Issue number: G9-0009011R01

Online Specifications

Equipment name: APS-3100

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ALOKA Co., Ltd.

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< Precaution in Use >

- Make an item code of aliquot information agree with a code in protocol information.
- Send back an aliquot information with the contents meeting an aliquot information inquiry.
- Please pay attention to the case that a specimen which finished a transmission of aliquot information can be inquired again by the system.
- In a case of trouble occurrence, an aliquot result finished transmission can be transmitted again from this system.

Ⅰ. General Description

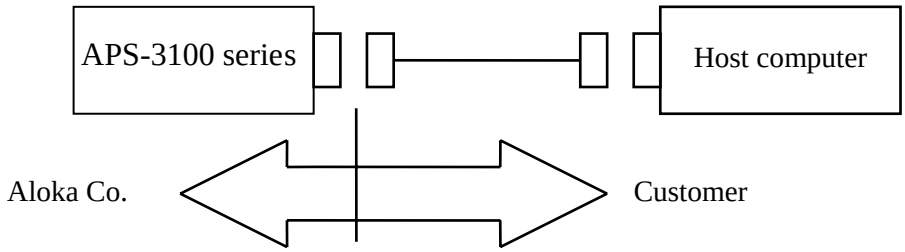
This document describes the general description of online specifications and data contents for the sample preprocessing system "APS-3100 series".

Please refer to contents of this document for the outline and data preparation to make online classification aliquotting. Furthermore, for the communication protocol, please refer to another sheet "APS-3000 Series, External Communication Protocol Instructions" (No. 000614-1).

APS-3100 series makes reading of a barcode label (parent specimen ID) affixed to parent specimen tube and transfer the parent specimen ID (maximum 10 ID) in a rack unit to the host computer. The host computer sends aliquot information of the parent specimen ID to APS-3100 series. APS-3100 series makes aliquotting of specified (aliquotting) volume for a specified aliquotting item based on the aliquotting information from the host computer. Aliquot result information including an aliquotting position and the result is sent back to the host computer by each aliquot processing.

About a label format for a daughter specimen tube which can be made based on the contents described in this specification, please refer to the label format specifications for your customer.

1-1. Connection Schematic Diagram



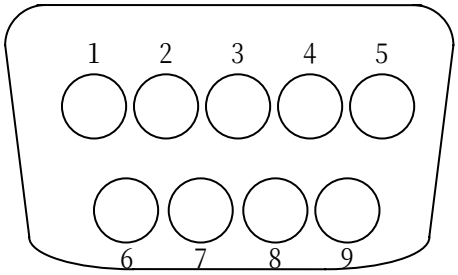
Demarcation point of responsibility/share

1-2. Transmitting Method

（1）Communication method	Asynchronous half-duplex operation （1 start bit/1 stop bit）
（2）Code system	ASCII 7 bit code （nontransparent mode）
（3）Error detection	Vertical Redundancy Check (even) Longitudinal Redundancy Check (even)
（4）Communication speed	9600BPS
（5）Maximum text, Block length	1024 characters （STX, ETB, ETX and BCC are not included.）

1-3. RS-232C Connector

It is similar specifications to a connector for DOS-V PC.

Terminal number	Signal name	Input and output	Pin assignments (APS-3100 series side)
1	DCD	IN	 9-pin D-sub (EIA-RS232C) (male) (Figure of plugging plane)
2	RXD	IN	
3	TXD	OUT	
4	DTR	OUT	
5	SG	—	
6	DSR	IN	
7	RTS	OUT	
8	CTS	IN	
9	RI	NC	

NC: Make no-wiring

Ⅱ. Communication Contents

Ⅱ-1. Information Classification

(1) Protocol information

(2) Protocol reply

(3) Aliquot information inquiry (by one parent specimen rack)

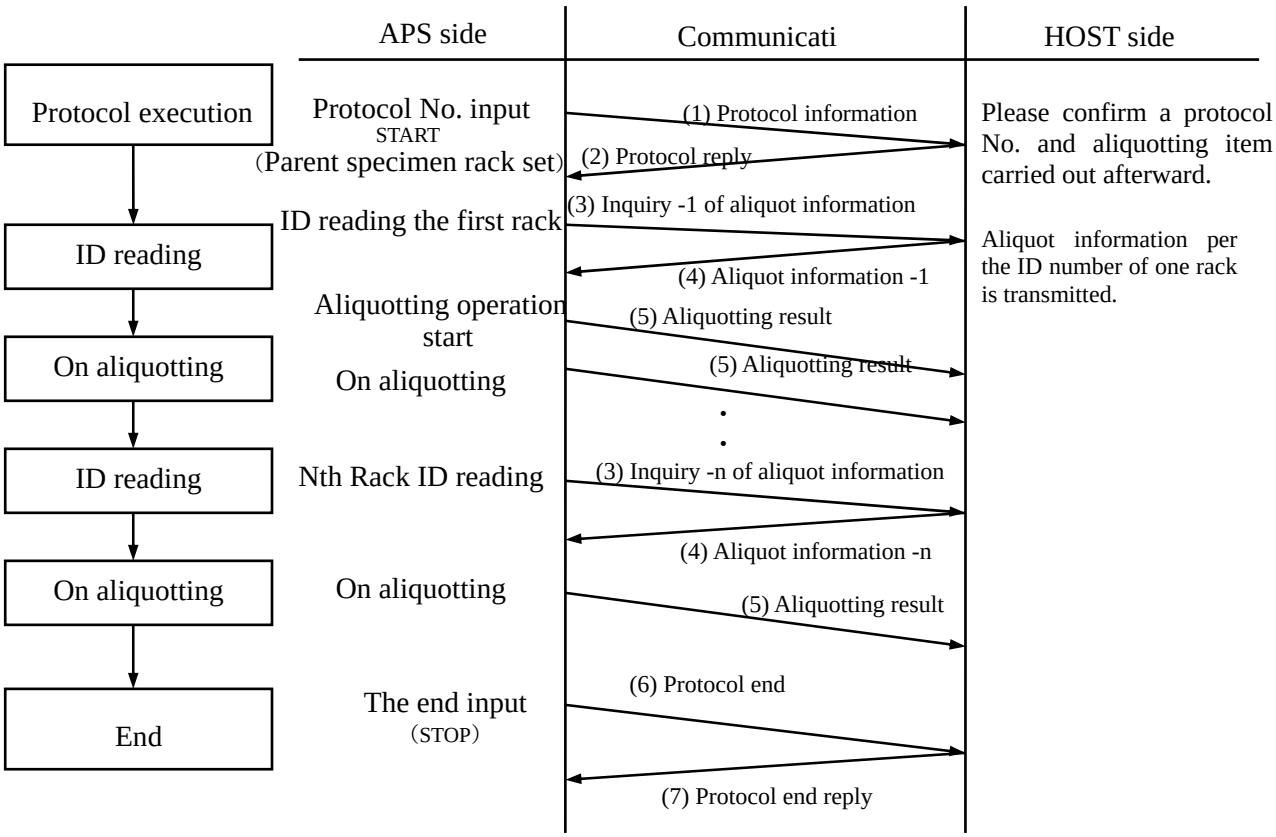
(4) Aliquot information (by one parent specimen rack)

(5) Aliquot result (per one aliquotting is done)

(6) Protocol end

(7) Protocol end reply

Ⅱ-2. Communication Image



* Result information occurs in any timing after receiving of aliquot information.

However, the result information is not output by the aliquotting equipment till the aliquot information is received after the inquiry. Result information is transmitted at every making of one daughter specimen.

Ⅱ-3. Text Configuration

A text header is attached by all means to distinguish a purpose of a sending text or a receiving text.
A text consists of text header and text body.
A text consists of plural data, a separator (comma ",") and a delimiter (CR and LF).

Text header 4	,	Text body n

"Omission" in a data field means that a comma is continued with a blank between commas. When the data noted with "omissible" in a text published by the host computer are omitted, please enter a comma continuously.

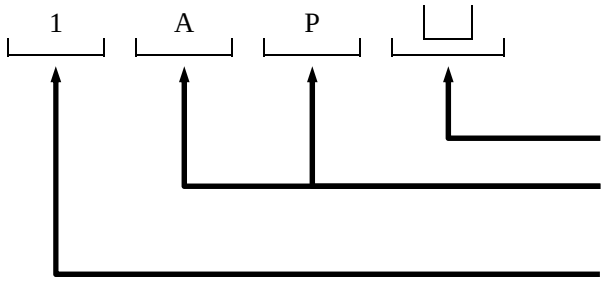
* "Numeric data" in a text are transmitted and received only with significant digits. All parts in which "Character data" is not noted in an explanation are treated as "Numeric data".
* "Numeric data" can be used with a number of 0 to 9.
* When "character data" does not have a note, alpha numeric can be used.
  However, in use as data (parent specimen ID, daughter specimen ID) of the barcode, the letter which does not affect communication in a limit prescribed in the used barcode can be used.
  Please refer to Aloka in detail.

(Example) Aliquotting item code,

0012: . . . , 12, . . .
0003: . . . , 3, . . .

3-1. Text Header

A text header consists of a combination of four digits of alphanumeric characters.
(Character data)



Space fixing, Spare

Communication direction, Combination of text classification (Based on table of combination. Direction to the first column.)

ChNo., Registration equipment number (1-9)

␣ Space (20H)

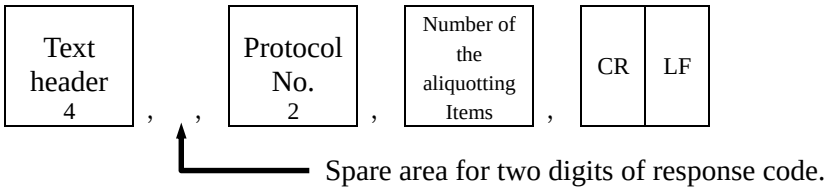
3-2. Communication direction, Combination of text classification

(Table 1)

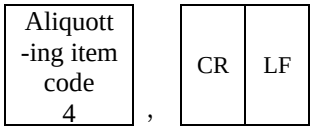
Communication direction code / Text Classification code	APS→HOST COMPUTER 'A' fixed	HOST COMPUTER→APS 'H' fixed	Remarks
P	(1) Protocol information		
O		(2) Protocol reply	
Q	(3) Aliquotting information inquiry		
I		(4) Aliquotting information	
R	(5) Aliquotting result		
E	(6) Protocol end		
F		(7) Protocol end reply	

Ⅱ-4. Protocol Information

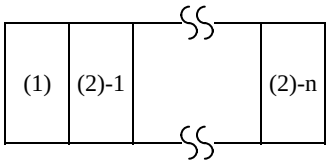
(1)



(2)



4-1. Transmission Image



n≦120, n is number of aliquotting items

4-2. Text

・Text header (an example) 1 A P ␣

・Protocol No. 1～10

・Number of aliquotting items 1～120

・Aliquotting item code 1～9999

Ⅱ-5. Protocol Reply

(1)

Text header 4	,	Reply code 2	,	Protocol No. 2	,	Aliquotting 3	,	CR	LF

(2)

Message Maximum 64	,	CR	LF

* When a reply code for (2) is normal, omission is possible.

5-1. Transmission Image

(1)	(2)

* When a reply code for (2) is normal, omission is possible.

5-2. Text

・Text header (an example) 1 H O ␣

・Reply code "00" or "ZZ", Please refer to table -2. (Character data)

・Protocol No. 1～10 (Please just return a transmitted text.)

・Number of aliquotting items 1～120（Please just return a transmitted text.）

・Message Alphanumeric character, maximum 64 digits.
Omissible (character data)
When a reply code is normal, the message screen is not displayed.
When a reply code is abnormal, the message screen is displayed.
When a message is omitted, the message part on the message screen is displayed in a blank.

Ⅱ-6. Aliquotting Information Inquiry

Aliquotting information inquiry is transmitted to the host computer every one parent specimen rack.

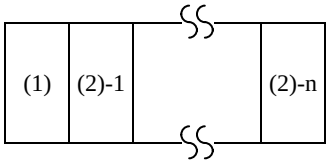
(1)

Text header 4	,	Parent specimen Rack ID 10	,	Parent specimen Rack No. 4	,	Inquiry Number of parent specimen ID 2	,	CR	LF

(2)

Hole SEQ in a parent specimen rack No. 2	,	Parent specimen SEQ 5	,	Parent specimen ID 16	,	CR	LF

6-1. Transmission Image



n≦10, n is parent specimen ID number for inquiry.

6-2. Text

・Text header (an example) 1 A Q ␣

・Parent specimen rack ID — Read out parent specimen rack ID (character data). 0-10 digits
ID is based on a code and a number of digits in the used barcode and a specification of label dimensions. When a reading function for parent specimen rack ID is not used, it is omitted.

・Parent specimen rack No. — SEQ No. of a parent specimen rack. 1～9999

・Number of inquiry ID — Parent specimen ID number for inquiry.
Empty rack without a parent specimen is appointed with zero.

・Hole SEQ in a parent specimen rack No. — The hole number in the rack which a parent specimen is placed is shown. 1～10
When there is the same ID more than two, the first is reference.

・Parent specimen SEQ — SEQ No. of the equipment for parent specimen ID. 1～65535
When there is the same ID more than two parent specimens, a SEQ number after the second parent specimen counts up. Only the first parent specimen is reported to the host computer, and a SEQ number after the second parent specimen is not reported.

・Parent specimen ID — ID (character data) of maximum 16 digits. ID is based on a code, a number of digits of the used barcode and the specification of label dimensions.

Note 1) A unit to recognize the same parent specimen ID as the same parent specimen is a parent specimen rack unit. Because the aliquotting objects are up to three same parent specimens, do not set more than four same IDs. For parent specimens more than four, only parent specimen SEQ counts up.

Note 2) In the case of the reference prohibition setting (prohibition to the same parent specimen ID in a rack), an error occurs at the reading time of the parent specimen barcode, and the parent specimen rack is removed. Set the parent specimens again so that there is not redundancy ID to the same parent specimens, and supply the parent specimens from the supply unit again. In other words, do not set the same parent specimen ID on a rack.

Note 3) When there is the same ID, an inquiry of the same ID may be performed more than twice to the host computer.
Make the processing for a redundancy inquiry of the same ID in the host computer side.

Ⅱ-7. Aliquotting Information

(1)

Text header 4	,	Reply code 2	,	Parent specimen rack No. 4	,	Number of ID for inquired parent specimen. 2	,	CR	LF

In the case of reply code 00 (normal),

(2)

Hole SEQ in a parent specimen rack No. 2	,	Parent specimen SEQ 5	,	Parent specimen ID 16	,	Code of blood collection tube 2	,	Spare 2	,	Parent specimen comment 16 Label printing data +α	,	Number of aliquotting items 2	,	CR	LF

(3)

Aliquotting item code 4	,	Processing code 2	,	Aliquotting volume	,	Daughter specimen ID 16	,	Daughter specimen comment 16 Label printing data +α	,	CR	LF

Reply code is a case other than 00 (normal),

(2)

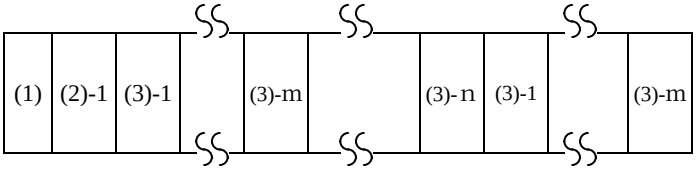
Message Maximum 64	,	CR	LF

* When a reply code for (2) is normal, omission is possible.

Note: Parent specimen comment, (1) Parent specimen comment "16 characters data, and (2) Label printing data "Printing data consists of a maximum 15 field".

7-1. Transmission Image

In the case of reply code 00 (normal),



n≦10, n is the number of ID for inquired parent specimen.
m ≦ 30, m is an aliquotting item number.

Reply code is a case other than 00 (normal)

(1)	(2)

* When a reply code for (2) is normal, omission is possible.

7-2. Text

・Text header (an example) 1 H I ␣

・Reply code "00" or "ZZ", Please refer to table -2. (character data)

・Message Alphanumeric character, maximum 64 digits. Omissible (character data)
When a reply code is normal, a message screen is not displayed. When a reply code is abnormal, a message screen is displayed. When a message is omitted, the message part on the message screen is displayed in a blank.

Continues to the next page

・Parent specimen rack No.	SEQ No. of parent specimen rack. 1～9999 (* Please just send back the data which transmitted.)
・Number of inquiry ID	Number of ID for inquired parent specimens. 0～10 (* Please just send back the data which transmitted.)
・Hole SEQ in a parent specimen rack No.	The hole number in the rack which a parent specimen is placed is shown. 1～10 (* Please just send back the data which transmitted.)
・Parent specimen SEQ	SEQ No. of parent specimen ID 1～65535 (* Please just send back the data which transmitted.)
・Parent specimen ID	* Please just send back the data which transmitted. (character data)
・Code of blood collection tube	Classification code of parent specimen tube. Please refer to table -3. Please decide two digits corresponding to the alphanumeric character previously. Omissible (character data)
・Spare	Two digits, Omissible
・Parent specimen comment	Setting for a patient name of parent specimen is possible. Omissible 16 characters of alphanumeric. (character data). Refer to other documents about usable letters. Use for only printing of a result (printer output).
Label printing data	Label printing data Attach the label printing data corresponding to comment field of the label condition data to the parent specimen comment, and transmit it from the host computer. Label printing data consist of in several fields. (1) Transmission to a maximum 15 field (No.1-No.15) is possible. Note 2 15x17 =255 bytes However, a field and bytes that can be printed really depend on registration contents of label printing data. (2) One field has the following configuration. TAB (0x09) + printing data (0-16 bytes) ・Field No. is recognized with the number of TAB. The first TAB becomes the first comment field in a label condition data. [TAB]1xx[TAB]2xxx[TAB]3xx…[TAB]15 ・TAB can be omitted. However, TAB is needed when a field is disregarded. For example, it is the case that the field No. 2 is disregarded and the field No. 3 is printed. [TAB]xxxxx[TAB][TAB]xxxxxxxx ・Printing data can be omitted. ・Printing data is not saved as an aliquotting result. ・The printing data which is not registered with label condition data is not printed to a label. Delete an error without outputting.
・The number of the aliquotting items	0-30 (Please set zero for a specimen without request of aliquotting and label affixing, and omit the items after (3) -1.)

Continues to the next page.

Note 2: About a field number, refer to the label format specification.

・Aliquotting item code	Number 1-9999.
・Processing code	Setting the aliquotting for a daughter specimen unit only and the label affixing only are possible. Please refer to table -4. Omissible (character data)
・Aliquotting volume	Number 0-9999. Unit μl When it is omitted, the volume is specified to APS setting aliquotting volume (fixed volume on every item).
・Daughter specimen ID	Setting when ID is printed for result printing and label printing. Omissible 16 characters of alphanumeric. (character data). It is limited with label size and code.
・Daughter specimen comment	Set a comment of daughter specimen. Omissible 16 characters of alphanumeric. (character data). It is used for label printing. Refer to other documents about usable letters. It is used for labeler printing.
Label printing data	Label printing data Attach the label printing data corresponding to comment field of the label condition data to the parent specimen comment, and transmit it from the host computer. Label printing data consist of in several fields. (1) Transmission to a maximum 5 field (No.16-No.20) is possible. Note 2 5x17 =105 bytes However, a field and bytes that can be printed really depend on registration contents of label printing data. (2) One Field is the following configuration. TAB (0x09) + printing data (0-16 bytes) ・Field No. is recognized with the number of TAB. The first TAB becomes the 16th in a comment field of label condition data. [TAB]16xx[TAB]17xxx[TAB]18xx[TAB]19xx[TAB]20xx ・TAB can be omitted. However, TAB is needed when a field is disregarded. For example, the case when field No.17 is disregarded and field No.18 is printed is, [TAB]xxxxx[TAB][TAB]xxxxxxxx ・Printing data can be omitted. 2 bytes unit. Note 3. ・Printing data are not saved as an aliquotting result. ・The printing data which is not registered with label condition data is not printed to a label. Delete an error without outputting.

Continues to the next page.

Note 2: About a field number, refer to the label format specification.

*: When the transmitted content is different, an error is output by the aliquotting equipment, and re-transmission or removal of the rack is performed.

Note 1) In protocol information, do not include an aliquotting item other than an aliquotting item code sent to a host computer into the aliquotting information. When an aliquotting item other than an aliquotting item code was included, it is not an error, however, the item data is not entered at the receiving of aliquotting information. Therefore, a daughter specimen is not supplied, and a result is not sent back to a host computer (a no-aliquotting result is not sent back, too). Printing/display is not performed at all, too.

Note 2) About barcode label printing.

In aliquotting information from a host computer, the data that can be used for barcode label printing are three kinds of the following.

(1) Label printing data (printed as comment) in a parent specimen comment.

(2) Label printing data (it is printed as comment) in daughter specimen comment
(3) Daughter specimen ID (printed as the barcode)

They are printed by barcode labeler as the barcode and comment specified by registration contents of assay label condition data which is used with this equipment, and then they are affixed on a assay tube.

In addition, the label printing for an item using the daughter specimen transportation line is not performed.

When these data are printed as the barcode, there is a limit in a printing digit/printable character with a code to use. Please inquire Aloka in detail.

Ⅱ-8. Aliquotting Result (one aliquotting unit)

An aliquotting result is transmitted by every one aliquotting end.

(1) Text header 4 , , Parent specimen rack No. 4 , Parent specimen rack ID 10 , CR LF

(2) Hole SEQ in a parent specimen rack No. 2 , Parent speci-men SEQ , Parent speci-men ID 16 , , CR LF

(3) Aliquotting item code 4 , Aliquotting volume 4 , Daughter specimen ID 16 , Daughter specimen comment 16 , Daughter specimen rack ID 10 , Daughter specimen rack No. 5 , Hole SEQ in daughter specimen rack No. 3 , Daughter specimen SEQ 5 , Result 2 , CR LF

8-1. Transmission image

(1)	(2)	(3)

8-2. Text

・Text header (an example) 1 A R ␣

・Parent specimen rack No. SEQ No. of parent specimen rack. 1～9999

・Parent specimen rack ID ID read with this equipment is set. When the rack ID reading function is not used, ID is omitted. (character data)

・Hole SEQ in a parent specimen rack No. The hole number in the rack which a parent specimen is placed is shown. 1～10

・Parent specimen SEQ SEQ No. of parent specimen ID. 1～65535

・Parent specimen ID ID of maximum 16 digits. ID is based on a code and a number of digits of the used barcode and a specification of label dimensions. (character data)

Continues to the next page.

・Aliquotting item code	Number 1-9999.
・Aliquotting volume	Number 0-9999. Unit is μl. Aliquotting volume requested by the host computer or aliquotting volume set on the aliquotting equipment is sent back.
・Daughter specimen ID	When a daughter specimen ID was affixed on a label, the ID is sent back. In other case, ID is omitted. (character data)
・Daughter specimen rack ID	Because the reading function of daughter specimen rack ID is an exclusive use function for two-nozzle aliquotting unit, the daughter specimen rack ID is sent back as the aliquotting result which is aliquotted by two-nozzle aliquotting unit. In the case of others, ID is omitted. (character data)
・Daughter specimen comment	16 characters of alphanumeric. (character data) Received data is sent back by the host computer.。 Printing data for labels is not sent back.
・Daughter specimen rack No.	SEQ No. of a daughter specimen rack. 1～65535
・Hole SEQ in a daughter specimen rack	The hole number in the rack which a daughter specimen is placed is shown. 1～200
・Daughter specimen SEQ	Daughter specimen SEQ No. of each item. 1～65535
・Result	（two digits）Please refer to table -5 and table -6. (character data)

Note 1) An aliquotting result of a daughter specimen blank is transmitted after setting of daughter specimen rack No, hole SEQ in a daughter specimen rack, daughter specimen SEQ and a result. Daughter specimen rack ID is set for an item aliquotted by two-nozzle aliquotting unit. Because the each value for a parent specimen information (rack NO, rack ID, hole SEQ, SEQ, ID), a daughter specimen ID and a daughter specimen comment is not fixed, these values are omitted.

Note 2) The timing that sends back a host computer an aliquotting result becomes after that an aliquotting information corresponding to an aliquotting result was received by the host computer. In addition, each aliquotting result is sent back to the host computer in occurrence order. They are not sent back in order of parent specimen SEQ and daughter specimen SEQ.

Ⅱ-9. Protocol End

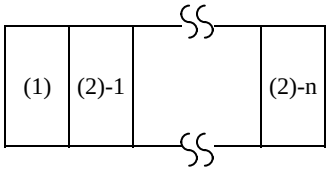
(1)

Text header. 4	,	,	Protocol No. 2	,	Number of aliquotting items 3	,	CR	LF

(2)

Aliquotting item code 4	,	,	End SEQ 5	,	CR	LF

9-1. Transmission Image



n ≦ 120, n is aliquotting item number.

9-2. Text

・Text header (an example)	1 A E ␣
・Protocol No.	1～10
・Number of aliquotting items	1～120
・Aliquotting item code	1～9999
・End SEQ	Daughter specimen SEQ of each item at the end is sent back. 0～65535

In the item where aliquotting/label affixing is not performed, the daughter specimen SEQ -1 set in aliquotting start condition is sent back to the host computer.

Ⅱ-10. Protocol end reply

(1) Text header 4 , Reply code 2 , Protocol No. 2 , Number of aliquotting items 3 , CR LF

(2) Message, maximum 64 , CR LF

* When a reply code for (2) is normal, omission is possible.

10-1. Transmission image

(1) (2)

* When a reply code for (2) is normal, omission is possible.

10-2. Text

・Text header (an example)	1 H F ␣
・Reply code	Two digits Please refer to table -2. (character data)
・Protocol No.	1-10 (Please just send back by the data that transmitted a message at the time of protocol end.) Number of aliquotting items
・Number of aliquotting items	1-120 (Please just send back by the data that transmitted a message at the time of protocol end.)
・Message	Alphanumeric character, maximum 64 digits. Omissible, (character data) When a reply code is normal, a message screen is not displayed. When a reply code is abnormal, a message screen is displayed. When a message is omitted, the message part on the message screen is displayed in a blank.

Reply Code Table

Reply code is common for a protocol reply, aliquotting information, and protocol end reply.

It is reply of normal/error for an inquiry. (character data)

(table -2)

Code (two digits)	Contents
“ 00 ”	Normal
“ ZZ ”	Error

When abnormal reply was performed in protocol reply and a protocol end reply, a reply error occurs
In this case, a message from the host computer is displayed on the error screen.
When a reply error is removed, a protocol and a protocol end are retransmitted.

Blood Collection Tube Code Table

Blood collection tube code is a character data appointing a blood collection tube used for parent specimen tube for each parent specimen. Registration is possible to maximum five kinds. Each parent specimen tube No. is decided with code (the following table) transmitted by the host computer. However, when a code is not registered (code is "00" or omitted), each parent specimen tube is specified to tube No. 1 or No. 2 by the outside diameter measurement of parent specimen tube. （(The outside diameter measurement can distinguish only two kinds of φ16 and φ13 tubes.) When the outside diameter measurement of parent specimen tube is not used, all parent specimen tube is specified with tube No. (1-5 either one) set in the equipment. In addition, when there were parent specimens having the same ID more than two in a rack, the ID after the second is used with tube No. for the first parent specimen tube. Please use the same tube for parent specimens having the same ID.

（Table -3）

Code (two digits)	Kind of tube
"00" (or omitted)	Un-registration
“ 01 ”	Equipment setting tube No. 1 (fixed to φ13)
“ 02 ”	Equipment setting tube No. 2 (fixed to φ16)
“ 03 ”	Equipment setting tube No. 3
“ 04 ”	Equipment setting tube No. 4
“ 05 ”	Equipment setting tube No. 5
Other than the code mentioned above	Un-registration

In addition, please inquire Aloka because usable tube is different for the equipments.

Processing Code

Processing code is used to indicate processing for a daughter specimen. (character data)

(Table -4)

Aliquotting / Label	Yes	No
Affix	“ 00 ” (or omitted)	“ 10 ”
no affixing	“ 01 ”	“ 11 ”

However, the specification to publish a label is effective for only a label publication item registered in the equipment. Therefore, a processing code from the host computer can make only control the aliquotting and label publishing.

Result code

Result code transfers a processing result of aliquotting and label printing for each daughter specimen to the host computer. (character data)

Result code has two digits. (The first digit: aliquotting result, the second digit: label printing result)

Aliquotting result
(the first digit)
(Table -5)

Contents	Code	
Normal	0	
Cancellation	2	
Un-processing	␣ (space)	
Error	Dispensing	No-dispensing
No liquid	A	a
Short	B	b
Clogging	C	c
Air	D	d
Lack 1	E	e
Short (Liquid volume monitor)	G	g
Other error	Z	z

Label printing result
(the second digit)
(Table -6)

Contents	Code
Normal	0
Cancellation	2
Un-processing	␣ （space）
Error	Z

Cancellation: Cancellation of aliquotting or label printing with processing code or a blank.

Un-processing: Processing was not performed by the forced end.