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“OC SENSOR PLEDIA”
Computer Interface Specifications

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Date	Location	Revisions
Feb.23, 2015	First edition	
Mar.9,2016	Second edition	"Spare 2" is updated in (ii) Output Data Information page 18. "Spare 5" is updated in (2) Output Data Information page 22. "Spare 6" is updated in (2) Output Data Information page 22.
Mar.28.2018	Third edition	"Universal Test ID" is updated in *6.2. Level 2 : Test Order Record (O)* FOBT to F-Hb page 8. "User Field No.2" is added in *6.2. Level 2 : Test Order Record (O)* page 9. "Universal Test ID" and "Data or Measurement Value" are updated in *6.3. Level 3 : Result Record (R)* page 9. "Operator Identification" is newly added in *6.3. Level 3 : Result Record (R)* page 9. Example is updated in *7. Example of Result Output* page11 to 13. Annotation (*) is added in the 4. Settings. [Page 5] 2D Barcode Reader Specifications is added.[Page 27]

OC SENSOR PLEDIA 2018/03/28

OC-PLEDIA INTERFACE SPECIFICATIONS

1. Overview 4
2. Demarcation Point 4
3. Hardware Specifications 4
4. Settings 5
5. “ASTM” MODE Interface 6
6. High Level Protocol 8
6.1. Level 0 : Message Header Record (H) 8
6.2. Level 2 : Test Order Record (O) 8
6.3. Level 3 : Result Record (R) 9
6.4. Level 4 : Comment Record (C) 10
6.5. Level 0 : Message Terminator Record (L) 10
7. Example of Result Output 11
8. Supplement: State Transition Table 14
9. “DIANA” Communication MODE Interface 15
A. Communication Procedures 15
B. Data of Test Results 17
C. List of Error Codes 20
10. “io” Communication MODE Interface[Same as OC Sensor MICRO] 22
A. Communication Procedures 22
B. Data of Test Results 22
C. List of Error Codes 24
11. Sample Barcode 25

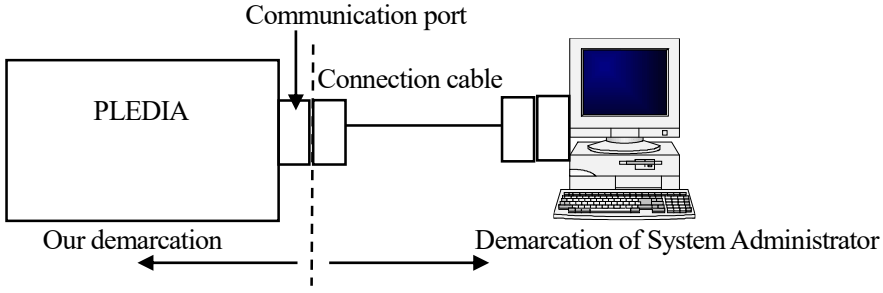
OC SENSOR PLEDIA 2018/03/28

1. Overview

This document covers the specifications used for communication between Occult Blood Analyzer “OC Sensor PLEDIA” (hereinafter referred to as “PLEDIA”) and host computer.

2. Demarcation Point

Our demarcation point is PLEDIA and to its communication port.



* Connection cables should be prepared by the system administrator.

3. Hardware Specifications

(1) Physical Specification : EIA RS-232C
(2) Synchronization : Asynchronous system
(3) Transmission : Full-duplex system
(4) Data Signal : Voltage type

Signal level	Data signal	Control signal
+5 - +15 V	Logic “0” start bit	ON
-5 - -15 V	Logic “1” stop bit	OFF

(5) Connector Shape

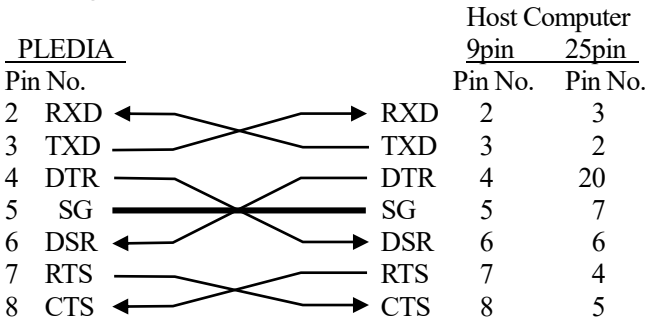
1) PLEDIA side connector 9-Pin D-SUB Male (D-SUB9P)
2) Cable side connector 9-Pin D-SUB Female (D-SUB9S)

(6) Signal Lines and Pin Locations

Pin No.	Signal type	Direction (from PLEDIA)	Name
1	-	-	
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	DTR	Output	Data terminal ready
5	SG	-	Signal ground
6	DSR	Input	Data set ready
7	RTS	Output	Request to send
8	CTS	Input	Clear to send
9	-	-	

A space is always output for DTR and RTS. Output information for DSR is disregarded.

(7) Standard Cable Wiring



4. Settings

* Underlined information indicates default settings.

* If the operator function (Operator Identification, Operator Name, Reagent Lot No., Control Lot No. and Expiration Date) is used, ASTM mode have to be used.

(1) Communication MODE : · ASTM
· DIANA (OC Sensor DIANA Compatible Mode)
· io (OC Sensor io Compatible Mode[Same as OC Sensor MICRO])

(2) BAUDRATE (baud rate) : 2400, 4800, **9600**, 19200, or 38400 (bps)

(3) DATA LENGTH : 7 or 8 (bits)

(4) PARITY : NONE, EVEN, or ODD

(5) STOP BIT : 1 or 2 (bit(s))

(6) TRANSMISSION PROCEDURE : NONE (no procedures) or ACK/NAK

(7) DELIMITER : STX/ETX, CR/LF or CR
· STX/ETX : STX [Record] ETX
· CR/LF : [Record] CR LF
· CR : [Record] CR

(8) CHECK CHARACTER : NONE, BCC or SUM

(9) SEPARATOR : NONE or YES (comma "," delimited)

The above-mentioned settings can be changed by using the following procedures on the operation panel of the PLEDIA system:

[MENU] --> [SETTINGS] --> [SYSTEM SETTINGS] --> [DATA OUTPUT] --> [ONLINE SETTINGS]

* In the ASTM Mode setting, the "TRANSMISSION PROCEDURE," "DELIMITER" "CHECK CHARACTER" and "PARTITION" are fixed to the following settings; then it is not possible to change.

[TRANSMISSION PROCEDURE] : ACK/NAK

[DELIMITER] and [CHECK CHARACTER] : Fixed on following

[STX][DATA][CR][ETX][SUM1][SUM2][CR][LF]

[SEPARATOR] : NONE

* XON/XOFF NO CONTROL

(10) Others

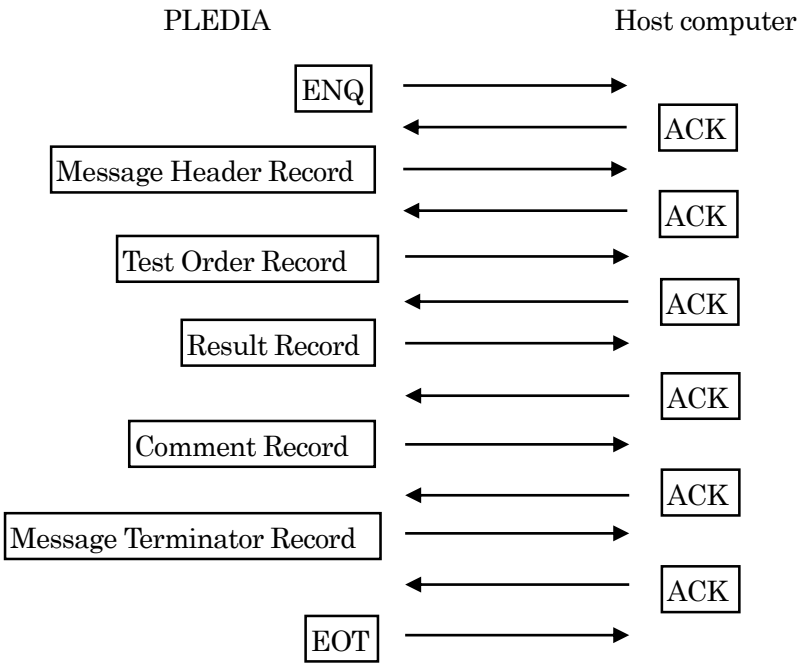
(i) Start Bit : 1 (bit), Fixed

(ii) Character Code : ASCII

(iii) Number of Retries at Hand shaking : 3 times, Fixed

(iv) Response Time Out at Hand shaking : 3 seconds, Fixed

(1) Succeeded case of protocol for one specimen



(2) [ACK/NAK] protocol Error

<NAK Count Error>

If the reply from the host computer is “NAK”, data will be re-sent 6 times for each specimen. If the system fails to recover, it will proceed to the end phase.

Ex) [NAK] response to [ENQ]

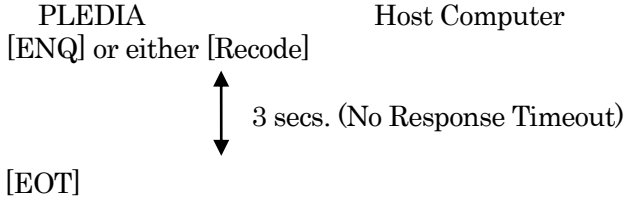
PLEDIA		Host Computer	
[ENQ]	---------->		re-sent
	<----------	[NAK]	
[ENQ]	---------->		(1)
	<----------	[NAK]	
[ENQ]	---------->		(2)
	<----------	[NAK]	
[ENQ]	---------->		(3)
	<----------	[NAK]	
[ENQ]	---------->		(4)
	<----------	[NAK]	
[ENQ]	---------->		(5)
	<----------	[NAK]	
[ENQ]	---------->		(6)
	<----------	[NAK]	
[EOT]	---------->		

Message "ON-LINE NAK count ERROR" is displayed on the screen, and the communication line is disconnected.

* The case of response [NAK] to either [Recode] data, then always retry from [Message Header Record]. Procedure for the number of retrial times and finishing method are same as case of [NAK] response to [ENQ].

<ACK Timeout Error>

If there is no reply from the host computer within 3 seconds, the system will proceed to the end phase.



Message "ON-LINE ACK timeout ERROR" is displayed on the screen, and the communication line is disconnected.

< Cancel communication error >

Continue an analysis, but disconnect communication with host computer.
Do return processing in PLEDIA system after reason investigation and cancellation of the error.

<Return Processing>

In the event of a communication error, the button [CONNECT] will be enabled on the <ANALYSIS STATE> screen.

If this button is touched, data that were not output due to the error are output.

Real time transmission finished as an analysis is finished even if transmission of all data is not completed.
To output remaining data, do a batch transmission by returning to the <MENU> screen, and then go to the <PROCESS MEASURED DATA> screen.

6. High Level Protocol

The following items apply, based on ASTM1394-97.

6.1. Level 0 : Message Header Record (H)

Message Header Record (H)			
Name	Max digits	Contents	
Record Type	1	[H]	
Delimiter Definition	4	Field Delimiter	Vertical bar [|(7CH)]
		Repeat Delimiter	Backslash [¥(5CH)]
		Component Delimiter	Caret [^(5EH)]
		Escape Delimiter	Ampersand 「&(26H)」
Sender Name or ID	15	Device name. "OC PLEDIA" Note : " " is Space (H20)	
	5	Device version. Ex) "1.001"、"2.01P"、"10.00"	
Date and Time of Message	14	Based on ASTM1394-97	

6.2. Level 2 : Test Order Record (O)

Test Order Record		
Name	Max digits	Contents
Record Type	1	[O]
Sequence Number	1	[1] Fixed
Specimen ID	15 (Variable)	1. Barcode information pasted on the specimen that is read by PLEDIA. 2. "CONT1" or "CONT2" or "CONT3" or "CONT4" automatically at QC mode.
	3	Rack barcode.
Instrument Specimen ID	5	Measurement sequence.
	2	Rack Position.
	1	Day setting.
	1	Group no.
Universal Test ID	7	Manufacturer's code after the three component element partition symbols. "^^^F-Hb"

	2	Item name. “90”
User Field No.1	2	Measured Data Real Time Output ‘N^’ Sample Data Batch Transmission ‘R^’ Control Data ‘Cx’ : x: QC no. of 1 to 4 Stat Sample Real Time Output ‘S ^ Stat Sample Batch Transmission ‘P^’ Retest Data Real Time Output ‘A^’ Retest Data Batch Output ‘B^’ (NOTE) Retest data include dilute test data. (NOTE) "N" in the second byte, if the edit or calculation data.
User Field No.2 (Note) It is not output when the operator function is not used.	20 (Variable)	Operator Name
	6	Control Lot No
	8	Control Expiration Date
	6	Reagent Lot No
	8	Reagent Expiration Date
	6	Buffer Lot No
	8	Buffer Expiration Date

* The Result Record is always output after the Test Order Record in 1:1 correspondence.

6.3. Level 3 : Result Record (R)

Result Record (R)		
Name	Max digits	Contents
Record Type	1	[R]
Sequence Number	1	[1] Fixed
Universal Test ID	7	“^^^F-Hb”
	2	“90”
Data or Measurement Value Outputs qualitative result and quantitative value punctuated by component delimiter in one field delimiter. Ex)Positive ---|Positive^279| Negative ---|Negative^9| OR/PRC ---|Positive^| UR ---|Negative^| Control Level=1 ---|^151| Control Level=2 ---|^447| no result(error)---|^|	8	Qualitative value for result obtained by measurement with OC PLEDIA. [Positive] or [Negative] If a result cannot be obtained because of a measurement error, etc., nothing is output.
	9	4 digit measured value (integer).
Units	5 (Fixed)	Unit of measure for Quantitative value “ng/mL”
Operator Identification	20 (Variable)	Operator ID (Note) It is not output when the operator function is not used.

Date/Time Test Completed	14	Based on ASTM1394-97.

* The Result Record is always output after the Test Order Record in 1:1 correspondence.

6.4. Level 4 : Comment Record (C)

Comment Record (C)		
Name	Max digits	Contents
Record Type	1	[C]
Sequence Number	1	[1] Fixed
Comment Source	1	[I] Fixed I : clinical instrument system
Comment Text * If error is not occurred, error code also is not output.[0 bite] * If the result is not gotten by error, the qualitative assessment of measured data also is not output.[0 bite] *QC result also is not output the qualitative assessment of measured data.[0 bite]	2	Error code with OC PLEDIA.
	2	Qualitative assessment of measured data using cut-off values registered arbitrarily in PLEDIA system: [-], [+], [1+], [2+] and [3+] * Up to three cut-off values can be set. If only one cut-off value is set, a qualitative assessment is either [-] or [+]. If more than one cut-off value is set, flag (+, -) are [-] [1+] [2+] ···. *
	2	Spare

6.5. Level 0 : Message Terminator Record (L)

Message Terminator Record (L)		
Name	Max digits	Contents
Record Type	1	[L]
Sequence Number	1	[1] Fixed
Termination Code	1	N: Normal end. “N” is always sent.

7. Example of Result Output

The results are output to the host computer in the sequence H, O, R, C and L. -------
Data is sent in the following sequence for both real-time sending, and batch sending of stored data.

(I): Data is sent from PLEDIA to host computer.
(H): Data is sent from host computer to PLEDIA.

* Output format when operator function is not used.

<Example> 1st specimen : Specimen ID=12345678901234, Result=Negative

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H|¥^&|||OC PLEDIA^1.003|||||||||20150204140916[CR] [ETX] [SUM1] [SUM2] [CR] [LF]
(H) [ACK]
(I) [STX][2]O|1|12345678901234^006|00007^05^1^0|^^^F-Hb^90|||||||||||||N [CR] [ETX] [SUM1] [SUM2] [CR] [LF]
(H) [ACK]
(I) [STX][3]R|1|^^^F-Hb^90|Negative^34|ng/mL|||||||20150204140915[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][4]C|1|I|^-[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][5]L|1|N[CR] [ETX] [SUM1] [SUM2] [CR] [LF]
(H) [ACK]
(I) [EOT]

<Example> 2nd specimen: Specimen ID=23456789012345, Result=Positive

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H|¥^&|||OC PLEDIA^1.003|||||||||20150204141032[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][2]O|1|23456789012345^002|00006^03^1^0|^^^F-Hb^90|||||||||||||N [CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][3]R|1|^^^F-Hb^90|Positive^251|ng/mL|||||||20150204141031[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][4]C|1|I|^+[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][5]L|1|N[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [EOT]

<Example> Control Mode Measurement: Control ID=01234567890123, Control Level = 1

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H|¥^&|||OC PLEDIA^1.003|||||||||20150204160527[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][2]O|1|01234567890123^099|00001^09^^^|^^^F-Hb^90|||||||||||||C1[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][3]R|1|^^^F-Hb^90|^156|ng/mL|||||||20150204160526[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][4]C|1|I[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]

OC SENSOR PLEDIA 2018/03/28
(I) [STX][5]L|1|N[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [EOT]

<Example> Control Mode Measurement : Control ID = none, Control Level = 2

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H|¥^&|||OC PLEDIA^1.003|||||||||20150204160527[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][2]O|1|CONT2^099|00002^10^^|^^^F-Hb^90|||||||||||||C2[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][3]R|1|^^^F-Hb^90|^416|ng/mL|||||||20150205160526[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][4]C|1|I[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][5]L|1|N[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [EOT]

* Output format when operator function is used.

<Example> Operator Mode : Specimen ID=123456789, Result=Positive, Operator ID="Operator001"

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H|¥^&|||OC PLEDIA^2.000|||||||||20180328151647[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][2]O|1|123456789^015|00075^02^1^0|^^^F-Hb^90|||||||||||||N
|OperatorName^^^82101^20190228^83101^20190331[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][3]R|1|^^^F-
Hb^90|Positive^567|ng/mL|||||Operator001||20180328151445[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][4]C|1|^+[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][5]L|1|N[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [EOT]

<Example> Operator Mode : Specimen ID=123456789,Result=Error(Insufficient Sample/No Sample),Operator ID="Operator001"

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H|¥^&|||OC PLEDIA^2.000|||||||||20180328151647[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][2]O|1|123456789^021|00081^03^1^0|^^^F-Hb^90|||||||||||||N |Operator Name^^^^^^
[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][3]R|1|^^^F-Hb^90|^|ng/mL|||||Operator001||20180328151445[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][4]C|1|I|01[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][5]L|1|N[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [EOT]

<Example> Operator Mode : Specimen ID=123456789,Result=Error(Over Range),Operator ID="Operator001"

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H|¥^&|||OC PLEDIA^2.000|||||||||20180328151647[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][2]O|1|123456789^002|00003^05^1^0|^^^F-Hb^90|||||||||||||||N |Operator Name^^^^^^
[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][3]R|1|^^^F-
Hb^90|Positive^|ng/mL|||||Operator001||20180328151445[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][4]C|1|I|05^+[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][5]L|1|N[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [EOT]

* If the sampling operation is not done and error is occured, Reagent Lot No., Reagent Expiration Date, Buffer Lot No., Buffer Expiration Date are not output.

<Example> Operator Mode Control Measurement: Control ID=none, Control Level = 2

(I) [ENQ]
(H) [ACK]
(I) [STX][1]H| ¥^&|||OC PLEDIA^2.000|||||||||20180204160527[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I)[STX][2]O|1|CONT2^099|00002^10^^|^^^F-
Hb^90|||||||||||||||C2|OperatorName^82111^20190228^82101^20190228^83101^20190331
[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I)[STX][3]R|1|^^^F-
Hb^90|^478|ng/mL|||||Operator001||20180205160526[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [STX][4]C|1|I[CR][ETX][SUM1][SUM2][CR] [LF]
(H) [ACK]
(I) [STX][5]L|1|N[CR][ETX][SUM1][SUM2][CR][LF]
(H) [ACK]
(I) [EOT]

8. Supplement: State Transition Table

>OC: PLEDIA does not wait for a text message from the host computer, but only waits for a reply. If an irregular signal is received, carry out processing according to the following transition table.

>HOST: Ensure that the host computer does not send [ENQ] or [text] to OC PLEDIA. If the host computer sends data other than [ACK] or [NAK], take action according to the following transition table.

>RC: Retry Counter

Receiving / State	A: ENQ	B: ACK	C: NAK	D: Timeout	E: EOT	F: Text message, others
I1: Idling (neutral)	OC: Sends NAK. (I1) HOST: Sends [ACK] (R1). Sends [NAK] (I1).	OC: Ignored (I1) HOST: ---	OC: Ignored (I1) HOST: ---	----------	OC: Ignored (I1) HOST: ---	OC: Ignored (I1) HOST: ---
W1: Waiting for reply after ENQ was sent	Collision OC: Waits for at least 1 sec, and then Re-sends ENQ (W1) within 5 secs. HOST: Proceeds to 5 secs [ENQ] receiving wait state. If more than 5 secs elapses, proceeds to (I1).	OC: RC is reset to 0. [H] text sent (W2) Waiting timer set. HOST: ---	OC: Re-sends ENQ. RC = RC + 1 (W1) (*1) HOST: (I1)	Timeout = 3 OC: ACK Timeout (*2) HOST: (I1)	OC: Same processing as ACK reply (W1:B) HOST:--	OC: Same processing as NAK reply (W1:C) HOST: --
W2: Waiting for reply after text ([H][O][R][L] record) was sent	OC: Same processing as [NAK] receiving (W2:C) HOST: -----	OC: RC is reset to 0. When [H][O][R] record is sent, status becomes (W2). When final [L is sent, resets RC to 0. Sends [EOT] (I1). HOST: -----	OC: RC = RC + 1 [RC<=6] Re-sends from record.[H] RC = RC + 1 (W2) [RC>6] (*1) (*1) HOST: -----	Timeout = 3 OC: ACK Timeout (*2) [EOT] sent (I1) HOST: -----	OC: Same processing as ACK reply (W2:B) HOST: -----	OC: Same processing as [NAK] receiving (W2:C) HOST: -----
----------	----------	----------	----------	----------	----------	----------
R1: Waiting for text message after reply	----------	----------	----------	After [ACK] or [NAK] reply, timer starts and monitoring takes place. Timeout = 5 OC: ----- HOST: (I1)	OC: --- HOST: If final receiving record is [H][O], the text message being received is discarded (I1). If final receiving record is [R][L], the final result is extracted, and the host goes into idling state (I1).	OC: --- HOST: Checks and stores the contents of the text, and then sends [ACK] reply (R1). Alternatively, if receiving preparations are not completed, sends [NAK] reply (R1).

*1: When RC > 6 , please refer [NAK Count Error] status of "3.3. Communication Procedure".
RC is reset to 0, and then phase [EOT] is sent.

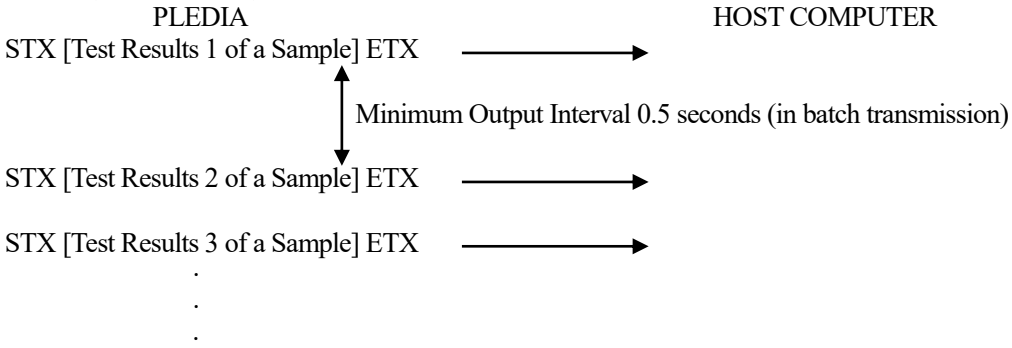
*2: Please refer [ACK Timeout Error] status of "3.3. Communication Procedure".

9. "DIANA" Communication MODE Interface

A. Communication Procedures

(When delimiter is STX/ETX)

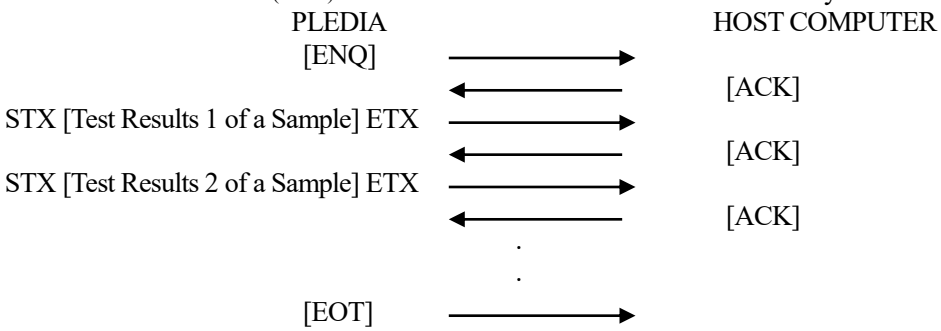
(1) NONE (No Procedures)



(2) ACK/NAK ··· Default Setting

<Real Time Transmission (note 1) > It is terminated on each sample.

<Batch Transmission (note 2) > It is terminated when all selected memory data were transmitted.



NOTE 1) Real Time Transmission
Mode of data transmission during analysis. Test results of a sample are transmitted to a host computer as they are gained.

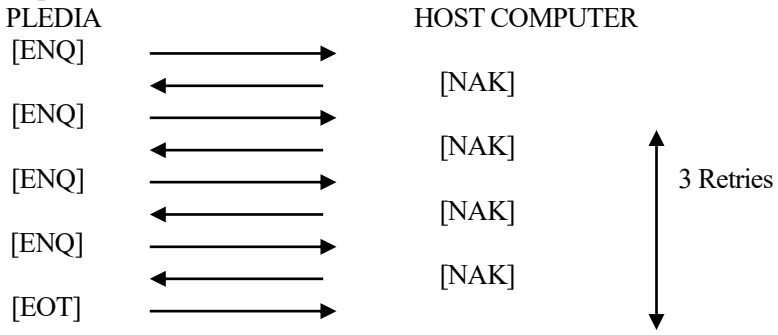
NOTE 2) Batch Transmission (Memory Data Output)
Mode of data transmission set in [SUPPORT] - [PROCESS MEASURED DATA].
Transmit a range of data selected from the stored measured data in the system.

* Up to 5000 samples' worth of data can be stored in the system.

(3) ACK/NAK Sequence Error

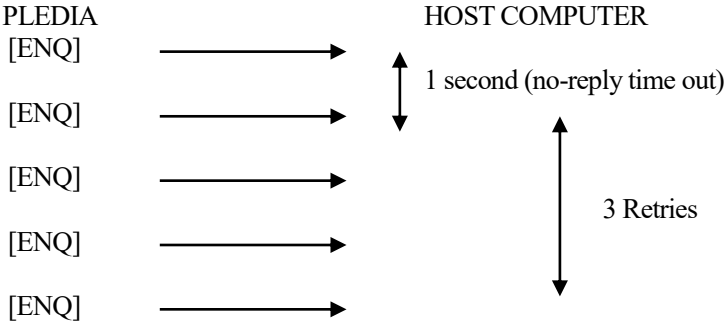
* In the event of a sequence error, three retries (total four times) are made. If the error is not cancelled yet, EOT is transmitted to display an error status on the screen and disconnect the communication line.

(i) NAK reply from a host computer



Message "ON-LINE NAK count ERROR" is displayed on the screen, and the communication line is disconnected.

(ii) No reply from a host computer (Statuses other than ACK/NAK)



Message "ON-LINE ACK timeout ERROR" is displayed on the screen, and the communication line is disconnected.

NOTE 1) All information transmitted during communication line disconnection from a host computer, including ACK, NAK and EOT, is disregarded.

NOTE 2) The same cancellation procedures for a sequence error are applied to both replies to ENQ and those to test results.

(iii) Cancel communication error

Continue an analysis, but disconnect communication with a host computer.

Do return processing in PLEDIA system after investigation of the cause of the error and cancellation of the error.

<Return Processing>

In the event of a communication error, the button [CONNECT] will be enabled on the <ANALYSIS STATE> screen.

If this button is touched, data that were not output due to the error are output.

Real time transmission finished as an analysis is finished even if transmission of all data is not completed.

To output remaining data, do a batch transmission by returning to the <MENU> screen, and then go to the <PROCESS MEASURED DATA> screen.

B. Data of Test Results

(i) Data Output Form

*

Data size can be changed by setting of “SEPARATOR”.
Partitions are inserted between items. A partition is also inserted between Spare 2 and Spare 3 of No. 10 and No. 11 in “(ii) Output Data Information” on the next page. No partition is attached to the end of “EE (error)” the last output item of the telegraphic message.

* If “SEPARATOR” is disabled on an item, blanks (20 H) are filled in its display space.

Standard Setting (Separator disabled): 69 bytes, excluding a delimiter

1 2	3 4	5 – 14	15 – 19	20 – 24	25	26 – 29	30	31 – 45	46 – 50	51 – 55
OO	^^	DDDDDDDDDD	TTTTT	RRRRR	G	NNNN	M	BBBBBBBBBBBBBB	^^^^^	^^^^^

56 – 64	65 66	67	68 69
CCCCCCCCC	FF	^	EE

Partition enabled: 83 bytes, excluding a delimiter

1 2	4 5	7 – 16	18 – 22	24 – 28	30	32 – 35	37
OO	, ^^ ,	DDDDDDDDDD	, TTTTT	, RRRRR	, G	, NNNN	, M ,

39 – 53	55 – 59	61 – 65	67 – 75	77 78	80	82 83
BBBBBBBBBBBBBB ,	^^^^^ ,	^^^^^ ,	CCCCCCCCC ,	FF ,	^ ,	EE

^ : One-byte space(20H)
, : One-byte comma (2CH)

(ii) Output Data Information

note : ^ means One-byte space (20H)

[D-FRM]

No.	Symbol	Name	byte(s)	Information
1	O	Data Type	2	Measured Data Real Time Output ‘N^’ Sample Data Batch Transmission ‘R^’ Control Data ‘Cx’ : x: QC no. of 1 to 4 Stat Sample Real Time Output ‘S ^ Stat Sample Batch Transmission ‘P^’ Retest Data Real Time Output ‘A^’ Retest Data Batch Output ‘B^’ (NOTE) Retest data include dilute test data. (NOTE) Output the "N" in the second byte, in the event of Data editing or calculation.
2	^	Spare 1	2	^^ (20H*2)
3	D	Measurement Date	10	Measurement date for a test: year (4)/month (2)/date (2) e.g.: February 1, 2015 → 2015/02/01
4	T	Measurement Time	5	Measurement time for a test: Hour (2) + : minute (2) in 24-hour time notation. e.g.: 2:5 p.m. → 14:05
5	R	Rack No.	5	Rack No. (3) + Position in Rack (2) Rack No. : Barcode information on a rack. 3 bytes number of 001-999 Position in Rack : Position in a rack. No. 01-10
6	G	Sample Group No.	1	Key number specified for grouping a sample mainly in sequence operation. Arbitrary allocation of 0 to 9 (0 is allocated if the group no. is set to *) * ^ is output for a stat sample and a control.
7	N	Sample No.	4	Measurement sequential number of 0001 to 9999. Error samples are counted. · Zero Supplement · Sample and control 0001-9999 *Sequential measurement. When the number reaches 9999, it rolls back to 0000, followed by 0001, 0002, ···. (Measurement sequence of 10000, 20000, 30000, ··· in the system unit is set to 0000)
8	M	Measurement Method Counter	1	Classification of measurement method by day: 1-3 A sample collection day on the 1-day, 2-day, or 3-day method. Counting is also performed on error samples and retests sample. * ^ is output in a dilution test and a control.
9	B	Sample Barcode	15	Barcode information on sampling bottles: Right aligned. No zero suppression. A digit between 5 and 15 inclusive. 15 bytes of ^ are filled for the sample barcode reading error, double barcode error, sample unset error and barcode-reading disabled measurement. For a barcode with a digit number of higher than 15 bytes, the last 15 bytes of information will be output.
10	I	Item Name	5	‘^F-Hb’
11	S	Item No	2	‘90’
12	^	Spare 2	3	^^^ (20H*3)
13	C	Measured Data	9	Consists of a 7 bytes integer part, a decimal point, and a byte after the decimal point. Select whether or not to use a digit after the decimal point on PLEDIA system. 0-9999999.9. Right aligned. Zero suppressed. For a sample measured more than once in the Replicate mode, a mean value is output. Nine bytes of ^ are output if an error produces no measured data.
14	F	Flag (+, -)	2	Qualitative assessment of measured data using cut-off values registered arbitrarily in PLEDIA system: [^-], [^+], [1+], [2+] and [3+] * Up to three cut-off values can be set. If only one cut-off value is set, a qualitative assessment is either [^-] or [^+]. If more than one cut-off value is set, flag (+, -) are [^-] [1+] [2+] ···. Two bytes of □ are output if an error produces no measured data.

15	^	Spare 3	1	^(20H*1)
16	E	Error Code	2	An error code according to the error code list [D-ERR] is output. Two bytes' worth of ^ is output if no error is produced.

C. List of Error Codes

[D-ERR]

Code	Error Information	Measured data	Remark
10	SAMPLE BARCODE READING ERROR	YES	
20	DOUBLE SAMPLE BARCODE ERROR (Check within a day)	-	Doesn't appear if "NO" is selected to "DUPLICATED SAMPLE BARCODE CHECK".
01	INSUFFICIENT SAMPLE/NO SAMPLE	-	Doesn't perform dispensing.
02	NO LATEX	-	
03	RBC (PROZONE)	YES	PRC is given priority over RBC if both of them are set.
04	PRC (PROZONE)	*	
05	OR (OVER RANGE)	*	For a dilute test, the maximum measurement value is changed in conjunction with the dilution factor.
06	UR (UNDER RANGE)	-	Appears only in a dilution test.
07	SAMPLE DISPENSING ERROR (such as jamming in the sample nozzle) PUNCTURING ERROR	-	Doesn't perform dispensing
08	LATEX DISPENSING ERROR (such as jamming in the reagent nozzle)	-	Doesn't perform dispensing.
09	MIXER ERROR (such as jamming in the mixer)	-	Doesn't perform mixing.
0A	LATEX BLANK ERROR (A1 CHECK) Or DILUTION ERROR	-	Reagent blank is irregular. Otherwise, a logic error of dilute test results is detected. e.g.) An uncorrected value of 15-times dilution is lower than that of 250-times dilution.
0B	NO CC	-	Includes mismatching of calibration curve lot numbers, including a reagent setting error.
90	UNSET	-	Doesn't appear if MODE 1 is selected to Numbering MODE.
The following is a list of combinations of the above-mentioned errors. No other combinations are produced under present circumstances.			
11	Combined error of Errors 10 and 01	-	
12	Combined error of Errors 10 and 02	-	
13	Combined error of Errors 10 and 03	YES	
14	Combined error of Errors 10 and 04	*	
15	Combined error of Errors 10 and 05	*	
16	Combined error of Errors 10 and 06	-	
17	Combined error of Errors 10 and 07	-	
18	Combined error of Errors 10 and 08	-	
19	Combined error of Errors 10 and 09	-	
1A	Combined error of Errors 10 and 0A	-	
1B	Combined error of Errors 10 and 0B	-	

- The "NO LATEX" error appears when the remaining volume of the 1st latex is found to be 0 μL before the reagent is dispensed. Usually, latex is supplied from the 2nd latex bottle before the contents of the 1st latex bottle become 0 μL. Also, an analysis will be stopped before the contents of the 2nd latex bottle become 0 μL. The NO LATEX error will not usually appear.

- Measured data and flag (+, -) will be output in the case of an error in which "Yes" is provided in its "Measured Data" box of the above list.
  Spaces (20H) are output as measured data and flag (+, -) in the case of an error in which "-" is provided in its "Measured Data" box of the above list.
  Blanks will be output as measured data and flag (+, -) will be output in the case of an error in which "*" is provided in its "Measured Data" box of the above list.

- Numbering Mode
  "Mode 1" is a setting to detect containers and give sample numbers to only container-mounted positions.
  "Mode 2" is a setting to give sample numbers to all positions, including blank positions (container-free positions) with error code "90" output on blank positions.

- If the accessory [end ring] of the system is set to a rack when Mode 2 is selected, sample numbering of blank position and information outputting are not performed from the ring-set position through the last position (10) of the rack.
  If no end ring is set on Mode 2, error code "90" is output on all blank positions.

- The error code table may be changed without previous notice. A flexible correspondence at Host System is recommended.

10. “io” Communication MODE Interface[Same as OC Sensor MICRO]

To return to the factory pre-settings of “io”, use the following settings.

(
“io” Communication MODE Interface,
9600 Baud Rate,
8 Data Bits,
NONE Parity,
1 Stop Bit,
STX/ETX,
NONE Check Character,
No Partition
)

* OC Sensor io is hereinafter referred to as “io”.

A. Communication Procedures

Abide by “PLEDIA” Communication MODE Interface.

B. Data of Test Results

(1) Data Output Form

*

Data size can be changed by setting of “SEPARATOR”.
Partitions are inserted between items. A partition is inserted between Spares in “(2) Output Data Information” on the next page. No partition is attached to the end of “EE (Error),” the last output item of the telegraphic message.

* If “PARTITION” is disabled on an item, blanks (20 H) are filled in its display space.

Standard Setting (PARTITION disabled): 69 bytes, excluding a delimiter

1 2	3 4	5 14	15 19	20 24	25	26 29	30	31 45	46 50
OO	PP	DDDDDDDDDD	TTTTT	^^^^	^	NNNN	^	BBBBBBBBBBBBBBB	^^^^^

51 52	53 55	56 64	65 66	67	68 69
^^	^^^	CCCCCCCCC	FF	A	EE

PARTITION enabled: 83 bytes, excluding a delimiter

1 2	4	5	7 16	18	22	24	28	30	32	35	37	
OO	,	PP	,	DDDDDDDDDD	,	TTTTT	,	^^^^^	,	^	,	NNNN	,	^	,

39 53	55 59	61 62	64 66	67 75	77 78	
BBBBBBBBBBBBBBB	,	^^^^^	,	^^	,	^^^	,	CCCCCCCCC	,	FF	,

80	82 83	
A	,	EE

^ : One-byte space (20H)
, : One-byte comma (2CH)

(2) Output Data Information

[U-FRM]

No	Symbol	Name	Digit Number	Information
1	O	Data type	2	Measured Data Real Time Output ‘N^’ Normal Data Batch Transmission ‘R^’ (NOTE) Output the "N" in the second byte, in the event of Data editing or calculation.
2	P	Auxiliary	2	‘^0’(mean value)
3	D	Measurement Date	10	Measurement date for a test: year (4)/month (2)/date (2) e.g.: February 1, 2015 → 2015/02/01
4	T	Measurement Time	5	Measurement time for a test: Hour (2)/minute (2) in 24-hour time notation. e.g.: 2:5 p.m. → 14:05
5	^	Spare 1	5	^^^^^ (20H*5)
6	^	Spare 2	1	^(20H*1)
7	N	Sample No.	4	Measurement sequential number of 0001 to 0999. Error samples are also counted. *Zero Supplement *Sequential measurement. When the number reaches 0999, it rolls back to 0000, followed by 0001, 0002, ···. (the measurement sequence of 1000, 2000, 3000, ··· in the system unit is set to 0000) · Numbers allocated to emergency samples of 9001 or higher start at 0001.
8	^	Spare 3	1	^(20H*1)
9	B	Sample Barcode	15	Barcode information on sampling bottles: Right aligned. No zero suppression. A digit between 5 and 15 inclusive. 15 bytes of ^ are filled in the case of the sample barcode reading error, double barcode error, sample unset error or barcode-reading disabled measurement. For a barcode with a digit number of higher than 15, the last 15 digits of information will be output.
10	^	Spare 4	5	^^^^^ (20H*5)
11	^	Spare 5	2	^^ (20H*2)
12	^	Spare 6	3	^^^ (20H*3)
13	C	Measured Data	9	An integer of up to seven digits represented as ‘^^^^^^^0’ - ‘^^9999999’. Right aligned. Zero suppressed. For a sample measured more than once in the Replicate mode, a mean value is output. Nine bytes of ^ are output if an error produces no measured data.
14	F	Flag (+, -)	2	Qualitative assessment of measured data using cut-off values registered arbitrarily in PLEDIA system: [-] and [+] * If more than one cutoff value is set, [1], [2], ··· is output as an index for [1+], [2+], · · ·, in Auxiliary Flag (+, -). Two bytes of ^ are output if an error produces no measured data.
15	A	Auxiliary Flag (+, -)	1	If flag (+, -) (F) is found to be “+”, the first one byte of 1+, 2+ and 3+ of PLEDIA’s judgment (1, 2 or 3) is output. If no measured data is produced, or flag (+, -) is “ -” or “ +”, then “ ” is output.
16	E	Error Code	2	An error code according to the error code list [U-ERR] is output. Two bytes of ^ are output if no error is produced.

C. List of Error Codes

[U-ERR]

Error Information in PLEDIA		Error Information in io Compatible		
Code	PLEDIA Error Information	Measured Data		io Compatible Error Code
10	SAMPLE BARCODE READING ERROR	YES		10
20	DOUBLE SAMPLE BARCODE ERROR (Check within a day)	-		0A
01	INSUFFICIENT SAMPLE/NO SAMPLE	-		01
02	NO LATEX	-		02
03	RBC (PROZONE)	YES		04
04	PRC (PROZONE)	YES Value fixed to "9999"		04
05	OR (OVER RANGE)			05
06	UR (UNDER RANGE)	-		01
07	SAMPLE DISPENSING ERROR (such as jamming in the sample nozzle) PUNCTURING ERROR	-		01
08	LATEX DISPENSING ERROR (such as jamming in the reagent nozzle)	-		0A
09	MIXER ERROR (such as jamming in the mixer)	-		0A
0A	LATEX BLANK ERROR (A1 CHECK) Or Dilution Error	-		0A
0B	NO CC	-		0A
90	UNSET	-		90
The following is a list of combinations of the above-mentioned errors. No other combinations are produced under present circumstances.				
11	Combined error of Errors 10 and 01	-		11
12	Combined error of Errors 10 and 02	-		12
13	Combined error of Errors 10 and 03	YES	For details on flag (+, -) and data, see the above-mentioned output conditions for corresponding single errors.	14
14	Combined error of Errors 10 and 04	YES		14
15	Combined error of Errors 10 and 05	YES		15
16	Combined error of Errors 10 and 06	-		11
17	Combined error of Errors 10 and 07	-		11
18	Combined error of Errors 10 and 08	-		1A
19	Combined error of Errors 10 and 09	-		1A
1A	Combined error of Errors 10 and 0A	-		1A
1B	Combined error of Errors 10 and 0B	-		1A

* PLEDIA errors that are not controlled by Micro are integrated into the Micro error codes. Therefore, accurate error information of PLEDIA-could not be obtained on the system side through an on-line connection with Micro Compatible.
* Error code "04" of Micro is handled as PRC, in which data that can be measured are output. In PLEDIA, PRC and RBC are integrated in this error code on the io Communication MODE interface. However, in PLEDIA, PRC provides only flag (+, -) without outputting data, and RBC provides both. In error code "04" of io , a value of "9999" is always displayed for PRC, and a value between 1000 and 9999999 inclusive is displayed for RBC.
* For more information about other errors, see the list of error codes for "PLEDIA" Communication MODE interface [D-ERR].

11. Sample Barcode

Barcode Reader Specifications

1) Barcode Type: CODE 39, ITF, INDUSTRIAL 2 OF 5, COOP 2 OF 5, NW-7, CODE 128, and JAN.(Up to four types of barcodes can be set at a time.)

NOTE) Two-dimensional barcode is optional.

2) Barcode height: At least 6 mm

3) Narrow bar width: At least 0.19 mm (ratio of narrow bar width to wide bar width is 1:2.2 or higher.)

4) Quiet Zone: At least10 times the narrow bar width

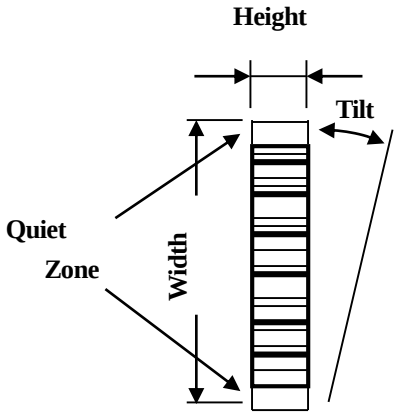
5) Number of digits: A number between 5 and 15 inclusive

6) PCS value: At least 0.45 (At least 75% white reflection)

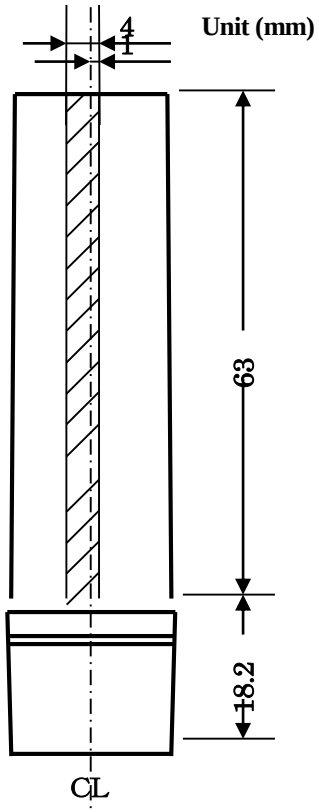
NOTE) PCS value = (White bar reflection - Black bar reflection) / White bar reflection

7) Bar label tilt: between ±4°

Terminology of barcode size and readable range

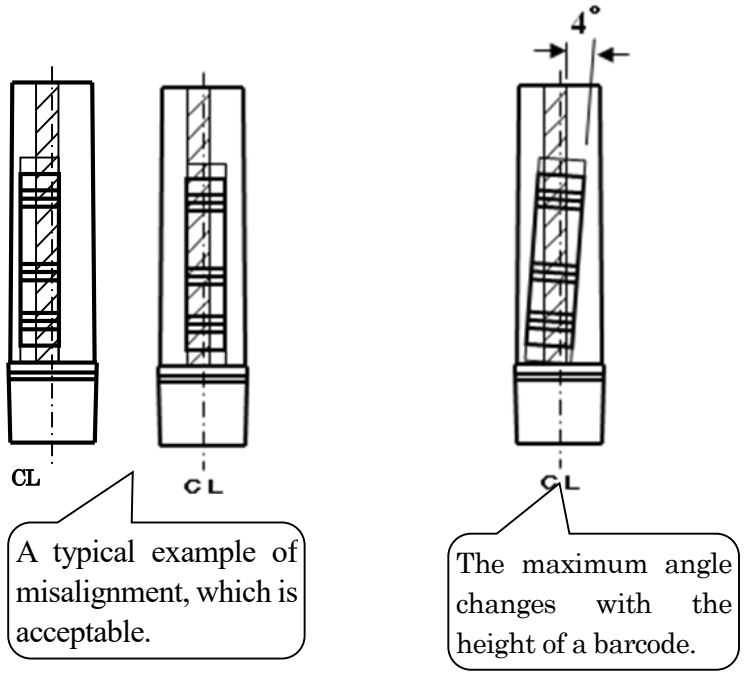


Direction of the Labeling



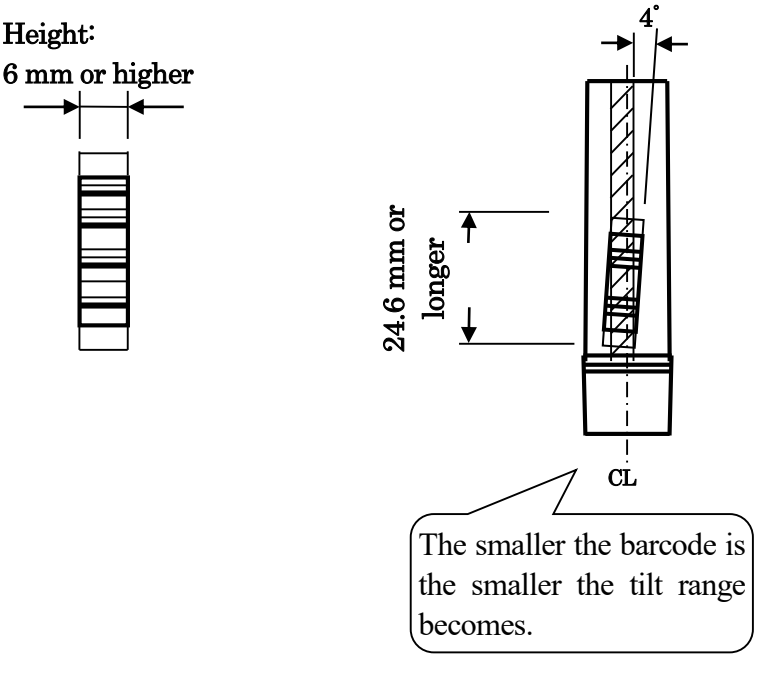
Position of the Labeling

Ex. Barcode pasting position of OC sampling bottle



Ex. Relation between barcode size and tilt

Case of using the barcode of following size, the permissible range of tilt is 4 °

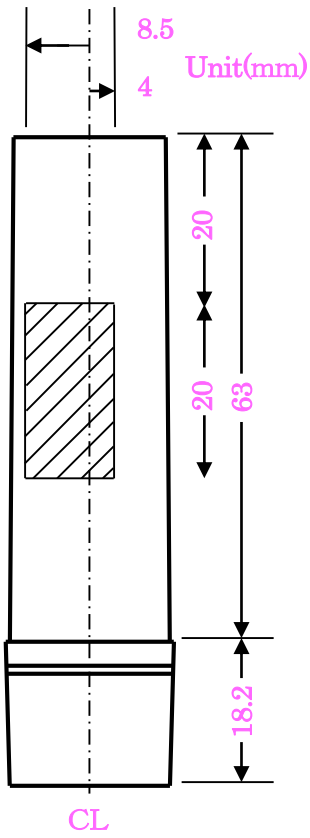


2D Barcode Reader Specifications

1) Barcode Type: QR Code (Model2, Version.4 , 33 x 33 Modules , Cell Size 0.25mm) ,
Micro QR Code (Version M1 to M4 , 17 x 17 Modules , Cell Size 0.33mm) ,
DataMatrix (24 x 24 Modules , Cell Size 0.25mm)

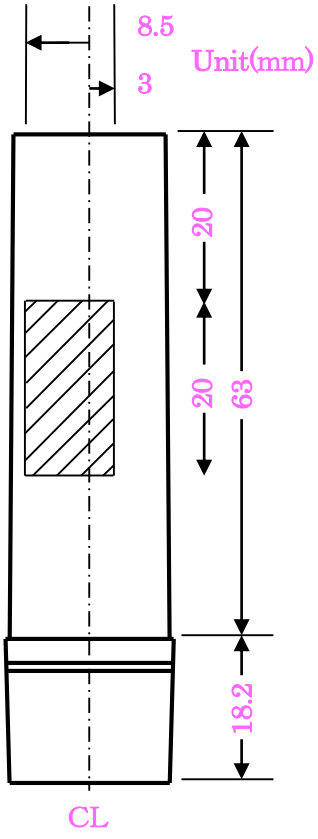
2) Number of digits: A number between 5 and 50 inclusive

Ex. Barcode pasting position of OC sampling bottle



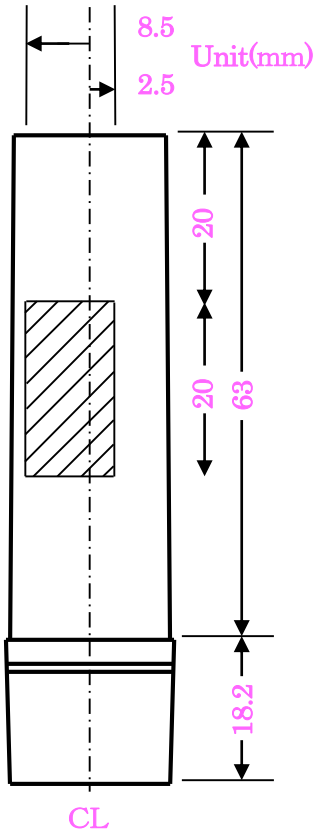
Position of the Labeling

[QR Code]



Position of the Labeling

[Micro QR Code]



Position of the Labeling

[DataMatrix]