Online Specification - Host Interface

AutoMate 2500 Family

Sample Processing System

Software version 4.1.1

Document revision 2.4

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Beckman Coulter Biomedical GmbH
Sauerbruchstr. 50
81377 München, Germany

Beckman Coulter, Inc.
250 S. Kraemer Blvd
Brea, CA 92821

BECKMAN COULTER

Online Specification - Host Interface

AutoMate 2500 Family

April 2013

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EC REP

Beckman Coulter Biomedical GmbH
Sauerbruchstr. 50
81377 München, Germany

Revision History

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

Initial Issue, 12/10

Document revision 2.1

Issue B, 07/10

Document revision 2.2

This manual replaces the Online Specification Version 2.1

Updated and new information includes:

- Functionality for camera rejected tubes implemented
- New parameter SendQueryForCameraRejectedTubes
- Enhancements for cap color and tube type recognition

Issue C, 05/11

Document revision 2.3

This manual replaces the Online Specification Version 2.2

Updated and new information includes:

- Moved all descriptions for processing camera rejected tubes to appendix E
- Added diagrams to show which instrument events trigger, that messages are sent to the host
- Added Appendix F to explain the order in which messages are sent to the host
- Added Appendix G to explain status messages for tubes that are manually removed from the instrument

Issue C, April 2013

Document revision 2.4

Applies to AutoMate 2500 Family software version 4.1.1020.

This manual replaces the Online Specification – document revision 2.3

Updated and new information includes:

- Added diagrams to show which instrument events trigger that messages are sent to the host
- Added description for the new P- and C-Message
- Note on “ReQuery” parameter in combination with Sorting-Drive
- New parameter “SendNoBarForEmptyRack
- Updated Figure 10 Query after bar code read and re-query

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For your notes

1 About this manual

1.1 Target group

This Online Specification is intended for Beckman Coulter or non-Beckman Coulter product specialists connecting an Auto*Mate* 2500 Family unit to a Laboratory Information System.

1.2 Related documents

For more information about operating or servicing the Auto*Mate* also refer to the following documents or databases:

- ❑ Auto*Mate* 2500 Family Systems Service Database
- ❑ Instructions for Use
- ❑ All officially published MODs

1.3 Conventions

In our documentation, we adhere to the following conventions:

File names, directories and locations	are presented in italic font
COMMANDS, MENU COMMANDS AND COMMAND → SEQUENCES	are presented in capital letters. Command sequences are separated by → arrows
[Buttons]	are set in square brackets and bold font
Keys, function keys and shortcuts	are presented in bold font
`Program extracts and parameter citations`	are presented in Courier, font size 10pt

1.4 Abbreviations used in this document

The following abbreviations are used within this document:

Abbreviation	Meaning
LIS	Laboratory Information System
MSB	Most significant bit
LSB	Last significant bit
WP	Workplace
MTP	Micro Titer Plate
SID	Sample Identification
SSID	Secondary Sample Identification

1.5 General introduction

This manual provides you with all relevant information for connecting the AutoMate 2500 Family Sample Distribution System to any LIS (Laboratory Information System).

The information contained in this manual is related to Auto*Mate* 2500 Family System systems, in the following referred to as **instrument**.

2 Protocol structure

The communication between the instrument and a LIS is based on a request-response system. This is performed by the exchange of several messages.

Messages can be exchanged by using the serial (COM) or TCP/IP interface.

The COM connection is established by a Null-Modem cable.

All messages are exchanged only by one COM or TCP/IP port.

2.1 General messaging concept

- ❑ If a tube bar code is identified by the instrument, it sends a query to the LIS.
- ❑ The LIS responds with information how to process this tube.

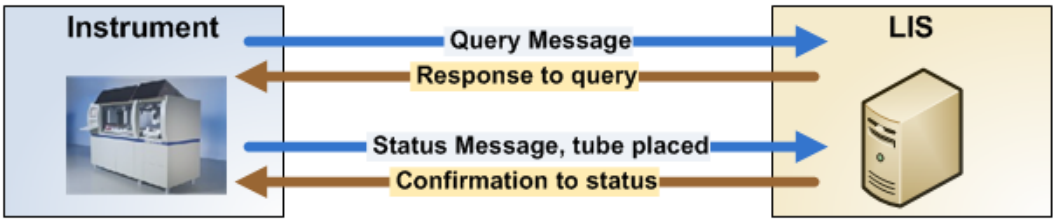


Figure 1: Query-Response system

- ❑ The instrument processes the tube and places it on the final destination. Now a status message (tube placed) is sent to the LIS, containing information about the current tube placement.
- ❑ The LIS confirms this status message with an OK message.

This process is repeated for each tube identified by the instrument.

2.2 General message structure

Messages consist of a **Data** block which is integrated into a set of control characters. The data block itself is divided into a set of fields. The first field (**Message ID)** identifies the type of information that is transferred.

Fields are ended by pipe character **|** chr(124) similar to ASTM protocol.

Every message starts with the *start of text* **<STX>** character and ends by a sequence of *carriage return* **<CR>** , *line feed* **<LF>** and **end of text <ETX>** characters.

The control characters are defined as ASCII:

<STX>=chr(**2**)

<CR>=chr(**13**)

<LF>=chr(**10**)

<ETX>=chr(**3**).

<STX>Data<CR><LF><ETX>

MessageID|Field02|Field03|…|…|… …|Field24|Field25|

Figure 2: Message structure



The protocol does not use any flow control characters like **<ENQ>**, **<ACK>, <NAK>** or **<BCC>** Block check character

The instrument supports two protocol versions.

Version 0:

Is using a data block with 19 fields. This version is used for the basic sorting functionality. It does not support color, tube type and volume information.

Version 1:

Is using a data block with 25 fields. This version is used for the enhanced sorting functionality. It supports all the information from the Tube Inspection Unit (TIU), such as detected cap color, tube type and measured volume.

Which version is used depends on the settings configured in the

CONFIGURATION MANAGER, SECTION [HOST], PARAMETER [PROTOCOL VERSION] :

Protocol version	Field count, including MessageID
0	19
1	25

Once the protocol version is selected, the Data block for all message types contains always 19 or 25 fields each.

Not all fields are used in every message type. Fields can remain empty. Field delimiters as presented below identify fields that do not contain any information:

Q|08399521|||97|||1633|||||||||0|0|15|1633|15.30|0.00||

Empty fields

Figure 3: Empty fields

2.3 Optional settings

All optional settings used for the online communication of the instrument can be defined in the CONFIGURATION MANAGER.

The main parameters for the communication with the LIS are explained in the following tables:

2.3.1 Configuration manager section => Interface_Host

Parameter	Meaning
Type=Com / Winsocket / Simulator	Com = Serial Port Winsocket = TCP/IP Simulator = internal host simulator (connected using TCP/IP protocol)
Settings=9600,N,8,1	Baud rate, parity and start stop bit for COM communication
Port=2220	Port=n Serial COM port number or TCP/IP port number
LogSize=1000	Number of lines, shown within the communication window
Server	IP address or DNS name of LIS for TCP/IP connection.

2.3.2 Configuration Manager section => Host

Parameter	Meaning
Typ=2	Fixed to 2. Only protocol type 2 is supported. Other protocol types are obsolete.
ResponseTime=10000	Timeout of the LIS communication [ms] If there is no answer / confirmation from the LIS within a specified time, the instrument informs about the timeout error with just the possibility to reinitialize the communication.
SendDelay=0	Delay before sending a message to host [ms]
LogStatus=1	LogStatus=1 A log file with sent status -Messages will be created, each time the system is started. LogStatus=0 No log file will be created

Parameter	Meaning
PosFormatR=YYXX PosFormatS=P PosFormatV=P	These parameters define the rack design and its correlated format of the tube position which is transmitted to a host. A tube position is identified by its row value and its column value. The following designs exist: R - Rectangular Rack S - SpecialTypeX und SpecialTypeY V - Variant Rack. Possible values are: YYXX AXX AYY PPPP P A=column or row, XX=row and YY=column A Y Y Letter Number Number e.g. **A08** XXYY XX=row YY=column X X Y Y Number Number Number Number e.g. **0203** PPPP or P=continuous P P P P Number Number Number Number e.g.: **0008** or **8** **Note: For detailed information refer to AutoMate 2500 Family Systems Service Database, Chapter 05. Teaching the System, section Position Formats**
Buffer Size	Not used anymore
IgnoreSekTubes=0	The parameter in the Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to “Yes”, A-Messages sent by the host for secondary tube creation are ignored.

Protocol structure - Optional settings

Parameter	Meaning
Version	Version of the Host protocol. See also Section 2, Protocol structure. Software versions 3.1 or higher support host protocol version 0 and 1.
ReQuery	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to "Yes", the re-query message is sent if measured sample volume is less than the ordered volume. **Note:** This option is valid only if the parameter QueryAfterCamera is set to 0. **Note:** If the AutoMate is operated in combination with Sorting-Drive, the parameter ReQuery should be set to No (ReQueryRequery=0).
QueryAfterCamera	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to “Yes”, a query (Q-Message) is sent after tube inspection unit evaluation. **Note:** When using Sorting Drive, this parameter must be set to 1. If this parameter is set to 1, the parameter ReQuery must be set to 0.
SendIPWhileInitialisation	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to “Yes”, the transmission of the IP-address to the host during initialization is enabled.
StatusForManually RemovedTubes	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to "Yes", a status message (S - type) is sent after a tube has been manually removed from the instrument Read Appendix “G Status for manually removed tubes” for further information.
StatusForTubes InBufferRack	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to "Yes", a status message (S - type) is sent after a tube was put into the buffer rack by the robot.
StatusForLostAndFoundTubes	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to “Yes”, then sending a status message (S – type) is also enabled for new tubes that were found during instrument initialization (e.g. in the robot gripper). The status messages are only sent if the instrument successfully reads the bar code of the newly found tube. Read Appendix “G Status for manually removed tubes” for further information.

Parameter	Meaning
SendQueryForCameraRejectedTubes	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” If set to "Yes", a query (Q-Message) or a re-query (R-Message) is sent also for *camera-rejected tubes*. Camera rejected tubes are tubes for which the camera was unable to identify the tube type, cap type or cap color (if cap color detection is active). The default setting for the parameter is “No”, i.e. no query or re-query is sent and the instrument distributes the tube to the system or clone error workplace. Read carefully appendix “E Processing camera rejected tubes” before setting to “Yes”.
SendNoBarForEmptyRack	If set to “Yes”, the Instrument will send rack-query “U” message also for MTP racks where no rack-bar code could be read (erroneous bar code or rack is configured but absent in the system). The message will contain 'NOBAR' as bar code. If set to “No” (default), no “U” message will be sent to host if no rack-bar code could be read (erroneous bar code or empty rack).



The Parameter ReQuery is related to the parameter QueryAfterCamera

2.3.3 Configuration Manager section => Workplace

.

Parameter	Meaning
SystemError	ID of the system error workplace to place faulty samples (primary and secondary tubes)
CloneError	Workplace ID to place faulty samples (primary and secondary tubes) in case of aliquoting tubes. (Option)
CloneError2	Workplace ID to place samples if requested number of clones its maximum amount allowed by Instrument (Option)
ClonInfo	If set to "Yes", the status message will transfer the rack bar code together with the workplace ID. This is working for workplace of type 'Archive' or 'Clone' (MTP) If set to "No", only the workplace ID is sent.
CheckUniqueMTP	If set to “Yes”, the unique assignment of workplaces to MTP racks will be checked. If set to”No” (default), different MTP racks can have the same WP.

2.3.4 Configuration Manager section => Tubes

There is only one parameter in this section that is relevant for host connection.

Parameter	Meaning
AllowZeroTargetVolumeFromHost	To receive an empty labeled secondary tube the volume within the aliquot A-Message field (8) must be set to ZERO (0). The parameter AllowZeroTargetVolumeFromHost will influence the distribution as follows: AllowZeroTargetVolumeFromHost=Yes will distribute the empty aliquot tube to its requested destination workplace. AllowZeroTargetVolumeFromHost=No will distribute the whole tube batch (primary and all aliquots) to an error workplace.

3 Message types

The communication between the instrument and a LIS System is based on exchanging messages. All messages have the same format. Some messages are sent by the instrument and others by the LIS.

The type of messages used depends on instrument mechanical equipment or is related to some configuration manager settings.

The message identifier (Field01 => MessageID) specifies the type of message.

The **Q**, **A** , **S** and **O-Message**s are used in any configuration. These are the essential sorting messages.

Equip-ment	Message ID	Meaning	Message used by:		Comment
			Instr.	LIS	
Essential messages - Always used	**Q**	Query	✓		The instrument uses this message to inform the LIS that a new primary tube with Sample ID xxxx has been detected.
	A	Answer		✓	Reply to instrument Q- or R-Message. The LIS uses this message to inform the instrument what to do with the current primary tube with Sample ID xxxx. If additional aliquots are requested a separate A-Message for each aliquot must be sent to the instrument
	S	Status	✓		The instrument uses this message to inform the LIS that it has placed a tube with Sample ID xxxx to its output destination rack. S-Messages are sent for any tube placed to output destinations.
	O	OK		✓	Reply to S-Message or a W-Message. The LIS has to confirm each S- or W-Message with this O-Message
Re -Query is set	**R**	Re-query	✓		The instrument uses this message to inform the LIS that the ordered volume is higher than the currently measured volume. The LIS has to restructure the order to match the available primary tube volume and must send new A-Message. **Note:** This message is only sent if the parameters QueryAfterCamera=0 and ReQuery=1
rack code reader or manual rack code	**U**	Rack identified	✓		The instrument uses this message to inform the LIS that a bar-coded MTP plate with Bar code nnnn has been detected. The message contains a proposal from the instrument for the next pipetting position.

Message types - Optional settings

Equip-ment	Message ID	Meaning	Message used by:		Comment
			Instr.	LIS	
					Note: This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner.
	T	Rack approval		✓	Reply to U-Message. The LIS uses this message to inform the instrument whether the currently detected MTP plate is valid and where to continue pipetting **Note:** This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner.
	F	Rack drawer closed	✓		The instrument uses this message to inform the LIS that the drawer with MTP plates is closed now. **Note:** This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner.
	G	All racks approved		✓	Reply to F-Message The LIS has to confirm that all detected MTP plates are valid and the instrument is allowed to use them now. If not confirmed, the MTP drawer will be opened again. **Note:** This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner.
Messages prior to dispen	**P**	Prior-to dispense	✓		The instrument uses this message to inform the LIS about the next occupied MTP position before starting to dispense to the very position. **Note:** This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner. Also this message is only sent if the parameter PreDispenseMessageEnabled=1.
	C	Confirmation		✓	Reply to P-Message The LIS has to confirm that it marked that MTP position as “in use” which it has received in the P-Message. If not confirmed, the whole job will be marked as faulty and the MTP drawer will be opened.
Electronic balance	**W**	Weight increase	✓		The instrument uses this message to inform the LIS about the weight increase of the last pipetting action for Sample ID xxxx. **Note:** This message is only sent if the instrument is equipped with electronic scales.

3.1 Field description of Q-Message

Message to inform the LIS that a new primary tube with Sample ID xxxx (SID) has been detected.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**Q**
	02	Sample ID (SID)	Text	✓	Scanned bar code
	03	Secondary Sample ID (SSID)	Text		Empty
	04	Laboratory sample ID	Text		Empty
	05	Rack ID	Lng	✓	Number (ID) of the input rack the tube was taken from.
	06	Sample position	Text		Empty
	07	De-cap	Tri state bool.		Empty
	08	Sample volume (µl)	Lng	✓	If a volume detection is activated it will hold the same value than Field(22) **Note:** This field is used for compatibility reasons.
	09	Amount of secondary tubes requested	Lng		Empty
	10	Re-cap	Tri state bool.		Empty
	11	Bar code label ID	Lng		Empty
	12	Label text 1	Text		Empty
	13	Label text 2	Text		Empty
	14	Label text 3	Text		Empty
	15	Label text 4	Text		Empty
	16	Label text 5	Text		Empty
	17	Label text 6	Text		Empty
	18	Comment	Text		Empty

Message types - **Field description** of Q-Message

Vers.	Field No.	Name	Data type	Used by this message type	Comments
	19	Sequence counter	Lng	✓	First transmission of message = 0 Second transmission of message = 1 Third transmission of message = 2 …
Only version 1	**20**	Cap color ID	Lng	✓	Detected cap color [ID] **Note:** • Valid color IDs are greater than zero • The value “minus three” (-3) identifies an open tube • The value minus two ("-2") means that the Cap color ID could not be found in the file *tubes.ini* • 0 => no cap color detection activated
	21	Tube type ID	Lng	✓	Detected tube type [ID] **Note:** • Valid tube type ID's are greater zero
	22	Sample volume (µl)	Lng	✓	Usable sample volume identified [µl] **Note:** • For spun tubes this is the serum or supernatant volume of the sample • For unspun or urine tubes this is the complete volume of the sample • Valid volume values are greater than zero • The value “minus one” (-1) identifies a volume measure error • 0: No volume detection activated or installed
	23	Volume upper edge (mm)	Dbl	✓	Detected volume upper edge (mm) **Note:** • Valid values are greater than zero (0.00) • 0.00 or Empty => No volume detection activated or installed
	24	Volume lower edge (mm)	Dbl	✓	Detected volume lower edge (mm) **Note:** • Valid values are greater than zero (0.00) • 0.00 or Empty => No volume detection activated or installed
	25	Sample quality information	Text		Empty For future use

3.2 Field description of A-Message

Reply to instrument Q- or R-Message.

The LIS uses this message to tell the instrument what to do with the current primary tube with Sample ID xxxx (SID).

The first A-Message contains the information for the primary sample and information on how many secondary samples are to be created. For each secondary sample, the LIS has to send a separate A-Message.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**A**
	02	Sample ID (SID)	Text	✓	Scanned bar code from previous Q- or R-Message **Note:** If this message is used for aliquot tubes, this value can be printed as secondary tube bar code ($Bar code).
	03	Secondary Sample ID (SSID)	Text	✓	For free use by LIS. Can remain empty. Any value placed here will be returned by S- or R- message. **Note:** If this message is used for aliquot tubes, this value can be printed as secondary tube bar code ($Bar code2).
	04	Laboratory sample ID	Text	✓	For free use by LIS. Can remain empty. Any value placed here will be returned by S- or R- message
	05	Rack ID	Lng	✓	Number (ID) of target output rack where the instrument has to transfer the tube
	06	Sample position	Text		Empty
	07	De-cap	Tri state bool.	✓	Instruct the instrument to de-cap the primary tube. **Note:** • 1 = de-cap • 0 = keep it closed • Empty = take the decision from configuration manager settings If de-cap flag is set for an open tube or for aliquot A-Message, the instrument will ignore the action

Message types - **Field description** of A-Message

Vers.	Field No.	Name	Data type	Used by this message type	Comments
	08	Sample volume (µl)	Lng	✓	Volume to use for this tube. **Note:** • If only a primary tube should be processed, this is the volume needed to perform the tests on the primary tube. The value must be greater than zero. • If aliquots are to be prepared, the volume for the first primary tube A-Message is the total volume of the whole tube batch. (Primary tube volume + first aliquot volume + sec. aliquot volume…) It must be greater than zero. • For the aliquot tube A-Message it is the volume to be pipetted into the secondary tube. If this volume is set to zero, an empty labeled secondary tube is prepared.
	09	Amount of secondary tubes requested	Lng	✓	This field is used to inform the instrument about the amount of secondary tubes. And it is also used to number the A-Messages for the requested aliquots. **Note:** • If only a primary tube should be processed, this value must be empty or zero. • If aliquots are to be prepared, the value for the first primary tube A-Message is the total amount of aliquots. • For the aliquot tube A-Message it is the number of the: o 1. aliquot A-Message = -1 o 2. aliquot A-Message = -2 o 3. aliquot A-Message = -3 o … If the amount sent with the first A-Message does not correlate to the following aliquot A-Messages the instrument will generate an error. **Note:** Currently, a maximum of 7 aliquots is allowed.
	10	Re-cap	Tri state bool.	✓	Instructs the instrument to re-cap this tube. **Note:** • 1 = Re-cap

Vers.	Field No.	Name	Data type	Used by this message type	Comments
					• 0 = do nothing • Empty = take the decision from configuration manager settings If the re-cap flag is set for a closed tube or not in combination with de-cap, the instrument generates an error (Can't re-cap because tube was not de-capped)
	11	Bar code label ID	Lng	✓	Informs the instrument which label layout to use for printing the secondary tube label. Values = 1 to n . Depending on the instrument's label layout set-up. **Note:** Used only for aliquot A-Messages. For a primary tube this field is empty.
	12	Label text 1	Text	✓	For free use by LIS. Tells the instrument what text to print on the aliquot label. **Note:** Used only for aliquot A-Messages. For a primary tube or if not needed,this field remains empty.
	13	Label text 2	Text	✓	For free use by LIS. Tells the instrument what text to print on the aliquot label. **Note:** Used only for aliquot A-Messages. For a primary tube or if not needed, this field remains empty.
	14	Label text 3	Text	✓	For free use by LIS. Tells the instrument what text to print on the aliquot label. **Note:** Used only for aliquot A-Messages. For a primary tube or if not needed, this field remains empty.
	15	Label text 4	Text	✓	For free use by LIS. Tells the instrument what text to print on the aliquot label. **Note:** Used only for aliquot A-Messages. For a primary tube or if not needed, this field remains empty.
	16	Label text 5	Text	✓	For free use by LIS. Tells the instrument what text to print on the aliquot label.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
					Note: Used only for aliquot A-Messages. For a primary tube or if not needed, this field remains empty.
	17	Label text 6	Text	✓	For free use by LIS. Tells the instrument what text to print on the aliquot label. **Note:** Used only for aliquot A-Messages. For a primary tube or if not needed, this field remains empty.
	18	Comment	Text	✓	For free use by LIS. Can remain empty. The instrument will show this text as a remark within the tube's details dialog.
	19	Sequence counter	Lng	✓	First transmission of message = 0 Second transmission of message = 1 Third transmission of message = 2 …
Only version 1	**20**	Cap color ID	Lng		Empty
	21	Tube type ID	Lng		Empty
	22	Sample volume (µl)	Lng		Empty
	23	Volume upper edge (mm)	Dbl		Empty
	24	Volume lower edge (mm)	Dbl		Empty
	25	Sample quality information	Text		Empty

3.3 Field description of S-Message

The instrument uses this message to inform the LIS that it has placed a tube (primary or secondary) with Sample ID xxxx to its output destination rack.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**S**
	02	Sample ID (SID)	Text	✓	Scanned bar code
	03	Secondary Sample ID (SSID)	Text	✓	SSID received from LIS with A-Message **Note:** If nothing was transmitted by A-Message, this field is empty
	04	Laboratory sample ID	Text	✓	Laboratory sample ID received from LIS with A-Message **Note:** If nothing was transmitted by A-Message, this field is empty
	05	Rack ID	Text	✓	ID of the rack on which the tube was placed by the instrument. **Note:** There are two interpretations for the return value: • Without dash(**-**) Value = **XXX** The tube was placed on a normal distribution rack. The value is the number of the rack as defined by instrument set-up • With dash(**-**) Value = **XXX-YYYYYYYY** The tube was placed on an archive rack or MTP serum plate. The value is the number of the rack as defined by instrument set-up and the rack/plate identification (bar code)
	06	Sample position	Text	✓	Position of the sample within the destination rack **Note:** The format depends on settings in 3.3.2 Configuration manager section => Host. Possible formats are: **YYXX, AXX, AYY, PPPP, P** **Note: For detailed information refer to AutoMate 2500 Family Systems**

Message types - **Field description** of S-Message

Vers.	Field No.	Name	Data type	Used by this message type	Comments
					Service Database, Chapter 05. Teaching the System, section Position Formats
	07	De-cap	Tri state bool.		Empty
	08	Sample volume (µl)	Lng	✓	The volume requested by the corresponding A-Message
	09	Amount of secondary tubes requested	Lng	✓	• In case of a primary sample: Amount of secondary tubes requested • In case of secondary sample: Every time zero
	10	Re-cap	Tri state bool.		Empty
	11	Bar code label ID	Lng		Empty
	12	Text 1	Text	✓	The instrument returns the information that has been sent by the corresponding A-Message. **Note:** In case of any error detected: The instrument sends a remark text containing a short error description.
	13	Text 2	Text	✓	The instrument returns the information that has been sent by the corresponding A-Message. **Note:** In case of any error detected: The instrument returns the target workplace ID of the destination workplace.
	14	Text 3	Text	✓	In case that the destination workplace is an archive or clone (MTP) place, the field contains the rack/plate identification (bar code). Else it stays empty.
	15	Text 4	Text		Empty
	16	Text 5	Text		Empty
	17	Text 6	Text		Empty
	18	Comment	Text	✓	In case the error flag in field 19 is 0 this field contains information about the error.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
	19	Error identifier	Lng	✓	Every time **1** In case of an error: **0**
Only version 1	**20**	Cap color ID	Lng	✓	Detected cap color ID
	21	Tube type ID	Lng		Empty
	22	Sample volume (µl)	Lng		Empty
	23	Volume upper edge (mm)	Dbl		Empty
	24	Volume lower edge (mm)	Dbl		Empty
	25	Sample quality information	Text		Empty For future use

3.4 Field overview – O-Message

The LIS has to confirm each S- or W-Message with this O-Message

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**O**
	02	Sample ID (SID)	Text	✓	Scanned bar code from previous Q- or R-Message Note: If the bar code field is empty this is a dummy message from SortingDrive, see 5.6 (Port Scan functionality)
	03				Empty
	04				Empty
	05				Empty
	06				Empty
	07				Empty
	08				Empty
	09				Empty
	10				Empty
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18				Empty
	19				Empty
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty
	24				Empty
	25				Empty

3.5 Field overview – R-Message

The instrument uses this message to inform the LIS that the total ordered volume by its A-Message is higher than the currently measured volume.

According to this R-Message the LIS has to restructure the order to match the available primary tube volume and must send new A-Messages.

Note: This message is only sent if the parameters QueryAfterCamera=No and ReQuery=Yes.
This causes the system to send the Q-Message directly after bar code scan.

Otherwise the Q-Message is sent after tube inspection has been done and the measured volume has already been transmitted with the Q-Message

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**R**
	02	Sample ID (SID)	Text	✓	Scanned bar code
	03	Secondary Sample ID (SSID)	Text	✓	SSID if the value for this field has already been received by previous A-Message. Otherwise empty.
	04	Laboratory sample ID	Text	✓	Laboratory sample ID if the value for this field has already been received by previous A-Message. Otherwise empty.
	05	Rack ID	Lng	✓	Number of primary tube target workplace.
	06	Sample position	Text		Empty
	07	De-cap	Tri state bool.		Empty
	08	Sample volume (µl)	Lng		Empty if volume = 0 else the volume of the sample
	09	Amount of secondary tubes requested	Lng	✓	Amount of secondary tubes requested by previous A-Message
	10	Re-cap	Tri state bool.		Empty
	11	Bar code label ID	Lng		Empty
	12	Label text 1	Text		Empty
	13	Label text 2	Text		Empty

Vers.	Field No.	Name	Data type	Used by this message type	Comments
	14	Label text 3	Text		Empty
	15	Label text 4	Text		Empty
	16	Label text 5	Text		Empty
	17	Label text 6	Text		Empty
	18	Comment	Text		Empty
	19	Sequence counter	Lng	✓	First transmission of message = 0 Second transmission of message = 1 Third transmission of message = 2 …
Only version 1	**20**	Cap color ID	Lng	✓	Detected cap color [ID] **Note:** • Valid color IDs are greater than zero • The value “minus three” (-3) identifies an open tube • 0 => No cap color detection activated
	21	Tube type ID	Lng	✓	Detected tube type [ID] **Note:** • Valid tube type ID's are greater zero
	22	Sample volume (µl)	Lng	✓	Sample volume identified [µl] **Note:** • Valid volume values are greater than zero • The value “minus one” (-1) identifies a volume measure error • 0 => No volume detection activated or installed
	23	Volume upper edge (mm)	Dbl	✓	Detected volume upper edge (mm) **Note:** • Valid values are greater than zero (0.00) • 0.00 => No volume detection activated
	24	Volume lower edge (mm)	Dbl	✓	Detected volume lower edge (mm) **Note:** • Valid values are greater than zero (0.00) • 0.00 => No volume detection activated
	25	Sample quality information	Text		Empty For future use

3.6 Field overview – U-Message

The instrument uses this message to inform the LIS that a bar-coded MTP plate with Bar code nnnn was detected.

The message contains a proposal from the instrument for the next pipetting position.

Note: This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner

Note: If the rack bar code could not be read or a rack was configured but could not be detected, then the sending of this message depends on the parameter Host-SendNoBarForEmptyRack.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
NoBarUsed by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**U**
	02	Rack Code	Text	✓	Scanned bar code of MTP plate
	03	Workplace ID	Lng	✓	ID number of the workplace
	04	Drawer ID	Text	✓	ID of the drawer on which the plate is installed
	05	Rack Position	Lng	✓	Position number of the currently scanned plate. Possible 1 to 6.
	06	Pipette position	Text	✓	Next position to pipette on the current MTP plate (proposal from the instrument) 1 or 0101 means the plate is empty and the instrument will place the next sample into the first position. **Note:** The format depends on settings in 3.3.2 Configuration manager section => Host. Possible formats are: **YYXX, AXX, AYY, PPPP, P** **Note: For detailed information refer to AutoMate 2500 Family Systems Service Database, Chapter 05. Teaching the System, section Position Formats**
	07	Rack Position	Lng	✓	Position number of the currently scanned plate. Possible 1 to 6. **Note:** In earlier versions this field contained the group ID the serum plate belongs to.
	08	Fill direction	Text	✓	This describes the direction in which to fill up the plate. This is set up within the

Vers.	Field No.	Name	Data type	Used by this message type	Comments
					instrument rack wizard. Example: Left-Front = **LF** or Back-Left = **BL** … **Note: For detailed information refer to AutoMate 2500 Family Systems Service Database, Chapter 5 Teaching the System, section Rack parameters – Working direction**
	09	Rack design	Text	✓	What kind of plate is set up Example: Rectangular = **R** Special X = **S** … **Note: For detailed information refer to AutoMate 2500 Family Systems Service Database, Chapter 05. Teaching the System, section Position Formats**
	10				Empty
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18				Empty
	19				Empty
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty
	24				Empty
	25				Empty

3.7 Field overview – T-Message

Reply to U-Message.

The LIS uses this message to tell the instrument whether the currently detected MTP plate is valid and where to continue pipetting.

Note: This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**T**
	02	Rack Code	Text	✓	MTP plate bar code received by previous U-Message
	03	Workplace ID	Lng	✓	Workplace ID number received by previous U-Message
	04	Drawer ID	Text	✓	Drawer ID received by previous U-Message
	05	Rack Position	Lng	✓	Position number received by previous U-Message
	06	Pipette position	Text	✓	The LIS has to calculate the next position where to pipette on this serum plate. 3 or 0103 means the instrument will place the next sample into the third position. **Note:** This value will overwrite the instrument proposal! The format depends on settings in 3.3.2 Configuration manager section => Host. Possible formats are: **YYXX, AXX, AYY, PPPP, P** **Note: For detailed information refer to AutoMate 2500 Family Systems Service Database, Chapter 05. Teaching the System, section Position Formats**
	07	Rack Position	Lng	✓	The Rack Position received by previous U-Message **Note:** In earlier versions this field contained the group ID the serum plate belongs to.
	08	Fill direction	Text	✓	Fill direction received by previous U-Message **Note: For detailed information refer to AutoMate 2500 Family Systems Service Database, Chapter 5 Teaching the System, section Rack parameters – Working direction**
	09	Rack design	Text	✓	Rack design received by previous U-Message

Vers.	Field No.	Name	Data type	Used by this message type	Comments
					Note: For detailed information refer to AutoMate 2500 Family Systems Service Database, Chapter 5 Teaching the System, section Position Formats
	10	Error message	Text	✓	If an error message is placed here, the LIS does not want to accept this plate. The plate will be disabled by the instrument and the text is displayed as tool tip. If the plate is to be accepted, this field must be empty.
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18				Empty
	19				Empty
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty
	24				Empty
	25				Empty

3.8 Field overview – F-Message

The instrument uses this message to tell the LIS that the drawer with MTP plates is closed now.

Note: This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
o t o c	**01**	Message	Text	✓	**F**

Vers.	Field No.	Name	Data type	Used by this message type	Comments
		identifier			
	02				Empty
	03				Empty
	04	Drawer ID	Text	✓	ID of the drawer which was currently closed
	05				Empty
	06				Empty
	07				Empty
	08				Empty
	09				Empty
	10				Empty
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18				Empty
	19				Empty
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty
	24				Empty
	25				Empty

3.9 Field overview – G-Message

Reply to F-Message

The LIS has to confirm that all detected MTP plates are valid and the instrument is allowed to use them now. If not confirmed the MTP drawer will be opened again.

Note: This message is only sent if the instrument is equipped with automatic rack code reader or a manual rack code scanner

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**G**
	02				
	03				
	04	Drawer ID	Text	✓	Drawer ID received by previous F-Message
	05				
	06				
	07				
	08				
	09				
	10	Error message	Text	✓	Error message. If not empty, the drawer will be opened by the system and the text will be displayed as modal message on instruments screen
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18				Empty
	19				Empty
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty
	24				Empty
	25				Empty

3.10 Field overview – W-Message

The instrument uses this message to inform the LIS about the weight increase of the last pipetting action for Sample ID xxxx on MTP plate.

Note: This message is only sent if the instrument is equipped with electronic balance

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**W**
	02	Sample ID (SID)	Text	✓	Scanned bar code
	03	Secondary sample ID (SSID).	Text	✓	SSID received from LIS with A-Message **Note:** If nothing was transmitted by A-Message this field is empty
	04	Rack Code	Text	✓	Scanned bar code of the MTP plate - Message-Message
	05	Sample position	Text	✓	Position of the sample within the destination plate **Note:** The format depends on settings in 3.3.2 Configuration manager section => Host. Possible formats are: **YYXX, AXX, AYY, PPPP, P**
	06	Workplace ID	Lng	✓	Workplace ID of the MTP plate.
	07	Weight, [mg]	Dbl	✓	The weight of the current pipetted serum
	08				Empty
	09				Empty
	10				Empty
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18				Empty
	19				Empty

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty
	24				Empty
	25				Empty

3.11 Field overview – P-Message

The instrument uses this message to inform the LIS about the next pipetting position on the specified MTP plate into which it is going to dispense so that the LIS considers this position as occupied.

Note: This message is sent only if the instrument is equipped with an automatic rack code reader and "prior-to dispense" messages are enabled.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**P**
	02	Sample ID (SID)	Text	✓	Scanned bar code of primary tube
	03	Secondary Sample ID (SSID)	Text	✓	SSID received from LIS with "A" message **Note:** If nothing was transmitted by "A" message, this field is empty
	04	Laboratory sample ID	Text	✓	Laboratory sample ID received from LIS with "A" message **Note:** If nothing was transmitted by "A" message, this field is empty
	05	Rack ID	Text	✓	ID of the MTP rack to which will be dispensed. **Note:** The return value has the format **XXX-YYYYYYYY** The value is the number of the rack as defined by system set-up (XXX = Workplace ID) and the rack/plate identification bar code (YYYYYYYY). Configurable in the Config Manager.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
	06	Sample position	Text	✓	Position of the sample in the destination rack **Note:** The format depends on settings in instrument Possible formats are: **YYXX, AXX, AYY, PPPP, P**
	07				Empty
	08	Sample volume (µl)	Lng	✓	The volume to be filled in the specified position during the current action
	09	The current number of the secondary sample	Lng	✓	The number of the sample to be dispensed in. **Note:** The format is: ***-x*** o 1. aliquot A-Message = -1 o 2. aliquot A-Message = -2 o 3. aliquot A-Message = -3
	10				Empty
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18				Empty
	19	Sequence counter	Lng	✓	First transmission of message = 0 Second transmission of message = 1 Third transmission of message = 2 …
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty
	24				Empty
	25				Empty

3.12 Field overview – C-Message

Reply to P-Message.

The LIS uses this message to tell the instrument whether the announced position in MTP plate is valid and it is allowed or not to dispense into this position.

Note: This message is only sent if the instrument is equipped with an automatic rack code reader and “prior-to dispense” messages are enabled.

Note: If the position to dispense has been rejected by host in field 19 of C-Message, the AutoMate sets the whole job faulty, but doesn't send the new S-Message for the current position.

Vers.	Field No.	Name	Data type	Used by this message type	Comments
Used by host protocol version 0 and 1	**01**	Message identifier	Text	✓	**C**
	02	Sample ID (SID)	Text	✓	Scanned bar code of primary tubebar code-Message
	03				Empty-Message
	04				Empty-Message
	05				Empty-Message
	06				Empty
	07				Empty-Message
	08				Empty-Message
	09				Empty-Message
	10				Empty
	11				Empty
	12				Empty
	13				Empty
	14				Empty
	15				Empty
	16				Empty
	17				Empty
	18	Comment	Text	✓	In case the error flag in field 19 is active (value is 0) this field contains information about the error.
	19	Error identifier	Lng	✓	Default: **1** In case of an error: **0**
Only version 1	**20**				Empty
	21				Empty
	22				Empty
	23				Empty

Vers.	Field No.	Name	Data type	Used by this message type	Comments
	24				Empty
	25				Empty

4 Initialization procedure

4.1 Default initialization procedure

To determine whether the LIS interface is available or not the instrument sends an INIT Q-Message to the LIS. The LIS has to send the same message as an A-Message back to the instrument.

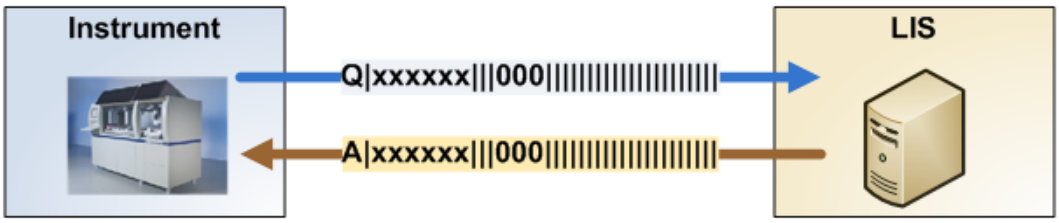


Figure 4: Default initialization procedure

In this case, field 2 always contains the dummy sample ID => **xxxxxx**

This can happen at any time if the user chooses '**Initialize Host**' in the instrument's menu even if another message processing is active. The job belonging to a currently active message is set to faulty.

4.2 Option "Send IP-Address during the initialization procedure"

The instrument can send its local IP address to the LIS. The option is set up in the Configuration Manager → Main Setup → Host.

Select the following parameter: SENDIPWHILEINITIALISATION

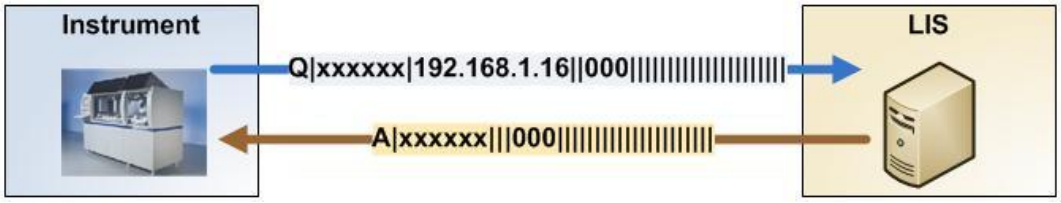


Figure 5: Send IP address during initialization

5 Message processing

There are two possible types of request message processing. The Q-Message for a newly detected sample is sent at different times to the LIS.

- **First type (Query after camera)**

  The configuration parameter QUERYAFTERCAMERA is set to **YES**

  In that case the Q-Message is triggered after the sample has been inspected completely by the instrument's tube inspection unit.

  All information is available: sample **bar code,** input rack (**ID**), **cap color**, **tube type** and measured **volume**.

  Q|08399495|||97|||3478||||||||||0|3|1|3478|65.30|39.10||

- **Second type (Query after bar code read)**

  The configuration parameter QUERYAFTERCAMERA is set to **NO**

  In that case the Q-Message is triggered immediately after the sample bar code has been read.

  Now only the basic information is available: The sample **bar code** and from which input rack (**ID**) the sample was taken.

  Q|08397286|||97||||||||||||0|||||||



If the Second type is used in combination with the instrument's volume detection, the configuration parameter REQUERY must be set to YES.

In that case, if the total amount of ordered volume is higher than the currently measured volume, the instrument will inform the LIS by sending an **R-Message.**

5.1 First type: Query after camera (default)

The Configuration parameter QUERYAFTERCAMERA is set to **YES** and REQUERY is set to **NO**

5.1.1 Primary tube without aliquots

Q-Message is triggered after the sample has been inspected completely by the instrument's tube inspection unit.

Available information within Q-Message:
Sample bar code = 8399487**,** Input rack (ID)=97, Cap color =2, Tube type=4 and Measured volume=3531µl.

The LIS requests the instrument to process the primary tube without any aliquoting. The A-Message tells the instrument that the primary tube with Sample bar code = 8399487 should be **de-capped=1** and placed on output destination 210. The requested volume for this tube should be 520µl.



Figure 6: Primary tube without aliquots

After successfully placing the tube into the rack, the instrument informs the LIS by sending a S-Message that the tube with Sample bar code = 8399487 is placed on output destination 210. The position within the output rack is 0103 (row 1 / column 3).

The LIS confirms the S-Message by sending the O-Message

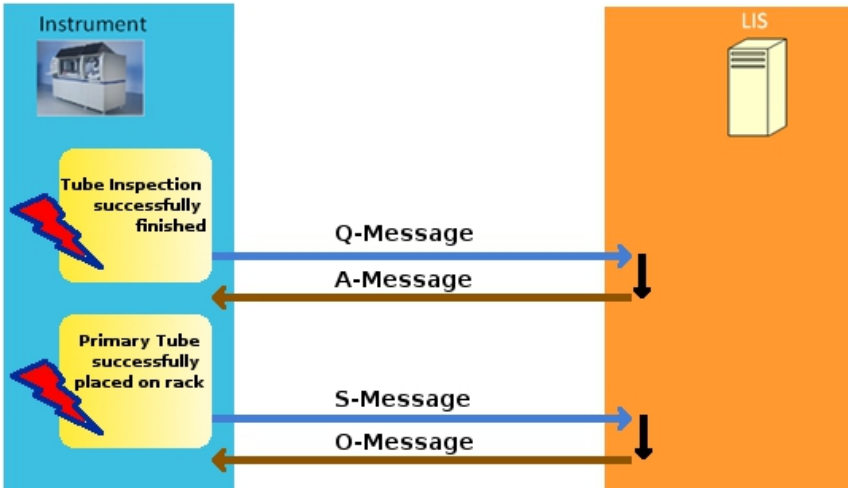


Figure 7: Trigger Diagram: Primary tube without aliquots

5.1.2 Primary tube with two aliquots

Q-Message is triggered after the sample has been inspected completely by the instrument's tube inspection unit.

Available information within Q-Message:
Sample bar code = 8399487**,** Input rack (ID)=97, Cap color =2, Tube type=4 and Measured volume=3531µl.

The LIS requests the instrument to process the primary tube and two additional aliquots. In that case the LIS has to send 3 A-Messages, one for the primary tube and one for each aliquot to be created.

The first A-Message tells the instrument that the primary tube with Sample bar code = 8399487 should be **de-capped=1** and placed on output destination 210. The requested volume for this tube should be 500µl (2070µl). Two additional aliquot A-Messages (2) will follow.

Note: In case of additional aliquots, the primary tube's A-Message must specify the total amount of volume. The primary tube's volume plus all aliquot volumes. In this example: 500µl + 520µl + 1050µl = 2070µl

The second A-Message (-1) requests the first aliquot for output destination 220. The volume to be pipetted is 520µl. The label layout to print the Text1 to Text6 information is 3.

The third A-Message (-2) request second aliquot for output destination 230. The volume to be pipetted is 1050µl. The label layout to print the Text1 to Text6 information is 5.



As long as the instrument has not received ALL order inputs for one sample by the LIS, no new message (Q, R or S) is sent.

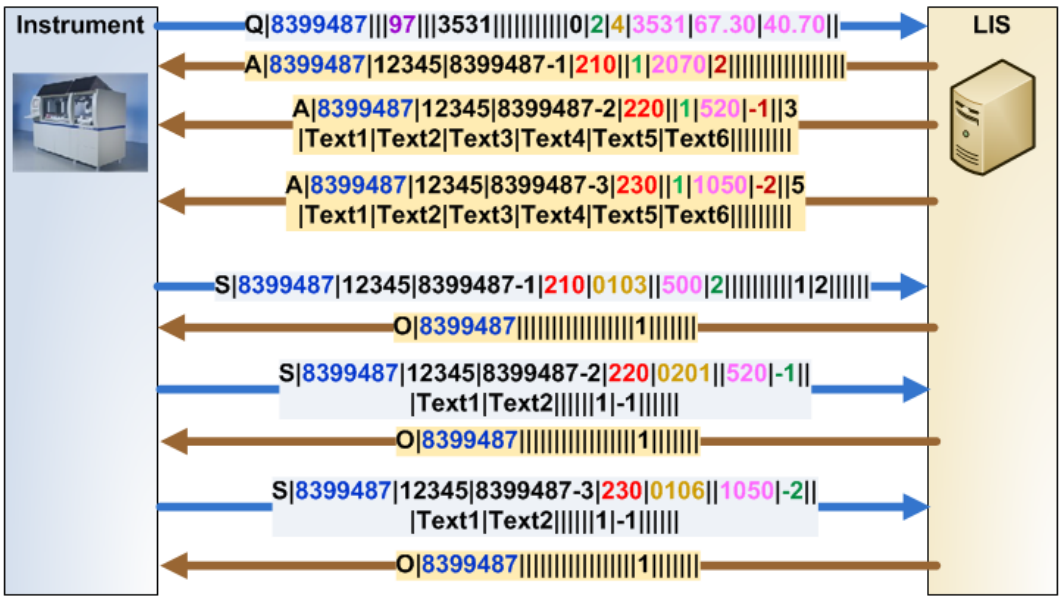


Figure 8: Primary tube with two aliquots

Message processing - **First type**: Query after camera (default)

After successful processing, the instrument informs the LIS by sending an S-Message that the primary tube with Sample bar code = 8399487 is placed on output destination 210. The position within the output rack is 0103 (row 1 / column 3).

The LIS confirms the S-Message by sending the O-Message.

The next S-Message informs the LIS that the first aliquot tube (-1) with Sample bar code = 8399487 was placed on output destination 220. The position within the output rack is 0201 (row 2 / column 1)

The LIS confirms with O-Message.

The last S-Message informs the LIS that the second aliquot tube (-2) with Sample bar code = 8399487 was placed on output destination 230. The position within the output rack is 0106 (row 1 / column 6).

The LIS confirms with O-Message.

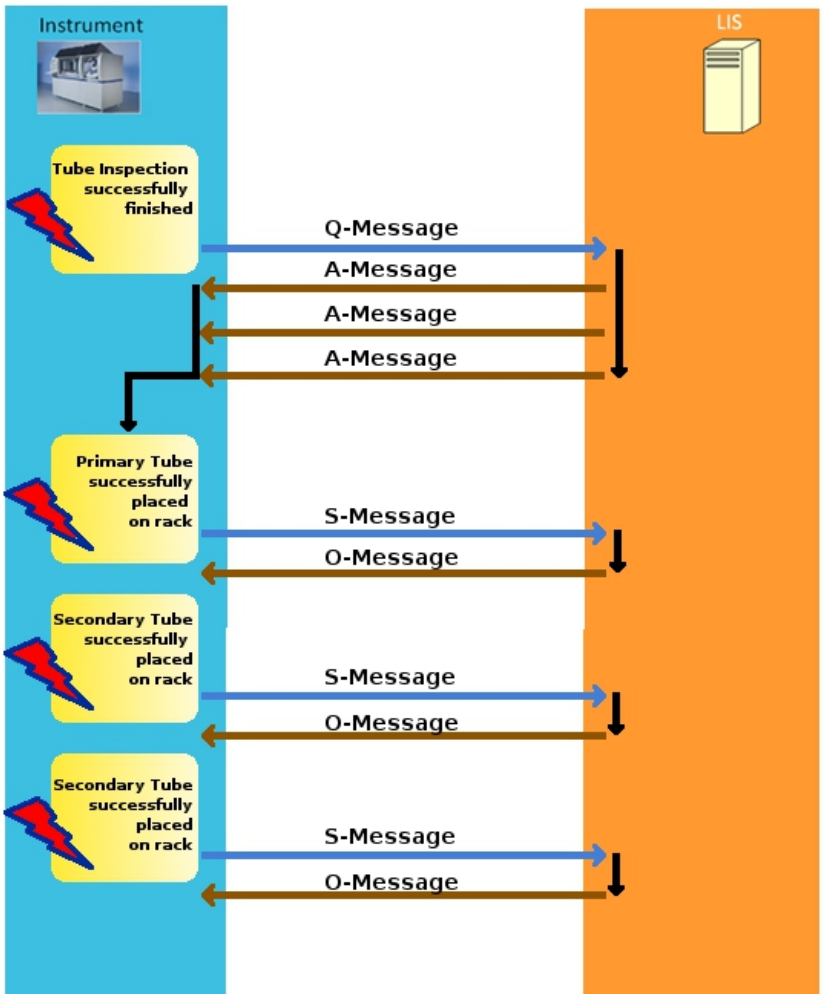


Figure 9: Trigger Diagram: Primary tube with two aliquots

5.2 Second type: Query after bar code read and re-query

The Configuration parameters QUERYAFTERCAMERA is set to **NO** and REQUERY is set to **YES**.

The example is the same than in **5.1.2**. The LIS requests the instrument to process the primary tube and two additional aliquots. The Q-Message is triggered immediately after the sample bar code has been read.

Only the basic information is available: the sample **bar code** and from which input rack (**ID**) the sample was taken. The LIS does not know how much sample volume is available, even not the color- and tube type ID.

The LIS will generate the A-Messages for the primary and the two aliquot tubes. The total amount of volume of the LIS orders is **2070µl** (500µl + 520µl + 1050µl = 2070µl).

After the instrument has received this order the tube moves into the tube inspection unit. Now the volume is measured. The result is **1944µl**. This is less than the ordered **2070µl** and the instrument informs the LIS by sending the R-Message.

The LIS has to correct its order to match the measured volume of **1944µl**. In this example 500µl + 500µl + 944µl = 1944µl

Message processing - **Second type**: Query after bar code read and re-query

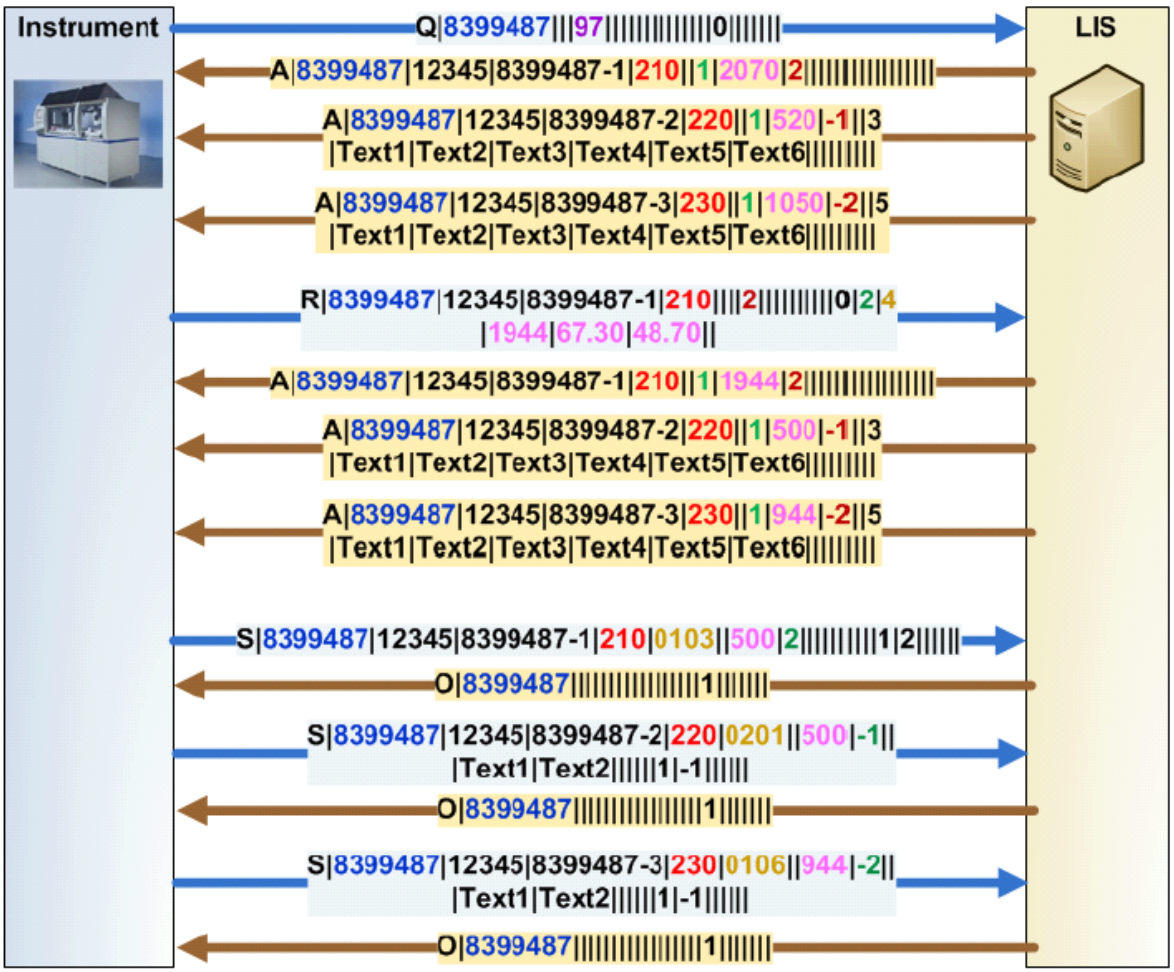


Figure 10: Query after bar code read and re-query

After receiving the **R-Message,** the LIS order can be generated completely new. If the first two aliquots are ordered and the volume is too low, the LIS can only reply with a primary tube order after R-Message.

R-MessageIf there is no response, an error message pops up, indicating that there is a problem with the interface communication.The instrument stops.

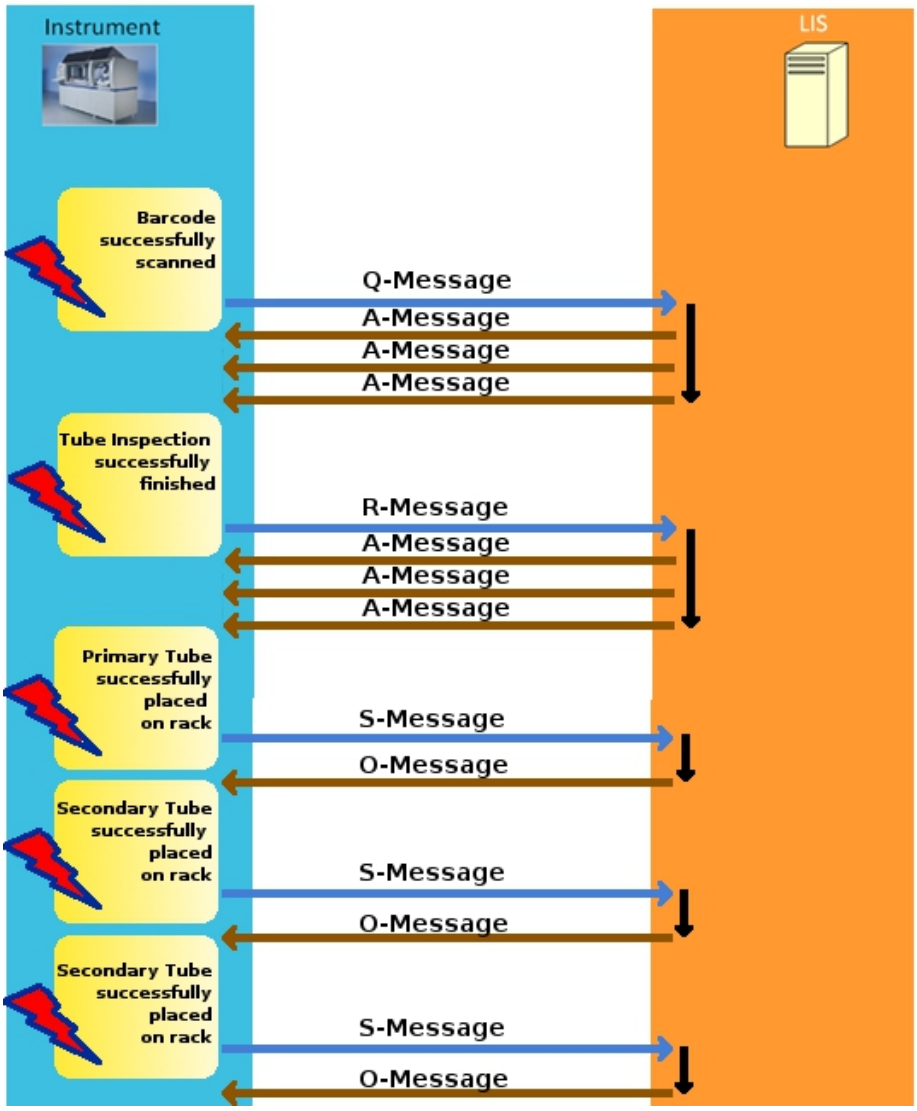


Figure 11: Trigger diagram: Query after bar code read and re-query

5.3 Preparing two aliquots and weighing one clone (Query after camera)

The LIS requests the instrument to process the primary tube, pipette into a serum plate which is installed on an electronic balance (output destination 414) and to process one additional aliquot on output destination 230.

The option weighing is only available, if the balance module is installed on the system.

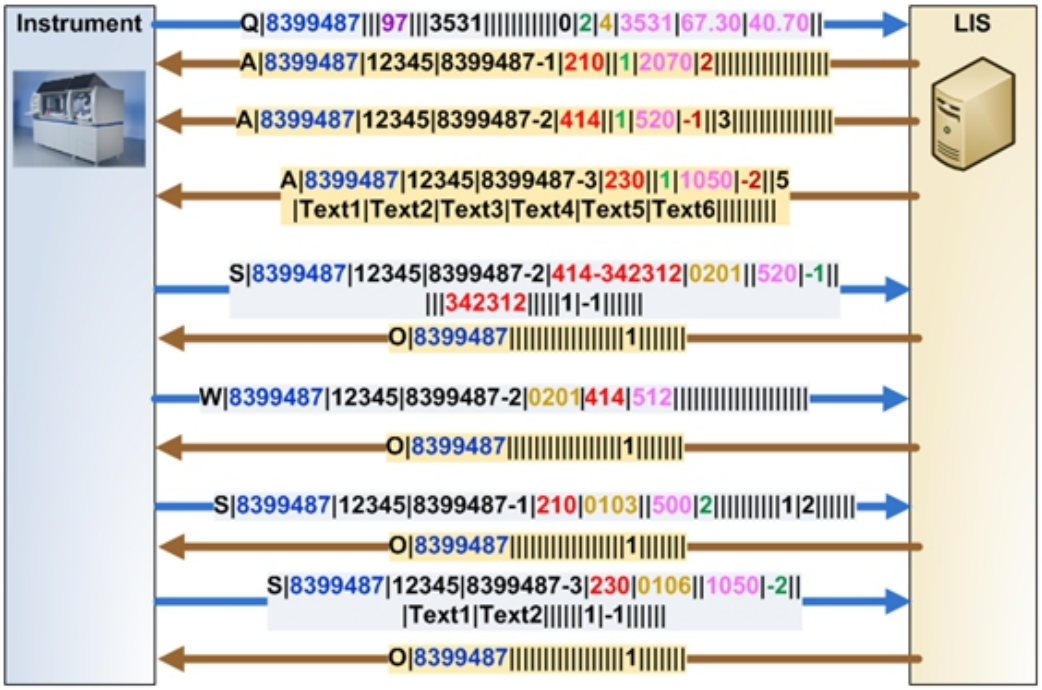


Figure 12: Preparing two aliquots

After the LIS receives the S-Message for the serum plate **414** and confirms with O-Message the W-Message is send out.

This informs the LIS about the weight increase (512 mg) of the last pipetting action for sample bar code (8399487) on output destination (414)

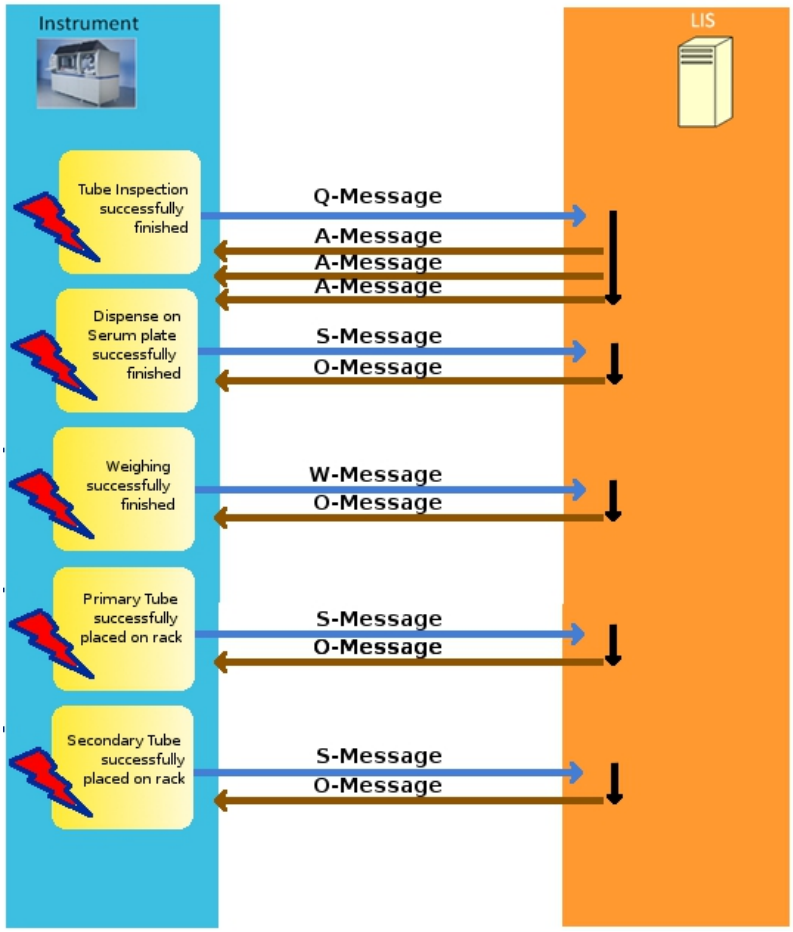


Figure 13: Triggerdiagram: Preparing two aliquots

5.4 Controlling the automatic rack code reader

This message sequence is only used if the instrument is equipped with an automatic rack code reader.

The instrument uses this message sequence to inform the LIS that a bar-coded MTP plate with Bar code (666002) was detected. This happens each time when the user opens and closes the drawer with the installed serum plates.

While closing the drawer, each installed serum plate is scanned and the U-Message is sent out.

The U-Message contains the output destination ID (116), the position (6) on the drawer, a proposal from the instrument for the next pipetting position (0101) and information about the plate design (Fill order=LeftBack, RackType=Rectangular).

If any MTP plate is configured in rack wizard of the instrument, but is absent (or bar code cannot be read) the instrument either sends no message for this rack or sends ‘NOBAR’ as bar code, depending on the parameter SendNoBarForEmptyRack. The output destination is -999 for inactive workplaces.

The LIS has to confirm that the current serum plate is OK by sending the T-Message.

After the drawer has been closed completely, the F-Message is sent. This tells the LIS that the instrument is ready to use the currently scanned serum plates.

The LIS has to confirm that the current set of serum plates is ready to use by sending the G-Message.

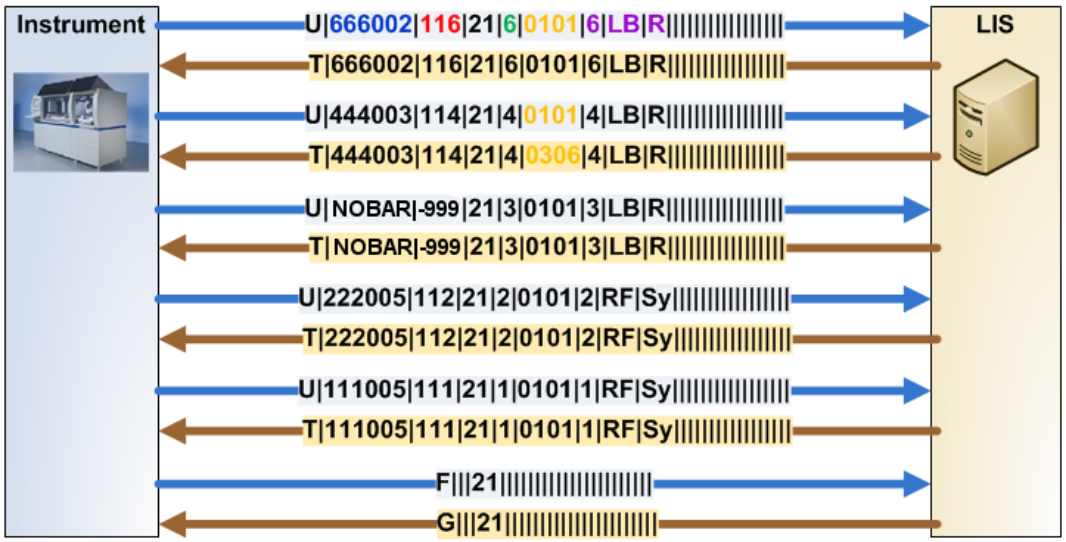


Figure 14: Controlling the automatic rack code reader

In this example, the instrument informs the LIS about four detected MTP plates with bar codes 666002, 444003, 222005 and 111005. The start position proposal is 0101 for each plate. The third plate could not be read or is absent, so 'NOBAR' is sent as bar code (assuming the parameter SendNoBarForEmptyRack is on).

The LIS confirms each U-Message with the T-Message. Using the T-Message, the LIS can change the instrument start position proposal.
An example is given in the graphic above: T-Message for plate bar code 444003 the start position is changed to 0306.

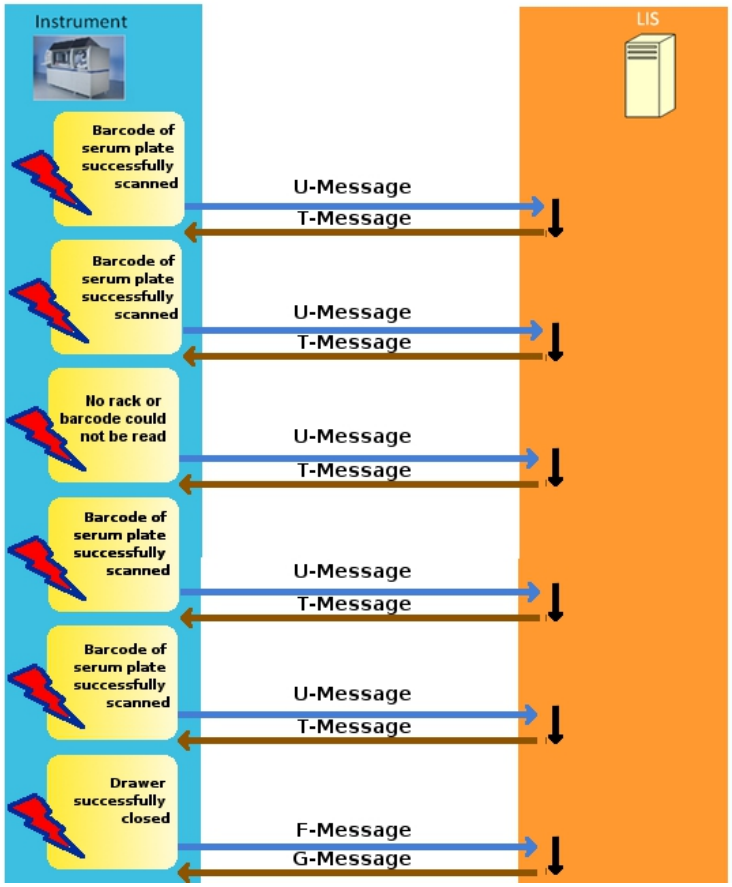


Figure 15: Trigger diagram: Controlling the automatic rack code reader

5.4.1 The LIS does not accept the current serum plate configuration

This example shows how the LIS can reject the current set of MTP plates.

For a single plate, the LIS can transmit an Error Message1 within the T-Message. This will disable the plate and the error message is shown as a tool tip on the instrument GUI.

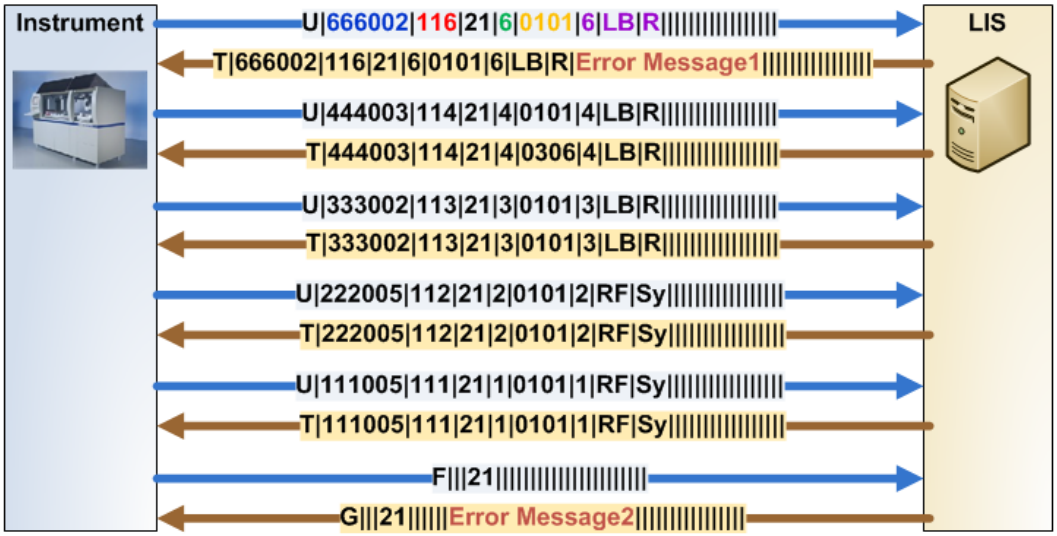


Figure 16: LIS does not accept current serum plate configuration

The LIS can transmit an Error Message2 within the G-Message in order to force the instrument to open the drawer again.

5.5 Dispensing into position on an MTP rack

5.5.1 Instrument is equipped with an automatic rack code

The P-Message is triggered before the Robot is moved to the next dispense position and the communication to the LIS is not in an error state.

Available information within P-Message:

Primary sample bar code = 692, Secondary sample ID = 6922, Target rack ID = 301-MTP_6, Sample position = 0108, Sample volume = 120 µl, Number of the secondary sample = -2, Sequence counter = 0.

The sequence:

The LIS requests the instrument to process the primary tube, one secondary aliquot tube and two MTP aliquots. In that case the LIS has to send 4 A messages, one for the primary tube and one for each aliquot to be created.

The **first A-Message** tells the instrument that the primary tube with Sample bar code = 692 should be de-capped = 1 and placed on output destination rack ID = 100. The total amount of aliquots = 3. The requested volume for this tube should be 440 µl. Three additional aliquot A-Messages (3) will follow.

The second A-Message (-1) requests the first aliquot for output destination rack ID = 102. The secondary sample IDbar code = 6921. The volume to be pipetted is 200µl. The third A-Message (-2) requests second aliquot for output destination rack ID = 301. The secondary sample IDbar code = 6922. The volume to be pipetted is 120µl.

The forth A-Message (-3) requests second aliquot for output destination rack ID = 302. The secondary sample IDbar code = 6923. The volume to be pipetted is 120µl.

When the primary tube is at the pipetting position on the conveyor belt 2, the pump aspirates the A-Messagerequested volume and starts moving to the first MTP position. At this time the P-Message is sent to the LIS indicating the ID of the MTP rack plus the plate ID bar code into which will be dispensed – 301-MTP_6 – and the position – 0108 – on this MTP plate.

The instruments moves the pump to the dispense position and waits for the C-Message with the error identifier = 1 (inactive) from the LIS before it starts to dispense to this position.

As soon as the dispense process to the position is finished an S-Message is sent to the LIS that indicates that the secondary tube (-2) with sample bar code = 692 and secondary sample IDbar code = 6922 was successfully completed on MTP rack ID =301 and plate ID bar code = MTP_6. The position within the output rack is 0108 (row 1 / column 8).

The LIS confirms the S-Message by sending the O-Message.

The instruments sends the pump to the second MTP position as requested in the A-Message -3. Also a P-Message is sent to the LIS to inform it about the next position to be dispensed into.

The LIS confirms with a positive C-Message (error identifier = 1).

The primary and first secondary tube – after dispensing to the secondary tube – are transported further on the conveyor belt.

Message processing - **Dispensing into** position on an MTP rack

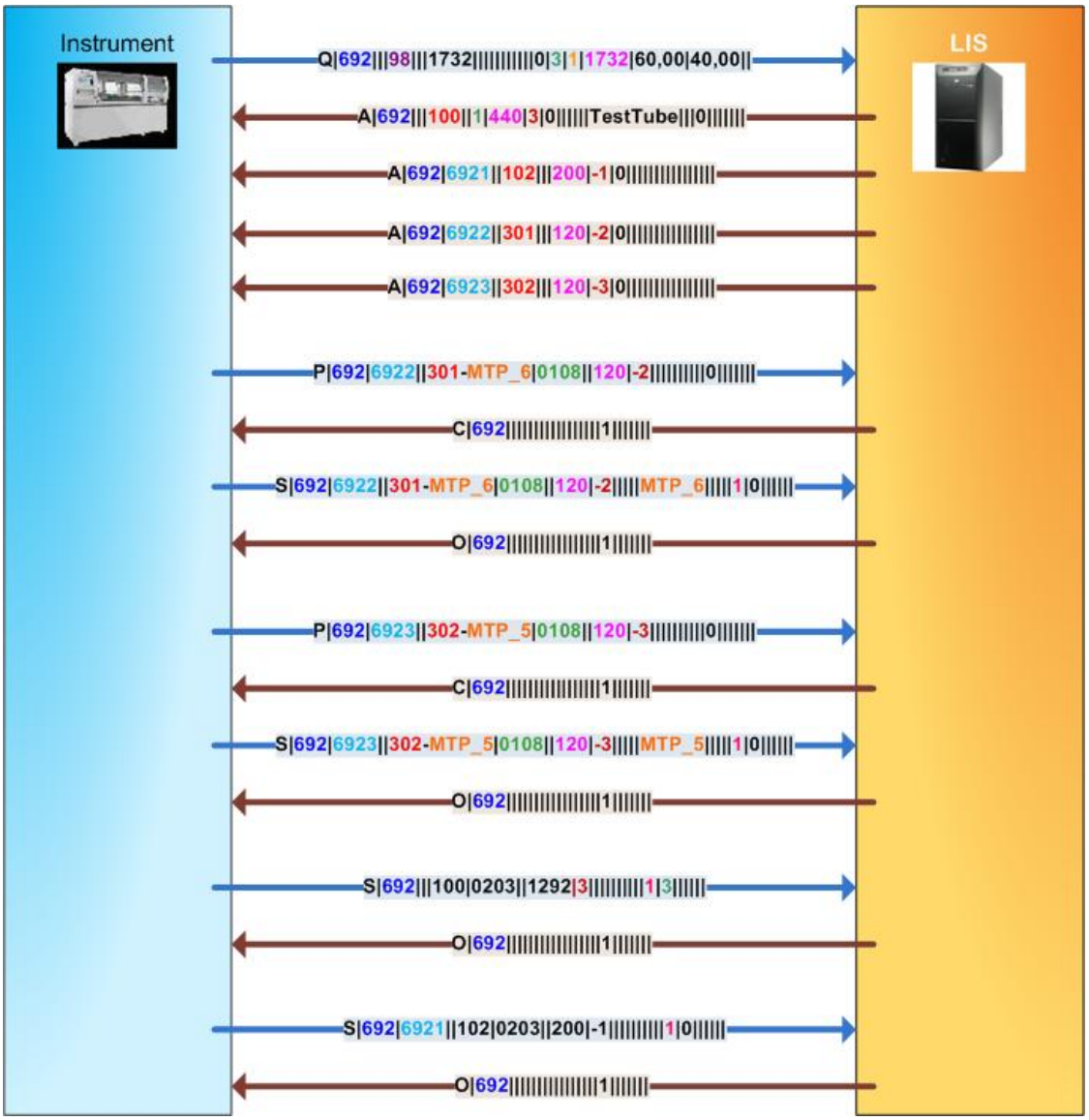


Figure 17: Instrument is equipped with an automatic rack code

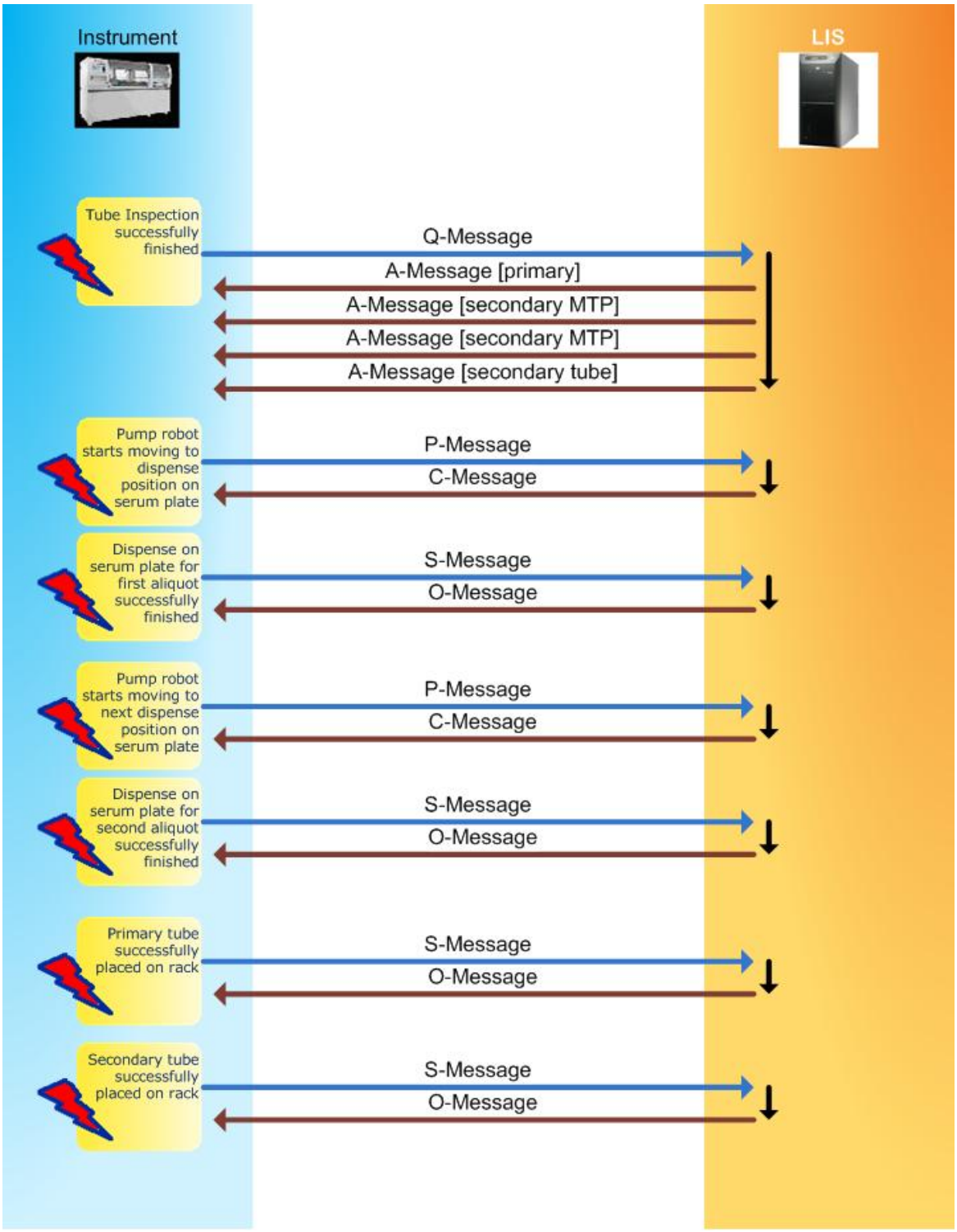


Figure 18: Trigger diagram: Instrument is equipped with an automatic rack code

5.5.1.1 The LIS does not accept the announced position to dispense

The P-Message is triggered before the Robot is sent to the next dispense position and the communication to the LIS is not in an error state.

The C-Message returns with error code in field 19. Field 18 can contain an error message. If the field 18 contains no text, the instrument generates one.

The sequence:

The LIS requests the instrument to process the primary tube, one secondary aliquot tube and two MTP aliquots. In that case the LIS has to send 4 A-Messages, one for the primary tube and one for each aliquot to be created.

The **first A-Message** tells the instrument that the primary tube with Sample bar code = 692 should be de-capped = 1 and placed on output destination rack ID = 510. The total amount of aliquots = 3. The requested volume from this tube should be 300 µl. Three additional aliquot A-Messages (3) will follow.

The second A-Message (-1) requests a second aliquot for output destination rack ID = 520. The secondary sample IDbar code = 6921. The volume to be pipetted is 200µl.

The third A-Message (-2) requests a second aliquot for output destination rack ID = 111. The secondary sample IDbar code = 6922. The volume to be pipetted is 200µl.

The forth A-Message (-3) requests the first aliquot for output destination rack ID = 113. The secondary sample IDbar code = 6923. The volume to be pipetted is 120µl.

When the primary tube is at the pipetting position on conveyor belt 2, the pump aspirates the volume requested in the A-Message and starts moving to the first MTP position. At this time the P-Message is sent to the LIS indicating the ID of the MTP rack plus the plate ID bar code to which will be dispensed – 111-MTP_6 – and the position – 2 (P-Format) – on this MTP plate.

The instruments moves the pump to the dispense position and waits for the C-Message with the error identifier = 1 (inactive) from the LIS before it starts to dispense to this position.

In the meantime the primary tube was successfully placed on its output destination rack (ID=510).

As soon as the dispense process for the MTP aliquot to the position was finished an S-Message is sent to the LIS that indicates that the secondary tube (-2) with sample bar code = 692 and secondary sample IDbar code = 6922 was successfully completed on MTP rack ID =111 and plate ID bar code = MTP_6. The position within the output rack is 2 (P-Format).

The LIS confirms the S-Message by sending the O-Message.

The instrument sends the pump to the second MTP position as requested in the A-Message -3. Also a P-Message is sent to the LIS to inform it about the next position to be dispensed into.

The LIS confirms with a negative C-Message (error identifier = 0) without error text in field 18.

The job is now set faulty. No S-Message will be sent for the current erroneous MTP aliquot.

Because the secondary tube (-1) was not yet placed to its output destination rack, it will be placed into a system error workplace (WP-ID: 0). After it has been successfully placed there an S-Message will be sent.

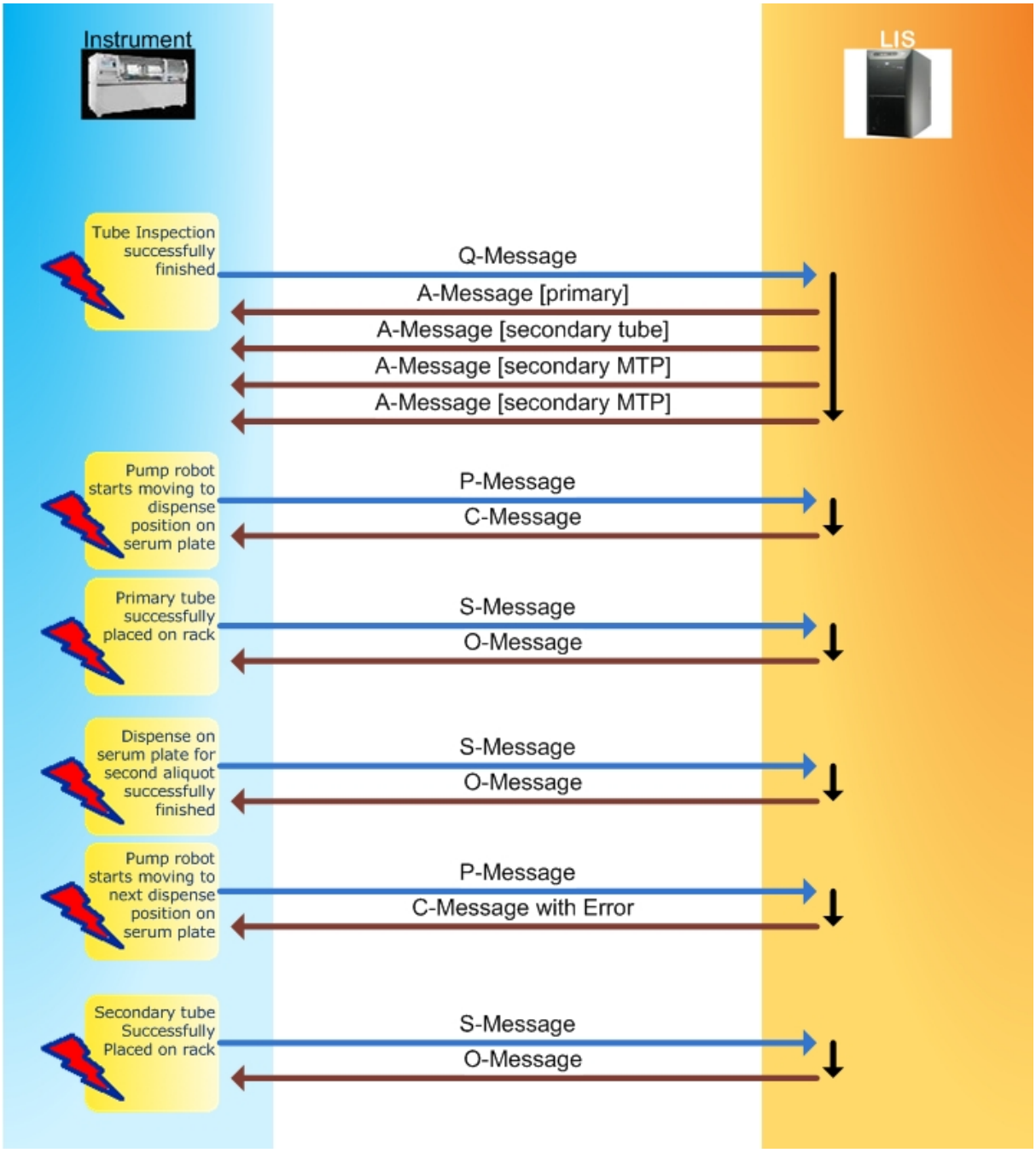


Figure 19: Trigger diagram:The LIS does not accept the announced position to dispense

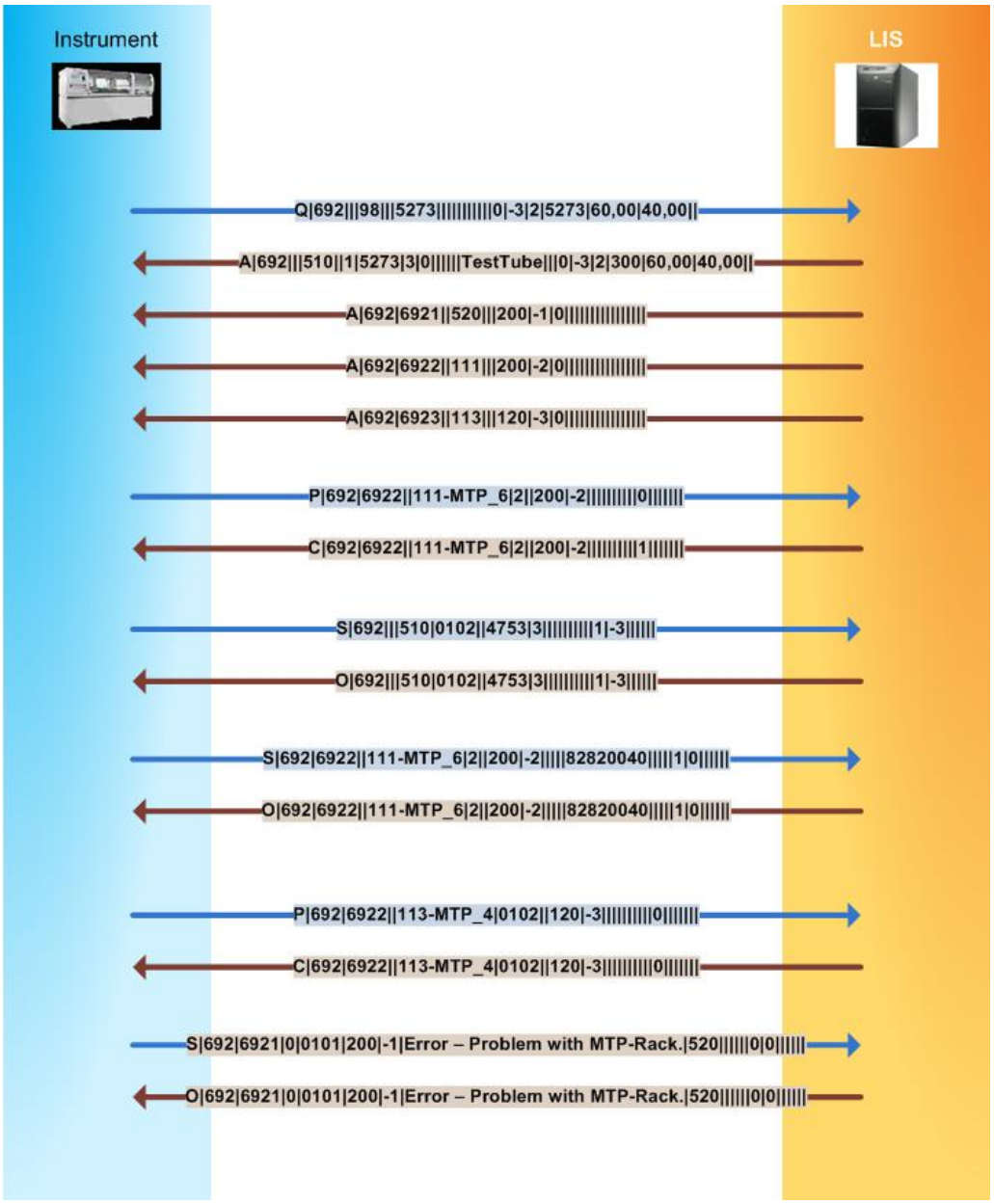


Figure 20: The LIS does not accept the announced position to dispense

5.5.2 Instrument is not equipped with rack code reader

If the instrument is not equipped with a rack code reader, P and C-Messages will not be used.

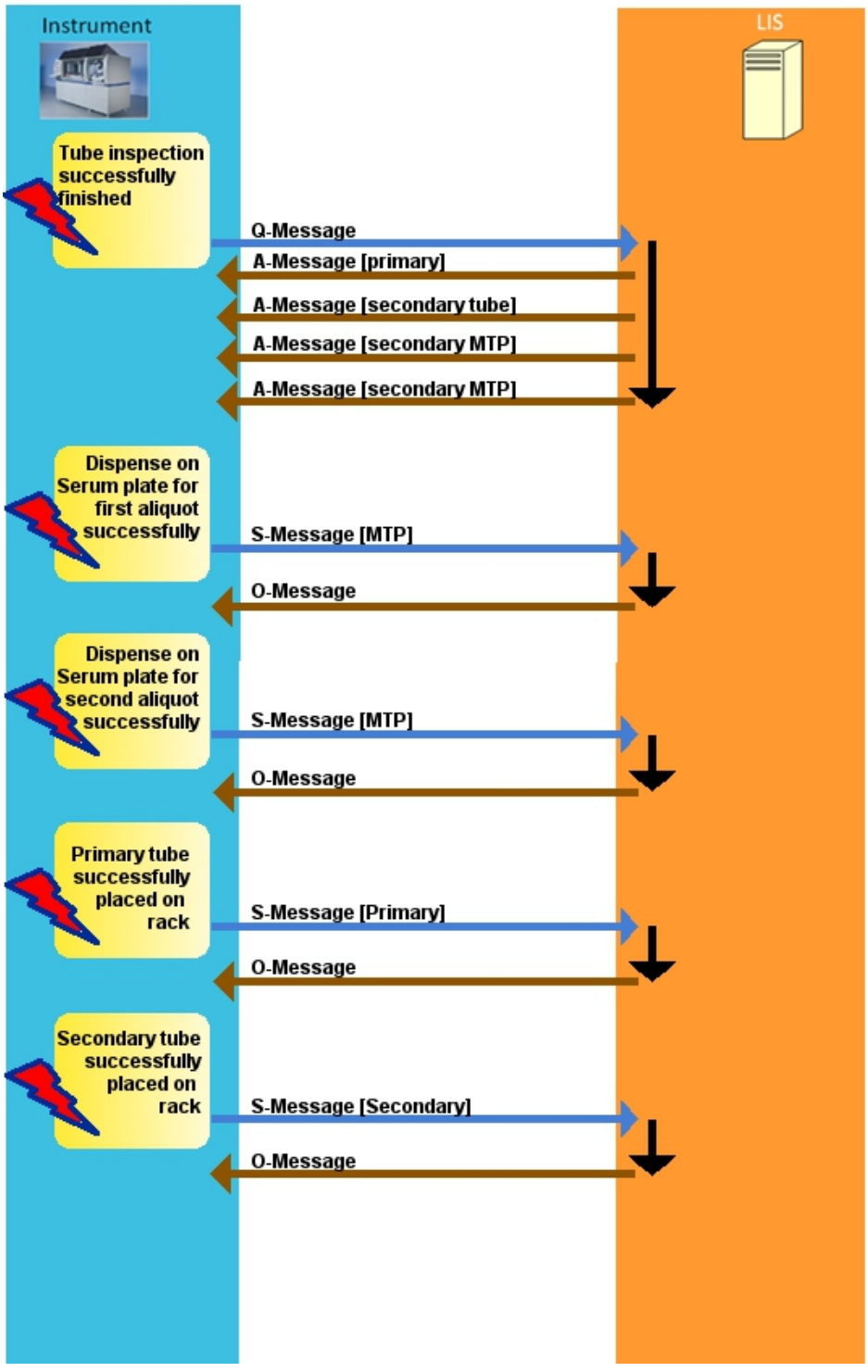


Figure 21: Trigger diagram: Instrument is not equipped with rack code reader



Figure 22: Instrument is not equipped with rack code reader

5.6 Port Scan Functionality

It is possible that the Sorting-Drive sends O-Messages without bar code. These messages are dummy messages just for keeping the network connectivity alive in some networks.

The parameter “PortScan” of the instrument must be set to “Yes” to ignore such messages. If the parameter is set to “No” and an O-Message with empty bar code field comes, an error message will pop up.

The default setting for the parameter “PortScan is “No”.

Appendix A: Workflow examples

A.1 Communication example in ASCI and HEX

Initializing:
Interpreted
16:15:25,527 ANL> <STX>Q|xxxxxx|||000|||||||||||||||||||<CR><LF><ETX>
16:15:25,567 HST> <STX>A|xxxxxx|||000|||||||||||||||||||<CR><LF><ETX>
HEX
16:22:54,252 ANL> 02 51 7C 78 78 78 78 78 78 7C 7C 7C 30 30 30 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 0D 0A 03
16:22:54,292 HST> 02 41 7C 78 78 78 78 78 78 7C 7C 7C 30 30 30 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 0D 0A 03

Create one Aliquot:
Interpreted
16:15:37,344 ANL> <STX>Q|9922003|||97|||||||||||||0|-1|-3|0|0,00|0,00||<CR><LF><ETX>
16:15:37,394 HST> <STX>A|9922003|9922003|992200-3-510|510||1|800|1|||||||||||||||<CR><LF><ETX>
16:15:37,424 HST> <STX>A|9922003|9922003|992200-3-610|610||1|500|-1||2| Name <Unknown> 0 | 610 Bar code No.3 secundary tube |DayNo.: 992200 |PT: (510)Bar code No.3 primary decap |Date: 28.10.2004 16:15:37 | AutoMate |||||||||<CR><LF><ETX>
16:16:12,565 ANL> <STX>S|9922003|9922003|992200-3-510|510|0101|||1|||||||||1||||||<CR><LF><ETX>
16:16:12,605 HST> <STX>O|9922003|||||||||||||||||1||||||<CR><LF><ETX>
16:16:14,407 ANL> <STX>S|9922003|9922003|992200-3-610|610|0101|||-1||| Name <Unknown> 0 | 610 Bar code No.3 secundary tube ||||||1||||||<CR><LF><ETX>
16:16:14,457 HST> <STX>O|9922003|||||||||||||||||1||||||<CR><LF><ETX>
HEX
16:23:05,869 ANL> 02 51 7C 39 39 32 32 30 30 33 7C 7C 7C 39 37 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 30 7C 2D 31 7C 2D 33 7C 30 7C 30 2C 30 30 7C 30 2C 30 30 7C 7C 0D 0A 03
16:23:05,919 HST> 02 41 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 2D 33 2D 35 31 30 7C 35 31 30 7C 7C 31 7C 38 30 30 7C 31 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 0D 0A 03
16:23:05,949 HST> 02 41 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 2D 33 2D 36 31 30 7C 36 31 30 7C 7C 31 7C 35 30 30 7C 2D 31 7C 7C 32 7C 20 4E 61 6D 65 20 3C 55 6E 6B 6E 6F 77 6E 3E 20 30 20 20 7C 20 36 31 30 20 42 61 72 63 6F 64 65 20 4E 6F 2E 33 20 73 65 63 75 6E 64 61 72 79 20 74 75 62 65 20 7C 44 61 79 4E 6F 2E 3A 20 39 39 32 32 30 30 20 7C 50 54 3A 20 28 35 31 30 29 42 61 72 63 6F 64 65 20 4E 6F 2E 33 20 70 72 69 6D 61 72 79 20 64 65 63 61 70 20 7C 44 61 74 65 3A 20 32 38 2E 31 30 2E 32 30 30 34 20 31 36 3A 32 33 3A 30 35 20 7C 20 4F 4C 59 4D 50 55 53 20 4F 4C 41 32 35 30 30 20 7C 7C 7C 7C 7C 7C 7C 7C 7C 0D 0A 03

16:23:36,313 ANL> 02 53 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 2D 33 2D 35 31 30 7C 35 31 30 7C 30 33 30 31 7C 7C 7C 31 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 0D 0A 03
16:23:36,363 HST> 02 4F 7C 39 39 32 32 30 30 33 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 31 7C 7C 7C 7C 7C 7C 7C 0D 0A 03
16:23:37,935 ANL> 02 53 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 33 7C 39 39 32 32 30 30 2D 33 2D 36 31 30 7C 36 31 30 7C 30 33 30 31 7C 7C 7C 2D 31 7C 7C 7C 20 4E 61 6D 65 20 3C 55 6E 6B 6E 6F 77 6E 3E 20 30 20 20 7C 20 36 31 30 20 42 61 72 63 6F 64 65 20 4E 6F 2E 33 20 73 65 63 75 6E 64 61 72 79 20 74 75 62 65 20 7C 7C 7C 7C 7C 7C 7C 31 7C 7C 7C 7C 7C 7C 7C 0D 0A 03
16:23:37,985 HST> 02 4F 7C 39 39 32 32 30 30 33 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 31 7C 7C 7C 7C 7C 7C 7C 0D 0A 03

Sort only a Primary tube:

Interpreted

16:19:16,920 ANL> <STX>Q|9922004|||97|||||||||||||0|-1|-3|0|0,00|0,00||<CR><LF><ETX>
16:19:16,970 HST> <STX>A|9922004|9922004|992200-4-220|220|||300|||||||||||||||||<CR><LF><ETX>

16:19:29,257 ANL> <STX>S|9922004|9922004|992200-4-220|220|0101|||0|||||||||1||||||<CR><LF><ETX>
16:19:29,297 HST> <STX>O|9922004|||||||||||||||||1||||||<CR><LF><ETX>

HEX

16:23:48,070 ANL> 02 51 7C 39 39 32 32 30 30 34 7C 7C 7C 39 37 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 30 7C 2D 31 7C 2D 33 7C 30 7C 30 2C 30 30 7C 30 2C 30 30 7C 7C 0D 0A 03
16:23:48,120 HST> 02 41 7C 39 39 32 32 30 30 34 7C 39 39 32 32 30 30 34 7C 39 39 32 32 30 30 2D 34 2D 32 32 30 7C 32 32 30 7C 7C 7C 33 30 30 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 0D 0A 03

16:23:58,785 ANL> 02 53 7C 39 39 32 32 30 30 34 7C 39 39 32 32 30 30 34 7C 39 39 32 32 30 30 2D 34 2D 32 32 30 7C 32 32 30 7C 30 31 30 33 7C 7C 7C 30 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 31 7C 7C 7C 7C 7C 7C 7C 0D 0A 03
16:23:58,835 HST> 02 4F 7C 39 39 32 32 30 30 34 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 7C 31 7C 7C 7C 7C 7C 7C 7C 0D 0A 03

Appendix B: Details of sample volume processing

B.1 Instrument without Volume Detection Unit

If the instrument is not equipped with an infrared Volume Detection Unit (TIU level 4), field(8) and field(22) (sample volume) in the Q-Message are empty.

B.2 Instrument with Volume Detection Unit

There are some additional parameters influencing the behavior of the instrument's volume calculation. The parameters are located in the tubes-setup.

For each defined cap color the parameters

Parameter	Meaning
CalculateNoVolume	If set to 1, the volume calculation is ignored for this cap color and the Q-Message field(8) and field(22) contains ZERO (0).
IgnoreFuelBottom	If set to 1, the fuel bottom value is ignored during volume calculation. This can be useful for urine or whole blood samples.
HeightOffsetOfVolumeCalc	If set to greater than zero (mm), it will increase the measured fuel bottom value. This is useful to compensate the shape of the sedimented blood cells.

You can find further information on the tubes setup within the instrument Service Guide, Chapter System Management.

B.3 Volume calculation for primary tube A-Message

If the LIS requests the instrument to prepare aliquots or clones, the volume value field(8) within the primary tube A-Message must contain the total volume of the whole tube batch.

Example: The LIS requests 5 aliquots

Q|08399489|||97|||4062||||||||||0|0|1|**4062**|71.30|40.70||

A|08399489|08399489|08399489-001|210||1|**2263**|5|||||||||||||||

A|08399489|08399489|08399489-002|240||1|**250**|-1||2|Name1|240 Immuno 2|08399489|(210) Modular|17.06.2008 14:19:55|Test Labor|||||||||

A|08399489|08399489|08399489-003|270||1|**265**|-2||2|Name1|270 Immulite 2000|08399489|(210) Modular|17.06.2008 14:19:55|Test Labor|||||||||

A|08399489|08399489|08399489-014|370||1|**328**|-3||2|Name1|370 Falcor |08399489|(210) Modular|17.06.2008 14:19:55|Test Labor|||||||||

A|08399489|08399489|08399489-005|450||1|**250**|-4||2|Name1|450 AA Compact Rack|08399489|(210) Modular|17.06.2008 14:19:55|Test Labor|||||||||

A|08399489|08399489|08399489-006|470||1|**650**|-5||2|Name1|470 IS Compact Rack|08399489|(210) Modular|17.06.2008 14:19:55|Test Labor|||||||||

Within the Q-Message the instrument detects a useable volume of 4062µl.

The total volume amount of the 5 aliquot tubes is:

250µl+265µl+328µl+250µl+650µl = **1343µl**

The volume specified within the primary tube A-Message is **2263µl**.

Thus the difference is **2263µl** - **1343µl** = **920µl**. The value of 920µl is the volume for the primary tube used to perform the analysis from this tube.



The volume within the primary tube A-Message must be at least equal to or higher than the total amount of the requested aliquots.

B.4 Create empty labeled secondary tubes

To receive an empty labeled secondary tube the volume within the aliquot A-Message field (8) must be set to ZERO (0).

The parameter AllowZeroTargetVolumeFromHost (see Configuration Manager section => Tubes) will influence the distribution in that case.

AllowZeroTargetVolumeFromHost=Yes will distribute the empty aliquot tube to its requested destination workplace.

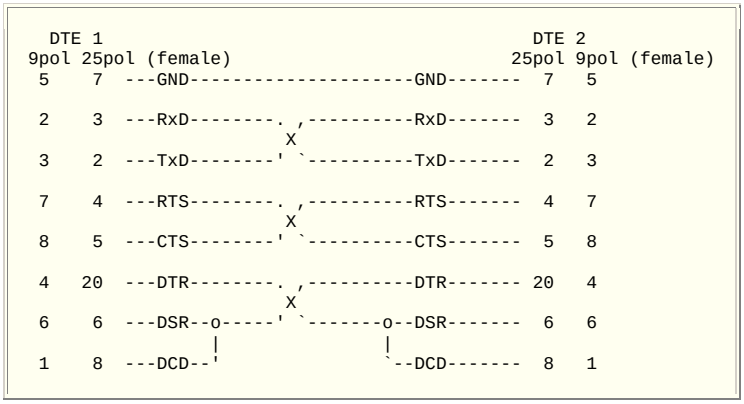
AllowZeroTargetVolumeFromHost=No will distribute the whole tube batch (primary and all aliquots) to an error workplace.

Appendix C: Data types

Data type	Short cut	Comment
String	Text	A variable-length string can contain up to approximately 2 billion (2^{31}) characters. The codes for string characters range from 0-255. The first 128 characters (0-127) of the character set correspond to the letters and symbols on a standard U.S. keyboard. These first 128 characters are the same as those of the ASCII character set. The second 128 characters (128-255) represent special characters, such as letters in international alphabets, accents, currency symbols and fractions. This data type is used for text fields.
Long	Lng	Long (long integer) variables are stored as signed 32-bit (4-byte) numbers ranging in value from **–2,147,483,648** to **2,147,483,647**.
Double	Dbl	Double (double-precision floating point) variables are stored as IEEE 64-bit (8-byte) floating-point numbers ranging in value from **–1.79769313486231E308** to **–4.94065645841247E-324** for negative values, and from **4.94065645841247E-324** **to** **1.79769313486231E308** for positive values.
Three State Boolean	TSB	Empty 1= Yes 0= No

Appendix D: Connecting Null-modem cable

D.1 Connection diagram for Null-Modem cable (9 to 9, 25 to 25)



Pin-Connection and Signals

Signal-Short-Cut	Function Description
PG , DCD	Ground
TxD , SD	Send-Data
RxD	Receive-Data
DTR	Send-Request
CTS	Send-Standby
DSR	Operating-Standby
GND	Ground
DTR	Printer-Standby

Appendix E: Processing camera rejected tubes

The instrument provides the possibility to send a query (Q-Message) or a re-query (R-Message) also for *camera-rejected tubes*. Camera rejected tubes are tubes for which the camera was unable to identify the tube type, cap type or cap color (if cap color detection is active). The instrument **default** setting is to send **no query** or **no re-query** for camera rejected tubes and to distribute such tubes to the system or clone error workplace.

E.1 Activating the feature "Camera rejected tubes"

The feature “Processing camera rejected tubes” is activated by changing the parameter *SendQueryForCameraRejectedTubes* in the configuration manager section “Host” from value “NO” to “YES”.

E.2 Feature description

If the feature is activated, a host query (Q-Message) or a re-query (R-Message) is sent for camera-rejected tubes and the reply (A-Message) is evaluated by the instrument. Otherwise no Q- or R-Message is sent.

E.3 Q- or R-Message (query or re-query)

There are differences between a host (re-)query for tubes which were identified correctly by the camera and camera-rejected tubes. The values of the following fields of a **Q-** or **R-Message** are different for camera rejected tubes:

Field No.	Name	Value / Comments
8	Sample volume (µl)	Empty (for all camera rejected tubes)
20	Cap color ID	0 => • no cap color detection activated **or** • the camera was unable to identify the cap color.
21	Tube type ID	-6 (for all camera rejected tubes and for all tubes in Q messages if “QueryAfterCamera=No”)
22	Sample volume (µl)	0 (for all camera rejected tubes)

Important:

- ❑ The LIS can identify camera rejected tubes by the unique detected tube type ID = -6. However, the cap color ID for camera rejected tubes may have any possible value (>0, 0 or –3).
- ❑ The user is able to identify camera rejected tubes in the graphical user interface by an orange warning color. See the user guide for more information.

E. 4 A-Message (reply to Q- or R-Message)

Camera rejected tubes are missing important tube type and geometry information which is necessary for correct processing in the instrument (e.g. cap type for the Decapper, tube diameters for volume calculation, etc.). Therefore, not all instructions in the A-Message can be processed by the instrument. Some instructions can be ignored by the instrument, others are not allowed.

The following parameters in the configuration manager in section Host → RulesForCameraRejectedTubes define how the instrument processes the instructions for camera rejected tubes:

Parameter	Meaning
SendDecapRequestToError	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” “Yes” = The instrument distributes camera rejected tubes with de-cap instruction to the error workplace. “No” = The instrument ignores the de-cap instruction for camera rejected tubes (Default)
SendRecapRequestToError	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” “Yes” = If the Recapper is active, the instrument distributes camera rejected primary tubes with re-cap instruction to the error workplace. “No” = The instrument ignores the re-cap instruction for camera rejected primary tubes (Default)
SendAliquotRequestToError	The parameter in Config-Manager is Boolean and displayed as ComboBox with two options “Yes/No” “Yes” = The instrument distributes camera rejected primary tubes with aliquot instruction to the error workplace without creating the aliquots (Default) “No” = The instrument allows the creation of empty secondary tubes for camera rejected primary tubes (Default).

The values of the following fields of a **primary** tube **A-Message** are different for camera rejected tubes:

Field No.	Name	Comments
07	De-cap	The instrument cannot de-cap camera-rejected primary tubes. Therefore, de-cap instructions for camera-rejected primary tubes are processed as follows: • If parameter *SendDecapRequestToError* = *YES*: The instrument distributes the tube to the system or clone error workplace. • If parameter *SendDecapRequestToError* = *NO*: The instrument ignores the de-cap instruction and normal

Field No.	Name	Comments
		distribution continues.
09	Amount of secondary tubes requested	The instrument cannot pipette camera rejected primary tubes. Therefore, aliquot instructions are processed as follows: • If parameter *SendAliquotRequestToError* = *YES*: The instrument distributes the primary tube to the system or clone error workplace without creating aliquots. • If parameter *SendAliquotRequestToError* = *NO*: The instrument creates empty secondary tubes if the requested aliquot volume is zero for each secondary tube. The empty secondary tubes are either distributed to the system or clone error workplace or to the target rack requested by the LIS. This depends on the parameter *AllowZeroTargetVolumeFromHost.* See also appendix B.4 for further information.
10	Re-cap	The instrument cannot re-cap camera rejected primary tubes. Therefore, re-cap instructions for camera-rejected primary tubes are processed as follows: • If parameter *SendRecapRequestToError* = *True*: The instrument distributes the tube to the system or clone error work place. • If parameter *SendRecapRequestToError* = *False*: The instrument ignores the re-cap instruction and normal distribution continues

The values of the following fields of an **aliquot** tube **A-Message** are different for camera rejected tubes:

Field No.	Name	Comments
05	Rack ID	For an aliquot A-Message the Rack ID of a MTP rack is not allowed, because the instrument cannot create aliquots for camera rejected primary tubes on MTP plates. If one or more MTP aliquots is requested, the instrument distributes the primary tube to the system or clone error work place without creating any aliquots. This is independent of the parameter *SendAliquotRequestToError.*
08	Sample volume (µl)	For the aliquot tube A-Message of a camera rejected tube, only the volume zero is allowed. If it is not zero, the instrument distributes the primary tube to the system or clone error work place without creating any aliquots. This is independent of the parameter *SendAliquotRequestToError.*

Appendix F: Message and Processing Sequence

Please be aware of the following cases regarding message and processing sequences:

a) When moving several primary tubes from conveyor belt 1 to the output destination racks the instrument can change the processing sequence of the tubes. For instance, tube 2 could be placed to the destination rack before tube 1 although tube 1 was put before tube 2 on to conveyor belt 1 by the robot. That means that the S–message for tube 2 is sent before the S-Message for tube 1.

b) When moving several primary tubes from conveyor belt 1 to conveyor belt 2 the instrument can change the processing sequence of the primary tubes. For instance, the aliquots of primary tube 2 could be created before the aliquots of primary tube 1 although primary tube 1 was put before primary tube 2 on to conveyor belt 1 by the robot. That means that the S-Messages for primary tube 2 and its aliquots are sent before the S-Messages for primary tube 1 and its aliquots.

c) If one job contains both serum plate aliquots and secondary tube aliquots, then the time sequence of the S-Messages can be different from the sequence of the A-Messages because the S-Message of serum plate aliquots is sent already after successful dispense and the S-Message of secondary tubes is sent only after successfully placing the tube on the output rack.

d) When a tube is removed manually from the system by the user and if sending a status for manually removed tubes is active then the S-Message for that tube is sent at the time the tube is removed. That means that the S-Message for this manually removed tube can be sent earlier than the S-Messages of tubes which were put later on to conveyor belt 1 by the robot

Appendix G: Status for manually removed tubes

G.1 Manually removed known tubes

There can be situations in which the user needs to remove a tube physically from the instrument before it has reached its final destination workplace, i.e. while the tube is still in process. The instrument will send a status message (S - type) for this tube only if the parameter *StatusForManuallyRemovedTubes* is set to*YES*. You can disable status messages for manually removed tubes by setting this parameter to *NO*. Be aware that in that case the LIS will not receive any status message for the manually removed tube.

G.2 Manually removed unknown tubes

There is a special situation in which the instrument can detect an unknown tube in the instrument (e.g. tube left in a tube gripper at the time the instrument software is restarted and initialized). If the instrument did not successfully read the bar code after the tube was found then no status message will be sent to the LIS.

If the instrument did successfully read the bar code after the tube was found and if this tube is then manually removed from the instrument before it has reached its final destination workplace then the instrument will send a status message only if both parameters *StatusForManuallyRemovedTubes and StatusForLostAndFoundTubes* are set to *YES*. If no status message shall be sent for unknown tubes, set the parameter *StatusForLostAndFoundTubes* to *NO.*

Be aware that in a status message for unknown tubes that were manually removed only the following fields contain valid information:

Field No.	Name	Value / Comments
02	Sample ID (SID)	Scanned bar code
05	Rack ID	ID of the system error workplace
06	Sample position	Position at which the sample was manually removed
12	Text 1	Remark text containing a short error description.
19	Error identifier	0 (= error)

All other tube information is not available. Please make sure the LIS can handle this status message correctly before setting the parameter *StatusForLostAndFoundTubes* to *YES.*

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Related Documents

AutoMate 2500 Family – Instructions for Use

This document describes how to operate an AutoMate 2500 Family system.

Sorting Drive – Instructions for Use

This document describes how to work with the Sorting Drive software application.

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