cobas® 8000 data manager

Host Interface Manual

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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, EP-17A.
1.01 (revision 2)	1.01.00	June 2010	Branding and trademark corrections.
1.01 (revision 3)	1.01.01	August 2010	Enhanced ACK functionality and minor corrections.
1.01 (revision 4)	1.01.01	September 2010	Added cautions to "New in this version" sections. Corrections to ID for instrument module, and other areas.

New in this version

This section gives an overview of the most important changes in this version.

👁 For a more detailed list of these changes, and which parts of the manual have changed, see *New in this version* on page A-5.

Type of change	Summary of changes
Order query	Communication scenarios, message types and fields definitions updated.
Result query	Communication scenarios, message types and fields definitions updated.
Support for e602	Field definitions updated
Flags for EP-17A limits	General overview and field definitions updated.
Masking command messages	Communication scenarios, message types and fields definitions updated.
Calibration results	Communication scenarios, message types and fields definitions updated.
Enhanced ID for analyzer / instrument module	Description of ID of analyzer module extended with enhanced information.
Reference ranges	Field descriptions updated to define where reference range information is passed with results.
Acknowledgement types in HL7	Wider range of acknowledgement messages supported in HL7.
Result report for qualitative results	Postion of qualitative and quantitative results reversed. First component contains the qualitative result, and the second contains the quantative value.

New in this manual (revision 4)

This revision to the manual (revision 4) contains:

- Corrections to the identifier for the instrument module
- Corrections to the recommended settings for Immunoassay Qualitative tests in the Control Unit.

⚠️ **CAUTION**

Check the changes to the host interface before performing the upgrade

If you are upgrading from an earlier version to version 1.01.01, be sure to check everything in this list, and in the more detailed list, before you perform the upgrade, to make sure that the host can correctly read the messages from, and construct messages for, the *data manager*.

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 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, Version 1.01.01.

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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.

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Table of contents

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

Following are symbols and conventions used in this manual.

Symbols   The following symbols may be used to draw your attention to important information:

Symbol	Meaning
👁	Cross reference
�	Note

Abbreviations   The following abbreviations are used:

Abbreviation	Definition
A	
ANSI	American National Standards Institute
ASTM	ASTM International, originally known as the American Society for Testing and Materials (ASTM), in particular the 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).
B	
BTS	barcode transfer sheet
C	
CBT	Computer based training
cc	cubic centimeter
CLAS 2	Clinical Laboratory Automation System 2
CLIA	Clinical Laboratory Improvement Amendments
CLSI	Clinical and Laboratory Standards Institute (formerly NCCLS)
COBI-CD	compendium of background information
CSA	Canadian Standards Association
D	
dBA	decibel weighted against the A-frequency response curve. This curve approximates the audible range of the human ear.
DIL	diluent
E	
EC	European community
ECL	electrochemiluminescence
e.g.	*exempli gratia* – for example

Abbreviation	Definition
EMC	electromagnetic compatibility
EN	European standard
F	
FIFO	First in first out
H	
HCFA	Health Care Financing Administration
HIS	Hospital Information System
HL-7	Health Level 7
I	
i.e.	*id est* – that is to say
IEC	International Electrical Commission
IS	Internal Standard (ISE module)
ISE	ion selective electrode
IVD	In vitro Diagnostic Directive
K	
KVA	kilovolt-Ampere. Unit for expressing rating of AC electrical machinery.
L	
LDL	see analytical sensitivity lower detection limit
LIS	Laboratory Information System
LLD	liquid level detection
M	
MBC	matrix barcode
MSDS	material safety data sheet
N	
n/a	not applicable
NCCLS	National Committee for Clinical Laboratory Standards
P	
PC/CC	ProCell M/CleanCell M
PW	PreClean solution PreWash
Q	
QC	Quality control
R	
REF	Reference solution for ISE module
S	
SD	standard deviation
SIP	ISE sipper syringe
SVGA	Super Video Graphics Adapter
SWA	Serum Work Area
T	
TPA	tripropylamine
TS	Test Selection
U	
UL	Underwriters Laboratories Inc.

Abbreviation	Definition
V	
VDE	Association of German Electrical Engineers (Verband Deutscher Elektrotechniker)
W	
WAM	Work Area Manager

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:

WARNING

Warning

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

CAUTION

Caution

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

NOTICE

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

System safety

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

CAUTION

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.

CAUTION

Incorrect or corrupt data due to unauthorized access

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

Data security

⚠️ **CAUTION**	**Data loss** Back up your data at regular intervals (ideally every day).

Maintenance

⚠️ **CAUTION**	**Data loss or damage to the system due to power failure.** Ensure regular maintenance of the uninterruptible power supply.

Laboratory workflows

⚠️ **WARNING**	**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.

⚠️ **WARNING**	**Incorrect results due to expired calibration and quality controls** Perform regular quality controls and calibrations.

⚠️ **WARNING**	**Incorrect results due to incorrect entry** Ensure that manually entered data is correct.

⚠️ **CAUTION**	**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.

⚠️ **CAUTION**	**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.

⚠️ **CAUTION**	**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.

⚠ CAUTION	**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.
⚠ CAUTION	**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.

Third-party software

⚠ CAUTION	**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   **A**

Overview

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

In this chapter	*Chapter* **1**

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 Operator's Manual for more detailed information on the use of **cobas®** 8000 data manager.

This document consists primarily 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.

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

New in this version

This manual, the **cobas®** 8000 data manager Host Interface Manual Version 1.01 (revision 4) is released with Version 1.01.01 of the **cobas®** 8000 data manager. The manual describes new functionality and gives further clarification and updated information on earlier functionality.

⚠ CAUTION

Check the changes to the host interface before performing the upgrade

If you are upgrading from an earlier version to version 1.01.01, be sure to check everything in this list before you perform the upgrade, to make sure that the host can correctly read the messages from, and construct messages for, the *data manager*.

New functionality
- The ID that identifies the submodule has been extended with enhanced information.
  - 👁 For details of this with ASTM results, see *Instrument identifier for the host* on page C-29.
  - 👁 For details of this with HL7 results and masking messages, see *Instrument identifier for the host* on page D-30.

⚠ **CAUTION**

Changes to be implemented in an upgrade

The **cobas®** 8000 data manager, version 1.0 passed the instrument's serial number in the HL7 segment OBX-18, component 3 and ASTM record R-14, component 3. The *data manager* version 1.01.01 implements an enhanced identifier with more information, in a different format. The host must be updated to implement the current identifier.

- The reporting of qualitative results has changed. The qualitative flag is now passed as the first component in ASTM field Result-4 and HL7 field OBX-5.
  - 👁 For details of this in ASTM, see field 4 in *Result Record* on page C-26.
  - 👁 For details of this in HL7, see the details of the field OBX-5 in *Numeric and qualitative results* on page D-24.

⚠ **CAUTION**

Qualitative test reports transferred in a different component.

From version 1.01, in ASTM field Result-4 and HL7 field OBX-5, the qualitative result is passed in the first component in qualitative tests. Previously it was passed as the second component. This may require code revisions of certain LIS interfaces that read this data.

- The *data manager* supports further HL7 acknowledgement message functionality.
  - 👁 For details, see field 16 of the MSH segment in *Message Header Segment - MSH* on page D-12, and *Acknowledgement messages* on page D-15.

⚠ **CAUTION**

Acknowledgement messages in HL7 test selection downloads

Before version 1.01.01, *data manager* did not send acknowledgement messages in response to test selection downloads. From version 1.01.01 the data manager is able to acknowledge HL7 Test Selection Download Messages, if requested. If the host cannot handle an ACK message with AE in MSA-1, then the test selection download must contain NE in MSH-16.

- The message type code for a test selection request in HL7, in the MSH segment, in the field MSH-9, has changed. In previous versions, a test selection request was type QBP^TSREQ, but in version 1.01 is simply TSREQ. Note that this means the string "TSREQ" is now in component 1, not component 2.
  - 👁 For details of MSH-9, see *Message Header Segment - MSH* on page D-12.
- The supported dilution factors have changed for specific modules.
  - 👁 For details of the dilution factors supported in version 1.01, in ASTM, see *Testcode with dilution factor* on page C-23.
  - 👁 For details of the dilution factors supported in version 1.01 in HL7, see *Test Code Detail Segment - TCD* on page D-31.
- The *data manager* now supports the e602 module.
  - 👁 The instrument identifier may include the string e602, see *Equipment instance identifier* on page C-29 and *Instrument identifier for the host* on page D-30.
- If using HL7 messages, the host can send a message to instruct the *data manager* to mask or unmask specified tests on specified instruments or modules.
  - 👁 For a general overview, see *Communication and message types* on page B-9, and *Masking* on page B-13.

- 👁 For details of the message, see *Equipment Detail Segment - EQU* on page D-37, and *Equipment Command Segment - ECD* on page D-38.

- The host can send a result query message, to which the *data manager* replies with the requested results.

  - 👁 For an overview, see *Communication and message types* on page B-9, and *Result query* on page B-13.

  - 👁 To see how the result query message is sent in ASTM, see *Messages transmitted by the host* on page C-17, and *Query Record (Request Information Record)* on page C-33.

  - 👁 To see how the result query message is sent in HL7, see *Messages transmitted only by the host* on page D-10, and *Query Parameter Segment - QPD (for a Result Query)* on page D-35.

- The host can send an order query message, to which the *data manager* replies with a test selection upload, stating what tests are in the order for a specified sample.

  - 👁 For an overview, see *Communication and message types* on page B-9, and *Order query* on page B-13.

  - 👁 To see how the order query message is sent in ASTM, see *Messages transmitted by the host* on page C-17, and *Query Record (Request Information Record)* on page C-33.

  - 👁 To see how the order query message is sent in HL7, see *Messages transmitted only by the host* on page D-10, and *Query Parameter Segment - QPD (for an Order Query)* on page D-36.

- The *data manager* can send the host details of calibration results.

  - 👁 For details of the ASTM message, see *Messages transmitted by data manager* on page C-16, *Photometric Calibration Result M(PCR)* on page C-35, *ISE Calibration Result Record - M(ICR)* on page C-36, and *E-module (immunology) Calibration Result Record - M(ECR)* on page C-38.

  - 👁 For details of the HL7 message, see *Message sent only by cobas® 8000 data manager* on page D-9, *C-module photometric Calibration Result* on page D-24, *ISE Calibration Result* on page D-25, and *E-module immunological Calibration Result* on page D-26.

- When sending results, the *data manager* can send flags stating that the result values have fallen below the limits defined by the NCCLS EP-17A standard.

  - 👁 For a general overview, see *EP-17A and the result abnormal flags* on page B-7.

  - 👁 For details of EP-17 in ASTM, see *EP-17 flags* on page C-28.

  - 👁 For details of EP-17 in HL7, see *EP-17 flags* on page D-28.

- Enhancement of the action code used with rerun tests: in the ASTM order record, "A", as well as "R", can be used to order a rerun of a test.

  - 👁 For details, see *Order Record* on page E-83, and field 12 of the table in *Order Record* on page C-21.

- Enhancement of the action code used with rerun tests: in the HL7 OBR segment, "A", as well as "R", can be used to order a rerun of a test.

  - 👁 For details, see field 11 of the table in *Observation Request Segment - OBR* on page D-20.

Further information
- Handling new test selections sent for existing sample IDs.

  - 👁 For details, see *Multiple test selection messages* on page B-6.

- Information on the time results are returned to the host.

  - 👁 For details, see *Time results are returned* on page B-7.

- Further information on the Substance Identifier Segment available in HL7.

  - 👁 For details, see *Substance Identifier Segment - SID* on page D-32.

- Updates and corrections to the list of instrument alarms.

⊙   For details, see *Instrument alarms* on page E-21.

- Correction to the description of the *data manager* configuration option ***Strict rack and position mode***. This feature enables the use of rack and position within a batch test selection download. It should be noted that although supported, this is not the recommended way to implement using the *data manager* with a **MODULAR** *PRE-ANALYTICS*.

  ⊙   For details of how to use an **MODULAR** *PRE-ANALYTICS* and strict rack and position mode, see *Using a MODULAR PRE-ANALYTICS* on page E-39.

New in this manual (revision 4)   This revision to the manual (revision 4) contains:

- Corrections to the identifier for the instrument module.

    - ⊙ For details of this with ASTM results, see *Instrument identifier for the host* on page C-29.

    - ⊙ For details of this with HL7 results and masking messages, see *Instrument identifier for the host* on page D-30.

- Corrections to the recommended settings for Immunoassay Qualitative tests in the Control Unit.

    - ⊙ For details, see *Result message only for Immunoassay Qualitative tests* on page B-30.

System architecture

Overview of the cobas® 8000 data manager and cobas®

8000 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

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 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.

A Host (LIS, WAM etc.)	**E** cobas® 8000 Control Unit	**I** **cobas®** 8000 modular analyzer series
B **cobas®** 8000 data manager	**F** cobas® 8000 analytical modules	**J** **cobas®** 8000 instrument
C cobas® link	**G** cobas® 8000 analytical modules	
D Roche Diagnostics e-services	**H** cobas® 8000 analytical modules	
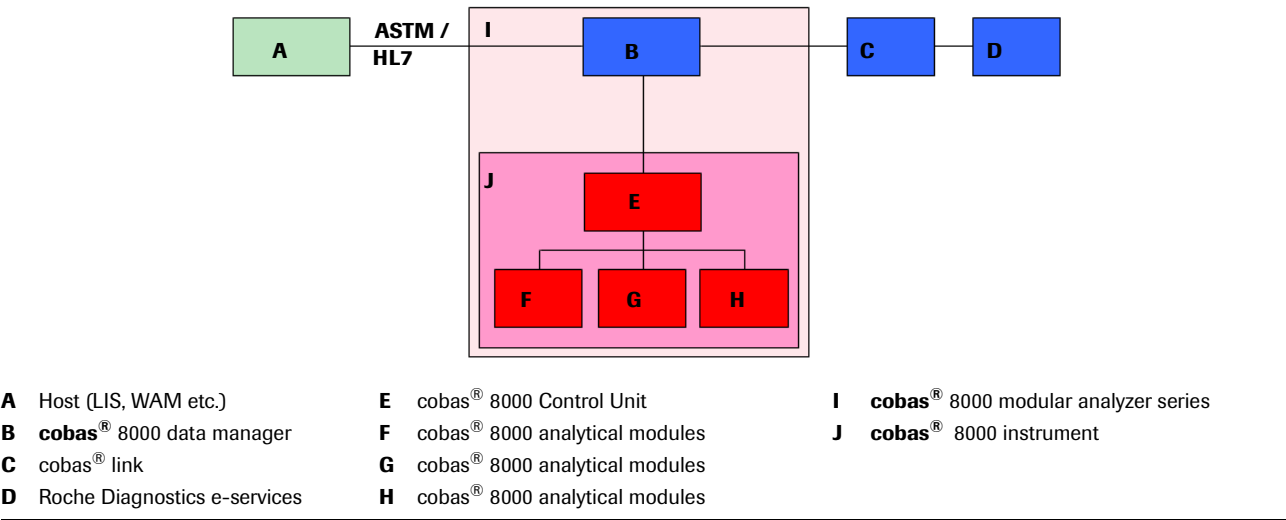
Figure A-1   Overview of the **cobas®** 8000 data manager system

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 and c701, perform clinical chemistry tests using photometry.

E-module The E-module, e602 or Elecsys, performs 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 or stopping a host connection* on page B-21.
- For details of the connections, see *Host communication settings and cables* on page B-42.
- For details of the HL7 protocol used, see Chapter 8 *HL7 protocol* and Chapter 9 *HL7 text content*.
- For details of the ASTM protocol used, see Chapter 6 *ASTM protocol (LIS2 - A2)* and Chapter 7 *ASTM text content (LIS2 - A2)*.

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 series and future high-throughput systems.

Network connection will be mandatory for future systems that are for example connected to two or three c8000 instruments. 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.

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, cerebral spinal fluid, and supernatant. For full information on supported sample types, see 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 so-called 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.

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

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 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 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 instrument identifies samples by reading the barcode on the sample tube. This barcode gives a number that uniquely identifies the sample. Different sample types from the same patient, therefore, must have separate barcodes. If a sample tube does not have a barcode, the instrument normally generates an error.

Barcodes All the racks are passed one-by-one to the input buffer, which feeds them sequentially into the system. The **cobas** 8000 instrument reads a number, up to 22-digits long, from the sample's barcode. The instrument, host and *data manager* use the number as a unique identifier for the sample, called the sample ID.

Missing barcodes If the **cobas** 8000 instrument cannot read a sample's barcode, the operator of the **cobas** 8000 instrument can manually enter information identifying the sample and its sample ID. For more information on this, see the **cobas** *IT 8000 modular analyzer series Operator's Manual*.

MODULAR *PRE-ANALYTICS* If a **MODULAR** *PRE-ANALYTICS* is used, the samples will lack barcodes. In this situation, the **cobas** 8000 instrument identifies the sample by its position on the rack, and the rack identifier. The host needs to identify the sample from this information, provided by TSM, 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* on page E-39.

- ☉ To configure the **cobas** 8000 instrument to process samples 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* on page B-33.

Test selection

The instructions telling the **cobas** 8000 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 instrument. (This is called "Batch Download".)
- The host, in response to a query (Test Selection Information Inquiry) initiated by the **cobas** 8000 instrument via *data manager*.
- The **cobas** 8000 instrument, as a result of a manually-programmed Test Selection on the **cobas** 8000 instrument by the operator. The test results can be uploaded to the host.
- The **cobas** 8000 data manager, 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 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 Chapter 3 *Sample Processing*.

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.

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 instrument manually, or on the *data manager* 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 instrument, if corresponding rules are programmed at the LIS.

Setting automatic rerun

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 set automatic rerun on the Control Unit**

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   **B**

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 instrument, **cobas**® 8000 data manager and the host.

Batch and realtime processing

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

Batch and realtime on *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

The **cobas**® 8000 data manager can be configured, so that it sends a test selection inquiry:

- never (*batch mode*).
- for every sample (*realtime mode*).
- only when it has no test selections for the sample in its database (*mixed mode*).

Batch mode
In batch mode, 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.

Realtime mode
In realtime mode, all download messages are in principle a reaction to previous inquiry and they have to be downloaded within a timeout. Once the *data manager* has received a test selection request from the Analyzer, it sends a test selection inquiry to the host. Nevertheless, batch downloads are still accepted without an error message.

Even if the operator has previously input a manual test selection for a sample at the *data manager*, or if the host has previously sent a batch download for the sample, the *data manager* will still send a test selection inquiry to the host.

Mixed mode
In the mixed mode, the *data manager* only sends a query to the host when it can not find any test selections for the sample in its internal database.

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

👁 For details of setting the modes, see *Test selection inquiry mode* on page B-23.

The **cobas**® 8000 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* on page B-32.

No parameter is passed to the host to indicate which mode *data manager* and **cobas**® 8000 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* on page B-14, and *Message flow for TS Inquiry from instrument / data manager* on page B-16.

Multiple test selection messages

In realtime mode or mixed mode, it is possible that the *data manager* will have test selections for a certain 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. It is important for the LIS not to reuse a sample ID for different samples.

If the *data manager* has no test selections for a 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 Analyzer to inform the Analyzer about this status.

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.

Barcode and sample ID   The **cobas**® 8000 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 without barcodes   If the sample tube's barcode is missing or unreadable, the **cobas**® 8000 instrument generates an error, and the instrument operator gives the sample a barcode or sample ID. See the information in the *Barcode read error* window in **cobas**® 8000 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* on page A-15.

The only 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 of the primary sample 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* on page E-39.

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 instrument sends to it. This is called *pass-through mode*.

In this mode, *data manager* automatically validates 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 and for quality control results.

👁 To see how to set "pass-through mode", see *Pass through for result uploads* on page B-25.

Time results are returned

Results are normally returned immediately to the host once they are ready.

👁 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* on page B-34.

If the host system time is ahead of the *data manager* system time there is a delay in result upload. In this case, once the order is sent from the host to *data manager*, the *data manager* creates the order with a time in the future. When the sample is loaded on the instrument it will query and it will run the tests. However the *data manager* will only upload the results to the host once the time associated with the order has passed.

EP-17A 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 EP-17A standard.

The EP-17 flags   The *data manager* provides three flags, *Limit of Blank*, *Limit of Detection*, and *Limit of Quantitation*, which follow the CLSI standard EP-17A. 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 EP-17A 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 EP-17 flags The EP-17A 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 abnormal flags* on page C-28.

👁 For details of the flags passed to the host in HL7, see *Result abnormal flags* on page D-28.

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 message types by the **cobas**® 8000 data manager host interface are described below from the host's viewpoint. That means the host, such as a LIS or Work Area Manager (WAM), will receive information from the connected *data manager* and send information to the *data manager*.

	Message type	Direction
Results	Receive patient results	*data manager* to host
	Receive patient results (realtime)	*data manager* to host in response to a result query
	Receive quality control results	*data manager* to host
	Receive calibration results	*data manager* to host
Inquiry	Receive test selection inquiry	*data manager* to host
Test selections	Send test selections (batch)	host to *data manager*
	Send test selection (realtime)	host to *data manager*
	Receive test selection (realtime)	*data manager* to host in response to an order query
Query	Send result queries	host to *data manager*
	Send order queries	host to *data manager*
Masking (HL7 only)	Send a command to mask or unmask tests	host to *data manager*

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.
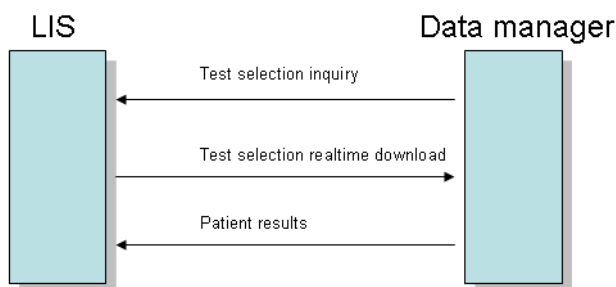
Figure B-1   Communication scenario for a realtime test selection download

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.
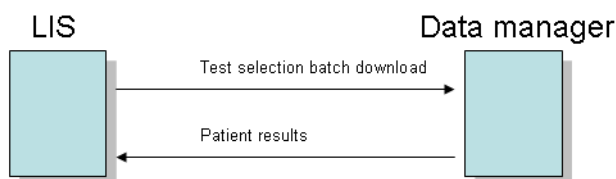
Figure B-2   Communication scenario for a batch test selection download

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 exits, or if there are no results , the *data manager* does not reply.
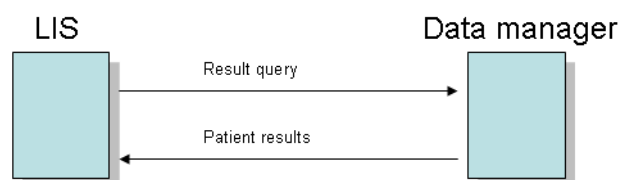
Figure B-3   Communication scenario for a result query

Order query   The host can send an order query, the *data manager* replies with the relevant test selection describing the order.
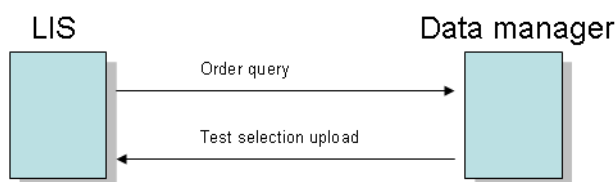
Figure B-4   Communication scenario for an order query

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 host sends a request for a sample ID that does not exist, then the *data manager* does not send a reply.

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.
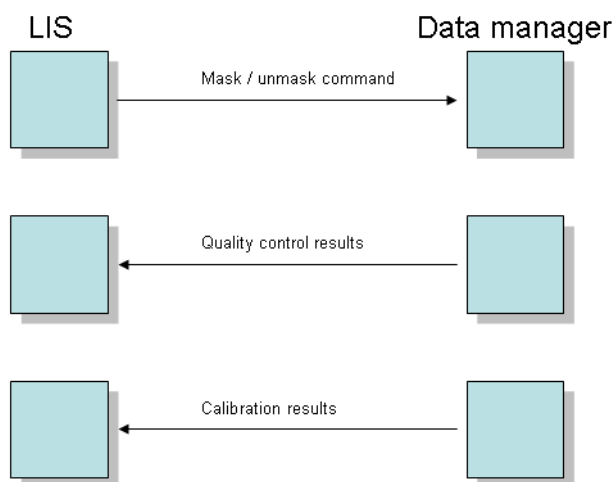
Figure B-5   Communication scenarios for independent messages

Details of message types

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

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 instrument sends an inquiry for test selections to the *data manager*, the *data manager* will return the test selections for that sample that are in the *data manager*'s database at that point in time.

If necessary, the host should also provide information about the rack and the sample's position on the rack, as well as the specimen information. The *data manager* will then use the sample ID sent with the test selection for future communication with the host.

When the **cobas®** 8000 data manager is configured to forward a query to the host it may forward the query message to the host. This depends on the settings within the system configuration screen. The query sent to the host contains always the container ID and the sample's position on the container and may also contain the sample identifier and specimen information if provided by the **cobas®** 8000 instrument.

Settings at the **cobas®** 8000 data manager and resulting behavior for the host interface:

Send query to LIS	Always Inquire	Behavior
N	**N**	Host has to send unsolicited test selections, the *data manager* sends no query at all to the host.
Y	**N**	The host may send unsolicited test selections. The *data manager* sends a query to the host only if there is no test selection in the *data manager*'s database for the sample identified in the query message sent by the instrument.
N	**Y**	*Not permissible*
Y	**Y**	The host may send unsolicited test selections, nevertheless the *data manager* always sends an inquiry message to the host.

👁 To see how to set these options, see *Test selection inquiry mode* on page B-23.

Sending patient test results

The measured test results for patient samples are sent from the *data manager* to the host. Additional information generated during the technical validation will be added to the result information provided by the instrument. This may include validator's name, used reference values and validation specific flags like LL, L, H and HH if the reference ranges are defined on the *data manager*.

In case that the pass-through mode for patient results is activated no manual technical validation is performed on the *data manager*. As soon as the results are sent from the instrument to the *data manager* they are forwarded to the host.

👁 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 for result uploads* on page B-25.

Sending quality control results

The measured quality control results are sent from the *data manager* to the host. The automatic sending of quality control results can be switched off on the **cobas®** 8000 data manager, by turning off the QC pass-through mode.

👁 For more information, see *Pass through for result uploads* on page B-25.

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.

Query message

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

Result query

The host sends 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".

Order query

The host sends 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.)

Masking

The host can send an instruction to the *data manager* to mask results from a certain test on a certain instrument. 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.

Message flow batch download from host

The following diagram shows the flow of messages (from top down) for ASTM communications for a batch order of three test applications in the rerun mode.
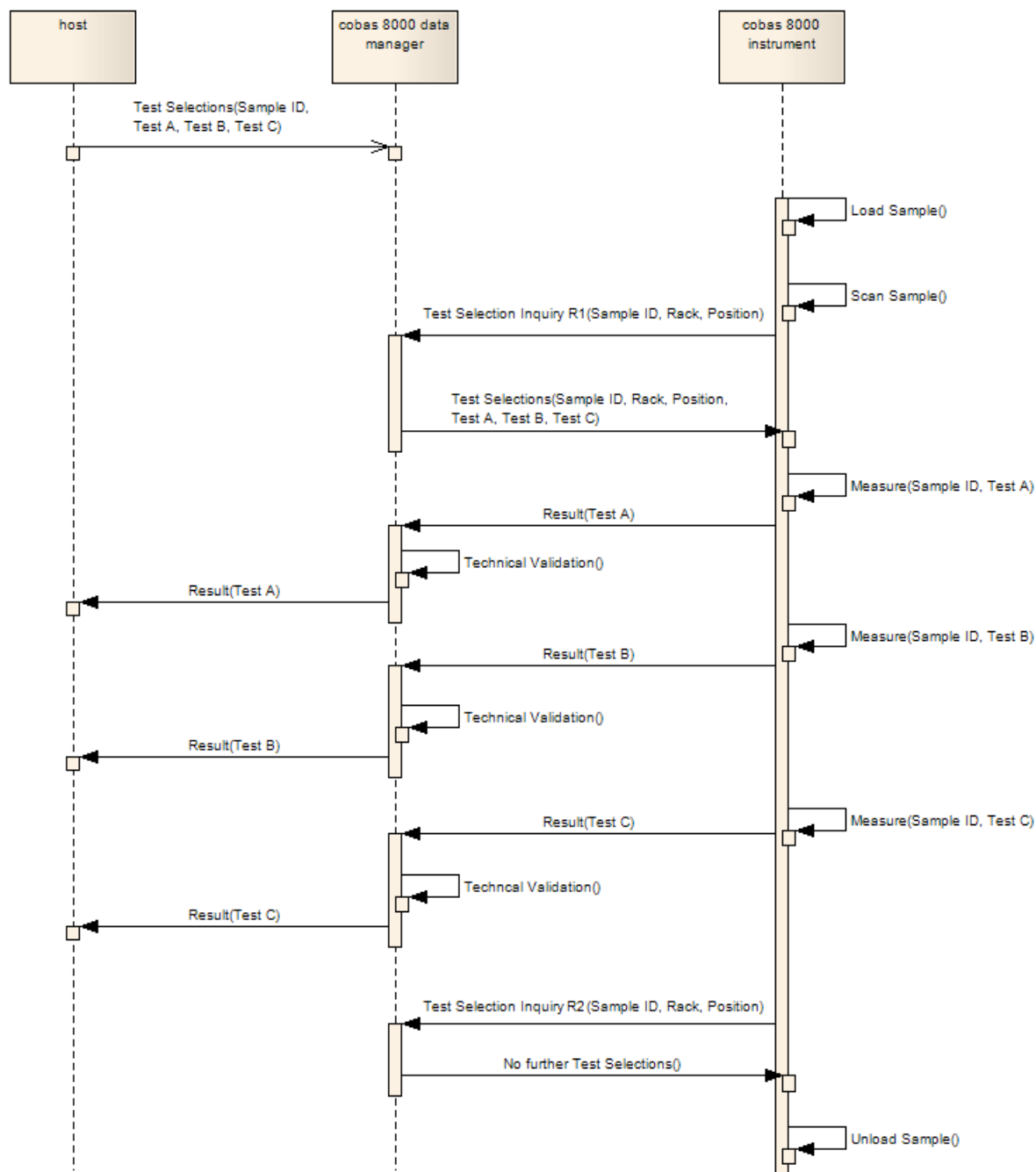
Figure B-6   ASTM messages for a batch order of three samples

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-thorough 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 the 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.
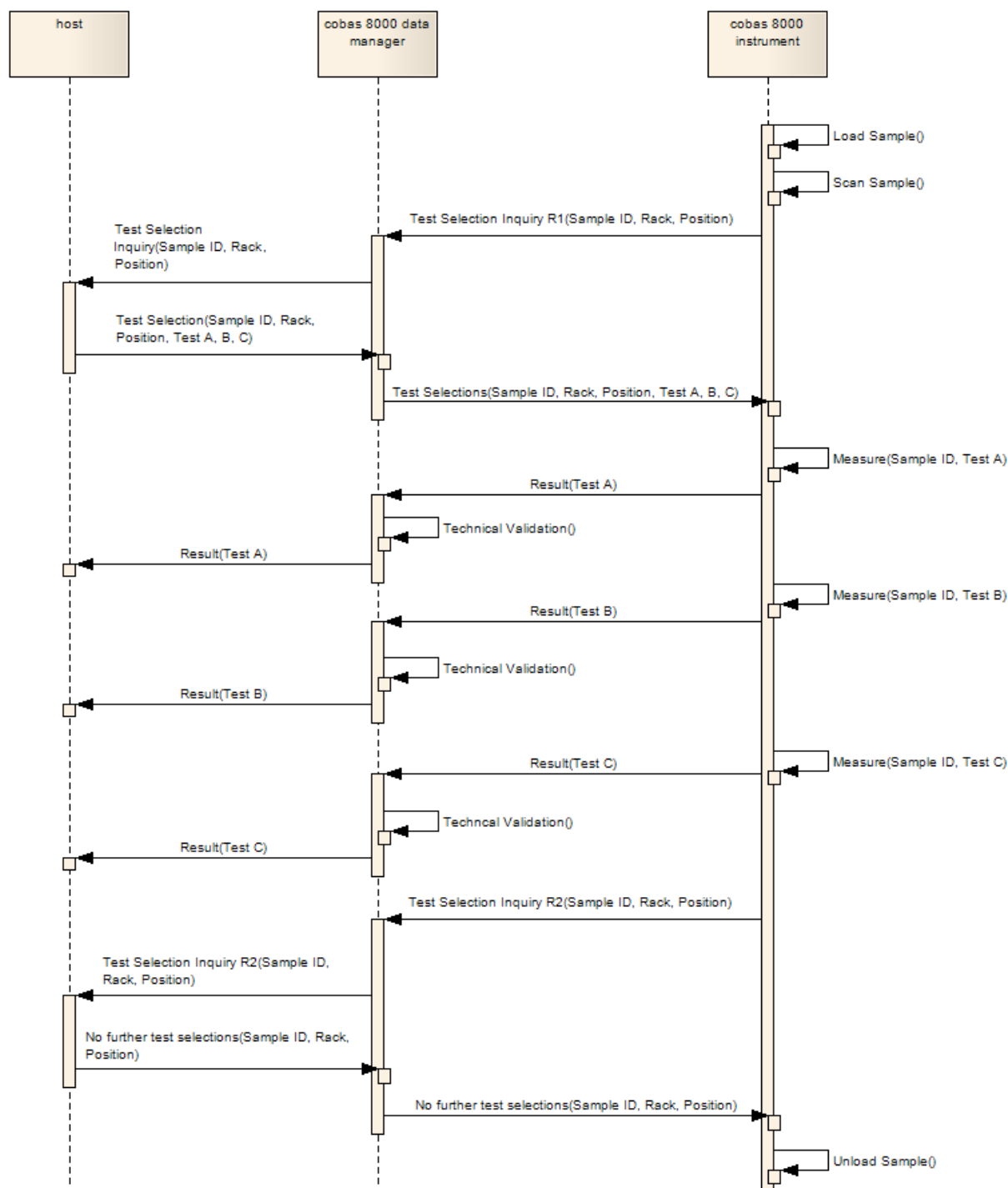
Figure B-7   Message flow for a Test Selection Inquiry from instrument / *data manager*

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. In the example above, no rerun/reflex tests were required.

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 or stopping a host connection

In *data manager*, communications with the host are controlled in the workplace *c8000 DM System Configuration Workplace*. In LISA Administration tasks, you can start or stop a host connection, or specify that a host connection should be started automatically when *data manager* starts.

⚠️
CAUTION

Implement only one host interface

Although configurations for several host connections are available here, it is important that only one of them is running at any time. (i.e. only one of ASTM-Network, ASTM-Serial, or HL7-Network.)

► **To set a network configuration to start automatically**

1 Log in as a user with Configuration privileges.

2 Navigate to the screen c8000 DM System Configuration Workplace > LISA Administration > Tasks.

3 From the list of tasks in the upper part of the screen, select the host communication you wish to use. With the right mouse button, select Automatic Start > Activate

To turn off automatic startup, follow the same process, but select Automatic Start > Deactivate
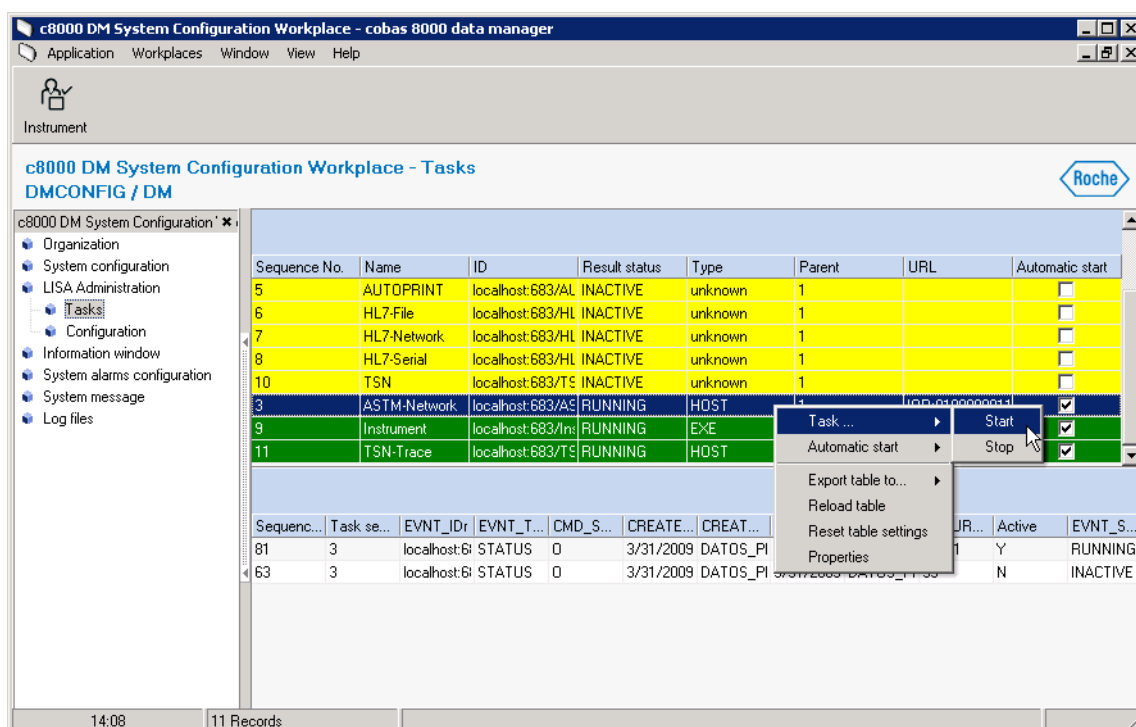
Figure B–8 c8000 DM System Configuration Workplace > LISA Administration > Tasks

You can manually start or stop a host interface or other task from the same right-button mouse menu by selecting Task... > Start or Task... > Stop. When you select a command in this screen, *data manager* implements it immediately, but the table takes

a few seconds to refresh. The status of each task is shown by the background color of the line:

Green	Running or active tasks
Yellow	Inactive but available tasks
Blue	Task selected with mouse-button
Grey	Task updating its settings in response to user instructions.

Configuring the host interface

This section describes how to configure the host interface in the *data manager* and the Control Unit.

To configure the system, you must log in as a user with configuration privileges, who can see the Service workplace.

► **To set up the interface options in *data manager***

1 Navigate to Service-related configuration > Interface options.

2 Select the appropriate settings from the display.

  ☉   For the correct use of these settings, see *Host interface options* on page B-22

Host interface options

When configuring the host interface, ensure that the settings in c8000 DM Service > Service-related configuration > Interface implement the required functionality.
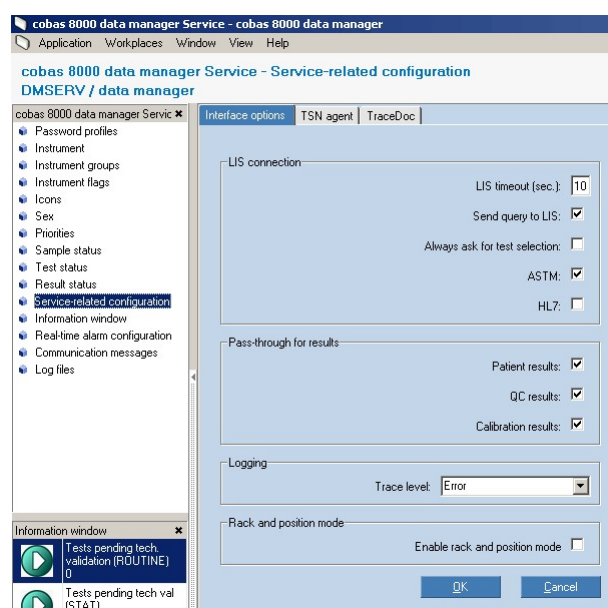
Figure B-9   Service-related configuration > Interface options

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Test selection inquiry timeout

The first three options in the interface options tab set values controlling queries that *data manager* makes to the host.

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. See time range **E** below in Figure B-10.

A	cobas® 8000 Control Unit	**D** Timeout on Control Unit in seconds.
B	**cobas®** 8000 data manager	Must be > (E + 2) secs.
C	Host (LIS / WAM)	Recommended is E + 8 secs.
		Default 18 secs.
		E Timeout on *data manager* in seconds.
		Must be < (D - 2) secs.
		Recommended is D - 8 secs.
		Default 10 secs.
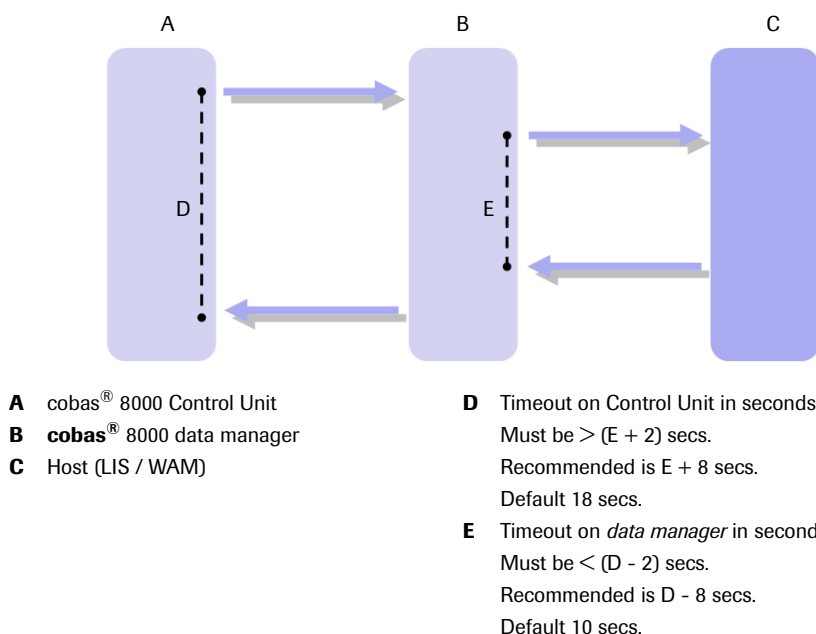
Figure B-10   Timeouts on Control Unit and *data manager*.

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.

⚠️ **CAUTION**

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 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, the host must send ACK messages in less than 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.

Test selection inquiry mode

The options *Send query to LIS* and *Always inquire for test selection* switch *data manager* between realtime mode and batch mode. 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 *data manager* always sends an inquiry message to the host. (Realtime mode)
Y	N	The host may send unsolicited test selections. The *data manager* sends a query to the host in case that there is no test selection in the *data manager*'s database for the sample identified in the query message sent by the instrument. ("Mixed" mode)
N	Y	*Not permissible*
N	N	Host has to send unsolicited test selections, the *data manager* sends no query to the host. (Batch mode)

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.

Therefore, if enabled, *Send query to LIS* configures *data manager* for "Realtime" or "Mixed" mode, depending on the setting for *Always inquire for test selection*. If disabled, it configures *data manager* for "Batch mode".

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. If enabled, *Always inquire for test selection* configures the *data manager* for "Realtime mode". If disabled, it configures the *data manager* for "Mixed mode" or "Batch mode", depending on the setting for *Send query to LIS*.

If all Test selections are introduced in the host, and if there is no Test selection manually entered at the *data manager*, then this function should be enabled. For consistency, if this option is selected, also set the option on the Control Unit called *Test selection inquiry always*, in Utility > System > Data Manager > Test Selection Inquiry Settings. This enables the same functionality on the Control Unit.

👁 For details of the Control Unit option *Test selection inquire always*, see *Test Selection Inquire Always* on page B-32.

Setting the communication protocol

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

ASTM
The ASTM option specifies communications over the ASTM protocol.

👁 For technical details of the ASTM protocol, see Chapter 6 *ASTM protocol (LIS2 - A2)*.

👁 For details of the data fields *data manager* supports over the ASTM protocol, see Chapter 7 *ASTM text content (LIS2 - A2)*.

HL7
The HL7 option specifies communications over the HL7 protocol.

👁 For technical details of the HL7 protocol, see Chapter 8 *HL7 protocol*.

👁 For details of the data fields *data manager* supports over the ASTM protocol, see Chapter 9 *HL7 text content*.

⚠️
CAUTION

To change the communication protocol

To change the protocol (ASTM <-> HL7) and/or the connectivity type (Network <-> Serial) further configuration is necessary. These will be set up by the service engineer.

Pass through for result uploads

These options tell *data manager* to automatically validate all results, and then pass them immediately to the host, including any flags.

Patient results

With the *Pass-through mode* checkbox selected, patient results are always forwarded to the host without manual validation. This overrides any manual and automatic validation settings in *data manager*.

If this checkbox is not selected, *data manager* will only forward patient results which pass automatic validation. More precisely, *data manager* will evaluate the patient results according its internal automatic validation settings specified in the Configuration workplace in Test/Reference Ranges. If the results fulfill these conditions, *data manager* sends the results automatically to the host. Otherwise, the results will be held back for manual validation, and *data manager* waits for an operator to release the results before passing them up to the host.

👁 For details on configuring automatic technical validation, see the Data Manager section of the *cobas® 8000 modular analyzer series Operator's Manual*.

QC results

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 modular analyzer series 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 modular analyzer series Operator's Manual*.

Logging settings

Trace level

From the **Trace level** drop-down menu, select the level of logging you require. In increasing quantity of information, the options are **No logging**, **Error**, **Warning**, **Information**, **Debug**.

This saves a log of the communications between the host and **cobas® 8000 data manager**, in the local directory, C:\data\log. The **No logging** level is not recommended. For troubleshooting purposes, it is recommended to set this to a higher level.

Rack and position mode

To configure *data manager* to process batch test selection downloads for samples without barcodes, enable the option **Enable rack and position mode** in **cobas 8000 data manager Service > Service-related configuration > Interface options**.

👁 For a more detailed description of how to implement this option, and other related options, see *Using a MODULAR PRE-ANALYTICS* on page E-39, and *Handling batch test selections with strict rack and position* on page E-41.

Getting a trace file from *data manager*

It is possible to get 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, for example, astm-serial.log or hl7-network.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-mesage.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 HL-7). These files may also contain a datestamp in the filename.

Other important files are:

• For uploaded results from the Control Unit to the *data manager*:

  `c:\data\log\instrument adapter\Channels\RS_Real.log.`*yyyy-mm-dd*

• For queries from the Control Unit to the *data manager*, and for test selection downloads from the *data manager* to the Control Unit:

  `c:\data\log\instrument adapter\Channels\TS_Real.log.`*yyyy-mm-dd*

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: Utility > System Overview
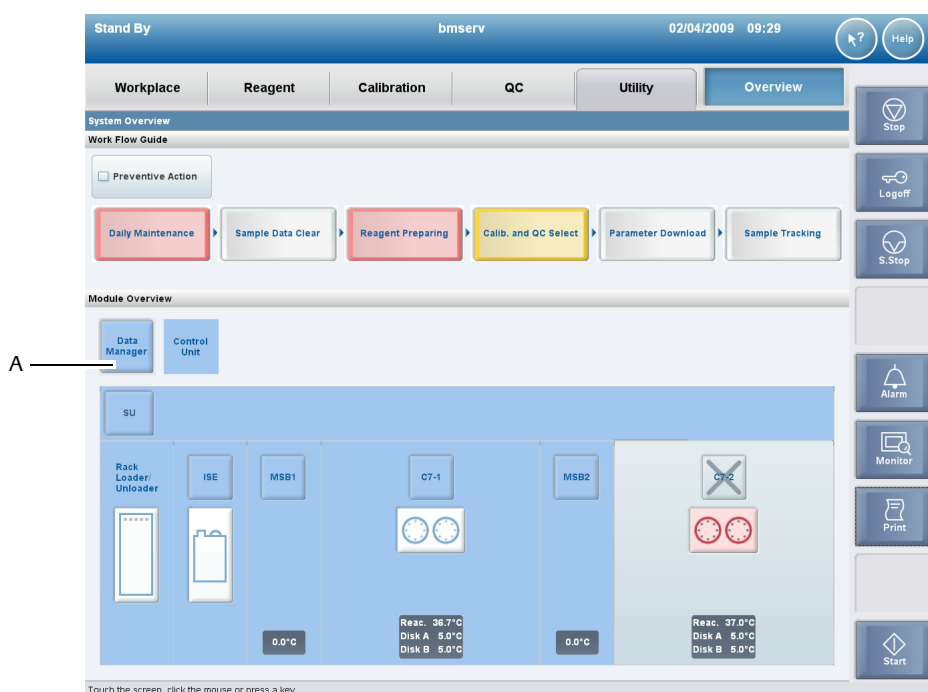
A Data Manager button

Figure B–11   The Control Unit screen at Utility > System Overview

2 In the section Module Overview, select the button Data Manager. The Data Manager Host Communication dialog appears.
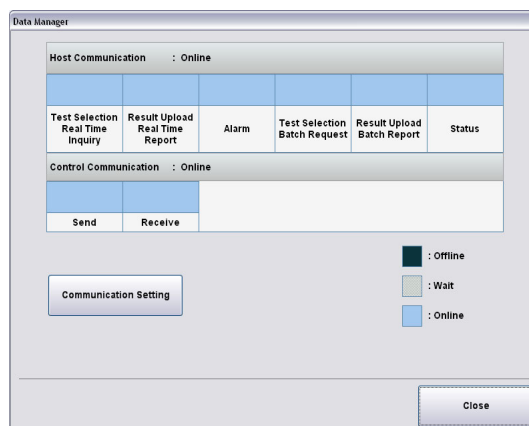
Figure B-12   The Data Manager Host Communication Status dialog on the Control Unit, at
Utility > System Overview > Module Overview > Data Manager

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.
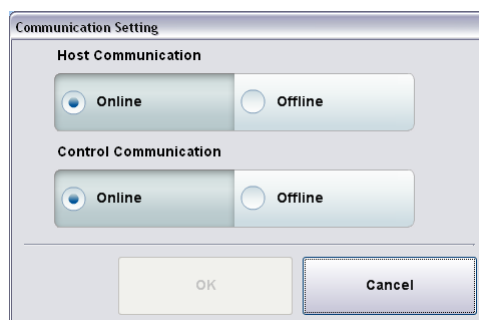
Figure B-13   The Communication Setting dialog on the Control Unit, at Utility > System
Overview > Module Overview > Data Manager > Communication Setting

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'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 B-14   Utility > System > Data Manager Settings > Communication Settings

In a production environment, the System (`cobas8000`) and Data Manager (`DataManager`) settings, including the ID settings, should be set as above in Figure B-14 on page B-29. The other options are reserved for future use.

Configuration of text settings

To configure the settings of text information sent to *data manager*, go to Utility > System > Data Manager Settings > Text Settings.
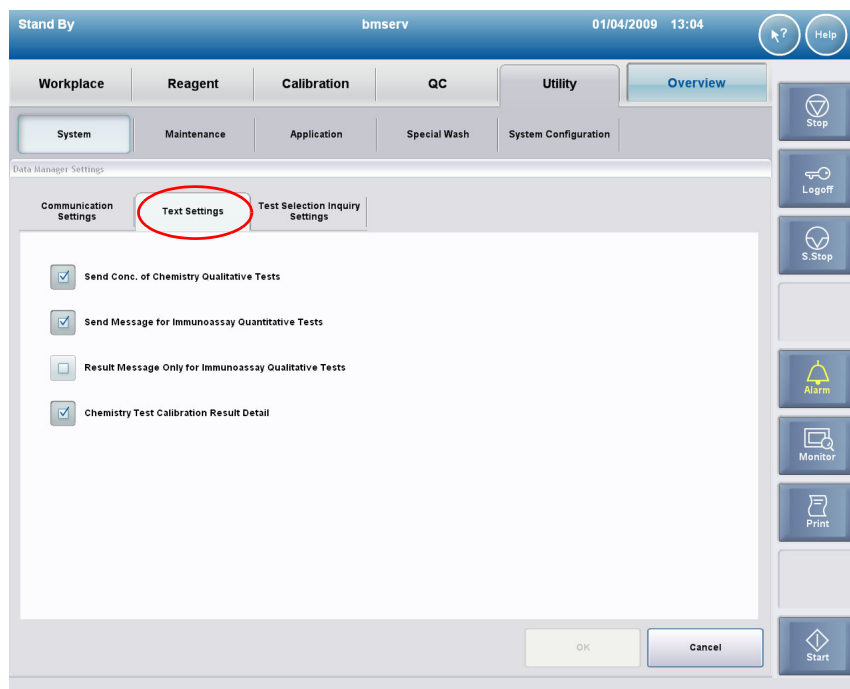
Figure B-15   Utility > System > Data Manager Settings > Text Settings

Send conc. of chemistry qualitative tests

This option must always be selected, when operating **cobas**® 8000 data manager in a production environment.

With this mode enabled, the concentration (i.e. actual numeric value) of the chemistry qualitative tests is sent to *data manager*, in addition to a qualitative result.

Send message for Immunoassay Quantitative tests

This option should always be selected, when operating **cobas**® 8000 data manager in a production environment.

When this function is enabled, the value for quantitative immunoassay is sent to the *data manager*.

Result message only for Immunoassay Qualitative tests

This option should not be selected, when operating **cobas**® 8000 data manager in a production environment.

When this function is enabled, the cut off index for immunoassay is not sent to the *data manager*.

⚠️ **CAUTION**

Result message only should be unselected 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

This option must always be selected, when operating **cobas**® 8000 data manager in a production environment.

When this function is enabled, the detail information (reagent lot number, reagent bottle sequence number, expired flag, calibrator lot number and pipetting date and

time) corresponding to the calibration result is sent to *data manager*. This is essential information for the internal operation of *data manager*.

Test selection inquiry settings

The Control Unit can be configured as regards how and when it sends inquiries about samples, (i.e. Test Selection Inquiries) in Utility > System > Data Manager > Test Selection Inquiry Settings.
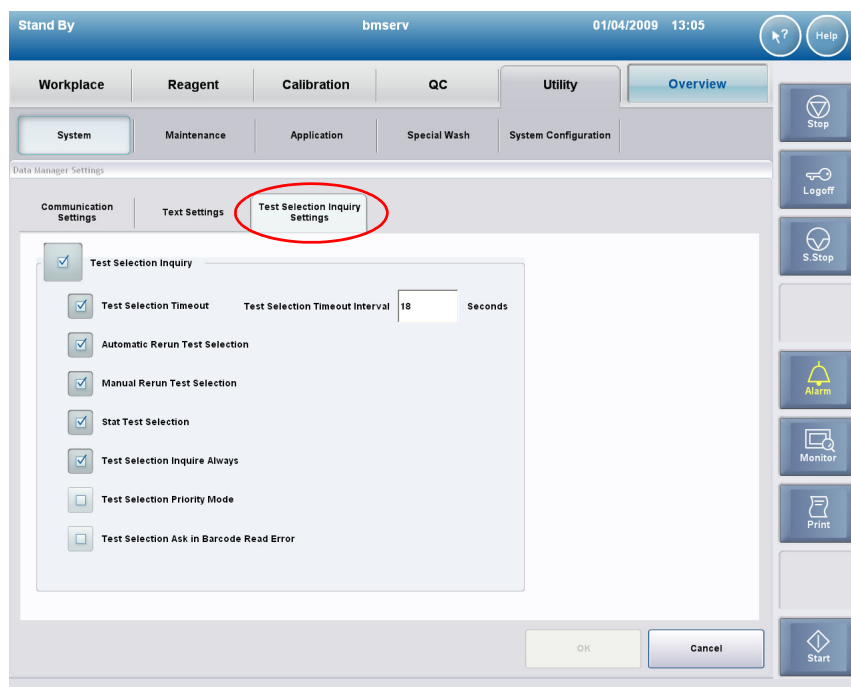
Figure B-16   Test Selection Inquiry Settings tab in the Data Manager Settings section of the Control Unit, in Utility > System > Data Manager.

Test Selection Inquiry   In production environments, the Test Selection Inquiry box must always be checked.

Test Selection Timeout   In production environments, the Test Selection Timeout box must always be checked.

The best value depends on the speed of communications in your system. This setting should be at least 2 seconds more than the timeout between *data manager* and host, but 8 seconds more is recommended. This gives enough time for the message to make the round-trip to the host and back. See **D** below in Figure B-17 on page B-32.

Default is 18 seconds. In production environments, it is recommended to set the Control Unit Test Selection Timeout to the default, and handle host communications timeouts on the *data manager*.

A	cobas® 8000 Control Unit	**D**	Timeout on Control Unit in seconds.
B	**cobas®** 8000 data manager		Must be $>$ (E + 2) secs.
C	Host (LIS / WAM)		Recommended is E + 8 secs.
			Default 18 secs.
		E	Timeout on *data manager* in seconds.
			Must be $<$ (D - 2) secs.
			Recommended is D - 8 secs.
			Default 10 secs.
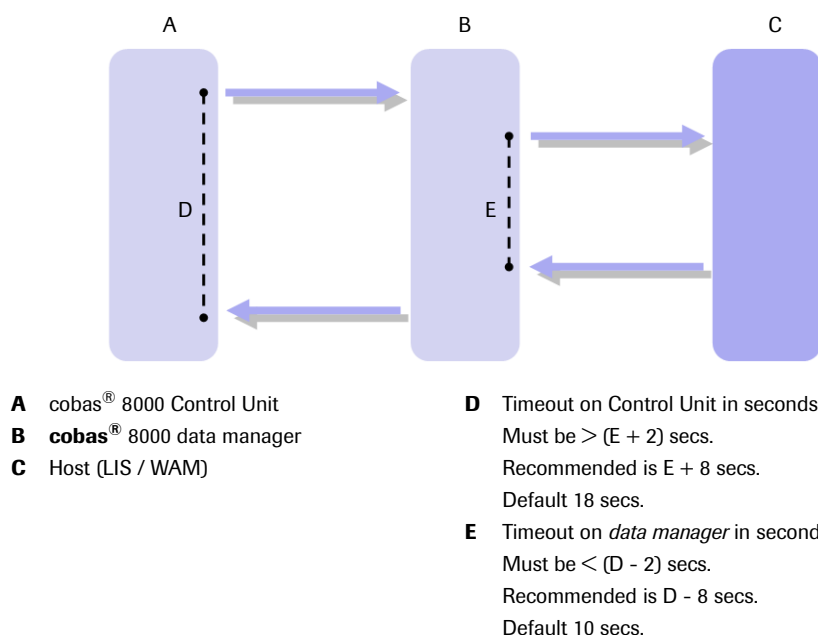
Figure B-17   Timeouts on Control Unit and *data manager*.

This option sets the timeout for Test Selection Information Inquiries for Realtime Communications and for routine, Stat and rerun samples.

Automatic Rerun Test Selection

When using the **cobas** 8000 data manager in production environments, the Automatic Rerun Test Selection must be checked, if Rerun and Reflex Orders are used.

This function applies to Auto Rerun TS inquiry within the Realtime Communications. When this function is enabled in the Auto Rerun mode during analysis, an inquiry is made for the Auto Rerun selections. The timeout is the same as that set for the Test Selection Timeout.

👁 To set automatic rerun, see *Setting automatic rerun* on page A-17.

Manual Rerun Test Selection

When using the **cobas** 8000 data manager in production environments, the Automatic Rerun Test Selection must be checked, if Rerun and Reflex Orders are used.

With a manual rerun, the operator manually reloads the sample on the instrument.

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

STAT Test Selection

When using the **cobas** 8000 data manager in production environments, the checkbox STAT Test Selection should be selected. This function applies to the Test Selection Information inquiry for STAT samples in Realtime Communications. When this function is enabled, an inquiry is made for the test selections for STAT samples during analysis. When this function is not enabled, no test Selection inquiry for STAT samples is made.

Test Selection Inquire Always

When using the **cobas** 8000 data manager in production environments, the checkbox Test Selection Inquire Always should be selected. When this function is

enabled, an inquiry is made whether the Test Selection information is in the Control Unit or not. When not enabled, an inquiry is made only for the samples that do not already have test selections.

This function applies to the Test Selection information inquiry for routine and STAT samples in Realtime Communications. This does not apply to Test Selection information inquiry for rerun samples or Auto Rerun Selection inquiries.

Test Selection Priority Mode

When using the **cobas®** 8000 data manager in production environments, the checkbox Test Selection Priority Mode must be selected.

If this function is enabled, after a Test Selection inquiry, the Control Unit will stop sending any information, i.e. result data, until the Control Unit receives the answer to the inquiry from the *data manager* or the Test Selection timeout period passes. This option applies to both the inquiry at the barcode reader and the inquiry after the last result upload per round.

With this checkbox selected, the range of the Test Selection timeout and Auto Rerun Test Selection timeout is from 1 to 18 seconds. With this checkbox unselected, the Test Selection Timeout options remain at 10 to 9999 seconds. If this checkbox is selected and the Test Selection Timeout checkbox is off, Test Selection timeout is handled as 18 seconds.

Test Selection Ask in Barcode Read Error

If sample tubes with a barcode are used, keep this option unselected. Most configurations use barcodes. If using barcodes, keep this option off, in order to generate an error on the instrument if there is an unreadable barcode. See **cobas® 8000 modular analyzer series Operator's Manual** for details on how the instrument operator will handle a barcode read error.

Only select this option if you are using samples without a barcode (Aliquots), for example from a **MODULAR** *PRE-ANALYTICS*. If this function is enabled, and the analyzer cannot read a sample barcode, it will send the rack ID and position of the sample to the *data manager*, which forwards the information to the host (in realtime mode). The sample ID is sent as a string of 22 asterisk characters: '**********************'. The host should have a table that matches the rack ID, position and Sample ID, and the host should reply with the correct Sample ID in the test selection message. After this, the host, *data manager* and Analyzer can use this Sample ID as the identifier.

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.

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.
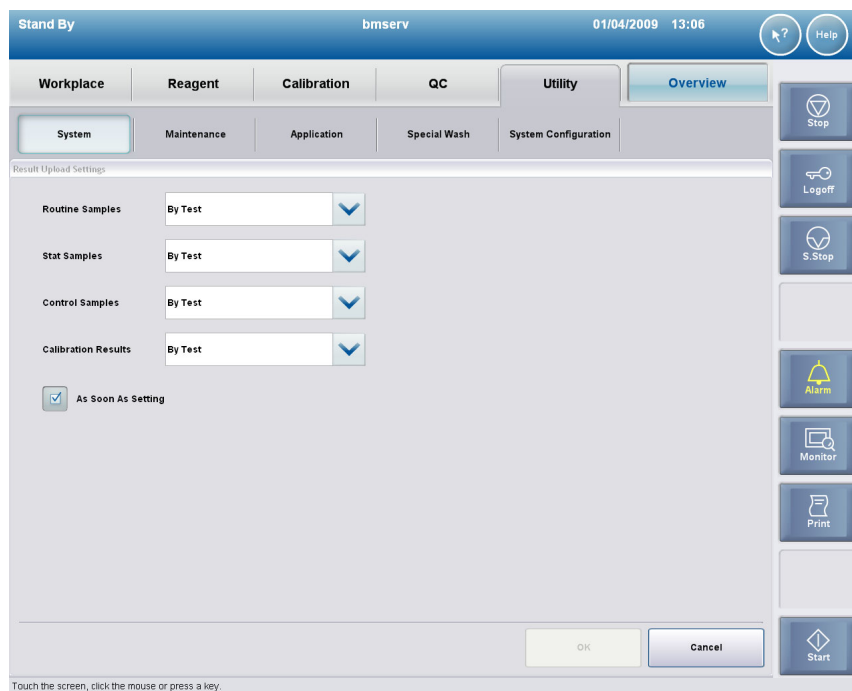
Figure B-18   Utility > System > Result upload

For maximum efficiency, it is recommended that you:

* set all these values to "By Test", and
* check the As Soon As Setting checkbox.

This tells the Control Unit to upload all results immediately, once they are available.

The other options are reserved for future use.

Getting a trace file from 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 button > Communication Trace.
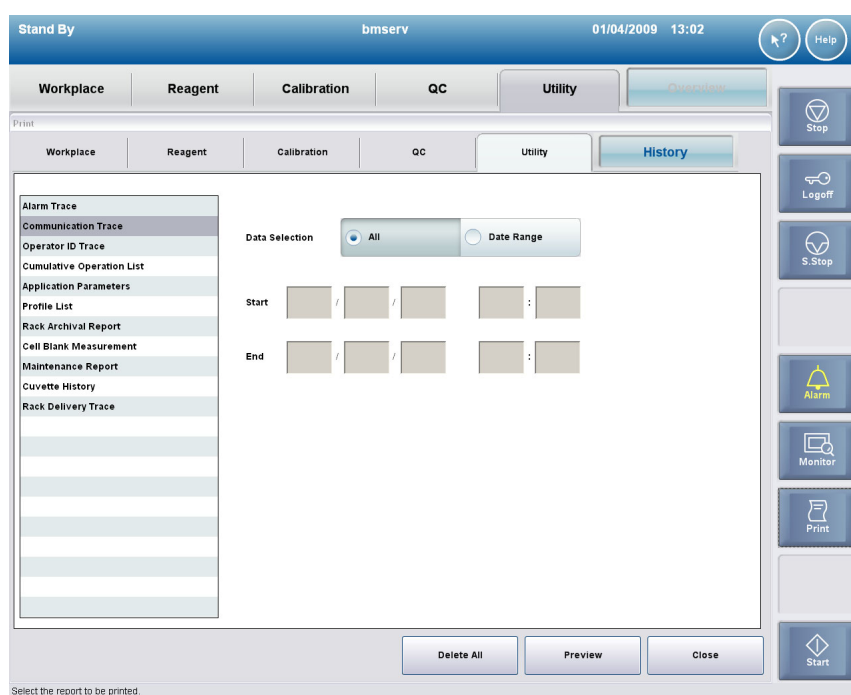
Figure B–19   Print > Utility > Communication Trace

► **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 B-20   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.

6 To display the file in the Control Unit, select the History tab.
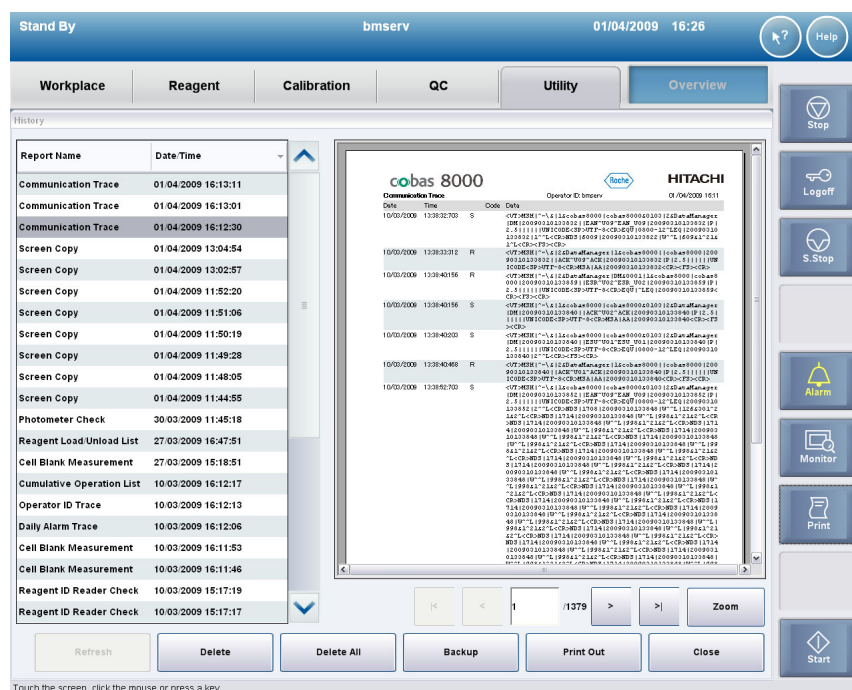
Figure B-21   Print > Utility > Communication Trace > Preview > History > Communication Trace

7   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.

8   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.

-🔅-   **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.

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

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.

> **⚠ WARNING**
>
> **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* on page E-90.

Host communication settings and cables

This section describes the cables required for a network or a serial connection, and where they have to be connected at the *data manager*'s machine.
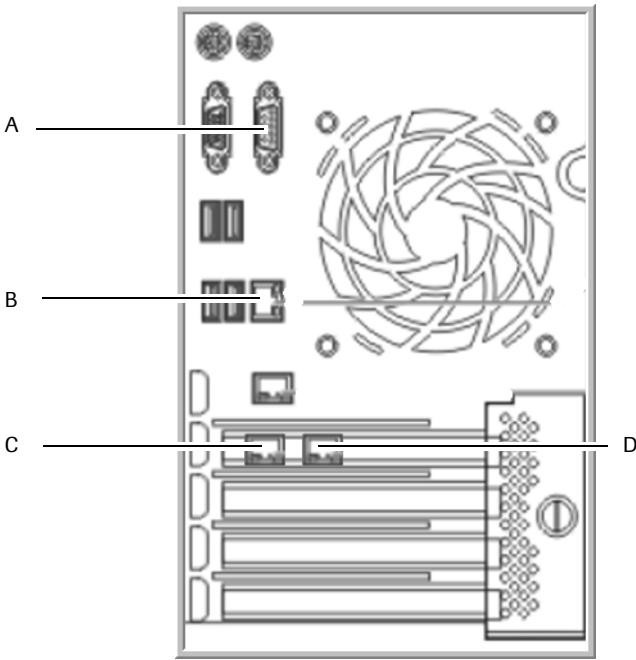
A	Serial RS232	**C**	LIS or host
B	Control Unit connection	**D**	cobas Link

Figure B-22   Cables for connecting the PC running *data manager*

The cables should be connected as above.

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.

Figure B-23   Cat.5e ethernet cable

A crossover cable and straight-through cable are both supported.

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.

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 port number is fixed to 50001
- For HL7, the 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 ASTM or HL7 port (by default 50001 or 50002 respectively).

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.

Serial connection

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

```
Host Cable
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

cobas® 8000
data manager            Host
DB 9 Female             DB 9 Female
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

TxD Pin 3 ─┐   ┌─ TxD Pin 3
RxD Pin 2 ─┘   └─ RxD Pin 2
RTS Pin 7 ┈┐   ┌┈ RTS Pin 7
CTS Pin 8 ┈┘   └┈ CTS Pin 8
DTR Pin 4 ┈┐   ┌┈ DTR Pin 4
DSR Pin 6 ┈┘   └┈ DSR Pin 6
DCD Pin 1         DCD Pin 1
GND Pin 5 ──────── GND Pin 5
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

────────  Required
┈┈┈┈┈┈┈┈  Optional
```
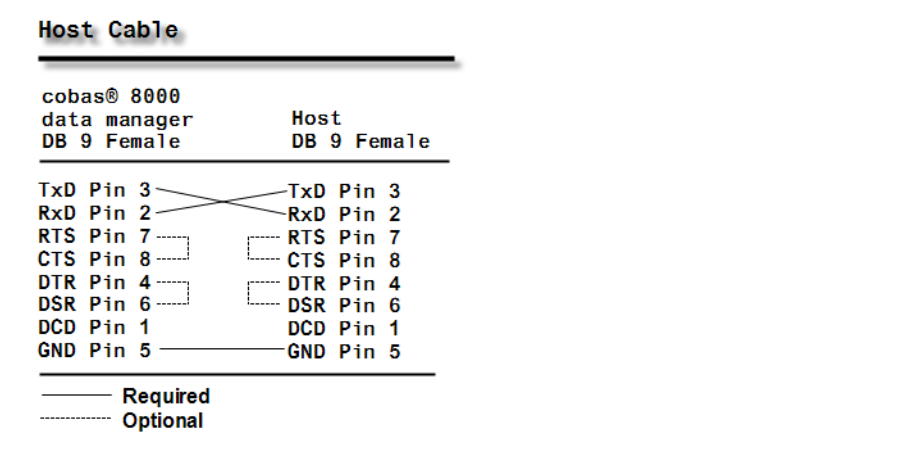
Figure B-24   Typical serial host interface connection cable for **cobas®** 8000 data manager

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

⚠ **CAUTION**

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
Communication Port	1
Electrical Signal	In accordance with EIA-232-D-1986
Cable Length	Maximum 15m
Communication speed (Baud rate)	19200
Parity	N
Databits	8
Stopbits	1

CAUTION

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 Roche Diagnostics service engineers to reconfigure the communication settings on individual sites according to individual requirements.

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.

CAUTION

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.

ASTM Reference **C**

ASTM protocol (LIS2 - A2)

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

In this chapter   *Chapter* **6**

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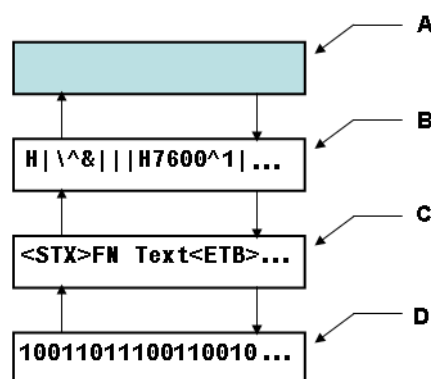
A	Application Layer. Server specification of host communication.	C	ASTM Lower Layer. ASTM E1381-91
B	ASTM Upper Layer. ASTM E1394-91	D	Physical Layer.

Figure C–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 <STX> FN text <ETB> C1 C2 <CR><LF> For Last Frame <STX> FN text <ETX> C1 C2 <CR><LF>	• Control character (characters enclosed in <>): <STX> is control character (HEX 02) <ETB> is control character (HEX 17) <CR> is control character (HEX 0D) <LF> is control character (HEX 0A) <ETX> is control character (HEX 03) • 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. • 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. • C1 and C2: When 1 byte resulting from adding each byte, FN to <ETB> for the middle frame and FN to <EXT> 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'.
Frame Character Configuration of Text	Characters other than <SOH><STX><ETX> <EOT><ENQ><ACK> <DLE><NAK><SYN> <ETB><CR><LF> <DC1><DC2><DC3> <DC4>	<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)
Maximum Length of the Frame	247 characters	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>.

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.

Message	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.
Record	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.
Field	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 '|'

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, it is recommended that a vertical bar '|' be used.

Repeat delimiter = backslash '\'

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, it is recommended that a backslash '\' be used.

Component delimiter = caret '^'

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, it is recommended that a caret '^' be used.

Escape character = ampersand '&'

CAUTION

Escape character not supported

The escape character is not supported in the current version of **cobas®** 8000 data manager (version 1.01). This functionality is planned for a future version.

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, it is recommended that an ampersand '&' be used.

Special characters with escape character

CAUTION

Special characters not supported

The escape character is not supported with special character in the current version of **cobas®** 8000 data manager (version 1.01). This functionality is planned for a future version.

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.

&F&	Indicates field delimiter
&S&	Indicates component delimiter
&R&	Indicate Repeat delimiter
&E&	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

A	Intermediate frame	**E**	Establishment phase (ACK must be sent within 10 ms.)
B	End frame		
C	Sender	**F**	Transfer phase
D	Receiver	**G**	Termination phase
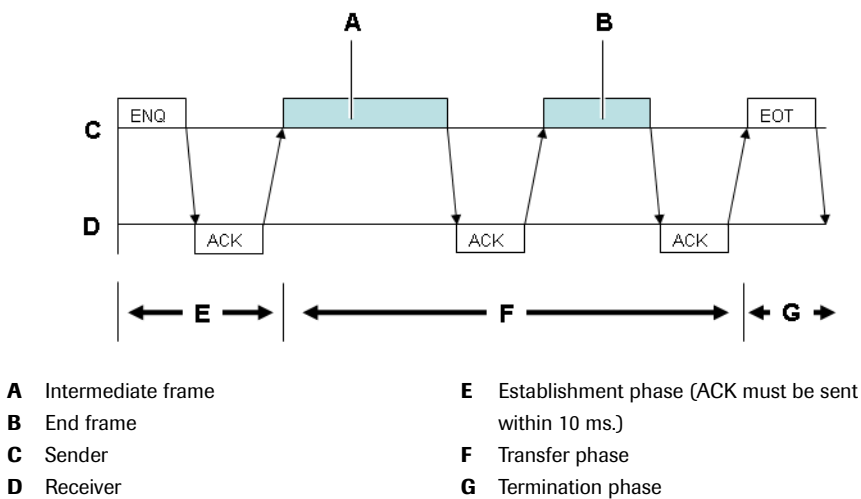
Figure C–2   Message Transaction Phases

CAUTION

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

[STX]	FN	Text first char .... Text last char	ETB	CH	CL	[CR]	[LF]
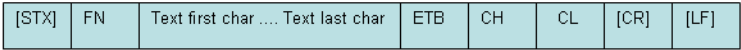
Figure C-3   The intermediate frame

[STX]	FN	Text first char .... Text last char	ETX	CH	CL	[CR]	[LF]

Figure C-4   The end frame

[STX]	The ASCII code 2, indicating the beginning of a frame transmission.
FN	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).
Text	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.
[ETB]	The ASCII code 23 (17hex), indicating the end of the text block of an intermediate frame.
[ETX]	The ASCII code 3, indicating the end of the text block of an end frame.
CH, CL	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
[STX]	02h	00h
'1'	31h	31h
'T'	+54h	85h
'e'	+65h	EAh
's'	+73h	15Dh
't'	+74h	1D1h
[ETX]	+03h	1D4h
	= 1D4h	
	Mod 100h	
	= D4h	

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

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* on page C-5.

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

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 (a)	Batch Communication
Test Selection Inquiry	*data manager* to Host	o	x
Auto Rerun Selection Inquiry	*data manager* to Host	o	x
Test Selection Information	Host to *data manager*	o	o
Automatic Rerun Selection Information	Host to *data manager*	o	x
Patient Sample Analytical Data	*data manager* to Host	o	o
Control Sample Analytical Data	*data manager* to Host	o	o

(a) o = available, x = not available

Messages transmitted by *data manager*

Messages transmitted from *data manager* to the host are shown in the table below.

The identifier is set in the Comment or Special Instruction Field in the Message Header Record with the reason for the messages.

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⁽ᵃ⁾
L
``` | TSUPL | Test selection for a sample as answer to an order query. |
| Result report | ```
H
    P
        O
        C
            {
              R
                C
            }⁽ᵇ⁾
L
``` | RSUPL | 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. |
| | | RSUPL^REAL | First upload of QC results |
| | | RSUPL^BATCH | Repeat upload of QC results that were uploaded before (ordered by operator on machine) |
| 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-PCR
L
``` | ICUPL^REAL | Reports at the point when the ISE calibration results are output. |
| Elecsys Calibration Result Report | ```
H
    M-PCR
L
``` | ECUPL^REAL | Reports at the point when the Elecsys calibration results are output. |

(a) Mandatory in this case.

(b) May be multiple results in an order.

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] [a]
	L
		TSDWN	Test selection for a sample as 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 *data manager*, sent from host.

(a) Comments are optional

Record description

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. *Specification for Transferring Information Between Clinical Laboratory Instruments and Information Systems: Approved Standard, Second Edition.* NCCLS document LIS2-A2 [ISBN 1-56238-550-X]. NCCLS, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2004.
Value	This shows either: • The precise text to be sent. • The format of the field. The format of the field can take one of the following values: • *Character.* A single character. • *String*: A character string. • *Number*: A numeric value. Positive (+) or negative (-) is indicated before the numeric value. If it is not indicated, it is treated as positive (+). 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. • *Date.* 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. • *Time*: Military time. The format is HHMMSS (HH is the hour, MM is the minute, and SS is the second). • *DateTime.* A combination of DT and TM. The format is: YYYYMMDDHHMMSS. • *Complex.* A field in which multiple data components are combined, separated by a component delimiter. Each component may take one of the other formats.
Host	If sent from the host or LIS, this field is either: • R, required • O, optional
DM	If sent from *data manager*, this field is either: • R, required • O, optional
Description	A description of the field, including use and permitted values. In the case of complex fields, this includes a description of individual components.

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.

WARNING

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 8000^1.01|||||host|TSREQ|P|1|20090326142034|
H|\^&|12345||cobas 8000^1.01|||||host|TSUPL|P|1|20090326142034|
H|\^&|12345||cobas 8000^1.01|||||host|RSUPL|P|1|20090326142034|
H|\^&|12345||cobas 8000^1.01|||||host|RSUPL^REAL|P|1|20090326142034|
H|\^&|12345||cobas 8000^1.01|||||host|RSUPL^BATCH|P|1|20090326142034|
H|\^&|12345||cobas 8000^1.01|||||host|PCUPL^REAL|P|1|20090326142034|
H|\^&|12345||cobas 8000^1.01|||||host|ICUPL^REAL|P|1|20090326142034|
H|\^&|12345||cobas 8000^1.01|||||host|ECUPL^REAL|P|1|20090326142034|
H|\^&|12345||host|||||cobas 8000^1.01|TSDWN|P|1|20090326142034|
H|\^&|12345||host|||||cobas 8000^1.01|RSREQ|P|1|20090326142034|
H|\^&|12345||host|||||cobas 8000^1.01|TSREQ|P|1|20090326142034|
```

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: • | Field delimiter = vertical bar [ascii 124] • \\ Repeat Delimiter = backslash [ascii 92] • ^ Component Delimiter = caret [ascii 94] • & Escape character = ampersand [ascii 38] (not supported)
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* • *Sender* is a fixed value: cobas 8000 • *Version* is the *data manager* version (numeric value).

Roche Diagnostics

Field	Ref.	Value	Host	DM	Description
			O	-	Sender ID. Sent from host, an identifier for the host is required, but it may optionally include version: *Sender^Version.*
6	6.6	*Field contains no data.*			
7	6.7	*Field contains no data.*			
8	6.8	*Field contains no data.*			
9	6.9	*Field contains no data.*			
10	6.10	*String*	O	R	Receiver ID. Fixed value. Sent from *data manager*, is: • `Host` Sent from host, is optionally: • `cobas 8000.` (In which case it is used only for tracing purposes.)
11	6.11	*Complex*	R	R	Identifier for the message type and purpose. Format: *Type^Mode.* 👁 For details of permitted values, see *Identifier for message type* on page C-20.
12	6.12	P	O	R	Processing ID, fixed value P, meaning production.
13	6.13	1	O	R	Protocol version, fixed value. (Meaning LIS2-A2.)
14	6.14	*DateTime*	O	R	Time and date the message was created.

Identifier for message type

Field 11 of the Header Record contains a string that identifies the type of message that is sent. The *data manager* uses this string to write information to the trace file, to assist in identifying what type of message has been sent. These values are used by *data manager* for tracing only.

TSREQ	Test selection request, from *data manager* to host, or from host to *data manager*.
TSDWN	Test selection download, from host to *data manager*.
TSUPL	Test selection upload, from *data manager* to host.
RSREQ	Result request, from host to *data manager*.
RSUPL	Result upload, from *data manager* to host.
PCUPL	Photometry calibration report, from *data manager* to host.
ICUPL	ISE calibration report, from *data manager* to host.
ECUPL	Elecsys calibration report, from *data manager* to host.
RSUPL^REAL	First transmission of the QC results, from *data manager* to host.
RSUPL^BATCH	Repeat transmission of QC results, from *data manager* to host, or a sample result upload from *data manager* to host in reply to a result query.

Patient Information Record

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

```
P|1||SH25111965M||Heesch^Stefan||19651125|M|
```

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	*Field contains no data.*			

Field	Ref.	Value	Host	DM	Description
4	7.4	*String*	O/R	O/R	Laboratory-assigned patient identifier.
					This field is mandatory only if some patient demographic data is sent, i.e. if one or more of fields 6, 8, or 9 contain data.
					The *data manager* cannot handle a patient ID that consists only of a question mark: ?.
5	7.5	*Field contains no data.*			
6	7.6	*Complex*	O	O	Patient surname and first name, in separate components:
					`Surname^Firstname`
7	7.7	*Field contains no data.*			
8	7.8	*Date*	O	O	Patient's birthdate. (YYYYMMDD)
9	7.9	*Character*	O	O	Patient sex:
					• `M` Male
					• `F` Female
					• `U` Unknown
All following patient record fields contain no data.					

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 message

`O|1|500169|^50017^3^^S1^SC|^^^8706^|R||||||A||||1|||||||||||O`

Order record in Result Upload message

`O|1|110005|0^110005^2^^S1^SC^not|^^^989^1\^^^990^1\^^^991^1|R|`
`20100429161525|20100429161525||||N||||1|||||||||||F|`

Order record in Quality Control result message

`O|1|HBCN^611490^1|0^30001^2^^QC^SC^not|^^^870^1|R||||||Q||||4|`
`|||||||||F|`

Field	Ref.	Value	Host	DM	Description
1	8.4.1	`O`	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	R	Identifier for the sample. Except for quality control material, this is the sample's barcode (string of max. 22 characters padding not allowed),
					For Quality Control material, `Name^Lot^ID`
					• `Name` Control name, e.g. `PNU`
					• `Lot` Control lot
					• `ID` Control identifier (a unique control ID contained in *data manager*)
					Ordering test selections for QC is not possible from host.
4.	8.4.4	*Complex*	R	R	Instrument sample identifier, with additional information for identifying the sample.
					`Sample_Number^Rack_ID^Position^^Rack_Type^Container^Diluted`
					👁 For details, see *Instrument sample identifier* on page C-22.

Field	Ref.	Value	Host	DM	Description
5	8.4.5	*Complex*	O	R	Testcode with dilution factor. `^^^Testcode^Dilution` 👁 For details, see *Testcode with dilution factor* on page C-23. If the host has no pending test, the host must send a Test Selection Download message with this field empty. If the *data manager* has no pending test, the *data manager* sends a Result Upload message with this field empty.
6	8.4.6	*String*	R	R	Priority. If this data is inconsistent with the actual rack the sample is on, then the c8000 instrument refuses the test. • R Routine • S STAT
7	8.4.7	*DateTime*	O	O	Date and time of order creation
8	8.4.8	*DateTime*	O	O	Date and time of sample collection
9	8.4.9	*Field contains no data.*			
10	8.4.10	*Field contains no data.*			
11	8.4.11	*Field contains no data.*			
12	8.4.12	*Character*	R	R	Action code. This instructs the system that receives the message what action to take in response to the message. 👁 For details, see *Action code* on page C-24.
13	8.4.13	*Field contains no data.*			
14	8.4.14	*Field contains no data.*			
15	8.4.15	*Field contains no data.*			
16	8.4.16	*Character*	R	R	Specimen type. The specimen type must match the second character of the rack type except for QC samples. 👁 For details, see *Specimen type* on page C-25.
17	8.4.17	*Field contains no data.*			
18	8.4.18	*Field contains no data.*			
19	8.4.19	*Field contains no data.*			
20	8.4.20	*Field contains no data.*			
21	8.4.21	*Field contains no data.*			
22	8.4.22	*Field contains no data.*			
23	8.4.23	*Field contains no data.*			
24	8.4.24	*Field contains no data.*			
25	8.4.25	*Field contains no data.*			
26	8.4.26	*Character*	R	R	Report type, indicating source of message. • O Sent from host. • F Sent from *data manager* / **cobas**® 8000 modular analyzer seriess.

Instrument sample identifier

Field 4 of the order record contains an identifier for the instrument, plus additional information to identify the sample.

`Sample_Number^Rack_ID^Position^^Rack_Type^Container^Diluted`

Sample_Number   When sent by the host, this contains the Sample ID.

When sent by *data manager*, this is set to 0 (zero), and the value is ignored when received by host.

Rack_ID ID of the sample rack with 5 samples. Not sent with result records with manually-entered results.

Position Sample's position on the rack. Value 1 to 5. Not sent with result records with manually-entered results.

Rack_Type A two character code, identify the rack type:

S1	Serum / Plasma
S2	Urine
S3	Cerebral spinal fluid
S4	Supernatant
S5	Other fluids
S6	Whole blood
S7	Oral fluids (Saliva)
S8	Reserved
S9	Reserved
SA	Reserved
QC	Quality Control

Container A two-character code, identifying the container.

MC	Micro Cup
SC	Standard Cup
(No value)	Default (Information available at the instrument is used)

Diluted A flag indicating if the sample is diluted or not.

not	Normal sample
pre-diluted	Prediluted sample
(No value)	Normal sample

Testcode with dilution factor

Field 5 of the Order Record contains the testcode, in other words the code that identifies the test to run on the sample or the analyte to search for.

From the host to the *data manager*, this field contains:

`^^^Testcode^Dilution`

From the *data manager* to the host, this field contains:

`^^^Testcode`

The first three components of this field are empty.

Testcode The fourth component contains the code to identify the test (i.e. the application code or analyte tested for). This is a 1 to 5 digit number: the *data manager* takes the last 5 digits and strips any leading zeros.

Dilution The fifth component contains the dilution factor.

For tests measured on an ISE module, the only permitted value for dilution is one: `1`. This means no dilution.

For tests measured on a C-module, the permitted values for dilution are:

- `Inc`
- `Dec`
- `1` (meaning no dilution)

For tests measured on a E-module, the permitted values for dilution are:

- `1` (meaning no dilution)
- `2`
- `5`
- `10`
- `20`
- `50`
- `100`
- `400`

This field is often repeated, for example:

```
O|1|1234|0^00083^5^^S1^SC|^^^989^1\^^^990^1\^^^991^1|S|20090326152611|
20090326152611||||N||||1|||||||||||F|
```

If the host has no pending test, the host must send a Test Selection Download message with this field empty.

Action code

Field 12 of the Order Record contains the "Action code". This instructs the receiver how to process the message.

If sent by the host:

A	Add the test.
	If the test already exists for the sample, the *data manager* will rerun the test.
R	Rerun the test.
	If the test does not exist for the sample, the *data manager* will add the test.
C	Cancel the test.
	The test can only be canceled before it has been downloaded to the **cobas**® 8000 modular analyzer series instrument.

If sent by the *data manager*:

N	Patient result
Q	Quality Control result
O	Order query response (test selection upload)

Specimen type

Field 16 of the Order Record has a code, one character long, showing the specimen type. 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.

1	Serum / Plasma
2	Urine
3	Cerebral spinal fluid
4	Supernatant
5	Other fluids
6	Whole blood
7	Oral fluids (Saliva)
8	Reserved
9	Reserved
A	Reserved

The specimen type must match the second character of the rack type (field R-4), except for QC samples.

Comment Record (following Order Record)

Record to transfer comments. This record is transmitted by the host (within test selection message) or the Control Unit (within result message).

`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.

Field	Ref.	Value	Host	DM	Description
1	10.1	C	R	R	Record Identifier, fixed value.
2	10.2	*Number*	R	R	Sequence number.
					The first comment relating to the preceding Order record takes the sequence number 1. The sequence number increments by one for each further comment for that Order record.
3	10.3	*Complex*	R	R	Comment source.
					• I The **cobas®** 8000 modular analyzer series instrument created the comment. The *data manager* passes it with the I flag.
					• L Host or *data manager* created the comment, for example, in the case of the *data manager* in a manually-edited result.
4	10.4	*Complex*	O	O	The format (when sent after an order record:
					comment1^comment2^comment3^comment4^comment5
					• comment1 String with up to 30 characters
					• comment2 String with up to 25 characters
					• comment3 String with up to 20 characters
					• comment4 String with up to 15 characters
					• comment5 String with up to 10 characters
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.

Result Record

Full result record showing most available fields.

```
R|1|^^^999/1/not|2.3|mmol/L|.5^7.5^TECH/^^NORM/^^CRIT/^^USER|N||F||
bmsrv^DMROUTINE|20090311163455|20090311163455|ISE^1^0800-09^3|
```

For an automatically-validated result, the operator is written as "SYSTEM".

```
R|1|^^^870/1/not|17.30|g/dL||||F||bmserv^SYSTEM|20091218164500|
20100429165317|22^1^MU1#c502#2#1^9^0^Current|
```

```
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^SYSTEM|
20091218164600|20100429161525|ISE^2^MU1#ISE#1#2^4|
```

Field	Ref.	Value	Host	DM	Description
1	9.1	R		R	Record identifier for Result record, fixed value.
2	9.2	*Number*		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	*Complex*		R	Test request
					`^^^Testcode/Dilution/Pre-dilution`
					👁 For details, see *Test request* on page C-27.
4	9.4	*Complex*		R	Measurement value.
					The measurement values are only transtmitted for patient and QC results.
					`ReportableResult^AdditionalResultValues`
					• `ReportableResult`
					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. The codes can be configured on the **cobas**® 8000 instrument, under Utility > Application > Range, see *cobas*® *8000 modular analyzer series Operator's Manual* for details.
					• `AdditionalResultValues`
					For quantitative results, this is empty or contains a qualitative flag.
					For qualitative results, this contains the quantitative result.
5	9.5	*String*		R	Units in which result is measured. (e.g. mmol/L, etc.)
6	9.6	*Complex*		O	Reference ranges, if defined. These take the format:
					`RangeDefinitionString^TypeOfRange`
					👁 For details, see *Reference ranges* on page C-27.
					This field is empty for QC and calibration results.
7	9.7	*String*		O	Result abnormal flags for patient results. This is empty for manually-edited results.
					👁 For details of permitted values, see *Result abnormal flags* on page C-28.
8	9.8	*Field contains no data.*			
9	9.9	*Character*		R	Result status. This can take:
					• F = First run result, or QC result
					• C = Corrected result
					• M = Manually edited result
10	9.10	*Field contains no data.*			

Field	Ref.	Value	Host	DM	Description
11	9.11	*Complex*		R	Active operators in the format:
					`Instrument operator^Datamanager operator`
					This is the username the operator used to log into the Control Unit , and *data manager* respectively, unless the *data manager* is in pass-through mode, when the second value reads `SYSTEM`.
12	9.12	*DateTime*		O	Pipetting time. This is considered to be the time the test started. (Format: YYYYMMDDhhmmss.)
					Note: In the case of manually-performed test this field is empty.
13	9.13	*Datetime*		R	Time result is available (i.e. time of validation at the *data manager*). (Format: YYYYMMDDhhmmss.)
14	9.14	*Complex*		R	Identifier of the measurement module that performed the test.
					`ModuleType^SubModule^UnitID^InstrumentID^CalID^Bottle^SBNo`
					👁 For details, see *Equipment instance identifier* on page C-29.

Test request

Field 3 of the Result record gives details about the test that was performed.

`^^^Testcode/Dilution/Pre-dilution`

Testcode	Identifier (or application code) for the test (analyte searched for), used by the **cobas®** 8000 modular analyzer series.
Dilution	Dilution factor, as sent by the **cobas®** 8000 modular analyzer series instrument.
	Permitted values are:
	• For an ISE module, the only value that can be used is: `1`
	• For a C-module: `Dec`, `Inc`, `1`
	• For an E-module: `Dec`,`1`, `2`, `5`, `10`, `20`, `50`, `100`, `400`
Pre-dilution	Indicates if the sample is pre-diluted. Permitted values are:
	• `pre-diluted`
	• `not`

Reference ranges

Field 6 contains details of the reference ranges used for patient samples, if any reference ranges have been defined. This field is empty for QC and calibration results.

The reference ranges take the format:

`RangeDefinitionString^TypeOfRange`

The `RangeDefinitionString` component can consist of the any of the following:

- Two numbers separated by space-hyphen-space, e.g.

  `.5 - 7.5`

  Note that either or both of these number may potentially be negative, e.g.

  `-7 - -10`
- A "greater than" or "less than" value, e.g.

  `<0.1`
- A comma-separated string of permissible values, e.g.

  `Y,N,U`

  `-,+,++`

The *TypeOfRange* component can consist of any of four values.

- TECH Hard-coded value to indicate "Technical Range"
- NORM Hard-coded value to indicate "Normal Range"
- CRIT Hard-coded value to indicate "Critical Range"
- USER Hard-coded value to indicate "User Range"

Any or all of these four values can occur in the same record as a repeat field, for example:

```
.5 - 7.5^TECH\3.3 - 5.1^NORM\^CRIT\^USER
```

Note that the different ranges are separated with the repeat delimiter, a backslash "\". If a range is not defined, the *RangeDefinitionString* is blank.

Result abnormal flags

Result record, field 7, presents the following flags identifying the level of the results:

HH	Above repeat high
H	Above high normal
N	Normal
L	Below low normal
LL	Below repeat normal
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.

Multiple flags are permitted as a repeat field. No value is sent with manually-edited results.

EP-17 flags The three flags, Limit of Blank, Limit of Detection, and Limit of Quantitation follow the CLSI standard EP-17A, and give three different possible definitions for the lowest level of meaningful measurement. Note that these values are not part of the ASTM definitions for the report abnormal flags, but an enhancement provided by the *data manager*.

- 👁 For a brief description of the meaning of the EP-17A flags, see *EP-17A and the result abnormal flags* on page B-7.

- 👁 For complete details of the EP-17A standard, 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.

Configuring the EP-17 flags The EP-17A levels for each analyte are configurable in the *data manager*. For details, see the ***cobas*** 8000 *Operators Manual.*

Equipment instance identifier

Field 14 of the Result Record contains the identifier of the measurement module that performed the test.

ModuleType^SubModule^UnitID^InstrumentID^CalID^Bottle^SBNo

ModuleType	• c502, c701, e602 , or ISE, showing the module that performed the test. • DM is sent to show that the result has been calculated on the *data manager.* • c8000 is sent for results that do not reach a submodule - e.g., a result that cannot be performed because the sample is short, or if all reagents for this test have run out. (The *data manager* assigns this value from the second sub-component of the *UnitID* in component 3.)
SubModule	1 or 2 shows the submodule that performed the test. 0 means the result was not obtained on either submodule, in the case of a manual or calculated result, or if the measurement failed. For example, if sample is assigned to e.g., c701 and then the reagent runs out on both rotors and the sample cannot be measured on either submodule. (The *data manager* assigns this value from the fourth sub-component of the *UnitID* in component 3.)
UnitID	Identifier for the module, as sent to the host. The default value is: *Instrument*#*ModuleType*#*Position*#*SubModule* Example: MU1#c502#2#1 👁 For details, see below, *Instrument identifier for the host* on page C-29.
InstrumentID	Instrument number in *data manager* (A specific identifier inside the *data manager* which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)
CalID	Calibration ID. Identifier of the calibration the result refers to.
Bottle	Used Reagent Set. • Current • Standby • empty Reserved field, only for QC measurements, otherwise empty.
SBNo	An integer showing the standby bottle number, if used. The standby bottles are numbered sequentially, starting with 1. Reserved field, only for QC measurements, otherwise empty.

Instrument identifier for the host

Each instrument and module defined in the *data manager* has a string that it sends to the host as its ID. The *data manager* sends the string in Field 14 of the Result Record, component 3. Ths identifies the module and instrument that performed the test. The same identifier is also passed in the calibration records M(PCR) Field 6, M(ICR) Field 5, M(ECR) Field 7.

Examples:

```
MU1#e602#1#1
MU1#ISE#1#1
MU1#C701#1#1
```

For results calculated on the *data manager*, the ID is:

`DM#DM#0#0`

For manually-edited results the ModuleType is by default `c8000`, and the Position and SubModule are zero, for example:

`MU1#c8000#0#0`

You can view these IDs in **Workplaces > Service > Instrument.**

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		
1	MU1	c8000	Hitachi	LAB1	0000-07	MU1#c8000#0#0	☑	5
2	ISE	ISE	Hitachi	LAB1	ISE#0800-09	MU1#ISE#1#0	☑	5
3	ISE(1)	ISE	Hitachi	LAB1	ISE#0800-09#1	MU1#ISE#1#1	☑	5
4	ISE(2)	ISE	Hitachi	LAB1	ISE#0800-09#2	MU1#ISE#1#2	☑	5
5	C7-1	c701	Hitachi	LAB1	c701#0800-08	MU1#c701#1#0	☑	5
6	C7-1(A)	c701	Hitachi	LAB1	c701#0800-08#1	MU1#c701#1#1	☑	5
7	C7-1(B)	c701	Hitachi	LAB1	c701#0800-08#2	MU1#c701#1#2	☑	5
8	c502	c502	Hitachi	LAB1	c502#0900-04	MU1#c502#2#0	☑	5
9	c502(A)	c502	Hitachi	LAB1	c502#0900-04#1	MU1#c502#2#1	☑	5
10	e602	e602	Hitachi	LAB1	e602#0900-07	MU1#e602#3#0	☑	5
11	e602(1)	e602	Hitachi	LAB1	e602#0900-07#1	MU1#e602#3#1	☑	5
12	e602(2)	e602	Hitachi	LAB1	e602#0900-07#2	MU1#e602#3#2	☑	5

Figure C-5   The instrument ID for host values in the *data manager*

Note that this field uses the hash symbol # to separate subcomponents, not the usual field or component delimiters `|` or `^`.

This identifier takes the format, by default:

`Instrument#ModuleType#Position#SubModule`

Instrument	Instrument number in *data manager*. (A specific identifier inside the *data manager* which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)
ModuleType	• `c502`, `c701`, `e602`, or `ISE`. • `DM` is sent to show that the result has been calculated on the *data manager*. • `cobas8000` is sent for results that do not reach a submodule - e.g., a result that cannot be performed because the sample is short, or if all reagents for this test have run out.
Position	The position of the module on the **cobas**® 8000 modular analyzer series.
Submodule	`1` or `2` shows the submodule that performed the test. `0` means the result was not obtained on either submodule, in the case of a manual or calculated result, or if the measurement failed. For example, if sample is assigned to e.g., c701 and then the reagent runs out on both rotors and the sample cannot be measured on either submodule.

Editing the instrument ID for host

This value is also editable in the *data manager* in **Workplaces > Service > Instrument >** [Select instrument] > [Shortcut menu] > **Edit instrument** > [field] **ID for Host**, but the default value is strongly recommended. Any edited value must keep to the same format.

- The *data manager* writes the value of `ModuleType` to Field 14 of the Result Record, component 1.
- The *data manager* writes the value of `SubModule` to Field 14 of the Result Record, component 2.

For example if a host required the Serial Number of the instrument as the first part of the **Instrument ID for Host**, then you could edit the Instrument ID to show it. For an ISE unit with the serial number 1048-12, this would be edited to:

```
1048-12#ISE#1#1
```

⚠️ **CAUTION**

Keep to the format

The **cobas®** 8000 data manager expects the identifier for the instrument to have the defined format. If you edit it, make sure to keep to the format.

`Instrument#ModuleType#Position#SubModule`

Although you can physically edit the entire field, you must keep the # separators and only make edits to the `Instrument` and `Position` values.

⚠️ **CAUTION**

Changes to be implemented in an upgrade

The **cobas®** 8000 data manager, version 1.0 passed the instrument's serial number in the Field 14 of the Result Record, component 3. However, with *data manager* version 1.01.01, it is not possible to send exactly the same identifier as in version 1.0. Therefore the host must be updated to implement the current identifier.

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.

```
C|1|L|Second comment^DMROUTINE^20090326164339|G|
```

```
C|2|L|Test done on instrument^DMROUTINE^20090326164238|G|
```

```
C|3|I|23^ISE Sample range over|I|
```

⚠️

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	Sequence number.
					The first comment relating to the preceding Order record takes the sequence number 1. The sequence number increments by one for each further comment for that Order record.

Field	Ref.	Value	Host	DM	Description
3	10.3	*Character*		R	Comment source: • `I` Instrument If the comment came from the instrument, then the *data manager* passes it on with the `I` flag here • `L` *data manager* If the *data manager* created the comment, e.g. in a manually-edited result, it passes the `L` flag here.
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. **Comment Type I** If the instrument has returned an error flag, the details of the flag are returned in this field. *Flag^Description* 👁 For details of these components, see *Instrument flags* on page C-32. 👁 For the meanings of the error flags, see Chapter 10 *Data Alarms*. **Comment Type G after result record** If the record is not passing an instrument flag, this field may contain a user comment. *Test^User^Date* 👁 For details, see *Comments entered by the user* on page C-32.
5	10.5	*Character*		R	Code for qualifying the comment record type. Comments sent by *data manager* can have the following types: • `I` Instrument flag • `G` Result comment created in *data manager* by an operator. The content of the comment is passed in field 4.

Instrument flags

If the instrument sends an error flag, it is passed in a type I comment record, identified with an `I` in field 5. The instrument flag is passed in field 4 of the Comment Record, with the following details.

Flag^Description

Flag	Number showing error status • 0 means no error • a number >0 is an error number. For details of the error flags, see Chapter 10 *Data Alarms*.
Desc	Description of error flag (blank if no error)

Comments entered by the user

If a user enters a comment, it is passed in a type G comment record, identified with a `G` in field 5. The comment itself if passed in field 4, with the following format.

Text^User^Date

Text	Comment text
User	User who entered the comment
Date	Creation date and time in datetime format

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. It is also used to request of test results in a Result Query message.

```
Q|1|^^123^0^00001^2^^S1^SC^R1||ALL|||||||R|O||

Q|1|^^*******************^0^00001^2^^S1^SC^R1||ALL|||||||R|O||

Q|1|^S1^10001||||||||||||

Q|1|^S2^10001||||||||||||O|

Q|1|^^10003||||||||||||
```

Field	Ref.	Value	Host	DM	Description
1	11.1	Q	R	R	Record identifier, fixed value.
2	11.2	1	R	R	Sequence number. Fixed value, showing that only one query record per message is supported.
3	11.3	*Complex*	R	R	Query parameters that shall be used for selecting the required information.
					When sent from the *data manager* to the host in a test selection query message, it contains:
					^^Sample_ID^Sample_No^Rack_ID^Position^^Rack_Type^Container^ QueryType
					When sent from the host to the *data manager* in a result or order query message, it contains:
					^Rack_Type^Sample_ID
					👁 For details, see *Query parameters* on page C-34.
4	11.4	*Field contains no data.*			
5	11.5	ALL	-	R	Subselection criteria, fixed value
6	11.6	*Field contains no data.*			
7	11.7	*Field contains no data.*			
8	11.8	*Field contains no data.*			
9	11.9	*Field contains no data.*			
10	11.10	*Field contains no data.*			
11	11.11	*Field contains no data.*			
12	11.12	*Character*	-	R	• R for Routine samples • S for STAT samples (Short Turn-Around Time)
13	11.13	*Character*		R	The request information status code.
					If sent from the *data manager* to the host:
					• O (capital letter O) for "Request for test selections".
		Character	O		The request information status code.
					If sent from the host to the *data manager* in a result inquiry:
					• F = send final results • (empty) = send all results
					If sent from the host to the *data manager* in an order inquiry:
					• O = (capital letter O) send only open orders with no results • (empty) = send all orders

Query parameters

The query parameters identify the sample.

data manager to host   In a test selection query from the *data manager* to the host the fields are as follows:

`^^Sample_ID^Sample_No^Rack_ID^Position^^Rack_Type^Container^QueryType`

Component	Type	Length	
Sample_ID	String	22	This is the barcode label attached to the sample tube. In case of a missing barcode this will hold 22 asterisk characters (*).
Sample_No			Always set to 0 (zero).
Rack_ID	String	5	Identifier of the rack sent by **cobas** 8000 instrument.
Position	Number		The sample's position on the rack sent by the instrument. Takes the value 1 to 5.
Rack_Type	String	2	The rack type as assigned to a specific sample type on **cobas** 8000 data manager. Depending on the version and modules installed, not all of these types may be available on any particular system

👁 For details of the rack type codes used here, see *Rack type* on page C-34. |
| Container | String | 2 | A two-character code:

• MC

  Micro cup

• SC (or empty)

  Standard cup |
| QueryType | String | 2 | A two-character code:

• R1

  Query for 1st measurement

• R2

  Rerun query |

host to data manager   In a result query or order query from the host to the *data manager* the fields are as follows:
`^Rack_Type^Sample_ID`

Component	Type	Length	
Rack_Type	String	2	This is the specimen type, identical to the rack type.

👁 For details of the rack type, see *Rack type* on page C-34 below. |
| Sample_ID | String | 22 | This is the barcode label attached to the sample tube. In case of a missing barcode this will hold 22 asterisk characters (*). |

Rack type   The rack type normally depends on the sample type, as each sample is placed on a rack specific to its type. Depending on the version and modules installed, not all of these types may be available on any particular system.

S1	Serum
S2	Urine
S3	CSF
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 *data manager*.)

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||^^^8717|MU1#c701#1#1|0|0|0^0^0^0^0^\0^0^0^0^0^\^^^^^\^^^^^
\^^^^^\^^^^^|
```

Field	Ref.	Value	Host	DM	Description
1	14	M	-	R	Record type ID, fixed value signifying manufacturer record.
2	14	*Number*	-	R	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	PCR	-	R	Record Type Sub ID. Set to 'PCR'.
4	14	*String*	-	R	ID of the operator who performed the calibration at the analyzer.
5	14	*Complex*	-	R	Test Code (Application code):
					`^^^Testcode`
					Photometrics: 1-910
					The maximum range of test code is 5- digits.
6	14	*String*	-	R	ID of the analytical unit (module) the test belongs to.
					👁 For details, see *Instrument identifier for the host* on page C-29.
7	14	*Number*	-	R	Calibration alarm.
8	14	*Number*	-	O	SD value data.
9	14	*Complex*	-	R	Repeat Field.
					Repeated from STD1 to STD6 for as many as there are.
					Format:
					*First Initial Absorbance^*
					*First Absorbance^*
					*Second Initial Absorbance^*
					*Second Absorbance^*
					*Data Alarm^*

The following fields contain no data.

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|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	Description
1	14	M		R	Record type ID, fixed value signifying manufacturer record.
2	14	*Number*		R	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	Record Type Sub ID:
					Use 'ICR'.
4	14	*String*		R	Operator ID:
					ID of the operator who performed the calibration at the analyzer.
5	14	*String*		R	Module ID:
					ID of the analytical unit (module) the test belongs to.
					👁 For details, see *Instrument identifier for the host* on page C-29.
6	14	*String*		O	Na Calibration Alarm: Na test calibration status.
					• Valid = the calibration was successful. • Invalid = the calibration was unsuccessful.
7	14	*String*		O	K Calibration Alarm: K test calibration status.
					• Valid = the calibration was successful. • Invalid = the calibration was unsuccessful.
8	14	*String*		O	Cl Calibration Alarm: Cl test calibration status.
					• Valid = the calibration was successful. • Invalid = the calibration was unsuccessful.
9	14	*Complex*		R	Na Data Alarm: Na test data alarm.
					👁 For details, see *ISE data alarms* on page C-37.
10	14	*Complex*		R	K Data Alarm: K test data alarm.
					👁 For details, see *ISE data alarms* on page C-37.
11	14	*Complex*		R	Cl Data Alarm: Cl test data alarm.
					👁 For details, see *ISE data alarms* on page C-37.
12	14	*Complex*		R	Na Data: Na test calibration analytical data.
					👁 For details, see *ISE calibration analytical data* on page C-37.
13	14	*Complex*		R	K Data: K test calibration analytical data.
					👁 For details, see *ISE calibration analytical data* on page C-37.
14	14	*Complex*		R	Cl Data: Cl test calibration analytical data.
					👁 For details, see *ISE calibration analytical data* on page C-37.

ISE data alarms

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

Na (Sodium)	Field 9
K (Potassium)	Field 10
Cl (Chlorine)	Field 11

Each of these fields is a complex type and contains the following components.

```
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.

Na (Sodium)	Field 12
K (Potassium)	Field 13
Cl (Chlorine)	Field 14

Each of these fields is a complex type and contains the following components. 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^
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#3#2|156369||
0|156272|O|I^O^\M^O^\S^O^\R^1.000^\D^F^\L^^\F^O^\Y^F^\B^O^|
826.502^827.638\29987.100^29670.610|||||20100316113523|
```

Field	Ref.	Value	Host	DM	Description
1	14	M		R	Record type ID, fixed value 'M' signifying manufacturer record.
2	14	*Number*		R	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	ECR		R	Record Type Sub ID: Use 'ECR'.
4	14	*String*		R	Operator ID: ID of the operator who performed the calibration at the analyzer.
5	14	*Complex*		R	Test Code (Application Code), the number identifying the analyte. `^^^TestCode`
6	14	*String*		R	Calibration method. Permitted values: • `NoCalibration` • `LotCalibration` • `ContainerCalibration` • `InheritedLotCalibration` • `InheritedItemCalibration` • `UserModifiedCalibration` • `UnmaskedCalibration` • `FailedCalibration`
7	14	*String*		O	ID of the analytical unit (module) the test belongs to. 👁 For details, see *Equipment instance identifier* on page C-29.
8	14	*Number*		O	e Pack Lot No. (Reagent lot number)
9	14	*Number*		O	e Pack No. (Reagent bottle count number)
10	14	*Number*		O	Expired e Pack Flag • `0` Calibration performed with "Not Expired e Pack" • `1` Calibration performed with "Expired e Pack"
11	14	*Number*		R	Calibrator Lot No: 1 to 99999999
12	14	*Character*		O	Result Status: • `0` OK • `F` Failed
13	14	*Complex*		O	Result Characteristics. Format: `CharacteristicID^Value^Detail` 👁 For details, see *Calibration result characteristics* on page C-39.
14	14	*Complex*		R	Calibration signal values repeated for two levels. Format: `<Signal1Level1>^<Signal2Level1>\<Signal1Level2>^<Signal2Level2>` Each value is the numeric value sent by the analyzer.
15	14	*Complex*		O	Target Value (not supported by the *data manager*)
16	14	*String*		O	Unit (not supported by the *data manager*)
17	14	*String*		O	CUT off
18	14	*Complex*		O	Border Line Area (not supported by the *data manager*)
19	14	*DateTime*		O	Date and time measurement was performed (YYYYMMDDHHMMSS).

Roche Diagnostics

Calibration result characteristics

The manufacturer-defined Elecsys Calibration Record, M(ECR), passes the calibration result characteristics in field 13. This field is often repeated, each repetition taking the following pattern of components.

`CharacteristicID^Value^Detail`

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.

CharacteristicID   `CharacteristicID` can have one of the following characteristic identifiers:

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

Value   `Value` can have one of the following values:

- a numeric value, showing the actual value of the result.
- `O`, meaning no violation or no failure.
- `F`, meaning a violation or failure.

Details   `Details` are the details for each calibrated level, but this is not supported in the *data manager*.

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.

HL7 Reference   D

HL7 protocol

This chapter presents the lower layers of the HL-7 protocol, as used by **cobas**® 8000 data manager.

In this chapter	*Chapter* **8**

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.

In **cobas**° 8000 data manager HL7 v2.5 is implemented.

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>

<start_block>	Start Block character (1 byte)
	ASCII <VT>, i.e., <0x0B>. This should not be confused with the ASCII characters SOH or STX.
data	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>.
<end_block>	End Block character (1 byte)
	ASCII <FS>, i.e., <0x1C>. This should not be confused with the ASCII characters ETX or EOT.
<CR>	Carriage Return (1 byte)
	The ASCII carriage return character, i.e., <0x0D>.

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

Figure D-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* **9**

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.
- { } Curly brackets indicate a segment or group of segments that may be optionally repeated.

Message sent only by cobas® 8000 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]}
	        {NTE}
	   }(a)
		OUL^R22	Reports on the sample results.

		OUL^R22^REAL	First upload of QC results
		OUL^R22^BATCH	Repeat upload of QC results that were uploaded before (ordered by operator on machine) For messages containing patient results from the ISE module, no SID segment is sent.

Calibration data	MSH
	 {
	   SPM
	    OBR
	     OBX
	     SID
	 }
		OUL^R22^PCUPL
		OUL^R22^ICUPL
		OUL^R22^ECUPL
			Reports calibration results.

(a) There may be multiple OBR Segments per PID Segment, and multiple SID and NTE Segments per OBX Segment. However, you may only have one OBX Segment per OBR.

Messages transmitted 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.

Masking	MSH
	   EQU
	   {
	     ECD
	   }
		EAC^U07	Instructs *data manager* to mask or unmask certain tests.

Messages sent by either *data manager* or the host

The *data manager* and a connected LIS both answer each HL7 message from each other with an Acknowledge message.

Either can send a test selection information message.

Message	Segments	Message Type	Description
Acknowledge	MSH MSA	ACK	HL7 Application Acknowledge for incoming orders 👁 For details of Acknowledgement message support, see *Acknowledgement messages* on page D-15

Test Selection Information	MSH
	   [PID] (a)
	     SPM
	     SAC
	     {
	       [TQ1] (b)
	      OBR
	     }
		OML^O33	Test selection sent by the host for a sample as answer to a test selection inquiry or as unsolicited order.
			
			It can also be send by the *data manager* as response to an order query.

(a) The PID segment is optional for the data manager

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

👁 For more details on message flow and how messages follow each other, see *Communication scenarios* on page B-10.

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	This shows either:
	• The precise text to be sent.
	• The format of the field.
	The format of the field can take one of the following values:
	• *Character*. A single character.
	• *String*: A character string.
	• *Number*: A numeric value. Positive (+) or negative (-) is indicated before the numeric value. If it is not indicated, it is treated as positive (+).
	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.
	• *Date*. 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.
	• *Time*: 24-hour military time.
	The format is HHMMSS (HH is the hour, MM is the minute, and SS is the second).
	• *DateTime*. A combination of DT and TM.
	The format is: YYYYMMDDHHMMSS.
	• *Complex*. A field in which multiple data components are combined, separated by the component delimiter. Each component may take one of the other formats.
Host	If sent from the host or LIS, this field is either:
	• R, required
	• O, optional
DM	If sent from *data manager*, this field is either:
	• R, required
	• O, optional
Description	A description of the field, including use and permitted values. In the case of complex fields, this includes a description of individual components.

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 HL-7 fields.

⚠️
WARNING

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	Delimiter definitions, fixed value:
				• ^ Component (or sub-field) delimiter = caret [94]
				• ~ Repeat delimiter = tilde [126]
				• \ Escape character = backslash [92] (not supported)
				• & Sub-component (or sub-sub-field) delimiter = ampersand [38]
				A carriage return (ASCII 13) marks the end of each segment.
MSH-3	*String*	-	R	Sending application, fixed value: `cobas 8000`
		O	-	Sending identifier, sent by host for tracing information
MSH-4	*Field contains no data.*			
MSH-5	*String*	-	R	Receiving application, fixed value: `host`
		O	-	Receiving identifier, sent by host for tracing information
MSH-6	*Field contains no data.*			
MSH-7	*DateTime*	O	O	Date and time message sent
MSH-8	*Field contains no data.*			

Field	Value	Host	DM	Description
MSH-9	*Complex*	R	R	Message Type. This is the code that defines the message type, according to the HL7 standard:
				• TSREQ
				• RSREQ
				• OML^O33
				• OUL^R22
				• EAC^U07
				• OUL^R22^PCUPL (C-module, or Photometric, Calibration Result)
				• OUL^R22^ICUPL (ISE Calibration Result)
				• OUL^R22^ECUPL (E-module, or Immunology, Calibration Result)
				• ACK
				In specific circumstances, the following message type codes are sent by the *data manager*:
				• OUL^R22^REAL (first transmission of the QC results)
				• OUL^R22^BATCH (repeat transmission of QC results, or reports on sample results as a reply to result query)
MSH-10	*String*	R	R	Message Control ID that uniquely identifies the message, e.g. a sequence number or GUID string (as autogenerated by Microsoft programs to uniquely identify objects etc.).
MSH-11	*Field contains no data.*			
MSH-12	2.5	O	O	Version ID for HL7 version used, fixed value string.
MSH-13	*Field contains no data.*			
MSH-14	*Field contains no data.*			
MSH-15	*Field contains no data.*			
MSH-16	*String*	O	R	Application Acknowledgement Type. This field defines the conditions under which the application has to respond with an acknowledgement message.
				When sent from the host to the *data manager* (in version 1.01.01), in a Test Selection message, this field contains either:
				• AL
				Always send an acknowledgement message.
				• SU
				Send an acknowledgement message if the message can successfully be processed.
				• ER
				Error/reject conditions only.
				• NE
				Never send an acknowledgement.
				👁 For all other messages sent to or from the *data manager* version 1.01.01, only certain values are supported. For details, see *Acknowledgement messages* on page D-15 below.
MSH-17	*Field contains no data.*			
MSH-18	UNICODE UTF-8	O	O	String defining the character set. Fixed value.
	Further MSH fields contain no data.			

Message Acknowledgement Segment – MSA

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

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

```
MSA|AA|38764||
```

Field	Value	Host	DM	Description
MSA-1	*String*	R	R	Acknowledgement code
				• `AA`
				Accept. This acknowledges the message is valid and the *data manager* is able to process it.
				• `AE`
				Error. This indicates that the message sent was not valid in format or content, and cannot be processed.
				• `AR`
				Reject. The *data manager* currently does not send this acknowledgement code, but it is reserved for future use.
MSA-2	*String*	R	R	Message Control ID, from MSH-10 segment of the message that the *data manager* is acknowledging.
MSA-3	*String*	O	O	Detailed error description. This field contains custom or Oracle error text values that are raised in erroneous cases only. The content of the field may help error analysis. The same message is written to the log file, where there may be further information.
				👁 For details of log files, see *Logging settings* on page B-25 and *Getting a trace file from data manager* on page B-26.
				👁 For details of any data alarm messages provided in the text of any message given here, see Chapter 10 *Data Alarms*.

Acknowledgement messages

The Header Segment, field MSH-16, contains instructions to the receiving application, about whether to send an acknowledgement.

The acknowledgement contains only a Header Segment (MSH) and a Message Acknowledgement Segment (MSA). The MSA segment says whether the message was successful or not.

The *data manager* version 1.01.01 has some limitations on what acknowledgment functionality it supports.

Message sent to the data manager

For messages sent from the host to the *data manager*, the supported values depend on the type of message.

Message type	MSH-16 values supported	Comments
Test Selection	• `AL` Always • `SU` Success • `ER` Error • `NE` Never	In any returning Acknowledgement message: • MSA-1 is `AA` / `AE` • MSA-2 is populated with the Message Control ID • MSA-3 will contain further information if available.
Masking / Unmasking	• `AL` Always Any other value defaults to `AL`.	In the returning Acknowledgement message, field MSA-2 (Message Control ID) is blank.
Acknowledge	• `NE` Never Any other value defaults to `NE`.	No Acknowledgement message is returned.
Order Query	• `NE` Never Any other value defaults to `NE`.	No Acknowledgement message is returned.
Result Query	• `NE` Never Any other value defaults to `NE`.	No Acknowledgement message is returned.

CAUTION

Acknowledgement messages in response to HL7 test selection downloads

Before version 1.01.01, *data manager* did not send acknowledgement messages in response to test selection downloads. From version 1.01.01 the data manager is able to acknowledge HL7 Test Selection Download Messages, if requested. If the host cannot handle an ACK message with AE in MSA-1, then the test selection download must contain NE in MSH-16.

Responses to a test selection download

The possible flow of acknowledgement messages in the case of a test selection download message are as follows:

Host sends MSH-16 code:	The test selection on the *data manager* is:	The *data manager* returns in MSA-1
`AL`	Processed successfully	`AA`
`AL`	Not processed, for example, due to unknown test number	`AE`
`SU`	Processed successfully	`AA`
`SU`	Not processed, for example, due to unknown test number	*no message*

Host sends MSH-16 code:	The test selection on the *data manager* is:	The *data manager* returns in MSA-1
ER	Processed successfully	*no message*
ER	Not processed, for example, due to unknown test number	AE
NE	Processed successfully	*no message*
NE	Not processed, for example, due to unknown test number	*no message*

Message sent from the data manager

For messages that the *data manager* sends to the host, the following acknowledgement types are supported:

Message type	MSH-16 value sent	Comments
Result report	• ER Error	But the *data manager* ignores the value of any Acknowledgement returned.
Acknowledge	• NE Never	
Inquiry for sending test selections	• ER Error	But the *data manager* ignores the value of any Acknowledgement returned.
Calibration data	• ER Error	But the *data manager* ignores the value of any Acknowledgement returned.
Test Selection Information	• ER Error	But the *data manager* ignores the value of any Acknowledgement returned.

Patient Identification Segment – PID

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

```
PID|1|SH25111965M|||Heesch^Stefan||19651125|M
```

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, i.e. if one or more of fields 5, 7, or 8 contain data.
PID-3	*Field contains no data.*			
PID-4	*Field contains no data.*			
PID-5	*Complex*	O	O	Patient last name and first name in the format:
				Last_name^First_name
PID-6	*Field contains no data.*			
PID-7	*Date*	O	O	Date of birth (YYYYMMDD)
PID-8	*String*	O	O	Sex of patient
				• M Male
				• F Female
				• U Unknown

Specimen Segment – SPM for patient 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 *Specimen Segment - SPM for calibration results* on page D-19.

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

Field	Value	Host	DM	Description
SPM-1	*Field contains no data.*			
SPM-2	*String,* or for QC, *Complex*	R	R	Identifier for the sample.
				For Patient Results, the sample's barcode (string of max. 22 characters padding not allowed), or sample ID. In case of a missing barcode this will hold 22 asterisk characters (*).
				👁 For details of Quality Control material, see *Sample identifier* on page D-18.
SPM-3	*Field contains no data.*			
SPM-4	*String*	R	R	Specimen Type
				This is a code that identifies the type of specimen.
				👁 For details, see *Specimen type code* on page D-18.
SPM-5	*Field contains no data.*			
SPM-6	*String*	O	R	Specimen Additives.
				• `not` Not a prediluted sample
				• `pre-diluted` Prediluted sample
SPM-7	*Field contains no data.*			
SPM-8	*Field contains no data.*			
SPM-9	*Field contains no data.*			
SPM-10	*Field contains no data.*			
SPM-11	*Complex*		R	Specimen role. This is a code that identifies what purpose the specimen is used for.
				• `P`, meaning patient result.
				• `Q`, meaning quality control result.
SPM-12	*Field contains no data.*			
SPM-13	*Field contains no data.*			
SPM-14	*Complex*	O	R	Specimen description in format:
				`C1^C2^C3^C4^C5`
				• `C1` Sample Comment 1. String with up to 30 characters
				• `C2` Sample Comment 2. String with up to 25 characters
				• `C3` Sample Comment 3. String with up to 20 characters
				• `C4` Sample Comment 4. String with up to 15 characters
				• `C5` Sample Comment 5. String with up to 10 characters
SPM-15	*Field contains no data.*			
SPM-16	*Field contains no data.*			
SPM-17	*DateTime*	O	O	Specimen collection date / time. (YYYYMMDDHHMMSS)
SPM-18	*Field contains no data.*			
SPM-19	*Field contains no data.*			

Field	Value	Host	DM	Description
SPM-20	*Field contains no data.*			
SPM-21	*Field contains no data.*			
SPM-22	*Field contains no data.*			
SPM-23	*Field contains no data.*			
SPM-24	*Field contains no data.*			
SPM-25	*Field contains no data.*			
SPM-26	*Field contains no data.*			
SPM-27	*String*	O	R	Container type.
				• SC Standard cup
				• MC Micro cup

Sample identifier

The sample identifier is contained in field SPM-2.

Patient results For Patient Results, the sample's barcode (string of max. 22 characters padding not allowed), or sample ID. In case of a missing barcode this will hold 22 asterisk characters (*).

Quality control material For Quality Control material, `Name^Lot^ID`

`Name`	Control name, e.g. `PNU`
`Lot`	Control lot
`ID`	Control identifier (a unique control ID contained in *data manager*)

Ordering test solutions for QC is not possible from host.

Calibration material Note that the sample identifier SPM-2 has a different use and format for calibration result messages.

Specimen type code

The specimen type code is contained in field SPM-4. This field is blank for calibration results.

S1	Serum / Plasma
S2	Urine
S3	CSF
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.

Specimen Segment – SPM for 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|||||||||C^P|
```

👁 For details of the use of the Specimen segment (SPM) with patient and quality control results, see *Specimen Segment - SPM for patient and quality control results* on page D-17.

Field	Value	Host	DM	Description
SPM-1	*Field contains no data.*			
SPM-2	*String,* or for QC, *Complex*	R	R	Identifier for the sample. 👁 For details when used with Calibrator material, see *Sample identifier for calibration results* on page D-19. This is a required field, except for ISE calibration results, when it is always empty.
SPM-3	*Field contains no data.*			
SPM-4	*Field contains no data*			
SPM-5	*Field contains no data.*			
SPM-6	*Field contains no data.*			
SPM-7	*Field contains no data.*			
SPM-8	*Field contains no data.*			
SPM-9	*Field contains no data.*			
SPM-10	*Field contains no data.*			
SPM-11	*Complex*		R	Specimen role. This is a code that identifies what purpose the specimen is used for. 👁 For details, see *Specimen role identifier* on page D-20.
SPM-12	*Field contains no data.*			
SPM-13	*Field contains no data.*			
SPM-14	*Field contains no data.*			
SPM-15	*Field contains no data.*			
SPM-16	*Field contains no data.*			
SPM-17	*DateTime*	O	O	Specimen collection date / time. (YYYYMMDDHHMMSS)
	Further SPM fields contain no data for calibration results.			

Sample identifier for calibration results

The sample identifier is contained in field SPM-2.

C-module and E-module calibration material

For C-module and E-module calibration materials, `Level^Lot^Code^Count`.

`Level`	Calibrator level
`Lot`	Calibrator lot
`Code`	Calibrator material code
`Count`	The calibrator bottle count number

Ordering test solutions for calibration material is not possible from host.

ISE module calibration material   For ISE calibration results, when it is always empty.

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-ᗄ̣-	**Required field**
	This is a required field, except for ISE calibration results, when it is always empty.

Specimen role identifier

The ID that identifies the role the specimen plays, is contained in field SPM-11.

C^P	C-module (Photometric) Calibration
C^I	ISE module Calibration
C^E	E-module (Immunological) Calibration

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 download message.

The host 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 download message. The host sends this information if it has it, for example if a pre-analytic system is being used.

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

Field	Value	Host	DM	Description
SAC-1	*Field contains no data.*			
SAC-2	*Field contains no data.*			
SAC-3	*Field contains no data.*			
SAC-4	*Field contains no data.*			
SAC-5	*Field contains no data.*			
SAC-6	*Field contains no data.*			
SAC-7	*Field contains no data.*			
SAC-8	*Field contains no data.*			
SAC-9	*Field contains no data.*			
SAC-10	*String*	O	R	Rack ID as displayed on the Control Unit.
SAC-11	*String*	O	R	Position in rack.

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

Field	Value	Host	DM	Description
OBR-1	*Number*	O	R	Set ID
OBR-2	*Field contains no data.*			
OBR-3	*Field contains no data.*			

Field	Value	Host	DM	Description
OBR-4	*Complex*	R	R	Universal service identifier. This is the testcode for the analyte and the dilution factor.
				`Testcode^Dilution`
				👁 For details, see *Identifying the analyte being tested for* on page D-21.
				If sent from the *data manager*, this field contains only the testcode.
OBR-5	*Field contains no data.*			
OBR-6	*Field contains no data.*			
OBR-7	*Field contains no data.*			
OBR-8	*Field contains no data.*			
OBR-9	*Field contains no data.*			
OBR-10	*Field contains no data.*			
OBR-11	*String*	R		Action code sent by host:
				• `A` Add test, or rerun test if it already exists.
				• `R` Rerun test, or add if test already exists. (NB: different from HL7 definitions)
				• `C` Cancel test
	The other OBR fields contain no data.			

Identifying the analyte being tested for

The universal service identifier identifies the analyte tested for, often called the "testcode" or "application code". If sent from the host, it also includes the dilution factor. This is contained in field OBR-4.

`Testcode^Dilution`

`Testcode`	Test code (application code). This holds the code that identifies the test or analyte which is this message is about.
`Dilution`	Dilution factor. This is only sent from the host to the *data manager*.
	Permitted values are:
	• For an ISE module, the only permitted factor is `1`, meaning no dilution.
	• For a C-module (photometry): `Dec`, `Inc`, `1`
	• For an E-module (immunoassay): `Dec`,`1`, `2`, `5`, `10`, `20`, `50`, `100`, `400`
	No dilution can also be indicated with an empty code.

Timing Quantity Segment – TQ1

The *data manager* uses this segment in a test selection messages (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	*Field contains no data.*			
TQ1-3	*Field contains no data.*			
TQ1-4	*Field contains no data.*			
TQ1-5	*Field contains no data.*			

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Field	Value	Host	DM	Description
TQ1-6	*Field contains no data.*			
TQ1-7	*Field contains no data.*			
TQ1-8	*Field contains no data.*			
TQ1-9	*String*	R	R	Priority
				• S STAT sample
				• R Routine sample (default)

Observation Result Segment – OBX

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

Patient result examples

```
OBX|1||990||9.0|mmol/L|||||F|||20090402171959|bmserv^SYSTEM||38|ISE^1^
0800-12^3|20090402171959|
```

```
OBX|1||8781||3.16|mmol/L|||||F|||20090402172650|bmserv^SYSTEM||10|c701
^1^0800-17^6|20090402172650|
```

Calibration result examples

Photometric Calibration Result Segment:

```
OBX|1||8678||0^-916&-913&357&-918&351&|||0|||F||||||45|
MU1#c701#1#1|20080423171800|
```

ISE Calibration Result Segment:

```
OBX|1||989||Type-A^0&0&0&16&0&16&0&0&0^-37.2&-41.5&-34.3
&-54.5&57.6&142&71&0.0&57.5&72|||||F||||bmserv||34|MU1#ISE#1#1|
20100316131039|
```

Immunological Calibration Result Segment:

```
OBX|1||1||Valid^false^false^false^1.000^false^^false^false^29987.100&
29670.610^^^^^|||LotCalibration|||F||||bmserv||68|MU1#e602#3#2|
20100316113523|
```

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	Result value
				👁 For details see *Measurement value* on page D-23.
OBX-6	*String.*		R	Units of measurement used for measuring the result
				This field is not used by calibration results.
OBX-7	*Complex*		R	Reference ranges, if defined. These take the format:
				RangeDefinitionString^TypeOfRange
				For example:
				.5 - 7.5^TECH~3.3 - 5.1^NORM~^CRIT~^USER
				👁 For details, see *Reference ranges* on page D-27.
				A required field for patient results, but empty for quality control and calibration results.

Field	Value	Host	DM	Description
OBX-8	*String*		O	Abnormal flags. This gives a code that identifies if the result is normal or abnormal. 👁 For details, see *Result abnormal flags* on page D-28. This field is manually-edited results, this field is blank.
OBX-9	*Field contains no data.*			
OBX-10	*Field contains no data.*			
OBX-11	*String*		O	Result status • F First run result, or QC or calibration result • C Corrected result • M Manually-edited result
OBX-12	*Field contains no data.*			
OBX-13	*Field contains no data.*			
OBX-14	*DateTime*		R	Pipetting time i.e. time that is considered to be when the test was started. *Note*: For manually-performed tests, and for calibration results, this field is empty.
OBX-15	*Complex*		R	Producer ID. Active operators in the format: `Instrument operator^Datamanager operator` This is the username the operator used to log into the Control Unit and *data manager* respectively, unless the *data manager* is in pass-through mode, when the second value reads SYSTEM. A required field for patient and quality control results, but usually empty calibration results.
OBX-16	*Field contains no data.*			
OBX-17	*Number*		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.
OBX-18	*Complex*		R	Equipment instance identifier 👁 For details of this field, see *Equipment instance identifier* on page D-29.
OBX-19	*DateTime*		R	Time at which result is available.

Measurement value

The result of the test is contained in field OBX-5. This field can take quite different contents, depending on the kind of result.

- For numeric or qualitative patient or quality control results, see *Numeric and qualitative results* on page D-24.

- For photometric calibration results, see *C-module photometric Calibration Result* on page D-24.

- For ISE calibration results, see *ISE Calibration Result* on page D-25.

- For Immunological calibration results, see *E-module immunological Calibration Result* on page D-26.

Numeric and qualitative results

The field OBX-5 contains the measurement result.

Quantitative result

For a quantitative result, OBX-5 can take up to 6 digits.

`ReportableResult^AdditionalResultValues`

`ReportableResult`	For quantitative results, this is a 6-digit number. In case of a missing result this field contains six spaces (ASCII 32 / 0x20).
`AdditionalResult Values`	For quantitative results, this is empty or contains a qualitative flag.

Note that for numeric values, the units of measurement are transferred in field OBX-6.

Qualitative result

For a qualitative result, the first component contains a flag showing the qualitative result. The actual observed value is transferred in the second component.

`ReportableResult^AdditionalResultValues`

`ReportableResult`	Qualitative result, if applicable for test. This is an integer code from -2 to 3 inclusive. The codes can be configured on the **cobas*** 8000 instrument, under Utility > Application > Range, see *cobas** *8000 modular analyzer series Operator's Manual* for details.
`AdditionalResult Values`	For qualitative results, this contains the quantitative result.

C–module photometric Calibration Result

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

`SD^STD`

Subcomponent	Description
`SD`	Standard deviation value data.
`STD`	Repeat Field.
	Repeated from STD1 to STD6 for as many as there are.
	Format:
	`Absorbance& FirstAbsorbance& FirstInitialAbsorbance& SecondAbsorbance& SecondInitialAbosorbance&`

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||20100318181004||OUL^R22^PCUPL|250||2.5||||
ER||UNICODE UTF-8|
SPM||1^888888^901^1|||||||||||C^P|
OBR|1|||8717|
OBX|1||8717||0^0&0&0&0&0&|||0|||F||||||21|MU1#c701#1#1|20100318181004|
SID||
SPM||2^181939^401^1|||||||||||C^P|
OBR|2|||8717|
OBX|2||8717||0^0&0&0&0&0&|||0|||F||||||21|MU1#c701#1#1|20100318181004|
SID||
```

ISE Calibration Result

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

```
CalType^DataAlarm^Data
```

Subcomponent	Description
CalType	This states what kind of test has been done. Possible values are: • Type-A • Type-B
DataAlarm	Data alarm. 👁 For details, see *ISE data alarms* on page D-25.
Data	Test calibration analytical data. 👁 For details, see *ISE calibration analytical data* on page D-25.

ISE data alarms

The data alarms from the ISE calibration contain the following subcomponents, separated with an ampersand (&).

- *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*

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&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|MU1#ISE#1#1|
20100316105741|
SID||
SPM|||||||||||C^I|
OBR|2|||990|
OBX|2||990||Type-A^0&0&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||||bmserv||38|MU1#ISE#1#1|
20100316105742|
SID||
SPM|||||||||||C^I|
OBR|3|||991|
OBX|3|||991||Type-A^0&0&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||||bmserv||39|MU1#ISE#1#1|
20100316105742|
SID||
```

E-module immunological Calibration Result

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
CalResultStatus	Result Status: • `0` OK • `Q` Question • `F` Failed
MissingValue	• `true` if violation • `false` if no violation
MinSignal	• `true` if violation • `false` if no violation
MaxSignal	• `true` if violation • `false` if no violation
CalibratorFactor	Decimal value
Deviation	• `true` if violation • `false` if no violation
Slope	Decimal value (used for qualitative tests)
MinAcceptDiff	• `true` if violation • `false` if no violation
SystemError	• `true` if violation • `false` if no violation
SignalVal1&SignalVal2	Signal value, in two decimal subcomponents: *SignalVal1&SignalVal2*
TargetValue	Target Value (for quantitative tests). This can be empty *Level1&Level2&Level3&Level4&Level5* Note that version 1.01 of the *data manager* does not send data for this component.
Unit	Unit
CUTOff	CUT off (for qualitative tests).
BorderLineAreaUpperLimit	(Used for qualitative tests). Note that version 1.01 of the *data manager* does not send data for this component.
BorderLineAreaLowerLimit	(Used for qualitative tests). Note that version 1.01 of the *data manager* does not send data for this component.

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||20100316113523||OUL^R22^ECUPL|251||2.5|||| 
ER||UNICODE UTF-8|
SPM||2^156272^1^None|||||||||C^E|
OBR|1|||1|
OBX|1||1||Valid^false^false^false^1.000^false^^false^false^29987.100&
29670.610^^^^^|||LotCalibration|||F||||bmserv||68|MU1#e602#3#2|
20100316113523|
SID|1^^^ASY^14^0|156369|
SPM||1^156272^1^None|||||||||C^E|
OBR|2|||1|
OBX|2||1||Valid^false^false^false^1.000^false^^false^false^826.502&
827.638^^^^^||LotCalibration|||F||||bmserv||68|MU1#e602#3#2|
20100316113523|
SID|1^^^ASY^14^0|156369|
```

Reference ranges

The reference ranges associated with the result are passed in OBX-7.

`RangeDefinitionString^TypeOfRange`

The `RangeDefinitionString` component can consist of the any of the following:

- Two numbers separated by space-hyphen-space, e.g.

  `.5 - 7.5`

  Note that either or both of these number may potentially be negative, e.g.

  `-7 - -10`

- A "greater than" or "less than" value, e.g.

  `<0.1`

- A comma-separated string of permissible values, e.g.

  `Y,N,U`

The `TypeOfRange` component can consist of any of four values.

- `TECH` Hard-coded value to indicate "Technical Range"
- `NORM` Hard-coded value to indicate "Normal Range"
- `CRIT` Hard-coded value to indicate "Critical Range"
- `USER` Hard-coded value to indicate "User Range"

Any or all of these four values can occur in the same record as a repeat field, for example:

`.5 - 7.5^TECH~3.3 - 5.1^NORM~^CRIT~^USER`

Note that the different ranges are divided with a tilde "~", which in HL7 is the repeat delimiter.

If a range is not defined, the `RangeDefinitionString` is blank.

OBX-7 is a required field for patient results, but empty for quality control and calibration results.

Result abnormal flags

The "results abnormal flags", which identify if the result is normal or abnormal, are contained in field OBX-8.

HH	Above repeat high value
H	Above high normal
N	Normal
L	Below low normal
LL	Below repeat low 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.

Multiple flags are permitted as a repeat field. For manually-edited results, this field is blank.

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.

C-module (photometric) calibration alarm

For photometric calibration results, this field contains the calibration alarm. Zero (`0`) indicates that there is no alarm.

E-module (immunological) calibration alarm

For Elecsys calibration results, this field contains the CalibrationMethod. This is a string with one of the following eight values.

NoCalibration
LotCalibration
ContainerCalibration
InheritedLotCalibration
InheritedItemCalibration
UserModifiedCalibration
UnmaskedCalibration
FailedCalibration

EP-17 flags

The three flags, *Limit of Blank*, *Limit of Detection*, and *Limit of Quantitation* follow the NCCLS standard EP-17A, and give three different possible definitions for the lowest level of meaningful measurement. Note that these values are not part of the HL7 definitions for the report abnormal flags, but an enhancement provided by the *data manager*.

- 👁 For a brief description of the meaning of the EP-17A flags, see *EP-17A and the result abnormal flags* on page B-7.

- 👁 For complete details of the EP-17A standard, 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.

If the *data manager* has received one of the EP-17 flags, the results will not be released unless pass-through mode is enabled.

👁 For details of pass-through mode, see *Pass through for result uploads* on page B-25.

Configuring the EP-17 flags   The EP-17A levels for each analyte are configurable in the *data manager*. For details, see the **cobas** ® *8000 Operators Manual*.

Equipment instance identifier

The equipment instance identifier, in field OBX-18, identifies the module that performed the test, and provides details about it. For patient and QC results, this contains:

`ModuleType^SubModule^UnitID^InstrumentNum^Bottle^SBNo`

`ModuleType`	• `c502`, `c701`, `e602`, or `ISE`, showing the module that performed the test. • `DM` is sent to show that the result has been calculated on the *data manager*. • `c8000` is sent for results that do not reach a submodule - e.g., a result that cannot be performed because the sample is short, or if all reagents for this test have run out. (The *data manager* assigns this value from the second sub-component of the `UnitID` in component 3.)
`SubModule`	`1` or `2` shows the submodule that performed the test. `0` means the result was not obtained on either submodule, in the case of a manual or calculated result, or if the measurement failed. For example, if sample is assigned to e.g., *c701* and then the reagent runs out on both rotors and the sample cannot be measured on either submodule. (The *data manager* assigns this value from the fourth sub-component of the `UnitID` in component 3.)
`UnitID`	Identifier for the module, as sent to the host. The default value is: `Instrument#ModuleType#Position#SubModule` Example: `MU1#c502#2#1` 👁 For details, see *Instrument identifier for the host* on page D-30.
`InstrumentNum`	Instrument number in *data manager* (A specific identifier inside the *data manager* which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)
`Bottle`	Used Reagent Set. • `Current` • `Standby` • `empty` Reserved field, only for QC measurements, otherwise empty.
`SBNo`	An integer showing the standby bottle number, if used. The standby bottles are numbered sequentially, starting with 1. Reserved field, only for QC measurements, otherwise empty.

For calibration results this field contains only the module's identifier.

👁 For details of the module identifier for the host, see *Instrument identifier for the host* on page D-30.

Instrument identifier for the host

Each instrument and module defined in the *data manager* has a string that it sends to the host as its ID. The *data manager* sends the string in the segment OBX-18, component 3, and ECD-5, component 3. This identifies the module and instrument that performed the test. Examples:

```
MU1#e602#1#1
```

```
MU1#ISE#1#1
```

```
MU1#C701#1#1
```

For results calculated on the *data manager*, the ID is:

```
DM#DM#0#0
```

For manually-edited results the ModuleType is by default c8000, and the Position and SubModule are zero, for example:

```
MU1#c8000#0#0
```

You can view these IDs in **Workplaces > Service > Instrument.**

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		
1	MU1	c8000	Hitachi	LAB1	0000-07	MU1#c8000#0#0	☑	5
2	ISE	ISE	Hitachi	LAB1	ISE#0800-09	MU1#ISE#1#0	☑	5
3	ISE(1)	ISE	Hitachi	LAB1	ISE#0800-09#1	MU1#ISE#1#1	☑	5
4	ISE(2)	ISE	Hitachi	LAB1	ISE#0800-09#2	MU1#ISE#1#2	☑	5
5	C7-1	c701	Hitachi	LAB1	c701#0800-08	MU1#c701#1#0	☑	5
6	C7-1(A)	c701	Hitachi	LAB1	c701#0800-08#1	MU1#c701#1#1	☑	5
7	C7-1(B)	c701	Hitachi	LAB1	c701#0800-08#2	MU1#c701#1#2	☑	5
8	c502	c502	Hitachi	LAB1	c502#0900-04	MU1#c502#2#0	☑	5
9	c502(A)	c502	Hitachi	LAB1	c502#0900-04#1	MU1#c502#2#1	☑	5
10	e602	e602	Hitachi	LAB1	e602#0900-07	MU1#e602#3#0	☑	5
11	e602(1)	e602	Hitachi	LAB1	e602#0900-07#1	MU1#e602#3#1	☑	5
12	e602(2)	e602	Hitachi	LAB1	e602#0900-07#2	MU1#e602#3#2	☑	5

Figure D-2   The instrument ID for host values in the *data manager*

Note that this field uses the hash symbol # to separate subcomponents, not the usual field or component delimiters | or ^ or &.

This identifier takes the format, by default:

Instrument#*ModuleType*#*Position*#*SubModule*

Instrument	Instrument number in *data manager*. (A specific identifier inside the *data manager* which identifies a module. This is a number which has no relationship to the internal position of the module in the machine.)
ModuleType	• c502, c701, e602, or ISE. • DM is sent to show that the result has been calculated on the *data manager*. • c8000 is sent for results that do not reach a submodule - e.g., a result that cannot be performed because the sample is short, or if all reagents for this test have run out.
Position	The position of the module on the **cobas**® 8000 modular analyzer series.
Submodule	1 or 2 shows the submodule that performed the test. 0 means the result was not obtained on either submodule, in the case of a manual or calculated result, or if the measurement failed. For example, if sample is assigned to e.g., c701 and then the reagent runs out on both rotors and the sample cannot be measured on either submodule.

Editing the instrument ID for host

This value is also editable in the *data manager* in **Workplaces > Service > Instrument >** [Select instrument] > [Shortcut menu] > **Edit instrument >** [field] **ID for Host**, but the default value is strongly recommended. Any edited value must keep to the same format.

- The *data manager* writes the value of `ModuleType` to segment OBX-18, component 1.
- The *data manager* writes the value of `SubModule` to segment OBX-18, component 2.

For example if a host required the Serial Number of the instrument as the first part of the **Instrument ID for Host**, then you could edit the Instrument ID to show it. For an ISE unit with the serial number 1048-12, this could be edited to:

```
1048-12#ISE#1#1
```

Keep to the format

The **cobas®** 8000 data manager expects the identifier for the instrument to have the defined format. If you edit it, make sure to keep to the format.

`Instrument#ModuleType#Position#SubModule`

Although you can physically edit the entire field, you must keep the # separator and only make edits to the `Instrument` and `Position` values.

Changes to be implemented in an upgrade

The **cobas®** 8000 data manager, version 1.0 passed the instrument's serial number in the segment OBX-18, component 3. However, with *data manager* version 1.01.01, it is not possible to send exactly the same identifier as in version 1.0. Therefore the host must be updated to implement the current identifier.

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	*Number*	-	R	Universal Service Identifier. (Testcode or Application Code. which identifies the analyte tested for.)
TCD-2	*String*	-	R	Auto-dilution factor. Permitted values are:
				• For an ISE module, the dilution factor is always: `1`
				• For C-modules (photometry) or ISE: `Dec`, `Inc`, `1`
				• For E-module (immunoassay): `1, 2, 5, 10, 20, 50, 100, 400`

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.

```
SID|8706^^784648^R1^2^0|231478|5|
```

```
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	*Complex*	-	R	Test code / Method Identifier. Takes the format: *Test^Type^Code^ReagentType^Pos^Exp* 👁 For details see *Testcode/ Method Identifier* on page D-32.
SID-2	*String*	-	O	Lot number of the reagent used. Used only for patient and E-module calibration results. 👁 For details, see *Reagent type* on page D-32.
SID-3	*String*	-	O	Serial number of the reagent used. Not used for calibration results.

Testcode/ Method Identifier

The testcode / method identifier gives the test (i.e. application or analyte to test for) and details of the reagent. For ISE and C-module calibration results, this field is empty.

Test^Type^Code^ReagentType^Pos^Exp

Test	Testcode (or Application Code). This is the code number the host uses for identifying the test or analyte to test for.
Type	Type of the test. For E-module calibration results, this field is empty.
Code	Reagent Code. For E- module calibration results, this field is empty.
ReagentType	Reagent Type. 👁 For details see *Reagent type* on page D-32 below.
Pos	Reagent Position on Disk
Exp	Expiration flag: • `0` = expired • `1` = not expired

This field is empty for ISE and C-module calibration results, but is used by E-module (Immunology) calibration results.

Reagent type

The reagent type, used in SID-1, component 2, can take any of the following values.

R1	Reagent 1 used for a test on a C module.
R2	Reagent 2 used for a test on a C module.
R3	Reagent 3 used for a test on a C module.
SPR	Special reagent
ASY	Assay, used on immunology (e) modules. [a]
IS	Inner standard (ISE)
DIL	Diluent (ISE)
REF	Reference (ISE)

(a) An e module test will have exactly one ASY segment.

-ᗧ-

Reagents on a C module

Note that R1-R3 might not all be present on a c module.

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^20090402172605|G|
```

Field	Value	Host	DM	Description
NTE-1	*Number*		R	Set ID
NTE-2	*Character*		R	Source of comment text. Fixed string value.
				• I From **cobas®** 8000 modular analyzer series instrument
				The I flag shows that the comment came from the instrument, and the *data manager* passed it on.
				• L From *data manager*.
				Shows the *data manager* created the comment, e.g. in a manually-edited result.
NTE-3	*Complex*		R	Comment. Value depends on value of NTE-4.
				👁 For details of this field, see *Types of comment segment* on page D-33.
NTE-4	*String*		R	Code for qualifying the comment segment type. Comments sent by *data manager* can have the following types.
				• I Instrument flag.
				• G Result comment created in *data manager* by an operator.

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^User^Date

Text	Comment text
User	User who entered the comment
Date	Creation date and time in datetime format

Instrument comments   If the instrument sends the *data manager* an 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 error flag.

flag^desc

flag	Number showing the code of the error. If there is no error, this value is zero: 0.
desc	Description of error flag. Blank if the status is 0.

👁 For details of possible error flags, see Chapter 10 *Data Alarms*

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|
```

```
QPD|TSREQ|12897|*********************||50045|1||||S1|SC|R1|R|
```

Field	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*		R	Sample ID. If the barcode is not being used, or in the case of a barcode read error, this field contains 22 `*` (asterisk) characters.
QPD-4	*Field contains no data.*			
QPD-5	*String*		R	Rack ID, as visible on Control Unit
QPD-6	*String*		R	Position on rack
QPD-7	*Field contains no data.*			
QPD-8	*Field contains no data.*			
QPD-9	*Field contains no data.*			
QPD-10	*String*		R	Rack type as assigned to a specific sample type on the cobas 8000 instrument. 👁 For details, see *Rack type* on page D-34.
QPD-11	*String*		R	Sample container type. A two-character code. • `MC` Micro cup • `SC` (or empty) Standard cup
QPD-12	*String*		R	Kind. A two-character code. • `R1` Query for 1st measurement (Initial run) • `R2` Rerun query
QPD-13	*String*		R	Code indicating the sample priority. • `S` STAT sample • `R` Routine sample

Rack type

The rack type is sent in field QPD-10. This shows the rack type as assigned to a specific sample type on the cobas 8000 instrument. 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	CSF
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 *data manager*).

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
QPD|RSREQ||12896|
QPD|RSREQ||12896|F
QPD|RSREQ||12896||||||S1
```

Field	Value	Host	DM	Description
QPD-1	RSREQ	R		Message name, fixed string RSREQ.
QPD-2	*String*	O		Query tag to identify the query.
QPD-3	*String*	R		Sample ID. If the barcode is not being used, or in the case of a barcode read error, this field contains 22 * (asterisk) characters.
QPD-4	*String*	O		Selection mode • (empty) All results • F Final results
QPD-5	*Field contains no data.*			
QPD-6	*Field contains no data.*			
QPD-7	*Field contains no data.*			
QPD-8	*Field contains no data.*			
QPD-9	*Field contains no data.*			
QPD-10	*String*	O		Rack type. This takes the same values as for other Query Parameter messages. For details see *Rack type* on page D-35.
Subsequent fields contain no data.				

Rack type

The rack type is sent in field QPD-10. 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	CSF
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	

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
QPD|TSREQ||12896|||||||S1
```

Field	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*	R		Sample ID. If the barcode is not being used, or in the case of a barcode read error, this field contains 22 * (asterisk) characters.

QPD-4	*String*	O		Selection mode
				• (empty)
				  All results
				• O
				  Open. (Only test selections with no results yet)

QPD-5	*Field contains no data.*			
QPD-6	*Field contains no data.*			
QPD-7	*Field contains no data.*			
QPD-8	*Field contains no data.*			
QPD-9	*Field contains no data.*			
QPD-10	*String*	O		Rack type. 👁 This takes the same values as for other Query Parameter messages. For details see *Sample type* on page D-36.
Subsequent fields contain no data.				

Sample type

The sample type is sent in field QPD-10. This differs slightly from the rack type passed in a test selection inquiry. 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	CSF	
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	

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	R	R	Query limited request, fixed value 1.
RCP-3	R	R	R	Response modality, fixed character value R.

Equipment Detail Segment – EQU

The host used 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.

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	*This field contains no data.*			
ECD-2	*String*	R		The instruction specifying masking or unmasking. • `LK` (for "lock") to implement masking. • `UC` (for "unlock"), to unmask.
ECD-3	*This field contains no data.*			
ECD-4	*This field contains no data.*			
ECD-5	*Complex*	R		This field specifies the parameters of the command. *TestCode^MaskTpe^Unit_ID^ALL* 👁 For details, see *Syntax of the masking command* on page D-38.

Syntax of the masking command

The *data manager* reads the basic command to mask or unmask a test in ECD-2 field. Details of the command are read from field ECD-5.

```
989^P^MU1#e602#1#1^ALL
989^T^MU1#ISE#1#1^ALL
989^^MU1#C701#1#1^ALL
```

This identifier takes the format, by default:

TestCode^MaskType^Unit_ID^ALL

TestCode	The code identifying the analyte or test.
MaskType	A character flag instructing *data manager* which kind of masking to perform: • `P` Mask only patient results. The *data manager* uploads quality control and calibration results to the host. • `T` Mask all results, including patient, quality control and calibration results. • An empty value tells the *data manager* to remove the masking.
Unit_ID	This is an identifier for the instrument and module. *Instrument*#*ModuleType*#*Position*#*SubModule* Example: `MU1#c502#2#1` 👁 For details, see *Instrument identifier for the host* on page D-30.
`ALL`	Cassette Serial identifier. Reserved for future use. For the moment, its value should be set to 'ALL'.

Appendices E

Data Alarms

This chapter gives a reference to the data alarms that **cobas**® 8000 data manager and the Control Unit can generate.

Data alarms explained

This table presents a brief description, the priority and output character of each data alarm

No.	Name	Meaning	Priority	HOST	PRN	SCR
0	(No Alarm)					
1	ADC abnormal	• *Photometry*: The ADC value of the primary or secondary wavelength is zero (in monochromatic measurement, the primary wavelength only). • *ISE*: The system cannot read the ADC data properly. • *Immunoassay*: The ADC data is abnormal.	1	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.	1	2	**>Cuvet**	✓
3	Sample short	Before sample aspiration, the liquid level cannot be detected in the sample container. *Immunoassay:* • Sample short was detected. • No sample was placed.	2	3	**Samp.S**	✓
4	Reagent short	The liquid level cannot be detected in the reagent container.	2	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)	3	5	**>Abs**	✓
6	Prozone Error	The prozone check value exceeds the specified limit value. (Antigen readdition method)	3	6	**>Proz**	✓
7	Reaction limit over	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 thee types: 1. All measure points exceed the reaction limit.	3	7	**>React**	✓
8	Reaction limit over (2nd ..)	2. The second and subsequent points exceed the reaction limit.	3	8	**>React**	✓
9	Reaction limit over (3rd ..)	3. The third and subsequent points exceed the reaction limit.	3	9	**>React**	✓
10	Linearity abnormal 1	In rate assay, the reaction linearity exceeds the specified limit value. There are two types of checks depending on the number of measure points: 1. When there are 9 or more measure points for c701, 17 or more for c502.	3	10	**>Lin**	✓
11	Linearity abnormal 2	2. When there are 4-8 measure points for c701, 6 to 16 for c502.	3	11	**>Lin**	✓
12	S1ABS abnormal	During calibration, expected absorbance is outside the S1 Abs Limit.	4	12	**S1A.E**	✓
13	DUPLICATE error	• *Photometry*: The difference between the first and second measurement (absorbance) of a calibrator is outside the specified range. • *Immunoassay*: The difference between the first and second measured signals of the calibrator is out of the range specified in the assay.	4	13	**Dup.E**	✓

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No.	Name	Meaning	Priority	HOST	PRN	SCR
					UI	
14	STANDARD error	During photometric calibration, any one of the following alarms was encountered: • ADC abnormal • cell blank abnormal • sample short • reagent short • absorbance over • reaction limit over • linearity abnormal • prozone error • duplicate error • calculation not possible • standard 1 absorbance abnormal. Otherwise one of the following errors occurred: • During calibration, calculation was disabled. • During nonlinear calibration, an extreme value appeared.	4	14	**Std.E**	✓
15	SENSITIVITY error	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: Mean Abs of Std (N)* - Mean Abs of Std (1) Mean Conc of Std (N) - Mean Conc of Std (1) *N: = Std 2 for 2 Point = span calibrator for multipoint calibration	4	15	**Sens.E**	✓
16	CALIB error	The current calibrator concentration value or slope value differs from the previous one by more than the specified Compensated Limit. $\|(previous\ value\ -\ current\ value)/\{(previous\ value\ +\ current\ value)/2\}\|*100 < Compensated\ limit$	5	16	**Cal.E**	✓
17	SD limit error	During nonlinear or multipoint linear calibration, the SD value was larger than the specified SD limit.	5	17	**SD.E**	✓
18	ISE Noise error	The fluctuation in electromotive force exceeds the following value: • Na+: 0.7 mV • K+:1.0 mV • Cl-: 0.8 mV	4	18	**ISE.N**	✓
19	ISE Voltage Level error	During measurement of internal reference, the mean of the EMF values was not within the following ranges (Internal standard solution): • Na+: -90.0 to -10 mV • K+: -90.0 to -10 mV • Cl-: 80.0 to 160 mV	4	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.	3	20	**Slop.E**	✓
21	Preparation abnormal	The slope value is within the following range: • Na+ or K+ electrodes: 45.0 to 49.9 mV • Cl- electrodes: -39.9 to -35.0 mV	3	21	**Prep.E**	✓

No.	Name	Meaning	Priority	Output character		
				HOST	UI	
					PRN	SCR
22	IS concentration abnormal	The concentration of the Internal Standard solution (ISE IS) was not within the following ranges* • Na+: 120.0-160.0 mmol/L, • K+: 3.0-7.0 mmol/L • Cl-: 80.0-120.0 mmol/L	3	22	**IStd.E**	✓
23	ISE Sample range over	The sample concentration was outside the following range: • Na+: 10-250 mmol/L, • K+: 1-100 mmol/L, • Cl-: 10-250 mmol/L	5	23	**<>Test**	✓
24	Data error in comp. Test	• In test-to-test compensation calculation, a data alarm for the compensation test data is indicated. • Calculation not possible, test-to-test compensation disabled, overflow, random error, systematic error, QC error and outside of expected value.	5	24	**CmpT.E**	✓
25	Unable to calculate comp. Test	• During test-to-test compensation calculation, the denominator became zero. • The test used for test-to-test compensation has not been measured yet. • Any test used for test-to-test compensation has data alarm not possible (Calc.?) or test-to-test compensation error (CmpT.E). • Any test used in the compensation formula has a data alarm that leaves the result blank.	5	25	**CmpT.?**	✓
26	Technical Limit over (upper)	The concentration exceeds the specified technical limit range. *Immunoassay:* The concentration exceeds the measuring range.	"4	26	**>Test**	✓
27	Technical Limit over (lower)	*Photometry/ISE:* The concentration is below the specified technical limit range. *Immunoassay:* The concentration is below the measuring range.	"4	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)	-			
36		Reserved for former alarm (QC error 2)	-			
37	Calculation test error	A data alarm has occurred for the test needed in the calculation.	6	37	**ClcT.E**	✓
38	Overflow	Display is not possible because the output figure exceeds the defined number of digits.	6	38	**Over.E**	✓
39	Calculation not possible	• The denominator becomes zero in calculation. • An overflow occurred in logarithmic or exponential calculation. • Result was left blank.	2	39	**Calc.?**	✓
40		Reserved for former alarm (Outside of expected value (upper))	-			
41		Reserved for former alarm (Outside of expected value (lower))	-			

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No.	Name	Meaning	Priority	Output character		
				HOST	UI	
					PRN	SCR
42	Edited test	The data has been edited.	0	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.	7	43	**Cal.E**	✓
44	Repeat limit over (upper)	The quantitative result exceeds the upper limit of the specified repeat limit range.	7	44	**>Rept**	✓
45	Repeat limit over (lower)	The quantitative result falls below the lower limit of the specified repeat limit range.	7	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).	3	46	**Samp.?**	✓
47			-			
48			-			
49			-			
50			-			
51	Response(ISE) abnormal 1	The A Factor is outside the following limits: • Na+: A > 0.154 • K+: A > 0.107 • Cl-: A > 0.330	3	51	**Rsp1.E**	✓
52	Response(ISE) abnormal 2	The A Factor is outside the following limits: • Na+: A > 0.232 • K+: A > 0.160 • Cl-: A > 0.490	3	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.	3	53	**Cond.E**	✓
54			-			
55	ISE range over		6	55	**>ISE**	✓
56	Kinetic unstable (Prozone error 2)	The prozone check value exceeds the specified limit value. (reaction rate method)	3	56	**>Kin**	✓
57		Reserved for former alarm (Serum index 1 interference)	-			
58		Reserved for former alarm (Serum index multiple interference)	-			
59	Stop mixing		2	59	**MIXSTP**	✓
60	Mixing current low		2	60	**MIXLOW**	✓
61			-			
62	System reagent short	Shortage in ProCell/CleanCell is detected.	2	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.	2	67	**Samp.H**	✓

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No.	Name	Meaning	Priority	Output character		
				HOST	UI	
					PRN	SCR
68	Sample air bubble	Air bubble is detected in the sample syringe flow path when the sample is aspirated.	2	68	**Samp.B**	✓
69	Reagent hovering	The reagent probe hovers over the reaction disk (over reagent / dilution / pretreatment).	2	69	**Reag.H**	✓
70	Reagent film detection	The reagent probe detects a film on the reagent (reagent / dilution / pretreatment / ProCell / CleanCell).	2	70	**Reag.F**	✓
71	Potential carry over	The signal level of this sample is low (a carryover may have occurred).	3	71	**CarOvr**	✓
72	Sample clot	The specified volume of sample is not aspirated: Clogging was detected in the sample probe.	2	72	**Samp.C**	✓
73	Carry over detergent short	Shortage of detergent for reagent carryover evasion is detected.	2	73	**Det.S**	✓
74	Reagent disk temperature	Reagent disk temperature is out of range	8	74	**Reag.T**	✓
75	Incubator temperature	Incubator temperature is out of range.	8	75	**Inc.T**	✓
76	System reagent temperature	ProCell/CleanCell temperature is out of range.	8	76	**SysR.T**	✓
77	Cell temperature	Measuring cell temperature is out of range.	8	77	**Cell.T**	✓
78	Missing value	One or more of the calibration results is invalid.	4		**------**	
79	System errors	An error occurs on the system during measurement.	4	(79)	**Sys.E**	✓
80	Monotony of curve	The working curve is not monotonically increasing or monotonically decreasing.	4	(80)	**Mono.E**	✓
81	Minimum signal	One or two of the calibrator signal values is lower than the specified lower limit value.	4	(81)	**<Sig**	✓
82	Maximum signal	One or two of the calibrator signal values is higher than the specified lower limit value.	4	(82)	**>Sig**	✓
83	Sample carry over for modules	After pipetting at C module, appended test (Reflex) is required sample carry over wash.	5	(83)	**Samp.O**	✓
84	Minimum/Maximum signal	If one or more effective signal values falls out of the allowable minimum/maximum signal range	4	(84)	**Sig.E**	✓
85	Minimum acceptable difference	The difference of the signals between each level of calibrators is below the permissible value.	4	(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.)	2	86	**SLLD.E**	✓
87	Sample LLD noise	The sample probe did not detects the liquid surface properly because of air bubbles on the sample or static electricity.	2	87	**SLLD.N**	✓
88			-			
89			-			
90			-			
91			-			
92			-			
93	Washing buffer temperature	PreClean temperature is out of range.	8	93	**WB.T**	✓
94	Washing buffer short	The remaining volume for PreClean is 0, or liquid short signal is detected.	2	94	**WB.S**	✓

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No.	Name	Meaning	Priority	HOST	PRN	SCR
95	Clot pressure sensor ADC (underflow)	In checking the pressure sensor, underflow data is detected.	2	95	**Clot.E**	✓
96	Clot pressure sensor ADC (overflow)	In checking the pressure sensor, overflow data is detected.	2	96	**Clot.E**	✓
97	Clot pressure abnormal	The clot pressure value is abnormal.	2	97	**Clot.E**	✓
98	Sample pipettor air bubble	Air bubble is detected in the sample syringe flowpath when the sample is aspirated.	2	98	**Samp.B**	✓
99	Current range over (operation)	The measuring cell current is out of range in the determination cycle during operation.	2	99	**>Curr**	✓
100	Low level signal	The effective signal of test is lower than the specified lower limit value.	2	100	**<SigL**	✓
101	Reagent Expired Date	The alarm indicates that an expired reagent was used; the test result is not guaranteed.	9	101	**ReagEx**	✓
102	QC error	There is an error related to QC.	7	102	**QCErr**	✓
103	Serum index interference lipaemia	The lipaemia value exceeds the specified limit value.	5	103	**>I.L**	✓
104	Serum index interference hemolysis	The hemolysis value exceeds the specified limit value.	5	104	**>I.H**	✓
105	Serum index interference icteric	The icteric value exceeds the specified limit value.	5	105	**>I.I**	✓
106	Serum index interference lipaemia / hemolysis	Both of the lipaemia value and hemolysis value exceed the specified limit value.	5	106	**>I.LH**	✓
107	Serum index specific interference lipaemia / icteric	Both of the lipaemia value and icteric value exceed the specified limit value.	5	107	**>I.LI**	✓
108	Serum index interference hemolysis / icteric	Both of the hemolysis value and icteric value exceed the specified limit value.	5	108	**>I.HI**	✓
109	Serum index interference lipaemia / hemolysis / icteric	All of lipaemia, hemolysis and icteric values exceed the specified limit value.	5	109	**>I.LHI**	✓

The "Output character" header spans HOST and UI, with UI covering PRN and SCR.

Data alarm usage

This section shows the usage of the data alarms, and with the alarm's the priority and output character.

The following symbols are used in the chart.

Data		Alarm		Rerun TS		Auto Rerun	
=	With result	●	AU	✳	Same volume	E	Auto rerun
□	Without result	○	Core/PC, AU	↓	Decrease	-	No auto rerun
△	Without result in specified conditions	◉	Core/PC	↑	Increase	+	Either
≥	Upper limit	$	*data manager*	-	No order		
≤	Lower limit						

No.	Name	Priority	HOST	UI (PRN)	SCR	R/S Photometry Data	R/S Photometry Alarm	R/S Photometry Rerun TS	R/S Photometry Auto Rerun	R/S LHI Data	R/S LHI Alarm	R/S LHI Rerun TS	R/S LHI Auto Rerun	R/S ISE Data	R/S ISE Alarm	R/S ISE Rerun TS	R/S ISE Auto Rerun	Ctrl Photo Data	Ctrl Photo Alarm	Ctrl ISE Data	Ctrl ISE Alarm	Ctrl Imm Data	Ctrl Imm Alarm	Cal Photo Data	Cal Photo Alarm	Cal ISE Data	Cal ISE Alarm	Cal Imm Data	Cal Imm Alarm
0	(No Alarm)																												
1	ADC abnormal	1	1	ADC.E	✓	=	●	*	✓	=	●	*	✓	=	●	*	✓	=	●	=	●	□	●	=	●	=	●		
2	ABS Cell blank abnormal	1	2	>Cuvet	✓	=	●	*	✓	=	●	*	✓					=	●					=	●				
3	Sample short	2	3	Samp.S	✓	◁	●	*	✓	◁	●	*	—	◁	●	*	—	◁	●	◁	●	◁	●	◁	●	◁	●		
4	Reagent short	2	4	Reag.S	✓	◁	●	*	—	◁	●	*	—	◁	●	*	—	◁	●	◁	●	◁	●	◁	●	◁	●		
5	ABS over	3	5	>Abs	✓	=	●	→	✓	=	●	*	✓					=	●					=	●				
6	Prozone Error	3	6	>Proz	✓	=	●	→	✓									=	●					=	●				
7	Reaction limit over	3	7	>React	✓	=	●	→	✓									=	●					=	●				
8	Reaction limit over (2nd ..)	3	8	>React	✓	=	●	→	✓									=	●					=	●				
9	Reaction limit over (3rd ..)	3	9	>React	✓	=	●	→	✓									=	●					=	●				
10	Linearity abnormal 1	3	10	>Lin	✓	=	●	*	✓									=	●					=	●				
11	Linearity abnormal 2	3	11	>Lin	✓	=	●	*	✓									=	●					=	●				
12	S1ABS abnormal	4	12	S1A.E	✓																			=	●				
13	DUPLICATE error	4	13	Dup.E	✓																			=	●			=	●
14	STANDARD error	4	14	Std.E	✓																			=	●	=	●		
15	SENSITIVITY error	4	15	Sens.E	✓																			=	●				
16	CALIB error	5	16	Cal.E	✓																			=	●				
17	SD limit error	5	17	SD.E	✓																			=	●				
18	ISE Noise error	4	18	ISE.N	✓									=	●	*	✓			=	●					=	●		
19	ISE Voltage Level error	4	19	ISE.E	✓									=	●	*	✓			=	●					=	●		
20	Slope abnormal	3	20	Slop.E	✓																					=	●	=	●

The table below is rotated 90° on the printed page. Column groups: **Output character** (HOST, UI = PRN/SCR); **Routine / STAT** → Clinical Chemistry (Photometry, LHI, ISE) and Calc. Test, each with Data / Alarm / Rerun TS / Auto Rerun; **Control** → Clinical Chemistry (Photo, ISE, Calc) and Imm, each with Data / Alarm; **Calibration** → Clin Chem (Photo, ISE) and Imm, each with Data / Alarm.

Symbol key as printed: ● filled circle, ○ open circle, ◉ circle-with-dot, □ square, = equals, ≤ / ≥, * asterisk, → / ← arrows, ✓ check, – dash.

No.	Name	Priority	HOST	PRN	SCR	Photo Data	Photo Alarm	Photo RerunTS	Photo AutoRerun	LHI Data	LHI Alarm	LHI RerunTS	LHI AutoRerun	ISE Data	ISE Alarm	ISE RerunTS	ISE AutoRerun	CalcTest Data	CalcTest Alarm	CalcTest RerunTS	CalcTest AutoRerun	CtrlPhoto Data	CtrlPhoto Alarm	CtrlISE Data	CtrlISE Alarm	CtrlCalc Data	CtrlCalc Alarm	CtrlImm Data	CtrlImm Alarm	CalPhoto Data	CalPhoto Alarm	CalISE Data	CalISE Alarm	CalImm Data	CalImm Alarm
21	Preparation abnormal	3	21	Prep.E	✓																											=	●		
22	IS concentration abnormal	3	22	IStd.E	✓																											=	●		
23	ISE Sample range over	5	23	<>Test	✓									=	●	*	✓							=	●										
24	Data error in comp. Test	5	24	CmpT.E	✓	=	○			=	○			=	○	*	✓					=		=	○										
25	Unable to calculate comp. Test	5	25	CmpT.?	✓	□	○	*	✓	□	○			□	○	*	✓					□	○	□	○										
26	Technical Limit over (upper)	"4	26	>Test	✓	=	●	→	✓					=	◉	→	✓						○					≤	●						
27	Technical Limit over (lower)	"4	27	<Test	✓	=	●	←	✓					=	◉	*	✓											≥	●						
28		–																																	
29		–																																	
30		–																																	
31		–																																	
32		–																																	
33		–																																	
34		–																																	
35		–																																	
36		–																																	
37	Calculation test error	6	37	ClcT.E	✓	□	○				○				○			=	○	*	✓		○		○	=	○		○		○	□	○		○
38	Overflow	6	38	Over.E	✓	□	◉	*	–	□	◉				○		–	□	○		–		◉		◉	□	○	□	●	□	●	□	●	□	
39	Calculation not possible	2	39	Calc.?	✓		◉	*	✓					□	◉	*	✓	□	○	*	✓		◉		◉	□	○		●		●		●		
40		–																																	

Legend of symbols used: `=` Data · `●` filled Alarm · `○` open Alarm · `✱` Rerun TS · `→` Rerun TS · `↘` Auto Rerun · `+` / `-` Auto Rerun · `□` Data · `△` Data

No.	Name	Priority	HOST	PRN	SCR	Phot Data	Phot Alarm	Phot Rerun TS	Phot Auto Rerun	LHI Data	LHI Alarm	LHI Rerun TS	LHI Auto Rerun	ISE Data	ISE Alarm	ISE Rerun TS	ISE Auto Rerun	Calc Data	Calc Alarm	Calc Rerun TS	Calc Auto Rerun	Ctrl Photo Data	Ctrl Photo Alarm	Ctrl ISE Data	Ctrl ISE Alarm	Ctrl Calc Data	Ctrl Calc Alarm	Ctrl Imm Data	Ctrl Imm Alarm	Cal Photo Data	Cal Photo Alarm	Cal ISE Data	Cal ISE Alarm	Cal Imm Data	Cal Imm Alarm
41		-																																		
42	Edited test	0	42	Edited	✓	=	○		-	=	○			=	○		-	=	○		-	=	●	=	●			△	●						
43	Calibration result abnormal (Sample Flag)	7	43	Cal.E	✓	=	●	✱	-	=				=	●	✱	-																			
44	Repeat limit over (upper)	7	44	>Rept	✓	=	○	✱	+					=	○	✱	+	=	○	✱	+														
45	Repeat limit over (lower)	7	45	<Rept	✓	=	○	✱	+					=	○	✱	+	=	○	✱	+														
46	ABS maximum over (nonLin curve)	3	46	Samp.?	✓	□	●	→	↘														●												
47		-																																	
48		-																																	
49		-																																	
50		-																																	
51	Response(ISE) abnormal 1	3	51	Rsp1.E	✓																										=	●		
52	Response(ISE) abnormal 2	3	52	Rsp2.E	✓																									=	●		
53	Conditioning(ISE) abnormal	3	53	Cond.E	✓																									=	●		
54		-																																	
55	ISE range over	6	55	>ISE	✓									=	○	→	↘																	
56	Kinetic unstable (Prozone error 2)	3	56	>Kin	✓		●	→	↘																									
57		-																																	
58		-																																	
59	Stop mixing	2	59	MIXSTP	✓	=	●	✱	↘	=	●	✱	↘	=	●	✱	↘					=	●	=	●					=	●	=	●		
60	Mixing current low	2	60	MIXLOW	✓	=	●	✱	↘	=	●	✱	↘	=	●	✱	↘					=	●	=	●					=	●	=	●		

No.	Priority	HOST	PRN	SCR	Name	R/S Photometry Data	R/S Photometry Alarm	R/S Photometry Rerun TS	R/S Photometry Auto Rerun	R/S LHI Data	R/S LHI Alarm	R/S LHI Rerun TS	R/S LHI Auto Rerun	R/S ISE Data	R/S ISE Alarm	R/S ISE Rerun TS	R/S ISE Auto Rerun	R/S Calc.Test	Ctrl CC Photo Data	Ctrl CC Photo Alarm	Ctrl CC ISE Data	Ctrl CC ISE Alarm	Ctrl CC Calc	Ctrl Imm Data	Ctrl Imm Alarm	Cal CC Photo Data	Cal CC Photo Alarm	Cal CC ISE Data	Cal CC ISE Alarm	Cal Imm Data	Cal Imm Alarm
61	-																														
62	2	62	SysR.S	✓	System reagent short																			□	●						
63	-	63	>AB	✓	AB level range over (Assay Buffer) run start																			=	●						
64	-	64	AB.E	✓	AB level check error																			=	●						
65	-	65	>Curr	✓	Current range over (run start)																			=	●						
66	-	66	Curr.E	✓	Current range check error																			=	●						
67	2	67	Samp.H	✓	Sample hovering																			□	●						
68	2	68	Samp.B	✓	Sample air bubble																			□	●						
69	2	69	Reag.H	✓	Reagent hovering																			□	●						
70	2	70	Reag.F	✓	Reagent film detection																			□	●						
71	3	71	CarOvr	✓	Potential carry over																			=	●						
72	2	72	Samp.C	✓	Sample clot	◁	●	*	-	◁	●	* (red)	- (red)	◁	●	*	-		◁	●	◁	●		□	●	◁	●	◁	●		
73	2	73	Det.S	✓	Carry over detergent short	=	●	*	-	=	●	* (red)	- (red)							●							●				
74	8	74	Reag.T	✓	Reagent disk temperature																			=	●						
75	8	75	Inc.T	✓	Incubator temperature																			=	●						
76	8	76	SysR.T	✓	System reagent temperature																			=	●						
77	8	77	Cell.T	✓	Cell temperature																			=	●						
78	4		-----		Missing value																										●
79	4	(79)	Sys.E	✓	System errors																										●
80	4	(80)	Mono.E	✓	Monotony of curve																						● (red)				●
81	4	(81)	<Sig	✓	Minimum signal																										●
82	4	(82)	>Sig	✓	Maximum signal																										●

No.	Name	Priority	HOST	PRN	SCR	R·Photometry Data	R·Photometry Alarm	R·Photometry RerunTS	R·Photometry AutoRerun	R·LHI Data	R·LHI Alarm	R·LHI RerunTS	R·LHI AutoRerun	R·ISE Data	R·ISE Alarm	R·ISE RerunTS	R·ISE AutoRerun	R·Calc.Test Data	R·Calc.Test Alarm	R·Calc.Test RerunTS	R·Calc.Test AutoRerun	Ctrl·Photo Data	Ctrl·Photo Alarm	Ctrl·ISE Data	Ctrl·ISE Alarm	Ctrl·Calc Data	Ctrl·Calc Alarm	Ctrl·Imm Data	Ctrl·Imm Alarm	Cal·Photo Data	Cal·Photo Alarm	Cal·ISE Data	Cal·ISE Alarm	Cal·Imm Data	Cal·Imm Alarm
83	Sample carry over for modules	5	(83)	Samp.O	✓	=	○	-	-					=	○	-	-					=	○	=	○			=	○						
84	Minimum/Maximum signal	4	(84)	Sig.E	✓																													●
85	Minimum acceptable difference	4	(85)	Diff.E	✓																													●
86	Sample LLD abnormal (underflow)	2	86	SLLD.E	✓																							□	●				
87	Sample LLD noise	2	87	SLLD.N	✓																							□	●				
88		-																																	
89		-																																	
90		-																																	
91		-																																	
92		-																																	
93	Washing buffer temperature	8	93	WB.T	✓																							□	●				
94	Washing buffer short	2	94	WB.S	✓																							□	●				
95	Clot pressure sensor ADC (underflow)	2	95	Clot.E	✓																							□	●				
96	Clot pressure sensor ADC (overflow)	2	96	Clot.E	✓																							□	●				
97	Clot pressure abnormal	2	97	Clot.E	✓																							□	●				
98	Sample pipettor air bubble	2	98	Samp.B	✓																							□	●				
99	Current range over (operation)	2	99	>Curr	✓																							□	●				
100	Low level signal	2	100	<SigL	✓																							□	●				
101	Reagent Expired Date	9	101	ReagEx	✓	=	○		-														○					=	○				
102	QC error	7	102	QCErr	✓																												
103	Serum index interference lipaemia	5	103	>I.L	✓	=	○	-	-					=	○	-	-	=	○	-	-	=	$	=	$	=	$	=	$				

No.	Name	Priority	HOST	PRN	SCR	Photometry Data	Photometry Alarm	Photometry Rerun TS	Photometry Auto Rerun	LHI Data	LHI Alarm	LHI Rerun TS	LHI Auto Rerun	ISE Data	ISE Alarm	ISE Rerun TS	ISE Auto Rerun	Calc. Test Data	Calc. Test Alarm	Calc. Test Rerun TS	Calc. Test Auto Rerun
104	Serum index interference hemolysis	5	104	>I.H	✓	=	○	-	-					=	○	-	-	=	○	-	-
105	Serum index interference icteric	5	105	>I.I	✓	=	○	-	-					=	○	-	-	=	○	-	-
106	Serum index interference lipaemia / hemolysis	5	106	>I.LH	✓	=	○	-	-					=	○	-	-	=	○	-	-
107	Serum index specific interference lipaemia / icteric	5	107	>I.LI	✓	=	○	-	-					=	○	-	-	=	○	-	-
108	Serum index interference hemolysis / icteric	5	108	>I.HI	✓	=	○	-	-					=	○	-	-	=	○	-	-
109	Serum index interference lipaemia / hemolysis / icteric	5	109	>I.LHI	✓	=	○	-	-					=	○	-	-	=	○	-	-
110																					

Table column groups:
- **Output character**: HOST; UI (PRN, SCR)
- **Routine / STAT** — Clinical Chemistry: Photometry (Data, Alarm, Rerun TS, Auto Rerun); LHI (Data, Alarm, Rerun TS, Auto Rerun); ISE (Data, Alarm, Rerun TS, Auto Rerun); Calc. Test (Data, Alarm, Rerun TS, Auto Rerun)
- **Control** — Clinical Chemistry: Photo (Data, Alarm), ISE (Data, Alarm), Calc (Data, Alarm); Imm (Data, Alarm) — all empty
- **Calibration** — Clin Chem: Photo (Data, Alarm), ISE (Data, Alarm); Imm (Data, Alarm) — all empty

Instrument alarms

This chapter describes the alarms generated on the **cobas**® 8000 instrument by errors in communication with the *data manager* or the host.

In this chapter	*Chapter* **11**

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* or host on the other.

If an instrument alarm occurs that is not in this list, consult your Roche service engineer 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.	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.
111	2	Abnormal Test Selection from Data Manager	System did not receive a response against its inquiry within a timeout period.	1. Check the Data Manager's operation or connection status. 2. Check if the connector got unplugged during the data communication. 3. Check the inquiry timeout on Utility > System > Data Manager Settings. 4. Contact service representative, if alarm recurs.
111	51	Abnormal Test Selection from Data Manager	Reading error occurred in the sample management database.	1. Restart the system. 2. Contact service representative, if alarm recurs.
111	52	Abnormal Test Selection from Data Manager	Dilution ratio value is outside the range.	1. Check the Data Manager settings. 2. Check the dilution ratio. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
111	53	Abnormal Test Selection from Data Manager	The received sample information is not requested one. Either of the following items is wrong: • Sample Type • Sample ID • Sequence No. • Rack ID • Position No.	1. Check the Data Manager settings. 2. Check the sample information. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
111	54	Abnormal Test Selection from Data Manager	Writing error occurred in the sample management database.	1. Restart the system. 2. Contact service representative, if alarm recurs.
111	55	Abnormal Test Selection from Data Manager	Sample data file on the sample management database is full.	1. Perform Delete All on Workplace > Data Review. 2. Perform Sample Data Clear on System Overview.
111	56	Abnormal Test Selection from Data Manager	Result data file on the sample management database is full.	1. Perform Delete All on Workplace > Data Review. 2. Perform Sample Data Clear on System Overview.
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.	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Test Selection Download Text - Batch) 3. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
111	59	Abnormal Test Selection from Data Manager	The combination of a Stat rack ID and a sample position has been already assigned.	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Test Selection Download Text)
111	60	Abnormal Test Selection from Data Manager	The sample ID contains the abnormal code.	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Test Selection Download Text)
126	200	Data Manager Communication Error	Communication error occurred. Communication line was turned to offline status.	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.
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.	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.
126	202	Data Manager Communication Error	Communication error occurred during connection. (Control socket communication line)	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.
126	203	Data Manager Communication Error	Communication error occurred. When receiving it, abnormality was detected. (Control socket communication line)	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.
126	204	Data Manager Communication Error	Internal process error occurred.	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	205	Data Manager Communication Error	Communication error occurred. When receiving it, abnormality was detected. (Control socket communication line)	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.
126	206	Data Manager Communication Error	Communication error occurred, due to either of the following causes: • Wire break. • Momentary power failure.	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.
126	207	Data Manager Communication Error	Internal process error occurred.	1. Restart the system. 2. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
126	208	Data Manager Communication Error	Internal process error occurred.	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	301	Data Manager Communication Error	No response from Data Manager within a timeout. (Control socket communication line)	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.
126	302	Data Manager Communication Error	Message error occurred. (Control socket communication line)	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	303	Data Manager Communication Error	FTP transmission error occurred. (Control socket communication line)	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	304	Data Manager Communication Error	Internal process error occurred. (Control socket communication line)	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	305	Data Manager Communication Error	Database access error occurred. (Control socket communication line)	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	306	Data Manager Communication Error	Communication was turned to offline status. (Control socket communication line)	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.
126	401	Data Manager Communication Error	Abnormality connection with Data Manager. (FTP line)	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	402	Data Manager Communication Error	A file cannot be copied.	1. Restart the system. 2. Contact service representative, if alarm recurs.
126	403	Data Manager Communication Error	There is no response from Data Manager.	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.
126	501	Data Manager Communication Error	The response from the Data manager is wrong.	1. Restart the system. 2. Contact service representative, if alarm recurs.
127	1	Abnormal Text from Data Manager	Communication ID error was detected in the CI11.	1. Perform System Communication Trace on Print. 2. Check the CI11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	2	Abnormal Text from Data Manager	Communication ID error was detected in the UR11.	1. Perform System Communication Trace on Print. 2. Check the UR11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.

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Code	Sub-	Alarm Message	Content	Troubleshooting
127	3	Abnormal Text from Data Manager	Communication ID error was detected in the PL11.	1. Perform System Communication Trace on Print. 2. Check the PL11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	4	Abnormal Text from Data Manager	Communication ID error was detected in the PD11.	1. Perform System Communication Trace on Print. 2. Check the PD11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	5	Abnormal Text from Data Manager	Communication ID error was detected in the CL11.	1. Perform System Communication Trace on Print. 2. Check the CL11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	6	Abnormal Text from Data Manager	Communication ID error was detected in the CD11.	1. Perform System Communication Trace on Print. 2. Check the CD11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	7	Abnormal Text from Data Manager	Communication ID error was detected in the QL11.	1. Perform System Communication Trace on Print. 2. Check the QL11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	8	Abnormal Text from Data Manager	Communication ID error was detected in the QD11.	1. Perform System Communication Trace on Print. 2. Check the QD11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	9	Abnormal Text from Data Manager	Communication ID error was detected in the RD11.	1. Perform System Communication Trace on Print. 2. Check the RD11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	10	Abnormal Text from Data Manager	Communication ID error was detected in the TQ11.	1. Perform System Communication Trace on Print. 2. Check the TQ11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	11	Abnormal Text from Data Manager	Communication ID error was detected in the CV11.	1. Perform System Communication Trace on Print. 2. Check the CV11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	12	Abnormal Text from Data Manager	Communication ID error was detected in the CQ11.	1. Perform System Communication Trace on Print. 2. Check the CQ11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
127	13	Abnormal Text from Data Manager	Communication ID error was detected in the MR11.	1. Perform System Communication Trace on Print. 2. Check the MR11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	14	Abnormal Text from Data Manager	Communication ID error was detected in the MK11.	1. Perform System Communication Trace on Print. 2. Check the MK11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	15	Abnormal Text from Data Manager	Communication ID error was detected in the RM11.	1. Perform System Communication Trace on Print. 2. Check the RM11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	16	Abnormal Text from Data Manager	Communication ID error was detected in the EI12.	1. Perform System Communication Trace on Print. 2. Check the EI11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	17	Abnormal Text from Data Manager	Communication ID error was detected in the EI13.	1. Perform System Communication Trace on Print. 2. Check the EI13 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	18	Abnormal Text from Data Manager	Communication ID error was detected in the PU11.	1. Perform System Communication Trace on Print. 2. Check the PU11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	19	Abnormal Text from Data Manager	Communication ID error was detected in the PU12.	1. Perform System Communication Trace on Print. 2. Check the PU12 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	20	Abnormal Text from Data Manager	Abnormal communication ID was detected.	1. Perform System Communication Trace on Print. 2. Check the undefined communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	21	Abnormal Text from Data Manager	Communication ID error was detected in the EU11.	1. Perform System Communication Trace on Print. 2. Check the EU11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	22	Abnormal Text from Data Manager	Communication ID error was detected in the WL11.	1. Perform System Communication Trace on Print. 2. Check the WL11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
127	23	Abnormal Text from Data Manager	Communication ID error was detected in the WD11.	1. Perform System Communication Trace on Print. 2. Check the WD11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	24	Abnormal Text from Data Manager	Communication ID error was detected in the ER11.	1. Perform System Communication Trace on Print. 2. Check the ER11 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	25	Abnormal Text from Data Manager	Communication ID error was detected in the ER12.	1. Perform System Communication Trace on Print. 2. Check the ER12 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
127	26	Abnormal Text from Data Manager	Communication ID error was detected in the ER13.	1. Perform System Communication Trace on Print. 2. Check the ER13 communication ID. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
300	1	Sample Management Database Error	Sample data file on the sample management database is full.	1. Perform Delete All on Workplace > Data Review. 2. Perform Sample Data Clear on System Overview.
300	2	Sample Management Database Error	Result data file on the sample management database is full.	1. Perform Delete All on Workplace > Data Review. 2. Perform Sample Data Clear on System Overview.
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.	1. Perform Delete All on Workplace > Data Review. 2. Perform Sample Data Clear on System Overview.
300	5	Warning of Database Registration	The sample data file on the sample management database becomes full.	1. Perform Delete All on Workplace > Data Review. 2. Perform Sample Data Clear on System Overview.
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. E.g. 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. E.g. Subcategory code No. (XXXXXY) XXXXX: rack No. Y: cup	Check the test selections on Workplace > Test Selection.

Code	Sub-	Alarm Message	Content	Troubleshooting
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: • In case of routine sample in barcode mode: Sample Type, Sample ID • In case of Stat sample in barcode mode: Sample Type, Sample ID • In case of routine sample in non-barcode mode: Sample Type	1. When the system completes the analysis of loaded samples, retry the sample. 2. Check the followings. * Sample Type * Sample ID * Sequence No. * Rack ID * Rack Position No.
322	-3	Control Sample Duplication Error	In the following cases, there exists same control sample numbers registered in database: • The same number is applied to a control sample because applied number returned to the first. • There are same control samples in a same rack group in case of rack assign mode. The subcategory code indicates the rack	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. E.g. 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.

Code	Sub-	Alarm Message	Content	Troubleshooting
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.
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.	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.
895	-2	Data Manager Communication Error	Internal process error occurred. The subcategory code indicates communication line number.	1. Restart the system. 2. Contact service representative, if alarm recurs.
901	-2	Abnormal Text from Data Manager	First segment is not a header segment (MSH). The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check the MSH segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
902	-2	Abnormal Text from Data Manager	Undefined segment was found. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check the undefined segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
903	-2	Abnormal Text from Data Manager	There is no end code in the message. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR><FS><CR>' (0x0d1c0d) is at the end of the message. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
904	-2	Abnormal Text from Data Manager	There is no end code in the EQU segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the EQU segment. 3. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
905	-2	Abnormal Text from Data Manager	There is no end code in the INV segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the INV segment. 3. Contact service representative, if alarm recurs.
906	-2	Abnormal Text from Data Manager	There is no end code in the MSA segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the MSA segment. 3. Contact service representative, if alarm recurs.
907	-2	Abnormal Text from Data Manager	There is no end code in the MSH segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the MSH segment. 3. Contact service representative, if alarm recurs.
908	-2	Abnormal Text from Data Manager	There is no end code in the NDS segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the NDS segment. 3. Contact service representative, if alarm recurs.
909	-2	Abnormal Text from Data Manager	There is no end code in the OBR segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the OBR segment. 3. Contact service representative, if alarm recurs.
910	-2	Abnormal Text from Data Manager	There is no end code in the OBX segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the OBX segment. 3. Contact service representative, if alarm recurs.
911	-2	Abnormal Text from Data Manager	There is no end code in the ORC segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the ORC segment. 3. Contact service representative, if alarm recurs.
912	-2	Abnormal Text from Data Manager	There is no end code in the PID segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the PID segment. 3. Contact service representative, if alarm recurs.
913	-2	Abnormal Text from Data Manager	There is no end code in the QAK segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the QAK segment. 3. Contact service representative, if alarm recurs.
914	-2	Abnormal Text from Data Manager	There is no end code in the QID segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the QID segment. 3. Contact service representative, if alarm recurs.
915	-2	Abnormal Text from Data Manager	There is no end code in the QPD segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the QPD segment. 3. Contact service representative, if alarm recurs.
916	-2	Abnormal Text from Data Manager	There is no end code in the RCP segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the RCP segment. 3. Contact service representative, if alarm recurs.
917	-2	Abnormal Text from Data Manager	There is no end code in the SAC segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the SAC segment. 3. Contact service representative, if alarm recurs.

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Code	Sub-	Alarm Message	Content	Troubleshooting
918	-2	Abnormal Text from Data Manager	There is no end code in the SID segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the SID segment. 3. Contact service representative, if alarm recurs.
919	-2	Abnormal Text from Data Manager	There is no end code in the SPM segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the SPM segment. 3. Contact service representative, if alarm recurs.
920	-2	Abnormal Text from Data Manager	There is no end code in the TQ1 segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the TQ1 segment. 3. Contact service representative, if alarm recurs.
921	-2	Abnormal Text from Data Manager	There is no end code in the TCD segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Check whether '<CR>' (0x0d) is at the end of the TCD segment. 3. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the EQU segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the INV segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the MSA segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the MSH segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the NDS segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the OBR segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the OBX segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
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.	1. Perform System Communication Trace on Print. 2. Check the ORC segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the PID segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the QAK segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the QID segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the QPD segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the RCP segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the SAC segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the SID segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the SPM segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the TQ1 segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
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.	1. Perform System Communication Trace on Print. 2. Check the TCD segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the message type [MSH-9] field of the MSH segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
941	-2	Abnormal Text from Data Manager	There is no EQU segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the EQU segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
942	-2	Abnormal Text from Data Manager	There is no MSA segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the MSA segment exits. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
943	-2	Abnormal Text from Data Manager	There is no MSH segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the MSH segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
944	-2	Abnormal Text from Data Manager	There is no OBR segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the OBR segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
945	-2	Abnormal Text from Data Manager	There is no OBX segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the OBX segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
946	-2	Abnormal Text from Data Manager	There is no ORC segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the ORC segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
947	-2	Abnormal Text from Data Manager	There is no PID segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. Confirm that the PID segment exists. 2. Refer to the specifications of system interface communication. 3. Contact service representative, if alarm recurs.
948	-2	Abnormal Text from Data Manager	There is no QAK segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the QAK segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
949	-2	Abnormal Text from Data Manager	There is no QID segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the QID segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
950	-2	Abnormal Text from Data Manager	There is no QPD segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the QPD segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
951	-2	Abnormal Text from Data Manager	There is no RCP segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the RCP segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
952	-2	Abnormal Text from Data Manager	There is no SPM segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the SPM segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
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.	1. Perform System Communication Trace on Print. 2. Check the message type [MSH-9] field of the MSH segment. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
941	-2	Abnormal Text from Data Manager	There is no EQU segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the EQU segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
942	-2	Abnormal Text from Data Manager	There is no MSA segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the MSA segment exits. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
943	-2	Abnormal Text from Data Manager	There is no MSH segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the MSH segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
944	-2	Abnormal Text from Data Manager	There is no OBR segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the OBR segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
945	-2	Abnormal Text from Data Manager	There is no OBX segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the OBX segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.

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Code	Sub-	Alarm Message	Content	Troubleshooting
946	-2	Abnormal Text from Data Manager	There is no ORC segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the ORC segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
947	-2	Abnormal Text from Data Manager	There is no PID segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the PID segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
948	-2	Abnormal Text from Data Manager	There is no QAK segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the QAK segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
949	-2	Abnormal Text from Data Manager	There is no QID segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the QID segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
950	-2	Abnormal Text from Data Manager	There is no QPD segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the QPD segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
951	-2	Abnormal Text from Data Manager	There is no RCP segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the RCP segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
952	-2	Abnormal Text from Data Manager	There is no SPM segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the SPM segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
953	-2	Abnormal Text from Data Manager	There is no TQ1 segment. The subcategory code indicates communication line number.	1. Perform System Communication Trace on Print. 2. Confirm that the TQ1 segment exists. 3. Refer to the specifications of system interface communication. 4. Contact service representative, if alarm recurs.
992	-1	Abnormal Test Selection from Data Manager	One or more tests requested by Data Manager are in progress.	1. Check if the Item Codes requested by the Host are appropriate. 2. Contact service representative, if alarm recurs.
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Test Selection Response Text) 3. Contact service representative, if alarm recurs.

Code	Sub-	Alarm Message	Content	Troubleshooting
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Patient/QC Result Response Text - Real) 3. Contact service representative, if alarm recurs.
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	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Chemistry Calibration Result Response Text) 3. Contact service representative, if alarm recurs.
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (ISE Calibration Result Response Text) 3. Contact service representative, if alarm recurs.
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Immune Calibration Result Response Text) 3. Contact service representative, if alarm recurs.
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	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Patient/QC Result Response Text - Batch) 3. Contact service representative, if alarm recurs.
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Reaction Monitor Result Response Text) 3. Contact service representative, if alarm recurs.
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Reaction Monitor Calibration Result Response Text) 3. Contact service representative, if alarm recurs.
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Raw Data Result Response Text) 3. Contact service representative, if alarm recurs.
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	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Raw Data Calibration Result Response Text) 3. Contact service representative, if alarm recurs.

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Code	Sub-	Alarm Message	Content	Troubleshooting
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)	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Alarm Response Text) 3. Contact service representative, if alarm recurs.
994	12	Data Manager Communication Error	The sample No. value is invalid.	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Test Selection Download Text - Batch) 3. Contact service representative, if alarm recurs.
994	13	Data Manager Communication Error	The orders of the serum index tests (L/H/I) are illegal.	1. Perform System Communication Trace on Print. 2. Check the HL7 text. (Test Selection Download Text - Batch) 3. Contact service representative, if alarm recurs.
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.	1. Check the Data Manager settings. 2. Refer to the system interface communication specifications.
999	-1	Data Manager Communication Error	Host code is duplication defined. The subcategory code indicates the application code.	Contact service representative.

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* **12**

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 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 instrument.

However, if a **MODULAR** *PRE-ANALYTICS* is used in conjunction with the **cobas** 8000 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 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 on to the host.

Handling query messages without barcodes

In normal operation, by default, a sample without a barcode generates an error on the **cobas** 8000 instrument, and is handled by the instrument operator. Unless a user with configuration privileges has reconfigured the instrument in order to work with an **MODULAR** *PRE-ANALYTICS*, the host will never receive a sample without a sample ID.

However, because a user with configuration privileges can (intentionally or otherwise) configure the **cobas** 8000 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 instrument to process samples without barcodes with an **MODULAR** *PRE-ANALYTICS*, enable the option on the Control Unit *Test Selection Ask in Barcode Read Error* in: Utility > System > Data Manager > Test Selection Inquiry Settings > *Test Selection Ask in Barcode Read Error*.

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 an **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 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:
     ◦ 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)* on page C-13, and *HL7 text content* on page D-7.

Handling batch test selections with strict rack and position

If you are using an **MODULAR** *PRE-ANALYTICS* or otherwise 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 > System 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* on page B-25.

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.

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**.

Communication and configuration 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* **13**

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.

Test selection query for first measurement

This example shows a query sent from *data manager* to the host, for test selections for the first measurement of a sample. To indicate this is for a first measurement, the last component of the third field of the Query record is set to R1.

```
c8kDM   16:17:59,703 [ACK]
HOST    16:17:59,718 [EOT]
c8kDM   16:18:01,343 [ENQ]
HOST    16:18:01,343 [ACK]
c8kDM   16:18:01,453 [STX]1H|\^&|34580||cobas·8000^1|||||host|TSREQ|P
                     |1|20090507161903|[CR]Q|1|^^000905^0^40012^4^^S1
                     ^SC^R1|ALL||||||||S|O|[CR]L|1|N|[CR][ETX]32[CR][
                     LF]
HOST    16:18:01,468 [ACK]
c8kDM   16:18:01,578 [EOT]
```

Figure E-1   Query for a test selection, for a first measurement test.

Test selection query for reflex test

This example shows a query sent from *data manager* to the host, for test selections for the reflex tests to be done on a sample.To indicate this is for a rerun or reflex test, the last component of the third field of the Query record is set to R2.

```
c8kDM   10:46:39,671 [ENQ]
HOST    10:46:39,687 [ACK]
c8kDM   10:46:39,734 [STX]1H|\^&|36559||cobas·8000^1|||||host|TSREQ|P
                     |1|20090508104740|[CR]Q|1|^^500169^0^50017^3^^S1
                     ^SC^R2|ALL|||||||||R|O|[CR]L|1|N|[CR][ETX]43[CR][
                     LF]
HOST    10:46:39,734 [ACK]
c8kDM   10:46:39,859 [EOT]
```

Figure E-2   Query for a test selection, for a reflex test.

Test selection download

This example shows a test selection download from the host to *data manager*, with six tests ordered for a STAT sample.

```
HOST    16:18:03,609  [ENQ]
c8kDM   16:18:03,671  [ACK]
HOST    16:18:03,703  [STX]1H|\^&|||ASTM-Host^V·6.8g|||||cobas·8000·da
                      ta·manager|TSDWN|P|1|20090507161801[CR]P|1||PatI
                      D3||Parker^Bill||19881231|M[CR]O|1|000905|^40012
                      ^4^^S1^SC|^^^989^\^^^990^\^^^991^\^^^8781^\^^^87
                      17^\^^^8418^|S||||A||||1|||||||||||O[CR]C|1|L|C
                      omm1^Comm2^Comm[ETB]B1[CR][LF]
c8kDM   16:18:03,796  [ACK]
HOST    16:18:03,828  [STX]23^Comm4^Comm5|G[CR]L|1|N[CR][ETX]45[CR][LF]
c8kDM   16:18:03,921  [ACK]
HOST    16:18:03,921  [EOT]
```

Figure E-3   Test selection download

Test selection download, with no tests ordered

This example shows an empty test selection download, i.e. a test selection download that informs *data manager* that there are no tests ordered for the sample.

```
HOST    16:18:03,609  [ENQ]
c8kDM   16:18:03,671  [ACK]
HOST    16:18:03,703  [STX]1H|\^&|||ASTM-Host^V·6.8g|||||cobas·8000·d
                      ata·manager|TSDWN|P|1|20090508114919[CR]P|1[CR]
                      O|1|500169|0^50017^3^^S1^SC||R||||||A||||1|||||
                      |||||O[CR]L|1|N[CR][ETX]2E[CR][LF]
c8kDM   16:18:03,921  [ACK]
HOST    16:18:03,921  [EOT]
```

Figure E-4   Test selection download, no tests available for the sample

Result upload ISE, pass-through

This example shows an result up load of ISE results, from *data manager* to the host, with the pass-through mode on.

```
c8kDM    16:18:54,953  [ENQ]
HOST     16:18:54,968  [ACK]
c8kDM    16:18:55,078  [STX]1H|\^&|34619||cobas·8000^1|||||host|RSUPL^|
                       P|1|20090507161957|[CR]P|1||PatID3||Wood^Julie||
                       19881215|U|[CR]O|1|000905|0^40012^4^^S1^SC|^^^98
                       9^1|S||20090507161907||||N||||1|||||||||||F|[CR]C
                       |1|I|Comm1^Comm2^Comm3^Comm4^Comm5|G|[CR]R|1|^^^
                       989/1/not|130.0|mm[ETB]F4[CR][LF]
HOST     16:18:55,109  [ACK]
c8kDM    16:18:55,203  [STX]2ol/L|34|||F|(bmserv^SYSTEM)20090507161950|
                       20090507161957|ISE^2^0800-12^4|[CR]C|1|I|0|I|[CR
                       ]L|1|N|[CR][ETX]44[CR][LF]
HOST     16:18:55,218  [ACK]
c8kDM    16:18:55,328  [EOT]

c8kDM    16:18:55,984  [ENQ]
HOST     16:18:56,000  [ACK]
c8kDM    16:18:56,125  [STX]1H|\^&|34622||cobas·8000^1|||||host|RSUPL^|
                       P|1|20090507161958|[CR]P|1||PatID3||Wood^Julie||
                       19881215|U|[CR]O|1|000905|0^40012^4^^S1^SC|^^^99
                       0^1|S||20090507161907||||N||||1|||||||||||F|[CR]C
                       |1|I|Comm1^Comm2^Comm3^Comm4^Comm5|G|[CR]R|1|^^^
                       990/1/not|3.0|mmol[ETB]59[CR][LF]
HOST     16:18:56,156  [ACK]
c8kDM    16:18:56,250  [STX]2/L|35|||F|(bmserv^SYSTEM)20090507161950|20
                       090507161958|ISE^2^0800-12^4|[CR]C|1|I|0|I|[CR]L
                       |1|N|[CR][ETX]6B[CR][LF]
HOST     16:18:56,265  [ACK]
c8kDM    16:18:56,375  [EOT]

8kDM     16:18:56,921  [ENQ]
HOST     16:18:56,937  [ACK]
c8kDM    16:18:57,046  [STX]1H|\^&|34625||cobas·8000^1|||||host|RSUPL^|
                       P|1|20090507161959|[CR]P|1||PatID3||Wood^Julie||
                       19881215|U|[CR]O|1|000905|0^40012^4^^S1^SC|^^^99
                       1^1|S||20090507161907||||N||||1|||||||||||F|[CR]C
                       |1|I|Comm1^Comm2^Comm3^Comm4^Comm5|G|[CR]R|1|^^^
                       991/1/not|92.0|mmo[ETB]2B[CR][LF]
HOST     16:18:57,078  [ACK]
c8kDM    16:18:57,171  [STX]2l/L|36|||F|(bmserv^SYSTEM)20090507161950|2
                       0090507161959|ISE^2^0800-12^4|[CR]C|1|I|0|I|[CR]
                       L|1|N|[CR][ETX]D9[CR][LF]
HOST     16:18:57,187  [ACK]
c8kDM    16:18:57,296  [EOT]
```

Figure E-5   Result upload for ISE results, with pass-through mode on

Result upload chemistry test, pass-through

This example shows a result up load of chemistry test results, from *data manager* to the host, with pass-through mode on. Note that the calibration ID in the Result record, field 14, contains a non-standard ID for the analytical unit. The user is given as the default bmserv^SYSTEM.

```
c8kDM    16:30:02,843  [ENQ]
HOST     16:30:02,843  [ACK]
c8kDM    16:30:02,906  [STX]1H|\^&|34840||cobas·8000^1|||||host|RSUPL^|
                       P|1|20090507163104|[CR]P|1||PatID3||Wood^Julie||
                       19881215|U|[CR]O|1|000905|0^40012^4^^S1^SC|^^^84
                       18^1\^^^8717^1\^^^8781^1|S||20090507161907||||N|
                       |||1|||||||||||F|[CR]C|1|I|Comm1^Comm2^Comm3^Comm
                       4^Comm5|G|[CR]R|1|[ETB]5E[CR][LF]
HOST     16:30:02,921  [ACK]
c8kDM    16:30:03,015  [STX]2^^^8418/1/not|7.0|mmol/L|11|||F||bmserv^SY
                       STEM|20090507162047|20090507163052|c701^2^0800-1
                       8^10|[CR]C|1|I|0|I|[CR]R|2|^^^8717/1/not|5.34|mm
                       ol/L|9|||F|(bmserv^SYSTEM)|20090507162049|2009050
                       7163054|c701^1^0800-18^9|[CR]C|1|I|0|I|[CR]R|3|^
                       ^^8781/1/not|1.28|[ETB]24[CR][LF]
HOST     16:30:03,046  [ACK]
c8kDM    16:30:03,140  [STX]3mmol/L|10|||F|(bmserv^SYSTEM)|2009050716205
                       2|20090507163058|c701^1^0800-18^9|[CR]C|1|I|0|I|
                       [CR]L|1|N|[CR][ETX]31[CR][LF]
HOST     16:30:03,156  [ACK]
c8kDM    16:30:03,250  [EOT]
```

Figure E-6   Result upload for a chemistry test, with pass-through mode on

Result upload ISE, no pass-through

This example shows an result up load of ISE results, from *data manager* to the host, with the pass-through mode off, and the UserID at *data manager* set to "DMROUTINE". The calibration ID in R-14, contains a non-standard ID for the analytical unit.

```
c8kDM    15:50:26,390  [ENQ]
HOST     15:50:26,390  [ACK]
c8kDM    15:50:26,515  [STX]1H|\^&|34400||cobas·8000^1|||||host|RSUPL^|
                       P|1|20090507155129|[CR]P|1||PatID3||Wood^Julie||
                       19881215|U|[CR]O|1|000122|0^50014^2^^S1^SC|^^^98
                       9^1|R||20090507144934||||N||||1|||||||||||F|[CR]C
                       |1|I|Comm1^Comm2^Comm3^Comm4^Comm5|G|[CR]R|1|^^^
                       989/1/not|131.0|mm[ETB]DB[CR][LF]
HOST     15:50:26,546  [ACK]
c8kDM    15:50:26,640  [STX]2ol/L|19|||F|(bmserv^DMROUTINE)|200905071453
                       19|20090507150046|ISE^1^0800-12^3|[CR]C|1|I|0|I|
                       [CR]L|1|N|[CR][ETX]0B[CR][LF]
HOST     15:50:26,656  [ACK]
c8kDM    15:50:26,765  [EOT]
```

Figure E-7   Result upload for a chemistry test, with pass-through mode off

Roche Diagnostics

Result upload chemistry test, with flag

This example shows an result up load of chemistry test results, from *data manager* to the host, with a data flag. ("PANIC value over (upper) Technical Limit").

```
c8kDM    12:17:13,062 [ENQ]
HOST     12:17:13,078 [ACK]
c8kDM    12:17:13,156 [STX]1H|\^&|37910||cobas·8000^1|||||host|RSUPL^|
                      P|1|20090508121812|[CR]P|1||U||^|||U|[CR]O|1|500
                      169|0^50017^3^^S1^SC|^^^8706^1|R||20090508120621
                      |||||N||||1|||||||||||F|[CR]C|1|I|Comm1^Comm2^Comm
                      3^Comm4^Comm5|G|[CR]R|1|^^^8706/1/not|2.15|mmol/
                      L|12|||F||bmserv^S[ETB]70[CR][LF]
HOST     12:17:13,171 [ACK]
c8kDM    12:17:13,265 [STX]2YSTEM|20090508120808|20090508121812|c701^2
                      ^0800-18^10|[CR]C|1|I|26^PANIC·value·over·(upper
                      )·Technical·Limit|I|[CR]L|1|N|[CR][ETX]D8[CR][LF
                      ]
HOST     12:17:13,296 [ACK]
c8kDM    12:17:13,375 [EOT]
```

Figure E-8   Result upload for a chemistry test, with a data flag

Query for test selection if no barcode

This example shows a query from *data manager* to the host, asking for a test selection, when the sample tube lacks a barcode, and in the Control Unit in the screen Utility > System > Data Manager > Test Selection Inquiry Settings, the option "*Test Selection Ask in Barcode Read Error*" is on. It also shows the response from the host, showing the SID (123456).

```
c8kDM    12:46:49,968 [ENQ]
HOST     12:46:49,984 [ACK]
c8kDM    12:46:50,093 [STX]1H|\^&|38262||cobas·8000^1|||||host|TSREQ|P
                      |1|20090508124751|[CR]Q|1|^^*******************
                      **0^50014^3^^S1^SC^R1|ALL|||||||||R|O|[CR]L|1|N|
                      [CR][ETX]A3[CR][LF]
HOST     12:46:50,093 [ACK]
c8kDM    12:46:50,218 [EOT]

HOST     12:46:52,234 [ENQ]
c8kDM    12:46:52,296 [ACK]
HOST     12:46:52,312 [STX]1H|\^&|||ASTM-Host^V·6.8g|||||cobas·8000·da
                      ta·manager|TSDWN|P|1|20090508124650[CR]P|1||PatI
                      D3||Wood^Julie||19881215|W[CR]O|1|123456|^50014^
                      3^^S1^SC|^^^989^\^^^990^\^^^991^|R|||||||R||||1||
                      |||||||||O[CR]C|1|L|Comm1^Comm2^Comm3^Comm4^Comm5
                      |G[CR]L|1|N[CR][ETX]7E[CR][LF]
c8kDM    12:46:52,421 [ACK]
HOST     12:46:52,421 [EOT]
```

Figure E-9   Query for a test selection without a barcode, and test selection download with barcode provided.

Result upload for a qualitative result

This shows an example of a qualitative result upload for an immunology test.

```
*        16:10:40,900 RSUPL:   SID^Rack^Pos^CID = PC HBSAG2^30009^2^208522

c8kDM   16:14:54,504 [ENQ]

HOST    16:14:54,544 [ACK]

c8kDM   16:14:54,624 [STX]1H|\^&|208534||cobas·8000^1.01|||||host|RSU
                     PL^BATCH|P|1|20100916161254|[CR]P|1|[CR]O|1|PC·H
                     BSAG2·^156342^222|0^30009^2^^QC^SC^not|^^^250^1|
                     R||||||Q||||1|||||||||||F|[CR]C|1|I|^^^^|G|[CR]R|
                     1|^^^250/1/not(1^2.68)COI||||F||bmserv^SYSTEM|20
                     100820105256|20100[ETB]C3[CR][LF]

HOST    16:14:54,654 [ACK]

c8kDM   16:14:54,725 [STX]2909132125|e602^1^MU1#e602#3#1^11^0^Standby
                     ^1|[CR]C|1|I|0|I|[CR]L|1|N|[CR][ETX]9C[CR][LF]

HOST    16:14:54,735 [ACK]

c8kDM   16:14:54,825 [EOT]
```

Figure E-10   Qualitative patient result, first upload

Query messages

This section shows an example of an order and result query messages from host to the *data manager*, and the replies.

Order query

This section shows an example of an order query from the host to the *data manager*, and the reply.

```
*       16:22:19,625 TSREQ: SID^Rack^Pos^Run = 110005^^^

HOST    16:22:19,656 [ENQ]
c8kDM   16:22:19,703 [ACK]
HOST    16:22:19,734 [STX]1H|\^&|||cobas·8000^1|||||host|TSREQ|P|1|[
                      CR]Q|1|^S1^110005||||||||||||[CR]L|1|N|[CR][ETX]
                      90[CR][LF]
c8kDM   16:22:19,828 [ACK]
HOST    16:22:19,859 [EOT]

c8kDM   16:22:20,218 [ENQ]
HOST    16:22:20,234 [ACK]
c8kDM   16:22:20,265 [STX]1H|\^&|||cobas·8000^1|||||host|TSUPL|P|1|[
                      CR]P|1|[CR]O|1|110005||^^^989^1\^^^990^1\^^^991
                      ^1|||||||O||||1|||||||||||F|[CR]C|1|L|^^^|G|[CR]
                      L|1|N|[CR][ETX]2B[CR][LF]
HOST    16:22:20,328 [ACK]
c8kDM   16:22:20,421 [EOT]
```

Figure E-11   ASTM order query message

Result query

This section shows an example of a result query from the host to the *data manager*, and the reply.

```
*       16:24:36,328 RSREQ: SID^Rack^Pos^Run = 110005^^^

HOST    16:24:36,359 [ENQ]
c8kDM   16:24:36,421 [ACK]
HOST    16:24:36,453 [STX]1H|\^&|12345||cobas·8000^1|||||host|RSREQ|
                     P|1|20090326142034|[CR]Q|1|^S1^110005|||||||||||
                     F|[CR]L|1|N|[CR][ETX]13[CR][LF]
c8kDM   16:24:36,546 [ACK]
HOST    16:24:36,562 [EOT]

c8kDM   16:24:36,953 [ENQ]
HOST    16:24:36,968 [ACK]
c8kDM   16:24:37,062 [STX]1H|\^&|53937||cobas·8000^1|||||host|RSUPL^
                     BATCH|P|1|20100429162436|[CR]P|1||?||^|||||[CR]O
                     |1|110005|0^110005^2^^S1^SC^not|^^^989^1\^^^990
                     ^1\^^^991^1|R|20100429161525|20100429161525||||
                     N||||1|||||||||||F|[CR]C|1|I|SampleComment1^Samp
                     leComment2^^^|G|[CR]R|1[ETB]2D[CR][LF]
HOST    16:24:37,093 [ACK]
c8kDM   16:24:37,125 [STX]2|^^^989/Dec/not|1.1|mmol/L|^TECH\^NORM\^C
                     RIT\^USER|||F||bmserv^SYSTEM|20091218164600|201
                     00429161525|ISE^2^MU1#ISE#1#2^4|[CR]C|1|I|23^IS
                     E·Sample·range·over|I|[CR]C|2|L|TestCommentByDM
                     ^DMDEV^20100429161848|G|[CR]R|2|^^^990/1/not|2.
                     2|mmol/L|^TECH\^NORM[ETB]73[CR][LF]
HOST    16:24:37,156 [ACK]
c8kDM   16:24:37,187 [STX]3\^CRIT\^USER|||F||bmserv^SYSTEM|200912181
                     64600|20100429161525|ISE^2^MU1#ISE#1#2^4|[CR]C|
                     1|I|23^ISE·Sample·range·over|I|[CR]R|3|^^^991/I
                     nc/not|5.5|mmol/L|4.0·-·44.0^TECH\2.0·-·22.0^NO
                     RM\3.0·-·33.0^CRIT\1.0·-·11.0^USER|||F||bmserv^
                     SYSTEM|2009121816[ETB]69[CR][LF]
HOST    16:24:37,218 [ACK]
c8kDM   16:24:37,250 [STX]44600|20100429161525|ISE^2^MU1#ISE#1#2^4|[
                     CR]C|1|I|23^ISE·Sample·range·over|I|[CR]L|1|N|[
                     CR][ETX]23[CR][LF]
HOST    16:24:37,265 [ACK]
c8kDM   16:24:37,281 [EOT]
```

Figure E-12   ASTM result query message

Quality control results

This section gives some example quality control result uploads from the *data manager* to the host.

Quality control results, first upload

This section shows a first upload of quality control results.

```
c8kDM   16:53:17,640 [ENQ]
HOST    16:53:17,656 [ACK]
c8kDM   16:53:17,671 [STX]1H|\^&|53989||cobas·8000^1|||||host|RSUPL^
                     REAL|P|1|20100429165317|[CR]P|1|[CR]O|1|HBCN^61
                     1490^1|0^30001^2^^QC^SC^not|^^^870^1|R|||||Q||
                     ||4|||||||||||F|[CR]C|1|I|^^^^|G|[CR]R|1|^^^870/
                     1/not|17.30|g/dL||||F||bmserv^SYSTEM|2009121816
                     4500|20100429165317|c50[ETB]54[CR][LF]
HOST    16:53:17,703 [ACK]
c8kDM   16:53:17,718 [STX]22^1^MU1#c502#2#1^9^0^Current|[CR]C|1|I|0|
                     I|[CR]L|1|N|[CR][ETX]D7[CR][LF]
HOST    16:53:17,734 [ACK]
c8kDM   16:53:17,765 [EOT]

c8kDM   16:53:18,015 [ENQ]
HOST    16:53:18,031 [ACK]
c8kDM   16:53:18,062 [STX]1H|\^&|53990||cobas·8000^1|||||host|RSUPL^
                     REAL|P|1|20100429165317|[CR]P|1|[CR]O|1|HBCN^^1
                     |0^30001^2^^QC^SC^not|^^^880^1|R|||||Q||||4|||
                     |||||||F|[CR]C|1|I|^^^^|G|[CR]R|1|^^^880/1/not|
                     1.50|g/dL||||F||bmserv^SYSTEM|20091218164500|20
                     100429165317|c502^1^MU1[ETB]D6[CR][LF]
HOST    16:53:18,078 [ACK]
c8kDM   16:53:18,109 [STX]2#c502#2#1^9^0^Current|[CR]C|1|I|0|I|[CR]L
                     |1|N|[CR][ETX]E5[CR][LF]
HOST    16:53:18,125 [ACK]
c8kDM   16:53:18,156 [EOT]
```

Figure E-13   Quality control results, first upload

Quality control results, re–sent

This section shows a message that re-sends quality control results from the *data manager* to the host.

```
c8kDM   16:54:35,156 [ENQ]
HOST    16:54:35,187 [ACK]
c8kDM   16:54:35,281 [STX]1H|\^&|53998||cobas·8000^1|||||host|RSUPL^
                     BATCH|P|1|20100429165434|[CR]P|1|[CR]O|1|HBCN^6
                     11490^1|0^30001^2^^QC^SC^not|^^^870^1|R|||||Q|
                     |||4|||||||||||F|[CR]C|1|I|^^^^|G|[CR]R|1|^^^870
                     /1/not|17.30|g/dL||||F||bmserv^SYSTEM|200912181
                     64500|20100429165317|c5[ETB]62[CR][LF]
HOST    16:54:35,296 [ACK]
c8kDM   16:54:35,312 [STX]202^1^MU1#c502#2#1^9^0^Current|[CR]C|1|I|0
                     |I|[CR]L|1|N|[CR][ETX]07[CR][LF]
HOST    16:54:35,328 [ACK]
c8kDM   16:54:35,484 [EOT]

c8kDM   16:54:35,562 [ENQ]
HOST    16:54:35,578 [ACK]
c8kDM   16:54:35,593 [STX]1H|\^&|53999||cobas·8000^1|||||host|RSUPL^
                     BATCH|P|1|20100429165434|[CR]P|1|[CR]O|1|HBCN^^
                     1|0^30001^2^^QC^SC^not|^^^880^1|R||||||Q||||4||
                     |||||||||F|[CR]C|1|I|^^^^|G|[CR]R|1|^^^880/1/not
                     |1.50|g/dL||||F||bmserv^SYSTEM|20091218164500|2
                     0100429165317|c502^1^MU[ETB]EC[CR][LF]
HOST    16:54:35,609 [ACK]
c8kDM   16:54:35,640 [STX]21#c502#2#1^9^0^Current|[CR]C|1|I|0|I|[CR]
                     L|1|N|[CR][ETX]16[CR][LF]
HOST    16:54:35,640 [ACK]
c8kDM   16:54:35,656 [EOT]
```

Figure E-14   Quality control results, re-sent

Calibration results

This section shows calibration result messages sent from the *data manager* to the host.

ISE module calibration results

This section has an example of an ISE module calibration results sent from the *data manager* to the host.

```
c8kDM  16:41:36,953 [ENQ]
HOST   16:41:37,078 [ACK]
c8kDM  16:41:37,109 [STX]1H|\^&|53957||cobas·8000^1.01|||||host|ICU
                    PL^REAL|P|1|20100316105742|[CR]M|1|ICR|bmserv|M
                    U1#ISE#1#1|Valid|Valid|Valid|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[ETB]A5[CR][LF]
HOST   16:41:37,156 [ACK]
c8kDM  16:41:37,187 [STX]2.5^-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|[CR]L|1|N|[CR][ETX]86[CR][LF]
HOST   16:41:37,218 [ACK]
c8kDM  16:41:37,234 [EOT]
```

Figure E-15   ISE calibration result message

C–module calibration results

This section has an example of a C-module (photometry) calibration results sent from the *data manager* to the host.

```
c8kDM  16:43:52,296 [ENQ]
HOST   16:43:52,312 [ACK]
c8kDM  16:43:52,328 [STX]1H|\^&|53961||cobas·8000^1.01|||||host|PCU
                    PL^REAL|P|1|20100318181004|[CR]M|1|PCR||^^^8717
                    |MU1#c701#1#1|0|0|0^0^0^0^0^\0^0^0^0^0^\^^^^^\^
                    ^^^^\^^^^^\^^^^^|[CR]L|1|N|[CR][ETX]FB[CR][LF]
HOST   16:43:52,375 [ACK]
c8kDM  16:43:52,468 [EOT]
```

Figure E-16   C-module (photomotery) calibration result message

E-module calibration results

> This section has an example of an E-module (immunology) calibration results sent from the *data manager* to the host.

```
c8kDM   16:42:26,781 [ENQ]
HOST    16:42:26,796 [ACK]
c8kDM   16:42:26,812 [STX]1H|\^&|53959||cobas·8000^1.01|||||host|ECU
                     PL^REAL|P|1|20100316113523|[CR]M|1|ECR|bmserv|^
                     ^^1|LotCalibration|MU1#e602#3#2|156369||0|15627
                     2|O|I^O^\M^O^\S^O^\R^1.000^\D^F^\L^^\F^O^\Y^F^\
                     B^O^|826.502^827.638\29987.100^29670.610|||||20
                     100316113523|[CR][ETB]6A[CR][LF]
HOST    16:42:26,828 [ACK]
c8kDM   16:42:26,859 [STX]2L|1|N|[CR][ETX]81[CR][LF]
HOST    16:42:26,875 [ACK]
c8kDM   16:42:26,890 [EOT]
```

Figure E-17   E-module (immunology) calibration result message

HL7 trace files

This section gives examples of HL7 messages between *data manager* and the host.

Test selection query, first measurement

This example shows a query for a test selection from *data manager* to the host, for a first measurement.

```
C80DM  13:57:30,187 [VT]
MSH|^~\&|cobas·8000||host||20090508135831||TSREQ|38749||2.5||||ER||UNICODE·UTF-
8|[CR]
QPD|TSREQ|38749|500152||50014|3||||S1|SC|R1|R|[CR]
RCP|I|1|R|[CR]
[FS][CR]
```

Figure E-18   Test selection query, first measurement

Test selection query, rerun test

This example shows a query for a test selection from *data manager* to the host, for a rerun or reflex test, with the rerun flag set to R2.

```
C80DM  14:09:34,609 [VT]
MSH|^~\&|cobas·8000||host||20090508141035||TSREQ|39090||2.5||||ER||UNICODE·UTF-
8|[CR]
QPD|TSREQ|39090|500152||50014|3||||S1|SC|R2|R|[CR]
RCP|I|1|R|[CR]
[FS][CR]
```

Figure E-19   Tense selection query, rerun or reflex test

Test selection download

This example shows a test selection download from the host to *data manager*, with six tests ordered for the sample.

```
HOST   13:57:30,421 [VT]
MSH|^~\&|ASTM-Host||cobas·8000·data·manager||20090508135730||OML^O33|38749||2.5
||||ER||UNICODE·UTF-8[CR]
PID|1|PatID3|||Wood^Sara||19881231|W[CR]
SPM||500152||S1||||||||||Comm1^Comm2^Comm3^Comm4^Comm5|||||||||||||SC[CR]
SAC|||||||||||50014|3[CR]
TQ1|1||||||||R[CR]
OBR|1|||990^||||||A[CR]
TQ1|1||||||||R[CR]
OBR|2|||991^||||||A[CR]
TQ1|1||||||||R[CR]
OBR|3|||8781^||||||A[CR]
TQ1|1||||||||R[CR]
OBR|4|||8717^Inc||||||A[CR]
[FS][CR]
```

Figure E-20   Test selection download

Test selection download, with no tests ordered

This example shows a test selection request, and a response showing that there are no test selections to download, in other words, a response with no TQ1- and OBR Segments. This informs *data manager* that there are no tests ordered for the sample.

```
C80DM  13:57:48,732 [VT]
MSH|^~\&|cobas·8000||host||20090508135850||TSREQ|38779||2.5||||ER||UNICODE·UTF-
8|[CR]
QPD|TSREQ|38779|000905||40012|4||||S1|SC|R1|S|[CR]
RCP|I|1|R|[CR]
 [FS][CR]


HOST   13:57:49,671 [VT]
MSH|^~\&|ASTM-Host||cobas·8000·data·manager||20090508135749||OML^O33|38779||2.5
||||ER||UNICODE·UTF-8[CR]
PID|1|PatID3|||Parker^Bill||19881231|M[CR]
SPM||000905||S1||||||||||Comm1^Comm2^Comm3^Comm4^Comm5|||||||||||||SC[CR]
SAC|||||||||||40012|4[CR]
[FS][CR]
```

Figure E-21   Test selection download, no tests available for the sample

Result upload ISE, pass-through

This example shows an result up load of ISE results, from *data manager* to the host, with the pass-through mode on.

```
C80DM  13:58:26,750 [VT]
MSH|^~\&|cobas·8000||host||20090508135928||OUL^R22|38798||2.5||||ER|[CR]
PID|1|PatID3|||Parker^Bill|||19881231|M|[CR]
SPM||500152||S1||NORMAL|||||P|||Comm1^Comm2^Comm3^Comm4^Comm5|||20090508135832|
|||||||||SC|[CR]
SAC|||||||||||50014|3|[CR]
OBR|1|[CR]
TQ1|1|||||||||R|[CR]
OBX|1||990||4.0|mmol/L|||||F|||20090508135928|bmserv^SYSTEM||35|ISE^2^0800-
12^4|20090508135922|[CR]
TCD|1|[CR]
[FS][CR]

C80DM  13:58:27,296 [VT]
MSH|^~\&|cobas·8000||host||20090508135928||OUL^R22|38801||2.5||||ER|[CR]
PID|1|PatID3|||Parker^Bill|||19881231|M|[CR]
SPM||500152||S1||NORMAL|||||P|||Comm1^Comm2^Comm3^Comm4^Comm5|||20090508135832|
|||||||||SC|[CR]
SAC|||||||||||50014|3|[CR]
OBR|1|[CR]
TQ1|1|||||||||R|[CR]
OBX|1||991||97.0|mmol/L|||||F|||20090508135928|bmserv^SYSTEM||36|ISE^2^0800-
12^4|20090508135922|[CR]
TCD|1|[CR]
[FS][CR]
```

Figure E-22   Result upload for ISE results, with pass-through mode on

Result upload chemistry test, pass-through

This example shows an result up load of chemistry test results, from *data manager* to the host, with the pass-through mode on.

```
C80DM  14:09:23,140 [VT]
MSH|^~\&|cobas·8000||host||20090508141024||OUL^R22|39061||2.5||||ER|[CR]
PID|1|PatID3|||Parker^Bill|||19881231|M|[CR]
SPM||500152||S1||NORMAL|||||P|||Comm1^Comm2^Comm3^Comm4^Comm5|||20090508135832|
|||||||||SC|[CR]
SAC|||||||||||50014|3|[CR]
OBR|1|[CR]
TQ1|1|||||||||R|[CR]
OBX|1||8717||5.54|mmol/L|||||F|||20090508141024|bmserv^SYSTEM|)9|c701^1^0800-
18^9|20090508140020|[CR]
TCD|Inc|[CR]
SID|108717&&R1&568316&1&14&0|612854|11|[CR]
SID|108717&&R3&568316&1&14&0|612854|11|[CR]
[FS][CR]

C80DM  14:09:26,765 [VT]
MSH|^~\&|cobas·8000||host||20090508141028||OUL^R22|39064||2.5||||ER|[CR]
PID|1|PatID3|||Parker^Bill|||19881231|M|[CR]
SPM||500152||S1||NORMAL|||||P|||Comm1^Comm2^Comm3^Comm4^Comm5|||20090508135832|
|||||||||SC|[CR]
SAC|||||||||||50014|3|[CR]
OBR|1|[CR]
TQ1|1|||||||||R|[CR]
OBX|1||8781||1.32|mmol/L|||||F|||20090508141028|bmserv^SYSTEM|10|c701^1^0800-
18^9|20090508140024|[CR]
TCD|1|[CR]
SID|108781&&R1&567107&1&12&0|611592|10|[CR]
[FS][CR]
```

Figure E-23   Result upload for a chemistry test, with pass-through mode on

Acknowledgement of test selection

This example shows an acknowledgement message sent by *data manager* to the host in response to a test selection download.

```
C80DM  13:57:31,000 [VT]
MSH|^~\&|cobas·8000||host||20090508135832||ACK|38753||2.5||||NE||UNICODE·UTF-8|[CR]
MSA|AA|38749||[CR]
[FS][CR]
```

Figure E-24   Acknowledgement response to test selection download

Query and download without barcode

This shows an example of communication when the sample lacks a barcode, and in the Control Unit, in the screen Utility > System > Data Manager > Test Selection Inquiry Settings, the option "*Test Selection Ask in Barcode Read Error*" is on

First, *data manager* sends a query with the sample located by type, rack and position. The host responds with the test selections, and includes the sample ID (123456) to be used for future communications. Finally, *data manager* then sends an acknowledgement message as a reply.

```
c8kDM  16:35:53,609 [VT]
MSH|^~\&|cobas·8000||host||20090508163654||TSREQ|40466||2.5||||ER||UNICODE·UTF-
8|[CR]
QPD|TSREQ|40466(**********************|)50014|3||||S1|SC|R1|R|[CR]
RCP|I|1|R|[CR]
 [FS][CR]

HOST  16:35:53,859 [VT]
MSH|^~\&|ASTM-
Host||cobas·8000·data·manager||20090508163553||OML^O33|40466||2.5||||ER||UNICOD
E·UTF-8[CR]
PID|1|PatID3|||Wood^Julie||19881215|W[CR]
SPM|(123456 )|S1|||||||||||Comm1^Comm2^Comm3^Comm4^Comm5|||||||||||||||SC[CR]
SAC|||||||||||50014|3[CR]
TQ1|1|||||||||R[CR]
OBR|1|||989^||||||A[CR]
TQ1|1|||||||||R[CR]
OBR|2|||990^||||||A[CR]
TQ1|1|||||||||R[CR]
OBR|3|||991^||||||A[CR]
 [FS][CR]

c8kDM  16:35:54,515 [VT]
MSH|^~\&|cobas·8000||host||20090508163655||ACK|40468||2.5||||NE||UNICODE·UTF-
8|[CR]
MSA|AA|40466|||[CR]
[FS][CR]
```

Figure E–25   Query for a test selection without a barcode, and test selection download with barcode (sample ID) provided.

Result upload with no UTF-8 conversion

This example shows the problems that can occur, if there is no UTF-8 conversion. Here the name "Bärbel Müller" is not correctly converted, and the wrong characters are sent. It is necessary to make sure the host software can handle UTF-8, which by default is what *data manager* sends, in order to avoid this problem.

```
c8kDM  15:35:05,750 [VT]
MSH|^~\&|cobas·8000||host||20090508153607||OUL^R22|39791||2.5||||ER|[CR]
PID|1|U|||^||||U|[CR]
SPM||000905||S1||NORMAL|||||P||(MÃ¼ller,·BÃ¤rbel)^Comm2^Comm3^Comm4^Comm5|||2009
0508135851|||||||||||SC|[CR]
SAC|||||||||||40012|4|[CR]
OBR|1|[CR]
TQ1|1||||||||R|[CR]
OBX|1||989||143.0|mmol/L|||||F|||20090508153607|bmserv^SYSTEM||34|ISE^2^0800-
12^4|20090508140052|[CR]
TCD|1|[CR]
OBX|2||990||4.0|mmol/L|||||F|||20090508153606|bmserv^SYSTEM||35|ISE^2^0800-
12^4|20090508140052|[CR]
TCD|1|[CR]
OBX|3||991||102.0|mmol/L|||||F|||20090508153606|bmserv^SYSTEM||36|ISE^2^0800-
12^4|20090508140052|[CR]
TCD|1|[CR]
OBX|4||8418||7.8|mmol/L|||||F|||20090508153607|bmserv^SYSTEM||11|c701^2^0800-
18^10|20090508135946|[CR]
TCD|1|[CR]
SID|108418&&R1&563039&2&13&0|612193|11|[CR]
SID|108418&&R3&563039&2&13&0|612193|11|[CR]
OBX|5||8717||5.96|mmol/L|||||F|||20090508153606|bmserv^SYSTEM||9|c701^1^0800-
18^9|20090508135948|[CR]
TCD|1|[CR]
SID|108717&&R1&568316&1&14&0|612854|11|[CR]
SID|108717&&R3&568316&1&14&0|612854|11|[CR]
OBX|6||8781||1.46|mmol/L|||||F|||20090508153607|bmserv^SYSTEM||10|c701^1^0800-
18^9|20090508135951|[CR]
TCD|1|[CR]
SID|108781&&R1&567107&1&12&0|611592|10|[CR]
[FS][CR]
```

Figure E-26   Result upload without UTF-8 conversion

👁 For the UTF-8 encoding for specific Western European characters, see *Western European characters in UTF-8* on page E-90.

Patient results, first upload

This section shows the first upload of patient results.

```
*        10:20:32,984 ?:  SID^Rack^Pos^CID = 110005^110005^2^54643
c8kDM   10:20:32,921 [VT]
c8kDM   10:20:32,921 MSH|^~\&|cobas·8000||host||20100430102031||OUL^
                     R22|54643||2.5|||||ER||UNICODE·UTF-8|[CR]
c8kDM   10:20:32,921 PID|1|?|||^|||||[CR]
c8kDM   10:20:32,921 SPM||110005||S1||not|||||P|||^^^^|||20100429161
                     525|||||||||||SC|[CR]
c8kDM   10:20:32,921 SAC|||||||||||110005|2|[CR]
c8kDM   10:20:32,921 OBR|1|||989|[CR]
c8kDM   10:20:32,921 TQ1|1|||||||||R|[CR]
c8kDM   10:20:32,921 OBX|1||989||1.1|mmol/L|^TECH\^NORM\^CRIT\^USER|
                     N|||F|||20091218164600|bmserv^SYSTEM||28|ISE^2^
                     MU1#ISE#1#2^4|20100430102029|[CR]
c8kDM   10:20:32,921 TCD|989|Dec|[CR]
c8kDM   10:20:32,921 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM   10:20:32,921 OBR|2|||990|[CR]
c8kDM   10:20:32,921 TQ1|1|||||||||R|[CR]
c8kDM   10:20:32,921 OBX|2||990||2.2|mmol/L|^TECH\^NORM\^CRIT\^USER|
                     N|||F|||20091218164600|bmserv^SYSTEM||29|ISE^2^
                     MU1#ISE#1#2^4|20100430102030|[CR]
c8kDM   10:20:32,921 TCD|990|1|[CR]
c8kDM   10:20:32,921 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM   10:20:32,921 OBR|3|||991|[CR]
c8kDM   10:20:32,921 TQ1|1|||||||||R|[CR]
c8kDM   10:20:32,921 OBX|3||991||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||
                     |20091218164600|bmserv^SYSTEM||30|ISE^2^MU1#ISE
                     #1#2^4|20100430102030|[CR]
c8kDM   10:20:32,921 TCD|991|Inc|[CR]
c8kDM   10:20:32,921 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM   10:20:32,921 [FS][CR]
```

Figure E-27   Patient results first upload

Patient results resent with comments

This section shows a reupload of patient results, including comments.

```
*        10:22:14,390 ?:  SID^Rack^Pos^CID = 110005^110005^2^54646
c8kDM   10:22:14,296 [VT]
c8kDM   10:22:14,296 MSH|^~\&|cobas·8000||host||20100430102214||OUL^
                     R22|54646||2.5|||||ER||UNICODE·UTF-8|[CR]
c8kDM   10:22:14,296 PID|1|?|||^||||[CR]
c8kDM   10:22:14,296 SPM||110005||S1||not|||||P|||^^^^|||20100429161
                     525|||||||||||SC|[CR]
c8kDM   10:22:14,296 SAC|||||||||||110005|2|[CR]
c8kDM   10:22:14,296 OBR|1|||989|[CR]
c8kDM   10:22:14,296 TQ1|1|||||||||R|[CR]
c8kDM   10:22:14,296 OBX|1||989||1.1|mmol/L|^TECH\^NORM\^CRIT\^USER|
                     N|||F|||20091218164600|bmserv^SYSTEM||28|ISE^2^
                     MU1#ISE#1#2^4|20100430102029|[CR]
c8kDM   10:22:14,296 TCD|989|Dec|[CR]
c8kDM   10:22:14,296 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM   10:22:14,296 OBR|2|||990|[CR]
c8kDM   10:22:14,296 TQ1|1|||||||||R|[CR]
c8kDM   10:22:14,296 OBX|2||990||2.2|mmol/L|^TECH\^NORM\^CRIT\^USER|
                     N|||F|||20091218164600|bmserv^SYSTEM||29|ISE^2^
                     MU1#ISE#1#2^4|20100430102030|[CR]
c8kDM   10:22:14,296 TCD|990|1|[CR]
c8kDM   10:22:14,296 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM   10:22:14,296 OBR|3|||991|[CR]
c8kDM   10:22:14,296 TQ1|1|||||||||R|[CR]
c8kDM   10:22:14,296 OBX|3||991||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||
                     |20091218164600|bmserv^SYSTEM||30|ISE^2^MU1#ISE
                     #1#2^4|20100430102030|[CR]
c8kDM   10:22:14,296 TCD|991|Inc|[CR]
c8kDM   10:22:14,296 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM   10:22:14,296 [FS][CR]
```

Figure E–28   Patient resent with comments

Result upload for a qualitative result

This shows an example of a qualitative result upload for an immunology test.

```
c8kDM  16:10:40,819 [VT]

MSH|^~\&|cobas·8000||host||20100916160840||OUL^R22^BATCH|208522||2.5||||ER||UNICODE·UTF-
8|[CR]
PID|1|[CR]
SPM||PC·HBSAG2·^156342^222||S1||not|||||Q|||^^^^|||||||||||||||SC|[CR]
SAC||||||||||30009|2|[CR]
OBR|1|||250^|[CR]
TQ1|1|||||||||R|[CR]
OBX|1||250|1^2.68|COI|||||F|||20100820105256|bmserv^SYSTEM||0|e602^1^MU1#e602#3#1^11^St
andby^1|20100909132125|[CR]
TCD|250|1|[CR]
SID|250^^250^ASY^2^0|157131|140031|[CR]
[FS] [CR]
```

Figure E-29   Qualitative patient result, first upload

Order query

This section contains an example order query message from the host to the *data manager*, and the replies.

```
*        10:53:33,781 ORD Req:  SID^Rack^Pos^Run^CID = 110005^^^^13007
HOST     10:53:33,796 [VT]
HOST     10:53:33,812 MSH|^~\&|host||cobas·8000||20100430105333||TSRE
                      Q|13007||2.5||||ER||UNICODE·UTF-8|[CR]
HOST     10:53:33,843 QPD|TSREQ||110005|O||||||S1|[CR]
HOST     10:53:33,859 [FS][CR]


*        10:53:34,125 TSDWN:  SID^CID = 110005^
c8kDM    10:53:34,062 [VT]
c8kDM    10:53:34,062 MSH|^~\&|cobas·8000||host||||OML^O33|||2.5||||E
                      R||UNICODE·UTF-8|[CR]
c8kDM    10:53:34,062 SPM||110005||S1|[CR]
c8kDM    10:53:34,062 [FS][CR]


*        10:53:40,375 ORD Req:  SID^Rack^Pos^Run^CID = 110005^^^^13007
HOST     10:53:40,390 [VT]
HOST     10:53:40,406 MSH|^~\&|host||cobas·8000||20100430105340||TSRE
                      Q|13007||2.5||||ER||UNICODE·UTF-8|[CR]
HOST     10:53:40,421 QPD|TSREQ||110005|||||||S1|[CR]
HOST     10:53:40,437 [FS][CR]


*        10:53:40,828 TSDWN:  SID^CID = 110005^
c8kDM    10:53:40,687 [VT]
c8kDM    10:53:40,687 MSH|^~\&|cobas·8000||host||||OML^O33|||2.5||||E
                      R||UNICODE·UTF-8|[CR]
c8kDM    10:53:40,687 SPM||110005||S1|[CR]
c8kDM    10:53:40,687 OBR||||989|[CR]
c8kDM    10:53:40,687 OBR||||990|[CR]
c8kDM    10:53:40,687 OBR||||991|[CR]
c8kDM    10:53:40,687 [FS][CR]
```

Figure E-30   Order query for sample 110005

Result query

This section contains example result query messages from the host to the *data manager*, and the reply.

```
*      10:51:26,703 RES Req:  SID^Rack^Pos^Run^CID = 110005^^^^13007
HOST   10:51:26,718 [VT]
HOST   10:51:26,734 MSH|^~\&|host||cobas·8000||20100430105126||RSRE
                    Q|13007||2.5|||||ER||UNICODE·UTF-8|[CR]
HOST   10:51:26,750 QPD|RSREQ||110005|F|[CR]
HOST   10:51:26,765 [FS][CR]


*      10:51:27,578 RSUPL:  SID^Rack^Pos^CID = 110005^110005^2^54684
c8kDM  10:51:27,484 [VT]
c8kDM  10:51:27,484 MSH|^~\&|cobas·8000||host||20100430105127||OUL^
                    R22^BATCH|54684||2.5|||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:51:27,484 PID|1|?|||^|||||[CR]
c8kDM  10:51:27,484 SPM||110005||S1||not|||||P|||^^^^|||20100429161
                    525|||||||||||SC|[CR]
c8kDM  10:51:27,484 SAC|||||||||||110005|2|[CR]
c8kDM  10:51:27,484 OBR|1|||989|[CR]
c8kDM  10:51:27,484 TQ1|1|||||||||R|[CR]
c8kDM  10:51:27,484 OBX|1||989||1.1|mmol/L|^TECH~^NORM~^CRIT~^USER|
                    |||F|||20091218164600|bmserv^SYSTEM||28|ISE^2^M
                    U1#ISE#1#2^4|20100430102029|[CR]
c8kDM  10:51:27,484 TCD|989|Dec|[CR]
c8kDM  10:51:27,484 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM  10:51:27,484 OBR|2|||990|[CR]
c8kDM  10:51:27,484 TQ1|1|||||||||R|[CR]
c8kDM  10:51:27,484 OBX|2||990||2.2|mmol/L|^TECH~^NORM~^CRIT~^USER|
                    |||F|||20091218164600|bmserv^SYSTEM||29|ISE^2^M
                    U1#ISE#1#2^4|20100430102030|[CR]
c8kDM  10:51:27,484 TCD|990|1|[CR]
c8kDM  10:51:27,484 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM  10:51:27,484 OBR|3|||991|[CR]
c8kDM  10:51:27,484 TQ1|1|||||||||R|[CR]
c8kDM  10:51:27,484 OBX|3||991||5.5|mmol/L|4.0·-·44.0^TECH~2.0·-·22
                    .0^NORM~3.0·-·33.0^CRIT~1.0·-·11.0^USER||||F|||
                    20091218164600|bmserv^SYSTEM||30|ISE^2^MU1#ISE#
                    1#2^4|20100430102030|[CR]
c8kDM  10:51:27,484 TCD|991|Inc|[CR]
c8kDM  10:51:27,484 NTE|1|I|23^ISE·Sample·range·over|I|[CR]
c8kDM  10:51:27,484 [FS][CR]
```

Figure E-31   Result query for final results of the sample 110005

Quality control messages

This section contains example of quality control messages

Quality control results first upload

The example below shows the first upload of quality control results.

```
*       10:35:10,640 RSUPL:  SID^Rack^Pos^CID = HBCN^30001^2^54661
c8kDM  10:35:10,578 [VT]
c8kDM  10:35:10,578 MSH|^~\&|cobas·8000||host||20100430103510||OUL^
                    R22^REAL|54661||2.5||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:35:10,578 PID|1|[CR]
c8kDM  10:35:10,578 SPM||HBCN^611490^1||S4||not|||||Q|||^^^^|||||||
                    |||||||SC|[CR]
c8kDM  10:35:10,578 SAC|||||||||||30001|2|[CR]
c8kDM  10:35:10,578 OBR|1|||870^|[CR]
c8kDM  10:35:10,578 TQ1|1|||||||||R|[CR]
c8kDM  10:35:10,578 OBX|1||870||17.30|g/dL|||||F|||20091218164500|b
                    mserv^SYSTEM||0|c502^1^MU1#c502#2#1^9^Current|2
                    0100430103509|[CR]
c8kDM  10:35:10,578 TCD|870|1|[CR]
c8kDM  10:35:10,578 SID|870^^712312^R1^9^0|901278|17788|[CR]
c8kDM  10:35:10,578 SID|870^^712312^R3^9^0|901278|17788|[CR]
c8kDM  10:35:10,578 [FS][CR]

*       10:35:11,218 RSUPL:  SID^Rack^Pos^CID = HBCN^30001^2^54662
c8kDM  10:35:11,093 [VT]
c8kDM  10:35:11,093 MSH|^~\&|cobas·8000||host||20100430103510||OUL^
                    R22^REAL|54662||2.5||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:35:11,093 PID|1|[CR]
c8kDM  10:35:11,093 SPM||HBCN^^1||S4||not|||||Q|||^^^^|||||||||||||
                    SC|[CR]
c8kDM  10:35:11,093 SAC|||||||||||30001|2|[CR]
c8kDM  10:35:11,093 OBR|1|||880^|[CR]
c8kDM  10:35:11,093 TQ1|1|||||||||R|[CR]
c8kDM  10:35:11,093 OBX|1||880||1.50|g/dL|||||F|||20091218164500|bm
                    serv^SYSTEM||0|c502^1^MU1#c502#2#1^9^Current|20
                    100430103510|[CR]
c8kDM  10:35:11,093 TCD|880|1|[CR]
c8kDM  10:35:11,093 SID|880^^685345^R1^10^0|501834|17788|[CR]
c8kDM  10:35:11,093 SID|880^^685345^R3^10^0|501834|17788|[CR]
c8kDM  10:35:11,093 [FS][CR]
```

Figure E-32   Quality control results, first upload

Quality control results re–sent

The example below shows the a re–sent upload of quality control results.

```
*       10:36:09,546 RSUPL:  SID^Rack^Pos^CID = HBCN^30001^2^54664
c8kDM  10:36:09,437 [VT]
c8kDM  10:36:09,437 MSH|^~\&|cobas·8000||host||20100430103609||OUL^
                    R22^BATCH|54664||2.5|||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:36:09,437 PID|1|[CR]
c8kDM  10:36:09,437 SPM||HBCN^^1||S4||not|||||Q|||^^^^|||||||||||||||
                    SC|[CR]
c8kDM  10:36:09,437 SAC|||||||||||30001|2|[CR]
c8kDM  10:36:09,437 OBR|1|||880^|[CR]
c8kDM  10:36:09,437 TQ1|1||||||||R|[CR]
c8kDM  10:36:09,437 OBX|1||880||1.50|g/dL|||||F|||20091218164500|bm
                    serv^SYSTEM||0|c502^1^MU1#c502#2#1^9^Current|20
                    100430103510|[CR]
c8kDM  10:36:09,437 TCD|880|1|[CR]
c8kDM  10:36:09,437 SID|880^^685345^R1^10^0|501834|17788|[CR]
c8kDM  10:36:09,437 SID|880^^685345^R3^10^0|501834|17788|[CR]
c8kDM  10:36:09,437 [FS][CR]

*       10:36:10,281 RSUPL:  SID^Rack^Pos^CID = HBCN^30001^2^54666
c8kDM  10:36:10,125 [VT]
c8kDM  10:36:10,125 MSH|^~\&|cobas·8000||host||20100430103609||OUL^
                    R22^BATCH|54666||2.5|||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:36:10,125 PID|1|[CR]
c8kDM  10:36:10,125 SPM||HBCN^611490^1||S4||not|||||Q|||^^^^|||||||
                    ||||||SC|[CR]
c8kDM  10:36:10,125 SAC|||||||||||30001|2|[CR]
c8kDM  10:36:10,125 OBR|1|||870^|[CR]
c8kDM  10:36:10,125 TQ1|1||||||||R|[CR]
c8kDM  10:36:10,125 OBX|1||870||17.30|g/dL|||||F|||20091218164500|b
                    mserv^SYSTEM||0|c502^1^MU1#c502#2#1^9^Current|2
                    0100430103509|[CR]
c8kDM  10:36:10,125 TCD|870|1|[CR]
c8kDM  10:36:10,125 SID|870^^712312^R1^9^0|901278|17788|[CR]
c8kDM  10:36:10,125 SID|870^^712312^R3^9^0|901278|17788|[CR]
c8kDM  10:36:10,125 [FS][CR]
```

Figure E-33   Quality control results, re-sent

Masking message

This section gives example of masking commands.

Set masking   The example message below sets:

- masking for all results, including quality control results and calibration results, for the analyte number 8687 on a c701 module.

- masking for patient results only for analyte number 8678 on a c701 module.

Notice that whatever the setting of the application acknowledgement type, the *data manager* sends an acknowledgement to a masking or unmasking message. In this example, although the host MSH segment sets the application acknowledgement type to NE, meaning "never send acknowledgement", the *data manager* in fact does send an acknowledgement.

```
*       13:57:43,171 Masking:   ^CID = ^10009


HOST    13:57:43,187 [VT]


MSH|^~\&|Host||cobas·8000·data·manager||20100420135743||EAC^U07|10009||2.5||||NE||UNICO
DE·UTF-8|[CR]
                EQU|0001|20100420135615|[CR]
                ECD||LK|||8687^T^MU1#c701#1#1^ALL|[CR]
                ECD||LK|||8678^P^MU1#c701#1#1^ALL|[CR]
                [FS][CR]


*       13:57:46,234 ACK:   ExCID^CID = ^10040


c8kDM   13:57:46,140 [VT]


MSH|^~\&|cobas·8000||host||20100420135800||ACK|10040||2.5||||ER||UNICODE·UTF-8|[CR]
                MSA|AA|||[CR]
                [FS][CR]
```

Figure E-34   Mask results for analytes 8687 and 8678

Unmasking   The example message below removes masking for the analytes 8687 and 8678 on a c701 module.

Note that although the message from the host sets the application acknowledge type to NE, meaning never send an acknowledgement, the *data manager* does in fact send an acknowledgement.

```
*       14:22:27,875 Masking:  ^CID = ^10009

HOST    14:22:28,265 [VT]

MSH|^~\&|Host||cobas·8000·data·manager||20100420142227||EAC^U07|10009||2.5||||NE||UNICO
DE·UTF-8|[CR]
                  EQU|0001|20100420142113|[CR]
                  ECD||UC|||8687^^MU1#c701#1#1^ALL|[CR]
                  ECD||UC|||8678^^MU1#c701#1#1^ALL|[CR]
                  [FS][CR]


*       14:22:31,531 ACK:  ExCID^CID = ^10111

c8kDM   14:22:31,406 [VT]

MSH|^~\&|cobas·8000||host||20100420142245||ACK|10111||2.5||||ER||UNICODE·UTF-8|[CR]
                  MSA|AA|||[CR]
                  [FS][CR]
```

Figure E–35   Unmask results for analytes 8687 and 8678

Calibration result messages

This section shows examples of calibration result messages.

ISE Calibration results   This section shows an example ISE calibration result sent from the *data manager* to the host.

```
*        10:48:48,015 Cal ISE:  Module^CID = ISE^54679
c8kDM  10:48:47,890 [VT]
c8kDM  10:48:47,890 MSH|^~\&|cobas·8000||host||20100316105742||OUL^
                    R22^ICUPL|54679||2.5||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:48:47,890 SPM|||||||||||C^I|[CR]
c8kDM  10:48:47,890 OBR|1|||989|[CR]
c8kDM  10:48:47,890 OBX|1||989||Type-A^0&0&0&0&0&0&0&0&0&0^-32.7&-3
                    4.7&-28.4&-30.2&50.4&131.5&147.7&0.0&49.9&-4.7|
                    ||Valid|||F||||bmserv||37|MU1#ISE#1#1|201003161
                    05741|[CR]
c8kDM  10:48:47,890 SID||[CR]
c8kDM  10:48:47,890 SPM|||||||||||C^I|[CR]
c8kDM  10:48:47,890 OBR|2|||990|[CR]
c8kDM  10:48:47,890 OBX|2||990||Type-A^1&2&3&4&5&6&7&8&9&10^-34.2&-
                    45.5&-24.8&-34.5&56.3&4.76&4.70&0.0&56.2&-0.17|
                    ||Valid|||F||||bmserv||38|MU1#ISE#1#1|201003161
                    05742|[CR]
c8kDM  10:48:47,890 SID||[CR]
c8kDM  10:48:47,890 SPM|||||||||||C^I|[CR]
c8kDM  10:48:47,890 OBR|3|||991|[CR]
c8kDM  10:48:47,890 OBX|3||991||Type-A^0&0&0&0&0&0&0&0&0&0^136.4&13
                    8.5&130.6&134.1&-44.9&89.0&100.3&0.0&-45.1&0.7|
                    ||Valid|||F||||bmserv||39|MU1#ISE#1#1|201003161
                    05742|[CR]
c8kDM  10:48:47,890 SID||[CR]
c8kDM  10:48:47,890 [FS][CR]
```

Figure E-36   ISE calibration result

C-module Calibration results   This section shows examples of C-module (photometric) calibration results, sent from the *data manager* to the host.

```
*      10:45:43,828 Cal Photo:  Module^TestCode^CID = c701^8717^54674
c8kDM  10:45:43,765 [VT]
c8kDM  10:45:43,765 MSH|^~\&|cobas·8000||host||20100318181004||OUL^
                    R22^PCUPL|54674||2.5|||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:45:43,765 SPM||1^888888^901^1|||||||||C^P|[CR]
c8kDM  10:45:43,765 OBR|1|||8717|[CR]
c8kDM  10:45:43,765 OBX|1||8717||0^0&0&0&0&0&|||0|||F|||||21|MU1#c
                    701#1#1|20100318181004|[CR]
c8kDM  10:45:43,765 SID||[CR]
c8kDM  10:45:43,765 SPM||2^181939^401^1|||||||||C^P|[CR]
c8kDM  10:45:43,765 OBR|2|||8717|[CR]
c8kDM  10:45:43,765 OBX|2||8717||0^0&0&0&0&0&|||0|||F|||||21|MU1#c
                    701#1#1|20100318181004|[CR]
c8kDM  10:45:43,765 SID||[CR]
c8kDM  10:45:43,765 [FS][CR]
```

Figure E–37   Photometric calibration result

E-module Calibration results   This section shows examples of immunological calibration results from an E-module, sent from the *data manager* to the host.

```
*      10:49:59,171 Cal Immuno:  Module^TestCode^CID = e602^1^54681
c8kDM  10:49:59,062 [VT]
c8kDM  10:49:59,062 MSH|^~\&|cobas·8000||host||20100316113523||OUL^
                    R22^ECUPL|54681||2.5|||||ER||UNICODE·UTF-8|[CR]
c8kDM  10:49:59,062 SPM||2^156272^1^None|||||||||C^E|[CR]
c8kDM  10:49:59,062 OBR|1|||1|[CR]
c8kDM  10:49:59,062 OBX|1||1||Valid^false^false^false^1.000^true^^f
                    alse^true^29987.100&29670.610^^^^^|||LotCalibra
                    tion|||F||||bmserv||68|MU1#e602#3#2|20100316113
                    523|[CR]
c8kDM  10:49:59,062 SID|1^^^ASY^14^0|156369|[CR]
c8kDM  10:49:59,062 SPM||1^156272^1^None|||||||||C^E|[CR]
c8kDM  10:49:59,062 OBR|2|||1|[CR]
c8kDM  10:49:59,062 OBX|2||1||Valid^false^false^false^1.000^true^^f
                    alse^true^826.502&827.638^^^^^|||LotCalibration
                    |||F||||bmserv||68|MU1#e602#3#2|20100316113523|
                    [CR]
c8kDM  10:49:59,062 SID|1^^^ASY^14^0|156369|[CR]
c8kDM  10:49:59,062 [FS][CR]
```

Figure E–38   E-module (immunological) calibration result

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 / cobas® 6000 and **cobas®** 8000 data manager.

In this chapter   *Chapter* **14**

Connection standards

This section describes the connection methods and standards that **cobas**® 8000 data manager supports.

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 or stopping a host connection* on page B-21.
- 👁 For details of the connections, see *Host communication settings and cables* on page B-42.
- 👁 For details of the HL7 protocol used, see Chapter 8 *HL7 protocol* and Chapter 9 *HL7 text content.*
- 👁 For details of the ASTM protocol used, see Chapter 6 *ASTM protocol (LIS2 - A2)* and Chapter 7 *ASTM text content (LIS2 - A2).*

-�ç̣- **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 future high-throughput systems.

Network connection will be mandatory for future systems that are for example connected to two or three c8000 instruments. 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 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.

⚠ **HL7 over a serial connection is not supported**

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

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 performance of the connection is equivalent to a serial connection, not a network connection.

- 👁 For details of network connections, see *Network connection* on page B-42.
- 👁 For details of serial connections, see *Serial connection* on page B-43.

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

⚠️ **WARNING**

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

Sample identification

Item	MODULAR *ANALYTICS* EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
Sample number mode[a]	Yes (Only for Batch Download with Sample Barcode Reader = OFF)	No	Reduced
Barcode label	Yes	Yes	
Rack & Sample Position	Yes	Yes	

(a) 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 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	
Cerebral Spinal 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

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

Item	MODULAR *ANALYTICS* EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
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

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	*data manager* to host	Reduced
Result Report (realtime)	RSUPL^REAL	RSUPL	*data manager* to host	Reduced
Result Report (batch)	RSUPL^BATCH	RSUPL	*data manager* to host	Reduced
Result Report (quality control: for first upload of results)	RSUPL^REAL	RSUPL^REAL	*data manager* to host	(Unchanged for QC results)
Result Report (quality control: when repeating uploads of results previously sent)	RSUPL^BATCH	RSUPL^BATCH	*data manager* to host	(Unchanged for QC results)
Result Report (query)	RSUPL^REPLY	RSUPL	analyzer to host	Reduced
Photometry Calibration Result Report	PCUPL^REAL	PCUPL	to host	Reduced
ISE Calibration Result Report	ICPUL^REAL	ICPUL	to host	Reduced
Calibration Result Report from Immunology Modules	ECUPL^REAL	ECUPL	to host	Reduced
Photometric Raw Data Report	ABUPL^BATCH	NO	to host	Reduced
Raw Data Report from Immunology Modules	EBUPL^BATCH	NO	to host	Reduced
Test Selection Download (answer to inquiry)	TSDWN^REPLY	TSDWN	host to *data manager*	Reduced
Test Selection Download (unsolicited)	TSDWN^BATCH	TSDWN	host to *data manager*	Reduced
Inquiry of Result	RSREQ^BATCH	RSREQ	host to instrument	Reduced

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

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	*data manager* to host: Sender ID	As specified at host setting screen	Fixed to `cobas 8000^1`	
10	*data manager* 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

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

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* on page E-79.

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

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
- from host only dilution factors INC, DEC, empty, but from *data manager* Inc,Dec,3,5,10,20,50,100,1.
- Action code "R" for reruns: "A" however can also be used for ordering reruns.

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 Clinical chemistry module: • 1, Inc, Dec Immunology 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

Field	Description	MODULAR *ANALYTICS* EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
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

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 the module's serial number, the module name and the internal number as registered in *data manager*.

The **cobas®** 8000 data manager writes the calibration ID into field no. 6, and also writes the instrument operator username and (when pass-though 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 clinical chemistry module: • 1, Inc, Dec For an immunology 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 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.	Change
4,C2	Measurement value	Quantitative Value	AdditionalResultValues For quantitative results, this is empty or contains a qualitative flag. For qualitative results, this contains the quantitative result	Change

Field	Description	MODULAR *ANALYTICS* EVO analyzer / cobas® 6000 analyzer series	cobas® 8000 data manager	Comment
6	Reference Ranges	No	Reference ranges	Extended
7	Result abnormal flags	A=Abnormal, no EP17 support.	A=Alphanumeric out of normal AA=Alphanumeric out of critical EP-17 flags also supported	Extended
9	Result status	F=First Run, C=Corrective	F=First Run, C=Corrective, M=Manually edited	Extended
11	Operator Identification	Operator at Analyzer	Operator at Analyzer^ Operator at *data manager*	Extended
13	Date/Time Test completed	No	Yes	Extended
14	Instrument ID	P1,P2,P3,P4,ISE1,ISE 2,Exy	`ModuleType^SubModule^UnitID^ InstrumentID^CalID^Bottle^ SBNo` `Bottle^SBNo` used only for QC. ModuleTypes: `c502, c701, e602, ISE, DM, c8000`	Extended

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 *data manager*	

Comment Record (following a Result Record)

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 *data manager*	Extended
4	Comment Text, if type I	Flagnumber	`Flagnumber^Description`	Extended
4	Comment Type, if type G	No	`Text^User^Date`	Extended

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: • R = Routine • S = STAT	Extended
13	Request Information Status Code	• A=Rejects previous req. • O=Request for Test Request • F=Final Result	• O=Request for Test Request • F=Final Resultt	Reduced

Other differences

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 for a test.	Can store and send all results for a test.	Extended

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* **15**

ASCII table

The ASCII 127 character codes are shown below, with each printed character and its hexadecimal and decimal value

NUL 000	DLE 10 16	Space 20 32	0 30 48	@ 40 64	P 50 80	` 60 96	p 70 112
SOH 011	DC1 11 17	! 21 33	1 31 49	A 41 65	Q 51 81	a 61 97	q 71 113
STX 022	DC2 12 18	" 22 34	2 32 50	B 42 66	R 52 82	b 62 98	r 72 114
ETX 033	DC3 13 19	# 23 35	3 33 51	C 43 67	S 53 83	c 63 99	s 73 115
EOT 044	DC4 14 20	$ 24 36	4 34 52	D 44 68	T 54 84	d 64 100	t 74 116
ENQ 055	NAK 15 21	% 25 37	5 35 53	E 45 69	U 55 85	e 65 101	u 75 117
ACK 066	SYN 16 22	& 26 38	6 36 54	F 46 70	V 56 86	f 66 102	v 76 118
BEL 077	ETB 17 23	' 27 39	7 37 55	G 47 71	W 57 87	g 67 103	w 77 119
BS 088	CAN 18 24	(28 40	8 38 56	H 48 72	X 58 88	h 68 104	x 78 120
HT 099	EM 19 25	) 29 41	9 39 57	I 49 73	Y 59 89	i 69 105	y 79 121
LF 0A 10	SUB 1A 26	* 2A 42	: 3A 58	J 4A 74	Z 5A 90	j 6A 106	z 7A 122
VT 0B 11	ESC 1B 27	+ 2B 43	; 3B 59	K 4B 75	[5B 91	k 6B 107	{ 7B 123
FF 0C 12	FS 1C 28	, 2C 44	< 3C 60	L 4C 76	\ 5C 92	l 6C 108	| 7C 124
CR 0D 13	GS 1D 29	- 2D 45	= 3D 61	M 4D 77	] 5D 93	m 6D 109	} 7D 125
SO 0E 14	RS 1E 30	. 2E 46	> 3E 62	N 4E 78	^ 5E 94	n 6E 110	~ 7E 126
SI 0F 15	US 1F 31	/ 2F 47	? 3F 63	O 4F 79	_ 5F 95	o 6F 111	DEL 7F 127

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	!	21	EXCLAMATION MARK
U+0022	"	22	QUOTATION MARK	U+0023	#	23	NUMBER SIGN
U+0024	$	24	DOLLAR SIGN	U+0025	%	25	PERCENT SIGN
U+0026	&	26	AMPERSAND	U+0027	'	27	APOSTROPHE
U+0028	(	28	LEFT PARENTHESIS	U+0029	)	29	RIGHT PARENTHESIS
U+002A	*	2a	ASTERISK	U+002B	+	2b	PLUS SIGN
U+002C	,	2c	COMMA	U+002D	-	2d	HYPHEN-MINUS
U+002E	.	2e	FULL STOP	U+002F	/	2f	SOLIDUS
U+0030	0	30	DIGIT ZERO	U+0031	1	31	DIGIT ONE
U+0032	2	32	DIGIT TWO	U+0033	3	33	DIGIT THREE
U+0034	4	34	DIGIT FOUR	U+0035	5	35	DIGIT FIVE
U+0036	6	36	DIGIT SIX	U+0037	7	37	DIGIT SEVEN
U+0038	8	38	DIGIT EIGHT	U+0039	9	39	DIGIT NINE
U+003A	:	3a	COLON	U+003B	;	3b	SEMICOLON
U+003C	<	3c	LESS-THAN SIGN	U+003D	=	3d	EQUALS SIGN
U+003E	>	3e	GREATER-THAN SIGN	U+003F	?	3f	QUESTION MARK
U+0040	@	40	COMMERCIAL AT	U+0041	A	41	LATIN CAPITAL LETTER A
U+0042	B	42	LATIN CAPITAL LETTER B	U+0043	C	43	LATIN CAPITAL LETTER C
U+0044	D	44	LATIN CAPITAL LETTER D	U+0045	E	45	LATIN CAPITAL LETTER E
U+0046	F	46	LATIN CAPITAL LETTER F	U+0047	G	47	LATIN CAPITAL LETTER G

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Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
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>
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>

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Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
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	Ç	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	Ë	c3 8b	LATIN CAPITAL LETTER E WITH DIAERESIS
U+00CC	Ì	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

Unicode code point	Character	UTF-8 (hex.)	Name	Unicode code point	Character	UTF-8 (hex.)	Name
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	Õ	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	Ù	c3 99	LATIN CAPITAL LETTER U WITH GRAVE
U+00DA	Ú	c3 9a	LATIN CAPITAL LETTER U WITH ACUTE	U+00DB	Û	c3 9b	LATIN CAPITAL LETTER U WITH CIRCUMFLEX
U+00DC	Ü	c3 9c	LATIN CAPITAL LETTER U WITH DIAERESIS	U+00DD	Ý	c3 9d	LATIN CAPITAL LETTER Y WITH ACUTE
U+00DE	Þ	c3 9e	LATIN CAPITAL LETTER THORN	U+00DF	ß	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	ì	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	ò	c3 b2	LATIN SMALL LETTER O WITH GRAVE	U+00F3	ó	c3 b3	LATIN SMALL LETTER O WITH ACUTE
U+00F4	ô	c3 b4	LATIN SMALL LETTER O WITH CIRCUMFLEX	U+00F5	õ	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
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	ý	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

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