

Automated Enzyme Immunoassay System

AIA-360

**Host Computer Connection
Specifications**

Rev.6

**TOSOH CORPORATION
BIOSCIENCE DIVISION**

Contents

1	Introduction	3
2	Lower level control	3
2.1	Communication specifications.....	3
2.2	Connections	3
2.3	Connector.....	3
2.4	Pin assignment.....	3
3	Higher level control	3
3.1	Message header record (H)	4
3.2	Patient information record (P)	4
3.3	Test order record (O).....	4
3.4	Result record (R) – Concentration.....	5
3.5	Result record (R) – Second R record (Rate value)	6
3.6	Comment record (C) – flag used on the AIA-360	7
3.7	Request information record (Q).....	7
3.8	Message terminator record (L)	7
3.9	Scientific record (S)	7
3.10	Manufacturer information record (M).....	7
4	AIA-360 operations and actual communications.....	7
4.1	Measurement result transmission to the host.....	7
4.1.1	General transmission examples	7

1 Introduction

This document describes the communication conventions used when connecting the AIA-360 system to a host computer (hereinafter called a host).

2 Lower level control

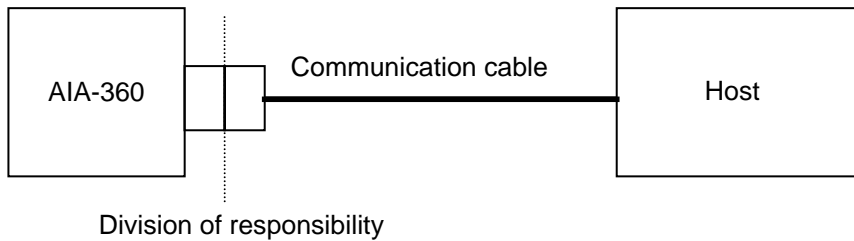
The following specifications shall be applied to ASTM E 1381-91. For details, refer to E1381-91.

2.1 Communication specifications

Item	Specification
Transmission method	RS232C asynchronous, half duplex
Transmission rate	1200, 2400, 4800, <u>9600</u> , 19200 bps
Transmission code	ASCII
Data length	7 bits, <u>8 bits</u>
Parity	Even, odd, <u>none</u>
Stop bit	<u>1 bit</u> , 2 bits

== Standard value

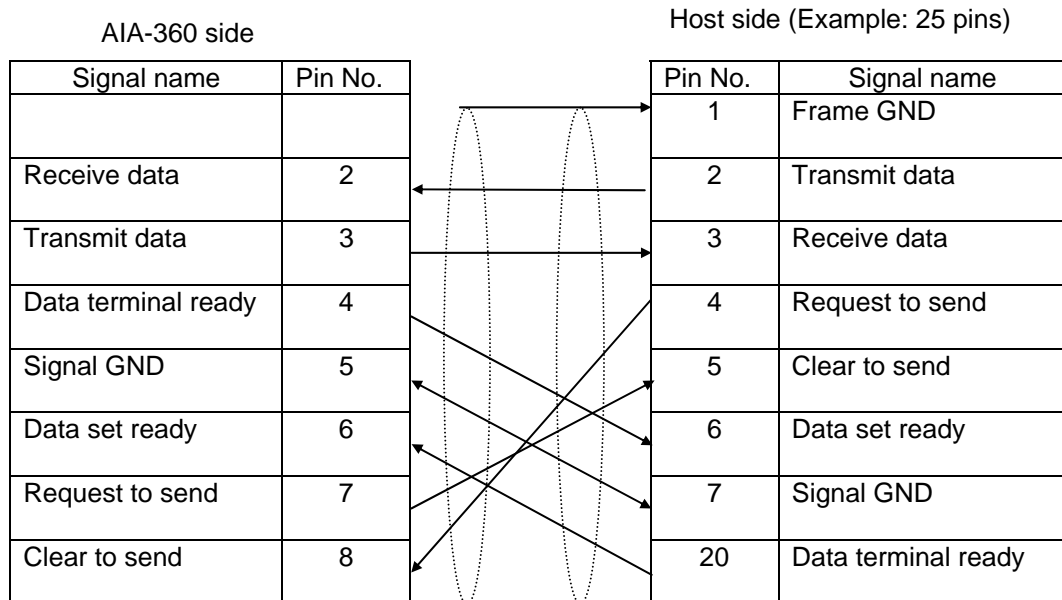
2.2 Connections



2.3 Connector

D-SUB 9p (socket) is used as the cable connector on the AIA-360 side.

2.4 Pin assignment



3 Higher level control

Only the information prescribed below is applied to ASTM E 1394-91. Other information will be discarded at reception or not handled at transmission. For details, refer to E 1394-91.

Notes:

- (1) For record transmission, store a single record in one low-level frame (do not store more than one record in one frame).
- (2) In the following explanations, "Transmit data" refers to data sent by the AIA-360 to the host.

3.1 Message header record (H)

No.	Name	Max digits	Transmit data
1	Record Type ID	1	H
2	Delimiter Definition	4	Delimiter set in AIA-360
3	Message Control ID	0	-
4	Access Password	0	-
5	Sender Name or ID	32	AIA-360
6-13	-	0	-
14	Date and Time of Message	14	Date and time of transmission YYYYMMDDHHMNSS
15	-	0	-

3.2 Patient information record (P)

No.	Name	Max digits	Transmit data
1	Record Type ID	1	P
2	Sequence Number	6	Serial number (from 1)
3	Practice Assigned Patient ID	14	-
4	Laboratory Assigned Patient ID	0	-
5	Patient ID No.3	0	-
6	Patient Name	Last: 0 First: 0	Only the component delimiter, ^ is transmitted
7-35	-	0	-

3.3 Test order record (O)

No.	Name	Max digits	Transmit data
1	Record Type ID	1	O
2	Sequence Number	6	Serial number (from 1)
3	Specimen ID	16	Specimen ID
4	Instrument Specimen ID	0	-
5	Universal Test ID Manufacturer's or Local Code	Analyte: 3 Dilution: 4 Lot:3	Analyte (000 to 999), Dilution(1-2500), Lot(000-999)
6-31	-	0	-

Note: The AIA-360 with Version 1.11 or later can transmit the Lot number of a test cup when the "6:LOT NUMBER TRANS" is set to **YES** in the **COMM** screen.

3.4 Result record (R) – Concentration

No.	Name	Max digits	Transmit data
1	Record Type ID	1	R
2	Sequence Number	6	Serial number (from 1)
3	Universal Test ID Manufacturer's or Local Code	3	Analyte (000 to 999)
4	Data or Measurement Value	8(12)	Concentration ZZZZZ9 to 9.99999 (Z for zero suppression, decimal point position fixed for each analytical item) Format in case of a digit overflow above: ±9.99999E±99
5	Units	6	Unit (X6)
6	Reference Ranges	Low: 8 High: 8 28 max including "to"	Normal lower limit (Low) Normal upper limit (High) ZZZZZ9 to 9.99999 (Z for zero suppression, decimal point position fixed for each analytical item) Format in case of a digit overflow above ±9.99999E±99 Low and high values separated by "to"
7	Result Abnormal Flags	2	Flag (See Table 1)
8	Nature of Abnormality Testing	0	-
9	Result Status	1	Status F: Final
10	Date of Change in Instrument Normative Values or Units	0	-
11	Operator Identification	32	Operator name
12	Date/Time Test Started	0	-
13	Date/Time Test Completed	14	Date and time of test completed YYYYMMDDHHMNSS
14	Instrument Identification	0	-

Note : The choices of the "7: OUT DATA (NO RESULT)" and the "8: OUT DATA (<L, >H)" has been added to the COMM. screen on the V1.20.

7 : OUT DATA (NO RESULT) : In case neither concentration, "<L" nor ">H" is obtained,

(SPACE) : Output a blank (Default)

(ZERO) : Output a "0"

The **unit** is not sent to the host.

8 : OUT DATA (<L, >H) : In case "<L" or ">H" is obtained for concentration,

(SPACE) : Output a blank (Default)

(ZERO) : Output a "0"

(RANGE) : Output the assay range

(<>RNG) : Output the assay range with a sign of inequality

The **unit** is sent to the host.

Note : When the (RANGE) is selected in the "8: OUT DATA (<L, >H)" on the COMM. Screen, if a result value is reported with <L or >H flag, the value of the ASSAY L or ASSAY H in the TEST FILE is output as a result value.

(Example) In the case of assaying in following conditions; ASSAY H: 400, concentration of specimen is about 1000 ng/mL. > is transmitted as ASTM flag and 400 is transmitted as a result value.



Although a result has several flags, only the highest-priority ASTM flag is transmitted. For example, when <L (or >H) and another higher-priority flag are added to a result, transmitted ASTM flag is A not < (nor >). Therefore, when the (RANGE) is selected in the "8: OUT DATA (<L, >H)" on the COMM. Screen, it is difficult to determine whether the transmitted result value from the AIA-360 is assay range or concentration.

It is recommended that the (SPACE) or (<>RNG) is selected in the "8: OUT DATA (<L, >H)" on the COMM. Screen.

Table 1 shows a cross-reference between flags used in the AIA-360 and for ASTM communications.

ASTM flag	Meaning	AIA-360 internal flag
L	Lower than normal	L□
H	Higher than normal	H□
HH	Abnormally high	None
LL	Abnormally low	None
<	Outside the measuring range	<L
>	Outside the measuring range	>H
N	Normal	Blank
A	Measurement error	SE,MF,BS, SP,DS,SS,SC, NB,DO,NC,CE,IO,WU,WS, AE,IM,LE,HB,CV,DL
U	-	None
D	-	None
B	-	None
W	-	None

Table 1

3.5 Result record (R) – Second R record (Rate value)

No.	Name	Max digits	Transmit data
1	Record Type ID	1	R
2	Sequence Number	6	Serial number (from 1)
3	Universal Test ID Manufacturer's or Local Code	4	Rate
4	Data or Measurement Value	7	Rate value Fraction: 3 digits (Note 4)
5	Units	4	nM/s
6	Reference Range	0	-
7	Result Abnormal Flags	2	Flag (See Table 2)
8	Nature of Abnormality Testing	0	-
9	Result Status	0	-
10	Date of Change in Instrument Normative Values or Units	0	-
11	Operator Identification	32	Operator name
12	Date/Time Test Started	0	-
13	Date/Time Test Completed	14	Date and time of test completed YYYYMMDDHHMNSS
14	Instrument Identification	0	-

Notes:

- (1) The AIA-360 transmits this record (second R record) when choosing the **RATE RS232C OUT** is set to **YES** in the **SYSTEM SPEC** screen.
- (2) NA is transmitted in the case of no measurement (due to an error) and >667 in the case of DO flag (rate exceeding 667 nM/s).

Table 2 describes each flag.

Flag	Meaning
N	Rate value is valid
A	Rate value is not valid. This flag reported when the rate value is NA or >667.

Table 2

3.6 Comment record (C) – flag used on the AIA-360

No.	Name	Max digits	Transmit data
1	Record Type ID	1	C
2	Sequence Number	6	Serial number (from 1)
3	Comment Source	1	Fixed to I
4	Comment Text	2 digits (fixed)	Flag used on AIA-360
5	Comment Type	1	Fixed to I

Note:

The "Comment Text" (flag) is fixed to 2 digits. This is filled with two space characters when the flag is null; with H followed by one space character for flag H; with L followed by one space character for flag L.

3.7 Request information record (Q)

Not used

3.8 Message terminator record (L)

No.	Name	Max digits	Transmit data
1	Record Type ID	1	L
2	Sequence Number	1	Fixed to 1
3	Termination Code	0	-

3.9 Scientific record (S)

Not used

3.10 Manufacturer information record (M)

Not used

4 AIA-360 operations and actual communications**4.1 Measurement result transmission to the host**

H, P, O, R, (second R), and L are transmitted to the host. The O and R records are transmitted as a pair.

4.1.1 General transmission examples

(Transmission example 1) When several measurement results are selected on the result screen and uploaded, the results are transmitted in the following format:

```
H|^&|||AIA-360|||||||19960910130500<CR>
P|1|||^^||<CR>
O|1|96000100000001|^001^1||||||| <CR>
R|1|^001|15.265|mg/ml|10.000 to 50.000|N||F||Operator||19960910121530<CR>
L|1<CR>
H|^&|||AIA-360|||||||19960910130500<CR>
P|1|||^^||<CR>
O|1|96000100000001|^002^1||||||| <CR>
R|1|^002|0.12|ng/ml|0.10 to 5.00|N||F||Operator||19960910121601<CR>
L|1<CR>
H|^&|||AIA-360|||||||19960910130500<CR>
P|1|||^^||<CR>
O|1|96000100000001|^003^1||||||| <CR>
R|1|^003|657|ug/ul|100 to 500|H||F||Operator||19960910121631<CR>
L|1<CR>
```

(Transmission example 2) When a second R record is added (by setting **YES** to the **RATE RS232C OUT** in the **SYSTEM SPEC** screen), the following format will be used.

```
H|^&||AIA-360|||||||19960910130500<CR>
P|1||||^||<CR>
O|1|96000100000001|^001^1|||||||<CR>
R|1|^001|15.265|mg/ml|10.000 to 50.000|N|F|Operator||19960910121530<CR>
R|2|^Rate|22.125|nN/s|N|||||19960910121530<CR>
L|1<CR>
```

(Transmission example 3) When Lot# is specified in the O record (by setting **YES** to the **"6:LOT NUMBER TRANS"** in the **COMM** screen), the following format will be used.

```
H|^&||AIA-360|||||||19960910130500<CR>
P|1||||^||<CR>
O|1|96000100000001|^001^1^45||||||| <CR>
R|1|^001|15.265|mg/ml|10.000 to 50.000|N|F|Operator||19960910121530<CR>
L|1<CR>
```