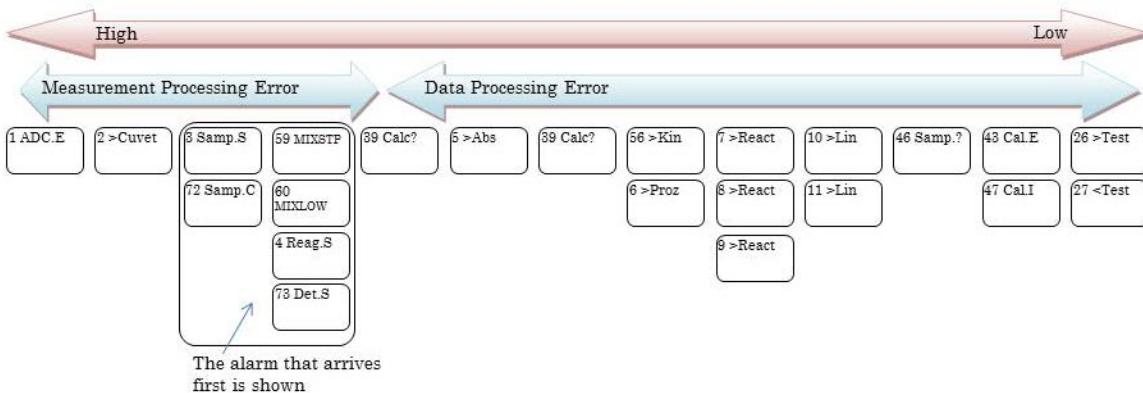


**Figure 11-1** Priority of alarms on routine or STAT samples

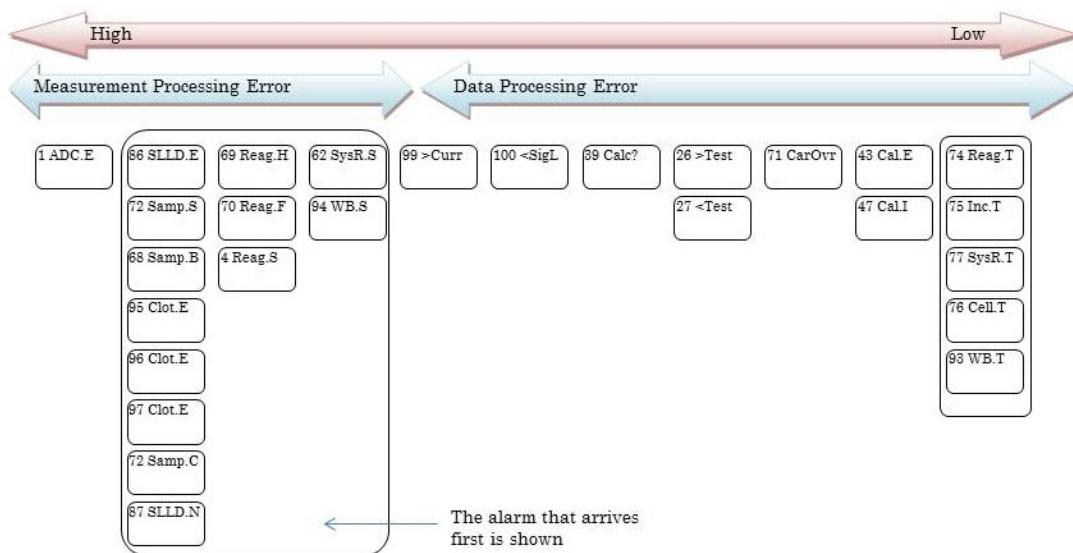
Each module has certain specific alarms.



**Figure 11-2** Priority of alarms from an ISE module



**Figure 11-3** Priority of alarms from a c-module



**Figure 11-4** Priority of alarms from an e602 module



# Instrument alarms

This chapter describes the alarms generated on the cobas® 8000 modular analyzer series instrument by errors in communication with the *data manager* or the host.

## In this chapter

## Chapter 12

Instrument alarms.....	239
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## Instrument alarms

This section has a table of the instrument alarms involving communication between the Control Unit or the instrument on one side, and the *data manager* on the other. Instrument alarms are not uploaded to the host.

If an instrument alarm occurs that is not in this list, consult your authorized Roche Diagnostics service personnel for more information.

Code	Sub-	Alarm Message	Content	Troubleshooting
110	1	Abnormal Text from Data Manager	Contents of the text received from the Data Manager are invalid.	<ol style="list-style-type: none"> <li>Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>Check if the connector was not plugged in during the data communication.</li> <li>Restart the system.</li> <li>Contact service representative, if alarm recurs.</li> </ol>
111	2	Abnormal Test Selection from Data Manager	System did not receive a response against its inquiry within a timeout period.	<ol style="list-style-type: none"> <li>Check the Data Manager's operation or connection status.</li> <li>Check if the connector got unplugged during the data communication.</li> <li>Check the inquiry timeout on Utility &gt; System &gt; Data Manager Settings.</li> <li>Contact service representative, if alarm recurs.</li> </ol>
111	51	Abnormal Test Selection from Data Manager	Reading error occurred in the sample management database.	<ol style="list-style-type: none"> <li>Restart the system.</li> <li>Contact service representative, if alarm recurs.</li> </ol>
111	52	Abnormal Test Selection from Data Manager	Dilution ratio value is outside the range.	<ol style="list-style-type: none"> <li>Check the Data Manager settings.</li> <li>Check the dilution ratio.</li> <li>Refer to the specifications of system interface communication.</li> <li>Contact service representative, if alarm recurs.</li> </ol>
111	53	Abnormal Test Selection from Data Manager	The received sample information is not requested one. Either of the following items is wrong: <ul style="list-style-type: none"> <li>• Sample Type</li> <li>• Sample ID</li> <li>• Sequence No.</li> <li>• Rack ID</li> <li>• Position No.</li> </ul>	<ol style="list-style-type: none"> <li>Check the Data Manager settings.</li> <li>Check the sample information.</li> <li>Refer to the specifications of system interface communication.</li> <li>Contact service representative, if alarm recurs.</li> </ol>
111	54	Abnormal Test Selection from Data Manager	Writing error occurred in the sample management database.	<ol style="list-style-type: none"> <li>Restart the system.</li> <li>Contact service representative, if alarm recurs.</li> </ol>
111	55	Abnormal Test Selection from Data Manager	Sample data file on the sample management database is full.	<ol style="list-style-type: none"> <li>Perform Delete All on Workplace &gt; Data Review.</li> <li>Perform Sample Data Clear on System Overview.</li> </ol>
111	56	Abnormal Test Selection from Data Manager	Result data file on the sample management database is full.	<ol style="list-style-type: none"> <li>Perform Delete All on Workplace &gt; Data Review.</li> <li>Perform Sample Data Clear on System Overview.</li> </ol>
111	57	Abnormal Test Selection from Data Manager	The Stat rack ID is out of the range.	Check the orders on System > Rack Assignment.
111	58	Abnormal Test Selection from Data Manager	The sample position on the Stat rack is out of the range.	<ol style="list-style-type: none"> <li>Perform System Communication Trace on Print.</li> <li>Check the HL7 text. (Test Selection Download Text - Batch)</li> <li>Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms

## Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
111	59	Abnormal Test Selection from Data Manager	The combination of a Stat rack ID and a sample position has been already assigned.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Test Selection Download Text)</li> </ol>
111	60	Abnormal Test Selection from Data Manager	The sample ID contains the abnormal code.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Test Selection Download Text)</li> </ol>
126	200	Data Manager Communication Error	Communication error occurred. Communication line was turned to offline status.	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	201	Data Manager Communication Error	Automatic recovery measures for connection between the Data Manager and the system were performed 15 times in a row. By this alarm, the communication will be disconnected.	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	202	Data Manager Communication Error	Communication error occurred during connection. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	203	Data Manager Communication Error	Communication error occurred. When receiving it, abnormality was detected. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	204	Data Manager Communication Error	Internal process error occurred.	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	205	Data Manager Communication Error	Communication error occurred. When receiving it, abnormality was detected. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	206	Data Manager Communication Error	Communication error occurred, due to either of the following causes: • Wire break. • Momentary power failure.	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	207	Data Manager Communication Error	Internal process error occurred.	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	208	Data Manager Communication Error	Internal process error occurred.	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
126	301	Data Manager Communication Error	No response from Data Manager within a timeout. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	302	Data Manager Communication Error	Message error occurred. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	303	Data Manager Communication Error	FTP transmission error occurred. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	304	Data Manager Communication Error	Internal process error occurred. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	305	Data Manager Communication Error	Database access error occurred. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	306	Data Manager Communication Error	Communication was turned to offline status. (Control socket communication line)	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	401	Data Manager Communication Error	Abnormality connection with Data Manager. (FTP line)	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	402	Data Manager Communication Error	A file cannot be copied.	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
126	403	Data Manager Communication Error	There is no response from Data Manager.	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
126	501	Data Manager Communication Error	The response from the Data manager is wrong.	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
127	1	Abnormal Text from Data Manager	Communication ID error was detected in the CI11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the CI11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	2	Abnormal Text from Data Manager	Communication ID error was detected in the UR11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the UR11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	3	Abnormal Text from Data Manager	Communication ID error was detected in the PL11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the PL11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms**Roche Diagnostics**

## Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
127	4	Abnormal Text from Data Manager	Communication ID error was detected in the PD11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the PD11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	5	Abnormal Text from Data Manager	Communication ID error was detected in the CL11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the CL11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	6	Abnormal Text from Data Manager	Communication ID error was detected in the CD11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the CD11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	7	Abnormal Text from Data Manager	Communication ID error was detected in the QL11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the QL11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	8	Abnormal Text from Data Manager	Communication ID error was detected in the QD11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the QD11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	9	Abnormal Text from Data Manager	Communication ID error was detected in the RD11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the RD11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	10	Abnormal Text from Data Manager	Communication ID error was detected in the TQ11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the TQ11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	11	Abnormal Text from Data Manager	Communication ID error was detected in the CV11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the CV11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	12	Abnormal Text from Data Manager	Communication ID error was detected in the CQ11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the CQ11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	13	Abnormal Text from Data Manager	Communication ID error was detected in the MR11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the MR11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	14	Abnormal Text from Data Manager	Communication ID error was detected in the MK11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the MK11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms**Roche Diagnostics**

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
127	15	Abnormal Text from Data Manager	Communication ID error was detected in the RM11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the RM11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	16	Abnormal Text from Data Manager	Communication ID error was detected in the EI12.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the EI11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	17	Abnormal Text from Data Manager	Communication ID error was detected in the EI13.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the EI13 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	18	Abnormal Text from Data Manager	Communication ID error was detected in the PU11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the PU11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	19	Abnormal Text from Data Manager	Communication ID error was detected in the PU12.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the PU12 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	20	Abnormal Text from Data Manager	Abnormal communication ID was detected.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the undefined communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	21	Abnormal Text from Data Manager	Communication ID error was detected in the EU11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the EU11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	22	Abnormal Text from Data Manager	Communication ID error was detected in the WL11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the WL11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	23	Abnormal Text from Data Manager	Communication ID error was detected in the WD11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the WD11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	24	Abnormal Text from Data Manager	Communication ID error was detected in the ER11.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the ER11 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
127	25	Abnormal Text from Data Manager	Communication ID error was detected in the ER12.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the ER12 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms**Roche Diagnostics**

## Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
127	26	Abnormal Text from Data Manager	Communication ID error was detected in the ER13.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the ER13 communication ID.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
300	1	Sample Management Database Error	Sample data file on the sample management database is full.	<ol style="list-style-type: none"> <li>1. Perform Delete All on Workplace &gt; Data Review.</li> <li>2. Perform Sample Data Clear on System Overview.</li> </ol>
300	2	Sample Management Database Error	Result data file on the sample management database is full.	<ol style="list-style-type: none"> <li>1. Perform Delete All on Workplace &gt; Data Review.</li> <li>2. Perform Sample Data Clear on System Overview.</li> </ol>
300	3	Sample Management Database Error	Link data file on the sample management database is full.	Check the test selection on Workplace > Test Selection.
300	4	Sample Management Database Error	The sample data file on the sample management database is full.	<ol style="list-style-type: none"> <li>1. Perform Delete All on Workplace &gt; Data Review.</li> <li>2. Perform Sample Data Clear on System Overview.</li> </ol>
300	5	Warning of Database Registration	The sample data file on the sample management database becomes full.	<ol style="list-style-type: none"> <li>1. Perform Delete All on Workplace &gt; Data Review.</li> <li>2. Perform Sample Data Clear on System Overview.</li> </ol>
301	-3	TS Register Error	The test selections are not registered because the sample test DB is full. The subcategory code indicates the rack No. and the cup position. For example, Subcategory code No. (XXXXXY) XXXXX: rack No. Y: cup	Check the test selections on Workplace > Test Selection or QC > Status.
302	-3	Rerun TS Register Error	The rerun test selections are not registered because the sample test DB is full. The subcategory code indicates the rack No. and the cup position. For example, Subcategory code No. (XXXXXY) XXXXX: rack No. Y: cup	Check the test selections on Workplace > Test Selection.
321	1	Sample Duplication Error	The system cannot analyze a sample, because duplicated date is included in the barcode label on the sample. The duplicated data is followings: <ul style="list-style-type: none"> <li>• In case of routine sample in barcode mode: Sample Type, Sample ID</li> <li>• In case of Stat sample in barcode mode: Sample Type, Sample ID</li> <li>• In case of routine sample in non-barcode mode: Sample Type</li> </ul>	<ol style="list-style-type: none"> <li>1. When the system completes the analysis of loaded samples, retry the sample.</li> <li>2. Check the followings. * Sample Type * Sample ID * Sequence No. * Rack ID * Rack Position No.</li> </ol>

**Table 12-1**      Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
322	-3	Control Sample Duplication Error	In the following cases, there exists same control sample numbers registered in database: <ul style="list-style-type: none"> <li>• The same number is applied to a control sample because applied number returned to the first.</li> <li>• There are same control samples in a same rack group in case of rack assign mode. The subcategory code indicates the rack</li> </ul>	1. Perform Delete All on Workplace > Data Review. 2. Perform Sample Data Clear on System Overview. 3. Don't set the same control samples in a same rack groups.
323	-3	Control Sequence No. Register Error	Control samples are not registered because the control sequence No. cannot be corresponding to the one which will be registered in the Sample DB. The subcategory code indicates the rack No. and the cup position. For example, Subcategory code No. (XXXXXY) XXXXX: rack No. Y: cup	1. Perform Delete All on Workplace > Data Review. 2. Contact service representative, if alarm recurs.
341	-1	Application Code / testcode Conversion Error (Transmission)	When result is uploading, Host code is not registered. The subcategory code indicates the application code.	Contact service representative.
342	1	Application Code / testcode Conversion Error	When request is downloading, Host code is not registered.	Contact service representative.
891	-2	Data Manager Communication Error	Communication error was occurred during connection. (HL7 communication line) The subcategory code indicates communication line number.	1. Check the connection status of Data Manager on System Overview > Data Manager. If it is wait status, connect it from Data Manager. 2. Check if the connector was not plugged in during the data communication. 3. Restart the system. 4. Contact service representative, if alarm recurs.
892	-2	Data Manager Communication Error	Communication error occurred during connection. Detected disconnection. The subcategory code indicates communication line number.	1. Check the connection status of Data Manager on System Overview > Data Manager. If it is wait status, connect it from Data Manager. 2. Check if the connector was not plugged in during the data communication. 3. Restart the system. 4. Contact service representative, if alarm recurs.
893	-2	Data Manager Communication Error	Communication error occurred. When receiving it, abnormality was detected. (HL7 communication line) The subcategory code indicates communication line number.	1. Check the connection status of Data Manager on System Overview > Data Manager. If it is wait status, connect it from Data Manager. 2. Check if the connector was not plugged in during the data communication. 3. Restart the system. 4. Contact service representative, if alarm recurs.

**Table 12-1**      Instrument alarms

## Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
894	-2	Data Manager Communication Error	Communication error occurred. When receiving it, abnormality was detected. (HL7 communication line) The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Check the connection status of Data Manager on System Overview &gt; Data Manager. If it is wait status, connect it from Data Manager.</li> <li>2. Check if the connector was not plugged in during the data communication.</li> <li>3. Restart the system.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
895	-2	Data Manager Communication Error	Internal process error occurred. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Restart the system.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>
901	-2	Abnormal Text from Data Manager	First segment is not a header segment (MSH). The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the MSH segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
902	-2	Abnormal Text from Data Manager	Undefined segment was found. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the undefined segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
903	-2	Abnormal Text from Data Manager	There is no end code in the message. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;&lt;FS&gt;&lt;CR&gt;' (0x0d1c0d) is at the end of the message.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
904	-2	Abnormal Text from Data Manager	There is no end code in the EQU segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the EQU segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
905	-2	Abnormal Text from Data Manager	There is no end code in the INV segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the INV segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
906	-2	Abnormal Text from Data Manager	There is no end code in the MSA segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the MSA segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
907	-2	Abnormal Text from Data Manager	There is no end code in the MSH segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the MSH segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
908	-2	Abnormal Text from Data Manager	There is no end code in the NDS segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the NDS segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
909	-2	Abnormal Text from Data Manager	There is no end code in the OBR segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the OBR segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
910	-2	Abnormal Text from Data Manager	There is no end code in the OBX segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the OBX segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
911	-2	Abnormal Text from Data Manager	There is no end code in the ORC segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the ORC segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
912	-2	Abnormal Text from Data Manager	There is no end code in the PID segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the PID segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
913	-2	Abnormal Text from Data Manager	There is no end code in the QAK segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the QAK segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
914	-2	Abnormal Text from Data Manager	There is no end code in the QID segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the QID segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
915	-2	Abnormal Text from Data Manager	There is no end code in the QPD segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the QPD segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
916	-2	Abnormal Text from Data Manager	There is no end code in the RCP segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the RCP segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
917	-2	Abnormal Text from Data Manager	There is no end code in the SAC segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the SAC segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
918	-2	Abnormal Text from Data Manager	There is no end code in the SID segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the SID segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
919	-2	Abnormal Text from Data Manager	There is no end code in the SPM segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the SPM segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
920	-2	Abnormal Text from Data Manager	There is no end code in the TQ1 segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the TQ1 segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
921	-2	Abnormal Text from Data Manager	There is no end code in the TCD segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check whether '&lt;CR&gt;' (0x0d) is at the end of the TCD segment.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
922	-2	Abnormal Text from Data Manager	An error was detected in the EQU segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the EQU segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms

## Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
923	-2	Abnormal Text from Data Manager	An error was detected in the INV segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the INV segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
924	-2	Abnormal Text from Data Manager	An error was detected in the MSA segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the MSA segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
925	-2	Abnormal Text from Data Manager	An error was detected in the MSH segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the MSH segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
926	-2	Abnormal Text from Data Manager	An error was detected in the NDS segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the NDS segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
927	-2	Abnormal Text from Data Manager	An error was detected in the OBR segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the OBR segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
928	-2	Abnormal Text from Data Manager	An error was detected in the OBX segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the OBX segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
929	-2	Abnormal Text from Data Manager	An error was detected in the ORC segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the ORC segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
930	-2	Abnormal Text from Data Manager	An error was detected in the PID segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the PID segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
931	-2	Abnormal Text from Data Manager	An error was detected in the QAK segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the QAK segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
932	-2	Abnormal Text from Data Manager	An error was detected in the QID segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the QID segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
933	-2	Abnormal Text from Data Manager	An error was detected in the QPD segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the QPD segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms**Roche Diagnostics**

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
934	-2	Abnormal Text from Data Manager	An error was detected in the RCP segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the RCP segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
935	-2	Abnormal Text from Data Manager	An error was detected in the SAC segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the SAC segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
936	-2	Abnormal Text from Data Manager	An error was detected in the SID segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the SID segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
937	-2	Abnormal Text from Data Manager	An error was detected in the SPM segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the SPM segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
938	-2	Abnormal Text from Data Manager	An error was detected in the TQ1 segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the TQ1 segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
939	-2	Abnormal Text from Data Manager	An error was detected in the TCD segment. The subcategory code indicates field number and communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the TCD segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
940	-2	Abnormal Text from Data Manager	An error was detected in the MSG segment. The message type of the HL7 text was abnormal. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the message type [MSH-9] field of the MSH segment.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
941	-2	Abnormal Text from Data Manager	There is no EQU segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the EQU segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
942	-2	Abnormal Text from Data Manager	There is no MSA segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the MSA segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
943	-2	Abnormal Text from Data Manager	There is no MSH segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the MSH segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms

## Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
944	-2	Abnormal Text from Data Manager	There is no OBR segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the OBR segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
945	-2	Abnormal Text from Data Manager	There is no OBX segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the OBX segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
946	-2	Abnormal Text from Data Manager	There is no ORC segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the ORC segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
947	-2	Abnormal Text from Data Manager	There is no PID segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the PID segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
948	-2	Abnormal Text from Data Manager	There is no QAK segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the QAK segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
949	-2	Abnormal Text from Data Manager	There is no QID segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the QID segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
950	-2	Abnormal Text from Data Manager	There is no QPD segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the QPD segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
951	-2	Abnormal Text from Data Manager	There is no RCP segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the RCP segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
952	-2	Abnormal Text from Data Manager	There is no SPM segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the SPM segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
953	-2	Abnormal Text from Data Manager	There is no TQ1 segment. The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Confirm that the TQ1 segment exists.</li> <li>3. Refer to the specifications of system interface communication.</li> <li>4. Contact service representative, if alarm recurs.</li> </ol>
992	-1	Abnormal Test Selection from Data Manager	One or more tests requested by Data Manager are in progress.	<ol style="list-style-type: none"> <li>1. Check if the Item Codes requested by the Host are appropriate.</li> <li>2. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**      Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
994	1	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Test Selection Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Test Selection Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	2	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Patient/QC Result Response Text - Real)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Patient/QC Result Response Text - Real)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	3	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Chemistry Calibration Result Response)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Chemistry Calibration Result Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	4	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (ISE Calibration Result Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (ISE Calibration Result Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	5	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Immune Calibration Result Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Immune Calibration Result Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	6	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Patient/QC Result Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Patient/QC Result Response Text - Batch)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	7	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Reaction Monitor Result Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Reaction Monitor Result Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	8	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Reaction Monitor Calibration Result Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Reaction Monitor Calibration Result Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	9	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Raw Data Result Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Raw Data Result Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>

**Table 12-1**

Instrument alarms

## Instrument alarms

<b>Code</b>	<b>Sub-</b>	<b>Alarm Message</b>	<b>Content</b>	<b>Troubleshooting</b>
994	10	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Raw Data Calibration Result Response)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Raw Data Calibration Result Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	11	Data Manager Communication Error	Message Control ID of the HL7 text received from Data Manager is not the corresponding one. (Alarm Response Text)	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Alarm Response Text)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	12	Data Manager Communication Error	The sample No. value is invalid.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Test Selection Download Text - Batch)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
994	13	Data Manager Communication Error	The orders of the serum index tests (L/H/I) are illegal.	<ol style="list-style-type: none"> <li>1. Perform System Communication Trace on Print.</li> <li>2. Check the HL7 text. (Test Selection Download Text - Batch)</li> <li>3. Contact service representative, if alarm recurs.</li> </ol>
995	-1	Abnormal Text from Data Manager	The sample type value is invalid. The subcategory code indicates the application code.	Check the sample type.
997	-2	Data Manager Communication Error	Though the system transmitted a text, the Data Manager did not receive a response within 15 seconds. (Reception timeout) The subcategory code indicates communication line number.	<ol style="list-style-type: none"> <li>1. Check the Data Manager settings.</li> <li>2. Refer to the system interface communication specifications.</li> </ol>
999	-1	Data Manager Communication Error	Host code is duplication defined. The subcategory code indicates the application code.	Contact service representative.

**Table 12-1**      Instrument alarms

# Using MODULAR PRE-ANALYTICS

*How to use a MODULAR PRE-ANALYTICS and aliquoted samples without barcodes with data manager*

This chapter describes how to use a MODULAR PRE-ANALYTICS with cobas® 8000 data manager. When using an MODULAR PRE-ANALYTICS, aliquoted samples do not have barcodes. This chapter describes how samples are identified in this case.

## In this chapter

## Chapter 13

Using a MODULAR PRE-ANALYTICS .....	255
Sample IDs and barcodes .....	255
Handling query messages without barcodes .....	255
Configuring the Control Unit .....	255
Rerun without barcodes.....	256
Order of messages .....	256
Handling batch test selections with strict rack and position.....	257
Configuring data manager.....	257
Identifying the sample.....	257
Clearing the sample list.....	258



# Using a MODULAR PRE-ANALYTICS

This chapter describes how to handle test selection requests, when using a MODULAR PRE-ANALYTICS with cobas® 8000 data manager. When using an MODULAR PRE-ANALYTICS, aliquoted samples do not have barcodes. This chapter describes how such samples are identified, and in which fields data is passed from *data manager* to the host and back.

## Sample IDs and barcodes

For maximum throughput on the cobas® 8000 modular analyzer series instrument, it is necessary to identify the samples from a barcode. For this reason, and other reasons of efficiency, the instrument generates the sample identifiers by reading the barcodes on the tubes. This is the default configuration for the cobas® 8000 modular analyzer series instrument.

However, if a MODULAR PRE-ANALYTICS is used in conjunction with the cobas® 8000 modular analyzer series instrument, aliquoted sample tubes will not have barcodes. Therefore, it is not possible to generate the sample identifiers from the barcodes. In this situation, it is necessary to configure the cobas® 8000 modular analyzer series instrument's Control Unit so that it sends a query to the *data manager* if a sample lacks a barcode. It is also necessary to configure *data manager* to send the query to the host.

## Handling query messages without barcodes

In normal operation, by default, a sample without a barcode generates an error on cobas® 8000 modular analyzer series instrument, and is handled by the instrument operator.



### The host should be able to handle a missing sample ID

Because a user with configuration privileges can (intentionally or otherwise) configure the cobas® 8000 modular analyzer series instrument and *data manager* to send test selection inquiries without barcode information, the host should be able to handle such a message, either with a test selection reply or at least with a meaningful error message.

## Configuring the Control Unit

To configure the cobas® 8000 modular analyzer series instrument to process samples without barcodes with a MODULAR PRE-ANALYTICS, enable the option on the Control Unit *Test Selection Ask in Barcode Read Error* in: **Utility > System > Data Manager Settings > Test Selection Inquiry Settings > Test Selection Ask in Barcode Read Error**.



For details of the GUI settings, see *Test Selection Ask in Barcode Read Error* (p. 79).

## Rerun without barcodes

When working without barcodes, rerun by gray racks (racks for 1st run) is not permitted, because the analyzer cannot determine whether this is the first or second presentation of the rack.

If you want to rerun the same routine rack, ensure that the LIS can handle a second R1 Query correctly. This means that the LIS has to know which tests have already been downloaded, because the tests should not be downloaded again. If this can not be guaranteed, use rerun racks.

## Order of messages

If a MODULAR PRE-ANALYTICS is connected, and a sample tube lacks a barcode, and the messages are sent in realtime mode, order of messages is then as follows:

1. The cobas® 8000 modular analyzer series instrument recognizes that a sample exists without a barcode. It sends *data manager* a query for test selections, identifying the sample by:
  - the rack ID
  - the sample's position on the rack (1 to 5)
  - the sample type (which is the same as the rack type, as each type of sample uses a different type of rack)
2. The *data manager* sends a query to the host asking for test selections for the sample. The sample is identified to the host through the following information:
  - the sample ID is given as a string of 22 asterisk (\*) characters. This shows that the sample tube lacks a barcode. This is passed in ASTM Query Record (Q) field 3, component 3, or HL7 Query Parameter Definition Segment QPD-3.
  - the rack ID, passed in ASTM Query Record (Q) field 3, component 5, or HL7 Query Parameter Definition Segment QPD-5.
  - the sample's position on the rack (1 to 5). This is passed in ASTM Query Record (Q) field 3, component 6, or HL7 Query Parameter Definition Segment QPD-6.
  - the sample type (or rack type), in ASTM in the Query Record (Q) field 3, component 8, or in HL7 Query Parameter Definition Segment QPD-10.
3. The host must be programmed so that it looks up the sample's identifier. It sends the sample identifier in the order (or test selection) to *data manager*, as well as the other identifying information:
  - the sample ID is passed in ASTM Order Record (O) field 3, or HL7 Specimen Segment (SPM) field SPM-2.
  - the rack number, passed in ASTM Order Record (O) field 4, component 2, or HL7 Container Information Segment (SAC) fields SAC-10.
  - the sample's position on the rack (1 to 5). This is passed in ASTM Order Record (O) field 4, component 3, or HL7 Container Information Segment (SAC) field SAC-11
  - the sample type (or rack type): ASTM the Order Record (O) field 4, component 4, or HL7 Specimen Segment (SPM) field SPM-4.
4. The *data manager* passes this information on to the Control Unit.
5. The Control Unit, *data manager* and the host then use the sample identifier to identify the sample in subsequent messages.



For full information on the content of the supported ASTM and HL7 fields, see the definitions in *ASTM text content (LIS2 - A2)* (p. 109), and *HL7 text content* (p. 153).

## Handling batch test selections with strict rack and position

If you are using a *MODULAR PRE-ANALYTICS* and working without barcodes, the recommended procedure is to configure the Control Unit and *data manager* to send test selection queries, and to obtain a sample ID. However, if for some reason this cannot be done, it is possible to configure the *data manager* to identify a sample tube by the rack and position given in a batch test selection download. The *data manager* then sets up a one-to-one relationship between the sample ID and the rack and position of the sample tube.

### Configuring data manager

To configure *data manager* to process batch test selection downloads for samples without barcodes with an *MODULAR PRE-ANALYTICS*, enable the option **Strict rack and position mode** in **c8000 DM System Configuration > Service-related configuration > Interface options**.

- To use the **Strict rack and position mode**, select the *data manager* option **Strict rack and position mode**. See *Rack and position mode* (p. 68).

By default, the *data manager* ignores any information about rack and position in a batch test selection message. The option **Strict rack and position mode** configures the *data manager* so that it uses the information on rack and position.

### Identifying the sample

In this situation, the host must be programmed so that it looks up the rack and position of the sample. It sends the sample identifier in the order (or test selection) to *data manager*, as well as the other identifying information:

- the sample ID, passed in:
  - ASTM Order Record (O) field 3, or
  - HL7 Specimen Segment (SPM) field SPM-2.
- the rack number, passed in:
  - ASTM Order Record (O) field 4, component 2, or
  - HL7 Container Information Segment (SAC) fields SAC-10
- the sample's position on the rack (1 to 5). This is passed in:
  - ASTM Order Record (O) field 4, component 3, or
  - HL7 Container Information Segment (SAC) field SAC-11
- the sample type (or rack type), passed in:
  - ASTM the Order Record (O) field 4, component 4, or
  - HL7 Specimen Segment (SPM) field SPM-4.

The *data manager* uses all the same fields to identify the sample in result message.



#### Do not move the sample to another rack

- If you are using the **MODULAR PRE-ANALYTICS** with **Strict rack and position mode**, do not move the sample to another rack until it is deleted. The tube's rack and position must stay the same, for the host, **cobas® 8000 modular analyzer series** and *data manager* to identify it.

**Clearing the sample list**

In this situation, the *data manager* keeps an internal list of the rack and position of each sample. When the samples are off-loaded from the racks, and new samples loaded, it is necessary to clear this list of samples. The host must implement functionality to do this, and simultaneously, the list of samples must be cleared manually from the *data manager* by the laboratory technicians. To clear the list of samples, navigate to **cobas® 8000 data manager Routine Workplace > Sample Overview**, and select **Reset Rack**. For details see the **cobas® 8000 data manager Operator's Manual**.

# Identifying patient samples by sequence number

*Numbering samples in sequence instead of using a barcode*

This chapter describes how the cobas® 8000 modular analyzer series can number patient samples in sequence, instead of using barcodes and sample IDs.

## In this chapter

## Chapter 14

Identifying samples .....	261
Sample IDs and barcodes .....	261
Patient samples without barcodes .....	261
Identifying patient samples by sequence number .....	262
Sequence numbers and sample IDs .....	262
What the data manager understands .....	263
Important information for using sequence numbers .....	264
When using sequence numbers, pay attention to the following .....	264
Using sample sequence numbers in ASTM .....	265
Test selection inquiry .....	265
Test selection download .....	265
Test result message .....	265
Using sample sequence numbers in HL7 .....	267
Test selection inquiry .....	267
Test selection download .....	267
Test result message .....	267



## Identifying samples

This section describes how the cobas® 8000 modular analyzer series instrument, Control Unit, and *data manager* identify samples. It gives an outline of the options available.

### Sample IDs and barcodes

For maximum throughput on the cobas® 8000 modular analyzer series instrument, it is necessary to identify the samples from a barcode. For this reason, and other reasons of efficiency, the instrument generates the sample identifiers by reading the barcodes on the tubes. This is the default configuration for the cobas® 8000 modular analyzer series instrument.

### Patient samples without barcodes

However, in some situations, the patient sample tubes will not have barcodes. Therefore, it is not possible to generate the sample identifiers from the barcodes.

In version 1.02.03 and higher, one way of handling this situation, is to configure the cobas® 8000 modular analyzer series instrument to give each sample a sequence number. This is described below.

## Identifying patient samples by sequence number

This section tells you how to identify patient samples by sequence number.

This setting on the instrument is called “*sequence mode*”. This works as follows:

- By default the sequence numbers start with 1, and then increase by 1 for each sample. (1, 2, 3, etc.) The starting number is configurable, but the highest possible number for a sample is 60,000.
- To implement this on the *data manager*, the Control Unit and the cobas® 8000 modular analyzer series instrument, ask for assistance from your authorized Roche Diagnostics service personnel. Implementation requires a dedicated installation tool. For details of installation, see the relevant service bulletins from August 2011, and the cobas® 8000 modular analyzer series *Service Manual* from version 1.02.04 (available 2012).

---

**NOTICE****Sequence numbers can only be used with patient samples**

- ▶ Sequence numbers can only be used with patient samples. Control samples cannot use sequence numbers, even if patient samples are configured to do so.

---

**NOTICE****This configuration does not support a MODULAR PRE-ANALYTICS**

- ▶ Note that sequence numbers cannot be used with samples from a **MODULAR PRE-ANALYTICS**.

## Sequence numbers and sample IDs

The *data manager* database is independent of the setting of the cobas® 8000 modular analyzer series instrument and the Control Unit. Even if the instrument, the Control Unit, and the *data manager* are configured for sequence mode, the host can still send the *data manager*:

- order queries for earlier samples which are identified by barcode / sample ID. Any response is sent at once.
- result queries for earlier samples which are identified by barcode / sample ID. Any response is sent at once.
- test selection inquiries for samples with barcodes. These test selections will not be downloaded to the instrument until the instrument is reconfigured to read barcodes.

**Identify a sample by either sample ID or sequence number, but not both.**

If you want to identify the sample by sequence number, make sure that the sample ID (O-3, SPM-2.3) is empty. If you send both a sample ID and a sequence number, the *data manager* will use only the sample ID to identify the sample.

## What the data manager understands

The *data manager* interprets each message as a barcode message or a sequence number message according to how the sample is identified.

Sample ID Sent in ASTM O-3, Q-3.3, or HL7 SPM-2, QPD-3	Sequence number Sent in ASTM O-4.1, Q-3.4, or HL7 QPD-3.2, SPM-2.2	Sample identified by:
empty	empty	Not permissible. Sample not identified. <ul style="list-style-type: none"> <li>• ASTM: sample created with no ID.</li> <li>• HL7: ORA-2001 validation error</li> </ul>
String	empty	Sample ID
empty	Integer up to 60,000	Sequence number
String	Integer up to 60,000	Sample ID, but this message is not recommended nor supported.

**Table 14-1** Identifying the sample in messages

## Important information for using sequence numbers

When setting up or using sequence numbers, please consider the following.



### Only service personnel can enable or disable sequence mode

- ▶ Only authorized Roche Diagnostics service personnel can enable or disable sequence mode on the *data manager*, the cobas® 8000 modular analyzer series instrument and Control Unit.

## When using sequence numbers, pay attention to the following

Carefully observe the following warnings.



### Regular database clean-up required

- ▶ The *data manager* and cobas® 8000 modular analyzer series instrument can only handle sequence numbers up to 60,000. **You must clean up and delete the data** in the *data manager*'s internal database before the sequence number reaches **60,000**. Otherwise samples will be confused with earlier ones. Consult your Roche Diagnostics service personnel and the relevant service bulletins starting August 2011 or the cobas® 8000 data manager *Service Manual* from version 1.02.04 (available 2012), for more information.



### Do not start sample IDs with the same internal prefix that is used in the *data manager*

- ▶ The *data manager* uses an internal prefix to identify sequence numbers, and to differentiate them from sample IDs. By default, this prefix is set to "seq#". However, it can be configured to any other value by the authorized Roche Diagnostics service personnel, using the relevant installation tool. Find out from them the exact prefix which is used in your installation of the *data manager*. **Choose a prefix that is different from the starting characters of any possible sample ID used on your site.** These sample IDs are read from the barcodes affixed to tubes. Ask the administrators of the laboratory organization for details on how they define the format of barcodes and sample IDs.
- ▶ Make sure that sample IDs and sequence numbers do not start with the same characters. Otherwise the *data manager* could confuse samples with each other.



### The sample ID sent by the host takes precedence over the sequence number

- ▶ If the host sends a sample ID to the *data manager*, the *data manager* uses the sample ID in preference to any sequence number in the message. If you are using a sequence number in the message, make sure that the sample ID is not sent.

## Using sample sequence numbers in ASTM

This section compares messages in ASTM using barcode sample IDs and sequence numbers.

### Test selection inquiry

In a test selection inquiry message from the *data manager* to the host:

- When using the default barcode sample IDs, the *data manager* sends sample ID from the barcode in Q-3.3.
- When identifying samples by sequence number, the *data manager* sends the sequence number in Q-3.4.

*Sample ID inquiry* Q|1|^^**2110903^0^50094^3**^^S1^SC^R1||ALL|||||R|O|

*Sequence number inquiry* Q|1|^^**3^50094^3**^^S1^SC^R1||ALL|||||R|O|

These fields are used the same way in an order query from the host to the *data manager*.

### Test selection download

In a test selection download message from the host to the *data manager*:

- When using the default barcode sample IDs, the host sends sample ID from the barcode in O-3.
- When identifying samples by sequence number, the host sends the sequence number in O-4.1.

*Sample ID order record* O|1|**2110903|^50094^3**^^S1^SC^|^^^205^|R|201108...

*Sequence number order record* Either

O|1||**3**^^^S1^SC^|^^^205^|R|201...

or

O|1||**3^50094^3**^^S1^SC^|^^^205^|R|201...

Note that in a test selection upload from the *data manager* to the host, the Order record, field 4 (O-4) is a simple number field, containing the sequence number.

O|1||**3**|^205^|R|201...

### Test result message

In a test result message from the *data manager* to the host:

- When using the default barcode sample IDs, the *data manager* sends sample ID from the barcode in O-3.
- When identifying samples by sequence number, the *data manager* sends the sequence number in O-4.1.

Using sample sequence numbers in ASTM

*Sample ID order record* O|1|**2110903|0^50094^3^^S1^SC^not|^^^112^1|R|201108...**

*Sequence number order record* O|1||**3^50094^3^^S1^SC^not|^^^991^1|R|201...**

## Using sample sequence numbers in HL7

This section compares messages in HL7 using barcode sample IDs and sequence numbers.

### Test selection inquiry

In a test selection inquiry message from the *data manager* to the host:

- When using the default barcode sample IDs, the *data manager* sends sample ID from the barcode in QPD-3-1.
- When identifying samples by sequence number, the *data manager* sends the sequence number in QPD-3.2.

*Sample ID inquiry* QPD|TSREQ|4362|**2110903**|**50094**|**3**||||S1|SC|R1|R|

*Sequence number inquiry* QPD|TSREQ|4565|^**3**||**50094**|**3**||||S1|SC|R1|R|

These fields are used the same way in an order query from the host to the *data manager*.

### Test selection download

In a test selection download message from the host to the *data manager*:

- When using the default barcode sample IDs, the host sends sample ID from the barcode in SPM-2.1.
- When identifying samples by sequence number, the host sends the sequence number in SPM-2.2, and must send the rack ID in SAC-10, and tube's position in SAC-11.

*Sample ID specimen segment* SPM||**2110903**||S1||not||||P|||^<sup>^^^</sup>|||20110615215424|||||  
|||||SC

*Sequence number specimen and container detail segments* SPM||^**3**||S1||not|||||P|||^<sup>^^^</sup>|||20110615215424|||||||||  
SC

SAC|||||||**50094**|**3**

These fields are used in the same way in a test selection upload from the *data manager* to the host.

### Test result message

In a test selection download message from the *data manager* to the host:

- When using the default barcode sample IDs, the *data manager* sends sample ID from the barcode in SPM-2.1, and the rack ID in SAC-10, and tube's position in SAC-11.
- When identifying samples by sequence number, the *data manager* sends the sequence number in SPM-2.2, and the rack ID in SAC-10, and tube's position in SAC-11.

Using sample sequence numbers in HL7

*Sample ID specimen and container detail segments* SPM||**2110903**||S1||not||||P|||^^\^|||20110615215424|||||  
SAC|||||**50094**|**3**|

*Sequence number specimen and container detail segments* SPM||^**3**||S1||not||||P|||^^\^|||20110617105639|||||  
SC|  
SAC|||||**50094**|**3**|

# Communication examples

This chapter presents some examples of messages generated by cobas® 8000 data manager, and a connected host system (LIS / WAM).

## In this chapter

## Chapter 15

Example communication trace files.....	273
ASTM trace files .....	273
Low level trace file.....	273
Test selection inquiry from data manager .....	274
Routine test selection inquiry and download .....	274
STAT sample test selection inquiry and download .....	274
Test selection inquiry and download if no sample found.....	274
Test selection inquiry with sequence number.....	275
Patient result upload messages .....	275
Realtime ISE result upload.....	275
ISE result upload - sample short .....	276
C-module result upload with no flag .....	276
Glucose result with alarm flag.....	276
Batch upload of current results .....	276
Batch upload of current results -sample short .....	277
Batch upload all previous results .....	277
Result below normal range .....	278
Result below level of detection .....	278
Result with sample identified by sequence number .....	278
Data point result.....	279
Quality control uploads.....	279
Realtime quality control upload.....	279
Realtime quality control upload with a standby bottle .....	280
Batch quality control upload .....	280
Batch quality control upload with a standby bottle.....	280
Calibration result uploads.....	280
C-module calibration result upload .....	280
ISE-module calibration result upload .....	281
E-module calibration result upload.....	281
Result request from host and the data manager result upload.....	281

Request for currently active results .....	281
Request for all results.....	282
Result request but no results.....	282
Result request but sample not found.....	283
Result request with a sequence number.....	283
Result request with an expired sample.....	283
Order query from the host.....	284
Order query for all tests .....	284
Order query for all open tests.....	284
Order query but no open tests .....	285
Order query but sample not found.....	285
Order query with sample identified by sequence number .....	285
HL7 trace files.....	287
Test selection inquiry and download.....	287
Test selection inquiry for routine rack.....	287
Test selection inquiry for STAT rack.....	287
Routine rack (AL) with acknowledgment .....	288
Routine rack invalid test (ER) .....	288
Test selection inquiry no sample found .....	289
Test selection inquiry with a sequence number.....	289
Patient result upload messages.....	289
Single patient result upload .....	290
Batch upload all previous results .....	290
Batch upload all current results .....	291
Batch upload of current results sample short.....	292
No result as sample short .....	292
Result outside user range .....	293
Result outside normal range.....	293
Result below level of detection .....	293
Data point result.....	294
Quality control result upload messages.....	294
Batch QC from c-module .....	295
Batch QC from c-module standby bottle.....	295
Realtime QC from c-module.....	295
Realtime QC from c-module standby bottle .....	296
QC results from e-module .....	296
Calibration result upload messages .....	296
C-module calibration results .....	296
ISE-module calibration results.....	297
E-module calibration results .....	298
Masking messages .....	299
Successful masking message.....	299
Unsuccessful masking message .....	299
Result requests from the host .....	299
Request for all results.....	299
Request for active results.....	300
No results found.....	301
Sample not found .....	301
Result request with a sequence number.....	301
Result request with an expired sample.....	302

Order requests from the host.....	303
Request for all tests .....	303
Request for open tests.....	303
No tests found.....	303
Sample not found.....	304
Order request with a sequence number.....	304
Instrument status and test availability messages.....	304
Equipment inventory update.....	305
Equipment inventory request.....	305
Equipment status update.....	305
Equipment status request.....	305



## Example communication trace files

This section gives example trace files of messages between *data manager* and the host. This shows the precise content of the messages sent, including the control characters.

## ASTM trace files

This section gives examples of ASTM messages between *data manager* and the host.

### Low level trace file

This section shows a low-level ASTM trace file, showing the control characters, the acknowledgment handling, and the frames.

---

```
c8kDM 18:46:29,145 [ENQ]
HOST   18:46:29,176 [ACK]
c8kDM 18:46:29,317 [STX]1H|\^&|116486||cobas 8000^1.04||||host|RS
UPL|P|1|20101020184623|[CR]P|1||||^|||[CR]O|1|
10002|0^10002^2^^S4^SC^not|^870^1|^880^1|^890^1|R|20101016120539|20101016120539||||N|||
4|||||||F|[CR]C|1|I|^G|[CR]R|1|^870/1/
not|17.30|g/dL|^TECH^\N[ETB]E9[CR][LF]
HOST   18:46:29,333 [ACK]
c8kDM 18:46:29,411 [STX]2ORM\^CRIT\^USER|||F||bmserv^SYSTEM|200912
18164600|20101016120550|c502^1^MU1#c502#2#1^9^0
|[CR]C|1|I|0|I|[CR]R|2|^880/1/not|1.50|g/dL|^
TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20091
218164600|20101016120552|c502^1^MU1#c502#2#1^9^0
|[CR]C|1|I|0|I|[CR]R|3[ETB]BA[CR][LF]
HOST   18:46:29,411 [ACK]
c8kDM 18:46:29,426 [STX]3|^890/1/not|8.67|%^TECH\^NORM\^CRIT\^U
SER|||F||bmserv^SYSTEM|20101016120552|c502^1^M
U1#c502#2#1^9^0|[CR]C|1|I|0|I|[CR]L|1|N|[CR][ET
X]F1[CR][LF]
HOST   18:46:29,426 [ACK]
c8kDM 18:46:29,442 [EOT]
```

---

Each frame has a maximum of 240 bytes for text, plus 7 bytes for frame control characters. The message is sent in as few frames as possible, so the last may be less than 240 bytes.

The message is sent as unicode UTF-8, so unicode characters may occupy more than one byte. Also, one unicode character might be split between two frames.

For readability the rest of the examples are displayed on a record level, and not on the frame level.

## Test selection inquiry from data manager

This section shows examples of ASTM test selection enquiries sent from the data manager, and the host's test selection downloads in reply.

### Routine test selection inquiry and download

This section shows an example of an ASTM test selection inquiry for a routine sample sent from the *data manager*, and the host's test selection download in reply.

---

DM:

```
H|^&|15220||cobas 8000^1.04||||host|TSREQ|P|1|20101020091706|
Q|1|^321070^0^50094^2^^S1^SC^R1||ALL|||||R|O|
L|1|N|
```

Host:

```
H|^&|||ASTM-Host^V 6.8g||||cobas 8000^1.04|TSDWN|P|1|20101020100000
P|1||PatID3||Parker^Bill||19881231|M
O|1|321070|0^50094^2^^S1^SC^not|^^^989^1|^^^990^1|^^^991^1|R|||||A||||1|||||||O
C|1|L|Comm1^Comm2^Comm3^Comm4^Comm5|G
L|1|N|
```

---

### STAT sample test selection inquiry and download

This section shows an example of an ASTM test selection inquiry for a STAT sample, and the host's test selection download.

---

DM:

```
H|^&|15223||cobas 8000^1.04||||host|TSREQ|P|1|20101020091724|
Q|1|^321040^0^40002^3^^S1^SC^R1||ALL|||||S|O|
L|1|N|
```

Host:

```
H|^&|||ASTM-Host^V 6.8g||||cobas 8000^1.04|TSDWN|P|1|20101020100000
P|1||PatID3||Parker^Bill||19881231|M
O|1|321040|0^40002^3^^S1^SC^not|^^^989^1|^^^990^1|^^^991^1|S|||||A||||1|||||||O
C|1|L|Comm1^Comm2^Comm3^Comm4^Comm5|G
L|1|N|
```

---

### Test selection inquiry and download if no sample found

This section shows an example of an ASTM test selection inquiry for a sample, and the host's test selection download, saying that it could not find the sample.

---

DM:

```
H|^&|15220||cobas 8000^1.04||||host|TSREQ|P|1|20101020091706|
Q|1|^321071^0^50094^1^^S1^SC^R1||ALL|||||R|O|
L|1|N|
```

Host:

```
H|^&|||ASTM-Host^V 6.8g||||cobas 8000^1.04|TSDWN|P|1|20101020100000
P|1|
O|1|321071|0^50094^1^^S1^SC||R|||||A||||1|||||||O
L|1|N|
```

---



### Send patient demographic data if sample found with no tests ordered

- ▶ Take care in the situation where the *data manager* sends a test selection query, but the host has no patient demographic information nor tests for the sample, although it recognizes the sample ID. When the host sends its test selection download, the *data manager* updates the patient demographic information along with the tests. Therefore, if the host sends no patient demographic information, the *data manager* might lose its current patient demographic data.
- ▶ In this case, the host should send a normal test selection download, with full patient information, and comments etc., but no testcodes.
- ▶ For examples of normal test selections, see *Routine test selection inquiry and download* (p. 274) and *STAT sample test selection inquiry and download* (p. 274).

### Test selection inquiry with sequence number

This section shows an example of an ASTM test selection inquiry for a sample, identified by sequence number. (See fields O-3.4 and O-4.1.) This functionality was introduced in version 1.02.03.

DM:

```
H|^\&|563017||cobas 8000^1.04||||host|TSREQ|P|1|20110720151610|
Q|1|^**1013^50101^3^^S1^SC^R1||ALL|||||R|O|
L|1|N|
```

Host:

```
H|^\&|||ASTM-Host^V 6.8g|||||cobas 8000^1.04|TSDWN|P|1|20110715093311
P|1||M820101K||Froihofe^Kahila||19831213|F
O|1||1013^50101^3^^S1^SC^not|^^8571^1|^8413^1|^8706^1|R|20110715093311|20110715093311|||A|||
1|||||||O
C|1|L|Comm1^Comm2^Comm3^Comm4^Comm5|G
L|1|N|
```

### Patient result upload messages

This section shows examples of ASTM patient result upload messages.

#### Realtime ISE result upload

This section shows an example of an ASTM realtime result upload from an ISE module.

```
H|^\&|12927||cobas 8000^1.04||||host|RSUPL|P|1|20101018185138|
P|1||||^|||
O|1|321088|0^50022^5^^S1^SC^not|^^990^1|R|20101016183237|20101016183237||||N||||1|||||||F|
C|1|I|^^^|G|
R|1|^^990/1/not|0.68|mmol/L|^TECH\^NORM\^CRIT\^USER||C||bmserv^SYSTEM|20101018185121|2010101818513
6|ISE^2^MU1#ISE#1#2^4^128|
C|1|I|23^ISE Sample range over|I|
L|1|N|
```

ASTM trace files

**ISE result upload - sample short**

This section shows an example of an ASTM result upload, stating that the result value is missing because the sample is short.

---

```
H|^&|12835||cobas 8000^1.04||||host|RSUPL|P|1|20101018183109|
P|1||||^|||
O|1|321042|0^50011^4^^S1^SC^not|^^^991^1|R|20101014115322|20101006162241||||N||||1|||||||F|
C|1|I|^^^|G|
R|1|^991/1/not| mmol/L|^TECH|^NORM|^CRIT|^USER|||C||bmserv^SYSTEM|20101018183051|2010101818
3106|ISE^1^MU1#ISE#1#1^3^126|
C|1|I|3^Sample short|I|
L|1|N|
```

---

**C-module result upload with no flag**

This section shows an example of an ASTM result upload from a c-module with no alarm flag.

---

```
H|^&|13815||cobas 8000^1.04||||host|RSUPL|P|1|20101019100042|
P|1||||^|||
O|1|321042|0^50011^4^^S1^SC^not|^^^8717^1|R|20101019094904|20101019094904||||N||||1|||||||F|
C|1|I|^^^|G|
R|1|^8717/1/not|4.28|mmol/L|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20101019095027|201010191000
40|c701^1^MU1#c701#1#1^6^77|
C|1|I|0|I|
L|1|N|
```

---

**Glucose result with alarm flag**

This section shows an example of an ASTM result upload from a c-module with an alarm flag.

---

```
H|^&|13667||cobas 8000^1.04||||host|RSUPL|P|1|20101019092637|
P|1||||^|||
O|1|321057|0^50007^1^^S1^SC^not|^^^8717^1|R|20101019085027|20101019085027||||N||||1|||||||F|
C|1|I|^^^|G|
R|1|^8717/1/not|-0.01|mmol/L|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20101019091622|20101019092
635|c701^1^MU1#c701#1#1^6^77|
C|1|I|27^PANIC value over (lower) Technical Limit|I|
L|1|N|
```

---

**Batch upload of current results**

This section shows an example of an ASTM batch result upload showing current results only.

---

```
H|^&|15326||cobas 8000^1.04||||host|RSUPL|P|1|20101020095834|
P|1||PatID1||Smith^Alan||19451231|M|
O|1|321015|0^50071^1^^S1^SC^not|^^^990^1|^^^991^1|^^^8717^1|R|20101019174209|20101019174209||||N|||
1|||||||F|
C|1|I|C1^C2^C3^C4^C5|G|
R|1|^990/1/not|0.75|mmol/L|^TECH|^NORM|^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101020095735|20101020095751|ISE^1^MU1#ISE#1#1^3^125|
C|1|I|23^ISE Sample range over|I|
R|2|^991/1/not|297.28|mmol/L|^TECH|^NORM|^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101020095735|20101020095751|ISE^1^MU1#ISE#1#1^3^126|
```

---

```
C|1|I|23^ISE Sample range over|I|
R|3|^^8717/Inc/not|-0.02|mmol/L|^TECH\^NORM\^CRIT\^USER||C||bmserv^SYSTEM|20101019175614|201010191
80627|c701^1^MU1#c701#1#1^6^77|
C|1|I|27^PANIC value over (lower) Technical Limit|I|
L|1|N|
```

### Batch upload of current results -sample short

This section shows an example of an ASTM batch result upload stating that the result value is missing because the sample is short.

```
H|\^&|12811||cobas 8000^1.04||||host|RSUPL|P|1|20101018182329|
P|1||||^|||||
O|1|321042|0^50011^4^^S1^SC^not|^^989^1\^^990^1\^^991^1|R|20101014115322|20101006162241||||N||||1
|||||||||F|
C|1|I|^^^|G|
R|1|^^989/1/not| mmol/L|^TECH\^NORM\^CRIT\^USER||C||bmserv^SYSTEM|20101018173814|2010101817
3829|ISE^1^MU1#ISE#1#1^3^124|
C|1|I|3^Sample short|I|
R|2|^^990/1/not| mmol/L|^TECH\^NORM\^CRIT\^USER||C||bmserv^SYSTEM|20101018173814|2010101817
3829|ISE^1^MU1#ISE#1#1^3^125|
C|1|I|3^Sample short|I|
R|3|^^991/1/not| mmol/L|^TECH\^NORM\^CRIT\^USER||C||bmserv^SYSTEM|20101018173814|2010101817
3829|ISE^1^MU1#ISE#1#1^3^126|
C|1|I|3^Sample short|I|
```

### Batch upload all previous results

This section shows an example of an ASTM batch upload of all previous results.

```
H|\^&|15325||cobas 8000^1.04||||host|RSUPL|P|1|20101020095830|
P|1||PatID1||Smith^Alan||19451231|M|
O|1|321015|0^50071^1^S1^SC^not|^^990^1\^^991^1\^^8717^1|R|20101019174209|20101019174209||||N||||1
|||||||||F|
C|1|I|C1^C2^C3^C4^C5|G|
R|1|^^990/1/not|0.91|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101019174423|20101019174439|ISE^2^MU1#ISE#1#2^4^128|
C|1|I|23^ISE Sample range over|I|
R|2|^^990/1/not|0.70|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||C||bmserv^SYSTEM|20101019174459|20101019174515|ISE^1^MU1#ISE#1#1^3^125|
C|1|I|23^ISE Sample range over|I|
R|3|^^990/1/not|0.75|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101020095735|20101020095751|ISE^1^MU1#ISE#1#1^3^125|
C|1|I|23^ISE Sample range over|I|
R|4|^^991/1/not|252.89|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101019174347|20101019174403|ISE^1^MU1#ISE#1#1^3^126|
C|1|I|23^ISE Sample range over|I|
R|5|^^991/1/not|256.84|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||C||bmserv^SYSTEM|20101019174423|20101019174439|ISE^2^MU1#ISE#1#2^4^129|
C|1|I|23^ISE Sample range over|I|
R|6|^^991/1/not|297.28|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101020095735|20101020095751|ISE^1^MU1#ISE#1#1^3^126|
C|1|I|23^ISE Sample range over|I|
R|7|^^8717/1/not|-0.04|mmol/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20101019174533|20101019175
547|c701^1^MU1#c701#1#1^6^77|
C|1|I|27^PANIC value over (lower) Technical Limit|I|
```

## ASTM trace files

```
R|8|^^8717/Inc/not|-0.02|mmol/L|^TECH\^NORM\^CRIT\^USER|||C||bmserv^SYSTEM|20101019175614|201010191
80627|c701^1^MU1#c701#1#1^6^77|
C|1|I|27^PANIC value over (lower) Technical Limit|I|
L|1|N|
```

**Result below normal range**

This section shows an example of an ASTM result upload below the normal reference range.

```
H|^&|10252||cobas|^8000^1.04||||host|RSUPL|P|1|20100610200938|
P|1||ES06516622121998||Rister^Wolfgang||19330813|M|
O|1|123|0^50063^2^S1^SC^not|^^^989^1\^^^991^1\^^^8717^1|R|20100604235148|20100604235148||||N||||1||
|||||||F|
C|1|I|^***|G|
R|1|^^^989/1/not|2.1|mmol/L|^TECH\9 - 144^NORM\^CRIT\^USER|L||F||bmserv^SYSTEM|20100621084348|201006
21084404|ISE^1^MU1#ISE#1#1^3^28|
C|1|I|0|I|
R|2|^^^991/1/not|1.1|mmol/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20100621084348|20100621084404
|ISE^1^MU1#ISE#1#1^3^28|
C|1|I|0|I|
R|3|^^^8717/1/not|14.57|mmol/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20100621085921|20100621090
935|c701^2^MU1#c701#1#2^7^168|
C|1|I|0|I|
L|1|N|
```

**Result below level of detection**

This section shows an example of an ASTM result upload below the EP17-A level of detection.

```
H|^&|10256||cobas|^8000^1.04||||host|RSUPL|P|1|20100610201014|
P|1||ES06516622121998||Rister^Wolfgang||19330813|M|
O|1|123|0^50063^2^S1^SC^not|^^^989^1\^^^991^1\^^^8717^1|R|20100604235148|20100604235148||||N||||1||
|||||||F|
C|1|I|^***|G|
R|1|^^^989/1/not|0.1|mmol/L|^TECH\9 - 144^NORM\^CRIT\^USER|LoD||F||bmserv^SYSTEM|20100621084348|2010
0621084404|ISE^1^MU1#ISE#1#1^3^28|
C|1|I|0|I|
R|2|^^^991/1/not|1.1|mmol/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20100621084348|20100621084404
|ISE^1^MU1#ISE#1#1^3^28|
C|1|I|0|I|
R|3|^^^8717/1/not|14.57|mmol/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20100621085921|20100621090
935|c701^2^MU1#c701#1#2^7^168|
C|1|I|0|I|
L|1|N|
```

**Result with sample identified by sequence number**

This section shows an example of an ASTM result upload with the sample identified by sequence number. (See field O-4.1.) This functionality was introduced in version 1.02.03.

```
H|\^&|563030||cobas 8000^1.04||||host|RSUPL|P|1|20110720152309|
P|1||M820101K||Froihofe^Kahila||19831213|F|
O|1||1013^50101^3^S1^SC^not|^^^8413^1\^^^8571^1\^^^8706^1|R|20110715093311|20110715093311||||N||||1
|||||||F|
```

```
C|1|I|^____|G|
R|1|^__8413/1/not|15|g/dL|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20110715084600|20110715084600|c
702^2^MU1#c702#1#2^7^193|
C|1|I|0|I|
R|2|^__8571/1/not|16|U/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20110715084600|20110715084600|c7
02^2^MU1#c702#1#2^7^193|
C|1|I|0|I|
R|3|^__8706/1/not|17|mmol/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20110715084600|20110715084600
|c702^2^MU1#c702#1#2^7^193|
C|1|I|0|I|
L|1|N|
```

---

## Data point result

This section shows an example of an ASTM patient result message with data point values, generated by an e602 module.

```
H|^&|155||cobas 8000^1.05||||host|RSUPL|P|1|20140725105340|
P|1||||^|||||
O|1|234001|0^50089^5^^S1^^not|^__64^1|R|20140725105326|20140707093721||||N||||1|||||||||F|
C|1|I|^____|G|
R|1|^__64/1/not|3.50|IU/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20140707092617|20140707092617|e
602^2^MU1#e602#3#2^12^0|
C|1|I|0|I|
R|2|^__64/1/not|1315^8427\8428\8435\8497\8504\8537\8604\8641\8680\8683\8650\8671\8653\8654\8681\8685
\8729\8794\8803\8834\8878\8880\8908\8912\8943\8939\8973\8965\8955\8964\8929\8926\8935\8938\8945\8964
\8949\9029\9008\9008\8992\8983\8997\9027\9025\9064\9047\9018\9099\9117\9071\9020\9046\9074\9067\9058
\9065\9053\9087\9053\9047\9016\9040\9015\9017\9001\9069\9084\9094\9126\9166\9127\9170\9170\9202\9216
\9178\9167\9184\9170\9241\90506\13668\17183\20213\22113\22997\22950\23041\23148\22863\22863\22635\22
550\22661\22446\22387\22299\22260\22176\22092\21966\22012\21868\21855\21813\21757\21821\21846\21516\
21535\21651\21455\21439\21363\21436\21340\21303\21325\21432\21215\21271\21207\21094\21070\21148\2111
3\21247\21186\21112\21069\21006\20992\20932\20833\20823\20714\20937\20854\20747\20723\20734\20699\20
750\20928\20744\20704\20715\20654\20605\20639\20718\20455\20480\20411\20390\20578\20554\20572\20653\
20535\20437\20473\20466\20324\20366\20376\20341\20546\20493\20565\20627\20508\20496\20589\20543\2050
3\20468\20414\20299\20151\20230\20301\20301\20243\20277\20306\20206\20242\20130\20121\20133\20169\20
069\20002\20195\20116\20116\20026\20079|count|^TECH\^NORM\^CRIT\^USER|||F||^|20140707092617|20140707
092617|e602^2^MU1#e602#3#2^12^EFS|
C|1|I|0|I|
L|1|N|
```

---

## Quality control uploads

This section shows examples of ASTM quality control result uploads.

### Realtime quality control upload

This section shows an example of an ASTM realtime quality control upload.

```
H|^&|13772||cobas 8000^1.04||||host|RSUPL^REAL|P|1|20101019094737|
P|1|
O|1|PNU^150403^2|0^30005^1^^QC^SC^not|^__8685^1|R|||||Q||||1|||||||||F|
C|1|I|^____|G|
R|1|^__8685/1/not|48|U/L|||F||bmserv^SYSTEM|20101019093722|20101019094737|c701^1^MU1#c701#1#1^6^75^
Current|
C|1|I|0|I|
```

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---

L|1|N|

### Realtime quality control upload with a standby bottle

This section shows an example of an ASTM realtime quality control upload measured from the standby bottle.

---

```
H|^&|13791||cobas 8000^1.04||||host|RSUPL^REAL|P|1|20101019094918|
P|1|
O|1|PNU^150403^2|0^30005^1^^QC^SC^not|^^^8685^1|R|||||Q||||1|||||||F|
C|1|I|^^^|G|
R|1|^^8685/1/not|44|U/L|||F||bmserv^SYSTEM|20101019093903|20101019094918|c701^1^MU1#c701#1#1^6^76^
Standby^1|
C|1|I|0|I|
L|1|N|
```

---

### Batch quality control upload

This section shows an example of an ASTM batch quality control upload.

---

```
H|^&|14262||cobas 8000^1.04||||host|RSUPL^BATCH|P|1|20101019124105|
P|1|
O|1|PNU^150403^2|0^30005^1^^QC^SC^not|^^^8685^1|R|||||Q||||1|||||||F|
C|1|I|^^^|G|
R|1|^^8685/1/not|47|U/L|||F||bmserv^SYSTEM|20101019111853|20101019112908|c701^1^MU1#c701#1#1^6^75^
Current|
C|1|I|0|I|
L|1|N|
```

---

### Batch quality control upload with a standby bottle

This section shows an example of an ASTM batch quality control upload measured from the standby bottle.

---

```
H|^&|14261||cobas 8000^1.04||||host|RSUPL^BATCH|P|1|20101019124103|
P|1|
O|1|PNU^150403^2|0^30005^1^^QC^SC^not|^^^8685^1|R|||||Q||||1|||||||F|
C|1|I|^^^|G|
R|1|^^8685/1/not|48|U/L|||F||bmserv^SYSTEM|20101019111857|20101019112911|c701^1^MU1#c701#1#1^6^76^
Standby^1|
C|1|I|0|I|
L|1|N|
```

---

## Calibration result uploads

This section shows examples of ASTM calibration result uploads.

### C-module calibration result upload

This section shows example of ASTM c-module calibration result uploads.

---

```
H|^&|14273||cobas 8000^1.04||||host|PCUPL^REAL|P|1|20101019091421|
M|1|PCR/bmserv|^^^8685|MU1#c701#1#1|16|0|22851^4^22866^2^0^\\24786^-361^24149^-362^0^\\^^^^^\\^^^^^\\^^^
^^\\^^^^^|
L|1|N|
```

---

H|^&|14274||cobas 8000^1.04||||host|PCUPL^REAL|P|1|20101019091425|  
M|1|PCR|bmserv|^^^8685|MU1#c701#1#1|16|0|22045^4^22237^6^0^\\24134^-372^23966^-361^0^\\^^^^^\\^^^^^\\^^^  
^^^\\^^^^^|  
L|1|N|

---

H|^&|14275||cobas 8000^1.04||||host|PCUPL^REAL|P|1|20101019091432|  
M|1|PCR|bmserv|^^^8717|MU1#c701#1#1|16|0|956^31^962^40^0^\\8100^6814^8147^6849^0^\\^^^^^\\^^^^^\\^^^  
^^^|  
L|1|N|

## **ISE-module calibration result upload**

This section shows examples of ASTM ISE-module calibration result uploads.

## **E-module calibration result upload**

This section shows examples of ASTM e-module calibration result uploads.

```
H|^&|14276||cobas 8000^1.04||||host|ECUPL^REAL|P|1|20101018175819|
M|1|ECR|bmserv|^^^1|LotCalibration|MU1#e602#2#1|157328||0|158941|O|I^O^\\M^O^\\S^O^\\R^1.074^\\D^O^\\L^\\^\\
F^O^\\Y^O^\\B^O^\\936.337^888.767\\39609.680^39716.950|||||20101018175819|
L|1|N|

```

---

```
H|^&|14277||cobas 8000^1.04||||host|ECUPL^REAL|P|1|20101018175844|
M|1|ECR|bmserv|^^^1|LotCalibration|MU1#e602#2#2|157328||0|158941|O|I^O^\\M^O^\\S^O^\\R^1.064^\\D^O^\\L^\\^\\
F^O^\\Y^O^\\B^O^\\839.413^797.173\\38293.490^38596.120|||||20101018175844|
L|1|N|
```

## **Result request from host and the data manager result upload**

This section shows examples of ASTM result requests from the host and the *data manager's* result upload in reply.



**Always give rack types if using sample lifetime**

- ▶ If you set sample lifetime to a number greater than zero, always send the rack type (“specimen type” or “sample type”) with an order or result query. Otherwise, the *data manager* does not reply.

## **Request for currently active results**

This section shows an example ASTM result request from the host for currently active results for a sample, and the *data manager's* result upload.

---

**Host:**

**Roche Diagnostics**

---

Host Interface Manual · 14

---

281

## ASTM trace files

---

```
H|^&|12345||cobas 8000^1.04||||host|RSREQ|P|1|20101020075900|
Q|1|^S1^321015|||||||||F|
L|1|N|
DM:
H|^&|15126||cobas 8000^1.04||||host|RSUPL^BATCH|P|1|20101020090056|
P|1||PatID1||Smith^Alan||19451231|M|
O|1|321015|0^50071^1^^S1^SC^not|^^^8717^1|R|20101019174209|20101019174209||||N||||1|||||||F|
C|1|I|C1^C2^C3^C4^C5|G|
R|1|^^^8717/Inc/not|-0.02|mmol/L|^TECH\^NORM\^CRIT\^USER|||C||bmserv^SYSTEM|20101019175614|201010191
80627|c701^1^MU1#c701#1#1^6^77|
C|1|I|27^PANIC value over (lower) Technical Limit|I|
L|1|N|
```

---

**Request for all results**

This section shows an example of an ASTM result request from the host for all results for a sample, and the *data manager's* result upload

---

```
Host:
H|^&|12345||cobas 8000^1.04||||host|RSREQ|P|1|20101020075900|
Q|1|^S1^321015|||||||||F|
L|1|N|
DM:
H|^&|15123||cobas 8000^1.04||||host|RSUPL^BATCH|P|1|20101020090031|
P|1||PatID1||Smith^Alan||19451231|M|
O|1|321015|0^50071^1^^S1^SC^not|^^^990^1\^^^991^1\^^^8717^1|R|20101019174209|20101019174209||||N||||1|||||||F|
C|1|I|C1^C2^C3^C4^C5|G|
R|1|^^^990/1/not|0.91|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101019174423|20101019174439|ISE^2^MU1#ISE#1#2^4^128|
C|1|I|23^ISE Sample range over|I|
R|2|^^^990/1/not|0.70|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||C||bmserv^SYSTEM|20101019174459|20101019174515|ISE^1^MU1#ISE#1#1^3^125|
C|1|I|23^ISE Sample range over|I|
R|3|^^^991/1/not|252.89|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||F||bmserv^SYSTEM|20101019174347|20101019174403|ISE^1^MU1#ISE#1#1^3^126|
C|1|I|23^ISE Sample range over|I|
R|4|^^^991/1/not|256.84|mmol/L|^TECH\^NORM\^CRIT\<
0^USER|||C||bmserv^SYSTEM|20101019174423|20101019174439|ISE^2^MU1#ISE#1#2^4^129|
C|1|I|23^ISE Sample range over|I|
R|5|^^^8717/1/not|-0.04|mmol/L|^TECH\^NORM\^CRIT\^USER|||F||bmserv^SYSTEM|20101019174533|20101019175
547|c701^1^MU1#c701#1#1^6^77|
C|1|I|27^PANIC value over (lower) Technical Limit|I|
R|6|^^^8717/Inc/not|-0.02|mmol/L|^TECH\^NORM\^CRIT\^USER|||C||bmserv^SYSTEM|20101019175614|201010191
80627|c701^1^MU1#c701#1#1^6^77|
C|1|I|27^PANIC value over (lower) Technical Limit|I|
L|1|N|
```

---

**Result request but no results**

This section shows an example of an ASTM result request from the host, where the *data manager* does not have any results for the sample.

---

```
Host:
H|^&|12345||cobas 8000^1.04||||host|RSREQ|P|1|20101020075900|
Roche Diagnostics
```

---

```
Q|1|^S1^321016|||||||  
L|1|N|
```

DM:

<No Reply>

---

### Result request but sample not found

This section shows an example of an ASTM result request from the host, where the *data manager* does not have record of the sample.

Host:

```
H|^&|12345||cobas 8000^1.04||||host|RSREQ|P|1|20101020075900|  
Q|1|^S1^NOT_A_SAMPLE|||||||  
L|1|N|
```

DM:

<No Reply>

---

### Result request with a sequence number

This section shows an example of an ASTM result request from the host, for the sample with sequence number 1031. (See fields Q-3.4 and O-4.1.) This functionality was introduced in version 1.02.03.

Host:

```
H|^&|12345||cobas 8000^1.04||||host|RSREQ|P|1|20110711093355|  
Q|1|^S1^^1031|||||||F|  
L|1|N|
```

DM:

```
H|^&|564735||cobas 8000^1.04||||host|RSUPL^BATCH|P|1|20110712112553|  
P|1||M820101K||Froihofe^Kahila||19831213|F|  
O|1||1031^50101^3^S1^SC^not|^^8413^1\^^8571^1\^^8706^1|R|20110711093311|20110711093311||||N||||1  
|||||||F|  
C|1|I|^^^|G|  
R|1|^^8413/1/not|15|g/dL|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20111212104600|20111212104600|c  
702^2^MU1#c702#1#2^7^193|  
C|1|I|0|I|  
R|2|^^8571/1/not|16|U/L|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20111212104600|20111212104600|c7  
02^2^MU1#c702#1#2^7^193|  
C|1|I|0|I|  
R|3|^^8706/1/not|17|mmol/L|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20111212104600|20111212104600  
|c702^2^MU1#c702#1#2^7^193|  
C|1|I|0|I|  
L|1|N|
```

---

### Result request with an expired sample

If your site is using sample lifetimes, there may be an expired sample in the *data manager* database that has the same sample ID as a current sample. Normally this will not cause any confusion. However, if you send a result request, the *data manager* sends a test result message for every sample in the database: for the expired samples, as well as for the current sample.

Host:

```
H|^&|12345||cobas 8000^1.02||||host|RSREQ|
```

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---

ASTM trace files

```
P|1|20121018135001|
Q|1|^S1^321071|||||||F|
L|1|N|

DM (older, expired sample):
H|^&|563356||cobas 8000^1.04||||host|RSUPL^BATCH|P|1|20121018135136|
P|1||||^||||O|1|321071|
0^54312^2^^S1^SC^not|^^^8413^1\^^^8571^1|R|20121017134430|20121017134430||||N||||1|||||||F|C|1|I|
^^^^|G|
R|1|^^^8413/1/not|12.11|g/dL|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20121016123430|2012101612343
0|c702^2^MU1#c702#1#2^7^193|C|1|I|0|I|
R|2|^^^8571/1/not|13.21|U/L|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20121016127430|20121016127430
|c702^2^MU1#c702#1#2^7^193|C|1|I|0|I|
L|1|N|

DM (current sample):
H|^&|563358||cobas 8000^1.04||||host|RSUPL^BATCH|P|1|20121018135137|
P|1||||^||||O|1|321071|0^54312^2^^S1^SC^not|^^^8413^1\^^^8571^1|R|20121018134635|20121018134635||||N
||||1|||||||F|C|1|I|^^^|G|
R|1|^^^8413/1/not|12.08|g/dL|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20121017151615|2012101715161
5|c702^2^MU1#c702#1#2^7^193|
C|1|I|0|I|
R|2|^^^8571/1/not|13.36|U/L|^TECH|^NORM|^CRIT|^USER|||F||bmserv^SYSTEM|20121017151915|20121017151915
|c702^2^MU1#c702#1#2^7^193|
C|1|I|0|I|
L|1|N|
```

---

## Order query from the host

This section shows examples of ASTM test selection queries (or order queries) from the host to the *data manager*.

### Order query for all tests

This section shows an example of an ASTM order query for all tests on a sample.

---

Host:

```
H|^&|||cobas 8000^1.04||||host|TSREQ|P|1|
Q|1|^S1^321015|||||||O|
L|1|N|
```

DM:

```
H|^&|14997||cobas 8000^1.04||||host|TSUPL|P|1|20101020081756|
P|1||PatID1||Smith^Alan||19451231|M|
O|1|321015||^^^990^1\^^^991^1\^^^8717^1||||||O||||1|||||||F|
C|1|I|C1^C2^C3^C4^C5|G|
L|1|N|
```

---

### Order query for all open tests

This section shows an example of an ASTM order query for open tests on a sample.

---

Host:

```
H|^&|||cobas 8000^1.04||||host|TSREQ|P|1|
Q|1|^S1^321015|||||||O|
```

---

```
L|1|N|
```

DM:

```
H|^&|15002||cobas 8000^1.04||||host|TSUPL|P|1|20101020082031|
P|1||PatID1||Smith^Alan||19451231|M|
O|1|321015||^^990^1\^^991^1|||||O||||1|||||||||F|
C|1|I|C1^C2^C3^C4^C5|G|
L|1|N|
```

---

### Order query but no open tests

This section shows an example of an ASTM order query for all open tests on a sample, but the *data manager* does not have any open orders on the sample.

---

Host:

```
H|^&|||cobas 8000^1.04||||host|TSREQ|P|1|
Q|1|^S1^321016|||||||O|
L|1|N|
```

DM:

```
H|^&|15005||cobas 8000^1.04||||host|TSUPL|P|1|20101020082222|
P|1||PatID1||Smith^Alan||19451231|M|
O|1|321016|||||||O||||1|||||||||F|
C|1|I|^|||G|
L|1|N|
```

---

### Order query but sample not found

This section shows an example of an ASTM order query for all open tests on a sample, but the *data manager* does not have any record of the sample.

---

Host:

```
H|^&|||cobas 8000^1.04||||host|TSREQ|P|1|
Q|1|^S1^NOT_EXISTING|||||||
L|1|N|
```

DM:

```
H|^&|14980||cobas 8000^1.04||||host|TSUPL|P|1|20101020081236|
P|1|||^|||
O|1|NOT_EXISTING|||||||O||||1|||||||||F|
C|1|I|^|||G|
L|1|N|
```

---

### Order query with sample identified by sequence number

This section shows an example of an ASTM order query for all open tests on a sample identified by sequence number. Note that the order record, field 4 (O-4) is a simple number field, containing the sequence number (1013). (See fields Q-3.4 and O-4.1.) This functionality was introduced in version 1.02.03.

---

Host:

```
H|^&|||cobas 8000^1.04||||host|TSREQ|P|1|
Q|1|^S1^1013|||||||O|
L|1|N|
```

DM:

```
H|^&|563024||cobas 8000^1.04||||host|TSUPL|P|1|20110720151956|
```

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```
P|1||M820101K||Froihofe^Kahila||19831213|F|
O|1||1013|^8413^1\^8571^1\^8706^1|||||O||||1|||||F|
C|1|I|Comm1^Comm2^Comm3^Comm4^Comm5|G|
L|1|N|
```

---

## HL7 trace files

This section gives examples of HL7 messages between *data manager* and the host.

### Test selection inquiry and download

In the examples in this section shows the *data manager* sends HL7 test selection requests, and the host replies with test selection downloads.

#### Test selection inquiry for routine rack

This section shows an example of an HL7 test selection inquiry for a routine rack.

---

DM:

```
MSH|^~\&|cobas 8000||host||20101020091052||TSREQ|15161||2.5||||ER||UNICODE UTF-8|
QPD|TSREQ|15161|321070||50094|2||||S1|SC|R1|R|
RCP|I|1|R|
```

Host:

```
MSH|^~\&|host||cobas 8000||20090508135730||OML^O33|38749||2.5||||ER||UNICODE UTF-8
PID|1|PatID3||Wood^Sara||19881231|F
SPM||321070||S1||not||||||Comm1^Comm2^Comm3^Comm4^Comm5|||20101020122000|||||||SC
SAC|||||||||50094|2
TQ1|1|||||||R
OBR|1|||990^||||||A
TQ1|1|||||||R
OBR|2|||991^||||||A
TQ1|1|||||||R
OBR|3|||8781^||||||A
TQ1|1|||||||R
OBR|4|||8717^Inc||||||A
```

---

#### Test selection inquiry for STAT rack

This section shows an example of an HL7 test selection inquiry for a STAT rack.

---

DM:

```
MSH|^~\&|cobas 8000||host||20101020091110||TSREQ|15164||2.5||||ER||UNICODE UTF-8|
QPD|TSREQ|15164|321040||40002|3||||S1|SC|R1|S|
RCP|I|1|R|
```

Host:

```
MSH|^~\&|host||cobas 8000||20101020123900||OML^O33|38749||2.5||||ER||UNICODE UTF-8
PID|1|PatID3||Wood^Sara||19881231|F
SPM||321040||S1||not||||||Comm1^Comm2^Comm3^Comm4^Comm5|||20101020122000|||||||SC
SAC||||||||4000232
TQ1|1|||||||S
OBR|1|||990^||||||A
TQ1|1|||||||S
OBR|2|||991^||||||A
TQ1|1|||||||S
OBR|3|||8781^||||||A
TQ1|1|||||||S
OBR|4|||8717^Inc||||||A
```

---

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HL7 trace files

### Routine rack (AL) with acknowledgment

This section shows an example of an HL7 test selection inquiry for a routine sample, with the test selection download. The host requests an acknowledgment (level AL) and the *data manager* replies.

DM:

```
MSH|^~\&|cobas 8000||host||20101020091052||TSREQ|15161||2.5||||ER||UNICODE UTF-8|
QPD|TSREQ|15161|321070||50094|2||||S1|SC|R1|R|
RCP|I|1|R|
```

Host:

```
MSH|^~\&|host||cobas 8000||20090508135730||OML^O33|38777||2.5||||AL||UNICODE UTF-8
PID|1|PatID3|||Wood^Sara||19881231|F
SPM||321070||S1||not||||||Comm1^Comm2^Comm3^Comm4^Comm5|||20101020122000|||||||SC
SAC|||||||||50094|2
TQ1|1|||||||R
OBR|1|||990^||||||A
TQ1|1|||||||R
OBR|2|||991^||||||A
TQ1|1|||||||R
OBR|3|||8781^||||||A
TQ1|1|||||||R
OBR|4|||8717^Inc||||||A
```

DM:

```
MSH|^~\&|cobas 8000||host||20101020132118||ACK|15831||2.5||||NE||UNICODE UTF-8|
MSA|AA|38777||
```

### Routine rack invalid test (ER)

This section shows an example of an HL7 test selection inquiry, and the host's test selection download. In this test selection download there is an invalid sample ID, and the *data manager* replies with an acknowledgment that informs the host of the error.

DM:

```
MSH|^~\&|cobas 8000||host||20101020091052||TSREQ|15161||2.5||||ER||UNICODE UTF-8|
QPD|TSREQ|15161|321070||50094|2||||S1|SC|R1|R|
RCP|I|1|R|
```

Host:

```
MSH|^~\&|host||cobas 8000||20090508135730||OML^O33|38777||2.5||||ER||UNICODE UTF-8
PID|1|PatID3|||Wood^Sara||19881231|F
SPM||321070||S1||not||||||Comm1^Comm2^Comm3^Comm4^Comm5|||20101020122000|||||||SC
SAC||||||||50094|2
TQ1|1|||||||R
OBR|1|||990^||||||A
TQ1|1|||||||R
OBR|2|||991^||||||A
TQ1|1|||||||R
OBR|3|||8781^||||||A
TQ1|1|||||||R
OBR|4|||INVALID^Inc||||||A
```

DM:

```
MSH|^~\&|cobas 8000||host||20101020132233||ACK|15834||2.5||||NE||UNICODE UTF-8|
MSA|AE|38777|ORA-20001: Validation error|
```

## Test selection inquiry no sample found

This section shows an example of an HL7 test selection inquiry, but the host cannot find the sample.

---

DM:

```
MSH|^~\&|cobas 8000||host||20101020091052||TSREQ|15167||2.5||||ER||UNICODE UTF-8|
QPD|TSREQ|15167|321071||50094|3||||S1|SC|R1|R|
RCP|I|1|R|
```

Host:

```
MSH|^~\&|host||cobas 8000||20090508135730||OML^O33|38749||2.5||||ER||UNICODE UTF-8
PID|1|
SPM||321071||S1|
SAC|||||||50094|3
```



### Send patient demographic data if sample found with no tests ordered

- ▶ Take care in the situation where the *data manager* sends a test selection query, but the host has no patient demographic information nor tests for the sample, although it recognizes the sample ID. When the host sends its test selection download, the *data manager* updates the patient demographic information along with the tests. Therefore, if the host sends no patient demographic information, the *data manager* might lose its current patient demographic data.
- ▶ In this case, the host should send a normal test selection download, with full patient information, and comments etc., but no testcodes.
- ▶ For examples of normal test selections, see *Routine test selection inquiry and download* (p. 274) and *STAT sample test selection inquiry and download* (p. 274).

## Test selection inquiry with a sequence number

This section shows an example of an HL7 test selection inquiry, when the sample is identified by sequence number. (See fields QPD-3.2 and SPM-2.2.) This functionality was introduced in version 1.02.03.

---

DM:

```
MSH|^~\&|cobas 8000||host||20110720154106||TSREQ|563067||2.5||||ER||UNICODE UTF-8|
QPD|TSREQ|563067|^1031||50203|3||||S1|SC|R1|R|
RCP|I|1|R|
```

Host:

```
MSH|^~\&|host||c8000DM||20110715081133||OML^O33|227442||2.5||||ER||UNICODE UTF-8
PID|1|M820092K|||Muller^Urs||19730416|F
SPM||^1031||S1||not||||P|||^^^^|||20110715085411|||||||SC
SAC|||||||50203|3
TQ1|1|||||||R
OBR|1|||8571^||||||A
TQ1|1|||||||R
OBR|2|||8413^||||||A
TQ1|1|||||||R
OBR|3|||8706^||||||A
```

## Patient result upload messages

In the examples in this section the *data manager* uploads HL7 patient results.

## Single patient result upload

This section shows an example of a single HL7 patient result upload.

Note that the result abnormal flag is blank as there is no reference range defined.

---

```
MSH|^~\&|cobas 8000||host||20101019101825||OUL^R22|13890||2.5||||ER||UNICODE UTF-8|
PID|1|||||^|||
SPM||321042||S1||not||||P|||^^^^|||20101019094904|||||||||SC|
SAC|||||||||50011|4|
OBR|1|||8685|
TQ1|1|||||||R|
OBX|1||8685||47|U/L|^TECH~^NORM~^CRIT~^USER||||F|||20101019100810|bmserv^SYSTEM||75|c701^1^MU1#c701#
1#1^6|20101019101824|
TCD|8685|1|
SID|8685^^564957^R1^9^0|616478|924|
SID|8685^^564957^R3^9^0|616478|924|
NTE|1|I|0|I|
```

---

## Batch upload all previous results

This section shows a batch upload of all previous results for a sample.

Note that the result abnormal flag is blank as there is no reference range defined.

---

```
MSH|^~\&|cobas 8000^1.04||host||20101020111635||OUL^R22|15593||2.5||||ER||UNICODE UTF-8|
PID|1|PatID1|||Smith^Alan||19451231|M|
SPM||321015||S1||not||||P|||C1^C2^C3^C4^C5|||20101019174209|||||||||SC|
SAC|||||||||50071|1|
OBR|1|||990|
TQ1|1|||||||R|
OBX|1||990||0.91|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||F|||20101019174423|bmserv^SYSTEM||128|ISE^2^MU
1#ISE#1#2^4|20101019174439|
TCD|990|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|2|||990|
TQ1|1|||||||R|
OBX|2||990||0.70|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101019174459|bmserv^SYSTEM||125|ISE^1^MU
1#ISE#1#1^3|20101019174515|
TCD|990|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|3|||990|
TQ1|1|||||||R|
OBX|3||990||0.75|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||F|||20101020095735|bmserv^SYSTEM||125|ISE^1^MU
1#ISE#1#1^3|20101020095751|
TCD|990|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|4|||990|
TQ1|1|||||||R|
OBX|4||990||0.99|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101020095905|bmserv^SYSTEM||128|ISE^2^MU
1#ISE#1#2^4|20101020095921|
TCD|990|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|5|||991|
TQ1|1|||||||R|
OBX|5||991||252.89|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||F|||20101019174347|bmserv^SYSTEM||126|ISE^1^
MU1#ISE#1#1^3|20101019174403|
TCD|991|1|
```

---

```

NTE|1|I|23^ISE Sample range over|I|
OBR|6|||991|
TQ1|1|||||||R|
OBX|6||991||256.84|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101019174423|bmserv^SYSTEM||129|ISE^2^
MU1#ISE#1#2^4|20101019174439|
TCD|991|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|7|||991|
TQ1|1|||||||R|
OBX|7||991||297.28|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||F|||20101020095735|bmserv^SYSTEM||126|ISE^1^
MU1#ISE#1#1^3|20101020095751|
TCD|991|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|8|||991|
TQ1|1|||||||R|
OBX|8||991||304.89|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101020095905|bmserv^SYSTEM||129|ISE^2^
MU1#ISE#1#2^4|20101020095921|
TCD|991|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|9|||8717|
TQ1|1|||||||R|
OBX|9||8717||-0.04|mmol/L|^TECH~^NORM~^CRIT~^USER||||F|||20101019174533|bmserv^SYSTEM||77|c701^1^MU1
#c701#1#1^6|20101019175547|
TCD|8717|1|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|27^PANIC value over (lower) Technical Limit|I|
OBR|10|||8717|
TQ1|1|||||||R|
OBX|10||8717||-0.02|mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101019175614|bmserv^SYSTEM||77|c701^1^MU
1#c701#1#1^6|20101019180627|
TCD|8717|Inc|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|27^PANIC value over (lower) Technical Limit|I|

```

## Batch upload all current results

This section shows a batch upload of all current results.

Note that the result abnormal flag is blank as there is no reference range defined.

```

MSH|^~\&|cobas 8000^1.04||host||20101020111632||OUL^R22|15591||2.5||||ER||UNICODE UTF-8|
PID|1|PatID1|||Smith^Alan||19451231|M|
SPM||321015||S1||not||||P|||C1^C2^C3^C4^C5|||20101019174209|||||||||SC|
SAC|||||||||50071|1|
OBR|1|||990|
TQ1|1|||||||R|
OBX|1||990||0.99|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101020095905|bmserv^SYSTEM||128|ISE^2^MU
1#ISE#1#2^4|20101020095921|
TCD|990|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|2|||991|
TQ1|1|||||||R|
OBX|2||991||304.89|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101020095905|bmserv^SYSTEM||129|ISE^2^
MU1#ISE#1#2^4|20101020095921|
TCD|991|1|

```

## HL7 trace files

```
NTE|1|I|23^ISE Sample range over|I|
OBR|3|||8717|
TQ1|1|||||||R|
OBX|3||8717||-0.02|mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101019175614|bmserv^SYSTEM||77|c701^1^MU1
#c701#1#1^6|20101019180627|
TCD|8717|Inc|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|27^PANIC value over (lower) Technical Limit|I|
```

---

**Batch upload of current results sample short**

This section shows an example of an HL7 batch upload of current results, saying that the measurement could not be done as the sample was short.

```
MSH|^~\&|cobas 8000||host||20101018174529||OUL^R22|12636||2.5||||ER| |UNICODE UTF-8|
PID|1||||^|||
SPM||321042||S1||not|||||P|||^^^|||20101006162241|||||||SC|
SAC|||||||||50011|4|
OBR|1|||989|
TQ1|1|||||||R|
OBX|1||989||| mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101018173814|bmserv^SYSTEM||124|ISE^1^MU
1#ISE#1#1^3|20101018173829|
TCD|989|1|
NTE|1|I|3^Sample short|I|
OBR|2|||990|
TQ1|1|||||||R|
OBX|2||990||| mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101018173814|bmserv^SYSTEM||125|ISE^1^MU
1#ISE#1#1^3|20101018173829|
TCD|990|1|
NTE|1|I|3^Sample short|I|
OBR|3|||991|
TQ1|1|||||||R|
OBX|3||991||| mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101018173814|bmserv^SYSTEM||126|ISE^1^MU
1#ISE#1#1^3|20101018173829|
TCD|991|1|
NTE|1|I|3^Sample short|I|
```

---

**No result as sample short**

This section shows an example of an HL7 result message, where the measurement could not be done as the sample was short.

```
MSH|^~\&|cobas 8000||host||20101018173833||OUL^R22|12624||2.5||||ER| |UNICODE UTF-8|
PID|1||||^|||
SPM||321042||S1||not|||||P|||^^^|||20101006162241|||||||SC|
SAC|||||||||50011|4|
OBR|1|||991|
TQ1|1|||||||R|
OBX|1||991||| mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101018173814|bmserv^SYSTEM||126|ISE^1^MU
1#ISE#1#1^3|20101018173829|
TCD|991|1|
NTE|1|I|3^Sample short|I|
```

---

## Result outside user range

This section shows an example of an HL7 patient result outside the user-defined reference range.

```
MSH|^~\&|cobas 8000||host||20101018192600||OUL^R22|13338||2.5||||ER||UNICODE UTF-8|
PID|1|||||^|||
SPM||321671||S1||not||||P|||^^^^|||20101018191906|||||||SC|
SAC|||||||||50054|5|
OBR|1|||991|
TQ1|1|||||||R|
OBX|1||991||202.52|mmol/L|^TECH~^NORM~^CRIT~< 1^USER||||F|||20101018192542|bmserv^SYSTEM||126|ISE^1^
MU1#ISE#1#1^3|20101018192558|
TCD|991|1|
NTE|1|I|0|I|
```

## Result outside normal range

This section shows an example of an HL7 result upload below the normal reference range.

```
MSH|^~\&|cobas 8000||host||20100609022505||OUL^R22|8277||2.5||||AL||UNICODE UTF-8|
PID|1|ES06516622121998|||Rister^Wolfgang||19330813|M|
SPM||123||S1||not||||P|||^^^^|||20100604235148|||||||SC|
SAC|||||||||50063|2|
OBR|1|||989|
TQ1|1|||||||R|
OBX|1||989||2.1|mmol/L|^TECH~9 - 144NORM~^CRIT~^USER|L||||F|||20100621084348|bmserv^SYSTEM||28|ISE^1
^MU1#ISE#1#1^3|20100621084404|
TCD|989|1|
NTE|1|I|0|I|
TQ1|1|||||||R|
OBX|2||991||1.1|mmol/L|^TECH~^NORM~^CRIT~^USER||||F|||20100621084348|bmserv^SYSTEM||28|ISE^1^MU1#ISE
#1#1^3|20100621084404|
TCD|991|1|
NTE|1|I|0|I|
OBR|3|||8717|
TQ1|1|||||||R|
OBX|3||8717||14.57|mmol/L|^TECH~^NORM~^CRIT~^USER||||F|||20100621085921|bmserv^SYSTEM||168|c701^2^MU
1#c701#1#2^7|20100621090935|
TCD|8717|1|
NTE|1|I|0|I|
```

## Result below level of detection

This section shows an example of an HL7 result upload below the EP17-A limit of detection. (LoD)

```
MSH|^~\&|cobas 8000||host||20100609022105||OUL^R22|8267||2.5||||AL||UNICODE UTF-8|
PID|1|ES06516622121998|||Rister^Wolfgang||19330813|M|
SPM||123||S1||not||||P|||^^^^|||20100604235148|||||||SC|
SAC|||||||||50063|2|
OBR|1|||989|
TQ1|1|||||||R|
OBX|1||989||0.1|mmol/L|^TECH~12 - 144NORM~^CRIT~^USER|LoD||||F|||20100621084348|bmserv^SYSTEM||28|IS
E^1^MU1#ISE#1#1^3|20100621084404|
TCD|989|1|
```

## HL7 trace files

```
NTE|1|I|0|I|
OBR|2|||991|
TQ1|1|||||||R|
OBX|2||991||1.1|mmol/L|^TECH~^NORM~^CRIT~^USER||||F|||20100621084348|bmserv^SYSTEM||28|ISE^1^MU1#ISE
#1#1^3|20100621084404|
TCD|991|1|
NTE|1|I|0|I|
OBR|3|||8717|
TQ1|1|||||||R|
OBX|3||8717||14.57|mmol/L|^TECH~^NORM~^CRIT~^USER||||F|||20100621085921|bmserv^SYSTEM||168|c701^2^MU
1#c701#1#2^7|20100621090935|
TCD|8717|1|
NTE|1|I|0|I|
```

## Data point result

This section shows an example of an HL7 patient result message with data point values, generated by an e602 module.

```
MSH|^~\&|cobas 8000||host||20140725105415||OUL^R22|237||2.5||||ER||UNICODE UTF-8|
PID|1||||^|||||
SPM||234031||S1||not||||P|||^^^|||20140707093721|||||||||
SAC|||||||50089|5|
OBR|1|||64|
TQ1|1|||||||R|
OBX|1||64||3.50|IU/L|^TECH~^NORM~^CRIT~^USER||||F|||20140707092617|bmserv^SYSTEM||0|e602^2^MU1#e602#
3#2^12|20140707092617|
TCD|64|1|
SID|64^^64^ASY^4^0|175377|60703|
NTE|1|I|0|I|
OBR|2|||64|
TQ1|1|||||||R|
OBX|2||64||1315^8427&8428&8435&8497&8504&8537&8604&8641&8680&8683&8650&8671&8653&8654&8681&8685&8729
&8794&8803&8834&8878&8880&8908&8912&8943&8939&8973&8965&8955&8964&8929&8926&8935&8938&8945&8964&8949
&9029&9008&9008&8992&8983&8997&9027&9025&9064&9047&9018&9099&9117&9071&9020&9046&9074&9067&9058&9065
&9053&9087&9053&9047&9016&9040&9015&9017&9001&9069&9084&9094&9126&9166&9127&9170&9170&9202&9216&9178
&9167&9184&9170&9241&10506&13668&17183&20213&22113&22997&22950&23041&23148&22863&22863&22635&22550&2
2661&22446&22387&22299&22260&22176&22092&21966&22012&21868&21855&21813&21757&21821&21846&21516&21535
&21651&21455&21439&21363&21436&21340&21303&21325&21432&21215&21271&21207&21094&21070&21148&21113&212
47&21186&21112&21069&21006&20992&20932&20833&20823&20714&20937&20854&20747&20723&20734&20699&20750&2
0928&20744&20704&20715&20654&20605&20639&20718&20455&20480&20411&20390&20578&20554&20572&20653&20535
&20437&20473&20466&20324&20366&20376&20341&20546&20493&20565&20627&20508&20496&20589&20543&20503&204
68&20414&20299&20151&20230&20301&20301&20243&20277&20306&20206&20242&20130&20121&20133&20169&20069&2
0002&20195&20116&20116&20026&20079|count |^TECH~^NORM~^CRIT~^USER||||F|||20140707092617|^||EFS|e602^2
^MU1#e602#3#2^12|20140707092617|
TCD|64|1|
NTE|1|I|0|I|
```

## Quality control result upload messages

In the examples in this section shows the *data manager* uploads HL7 quality control results.

## Batch QC from c-module

This section shows an example of a batch HL7 quality control result from a c-module.

---

```
MSH|^~\&|cobas 8000||host||2011119123938||OUL^R22^BATCH|14250||2.5||||ER||UNICODE UTF-8|
PID|1|
SPM||PNU^150403^2^20111121||S1||not||||Q|||^~^||||||||SC|
SAC|||||||30005|1|
OBR|1|||8717^|
TQ1|1|||||||R|
OBX|1||8717||4.30|mmol/L|4.5^TARGET~0.5^SD||||F|||2011119111900|bmserv^SYSTEM||77|c701^1^MU1#c701#1
#1^6^Current|2011119112915|
TCD|8717|1|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|0|I|
```

---

## Batch QC from c-module standby bottle

This section shows an example of a batch HL7 quality control result from a c-module from a standby bottle.

---

```
MSH|^~\&|cobas 8000||host||2011119123853||OUL^R22^BATCH|14249||2.5||||ER||UNICODE UTF-8|
PID|1|
SPM||PNU^150403^2^20111121||S1||not||||Q|||^~^||||||||SC|
SAC|||||||30005|1|
OBR|1|||8685^|
TQ1|1|||||||R|
OBX|1||8685||48|U/L|50^TARGET~3^SD||||F|||2011119111857|bmserv^SYSTEM||76|c701^1^MU1#c701#1#1^6^St
andby^1|2011119112911|
TCD|8685|1|
SID|8685^^564957^R1^31^0|616478|923|
SID|8685^^564957^R3^31^0|616478|923|
NTE|1|I|0|I|
```

---

## Realtime QC from c-module

This section shows an example of a realtime HL7 quality control result from a c-module.

---

```
MSH|^~\&|cobas 8000||host||2011119112926||OUL^R22^REAL|14109||2.5||||ER||UNICODE UTF-8|
PID|1|
SPM||PPU^150415^3^20111121||S1||not||||Q|||^~^||||||||SC|
SAC|||||||30005|2|
OBR|1|||8717^|
TQ1|1|||||||R|
OBX|1||8717||12.44|mmol/L|12^TARGET~1^SD||||F|||2011119111911|bmserv^SYSTEM||77|c701^1^MU1#c701#1
#1^6^Current|2011119112926|
TCD|8717|1|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|0|I|
```

---

## Realtime QC from c-module standby bottle

This section shows an example of a realtime HL7 quality control result from a c-module from a standby bottle.

---

```
MSH|^~\&|cobas 8000||host||20111119112922||OUL^R22^REAL|14105||2.5||||ER||UNICODE UTF-8|
PID|1|
SPM||PPU^150415^3^20111121||S1||not||||Q|||^~^~|||||||SC|
SAC|||||||||30005|2|
OBR|1|||8685^|
TQ1|1|||||||R|
OBX|1||8685||121|U/L|127^TARGET~3^SD||||F|||20111119111907|bmserv^SYSTEM||76|c701^1^MU1#c701#1#1^6^
Standby^1|20111119112922|
TCD|8685|1|
SID|8685^^564957^R1^31^0|616478|923|
SID|8685^^564957^R3^31^0|616478|923|
NTE|1|I|0|I|
```

---

## QC results from e-module

This section shows examples of HL7 quality control results from an e-module.

---

```
MSH|^~\&|cobas 8000||host||20111119123353||OUL^R22^REAL|14226||2.5||||ER||UNICODE UTF-8|
PID|1|
SPM||PC U1 ^156227^156227^4^20111121||S1||not||||Q|||^~^~|||||||SC|
SAC|||||||||30001|1|
OBR|1|||1^|
TQ1|1|||||||R|
OBX|1||1||1.45|mIU/L|1.5^TARGET^0.15^SD||||F|||20111119121523|bmserv^SYSTEM||0|e602^1^MU1#e602#2#1^
9^Current|20111119123353|
TCD|1|1|
SID|1^^1^ASY^18^0|157328|62769|
NTE|1|I|0|I|


---


MSH|^~\&|cobas 8000||host||20111119123413||OUL^R22^REAL|14231||2.5||||ER||UNICODE UTF-8|
PID|1|
SPM||PC U1 ^156227^4^20111121||S1||not||||Q|||^~^~|||||||SC|
SAC|||||||||30001|1|
OBR|1|||1^|
TQ1|1|||||||R|
OBX|1||1||1.45|mIU/L|1.5^TARGET^0.15^SD||||F|||20111119121544|bmserv^SYSTEM||0|e602^2^MU1#e602#2#2^
10^Current|20111119123413|
TCD|1|1|
SID|1^^1^ASY^18^0|157328|62769|
NTE|1|I|0|I|
```

---

## Calibration result upload messages

In the examples in this section the *data manager* uploads HL7 calibration results.

### C-module calibration results

This section shows examples of HL7 calibration results from a c-module.

---

```
MSH|^~\&|cobas 8000||host||20111119091421||OUL^R22^PCUPL|14262||2.5||||ER||UNICODE UTF-8|
SPM||1^999999^901^1^20111121|||||||C^P|
```

---

```
OBR|1|||8685|
OBX|1||8685||0^3&4&22851&2&22866&|||0|||F||||bmserv||75|c701^1^MU1#c701#1#1^6^Current|20111119091421|
|
SID|8685^^^2^1|231478|5|
SPM||2^153314^401^1^20111201|||||||C^P|
OBR|2|||8685|
OBX|2||8685||0^-362&-361&24786&-362&24149&|||0|||F||||bmserv||75|c701^1^MU1#c701#1#1^6^Current|2011119091421|
|
SID|8685^^^3^1|231480|9|


---


MSH|^~\&|cobas 8000||host||20111119091432||OUL^R22^PCUPL|14264||2.5||||ER||UNICODE UTF-8|
SPM||1^999999^901^1^20111121|||||||C^P|
OBR|1|||8717|
OBX|1||8717||0^36&31&956&40&962&|||0|||F||||bmserv||77|c701^1^MU1#c701#1#1^6^Current|20111119091432|
|
SID|8717^^^2^1|231478|5|
SPM||2^153314^401^1^20111121|||||||C^P|
OBR|2|||8717|
OBX|2||8717||0^6832&6814&8100&6849&8147&|||0|||F||||bmserv||77|c701^1^MU1#c701#1#1^6^Current|20111119091432|
|
SID|8717^^^3^1|231480|9|


---



```

## ISE-module calibration results

This section shows examples of HL7 calibration results from an ISE-module.

```
MSH|^~\&|cobas 8000||host||20101020110002||OUL^R22^ICUPL|14265||2.5||||ER||UNICODE UTF-8|
SPM|||||||C^I|
OBR|1|||989|
OBX|1||989||Type-A^0&0&0&0&0&0&0&0^~-33.0&-37.9&-30.4&-33.2&60.0&144.59&143.56&0.0&60.2&-
0.56|||Valid|||F||||bmserv||130|ISE^1^MU1#ISE#1#1^3|20101020110002|
|
SID|||
SPM|||||||C^I|
OBR|2|||990|
OBX|2||990||Type-A^0&0&0&0&0&0&0&0^~-34.9&-48.9&-27.3&-37.8&58.7&5.19&4.64&0.0&59.1&-0.05|||Valid
|||F||||bmserv||131|ISE^1^MU1#ISE#1#1^3|20101020110002|
|
SID|||
SPM|||||||C^I|
OBR|3|||991|
OBX|3||991||Type-A^0&0&0&0&0&0&0&0^137.3&141.6&132.8&136.8&-50.0&97.42&99.75&0.0&-
50.3&1.25|||Valid|||F||||bmserv||132|ISE^1^MU1#ISE#1#1^3|20101020110002|
|
SID|||


---


MSH|^~\&|cobas 8000||host||20101020110008||OUL^R22^ICUPL|14266||2.5||||ER||UNICODE UTF-8|
SPM|||||||C^I|
OBR|1|||989|
OBX|1||989||Type-A^0&0&0&0&0&0&0&0^~-37.9&-42.6&-35.3&-38.0&58.4&144.15&143.45&0.0&59.4&-
0.45|||Valid|||F||||bmserv||133|ISE^2^MU1#ISE#1#2^4|20101020110008|
|
SID|||
SPM|||||||C^I|
OBR|2|||990|
OBX|2||990||Type-A^0&0&0&0&0&0&0&0^~-38.7&-51.9&-31.2&-41.3&56.3&5.15&4.63&0.0&57.3&-
0.04|||Valid|||F||||bmserv||134|ISE^2^MU1#ISE#1#2^4|20101020110008|
|
SID|||
SPM|||||||C^I|
OBR|3|||991|
OBX|3||991||Type-A^0&0&0&0&0&0&0&0^131.3&134.6&126.2&130.1&-47.7&93.93&99.57&0.0&-
48.3&1.43|||Valid|||F||||bmserv||135|ISE^2^MU1#ISE#1#2^4|20101020110008|


---



```

---

SID| |

---

## E-module calibration results

This section shows examples of HL7 calibration results from an e-module.

---

```
MSH|^~\&|cobas 8000||host||20111118175819||OUL^R22^ECUPL|14267||2.5||||ER||UNICODE UTF-8|
SPM||2^158941^1^None^20111119|||||||C^E|
OBR|1|||1|
OBX|1||1||Valid^false^false^false^1.074^false^^false^false^39609.680&39716.950^^^^^|||LotCalibration
|||F|||bmserv||25|e602^1^MU1#e602#2#1^9^Current|20111118175819|
SID|1^^^ASY^18^0|157328|5|
SPM||1^158941^1^None^20111119|||||||C^E|
OBR|2|||1|
OBX|2||1||Valid^false^false^false^1.074^false^^false^false^936.337&888.767^^^^^|||LotCalibration|||F
|||bmserv||25|e602^1^MU1#e602#2#1^9^Current|20111118175819|
SID|1^^^ASY^18^0|157328|5|
```

---

```
MSH|^~\&|cobas 8000||host||20111118175844||OUL^R22^ECUPL|14268||2.5||||ER||UNICODE UTF-8|
SPM||2^158941^1^None^20111119|||||||C^E|
OBR|1|||1|
OBX|1||1||Valid^false^false^false^1.064^false^^false^false^38293.490&38596.120^^^^^|||LotCalibration
|||F|||bmserv||26|e602^2^MU1#e602#2#2^10^Current|20111118175844|
SID|1^^^ASY^18^0|157328|5|
SPM||1^158941^1^None^20111119|||||||C^E|
OBR|2|||1|
OBX|2||1||Valid^false^false^false^1.064^false^^false^false^839.413&797.173^^^^^|||LotCalibration|||F
|||bmserv||26|e602^2^MU1#e602#2#2^10^Current|20111118175844|
SID|1^^^ASY^18^0|157328|5|
```

---

## Masking messages

In the examples in this section the host sends masking messages.

### Successful masking message

In this section the host sends a masking command, and the *data manager* replies with an Accept acknowledgment message.

---

Host:

```
MSH|^~\&|host||cobas 8000||20101007113655||EAC^U07|13010||2.5||||AL||UNICODE UTF-8|
EQU|1||20101007113600|
ECD|1234|LK|||989^P^MU1#ISE#1#1^ALL|
```

DM:

```
MSH|^~\&|cobas 8000||host||20101007113946||ACK|19922||2.5||||NE||UNICODE UTF-8|
MSA|AA|13010||
```

---

### Unsuccessful masking message

In this section the host sends a masking command, but the module does not exist.

---

Host:

```
MSH|^~\&|host||cobas 8000||20101007113655||EAC^U07|13011||2.5||||AL||UNICODE UTF-8|
EQU|1||20101007113600|
ECD|1234|LK|||989^P^module_X^ALL|
```

DM:

```
MSH|^~\&|cobas 8000||host||20101007125554||ACK|19987||2.5||||NE||UNICODE UTF-8|
MSA|AE|13011|Submodule (module_X) not found|
```

---

## Result requests from the host

In the examples in this section the host sends result requests.



### Always give rack types if using sample lifetime

- ▶ If you set sample lifetime to a number greater than zero, always send the rack type (“specimen type” or “sample type”) with an order or result query. Otherwise, the *data manager* does not reply.

### Request for all results

In this section the host sends a request for all results for a sample.

---

Host:

```
MSH|^~\&|host||cobas 8000||20100430105126||RSREQ|13007||2.5||||NE||UNICODE UTF-8|
QPD|RSREQ||321015|
```

DM:

```
MSH|^~\&|cobas 8000||host||20101020084603||OUL^R22^BATCH|15042||2.5||||ER||UNICODE UTF-8|
PID|1|PatID1|||Smith^Alan||19451231|M|
SPM||321015||S1||not||||P|||C1^C2^C3^C4^C5|||20101019174209||||||||SC|
SAC||||||||50071|1|
OBR|1|||990|
```

## HL7 trace files

```
TQ1|1|||||||R|
OBX|1||990||0.91|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||F|||20101019174423|bmserv^SYSTEM||128|ISE^2^MU
1#ISE#1#2^4|20101019174439|
TCD|990|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|2|||990|
TQ1|1|||||||R|
OBX|2||990||0.70|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101019174459|bmserv^SYSTEM||125|ISE^1^MU
1#ISE#1#1^3|20101019174515|
TCD|990|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|3|||991|
TQ1|1|||||||R|
OBX|3||991||252.89|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||F|||20101019174347|bmserv^SYSTEM||126|ISE^1^MU
1#ISE#1#1^3|20101019174403|
TCD|991|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|4|||991|
TQ1|1|||||||R|
OBX|4||991||256.84|mmol/L|^TECH~^NORM~^CRIT~< 0^USER||||C|||20101019174423|bmserv^SYSTEM||129|ISE^2^MU
1#ISE#1#2^4|20101019174439|
TCD|991|1|
NTE|1|I|23^ISE Sample range over|I|
OBR|5|||8717|
TQ1|1|||||||R|
OBX|5||8717||-0.04|mmol/L|^TECH~^NORM~^CRIT~^USER||||F|||20101019174533|bmserv^SYSTEM||77|c701^1^MU1
#c701#1#1^6|20101019175547|
TCD|8717|1|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|27^PANIC value over (lower) Technical Limit|I|
OBR|6|||8717|
TQ1|1|||||||R|
OBX|6||8717||-0.02|mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101019175614|bmserv^SYSTEM||77|c701^1^MU1
#c701#1#1^6|20101019180627|
TCD|8717|Inc|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|27^PANIC value over (lower) Technical Limit|I|
```

**Request for active results**

In this section the host sends a request for active results for a sample.

**Host:**

```
MSH|^~\&|host||cobas 8000||20100430105126||RSREQ|13007||2.5||||NE||UNICODE UTF-8|
QPD|RSREQ||321015|F|
```

**DM:**

```
MSH|^~\&|cobas 8000||host||20101020084713||OUL^R22^BATCH|15045||2.5||||ER||UNICODE UTF-8|
PID|1|PatID1|||Smith^Alan||19451231|M|
SPM||321015||S1||not||||P|||C1^C2^C3^C4^C5|||20101019174209|||||||||SC|
SAC|||||||||50071|1|
OBR|1|||8717|
TQ1|1|||||||R|
```

```
OBX|1||8717||-
0.02|mmol/L|^TECH~^NORM~^CRIT~^USER||||C|||20101019175614|bmserv^SYSTEM||77|c701^1^MU1#c701#1#1^6|20
101019180627|
TCD|8717|Inc|
SID|8717^^568316^R1^30^0|616731|674|
SID|8717^^568316^R3^30^0|616731|674|
NTE|1|I|27^PANIC value over (lower) Technical Limit|I|
```

## No results found

In this section the host sends a request for active results for a sample, but the *data manager* cannot find any results.

---

Host:

```
MSH|^~\&|host||cobas 8000||20100430105126||RSREQ|13007||2.5||||NE||UNICODE UTF-8|
QPD|RSREQ||321016|F|
```

DM:

```
<No Reply>
```

---

## Sample not found

In this section the host sends a request for active results for a sample, but the *data manager* cannot find any record of the sample.

---

Host:

```
MSH|^~\&|host||cobas 8000||20100430105126||RSREQ|13007||2.5||||NE||UNICODE UTF-8|
QPD|RSREQ||NOT_FOUND|F|
```

DM:

```
<No reply>
```

---

## Result request with a sequence number

In this section the host sends a request for results for a sample with sequence number 1031. (See fields QPD-3.2 and SPM-2.2.) This functionality was introduced in version 1.02.03.

---

Host:

```
MSH|^~\&|host||cobas 8000||20100430105126||RSREQ|13007||2.5||||NE||UNICODE UTF-8|
QPD|RSREQ||^1031|
```

DM:

```
MSH|^~\&|cobas 8000||host||20110712133259||OUL^R22^BATCH|564847||2.5||||NE||UNICODE UTF-8|
PID|1|M820092K|||Muller^Urs||19730416|F|
SPM||^1031||S1||not||||P|||^^^|||20110711085411|||||||||SC|
SAC|||||||50203|3|
OBR|1|||8413|
TQ1|1||||||R|
OBX|1||8413||19|g/dL|^TECH~^NORM~^CRIT~^USER||||F|||20111212104600|bmserv^SYSTEM||193|c702^2^MU1#c70
2#1#2^7|20111212104600|
TCD|8413|1|
SID|8413^^784648^R1^2^0|231478|5|
SID|8413^^784648^R3^2^0|231478|5|
NTE|1|I|0|I|
OBR|2|||8571|
TQ1|1||||||R|

```

## Roche Diagnostics

## HL7 trace files

```

OBX|2||8571||21|U/L|^TECH~^NORM~^CRIT~^USER||||F|||20111212104600|bmserv^SYSTEM||193|c702^2^MU1#c702
#1#2^7|20111212104600|
TCD|8571|1|
SID|8571^^784648^R1^2^0|231478|5|
SID|8571^^784648^R3^2^0|231478|5|
NTE|1|I|0|I|
OBR|3|||8706|
TQ1|1|||||||R|
OBX|3||8706||23|mmol/L|^TECH~^NORM~^CRIT~^USER||||F|||20111212104600|bmserv^SYSTEM||193|c702^2^MU1#c
702#1#2^7|20111212104600|
TCD|8706|1|
SID|8706^^784648^R1^2^0|231478|5|
SID|8706^^784648^R3^2^0|231478|5|
NTE|1|I|0|I|

```

---

## Result request with an expired sample

If your site is using sample lifetimes, there may be an expired sample in the *data manager* database that has the same sample ID as a current sample. Normally this will not cause any confusion. However, if you send a result request, the *data manager* sends a test result message for every sample in the database: for the expired samples, as well as for the current sample.

## Host:

```

MSH|^~\&|host||cobas 8000||20121018133058||RSREQ|13007||2.5||||NE||UNICODE UTF-8|
QPD|RSREQ||321071|F|||||S1

```

## DM (older, expired sample):

```

MSH|^~\&|cobas 8000||host||20121018133130||OUL^R22^BATCH|563324||2.5||||ER||UNICODE UTF-8|
PID|1||||^|||
SPM||321071||S1||not||||P|||^^^|||20121016124430|||||||SC|
SAC|||||||||54312|2|
OBR|1|||8413|TQ1|1|||||||R|
OBX|1||8413||12.11|g/dL|^TECH~^NORM~^CRIT~^USER||||F|||20121016123430|bmserv^SYSTEM||193|c702^2^MU1#
c702#1#2^7|20121016123430|
TCD|8413|1|
SID|8413^^784648^R1^2^0|231478|5|
SID|8413^^784648^R3^2^0|231478|5|
NTE|1|I|0|I|
OBR|2|||8571|
TQ1|1|||||||R|
OBX|2||8571||13.21|U/L|^TECH~^NORM~^CRIT~^USER||||F|||20121016127430|bmserv^SYSTEM||193|c702^2^MU1#
702#1#2^7|20121016127430|
TCD|8571|1|
SID|8571^^784648^R1^2^0|231478|5|
SID|8571^^784648^R3^2^0|231478|5|
NTE|1|I|0|I|

```

## DM (current sample):

```

MSH|^~\&|cobas 8000||host||20121018133131||OUL^R22^BATCH|563326||2.5||||ER||UNICODE UTF-
8|PID|1||||^|||
SPM||321071||S1||not||||P|||^^^|||20121017153615|||||||SC|
SAC|||||||||54312|2|
OBR|1|||8413|TQ1|1|||||||R|
OBX|1||8413||12.08|g/dL|^TECH~^NORM~^CRIT~^USER||||F|||20121017151615|bmserv^SYSTEM||193|c702^2^MU1#
c702#1#2^7|20121017151615|
TCD|8413|1|

```

## Roche Diagnostics

---

```

SID|8413^^784648^R1^2^0|231478|5|SID|8413^^784648^R3^2^0|231478|5|
NTE|1|I|0|I|
OBR|2|||8571|
TQ1|1|||||||R|
OBX|2||8571||13.36|U/L|^TECH~^NORM~^CRIT~^USER||||F|||20121017151915|bmserv^SYSTEM| |193|c702^2^MU1#c
702#1#2^7|20121017151915|
TCD|8571|1|
SID|8571^^784648^R1^2^0|231478|5|
SID|8571^^784648^R3^2^0|231478|5|
NTE|1|I|0|I|

```

---

## Order requests from the host

In the examples in this section the host sends order requests.

### Request for all tests

In this section the host sends a request for all tests for a sample.

---

Host:

```

MSH|^~\&|host||cobas 8000||20100825132805||TSREQ|10001||2.5||||NE||UNICODE UTF-8|
QPD|TSREQ||321015||||||S1|
RCP|I|1|R|

```

DM:

```

MSH|^~\&|cobas 8000||host||||OML^O33|15023||2.5||||ER||UNICODE UTF-8|
SPM||321015||S1|||||||C1^C2^C3^C4^C5|
OBR||||990|
OBR||||991|
OBR||||8717|

```

---

### Request for open tests

In this section the host sends a request for open tests for a sample. Note that rack type is required in QPD-10.

---

Host:

```

MSH|^~\&|host||cobas 8000||20100825132805||TSREQ|10001||2.5||||NE||UNICODE UTF-8|
QPD|TSREQ||321015|O||||||S1|
RCP|I|1|R|

```

DM:

```

MSH|^~\&|cobas 8000||host||||OML^O33|15021||2.5||||ER||UNICODE UTF-8|
SPM||321015||S1|||||||C1^C2^C3^C4^C5|
OBR||||990|
OBR||||991|

```

---

### No tests found

In this section the host sends a request for open tests for a sample, but the *data manager* does not find any tests. Note that rack type is required in QPD-10.

---

Host:

```

MSH|^~\&|host||cobas 8000||20100825132805||TSREQ|10001||2.5||||NE||UNICODE UTF-8|
QPD|TSREQ||321016|O||||||S1|

```

### Roche Diagnostics

HL7 trace files

RCP|I|1|R|

DM:

```
MSH|^~\&|cobas 8000||host|||OML^O33|15025||2.5||||ER||UNICODE UTF-8|
SPM||321016||S1|||||||||^____^
```

---

**Sample not found**

In this section the host sends a request for open tests for a sample, but the *data manager* does not find the sample.

Host:

```
MSH|^~\&|host||cobas 8000^1.04||20100825132805||TSREQ|10001||2.5||||NE||UNICODE UTF-8|
QPD|TSREQ||NOT_EXISTING|||||||S1|
RCP|I|1|R|
```

DM:

```
MSH|^~\&|cobas 8000^1.04||host|||OML^O33|15028||2.5||||ER||UNICODE UTF-8|
SPM||NOT_EXISTING||S1|||||||||^____^
```

---

**Order request with a sequence number**

In this section the host sends an order request for a sample with sequence number 1031. (See fields QPD-3.2 and SPM-2.2.) This functionality was introduced in version 1.02.03.

Host:

```
MSH|^~\&|host||cobas 8000||20110711122805||TSREQ|10001||2.5||||NE||UNICODE UTF-8|
QPD|TSREQ||^1031|||||||S1|
RCP|I|1|R|
```

DM:

```
MSH|^~\&|cobas 8000||host|||OML^O33|564825||2.5||||NE||UNICODE UTF-8|
SPM||^1031||S1|||||||||^____^
OBR||||8413^1|
OBR||||8571^1|
OBR||||8706^1|
```

---

**Instrument status and test availability messages**

In the examples in this section, the host sends requests for instrument status and test availability information, and the *data manager* sends this information. If forward instrument status mode is enabled, the *data manager* will send this information unsolicited.

 *Forward instrument status mode (HL7 only) (p. 69)*

## Equipment inventory update

This message contains test availability information, and is sent by the *data manager* to the host. The message lists the availability status of all tests currently installed on the *data manager*.

If forward instrument status mode is disabled, the *data manager* sends this message in response to an equipment inventory request message from the host. If enabled, the *data manager* sends this message as soon as it receives updated test availability information from the Control Unit.

```
MSH|^~\&|cobas 8000||host||20140630115511||INU^U05|1290||2.5||||ER||UN
ICODE UTF-8|
EQU|DM#DM#0#0|20140630115511|
INV|989|OK^OK_STATUS|
INV|990|OK^OK_STATUS|
INV|991|OK^OK_STATUS|
INV|992|NW^NOT_AVAILABLE_WARNING|
INV|993|NW^NOT_AVAILABLE_WARNING|
INV|994|NW^NOT_AVAILABLE_WARNING|
INV|8722|NW^NOT_AVAILABLE_WARNING|
INV|8723|NW^NOT_AVAILABLE_WARNING|
INV|8724|NW^NOT_AVAILABLE_WARNING|
INV|8725|NW^NOT_AVAILABLE_WARNING|
INV|8726|NW^NOT_AVAILABLE_WARNING|
```

## Equipment inventory request

The host sends this message to the *data manager* to request test availability information. The *data manager* responds with an equipment inventory update message.

```
MSH|^~\&|host||cobas 8000||20140630115042||INR^U06|30115042493||2.5|||
|NE||UNICODE UTF-8|
EQU|DM#DM#0#0|20140630115042|
```

## Equipment status update

This message contains instrument status information, and is sent by the *data manager* to the host.

If forward instrument status mode is disabled, the *data manager* sends this message in response to an equipment status request message from the host. If enabled, the *data manager* sends this message as soon as it receives updated instrument status information from the control unit.

```
MSH|^~\&|cobas 8000||host||20140630123849||ESU^U01|1535||2.5||||ER||UN
ICODE UTF-8|
EQU|DM#DM#0#0|20140630123849|PU^POWERED_UP^LECIS^1^Power up^Hitachi|
```

## Equipment status request

The host sends this message to the *data manager* to request instrument status information. The *data manager* responds with an equipment status update message.

```
MSH|^~\&|host||cobas 8000||20140630123830||ESR^U02|30123830908||2.5|||
|AL||UNICODE UTF-8|
EQU|DM#DM#0#0|20140630123830|
```



# Preparing the host communication

*Important preliminary information for the preparation  
of the host communication*

This chapter explains the differences in functionality as regards the host communication protocol between **MODULAR ANALYTICS EVO** analyzer / **cobas®** 6000 analyzer series and **cobas®** 8000 data manager.

## In this chapter

## Chapter 16

Differences to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series.....	309
General differences in the ASTM protocol.....	309
Message encoding and transport .....	309
Sample identification.....	310
Sample types .....	310
Patient demographics .....	311
ASTM message types.....	311
HL7 message types.....	312
Differences in ASTM message definitions.....	312
General differences in the ASTM messages .....	312
Message Header Record .....	313
Message Termination Record .....	313
Patient Record .....	313
Order Record.....	314
Result Record.....	315
Comment Record (following an Order Record). ....	316
Comment Record (following a Result Record).....	316
Query Record .....	317
Photometric Calibration Result Record.....	317
ISE Calibration Result Record.....	318
E-module (Immunology) Calibration Result Record .....	319
Other differences.....	320

Encoding .....	320
Rerun results.....	320
LIS communications.....	320
Identifying samples by sequence number.....	321
Traceability information for quality control and calibration results .....	321
The specimen segment SPM with quality control results.....	321
The specimen segment SPM with calibration results .....	322
The substance identifier segment SID.....	323
Data points.....	323
Upgrading from version 1.03.xx to version 1.04.00.....	324
Upgrading from version 1.04.00 to version 1.05.00.....	325

# Differences to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

This section describes the main differences in the ASTM protocols used with cobas® 8000 data manager and MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series.

## General differences in the ASTM protocol

This section describes the general differences in functionality between the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series and the cobas® 8000 data manager.

### Message encoding and transport



#### Extended ASCII is converted to UTF-8

- Extended ASCII values 128 to 255 were supported in MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series. However cobas® 8000 data manager uses UTF-8. You need to use a conversion mechanism to convert extended ASCII value to UTF-8.

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
Character encoding	Not specified / Only ASCII can be truly supported due to possible 7-bit data transfer option	UTF-8. That means characters up to 127 are compatible with ASCII 8-bit data transfer used.	
ASTM Message Type(s)	ASTM E1381 (low level), ASTM E1394 (message)	ASTM E1381 (low level), ASTM E1394 (message)	
HL7 Messaging	Not supported	Minimal Layer Protocol HL7 2.5	Extended
RS232	Variable settings, editable from graphical user interface	Fixed to 19200, 8 N 1 (could be changed by configuration file)	
Network	Not supported	TCP/IP socket client (could be changed by configuration files)	Extended

**Table 16-1** Message encoding, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## Sample identification

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
Sample number mode <sup>(1)</sup>	Yes (Only for Batch Download with Sample Barcode Reader = OFF)	Sequential sample numbering available from 1.02.03 for patient samples.	Similar functionality. See <i>Identifying patient samples by sequence number</i> (p. 259)
Barcode label	Yes	Yes	
Rack & Sample Position	Yes	Yes	

**Table 16-2** Sample identification, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

(1) No real sample identification

## Sample types

The sample types (or Rack Types) are used in Query Record and Order Record (Specimen Types). While all these types are supported by the cobas® 8000 data manager, their availability on any particular system also depends on the configuration and modules installed on the cobas® 8000 modular analyzer series instrument.

Item	Rack Type	Specimen Type	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
No specimen assigned	S0		Yes	Yes	
Serum/Plasma	S1	1	Yes	Yes	
Urine	S2	2	Yes	Yes	
Cerebrospinal Fluid	S3	3	Yes	Yes	
Supernatant	S4	4	Yes	Yes	
Other	S5	5	Yes	Yes	
Whole Blood	S6	6	No	Yes	Extended
Oral Fluids (Saliva)	S7	7	No	Yes	Extended
Other 2	S8	8	No	Yes	Extended
Other 3	S9	9	No	Yes	Extended
Other 4	SA	A	No	Yes	Extended

**Table 16-3** Sample types, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## Patient demographics

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
First Name	Comment Record after Order Record	Patient Record	See, more Details below
Last Name	Comment Record after Order Record	Patient Record	See, more Details below
Date of Birth	Comment Record after Order Record	Patient Record	See, more Details below
Patient's age	Patient Record	No (coded in Date of Birth)	See, more Details below
Patient's age unit	Patient Record	No (coded in Date of Birth)	See, more Details below

**Table 16-4** Patient demographics, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## ASTM message types

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Direction	Comment
Inquiry for the Requested Tests	TSREQ^REAL	TSREQ	<i>data manager</i> to host	Reduced
Result Report (realtime)	RSUPL^REAL	RSUPL	<i>data manager</i> to host	Reduced
Result Report (batch)	RSUPL^BATCH	RSUPL	<i>data manager</i> to host	Reduced
Result Report (quality control: for first upload of results)	RSUPL^REAL	RSUPL^REAL	<i>data manager</i> to host	(Unchanged for QC results)
Result Report (quality control: when repeating uploads of results previously sent)	RSUPL^BATCH	RSUPL^BATCH	<i>data manager</i> to host	(Unchanged for QC results)
Result Report (query)	RSUPL^REPLY	RSUPL	analyzer to host	Reduced
Photometry Calibration Result Report	PCUPL^REAL	PCUPL^REAL	to host	Reduced
Report				
ISE Calibration Result Report	ICPUL^REAL	ICPUL^REAL	to host	Reduced
Calibration Result Report from Immunology Modules	ECUPL^REAL	ECUPL^REAL	to host	Reduced
Photometric Raw Data Report	ABUPL^BATCH	n/a	to host	Reduced
Raw Data Report from Immunology Modules	EBUPL^BATCH	n/a	to host	Reduced
Test Selection Download (answer to inquiry)	TSDWN^REPLY	TSDWN	host to <i>data manager</i>	Reduced
Test Selection Download (unsolicited)	TSDWN^BATCH	TSDWN	host to <i>data manager</i>	Reduced
Inquiry of Result	RSREQ^BATCH	RSREQ	host to instrument	Reduced
Inquiry for Requested Test	n/a	TSREQ	host to <i>data manager</i>	Enhanced

**Table 16-5** ASTM message types, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

**HL7 message types**

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
Inquiry for the Requested Tests	NO	TSREQ	Extended
Result Report (realtime)	NO	OUL^R22	Extended
Result Report (batch)	NO	OUL^R22	Extended
Quality Control Result Report (realtime)	NO	OUL^R22^REAL	Extended
Quality Control Result Report (batch)	NO	OUL^R22^BATCH	Extended
Test Selection Download (inquiry)	NO	OML^O33	Extended
Test Selection Download (inquiry)	NO	OML^O33	Extended
Photometric Calibration Result	NO	OUL^R22^PCUPL	Extended
ISE Calibration Result	NO	OUL^R22^ICUPL	Extended
Immunology Calibration Result	NO	OUL^R22^ECUPL	Extended
Masking command	NO	EAC^U07	Extended
Equipment Status Request	NO	ESR^U02	Extended
Equipment Status Update	NO	ESU^U01	Extended
Inventory Status Request	NO	INR^U06	Extended
Inventory Status Update	NO	INU^U05	Extended

**Table 16-6** HL7 message types, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

**Differences in ASTM message definitions**

This section describes the differences in the ASTM messages used by the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series and the cobas® 8000 data manager.

**General differences in the ASTM messages**

ASTM message records in cobas® 8000 are terminated by a vertical bar, but in MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series the vertical bar is omitted.

## Message Header Record

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
3	Control ID	NO	YES	Extended
5	<i>data manager</i> to host: Sender ID	As specified at host setting screen	Editable in <b>Interface options</b> , default cobas 8000^1	
10	<i>data manager</i> to host: Receiver ID	As specified at host setting screen	Fixed to host	
11	Comment or special instruction	See ASTM Msg. Types	See ASTM Msg. Types	See above
14	Date/Time of message	No	Yes, YYYYMMDDhhmmss	Extended

**Table 16-7** Header record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## Message Termination Record

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
3	Termination Code	N, T, R, E, Q, I, T	N	Reduced

**Table 16-8** Termination record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## Patient Record

The cobas® 8000 data manager supports no patient age information, but uses the patient's day of birth instead.

 For more information, see *Patient demographics* (p. 311).

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
6, C1,C2	Patientname	NO	Name^firstname	Other location
8	Date of Birth	NO	YYYYMMDD	Other data and location
15 C1,C2	Special Field 1	Age^Age Unit	NO	Other data and location

**Table 16-9** Patient record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series



### The *data manager* supports only M, F, or U for patient sex.

- ▶ For male patients, the host must send M, for females, F. Otherwise the wrong reference range might be applied. The *data manager* reads any other value as U, and applies the reference ranges for a patient of unknown sex.
- ▶ Make sure the host sends only M, F or U, as required. Each new configuration must be tested to ensure the correct data transfer between the *data manager* and the host.

**Order Record**

The cobas® 8000 data manager supports:

- application codes (or testcodes) 1 to 5 characters long, as opposed to MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series which only supported up to 3 characters.
- rack types S1 to S9 + SA, but MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series only supports S1 to S5
- dilution factors changed, and no dilution shown by 1, not by an empty component.
- Action code "R" for reruns: "A" however can also be used for ordering reruns.
- The host may download testcodes for calculated tests, so long as the calculated tests are programmed on the *data manager*. For details, see the cobas® 8000 modular analyzer series Operator's Manual.

Also, cobas® 8000 data manager requires no padding with spaces for the sample ID.

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
3	Sample ID for controls	Control-SID: Name or Lotnumber (Selectable at Host Information Screen)	Name^LotNr^Control-ID (if no sample ID)	Extended, Upload
4,C2	Rack ID	4 digits	5 digits	Extended
4,C5	Rack Type	S1-S5,QC	S1-SA,QC	Extended
4,C7	Diluted	Not used	not, pre-diluted, no value	Extended
5,C5	Universal Test ID, Dilution	Photometry: Inc,Dec,3,5,10,20,50, 100,empty	ISE module: • 1 c-module: • 1, Inc, Dec, 3, 5, 10, 20, 50 e-module: • 1, 2, 5, 10, 20, 50, 100, 400	Reduced.  Also, the value 1 is now sent for "No dilution". When sent from the host (TS download), in case of no pending test on the host side this field has to be empty
7	Requested/ Ordered Date and Time	Not used	Yes, YYYYMMDDhhmmss	Extended
12	Action Code	By host: • A=Add, • C=Cancel	By host: • A=Add or rerun. • C=Cancel, • R=Add or rerun	Extended
16	Specimen Descriptor	1,2,3,4,5	1,2,3,4,5,6,7,8,9, A (According to Racktype)	Extended
23	Date/Time Results reported	Yes	No	Reduced for Result upload

**Table 16-10** Order record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## Result Record

The cobas® 8000 data manager identifier is different to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series identifier. The cobas® 8000 data manager consists of a configurable analytical unit ID, the module name and the internal number as registered in *data manager*. (Field R-14)

The cobas® 8000 data manager writes the instrument operator username and (when pass-through mode is off) the *data manager* operator username into two components of field 11.

The cobas® 8000 data manager can also indicate a manually edited result in field 9.

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
3,C5	Universal Test ID	Dilution Factor for Photometry: Inc,Dec,3,5,10,20,50, 100	For an ISE module, • 1 For a c-module, • 1, Inc, Dec, 3, 5, 10, 20, 50 For an e-module, • 1, 2, 5, 10, 20, 50, 100, 400	The value 1 is now sent for "No dilution".
4,C1	Measurement value	Qualitative Value	ReportableResult	Change
			For quantitative results, this is a number, up to 6 digits. In case of a missing result this field contains six spaces (ASCII 32 / 0x20).  For qualitative results, this contains an integer code from -2 to 3 inclusive.	
4,C2	Measurement value	Quantitative Value	AdditionalResultValues	Change
			For quantitative results, this is empty or contains a qualitative flag.  For qualitative results, this contains the quantitative result	
6	Reference ranges	No	Reference ranges	Extended
7	Result abnormal flags	A=Abnormal	A=Alphanumeric out of normal range  AA=Alphanumeric out of critical range  EP17-A flags also supported	Extended
9	Result status	F=First Run, C=Corrective	F =First Run, C =Corrected, M =Manually edited  X = Calculated test, but test could not be calculated (for example, divided by zero)	Extended

**Table 16-11** Result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

Differences to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
11	Operator Identification	Operator at Analyzer	Operator at Analyzer^ Operator at <i>data manager</i>	Extended
13	Date/Time Test completed	No	Yes	Extended
14	Measurement unit ID (Module or Instrument ID)	P1,P2,P3,P4,ISE1,ISE 2,Exy	<i>ModuleType</i> ^ <i>SubModule</i> ^ <i>AnalyticalUnitID</i> ^ <i>InstrumentID</i> ^ <i>CalID</i> ^ <i>Bottle</i> ^ <i>SBNo</i> <i>Bottle</i> ^ <i>SBNo</i> used only for QC. ModuleTypes: c502, c701, e602, c702, ISE, DM, c8000	Extended

**Table 16-11** Result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series**Comment Record (following an Order Record)**

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
3	Comment Source	“I” by Analyzer, “L” by Host	“I” by Analyzer, “L” by Host or <i>data manager</i>	

**Table 16-12** Comment record, after order record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series**Comment Record (following a Result Record)**

A *data manager* user can enter multiple comments for each result. This was not possible for the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series.

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
3	Comment source	“I” by Analyzer	“I” by Analyzer, “L” by <i>data manager</i>	Extended
4	Comment Text, if type I	Flagnumber	<i>Flagnumber</i> ^ <i>Description</i>	Extended
5	Comment Type, if type G	No	<i>Text</i> ^ <i>User</i> ^ <i>Date</i>	Extended

**Table 16-13** Comment record, after result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

**Query Record**

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
3, C5	Rack ID	4 Digits	5 Digits	Extended
3, C8	Rack Type	S0, S1, ... S5	S0, S1, ... S5, S6, ... S9, SA	Extended
12	User Field 2	No	Priority: <ul style="list-style-type: none"><li>• R = Routine</li><li>• S = STAT</li></ul>	Extended
13	Request Information Status Code	<ul style="list-style-type: none"> <li>• A=Rejects previous req.</li> <li>• O=Request for Test Request</li> <li>• F=Final Result</li> </ul>	<ul style="list-style-type: none"> <li>• O=Request for Test Request</li> <li>• F=Final Result</li> </ul>	Reduced

**Table 16-14** Query record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series**Photometric Calibration Result Record**

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
6	Analytical Unit ID	P1,P2,P3,P4,ISE1,ISE2,Exy	AnalyticalUnitID, default: <i>Instrument#</i> <i>ModuleType#</i> <i>Position#</i> <i>SubModule</i>  For example,; MU1#e602#1#1 Fully safely editable.	Extended
9, C6	Prozone value	Sent	Not sent	Reduced
10	Reagent lot number	1 to 99999999	Sent in HL7 SID-2	Reduced in ASTM, available in HL7
11	Reagent bottle number	1 to 19999	Sent in HL7 SPM-2.4	Reduced in ASTM, available in HL7
12	Expired flag	0 or 1	Not sent	Reduced
13	Calibrator lot number	1 to 99999999	Sent in HL7 SPM-2.2	Reduced
14	Pipetting date and time	YYYYMMDDHHM MSS	Not sent	Reduced

**Table 16-15** Photometric calibration result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

**ISE Calibration Result Record**

<b>Field</b>	<b>Description</b>	<b>MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series</b>	<b>cobas® 8000 data manager</b>	<b>Comment</b>
5	Analytical Unit ID	P1,P2,P3,P4,ISE1,ISE2,Exy	AnalyticalUnitID, default: <i>Instrument#</i> <i>ModuleType#</i> <i>Position#</i> <i>SubModule</i> For example; MU1#e602#1#1 Fully editable.	Extended
9,C7	Na Data alarms	Component 7 contains: Numbers for compensation alarm	Component 7 contains: Carryover rate alarm (Numbers for compensation alarm passed in Component 10.)	Extended
9,C8	Calculation slope value alarm	Not supported	Supported	Extended
9,C10	Numbers for compensation alarm	Passed in Component 7	Passed in Component 10	
10,C7	K Data alarms	Component 7 contains: Numbers for compensation alarm	Component 7 contains: Carryover rate alarm (Numbers for compensation alarm passed in Component 10.)	Extended
10,C8	Calculation slope value alarm	Not supported	Supported	Extended
10,C10	Numbers for compensation alarm	Passed in Component 7	Passed in Component 10	
11,C7	Cl Data alarms	Component 7 contains: Numbers for compensation alarm	Component 7 contains: Carryover rate alarm (Numbers for compensation alarm passed in Component 10.)	Extended
11,C8	Calculation slope value alarm	Not supported	Supported	Extended
11,C10	Numbers for compensation alarm	Passed in Component 7	Passed in Component 10	
12,C7	Na Calibration analytical data	Component 7 contains: Numbers for compensation data	Component 7 contains: Carryover rate (Numbers for compensation data passed in Component 10.)	Extended
12,C8	Calculation slope value alarm	Not supported	Supported	Extended
12,C10	Numbers for compensation data	Passed in Component 7	Passed in Component 10	
13,C7	K Calibration analytical data	Component 7 contains: Numbers for compensation data	Component 7 contains: Carryover rate (Numbers for compensation data passed in Component 10.)	Extended

**Table 16-16** ISE calibration result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
13,C8	Calculation slope value alarm	Not supported	Supported	Extended
13,C10	Numbers for compensation data	Passed in Component 7	Passed in Component 10	
14,C7	Cl Calibration analytical data	Component 7 contains: Numbers for compensation data	Component 7 contains: Carryover rate (Numbers for compensation data passed in Component 10.)	Extended
14,C8	Calculation slope value	Not supported	Supported	Extended
14,C10	Numbers for compensation data	Passed in Component 7	Passed in Component 10	

**Table 16-16** ISE calibration result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series**E-module (Immunology) Calibration Result Record**

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
6	Calibration method	LOT, RackPack	Permitted values: <ul style="list-style-type: none"><li>• NoCalibration</li><li>• LotCalibration</li><li>• ContainerCalibration</li><li>• InheritedLotCalibration</li><li>• InheritedItemCalibration</li><li>• UserModifiedCalibration</li><li>• UnmaskedCalibration</li><li>• FailedCalibration</li></ul>	Extended
7	Analytical Unit ID	P1,P2,P3,P4,ISE1,ISE2,Exy	AnalyticalUnitID, default: <i>Instrument#</i> <i>ModuleType#</i> <i>Position#</i> <i>SubModule</i>  For example; MU1#e602#1#1 Fully editable.	Extended
12	Result Status	• O • Q • F	• O • F	Reduced
13.3	Result Characteristics, detail	Many values, up to a 20 digit code	Not supported	Reduced
15	Target value	Complex field, five numbers	Not supported	Reduced

**Table 16-17** E-module (immunology) calibration result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

Differences to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

Field	Description	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
16	Unit	String	Not supported	Reduced
17	Cut off	Number	Not supported	Reduced
18	Border line area	Complex field	Not supported	Reduced

**Table 16-17** E-module (immunology) calibration result record, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## Other differences

There are differences between the cobas® 8000 data manager and the compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series in character encoding, handling of reruns, LIS communication protocols, and other areas.

### Encoding

Extended ASCII values 128 to 255 were supported in MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series. However, cobas® 8000 data manager uses UTF-8. This represents greatly extended functionality, but may require a conversion mechanism from extended ASCII to UTF-8.

### Rerun results

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
Stored rerun results	Can store and send: • first result • most recent result	Can store and send all results for a test.	Extended

**Table 16-18** Rerun results, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

## LIS communications

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
Communication protocols	ASTM over serial.	• HL7 over TCP/IP • ASTM over TCP/IP • ASTM over serial	Extended

**Table 16-19** LIS communication protocols, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

- Details** ⓘ For details of how to select a connection, see *Starting and stopping the host connection* (p. 59).
- ⓘ For details of the physical connections, see *Host communication settings and cables* (p. 90).

## Identifying samples by sequence number

Since version 1.02.03, it is possible to identify samples by a sequential number.

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
Identification of samples	Barcode and sample ID.	<ul style="list-style-type: none"> <li>• Barcode and sample ID</li> <li>• Sequential numbering</li> <li>• Rack and position</li> </ul>	Extended

**Table 16-20** Sequence numbers, compared to the MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series

- Details** ⓘ For details of how to identify samples by a sequential number, see *Identifying patient samples by sequence number* (p. 262).
- ⓘ For details of how to identify samples by a strict rack and position, see *Using a MODULAR PRE-ANALYTICS* (p. 255), and *Rack and position mode* (p. 68).

## Traceability information for quality control and calibration results

Since version 1.02.05, *data manager* sends traceability data with quality control and calibration results. This is only supported in HL7.

### The specimen segment SPM with quality control results

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comments
Control identification.	Control name in record O-4.	SPM-2: <i>Name^Lot^ID^ExpiryDate</i>	Extended
Control lot (Number)	Not available	SPM-2.2	Extended
Control identifier (a unique control ID contained in <i>data manager</i> ). (Number)	Not available	SPM-2.3	Extended
Expiry date of control lot.	Not available	SPM-2.4	Extended

**Table 16-21** Comparison of specimen segment SPM fields for quality control results in recent versions

**The specimen segment SPM with calibration results**

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comments
Calibration identification.	Not available.	SPM-2: For c-module and e-module calibration materials, <i>Level^Lot^Code^Count^Expirydate</i>	Extended

**Table 16-22** Comparison of specimen segment SPM fields for quality control results in recent versions

 In calibration results, the SPM segment is used differently than in other messages, see *SPM in calibration results* (p. 167).

## The substance identifier segment SID

This section lists the changes to the substance identifier segment SID.

Item	MODULAR ANALYTICS EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comments
Substance identifier (for calibration results)	<ul style="list-style-type: none"> <li>Not supported by c-module (photometry) or ISE calibration results.</li> <li>Supported by c-module calibration results.</li> <li>Not supported by ISE calibration results.</li> </ul>	SID-1	Extended
Reagent lot	<ul style="list-style-type: none"> <li>Not supported by c-module (photometry) or ISE calibration results.</li> <li>Supported by e-module (immunology) calibration results.</li> <li>Not supported by ISE calibration results.</li> </ul>	SID-2	Extended
Reagent serial number	<p>Not supported by calibration results.</p>	SID-3	Extended

**Table 16-23** Comparison of substance identifier segment SID fields in recent versions

## Data points

The cobas® 8000 modular analyzer series also supports data point results. The laboratory user can manually instruct the Control Unit to send a data point result message.

- Ⓐ ASTM:  
*Result Record* (p. 126)  
*Data point result* (p. 279)
- Ⓐ HL7:  
*Observation Result Segment - OBX (for patient results)* (p. 173)  
*Data point result* (p. 294)
- Ⓐ *cobas® 8000 data manager Operator's Manual*

## Upgrading from version 1.03.xx to version 1.04.00

This section lists the differences to be careful of, when upgrading from version 1.03.00 or 1.03.01 to version 1.04.00 of the *data manager*.

- The usage of data alarms, numbers 23, 26, 55, 59, and 60 have been slightly changed.  
    [i] [Data Alarms \(p. 217\)](#)
- STAT masking mode is available to assist certain busy systems with many STAT samples.  
    [i] [STAT masking mode \(p. 69\)](#)
- The **cobas**® 8000 data manager version 1.04.00 uses a generation 8 server. Before upgrading to a generation 8 server, consult your Roche Diagnostics Field Service Representative or the **cobas**® 8000 data manager *Service Manual*.  
    [i] [Connecting a Generation 8 server \(p. 91\)](#)

[i] There is no difference in the values of the HL7 or ASTM fields in the host interface in version 1.04.00, compared to version 1.03.00 or 1.03.01.

Version 1.03.00 was the previous mandatory upgrade of the **cobas**® 8000 data manager software. Version 1.03.01 was a recommended upgrade.

## Upgrading from version 1.04.00 to version 1.05.00

This section gives an overview of the differences between version 1.04 and version 1.05 of the *data manager*.

- The *data manager* sends instrument status and test availability information to the host. (HL7 only.)  
    • [Forward instrument status mode \(HL7 only\)](#) (p. 69)
- Four new message types for instrument status and test availability information are supported (HL7 only):
  - Instrument status: Equipment Status Update (ESU)
  - Test availability: Inventory Status (INU)
  - Instrument status query: Equipment Status Update Request (ESR)
  - Test availability query: Inventory Status Update Request (INR)
- False bottom and non-standard tubes are supported in both HL7 and ASTM.
- Raw data points in patient result messages are supported in both HL7 and ASTM. Accordingly, multiple OBX segments per OBR segment can be sent in a result report message.  
    • [Data point result](#) (p. 279) (ASTM)  
        • [Data point result](#) (p. 294) (HL7)  
        • [Messages sent only by the data manager](#) (p. 155)
- Orders which contain invalid (unknown) test codes are supported in both HL7 and ASTM. Such orders are now handled as follows:
  - If an order contains both valid and invalid test codes, the *data manager* accepts the order but logs an error for each invalid test code.
  - If an order contains only invalid test codes, the *data manager* rejects the order.
  - The rejection of invalid test codes and/or orders is shown in the information window.
- The way in which *data manager* handles sample container type values received from the instrument and the host has changed in both HL7 and ASTM.  
    • [Sample container types](#) (p. 29)
- Empty container type values no longer default to standard cup type in both HL7 and ASTM.  
    • [Sample container types](#) (p. 29)

**Changes to ASTM messages** The behavior of the following ASTM fields has changed.

Field	Description	Version 1.04	Version 1.05
O-4.6	Container type	<p>Only the following values are supported:</p> <ul style="list-style-type: none"> <li>• SC Standard cup</li> <li>• MC Micro cup</li> </ul> <p>An empty value defaults to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends SC to the Control Unit.)</p>	<p>The following values are additionally supported in test selections, patient results and quality control results:</p> <ul style="list-style-type: none"> <li>• NST0 Non-standard tube</li> <li>• FBT1 False bottom tube 1</li> <li>• FBT2 False bottom tube 2</li> <li>• FBT3 False bottom tube 3</li> <li>• &lt;Empty&gt; Unknown cup type</li> </ul> <p>These new values provide support for false bottom and non-standard tubes.</p> <p>Empty values no longer default to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.)</p>
O-5	Test code	The <i>data manager</i> rejects an order if it contains any invalid (unknown) test codes in this field.	<ul style="list-style-type: none"> <li>• If an order contains both valid and invalid test codes, the <i>data manager</i> accepts the order but logs an error for each invalid test code.</li> <li>• If an order contains only invalid test codes, the <i>data manager</i> rejects the order.</li> <li>• The rejection of invalid test codes and/or orders is shown in the information window.</li> </ul>
R-4	Measurement value	Quantitative and qualitative results only.	<p>Data point results are additionally supported.</p> <p>Up to 200 data point values can be sent in field R-4.2, separated by backslashes (\).</p>
R-5	Units of measurement	Units in which the result is measured. (For example, mmol/L, etc.)	For data point results, this field contains count or COUNT.
R-14.5	Calibration ID	Number data type.	<p>String data type. For data point results, this field contains one of the following codes:</p> <ul style="list-style-type: none"> <li>• EFS</li> <li>• EFV</li> <li>• EFC</li> <li>• PMT</li> </ul>
Q-3.9	Container type	<p>Only the following values are supported:</p> <ul style="list-style-type: none"> <li>• SC Standard cup</li> <li>• MC Micro cup</li> </ul> <p>An empty value defaults to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends SC to the Control Unit.)</p>	<p>The following values are additionally supported in test selections, patient results and quality control results:</p> <ul style="list-style-type: none"> <li>• NST0 Non-standard tube</li> <li>• FBT1 False bottom tube 1</li> <li>• FBT2 False bottom tube 2</li> <li>• FBT3 False bottom tube 3</li> <li>• &lt;Empty&gt; Unknown cup type</li> </ul> <p>These new values provide support for false bottom and non-standard tubes.</p> <p>Empty values no longer default to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.)</p>

**Table 16-24** Changes to ASTM messages in data manager 1.05

**Changes to HL7 messages** The behavior of the following HL7 fields has changed, or the fields have been newly implemented.

Field	Description	Version 1.04	Version 1.05
MSH-9	Message type	The following values are supported: <ul style="list-style-type: none"><li>• TSREQ</li><li>• RSREQ</li><li>• OML^O33</li><li>• OUL^R22</li><li>• EAC^U07</li><li>• OUL^R22^PCUPL</li><li>• OUL^R22^ICUPL</li><li>• OUL^R22^ECUPL</li><li>• ACK</li><li>• OUL^R22^REAL</li><li>• OUL^R22^BATCH</li><li>• OUL^R22^BATCH</li></ul>	The following values are additionally supported: <ul style="list-style-type: none"><li>• ESU^U01^ESU_U01</li><li>• ESR^U02^ESR_U02</li><li>• INU^U05^INU_U05</li><li>• INR^U06^INR_U06</li></ul> <p>These new values provide support for instrument status and test availability messages.</p>
SPM-27	Container type	Only the following values are supported: <ul style="list-style-type: none"><li>• SC Standard cup</li><li>• MC Micro cup</li></ul> <p>An empty value defaults to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends SC to the Control Unit.)</p>	The following values are additionally supported in test selections, patient results and quality control results: <ul style="list-style-type: none"><li>• NST0 Non-standard tube</li><li>• FBT1 False bottom tube 1</li><li>• FBT2 False bottom tube 2</li><li>• FBT3 False bottom tube 3</li><li>• &lt;Empty&gt; Unknown cup type</li></ul> <p>These new values provide support for false bottom and non-standard tubes.</p> <p>Empty values no longer default to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.)</p>
OBR-4.1	Test code	The <i>data manager</i> rejects an order if it contains any invalid (unknown) test codes in this field.	<ul style="list-style-type: none"><li>• If an order contains both valid and invalid test codes, the <i>data manager</i> accepts the order but logs an error for each invalid test code.</li><li>• If an order contains only invalid test codes, the <i>data manager</i> rejects the order.</li><li>• The rejection of invalid test codes and/or orders is shown in the information window.</li></ul>
OBX-5	Result value	Quantitative and qualitative results only.	Data point results are additionally supported. Up to 200 data point values can be sent, separated by ampersands (&).
OBX-6	Units of measurement	Units in which the result is measured. (For example, mmol/L, etc.)	For data point results, this field contains count or COUNT.
OBX-17	Calibration ID	Number data type.	String data type. For data point results, this field contains one of the following codes: <ul style="list-style-type: none"><li>• EFS</li><li>• EFV</li><li>• EFC</li><li>• PMT</li></ul>

**Table 16-25** Changes to HL7 messages in data manager 1.05

Field	Description	Version 1.04	Version 1.05
QPD-11	Sample container type	<p>Only the following values are supported:</p> <ul style="list-style-type: none"> <li>• SC Standard cup</li> <li>• MC Micro cup</li> </ul> <p>An empty value defaults to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends SC to the Control Unit.)</p>	<p>The following values are additionally supported in test selections, patient results and quality control results:</p> <ul style="list-style-type: none"> <li>• NST0 Non-standard tube</li> <li>• FBT1 False bottom tube 1</li> <li>• FBT2 False bottom tube 2</li> <li>• FBT3 False bottom tube 3</li> <li>• &lt;Empty&gt; Unknown cup type</li> </ul> <p>These new values provide support for false bottom and non-standard tubes.</p> <p>Empty values no longer default to standard cup type. (If the host sends no container type value, then <i>data manager</i> sends no value to the Control Unit.)</p>
EQU-3	Instrument status	Not supported.	This field is used to send instrument status information to the host.
INV-1	Test code	Not supported.	The INV (Inventory Detail) segment is used to send test availability information to the host.
INV-2	Test status		

**Table 16-25** Changes to HL7 messages in data manager 1.05

# Text encoding tables

This chapter shows a table with ASCII codes and another with UTF-8 codes for common Western European characters, for the convenience of developers.

## In this chapter

## Chapter 17

ASCII table .....	331
Western European characters in UTF-8 .....	332



## ASCII table

The ASCII 127 character codes are shown below, with each hexadecimal and decimal value.

	NUL	DLE	Space	0	@	P	'	p							
00	0	10	16	20	32	30	48	40	64	50	80	60	96	70	112
	SOH	DC1		!		1	A		Q		a		q		
01	1	11	17	21	33	31	49	41	65	51	81	61	97	71	113
	STX	DC2		"		2	B		R		b		r		
02	2	12	18	22	34	32	50	42	66	52	82	62	98	72	114
	ETX	DC3		#		3	C		S		c		s		
03	3	13	19	23	35	33	51	43	67	53	83	63	99	73	115
	EOT	DC4		\$		4	D		T		d		t		
04	4	14	20	24	36	34	52	44	68	54	84	64	100	74	116
	ENQ	NAK		%		5	E		U		e		u		
05	5	15	21	25	37	35	53	45	69	55	85	65	101	75	117
	ACK	SYN		&		6	F		V		f		v		
06	6	16	22	26	38	36	54	46	70	56	86	66	102	76	118
	BEL	ETB		,		7	G		W		g		w		
07	7	17	23	27	39	37	55	47	71	57	87	67	103	77	119
	BS	CAN		(		8	H		X		h		x		
08	8	18	24	28	40	38	56	48	72	58	88	68	104	78	120
	HT	EM		)		9	I		Y		i		y		
09	9	19	25	29	41	39	57	49	73	59	89	69	105	79	121
	LF	SUB		*		:	J		Z		j		z		
0A	10	1A	26	2A	42	3A	58	4A	74	5A	90	6A	106	7A	122
	VT	ESC		+		;	K		[		k		{		
0B	11	1B	27	2B	43	3B	59	4B	75	5B	91	6B	107	7B	123
	FF	FS		,		<	L		\		l				
0C	12	1C	28	2C	44	3C	60	4C	76	5C	92	6C	108	7C	124
	CR	GS		-		=	M		]		m		}		
0D	13	1D	29	2D	45	3D	61	4D	77	5D	93	6D	109	7D	125
	SO	RS		.		>	N		^		n		~		
0E	14	1E	30	2E	46	3E	62	4E	78	5E	94	6E	110	7E	126
	SI	US		/		?	O		-		o		DEL		
0F	15	1F	31	2F	47	3F	63	4F	79	5F	95	6F	111	7F	127

**Table 17-1** ASCII table

## Western European characters in UTF-8

This section shows the Unicode code point and the hexadecimal value of common Western European characters in UTF-8 format. By default, the cobas® 8000 data manager uses UTF-8.

Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
U+0000	00	<control>		U+0001	01	<control>	
U+0002	02	<control>		U+0003	03	<control>	
U+0004	04	<control>		U+0005	05	<control>	
U+0006	06	<control>		U+0007	07	<control>	
U+0008	08	<control>		U+0009	09	<control>	
U+000A	0a	<control>		U+000B	0b	<control>	
U+000C	0c	<control>		U+000D	0d	<control>	
U+000E	0e	<control>		U+000F	0f	<control>	
U+0010	10	<control>		U+0011	11	<control>	
U+0012	12	<control>		U+0013	13	<control>	
U+0014	14	<control>		U+0015	15	<control>	
U+0016	16	<control>		U+0017	17	<control>	
U+0018	18	<control>		U+0019	19	<control>	
U+001A	1a	<control>		U+001B	1b	<control>	
U+001C	1c	<control>		U+001D	1d	<control>	
U+001E	1e	<control>		U+001F	1f	<control>	
U+0020	20	SPACE		U+0021	!	EXCLAMATION MARK	
U+0022	"	22	QUOTATION MARK	U+0023	#	NUMBER SIGN	
U+0024	\$	24	DOLLAR SIGN	U+0025	%	PERCENT SIGN	
U+0026	&	26	AMPERSAND	U+0027	'	APOSTROPHE	
U+0028	(	28	LEFT PARENTHESIS	U+0029	)	RIGHT PARENTHESIS	
U+002A	*	2a	ASTERISK	U+002B	+	PLUS SIGN	
U+002C	,	2c	COMMA	U+002D	-	HYPHEN-MINUS	
U+002E	.	2e	FULL STOP	U+002F	/	SOLIDUS	
U+0030	0	30	DIGIT ZERO	U+0031	1	DIGIT ONE	
U+0032	2	32	DIGIT TWO	U+0033	3	DIGIT THREE	
U+0034	4	34	DIGIT FOUR	U+0035	5	DIGIT FIVE	
U+0036	6	36	DIGIT SIX	U+0037	7	DIGIT SEVEN	
U+0038	8	38	DIGIT EIGHT	U+0039	9	DIGIT NINE	
U+003A	:	3a	COLON	U+003B	;	SEMICOLON	
U+003C	<	3c	LESS-THAN SIGN	U+003D	=	EQUALS SIGN	
U+003E	>	3e	GREATER-THAN SIGN	U+003F	?	QUESTION MARK	
U+0040	@	40	COMMERCIAL AT	U+0041	A	LATIN CAPITAL LETTER A	
U+0042	B	42	LATIN CAPITAL LETTER B	U+0043	C	LATIN CAPITAL LETTER C	
U+0044	D	44	LATIN CAPITAL LETTER D	U+0045	E	LATIN CAPITAL LETTER E	

**Table 17-2** Western european characters in UTF-8

Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
U+0046	F	46	LATIN CAPITAL LETTER F	U+0047	G	47	LATIN CAPITAL LETTER G
U+0048	H	48	LATIN CAPITAL LETTER H	U+0049	I	49	LATIN CAPITAL LETTER I
U+004A	J	4a	LATIN CAPITAL LETTER J	U+004B	K	4b	LATIN CAPITAL LETTER K
U+004C	L	4c	LATIN CAPITAL LETTER L	U+004D	M	4d	LATIN CAPITAL LETTER M
U+004E	N	4e	LATIN CAPITAL LETTER N	U+004F	O	4f	LATIN CAPITAL LETTER O
U+0050	P	50	LATIN CAPITAL LETTER P	U+0051	Q	51	LATIN CAPITAL LETTER Q
U+0052	R	52	LATIN CAPITAL LETTER R	U+0053	S	53	LATIN CAPITAL LETTER S
U+0054	T	54	LATIN CAPITAL LETTER T	U+0055	U	55	LATIN CAPITAL LETTER U
U+0056	V	56	LATIN CAPITAL LETTER V	U+0057	W	57	LATIN CAPITAL LETTER W
U+0058	X	58	LATIN CAPITAL LETTER X	U+0059	Y	59	LATIN CAPITAL LETTER Y
U+005A	Z	5a	LATIN CAPITAL LETTER Z	U+005B	[	5b	LEFT SQUARE BRACKET
U+005C	\	5c	REVERSE SOLIDUS	U+005D	]	5d	RIGHT SQUARE BRACKET
U+005E	^	5e	CIRCUMFLEX ACCENT	U+005F	_	5f	LOW LINE
U+0060	`	60	GRAVE ACCENT	U+0061	a	61	LATIN SMALL LETTER A
U+0062	b	62	LATIN SMALL LETTER B	U+0063	c	63	LATIN SMALL LETTER C
U+0064	d	64	LATIN SMALL LETTER D	U+0065	e	65	LATIN SMALL LETTER E
U+0066	f	66	LATIN SMALL LETTER F	U+0067	g	67	LATIN SMALL LETTER G
U+0068	h	68	LATIN SMALL LETTER H	U+0069	i	69	LATIN SMALL LETTER I
U+006A	j	6a	LATIN SMALL LETTER J	U+006B	k	6b	LATIN SMALL LETTER K
U+006C	l	6c	LATIN SMALL LETTER L	U+006D	m	6d	LATIN SMALL LETTER M
U+006E	n	6e	LATIN SMALL LETTER N	U+006F	o	6f	LATIN SMALL LETTER O
U+0070	p	70	LATIN SMALL LETTER P	U+0071	q	71	LATIN SMALL LETTER Q
U+0072	r	72	LATIN SMALL LETTER R	U+0073	s	73	LATIN SMALL LETTER S
U+0074	t	74	LATIN SMALL LETTER T	U+0075	u	75	LATIN SMALL LETTER U
U+0076	v	76	LATIN SMALL LETTER V	U+0077	w	77	LATIN SMALL LETTER W
U+0078	x	78	LATIN SMALL LETTER X	U+0079	y	79	LATIN SMALL LETTER Y
U+007A	z	7a	LATIN SMALL LETTER Z	U+007B	{	7b	LEFT CURLY BRACKET
U+007C		7c	VERTICAL LINE	U+007D	}	7d	RIGHT CURLY BRACKET
U+007E	~	7e	TILDE	U+007F		7f	<control>
U+0080	c2 80	<control>		U+0081		c2 81	<control>
U+0082	c2 82	<control>		U+0083		c2 83	<control>
U+0084	c2 84	<control>		U+0085		c2 85	<control>
U+0086	c2 86	<control>		U+0087		c2 87	<control>
U+0088	c2 88	<control>		U+0089		c2 89	<control>
U+008A	c2 8a	<control>		U+008B		c2 8b	<control>
U+008C	c2 8c	<control>		U+008D		c2 8d	<control>
U+008E	c2 8e	<control>		U+008F		c2 8f	<control>

**Table 17-2** Western european characters in UTF-8**Roche Diagnostics**

Western European characters in UTF-8

Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
U+0090		c2 90	<control>	U+0091		c2 91	<control>
U+0092		c2 92	<control>	U+0093		c2 93	<control>
U+0094		c2 94	<control>	U+0095		c2 95	<control>
U+0096		c2 96	<control>	U+0097		c2 97	<control>
U+0098		c2 98	<control>	U+0099		c2 99	<control>
U+009A		c2 9a	<control>	U+009B		c2 9b	<control>
U+009C		c2 9c	<control>	U+009D		c2 9d	<control>
U+009E		c2 9e	<control>	U+009F		c2 9f	<control>
U+00A0		c2 a0	NO-BREAK SPACE	U+00A1	¡	c2 a1	INVERTED EXCLAMATION MARK
U+00A2	¢	c2 a2	CENT SIGN	U+00A3	£	c2 a3	POUND SIGN
U+00A4	¤	c2 a4	CURRENCY SIGN	U+00A5	¥	c2 a5	YEN SIGN
U+00A6	¦	c2 a6	BROKEN BAR	U+00A7	§	c2 a7	SECTION SIGN
U+00A8	„	c2 a8	DIAERESIS	U+00A9	©	c2 a9	COPYRIGHT SIGN
U+00AA	ª	c2 aa	FEMININE ORDINAL INDICATOR	U+00AB	«	c2 ab	LEFT-POINTING DOUBLE ANGLE QUOTATION MARK
U+00AC	¬	c2 ac	NOT SIGN	U+00AD		c2 ad	SOFT HYPHEN
U+00AE	®	c2 ae	REGISTERED SIGN	U+00AF	¯	c2 af	MACRON
U+00B0	°	c2 b0	DEGREE SIGN	U+00B1	±	c2 b1	PLUS-MINUS SIGN
U+00B2	²	c2 b2	SUPERSCRIPT TWO	U+00B3	³	c2 b3	SUPERSCRIPT THREE
U+00B4	‘	c2 b4	ACUTE ACCENT	U+00B5	µ	c2 b5	MICRO SIGN
U+00B6	¶	c2 b6	PILCROW SIGN	U+00B7	·	c2 b7	MIDDLE DOT
U+00B8	,	c2 b8	CEDILLA	U+00B9	¹	c2 b9	SUPERSCRIPT ONE
U+00BA	º	c2 ba	MASCULINE ORDINAL INDICATOR	U+00BB	»	c2 bb	RIGHT-POINTING DOUBLE ANGLE QUOTATION MARK
U+00BC	¼	c2 bc	VULGAR FRACTION ONE QUARTER	U+00BD	½	c2 bd	VULGAR FRACTION ONE HALF
U+00BE	¾	c2 be	VULGAR FRACTION THREE QUARTERS	U+00BF	¿	c2 bf	INVERTED QUESTION MARK
U+00C0	À	c3 80	LATIN CAPITAL LETTER A WITH GRAVE	U+00C1	Á	c3 81	LATIN CAPITAL LETTER A WITH ACUTE
U+00C2	Â	c3 82	LATIN CAPITAL LETTER A WITH CIRCUMFLEX	U+00C3	Ã	c3 83	LATIN CAPITAL LETTER A WITH TILDE
U+00C4	Ä	c3 84	LATIN CAPITAL LETTER A WITH DIAERESIS	U+00C5	Å	c3 85	LATIN CAPITAL LETTER A WITH RING ABOVE
U+00C6	Æ	c3 86	LATIN CAPITAL LETTER AE	U+00C7	Ҫ	c3 87	LATIN CAPITAL LETTER C WITH CEDILLA
U+00C8	È	c3 88	LATIN CAPITAL LETTER E WITH GRAVE	U+00C9	É	c3 89	LATIN CAPITAL LETTER E WITH ACUTE
U+00CA	Ê	c3 8a	LATIN CAPITAL LETTER E WITH CIRCUMFLEX	U+00CB	Ӯ	c3 8b	LATIN CAPITAL LETTER E WITH DIAERESIS

**Table 17-2** Western european characters in UTF-8

Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
U+00CC	Í	c3 8c	LATIN CAPITAL LETTER I WITH GRAVE	U+00CD	í	c3 8d	LATIN CAPITAL LETTER I WITH ACUTE
U+00CE	Î	c3 8e	LATIN CAPITAL LETTER I WITH CIRCUMFLEX	U+00CF	Ï	c3 8f	LATIN CAPITAL LETTER I WITH DIAERESIS
U+00D0	Ð	c3 90	LATIN CAPITAL LETTER ETH	U+00D1	Ñ	c3 91	LATIN CAPITAL LETTER N WITH TILDE
U+00D2	Ò	c3 92	LATIN CAPITAL LETTER O WITH GRAVE	U+00D3	Ó	c3 93	LATIN CAPITAL LETTER O WITH ACUTE
U+00D4	Ô	c3 94	LATIN CAPITAL LETTER O WITH CIRCUMFLEX	U+00D5	Ӧ	c3 95	LATIN CAPITAL LETTER O WITH TILDE
U+00D6	Ö	c3 96	LATIN CAPITAL LETTER O WITH DIAERESIS	U+00D7	×	c3 97	MULTIPLICATION SIGN
U+00D8	Ø	c3 98	LATIN CAPITAL LETTER O WITH STROKE	U+00D9	Ӯ	c3 99	LATIN CAPITAL LETTER U WITH GRAVE
U+00DA	Ӱ	c3 9a	LATIN CAPITAL LETTER U WITH ACUTE	U+00DB	ӻ	c3 9b	LATIN CAPITAL LETTER U WITH CIRCUMFLEX
U+00DC	Ӳ	c3 9c	LATIN CAPITAL LETTER U WITH DIAERESIS	U+00DD	Ӵ	c3 9d	LATIN CAPITAL LETTER Y WITH ACUTE
U+00DE	Þ	c3 9e	LATIN CAPITAL LETTER THORN	U+00DF	ϐ	c3 9f	LATIN SMALL LETTER SHARP S
U+00E0	à	c3 a0	LATIN SMALL LETTER A WITH GRAVE	U+00E1	á	c3 a1	LATIN SMALL LETTER A WITH ACUTE
U+00E2	â	c3 a2	LATIN SMALL LETTER A WITH CIRCUMFLEX	U+00E3	ã	c3 a3	LATIN SMALL LETTER A WITH TILDE
U+00E4	ä	c3 a4	LATIN SMALL LETTER A WITH DIAERESIS	U+00E5	å	c3 a5	LATIN SMALL LETTER A WITH RING ABOVE
U+00E6	æ	c3 a6	LATIN SMALL LETTER AE	U+00E7	ç	c3 a7	LATIN SMALL LETTER C WITH CEDILLA
U+00E8	è	c3 a8	LATIN SMALL LETTER E WITH GRAVE	U+00E9	é	c3 a9	LATIN SMALL LETTER E WITH ACUTE
U+00EA	ê	c3 aa	LATIN SMALL LETTER E WITH CIRCUMFLEX	U+00EB	ë	c3 ab	LATIN SMALL LETTER E WITH DIAERESIS
U+00EC	ѝ	c3 ac	LATIN SMALL LETTER I WITH GRAVE	U+00ED	í	c3 ad	LATIN SMALL LETTER I WITH ACUTE
U+00EE	î	c3 ae	LATIN SMALL LETTER I WITH CIRCUMFLEX	U+00EF	ï	c3 af	LATIN SMALL LETTER I WITH DIAERESIS
U+00F0	ð	c3 b0	LATIN SMALL LETTER ETH	U+00F1	ñ	c3 b1	LATIN SMALL LETTER N WITH TILDE
U+00F2	ð	c3 b2	LATIN SMALL LETTER O WITH GRAVE	U+00F3	ó	c3 b3	LATIN SMALL LETTER O WITH ACUTE
U+00F4	ð	c3 b4	LATIN SMALL LETTER O WITH CIRCUMFLEX	U+00F5	ö	c3 b5	LATIN SMALL LETTER O WITH TILDE
U+00F6	ö	c3 b6	LATIN SMALL LETTER O WITH DIAERESIS	U+00F7	÷	c3 b7	DIVISION SIGN
U+00F8	ø	c3 b8	LATIN SMALL LETTER O WITH STROKE	U+00F9	ù	c3 b9	LATIN SMALL LETTER U WITH GRAVE

**Table 17-2** Western european characters in UTF-8

Western European characters in UTF-8

Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
U+00FA	ú	c3 ba	LATIN SMALL LETTER U WITH ACUTE	U+00FB	û	c3 bb	LATIN SMALL LETTER U WITH CIRCUMFLEX
U+00FC	ü	c3 bc	LATIN SMALL LETTER U WITH DIAERESIS	U+00FD	ÿ	c3 bd	LATIN SMALL LETTER Y WITH ACUTE
U+00FE	þ	c3 be	LATIN SMALL LETTER THORN	U+00FF	ÿ	c3 bf	LATIN SMALL LETTER Y WITH DIAERESIS

**Table 17-2** Western european characters in UTF-8

# **Index**

---

*Index* ..... 339



# Index

## Numerics

8100, see cobas® 8100 instrument, 69

## A

- AA, HL7 acknowledgment, 208
- Abbreviations, 7
- Absorbance
  - photometric calibration results ASTM, 138
  - photometric calibration results HL7, 184
- ACK
  - message structure HL7, 158
  - MSH segment, 161
- Acknowledgment
  - application, MSH segment, 162
  - ASTM, 105
  - code, MSA segment, 163
  - example test selection messages, 288
  - HL7 overview, 66
  - message structure in HL7, 158
  - message type, 161
  - upload status, 207
- Action code
  - ASTM, 123
  - HL7, 171
- AE, HL7 acknowledgment, 208
- Alarms
  - calibration alarm photometric ASTM, 138
  - calibration alarms ISE ASTM, 139
  - calibration flags HL7, 181
  - data alarms HL7, 191
  - data alarms list, 219
  - data alarms, ASTM, 133
  - data alarms, ISE calibration results ASTM, 139
  - data alarms, ISE calibration results HL7, 185
  - instrument alarms list, 239
  - instrument alarms, calibration results HL7, 187
  - instrument alarms, photometric calibration results ASTM, 138
  - result abnormal examples ASTM, 278
  - result abnormal examples HL7, 293
  - result abnormal flags ASTM, 129
  - result abnormal flags HL7, 176
- Always inquire for test selection, 65
- Analytical data
  - calibration ASTM, 139
  - calibration HL7, 185
- Analytical Unit ID
  - configuration, 71
  - E-module calibration results ASTM, 141
  - ISE calibration ASTM, 138

- ISE calibration results ASTM, 139
- ISE calibration results HL7, 183
- masking message HL7, 203
- OBX segment HL7, 177
- OBX segment HL7 QC, 180
- overview, 71
- photometric and E-module calibration results HL7, 183
- result record ASTM, 131
- Analyzer
  - cobas® 8000 modular analyzer series, 23
  - **MODULAR ANALYTICS EVO** analyzer / **cobas® 6000** analyzer series, upgrading from, 309
- Application Code. See Testcode, 189
- AR, HL7 acknowledgment, 208
- As soon as setting, 80, 81
- ASCII 127 table, 331
- ASTM
  - checksum, 106
  - connections, 65
  - delimiters, 103
  - E1381-91 Low Level Protocol, 101
  - escape character, 104
  - field attributes, 115
  - field types, 115
  - frames, 102, 106
  - low-level examples messages, 273
  - message transmission phases, 105
  - repeat delimiter, 104
- Attributes, ASTM fields, 115
- Auto-dilution factor HL7, 189
- Automatic Rerun Test Selection, 78
- Autorerun enabled, 81

## B

- 
- Barcodes
    - introduction, 28
    - order sample ID ASTM, 120
    - sample IDs, 41
    - samples without barcodes, 41, 79
  - Batch mode (result upload message)
    - example messages HL7, 290
    - example QC result HL7, 295
  - Batch mode (test selection download message)
    - configuring, 65
    - definition, 29, 37
    - diagram, 45
    - example messages ASTM, 276
    - message flow diagram, 52
    - messages, 112
  - Birthdate
    - patient in ASTM, 119

– patient in HL7, 164

Bottle

– ASTM, 131

– HL7 calibration, 183

– HL7, QC, 180

– standby, ASTM, 131

– standby, HL7, 180

– standby, HL7 calibration, 183

## C

---

c702, 24

Cables

– diagram, 90

– recommendations, 91

Calibration

– analytical data ISE ASTM, 139, 140

– analytical data ISE HL7, 185

– calibration ID in calibration results, HL7, 182

– calibration ID in patient and QC results, ASTM, 131

– calibration ID in patient results, HL7, 177

– calibration ID in QC results, HL7, 179

– calibration type, HL7, 185

– method E-module ASTM, 141

Calibration results

– ASTM message structure, 113

– code in ASTM header, 118

– examples ASTM, 280

– examples HL7, 296

– HL7 message structure, 156

– photometric calibration alarm ASTM, 138

– status E-module HL7, 186

– value E-module result HL7, 186

– value ISE result HL7, 184

– value of E-module result, ASTM, 142

– values, HL7, 181

Calibrator Factor

– calibration result ASTM, 142

– calibration result HL7, 186

Calibrator lot number

– ASTM, 141

– HL7, 168

Cat.5e cable, 91

Caution, definition, 9

Character

– data type ASTM, 115

– data type in HL7, 159

Chart

– European characters in UTF-8, 332

– sequence numbers and sample IDs, 263

Charts

– configuration settings, 86

– modes, configuring, 65

Chemistry Test Calibration Result Detail, 77

Clinical chemistry modules, 24

C-module, definition, 24

cobas® 8100 instrument, 69

cobas® IT firewall, 91

Comment

– comment type flag ASTM, 125

– comment type flag HL7, 191

– record format in *data manager* ASTM, 125

– source of comment, HL7, 191

– source of result comment, ASTM, 132

Communication trace file, Control Unit, 83

Complex

– ASTM field type, 115

– data type HL7, 159

Configuration settings chart, 86

Connections

– configuring, 65

– recommendations, 93

– serial, 93

Container

– HL7 QPD segment, 194

– HL7 SPM segment, 167

– sample ASTM order, 121

– sample ASTM query, 137

Control lot, 321

Control Unit

– communication trace file, 83

– configuration, 74

– definition, 23

– host communication, 74

Conventions used in manual, 7

CR, HL7 framing, 151

Cup

– ASTM order, 121

– ASTM query, 137

– HL7 SPM segment, 167

– QPD segment HL7, 194

## D

---

Danger (hazard level), 9

Data

– calibration analytical data ASTM, 139

– collecting all, 77

– ISE calibration analytical data HL7, 185

Data alarms

– ASTM, 133

– calibration results ISE ASTM, 139, 140

– list, 219

– photometric calibration results ISE HL7, 185

*data manager*

– definition, 23

– system architecture diagram, 23

– version in ASTM, 117

Data point results

– ASTM result record, 128

– example result, ASTM, 279

– example result, HL7, 294

- HL7 OBX record, 174
- Databits, 93
- Date
  - data type ASTM, 115
  - data type HL7, 159
- DateTime
  - calibration result E-module ASTM, 142
  - data type ASTM, 115
  - data type HL7, 159
  - masking message, 200, 201, 204
  - message creation ASTM, 118
  - message creation HL7, 161
  - order creation ASTM, 123
  - pipetting ASTM, 130
  - pipetting HL7, 176
  - pipetting HL7, QC, 179
  - result available, HL7, 177
  - result available, HL7, QC, 180
  - results available, HL7, calibration, 183
  - results, ASTM, 130
  - sample collection ASTM, 123
  - specimen collection HL7, 167
- Delimiters
  - ASTM, 103
  - HL7, 161
  - location in ASTM message, 117
- Demographic data, no sample found, 275, 289
- Deviation of Duplicate Measurement
  - calibration result ASTM, 142
  - calibration result HL7, 186
- Diagram
  - ASTM transmission phases, 105
  - batch test selection download, 45
  - cables, 90
  - HL7 data framing, 151
  - message flow in batch test selection download, 52
  - message flow in realtime test selection download, 54
  - message flow with upload by sample, 56
  - order query, 45
  - realtime test selection download, 44
  - result query, 45
  - timeouts, 64
- Dilution, 27
  - factor in ASTM, 122
  - factor in order record ASTM, 122
  - factor TCD segment HL7, 189
  - flag ASTM order, 121
  - flag in HL7 SPM segment, 166
  - OBR segment HL7, 170
  - result record ASTM, 127
- Downloads
  - batch, 37
  - realtime, 37

**E**

- e Pack expired flag, ASTM, 141
- e Pack Lot No., 141
- E.I.U. Level (Essential Information Upload), 76
- EAC^U07
  - MSH segment, 161
  - structure, 157
- ECUPL^REAL
  - ASTM header, 118
  - structure, 113
- Elecsys, 24
- Electrolytes, 24
- E-module, definition, 24
- Encoding, UTF-8, 25, 89, 116, 160
- End block, HL7, 151
- EP-17A
  - example ASTM, 278
  - example HL7, 293
- Equipment Inventory
  - see Test availability
- Equipment status
  - see Instrument status
- Error acknowledgment, HL7, 162
- Escape character
  - ASTM, 104
  - HL7, 161
- ESR^U02
  - structure in HL7, 157
- ESU^U01
  - structure in HL7, 156
- Ethernet, 92
- Expiry date of control lot
  - calibration results HL7, 168
  - upgrading to 1.04, 321
- Expiry date of control lot, HL7, 166
- Expiry date of reagent HL7, 190
- Extended ASCII in UTF-8, 332

**F**

- False bottom tubes
  - ASTM order record, 121
  - ASTM query record, 137
  - HL7 QPD segment, 194
  - HL7 SPM segment, 167
- Flags
  - c8000, ASTM, 131
  - c8000, HL7, 177
  - c8000, HL7, calibration, 183
  - c8000, HL7, QC, 180
  - calibration alarms HL7, 181
  - comment type ASTM, 125
  - comment type HL7, 191
  - data alarm in ASTM, 133
  - data alarms HL7, 191

- dilution ASTM order, 121
  - dilution HL7 order, 166
  - DM, ASTM, 131
  - DM, HL7, 177
  - DM, HL7, calibration, 183
  - DM, HL7, QC, 180
  - e Pack expired flag, 141
  - module type, ASTM, 131
  - module type, HL7, 177
  - module type, HL7, QC, 180
  - qualitative result flag ASTM, 128
  - result abnormal examples ASTM, 278
  - result abnormal examples HL7, 293
  - result abnormal flags ASTM, 129
  - result abnormal flags HL7, 176
  - result comment, 132, 133
  - sender, host / *data manager* ASTM, 124
- Frames
- ASTM, 102, 106
- FS, HL7 framing, 151

**G**

Gender. See Sex

**H**

- Hazard levels, 9
- Hemolysis, 47
- HL7
- network, 65
  - recommendations, 25
  - version, 162
- Host Upload Status, 208
- Hosts
- communication log file, 73
  - Control Unit configuration, 74
  - *data manager* configuration, 62
  - no host, 66
  - start and stop connection, 59

**I**

- Icterus, 47
- ICUPL^REAL
- ASTM header, 118
  - structure, 113
- ID for host, of instrument. See Analytical Unit ID, 71
- IDs
- See Analytical Unit ID
  - See Calibration ID
  - See Operator
  - See Patient ID
  - See Quality control, control ID
- Immunology module, 24

**Roche Diagnostics**

Inquiry for test selection. See Test selection inquiries  
INR^U06

- structure in HL7, 157

## Instrument

- Analytical Unit ID. See Analytical Unit ID, 131
- data alarms HL7, 191
- ID for host. See Analytical Unit ID
- ID in *data manager*, ASTM, 131
- instrument alarms list, 239
- number, ASTM, 131
- number, HL7, 177
- number, HL7 calibration, 183
- number, HL7 QC, 180
- operator, ASTM, 130
- operator, HL7, 176
- operator, HL7, QC, 179
- sample ID ASTM, 120
- throttle, 67

## Instrument status

- Equipment Status Request message, 157
- Equipment Status Update message, 156
- Instrument status message, 201

International Standards Organization (ISO), HL7, 151

INU^U05

- structure in HL7, 156

IP addresses, recommendations, 91

ISE module (Ion-Sensitive-Diode), definition, 24

**K**

Kind, of HL7 query, 194

**L**

## Limit of Blank

- ASTM, 129
- HL7, 176

## Limit of Detection

- ASTM, 129
- HL7, 176

## Limit of Quantitation

- ASTM, 129
- HL7, 176

Lipemia, 47

LIS timeout, 64

LIS2-A2, see ASTM

LoB. See Limit of Blank

LoD. See Limit of Detection, 42

## Log files

- Control Unit communication, 73, 83
- host communication, 73

Log levels, *data manager*, 68

LoQ. See Limit of Quantitation, 42

## Lot

- calibrator lot number ASTM, 141

- quality control ASTM, 120
- quality control HL7, 166
- reagent lot number, calibration ASTM, 141
- reagent lot number, calibration HL7, 190

## M

---

- Manual Rerun Test Selection, 78
- Masking
  - ECD segment HL7, 203
  - EQU segment HL7, 200, 201
  - example messages, 299
  - message structure, 157
  - patient results, 203
- Measurement units
  - ASTM, 128
  - HL7, 174
  - HL7, QC, 178
- Messages
  - ASTM low-level, 105
  - batch, 37
  - batch communication, 112
  - date and time of creation, HL7, 161
  - date and time of creation, ASTM, 118
  - examples ASTM, 273
  - examples HL7, 287
  - flag for host / *data manager*, ASTM, 124
  - Message Control Identifier ASTM, 117
  - Message Control Identifier HL7, 161
  - Message Control identifier, HL7 acknowledgment, 163
  - realtime, 37
  - realtime communication, 112
  - structure ASTM, 103
  - structure in HL7, 155
  - types, 44
  - types in HL7, 161
  - upload one-by-one, 67
- Micro cups
  - ASTM order, 121
  - ASTM query, 137
  - HL7 SPM segment, 167
  - QPD segment HL7, 194
- Minimal Layer Protocol (MLP), 151
- Minimal Lower Layer Protocol (MLLP), 151
- Minimum Acceptance Difference
  - calibration result ASTM, 142
  - calibration result HL7, 186
- Missing Values
  - calibration result ASTM, 142
  - calibration result HL7, 186
- Mixed mode
  - configuring, 65
  - definition, 37
- Modes
  - batch, 37
  - configuring, 65

## Roche Diagnostics

- mixed, 37
  - order query HL7, 197
  - pass-through, 67
  - rack and position, 68
  - rack and position with batch mode, 257
  - rack and position with **MODULAR PRE\_ANALYTICS**, 255
  - realtime, 37
- MODULAR PRE-ANALYTICS**
- barcodes, 41
  - sample IDs and barcodes, 255
- Modules
- dilution factors ASTM, 122
  - IDs, 71
  - list, 24
  - module type, ASTM, 131
  - module type, HL7, 177
  - module type, HL7, calibration, 183
  - module type, HL7, QC, 180
- Monotony of Curve, calibration result ASTM, 142

## N

---

- Name
  - patient in ASTM, 119
  - patient in HL7, 164
- No host configuration, 66
- Notice, definition, 9
- Number
  - data type ASTM, 115
  - data type in HL7, 159
- See also Samples, sample numbers, Sequence numbers

## O

---

- OML^O33
  - MSH segment, 161
  - structure in HL7, 158
- Open System Interconnection (OSI), HL7, 151
- Operator
  - *data manager*, ASTM, 130
  - *data manager*, HL7, 176
  - *data manager*, HL7, QC, 179
  - instrument, ASTM, 130
  - instrument, HL7, 176
  - instrument, HL7, QC, 179
  - ISE calibration ASTM, 139
  - photometric calibration ASTM, 138
- Order query
  - ASTM message structure, 114
  - diagram, 45
  - example with sequence number ASTM, 285
  - example with sequence number HL7, 304
  - examples ASTM, 284–285
  - HL7 message structure, 156

- QPD segment HL7, 197

## Orders

- batch, 37

- datetime of creation ASTM, 123

- realtime, 37

## OUL^R22

- MSH segment, 161

- structure in HL7, 155

## P

Parity, 93

Pass-through, 67

## Patient ID

- ASTM, 119

- HL7, 164

## PCUPL^REAL

- ASTM header, 118

- structure, 113

Photometry, module, 24

## Pipetting time

- ASTM, 130

- HL7, 176

- HL7, QC, 179

Port numbers, recommendations, 91

## Position

- sample in ASTM query, 136

- sample in HL7 query, 193

- sample on rack, ASTM order, 121

- sample on rack, SAC segment HL7, 169

Pre-dilution, result record ASTM, 127

## Priority

- order record ASTM, 123

- query record ASTM, 137

- query record HL7, 194

- TQ-1 segment HL7, 172

## Protocols

- ASTM E1381-91 Low Level, 101

- host connection, 65

- recommendations, 25

- version ASTM, 118

- version HL7, 162

## Prozone value

- photometric calibration results ASTM, 138

- photometric calibration results HL7, 184

## Q

### Qualitative and quantitative results

- HL7 patient, 174

- HL7, QC, 178

### Quality control

- control ID HL7, 166

- control ID, ASTM, 120

- lot ASTM, 120

- lot HL7, 166

- name ASTM, 120

- name HL7, 166

Quantitative results. See Qualitative and quantitative results, 128

### Query

- order query QPD segment HL7, 197

- query type code ASTM, 137

- query type code HL7, 194

- result query QPD segment HL7, 195

- test selection in ASTM, 113

- test selection in HL7, 155

- test selection QPD segment HL7, 193

- See also Order Query, Result Query, Test selection inquiries

## R

### Rack and position mode

- batch test selections, 257

- configuring *data manager*, 68

- MODULAR PRE\_ANALYTICS, 255

- sample position, 257

### Rack ID

- ASTM query, 136

- HL7 SAC segment, 169

- QPD segment HL7, 193

### Rack type

- ASTM query, 135, 136

- QPD segment HL7, order query, 198

- QPD segment HL7, result query, 196

- QPD segment HL7, test selection, 193

- sample lifetime, 39

### Racks

- calibration, 27

- ID. See Rack ID

- manual rerun, 27

- quality control, 27

- routine, 27

- STAT, 27

- type. See Rack type

Reagent code HL7, 190

Reagent expiry date, 190

Reagent lot number

- ASTM, 141

- HL7, 190

- upgrading to 1.04, 323

Reagent serial number

- HL7, 190

- upgrading to 1.04, 323

Reagent set

- ASTM, 131

- HL7, 180

Reagent type HL7, 190

Realtime mode (result upload message)

- example QC result HL7, 295

- Realtime mode (test selection download message)
  - configuring, 65
  - definition, 29, 37
  - diagram, 44
  - diagram, message flow, 54
  - example messages ASTM, 275
  - example QC result ASTM, 279
  - messages, 112
- Receiver ID
  - ASTM, 118
  - HL7, 161
- Reference ranges
  - ASTM, 129
  - HL7, 175
  - QC, HL7, 179
- Reflex test, 31
- Repeat delimiter
  - ASTM, 104
  - HL7, 161
- Repeat test, definition, 31
- Request information status code, ASTM, 137
- Rerun
  - query type code ASTM, 137
  - query type code HL7, 194
  - test, 31
  - without barcodes, 256
- Response times, optimum., 64
- Result message only for Immunoassay Qualitative tests, 77
- Result query
  - ASTM message structure, 114
  - diagram, 45
  - example ASTM, 281–283
  - example with sequence number ASTM, 283
  - example with sequence number HL7, 301
  - examples HL7, 299–??
  - HL7 message structure, 156
  - QPD segment HL7, 195
- Results
  - abnormal flag examples ASTM, 278
  - abnormal flag examples HL7, 293
  - abnormal flags ASTM, 129
  - abnormal flags HL7, 176
  - calibration result code in ASTM header, 118
  - Calibration. See Calibration results
  - code in ASTM header record, QC, 118
  - completion time, ASTM, 130
  - example messages ASTM, 275
  - example messages HL7, 290
  - masking, 203
  - message structure ASTM, 113
  - message structure in HL7, 155
  - qualitative and quantitative QC, HL7, 178
  - qualitative and quantitative HL7, 174
  - query. See Result query
  - result comment flag, 132, 133
- result request code in ASTM header, 118
- result upload code in ASTM header, 118
- status ASTM, 130
- status E-module calibration result ASTM, 141
- status HL7, 176
- status, QC, HL7, 179
- time available, HL7, 177
- time available, HL7, calibration, 183
- time available, HL7, QC, 180
- units ASTM, 128
- units HL7, 174
- units, HL7, QC, 178
- upload by sample, 80
- upload by test, 80
- validation, 47
- value in HL7, patient results, 174
- Routine
  - order record ASTM, 123
  - query record ASTM, 137
  - query record HL7, 194
  - sample racks, 27
- RS232c cable, 93
- RSREQ
  - ASTM header, 118
  - HL7, 161
  - structure in ASTM, 114
  - structure in HL7, 156
- RSUPL
  - ASTM header, 118
  - structure in ASTM, 113
- RSUPL^BATCH
  - ASTM header, 118
  - structure in ASTM, 113
- RSUPL^REAL
  - ASTM header, 118
  - structure in ASTM, 113

## S

- Safety information, 9
- safety information, 10
- Sample IDs
  - barcodes, 41
  - instrument sample ID ASTM, 120
  - lifetime, 39
  - order ASTM, 120
  - QPD segment HL7, order query, 197
  - QPD segment HL7, result query, 195
  - QPD segment HL7, test selection, 193
  - query record ASTM, 135, 136
  - re-using, 39
  - samples with same ID, 39
  - SPM segment HL7, patient results, 165
  - SPM, patient messages, 165
- Samples
  - barcodes missing, 79

- clear sample list in rack and position mode, 258
  - container in query HL7, 194
  - datetime of collection ASTM, 123
  - expired, 39
  - identifying by sequence number. See Sequence numbers
  - IDs. See Sample IDs
  - keep position in rack and position mode, 257
  - lifetime, 39
  - **MODULAR PRE\_ANALYTICS**, 255
  - not found, message in HL7, 158
  - position in HL7 query, 193
  - rack and position batch mode, 257
  - rack and position identification, 68
  - sample container in ASTM order, 121
  - sample container in ASTM query, 137
  - sample numbers, 41
  - sample position in ASTM query, 136
  - sequence numbers. See sequence numbers
  - upload by sample, 80
  - upload by sample message flow, 56
  - without barcodes, 41
- Selection mode, order query HL7, 197
- Send conc(entrations) of chemistry qualitative tests, 77
- Send message for Immunoassay Quantitative tests, 77
- Send query to LIS, 65
- Sender ID, ASTM, 117
- Sending application name
- configuring, 63
  - HL7, 161
- Sequence numbers
- ASTM examples, 265
  - configuring on system, 262
  - example order query ASTM, 285
  - example order query HL7, 304
  - example result ASTM, 278
  - example result query ASTM, 283
  - example result query HL7, 301
  - example test selection ASTM, 275
  - example test selection HL7, 289
  - HL7 examples, 267
  - instead of barcodes, 28
  - instead of sample IDs, 85
  - order record ASTM, 121
  - QPD segment HL7, 193, 195, 197
  - query record ASTM, 135, 136
  - sample IDs compared, 263
  - SPM, patient messages, 165
  - warnings and cautions, 264
- Serial connections
- *data manager* settings, 65
  - hardware and low-level, 93
- Serial number, reagent HL7, 190
- Serum index tests
- ASTM, 122
  - request together, 47
- Settings, configuration chart, 86

- Sex
- patient in ASTM, 119
  - patient in HL7, 164
- Short Turn-Around Time. See STAT
- Signal values
- calibration E-module ASTM, 142
  - calibration E-module HL7, 187
- Slope
- calibration result ASTM, 142
  - calibration result HL7, 186
- Specimen type
- ASTM, 123
  - HL7, 166
- Standard deviation
- photometric calibration results ASTM, 138
  - photometric calibration results HL7, 184
- Standby bottle
- ASTM, 131
  - HL7, 180
  - HL7 calibration, 183
- Start block, HL7, 151
- Start host connection, 59
- STAT
- cobas® 8100 instrument, 69
  - limited STAT handling, 69
  - order record ASTM, 123
  - query record ASTM, 137
  - query record HL7, 194
  - sample racks, 27
  - STAT Test Selection, 78
- Status code, request information, ASTM, 137
- Stop host connection, 59
- Stopbits, 93
- String
- data type ASTM, 115
  - data type in HL7, 159
- Submodule
- ASTM, 131
  - HL7, 177
  - HL7, calibration, 183
  - HL7, QC, 180
- Symbols, 7
- System Error
- calibration result ASTM, 142
  - calibration result HL7, 187
- System time, 42

## T

- TCP/IP
- connections, 65
  - recommendations, 25
- Test availability
- Equipment Inventory Request message, 157
  - Equipment Inventory Update message, 156
- Test selection

- batch, 37
- definition, 29
- download message structure ASTM, 114
- download message structure in HL7, 158
- download message type in ASTM header, 118
- message timeout, 64
- not found in HL7, 209
- realtime, 37
- upload message structure ASTM, 113
- upload message type in ASTM header, 118
- upload message structure in HL7, 158
- See also Test selection inquiries

Test Selection Ask in Barcode Read Error, 79

Test Selection Inquire Always, 78

Test selection inquiries

- examples in ASTM, 274
- examples in HL7, 287
- HL7 acknowledgment, 209
- message structure ASTM, 113
- message structure HL7, 155
- Test selection inquiry, Control Unit option, 78
- test selection query code in ASTM header, 118

Test Selection Priority Mode, 78

Test Selection Timeout, 78

Test status

- test availability message, 204

Testcode

- E-module calibration results ASTM, 141
- masking message HL7, 203
- OBR segment HL7, 170
- OBX segment, QC results, HL7, 178
- order record ASTM, 122
- photometric calibration results ASTM, 138
- result record ASTM, 127
- SID segment HL7, 190
- TCD segment HL7, 189

Tests

- reflex, 31
- repeat, 31
- rerun, 31
- testcode. See Testcode
- type HL7, 190
- upload by test, 80

Third-party software, 11

Throttle instrument, 67

Time

- calibration result E-module ASTM, 142
- data type ASTM, 115
- data type HL7, 159
- masking message, 200, 201, 204
- message creation ASTM, 118
- message creation HL7, 161
- order creation ASTM, 123
- pipetting HL7, 176
- pipetting, ASTM, 130
- pipetting, HL7, QC, 179

- response times, optimum, 64
- result available, HL7, 177
- result available, HL7, QC, 180
- results available, HL7, calibration, 183
- results, ASTM, 130

- sample collection ASTM, 123
- specimen collection HL7, 167
- system time, 42

Timeouts

- diagram, 64
- LIS, 64
- test selection, 64
- test selection, on Control Unit, 78

Trace file, on Control Unit, 83

TSDWN

- ASTM header, 118
- structure in ASTM, 114

TSREQ

- ASTM header, 118
- HL7 MSH segment, 161
- structure in ASTM, 113, 114
- structure in HL7, 155, 156

TSUPL

- ASTM header, 118
- structure in ASTM, 113

## U

Units of measurement

- ASTM, 128
- HL7, 174
- HL7, E-module calibration, 187
- HL7, QC, 178

Universal Service Identifier. See Testcode

Unmask message, 203

Upload status, HL7 acknowledgment, 207

Uploading messages one-by-one, 67

UTF-8, 25, 89, 116, 160

## V

Version

- *data manager* ASTM, 117
- HL7, 162
- VT, HL7 framing, 151

## W

Warning

- definition, 9

## X

X12 of ANSI, 99

