HORIBA Medical

Coagulation Analyzer: Yumizen G200

Output Format for Host Connection

Ref: RAA076AEN

Output Format for Host Connection

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1. Foreword

1.1. Revisions

Internal Reference	Software Version	Document Date Issued
RAA076AEN	2.x	January 2020

2. Online Communication Specification

2.1. Overview

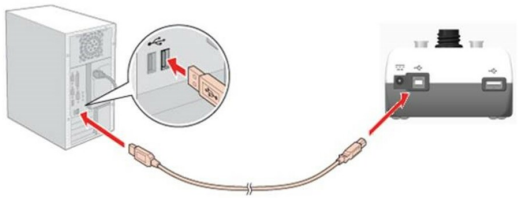
The purpose of this document is to specify the complete online communication protocol of Yumizen G200 instrument, from the instrument to the LIS (unidirectional).

2.2. To Configure the LIS Connection

*Access: **Main Menu** > **System** > **OnLine settings***

A USB Type-A to USB Type-B cable is needed for the connection to the LIS.

1. Connect the USB cable on the computer and the instrument.



2. Depending on your configuration, select **LIS system** or **LIS v2.0 system**.
3. Press the **Validate** button.

2.3. LIS Connection Protocol

Complies with software version 2.x.

HW parameters:

19200 baud, 8 bits, No parity, 1 Stop bit

Data format for LIS system setting:

Parameter	Format	Length
Start message	STX (ASCII=02)	1
ID	10 characters	10
Separator	'|' (ASCII=124)	1
Date	YYYY.MM.DD	10
Separator	'|' (ASCII=124)	1
Time	HH:MM	5
Separator	'|' (ASCII=124)	1
Measuring type	TTTTT (Note 1.)	5
Separator	'|' (ASCII=124)	1
Raw result 1.	C:ssss,s (Note 2.)	8
Separator	'|' (ASCII=124)	1
Raw result 2.	C:ssss,s (Note 2.)	8
Separator	'|' (ASCII=124)	1
Raw result AVG	ssss,s	6

Parameter	Format	Length
Separator	’|’ (ASCII=124)	1
Result field: ’%’	ppppp,p or ’ --- ’ if not defined	7
Separator	’;’ (ASCII=59)	1
Result field: Ratio	pppp,pp or ’ --- ’ if not defined	7
Separator	’;’ (ASCII=59)	1
Result field: INR	pppp,pp or ’ --- ’ if not defined	7
Separator	’;’ (ASCII=59)	1
Result field: ug/ml or %	pppp,pp or ’ --- ’ if not defined (Note 3.) pp.p	7
Separator	’;’ (ASCII=59)	1
Result field: g/l	pppp,pp or ’ --- ’ if not defined	7
Separator	’|’ (ASCII=124)	1
Error code	ddd (Note 4.)	3
Carriage return	(ASCII=13)	1
New line	(ASCII=10)	1
End message	ETX (ASCII=03)	1

Example:
<STX> 123 |14/11/2019|09:35|PT |1: 55,5| | --- | --- ; --- ; 0,0; --- ; --- |C <CR> <LF> <ETX>

Note 1:

Where 'TTTTT' is one of the following:

"APC ","PROTC","PROTS","LA ","PT ","APTT ","FIB ","TT ","D-DIM",”AT”

"Neph ","Turb ", "II ","V ","VII ","X " "VIII ","IX ","XI ","XII ", "QC ","undef"

Note 2:

Where C: measuring position ('1-2'), ssss,s: secundum ('123,4').

In the parallel measurement case, the position number of "Raw result1" and "Raw result2" is different.

In the simple mode, position number and secundum are equal (Raw result 1 = Raw result).

Note 3:

The result is "µgFEU/ml" in case of DDIMER, "%" in case of AT.

Note 4:

The "Error code" is the 3 digit decimal format of the error byte.

The bits are the following:

00 0000 0000: No error

00 0000 0001: Calibration error

00 0000 0010: Difference error during parallel measuring

00 0000 0100: Too much external light

00 0000 1000: Curve error (suspicious data during measure phase)

00 0001 0000: Out of range error (time is out of normal range)

00 0010 0000: Incubation error (the time was too long)

00 0100 0000: Expired lot

00 1000 0000: Control result out of limit

01 0000 0000: Reagent control differences

10 0000 0000: There is no derivate fibrinogen calibration data

(e.g.: If there is "Expired lot" and "Curve error" at the same time: 01001000 hex: 48h, the error code is "072")

2.4. LIS v2.0 Connection Protocol

2.4.1. Protocol

Complies with software version 2.x.

HW parameters:

19200 baud, 8 bits, No parity, 1 Stop bit

Data format for LIS v2.0 system setting:

Field	Format	Length
Start message	STX (ASCII=02)	1
ID	123456	variable
Separator	'|' (ASCII=124)	1
Timestamp	YYYY.MM.DD HH:MM	16
Separator	'|' (ASCII=124)	1
Test identifier	TTTTT	variable
Separator	'|' (ASCII=124)	1
Channel identifier	CH:x	4
Separator	'|' (ASCII=124)	1
Value 1	pppp,pp or ' --- ' and dimension	variable
Separator	'|' (ASCII=124)	1
Value 2	pppp,pp or ' --- ' and dimension	variable
Separator	'|' (ASCII=124)	1
Value 3	pppp,pp or ' --- ' and dimension	variable
Separator	'|' (ASCII=124)	1
Value 4	pppp,pp or ' --- ' and dimension	variable
Separator	'|' (ASCII=124)	1
Error code	list of error flags separated with ','	variable
Carriage return	(ASCII=13)	1
New line	(ASCII=10)	1
End message	ETX (ASCII=03)	1

Examples:
153|2018.12.21 15:18:59|PT|CH:0|<10,0 sec|--- INR|Error:C,T,L

123|2018.12.21 15:44:10|PT|CH:0|--- sec|--- INR|Error:C,dM

456|2018.12.21 15:45:10|PT|CH:1|16,8 sec|--- INR|Error:C

For more details about the fields refer to the *Field Details* chapter.

2.4.2. Field Details

The communication is based on ASCII text format, no binary data is used during the communication. The numbers and the dimensions (units) are sent as letters: 0-9, a-z, A-Z.

All measurement results and calculated results of a sample are included in a single package. Each package starts with the 0x02 start symbol (STX) and ends with the 0x03 stop symbol (ETX). The allowed characters between the STX and the ETX are: 0x32, 0x33, 0x34, …, 0x7D, 0x7E.

In the packages, fields are separated with the 0x7C separator symbol ('|', bar symbol), while the last field ends with ETX.

A package consists of the fields described below.

ID

This field is mandatory and is always the first field in a package after the STX symbol.

Timestamp

This field is mandatory and indicates the year, month, day, hour and minutes.

Test identifier

This field is mandatory.

Only the following predefined test identifier names can be used in this field:

PT	IX
APTT	XI
FIB	XII
TT	Neph
D-DIM	Turb
ATIII	Chrom
II	APC
VII	LA
X	PROTC
VIII	PROTS

Channel identifier

Defines the source of the measurement result.

The allowed values are:

	Description
CH:0	The source of the result is the left channel
CH:1	The source of the result is the right channel
CH:P	The result is calculated from a parallel measurement

Value

Always contains a number and a dimension. The following restrictions are defined:

- The length of this field is variable, depending on the content.
- The text of the dimension can contain spaces.
- The text of the dimension is closed with a bar or an ETX.
- The number can be integer or fraction. In case of a fraction the decimal separator is the 0x2C (',') character. After a decimal separator maximum four digits are allowed.
- Some special character are allowed before the first letter of a number (0x2D, '-', 0x3C, '<', 0x3E, '>').
- When the number cannot be given, for example in the case of a measurement error, the result must be sent anyway. The number can be replaced with '---' (three 0x2D characters) followed by the dimension.

Error codes

Contains the list of error flags applied to the result during or after measurement. One package can contain only one error field, however this field can contain several error codes. If this field is not present in a package, it means that the result in the current package does not contain errors.

The format of this package always starts with an error code, a 0x20 space character, and the list of the error codes separated by a 0x2C (',') character. If this field is present in a package, it must be the last one.

The following codes can be listed in this field:

Error code	Description
D	Difference error
C	Curve error
T	Out of range error
R	Calibration data error
O	Incubation was overheated
B	Barcode type error
Q	Out of QC
E	Expired lot
S	Slope error

Error code	Description
d	Diluted sample
W	Weak coag
dM	dMin error
MV	MinStep error
MS	MaxValue error
L	External light error
X	Extrapolated sample

The text of the dimensions are fix strings. Here are the used dimensions:

- sec
- dOD
- dOD/min
- INR
- Ratio
- INRC
- ug/l
- g/l
- %
- ugFEU/ml
- mg/dl
- dF g/l
- ng/ml