ADVIA® 1650
ADVIA® 1800
Chemistry Systems

ADVIA® 1650 and ADVIA® 1800 Chemistry Systems

LIS Interface Guide

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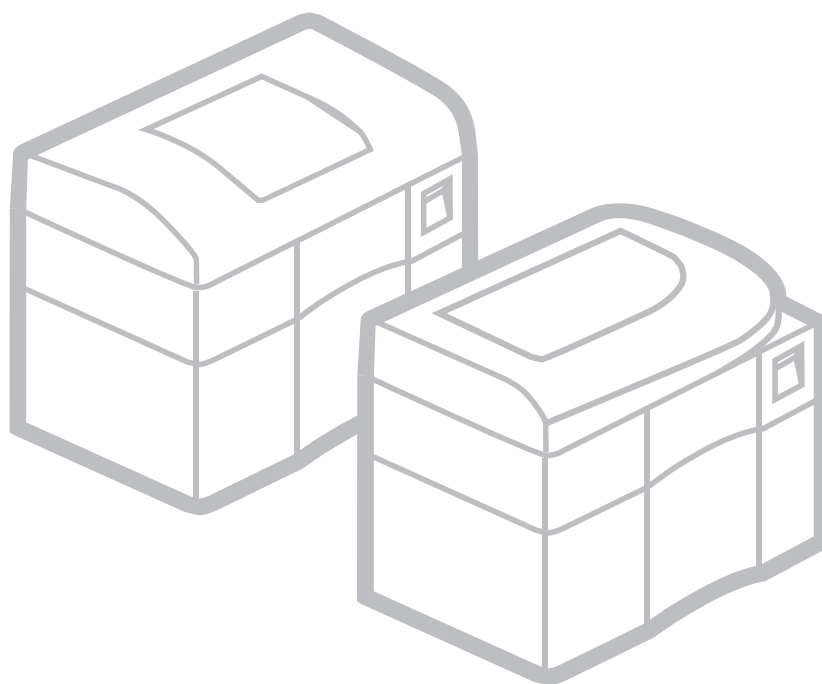
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Contents

Purpose

This document describes the communications between the ADVIA® 1650 and ADVIA 1800 Chemistry systems and a host computer (host).

The ADVIA Chemistry System and a host computer communicate in one of three ways:

- The ADVIA Chemistry system requests a specific workorder or a batch of workorders from the host computer.

- The host computer sends the workorders (test selections) in reply to these requests.

- The ADVIA Chemistry system sends the sample results for patient and control samples in real time, or in batch when initiated by the operator.

The ADVIA Chemistry system can also communicate with external samplers such as the rack handler and laboratory automation systems (ADVIA LabCell System). For information about these types of communications, refer to the publication entitled *ADVIA Chemistry System and Laboratory Automation System Connection Specifications.*

Interconnecting the ADVIA Chemistry System and the Host Computer

As shown below, the ADVIA Chemistry System is connected to the host computer via an RS-232C cable supplied by the laboratory. A 25-pin (RS-232C) to 9-pin adapter is required.
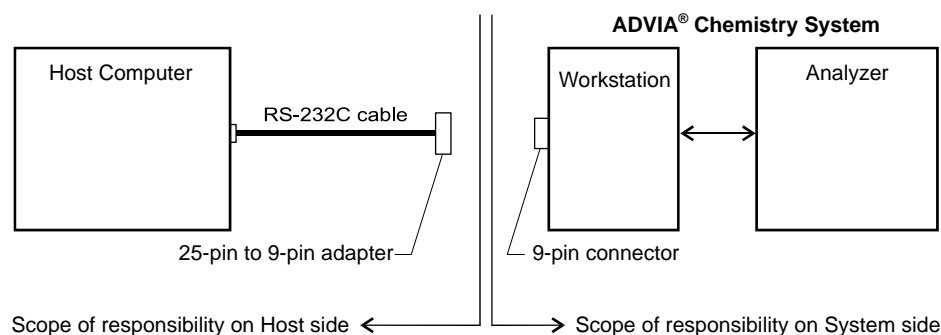

Figure 1 Simplified Interconnection Diagram

Communication Specifications and Parameters

The following specifications and parameters are applicable to the interface between the ADVIA Chemistry System and the host computer. The communication parameters are entered in the On-Line Set window. The underlined parameter values are the default selections.

Transmission specifications:	RS-232C
Synchronization:	Asynchronous
Communication speed:	4800 bps, <u>9600 bps</u>, 14400 bps,19200 bps
Coding:	
Parity:	None, <u>Even,</u> Odd
Start bit:	<u>1 bit</u>
Stop bit:	1 bit, <u>2 bits</u>
Data length:	7 bits, <u>8 bits</u>
Number of retries:	<u>3</u>
Number of error text skips:	<u>0</u>, 1, 2, 3
	When an abnormal text format causes an invalid response, this represents the number of times that processing of text alone can be skipped before the system goes offline,
ADVIA system connector:	D-SUB 25-pin female (Use a male connector on the cable side.)
Connector signals:	See Table 1 on page 3.
Transmission procedure:	The basic procedure is alternately to transmit a message and to receive an acknowledgment (ACK or NAK).
Online parameters	
Automatic test selection (STT):	No, <u>Yes</u>
Automatic real test selection (Rack Handler or LAS):	No, <u>Yes</u>
Automatic transfer of usual sample results:	No, <u>Yes</u>
Automatic transfer of interruption sample results:	No, <u>Yes</u>
Automatic transfer of pilot sample results:	No, <u>Yes</u>
Online timeout setting: The following timeout values can be set.	
Automatic test selection: (Timeout time from the start to end of automatic test selection.)	<u>60.0</u> seconds
Real-time test selecting: (Timeout time from the start to end of real-time test selection.)	<u>3.0</u> seconds
Frame interval: (Timeout time between frames)	<u>3.0</u> seconds
Online test setting:	Determines which tests are sent in the real-time output, batch output, and qualitative output. You can use the ADVIA processing test numbers (1–326) from the Process Sequence window, or you can define your own test codes (host numbers) on the Test Setting dialog box of the OnLine Setting window to identify the tests. The number that is entered into the code field on the Test Setting window, must be right justified.

Connector Pin Assignments

Table 1 lists the assignments for the 9-pin female connector attached to the COM1 port of the ADVIA workstation.

Table 1 9-Pin Connector Assignments

No.	I/O	Signal Name	Connection Information
1	IN	DCD	not connected
2	IN	SIN	ADVIA data IN
3	OUT	SOUT	ADVIA data OUT
4	OUT	DTR	Connect to pin 6 (DSR).
5		GND	signal ground
6	IN	DSR	Connect to pin 4 (DTR).
7	OUT	RTS	Connect to pin 8 (CTS).
8	IN	CTS	Connect to pin 7 (RTS).
9	IN	RI	not connected

Connect pins **4** (DTR) and **6** (DSR) together, and pins **7** (RTS) and **8** (CTS) together within the 9-pin connector because the ADVIA Chemistry System does not control these signals.

Use a separate shielded cable. To prevent external noise from entering the system, connect the shield to the connector casing at each end of the cable (if not already done).

Host connector:	Omron	XM2D-2501
		XM2Z-0001
9-pin adapter:	Omron	XM2A-2501 (soldered)
		XM2S-2511 (screw-on case)

When connecting this cable to the COM1 port connector at the rear of the ADVIA workstation (Figure 2), be sure to route it away from AC cables and any equipment that generates noise.

Do not try to connect the 25-pin RS-232C connector on the cable directly to the 9-pin COM1 connector.

NOTE

COM1 port locations vary with different models of PC:

PC Model SP6V	COM1 is located on the top.
PC Model SSE350	COM1 is located on the bottom.
PC Model Seattle2	COM1 is located on the bottom.
PC Model Arrow	COM1 is located on the bottom.

Message Frame Format

Each message frame exchanged between the ADVIA Chemistry System and the host computer contains the following elements:

STX	F# [0-7]	Message Text	ETX or ETB	CSH	CSL	CR	LF

Max frame length (selectable)	256 bytes, <u>512 bytes</u>
Code used	ASCII, shift JIS
STX (02H)	Frame start code
F# frame number	"1" (31H) to "7" (37H), "0" (30H) cyclically After ENQ transmission, the frame number is incremented beginning with 1, and when the frame number reaches 7, it returns to 0
Message	Text to be transmitted
ETX (03H)	Final-frame code
ETB (17H)	Intermediate-frame code
CSH	Checksum upper
CSL	Checksum lower
CR (0DH) + LF (0AH)	Frame end code

Communication Control Codes

The following control codes provide status information:

ENQ (05H)	Enquire Connection
ACK (06H)	Affirmative acknowledge (acknowledgment)
NAK (15H)	Negative acknowledge (acknowledgment)
EOT (04H)	End of transmission
DC1 (11H)	Sample request skip response (equipment control character)

The communication control codes are sent independently. (They are not enclosed by STX and ETX codes.)

Checksum Test   No, <u>Yes</u>

The Checksum test, which is enabled or disabled using the Online Settings window, checks the quality of the message. The sum of the characters, after STX, up to and including ETX or ETB, using modulo 256, is read hexadecimally and expressed as a 2-digit ASCII character. In the case of checksum No, a space code (20H) is transmitted, and no check is performed on the system side.

Example: <STX>1ABCDE<ETX><CSH><CSL><CR><LF>

```
    "1"  (49D)
    "A"  (65D)
    "B"  (66D)
    "C"  (67D)
    "D"  (68D)
    "E"  (69D)
+ ETX  (03D)
```

        387D → 183H (hexadecimal) → modulo 256 → 83H

        The checksum value 83H is sent as follows: CSH = "8" (38H) and   CSL = "3" (33H).

If both the sending and receiving device obtain the same checksum values, the message is considered valid.

Communication Modes

The available modes of communication are determined by the hardware configuration and by the specific options selected by the user.

■ Hardware Configuration

For communication purposes, the hardware configuration is determined by the sampling and barcode devices installed on your ADVIA Chemistry System. This information is contained on the System Specifications Settings window and is summarized as follows:

Table 2 System Specifications Settings Hardware Configuration

Specification	Barcode Option	Sample Delivery Option
Sample Tray (no barcode)	Yes <u>No</u>	<u>Sample Tray</u> / Rack conveyer / External Transport
Sample Tray (with barcode)	<u>Yes</u> No	<u>Sample Tray</u> / Rack conveyer / External Transport
Rack conveyer (no barcode)	Yes <u>No</u>[1]	Sample Tray / <u>Rack conveyer</u> / External Transport
Rack conveyer (with barcode)	<u>Yes</u> No[1]	Sample Tray / <u>Rack conveyer</u> / External Transport
Laboratory automation system	<u>Yes</u> No[2]	Sample Tray / Rack conveyer / <u>External Transport</u>

> [1] This setting is not supported. The rack handler used by the ADVIA Chemistry System is managed as a laboratory automation device (LAS).
>
> [2] Currently, all external sampling devices, including the rack handler, must have a barcode reader.

■ System Customization

The operator can customize the following system features:

Table 3 System Customization

Feature	Options	Applicable Window
Sampler for patient samples	<u>on-board sampler</u> external sampler	System Specifications Settings
Sample barcode reader	<u>Bar-code</u> cup posi.	System Specifications Settings
Automatic Test Select	Yes <u>No</u>	OnLine Settings
Results reporting	Auto transfer, User test Code, Data Clean	OnLine Settings

- Sampler Selection for Patient Samples

  Assuming that an external sampler (Rack Handler, LAS) is configured on the System Specifications Settings window, the Start Conditions Settings window determines which sampler is used for patient samples in the next run. For example, if the external sampler is unavailable, the operator can use the onboard sampler (STT) to run the patient samples.

- Barcode Selection

  Assuming the sample barcode reader is configured on the System Specifications Settngs window, the Start Conditions Settings window determines if the barcode mode or the position mode identifies samples on the onboard sampler.

  This option is valid only for the onboard sampler. The barcode mode must be used for the external sampler.

- Automatic test select is only applicable for patient samples aspirated from the onboard sampler (STT).

    Select **Yes** for the Automatic test select option on the OnLine Settings window to have workorders for the current tray (maximum 84) downloaded automatically from the host computer at the start of the run.

    When the Host toggle button is set to ON the system downloads a workorder from the host, if one is found. If a workorder is not found at the host, the system searches its internal database. If a workorder is not found in the internal database, the sample is not aspirated.

    The host workorder contains information that tells the system how to manage the workorder that was downloaded. The system can receive 4 different instructions.

Table 4 System Instructions for workorders

Instruction	System action
0	Create a new workorder in the system database. If a workorder with the same ID exists it is overwritten.
1	Create an additional test for the existing workorder. If a workorder with the same ID does not exist, a new one is created.
2	The system does not create a workorder for this ID.
3	An ID currently in the system database will be deleted.

Select **No** when patient samples are on an external sampler, such as the rack handler, or when you create workorders at the ADVIA Chemistry System workstation, or when you download workorders created at the host computer in batches.

- Data Output

    Use the OnLine Settings window (Figure 2) to determine if sample results are sent to the host computer in real time:

    Automatic transfer of general sample results (STT)

    Automatic transfer of interruption sample result (Rack Handler, LAS)

    Automatic transfer of pilot sample results (Controls)

Figure 2 OnLine Settings Window

■ Configure the New Host Protocol Format (optional)

The ADVIA system software provides for an optional new host protocol format. The new host protocol sends rack and position numbers (URH), an E flag, a 3 digit user code, and inspection time. The TDworkstation software V.8.22.1 does not support the new host protocol format. Host computers will have to be modified in order to support the new format.

Configuring the new host protocol

1. Log on to the ADVIA software as **supervisor**.

2. Set the data text form:

    a. Select **Setup** on the Menu Panel, then select **On-Line Settings**.

    b. At the On-Line setings window, select **NEW** for Online DATA TEXT format.

    c. Select **Save**, then **Yes**.

3. Set communication with the PC:

    a. Select **Setup** on the Menu Panel, then select **System Parameter Settings**.

    b. At the System Parameter Settings window, select **Controller 2** from the drop down list.

    c. Select **Next Page**, to locate parameter 213.

    d. In the Value field for 213: Sample Log Communication with PC, type **1**.

    e. Select **Next Page**, to locate parameter 224.

    f. In the Value field for 224: LAS Sample Log Communication, type **1**.

    g. Select **Save**, then **Yes**.

4. Set communication with the Rack Handler:

    a. At the Windows Desktop, double-select the **ARHOperator** icon.

    b. At the Universal Rack Handling System Operation Panel, select the **Administration** menu, then select **LAS Configuration**.

    c. At the LAS Configuration window, select **Yes** from the drop down list, then select **OK**.

    d. At the Universal Rack Handling System Operation Panel, select the **Exit,** then select **Yes**.

5. Restart the ADVIA system software.

The ADVIA system is set to transmit the new LIS format.

Refer to the *Message Data Text - New Format*, page 40, for a description of the new data text record format.

Turning off the new LIS format

1. Log on to the ADVIA software as **supervisor**.

2. Set the data text form:

    a. Select **Setup** on the Menu Panel, then select **On-Line Settings**.

    b. At the On-Line setings window, select **OLD** for Online DATA TEXT format.

    c. Select **Save**, then **Yes**.

The ADVIA system is set to transmit the old LIS format.

■ Available Operating Modes

Table 5 Operating Modes

Mode	System Configuration	Case	Sample ID	Sample feed	Order registration	Main purpose
1	Onboard sampler only (no barcode reader)	<1>	TT-CUP	Sample Tray	Auto.	Operation in which a TT-CUP number work sheet is drawn up by the host
2		<2>	TT-CUP	Sample Tray	Batch	When automatic test registration[1] is not possible
3	Onboard sampler only (with barcode reader)	<3>	Barcode	Sample Tray	Auto.	Sample numbers are used as barcodes
4		<4>	Barcode	Sample Tray	Batch	When automatic test registration[1] is not possible
5		<1>	TT-CUP	Sample Tray	Auto.	Processing of a sample that does not permit barcode operation
6		<2>	TT-CUP	Sample Tray	Batch	Processing of a sample that does not permit barcode operation
7	Rack handler (with barcode)	<5>	Barcode	Rack option	Real	Sample numbers are used as barcodes
8		<6>	Barcode	Rack option	Batch	When real test registration[1] is not possible
9	These modes are not supported at this time. Instead, the rack handler is managed as an LAS device as described in modes 17 to 24.	<7>	Rack number	Rack option	Real	When barcode operation is not possible
10		<8>	Rack number	Rack option	Batch	When barcode operation is not possible
11		<9>	SEQ number[2]	Rack option	Batch	Sample numbers automatically occurred are used
12		<9 >	SEQ number[2]	Rack option	Real	Sample numbers automatically occurred are used
13		<3>	Barcode	Sample Tray	Auto.	Interruption sample processing
14		<4>	Barcode	Sample Tray	Batch	Interruption sample processing
15		<1>	TT-CUP	Sample Tray	Auto.	Processing of a sample that does not permit barcode operation
16		<2>	TT-CUP	Sample Tray	Batch	Processing of a sample that does not permit barcode operation
17	Laboratory Automation System (LAS) device available including the rack handler	<5>	Barcode	Laboratory automation system	Real	Sample numbers are used as barcodes
18		<6>	Barcode	Laboratory automation system	Batch	When real test registration[1] is not possible
19		<7>	Rack number[3]	Laboratory automation system	Real	When barcode operation is not possible
20		<8>	Rack number[3]	Laboratory automation system	Batch	When barcode operation is not possible
21		<3>	Barcode	Sample Tray	Auto.	Interruption sample processing
22		<4>	Barcode	Sample Tray	Batch	Interruption sample processing
23		<1>	TT-CUP	Sample Tray	Auto.	Processing of a sample that does not permit barcode operation
24		<2>	TT-CUP	Sample Tray	Batch	Processing of a sample that does not permit barcode operation

[1] Refer to page 12 for explanations of the different communication protocols.

[2] Sequential No. analysis

[3] This setting is not presently supported.

In cases <1> and <7>, it is necessary to prepare a loadlist using the host, and also to set the data concerning the position number in the test selection instruction text.

In cases <2> and <8>, it is possible to draw up a loadlist using the ADVIA Chemistry System as well as the host.

In case (9), it is necessary to draw up a worksheet using the host, and also to set the data concerning the sample number in the test selection instruction text.

■ Sample Identification

The ADVIA Chemistry System has the following means of identifying samples internally within its database, during sampling, and during the transfer of data between the system and the host computer or an external sampler (rack handler or other LAS device).

Registration Number

The registration number is a sequence number between 1 and 10000. This number is employed in various ADVIA workstation software windows, but it cannot be used to identify samples in the communications between the ADVIA Chemistry System and the host computer or an external sampler.

Position Number

When not using barcodes, the sample position number is used to identify patient samples aspirated from the onboard sampler (STT). You can also use the position number as a data inquiry key in various ADVIA workstation windows.

The STT position number format is: 01-01 TT-CC (TT = tray number, 1 to 97; CC = sample position, 1 to 84)

Position numbers are used in online communications messages. The numbers are left-justified, not zero-suppressed, and terminated with an ASCII Space character (20H).

When position numbers are used, the entry of a sample number is still required.

Position numbers cannot be used to identify samples aspirated from an external sampler, such as, the rack handler.

Sample Number

The sample number consists of up to 13 alphanumeric characters. When barcode labels are used, the sample number becomes the barcode ID that identifies patient samples aspirated from the onboard sampler (STT) or an external sampler. You can also use the sample number as a data enquiry key in various ADVIA workstation windows.

A sample number is required for all workorders. This includes the position mode as described in the previous paragraph. The ADVIA Chemistry System does not accept a workorder that is missing a sample number.

Two sample number formats are available:

- General samples and interruption samples
  You can use IDs consisting of up to 13 arbitrary characters.

- Control samples
  A sample number from PA001 to PZ200 (5 characters, fixed length) is automatically assigned when a control sample is run.

  Pxnnn (P = pilot [control], x = control letter assigned on QC Sample Definition window, nnn = sequence number)

Sample numbers are used in online communications messages. When transmitted, these sample numbers are left-justified, not zero-suppressed, and terminated with an ASCII Space character (20H). For example: "001" and "1" are recognized as different sample numbers.

Sample Information

The sample information consists of comment 1, comment 2, sex, age, and so on.

Comments 1 and 2 each consist of a maximum of 16 arbitrary characters. You can use them as patient numbers or patient names. You can use them as search keys for making data inquiries. No check for duplicate entries exists.

In online communications messages, the sample data is treated as character data.

Classification of ADVIA Chemistry System Samples

Table 6 Sample Types

Sample	Sample ID	Test Registration by the Host	Data Output to the Host	Sample setting[1] Sample Tray	External Sampler
General sample[2]	13 digits	yes[3]	yes	yes[4]	yes[5]
Interruption sample[6]	13 digits	yes[3]	yes	yes	no
Control sample[7]	PA001 – PZ200	no	yes	yes	no
Calibration[8]	C0101 – C0110 M980101 – M980110	no	no	yes	no

[1] Run all samples except general samples on the Sample Tray (onboard sampler).
General samples are run on the Sample Tray or an external sampler such as the rack handler or a laboratory automation system (LAS), if available. When the run is started, the operator uses the Start Conditions window to select which sampler is used for general samples. If for any reason multiple samplers are selected, the analysis priority is to use the Sample Tray first and then use the rack handler or LAS.

[2] The ADVIA Chemistry System can manage a maximum of 10,000 general samples.

[3] The host computer can create workorders (test registration) for general samples and interruption samples.

[4] The position number for a sample on the Sample Tray (STT) consists of a tray number and a cup number. The tray number (TT) range is from 01 to 97, and the cup number (CUP) range is from 01 to 84.

[5] Currently, rack position numbers are not used for external samplers. Barcode labels are required for the LAS devices including the rack handler. However for reference purposes, the rack position number consists of a rack number and a sample number. The rack number range is from 0001 to 9999, and the sample number range is from 01 to 10.

[6] Interruption samples are treated as general samples; however, these samples are set at the CUP positions preset on the Sample Tray, and are analyzed first.

[7] Quality control samples are aspirated from positions on the Sample Tray (CTT). The listed sample IDs are reserved for controls only. Controls cannot be requested from the host computer. Instead, controls are usually requested from the Start Conditions window.

[8] Calibration samples are not handled online.

Single-point calibration: Cxxyy xx: Cup No. (01 - 61) yy: Number of times (01 - 05)

Multi standard: Mxxyyzz xx: TT No. (98,99)   yy: Cup No. (01 - 84) zz: Number of times (01 - 05)

■ Test Order Operation

When the host computer is online, all of the sample orders, regardless of analysis results of the sample, are inquired by the host computer. Then, workorders from the host computer and the ADVIA Chemistry System are combined, and the ADVIA Chemistry System selects the analysis orders.

The following Table explains how the system manages workorders from the host computer.

Table 7 Managing Workorders from the Host Computer

Host Order	System Order	System Response
New workorder	No	The system registers the sample and runs the tests requested by the host computer as a new workorder.
New workorder	Yes	The sample in the system is deleted, and the tests requested by the host computer are run as a new workorder.
Addition, Re-analysis	No	The sample is registered in the system, and the tests requested by the host computer are run as a new workorder.
Addition, Re-analysis	Yes	If tests requested by the host computer have already been run, they are repeated using the re-analysis conditions. If tests requested by the host computer have not been run, they are run as originals under first-analysis conditions.
No workorder	No	This sample is not analyzed.
No workorder	Yes	The tests in the system-created workorder are run.
Sample deletion	No	This sample is not analyzed.
Sample deletion	Yes	System order information of this sample is deleted. No analysis.

■ Sample and Test Database Registration Sizing

The system allows for the registration of routine samples.

- A single database block can store 10 tests.
- 30,000 blocks are available.
- If 11 tests are run, 2 blocks are required.

Table 8 Registered Samples by Number of Tests

# Tests	Number of Registered Samples
10	10,000
20	10,000
30	10,000
40	7,500
50	6,000
60	5,000
70	4,285
80	3,750
90	3,333
100	3,000

The number of samples that can be registered is roughly calculated by using the following formula:

$$\frac{30000}{(\text{Average number of tests} / 10)} = \text{Number of registered samples}$$

The system allows for the registration of a maximum of 10,000 routine samples.

Host Test Code Table

The ADVIA Chemistry System can manage a maximum of 326 tests:

- 300 tests
- 20 computed results (ratios)
- 3 serum indices (lipemia, hemolysis, and icterus)
- 3 electrolyte tests (Na$^+$, K$^+$, and Cl$^-$)

These tests areidentified in two ways for online communications. You can use the processing test numbers employed by the ADVIA Chemistry System, or you can define a separate set of test numbers or host test codes that agree with your laboratory's numbering scheme.

To enter the user-defined test codes, first select the **User Code Number** option in the Host Transfer Using field on the Online Settings window, and then select **Set Test** and enter the required numbers in the Code boxes of the Test Setting window. Thereafter, you can use the host test codes when ordering tests or managing results at the host computer. However, you must use the system processing numbers when working at the ADVIA Chemistry System.

The Serum indices area in the System Specification Settings window determines if the serum indices are automatically run for each sample or if they must be requested each time using the Order Entry window.

When any electrolyte test is ordered, the other two are run automatically.

In the indication of the result of each test, you can adjust the number of digits to the right of the decimal point can be adjusted for each test. Select the number of digits.

Table 9 Host Test Codes

Processing Test No.	Host Test Codes	Test Name	Number of Digits (Indication)	To right of decimal point	Classification
xx1	xx1[1]	(AST)	8 digits	test specific	photometric test
xx2	xx2	"	8 digits	test specific	photometric test
xxx	xx3	"	8 digits	test specific	photometric test
xxx	xxx	"	8 digits	test specific	photometric test
xxx	xxx	"	8 digits	test specific	photometric test
xxx	xxx	"	8 digits	test specific	photometric test
xxx	xxx	(A/G)	8 digits	test specific	ratio
xxx	xxx	"	8 digits	test specific	ratio
xxx	xxx	"	8 digits	test specific	ratio
xxx	xxx	"	8 digits	test specific	ratio
xxx	xxx	"	8 digits	test specific	ratio
xxx	xxx	Lipemia	Qualitative display possible	test specific	Blood serum data
xxx	xxx	Hemolysis	Qualitative display possible	test specific	Blood serum data
xxx	xxx	Icterus	Qualitative display possible	test specific	Blood serum data
xxx	xxx	Na	8 digits	test specific	Electrolyte test
xxx	xxx	K	8 digits	test specific	Electrolyte test
xxx	xxx	Cl	8 digits	test specific	Electrolyte test

[1] Normal test code is zero-suppressed, right-justified.

Communication Protocols

The following communication protocols are available:

- **Batch test registration**
  Communication starts after the operator uses the Host Request dialog box of the Order Entry window to identify a group (batch) of workorders to download from the host computer.

- **Automatic test select (Host Query Mode)**
  When this feature is selected on the Online Select window, the host computer downloads available workorders for STT patient samples upon request at the start of the run.

- **Real test select**
  This communications protocol supports external samplers, such as the rack handler or a laboratory automation system. The host computer downloads an available workorder for each sample identification number supplied by the external sampler.

- **Batch data output**
  Communication starts after the operator uses the Host Transfer dialog box of the Review / Edit window to identify a group (batch) of sample results to send to the host computer.

- **Real data output**
  Whenever each sample's assay is completed, the results are sent to the host computer.

The following information is applicable to each of the communication protocols.

- **Time outs**
  The system-side timer value is the maximum time that the ADVIA Chemistry system waits for a correct response from the host. Similarly, the host-side timer is the maximum time allowed for the ADVIA Chemistry System to respond.

  IMPORTANT

  The ADVIA Chemistry system can analyze individual tests at three-second intervals. If the sum of the system-side and host-side values exceeds the analysis time interval, the system sampling time is increased resulting in decreased throughput. To avoid a significant decrease in throughput, the host-side timer value should be less than that of the analyzer, and the host computer should respond as quickly as possible.

  If one sample has 'n' requested tests, the sample analysis interval is 3.0 seconds x 'n'. Consequently, the greater the value of n, the smaller the possibility of decreased throughput during the communication waiting period.

The three-second cycle time of the ADVIA Chemistry system imposes some restrictions on the response time of the host computer program. If one wants to continuously process samples with a single photometric test requested on the workorder (single test registration), then the host computer response time must be less than 3.0 seconds. A response time greater than 3.0 seconds reduces system throughput. The ADVIA Chemistry system must wait for a Host response before sampling can continue.

In addition the ADVIA Chemistry system gives priority to the communication of workorders (test registration) over result transfer (data communication). If the test registration is not completed within 3.0 seconds, then data accumulates in the ADVIA PC. This accumulation of data can damage the ADVIA PC.

The need for a 3.0 second response is reduced if two or more photometric tests are requested per workorder. The Host reponse time should be less than 3.0 seconds times the number of tests requested (3.0 sec x 'n' tests). ISE analysis by the ADVIA Chemistry system requires 24 seconds.

Table 10   Example of Response Time to Meet 3.0 Second Limitation

On condition of the transmission rate 9600bps

Test Registration		Communication Byte	Communciation Time (sec)	ADVIA Typical Response Time (sec)	Host Estimate Response Time (sec)
ADVIA → HOST	ENQ	1	0.00104		
ADVIA ← HOST	ACK	1	0.00104		0.25
ADVIA → HOST	Test request	30	0.03125	0.13	
ADVIA ← HOST	ACK	1	0.00104		0.25
ADVIA → HOST	EOT	1	0.00104	0.13	
ADVIA ← HOST	ENQ	1	0.00104		0.25
ADVIA → HOST	ACK	1	0.00104	0.13	
ADVIA ← HOST	Test regist.	93	0.09687		0.25
ADVIA → HOST	ACK	1	0.00104	0.13	
ADVIA ← HOST	EOT	1	0.00104		0.25
Data Online					
ADVIA → HOST	ENQ	1	0.00104		
ADVIA ← HOST	ACK	1	0.00104		0.25
ADVIA → HOST	Data online	112	0.11667	0.13	
ADVIA ← HOST	ACK	1	0.00104		0.25
ADVIA → HOST	EOT	1	0.00104	0.13	
		247	0.25729	0.78	1.75

Total Online Time — **2.79**

- **Required host response to communication initialization**
  The ADVIA Chemistry system initiates communications regardless of the receiving condition of the host computer. The first line request (ENQ) of the communication procedure is communicated to identify whether the host computer can receive or not. Regardless of the host process conditions, the host must receive the line request (ENQ) and reply for confirmation.

  If the host computer is temporarily unable to respond, the ADVIA Chemistry system retransmits a line request (ENQ) repeatedly up to the maximum number of times[1], if a negative response (NAK) is returned to the ADVIA Chemistry system line request within an analyzer-side time-out. This retransmission can expand the host reception starting time. Note that these processes reduce system performance.

- **Host means of identifying samples**
  The position-mode method (TT-CUP No.) is available for patient samples aspirated from the on-board sampler (STT). For example, a user who operates the ADVIA Chemistry system in the barcode mode can request a suitable ID that is different from the barcode ID during analysis, and process interruption samples using the TT-CUP numbers. If, however, the barcode sample is still being analyzed, the ADVIA Chemistry system cannot be offline. In this case, the automatic test registration by TT-CUP No. message is transmitted to the host. The ID that the host does not handle is transmitted, and the host must respond as follows:

  To test inquiries: No order response
  To measurement data text: Confirmation response

  If the response is not transmitted, a time-out error occurs on the analyzer side.

---

[1] Refer to the error processing information on page 22.

■ Batch Test Registration Protocol

Communication is started from the Order Entry window.

The request conditions (sample identification, range, and related data) entered by the operator are inserted into the batch test inquiry text which is then transferred to the host computer as a workorder inquiry.

The host sends the test-selection instruction text, under specified conditions, for the samples with tests to be analyzed by the ADVIA Chemistry system.

If these communications are interrupted by the operator, the ADVIA Chemistry System sends an EOT signal to the host, and the transmission is ended.

The event numbers in the following diagram, for example **<1>**, are explained in Table 9.

System	ENQ	→		Host
<1>				
System		←	Acknowledgment	Host
<2>				
System	Batch Test inquiry	→		Host
<3>				
System		←	Acknowledgment	Host
<4>				
System	EOT	→		Host
<5>				
System		←	ENQ	Host
<6>				
System	Acknowledgment	→		Host
<7>				
System		←	Test-selection instruction[1]	Host
<8>				
System	Acknowledgment	→		Host
… (Repetition)				
System		←	Test-selection instruction	Host
<8>				
System	Acknowledgment	→		Host
<7>				
		←	EOT	Host

Figure 3 Batch Test Registration Dialog

[1] Only samples that have test-selection instructions are registered. If the line finishes on this first timing, no registration is done.

Table 11 Batch Test Registration Events

| Timer | | Timer Monitoring Interval | | Timer Interval | Action |
		Start	End		
<1>	ENQ	ENQ sent	Receipt of acknowledgment	5 seconds	EOT is sent, and processing stops.
<2>	System-side processing period	Acknowledgment received	Inquiry sent	(2 seconds)	
<3>	Inquiry acknowledg-ment	Inquiry sent	Acknowledgment received	3 seconds	EOT is sent, and processing stops.
<4>	System-side processing period	Acknowledgment received	EOT sent	(2 seconds)	
<5>	Response after EOT	EOT sent	ENQ received	5 seconds + a[1] changeable	The system sends EOT, and test selection processing stops.
<6>	System-side processing period	ENQ received	Acknowledgment sent	(2 seconds)	
<7>	Response after an acknowledg-ment	Acknowledgment sent	Next-frame mes-sage received	5 seconds + a changeable	The system sends EOT, and test selection processing is interrupted. The received part is valid.
<8>	System-side processing period	Test selection received	Acknowledgment sent	2 seconds	
<9>	Entire proce-dure processing time	System ENQ sent	Host EOT sent	Not observed	

[1] a is the time-out value between frames.

■ Automatic Test Registration Protocol

If the Automatic test select option is selected on the Online Settings window, the system requests workorders for the current tray (samples loaded onto the STT). When the Sample Tray-analysis mode starts, communications take place and analysis starts automatically after the workorders are downloaded and registered.

The event numbers in the following diagram, for example **<1>**, are explained in Table 10.

System	ENQ	→		Host
<1>				
System		←	Acknowledgment	Host
<2>				
System	Test inquiry	→		Host
<3>				
System		←	Acknowledgment	Host
<4>				
System	EOT	→		Host
<5>				
System		←	ENQ	Host
<6>				
System	Acknowledgment	→		Host
<7>				
System		←	Test-selection instruction[1]	Host
<8>				
System	Acknowledgment	→		Host
… (Repetition)				
System		←	Test-selection instruction	Host
<8>				
System	Acknowledgment	→		Host
<7>				
		←	EOT	Host

Figure 4 Automatic Test Registration Dialog

[1] Only samples that have test-selection instructions are registered. If the line finishes on this first timing, no registration is done.

Table 12 Automatic Test Registration Events

	Timer	Timer Monitoring Interval		Timer Interval	Action
		Start	End		
<1>	ENQ	ENQ sent	Receipt of acknowledgment	5 seconds	EOT is sent, and processing stops.
<2>	System-side processing period	Acknowledgment received	Inquiry sent	(2 seconds)	
<3>	Inquiry acknowledg-ment	Inquiry sent	Acknowledgment received	3 seconds	EOT is sent, and processing stops.
<4>	System-side processing period	Acknowledgment received	EOT sent	(2 seconds)	
<5>	Response after EOT	EOT sent	ENQ received	5 seconds + a[1] changeable	EOT is sent, and processing stops.
<6>	System-side processing period	ENQ received	Acknowledgment sent	(2 seconds)	
<7>	Response after an acknowledg-ment	Acknowledgment sent	Next-frame mes-sage received	5 seconds + a changeable	EOT is sent, and processing stops.
<8>	System-side processing period	Test selection received	Acknowledgment sent	2 seconds	
<9>	Entire proce-dure processing time	System ENQ sent	Host EOT sent	42 seconds + b[2] changeable	EOT is sent, and processing stops.

[1] a is the time-out value between frames.

[2] Automatic test-selection time-out value

■ Real Test Registration Protocol

During analysis in which patient samples are aspirated from an external sampler such as the rack handler or LAS device, the external sampler reads the barcode ID for each sample and sends it to the ADVIA Chemistry system. If the required workorder is not available, the system queries the host computer.

The event numbers in the following diagram, for example **<1>**, are explained in Table 11.

System	ENQ	→		Host
<1>				
System		←	Acknowledgment	Host
<2>				
System	Test inquiry	→		Host
<3>				
System		←	Acknowledgment	Host
<4>				
System	EOT	→		Host
<5>				
System		←	ENQ	Host
<6>				
System	Acknowledgment	→		Host
<7>				
System		←	Test-selection instruction[1]	Host
<8>				
System	Acknowledgment	→		Host
… (Repetition)				
System		←	Test-selection instruction	Host
<8>				
System	Acknowledgment	→		Host
<7>				
		←	EOT	Host

Figure 5 Real Test Registration Dialog

[1] Only samples that have test-selection instructions are registered. If the line finishes on this first timing, no registration is done.

Table 13 Real Test Registration Events

	Timer	Timer Monitoring Interval		Timer Interval	Action
		Start	End		
<1>	ENQ	ENQ sent	Receipt of acknowledgment	5 seconds	EOT is sent, and processing stops.
<2>	System-side processing period	Acknowledgment received	Inquiry sent	(2 seconds)	
<3>	Inquiry acknowledg-ment	Inquiry sent	Acknowledgment received	3 seconds	EOT is sent, and processing stops.
<4>	System-side processing period	Acknowledgment received	EOT sent	(2 seconds)	
<5>	Response after EOT	EOT sent	ENQ received	5 seconds + a[1] changeable	EOT is sent, and processing stops.
<6>	System-side processing period	ENQ received	Acknowledgment sent	(2 seconds)	
<7>	Response after an acknowledg-ment	Acknowledgment sent	Next-frame mes-sage received	5 seconds + a changeable	EOT is sent, and processing stops.
<8>	System-side processing period	Test selection received	Acknowledgment sent	2 seconds	
<9>	Entire proce-dure processing time	System ENQ sent	Host EOT sent	42 seconds + b[2] changeable	EOT is sent, and processing stops.

[1] a is the time-out value between frames.

[2] Automatic test-selection time-out value

■ Batch Data Output Protocol

Communication is started from the Review/Edit window, where the operator identifies the group of sample results to send to the host computer.

You can use the Data Clean Set feature of the Online Settings window to validate the sample results before they are transmitted. Results that fail are not sent. Use the Test Results List dialog box of the Review / Edit window to determine which samples failed the data clean check.

If the operator interrupts this communication, the ADVIA Chemistry system sends an EOT signal to the host and the transmission is ended.

The event numbers in the following diagram, for example **<1>**, are explained in Table 12.

System	ENQ	→		Host
<1>				
System		←	Acknowledgment	Host
<2>				
System	Sample results	→		Host
<3>				
System		←	Acknowledgment	Host
… (Repetition)				
System	Sample results	→		Host
<3>				
System		←	Acknowledgment	Host
<2>				
System	EOT	→		Host

Figure 6 Batch Data Output Dialog

Table 14 Batch Data Output Events

	Timer	Timer Monitoring Interval		Timer Interval	Action
		Start	End		
<1>	ENQ	ENQ sent	Receipt of acknowledgment	5 seconds	EOT is sent, and processing stops.
<2>	System-side processing period	Acknowledgment received	Sample results sent	(3 seconds)	
<3>	Data acknowl-edgment	Sample results sent	Acknowledgment received	3 seconds	EOT is sent, and processing stops.
<4>	All processing period			not observed	

■ Real Data Output Protocol

The results for each sample are automatically sent to the host computer when they are available.

Use the Automatic transfer area on the Online Settings window to designate which kinds of sample results are sent. Use the Data Clean Set feature to validate the sample results before they are transmitted. Results that fail are not sent. Use the Test Results List dialog box of the Review / Edit window to determine which samples failed the data clean check.

The event numbers in the following diagram for example **<1>**, are explained in Table 13.

System	ENQ	→		Host
<1>				
System		←	Acknowledgment	Host
<2>				
System	Sample results	→		Host
<3>				
System		←	Acknowledgment	Host
<2>				
System	EOT	→		Host

Figure 7 Real Data Output Dialog

Table 15 Real Data Output Events

Timer		Timer Monitoring Interval		Timer Interval	Action
		Start	**End**		
<1>	ENQ	ENQ sent	Receipt of acknowledgment	5 seconds	EOT is sent, and processing stops.
<2>	System-side processing period	Acknowledgment received	Sample results sent	3 seconds	
<3>	Data acknowl-edgment	Sample results sent	Acknowledgment received	3 seconds	EOT is sent, and processing stops.
<4>	All processing period			not observed	

■ Error Processing

Abnormal Text Format

If the system receives text that is abnormally formatted, the ADVIA Chemistry system sends a NAK signal.

The abnormal text-NAK cycle may repeat up to 3 times.

When the system receives text that is abnormally formatted again, the error-skip counts (by the internal counter) increase, and the number of counts is compared to the set error-sample skip number. Then, either of the following processes takes place (refer to example below).

- If the number of error-skip counts is less than or equal to the number of text error-skip counts:

    System   The system transmits a request-skip response (DC1).

    Host   The host transmits test-selection an instruction for the next sample or EOT.

- If the number of error-skip counts exceeds the number of text error-skip counts:

    System   The system transmits EOT. Test-selection is terminated. Valid workorders are implemented.

    Host   The host transmission of an test-selection instruction is terminated.

[Example]
Responses from the ADVIA Chemistry system (when text that has an abnormal format is received while executing an test-selection instruction).

System		←	Test selection-instruction	Host
System	Acknowledgment (ACK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
System	Negative acknowledge (NAK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
System	Negative acknowledge (NAK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
System	Negative acknowledge (NAK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
(The number of error-skip counts does not exceed the number of text error-skip counts.)				
System	Sample request skip response (DC1)	→		Host
System		←	Next sample test selection-instruction	Host
		. . .		
System		←	Test selection-instruction	Host
System	Acknowledgment (ACK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
System	Negative acknowledge (NAK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
System	Negative acknowledge (NAK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
System	Negative acknowledge (NAK)	→		Host
System	Text format abnormal	←	Test selection-instruction	Host
(The number of error-skip counts exceeds the number of text error-skip counts.)				
System	Circuit interruption (EOT)	→		Host

Receipt Of Resend Request

If the ADVIA Chemistry system receives a negative acknowledgment (NAK) from the host, it resends the same frame 3 times. At the fourth negative acknowledgment (NAK), the ADVIA Chemistry system sends EOT and terminates the processing.

Text Formats

The following text formats specify how workorder and result information are transmitted.

- batch-test query text
- test-query text
- test-selection instruction text (previous time No/previous time Yes)
- measurement-data text

Typically, this information requires more than one frame:

termination code for intermediate frame = ETB (17H) + checksum + CR + LF

termination code for last frame = ETX (03H) + checksum + CR + LF

■ Batch-Test Query Text
(from ADVIA Order Entry window)

Applicable communication function:	Batch-test registration (page 14)
Communication direction:	ADVIA Chemistry system $\rightarrow$ Host Computer

Table 16 Batch-Test Query Text (fixed length, 41 bytes)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	'q' (71H)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"01" (no zero suppression)
Block number	2	"01" (no zero suppression)
ID classification	1	"0" (30H) Arbitrary sample ID, Barcode ID, Sequential ID "1" (31H) Sample Tray TT No. and cup position No "2" (32H) Rack No. and number indicating position in rack "3" (33H) Independent holder No
Initial sample ID	13	The response to the ID classification (previous test) is as follows: Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified, 20H at the end Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end

Table 16 Batch-Test Query Text (fixed length, 41 bytes) (Cont)

Data Test	Bytes	Code
Final sample ID	13	The response to the ID classification (previous test) is as follows: Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end Rack number: Fixed-length, 7 digits, no zero suppression, left-justified, 20H at the end Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

Before communication is initiated, the following information is provided by the operator using the Host request dialog box of the Order Entry window:

- The ID classification test indicates the method used to identify the starting sample ID and the final sample.

- The starting sample ID and the final sample ID determine the range of workorders being requested.

The ADVIA Chemistry system does not check for the order ID and the number of received samples, relative to the test-selection instruction text of the host.

In the case of transmission without range designation, the ID positions for the initial and final samples are blank spaces.

When inspection without range designation is performed, both the blank spaces and zeros should be taken into account.

◼ Test Request Text

Applicable communication function:	Automatic test registration (page 16)
	Real test registration (page 18)
Communication direction:	ADVIA Chemistry system → Host Computer

Maximum frame size	Maximum number of blocks
256 bytes	5 blocks
512 bytes	3 blocks

Table 17 Test Request Text (first block to last block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"Q" (51H)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"01" to "05" (no zero suppression)
Block number	2	"01" to "05" (no zero suppression)
Number of inquiry samples in a block	2	"01" to "99" (no zero suppression)
ID classification	1	"0" (30H) Arbitrary sample ID, Barcode ID, Sequential ID "1" (31H) Sample Tray TT No. and cup position No. "2" (32H) Rack No. and number indicating position in rack "3" (33H) Independent holder No.
Sample ID	13 byte x n[1]	The response to the ID classification (previous test) is as follows: Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified, 20H at the end Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] When the maximum frame size is 256 bytes, the maximum number of tests is n = 18. The maximum number of samples enquired with one text is 84 samples (Sample Tray) and 5 or 10 samples (rack).

When the maximum frame size is 512 bytes, the maximum number of tests is n = 38. STAT samples or quality control samples have no test enquiry.

■ Test-Selection Instruction Text

Two test-selection instruction texts are used, one with previous data and the other without previous data.

The number of tests for which a request can be made for one sample is 326.

Test-selection instruction text – no previous value

Applicable communication function:	Batch-test registration (page 14)
	Automatic test registration (page 16)
	Real test registration (page 18)
Communication direction:	ADVIA Chemistry system ← Host Computer

Maximum frame size	Maximum number of blocks
256 bytes	7 blocks
512 bytes	3 blocks

Table 18 Test-selection Text – No Previous Value (first block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"O" (4FH)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"01" to "07" (no zero suppression)
Block number	2	"01" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Sample classification	1	"N" (4EH) General sample "I" (49H) Interruption sample
Registration data	1	"0" (30H) New request. (If a registered sample [workorder] already exists, it is overwritten.) "1" (31H) Test addition, re-run. (In case of an unregistered sample, same as a new request.) "2" (32H) No request. (The system does not perform registration.) "3" (33H) Sample deletion. (Deletion of a previously registered sample)
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end. Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end. Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end. Be sure to set unique sample numbers, even for an order of position No. designation.

Table 18 Test-selection Text – No Previous Value (first block, variable length) (Cont)

Data Test	Bytes	Code
Position number	7	Filled with blank spaces when not used (20H).
		Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end
		Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified
		Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end
Comment 1	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Comment 2	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Sex	1	"M" (4DH) male or "F" (46H) female: When not used, set to "M".
Age	3	999 (right-justified): When not used, all three characters are 20H. Zero years old is 20H, 20H, "0".
Blood sampling date	8	YYYYMMDD Example: 19990229 Filled with blank spaces (20H) when not used.
Dilution coefficient	4	Format: 99.9 (right-justified): When not used, be sure to insert Format: ^1.0 (^0.1 - 99.9). ^ : blank space
Sample classification	1	"1" (31H) blood serum, "2" (32H) urine: When not used, be sure to input "1".
Container classification	1	"1" to "9" : When not used, "1".
Request test	$(3+1) \times n$[1]	Test number 3 bytes, Format: 999 (right-justified), 0 suppress
		Sample volume and dilution determined via the Analytical Parameters (Chemistry) window. One byte "M" or "D" or "U". Normally set to "M".
		"M" = Analytical conditions values
		"D" or "U" = Reanalysis condition values
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] When the maximum frame size is 256 bytes the maximum number of tests is n = 41. When the maximum frame size is 512 bytes the maximum number of tests is n = 105.

Table 19 Test-selection Text – No Previous Value (second to last block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"O" (4FH)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"02" to "07" (no zero suppression)
Block number	2	"02" to "07" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Spare	2	Not used (20H)

Data Test	Bytes	Code
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end
		Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end
		Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end
		Be sure to set unique sample numbers, even for an order of position No. designation.
Position number	7	Filled with blank spaces when not used (20H).
		Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end
		Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified
		Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end
Request test	$(3+1) \times n$[1]	Test number 3 bytes, Format: 999 (right-justified), 0 suppress
		Sample volume and dilution determined via the Analytical Parameters (Chemistry) window. One byte "M" or "D" or "U". Normally set to "M."
		"M" = Analytical conditions values
		"D" or "U" = Reanalysis condition values
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] When the maximum frame size is 256 bytes, the maximum number of tests is n = 54. When the maximum frame size is 512 bytes, the maximum number of tests is n = 118.

Operational Notes:

- If the ID is classified as a sample ID for a batch-test inquiry or a test inquiry, set the sample ID in the test-selection instruction text, and leave the position number unused (barcode operation or creation of worksheets using the ADVIA Chemistry system).

- If the ID is classified as a Sample Tray ID or rack-number ID for a batch-test inquiry or an test inquiry, set the position number to which the inquiry was addressed, and also set the sample number to be controlled by the host in the sample ID test (creation of worksheet using the host).

- At the start of Sample Tray analysis, the sample classified "I" as an interruption sample on sample classification is analyzed first. The ADVIA Chemistry system also has a built-in function to give priority to interruption samples for Sample Tray analysis. When the samples are analyzed on the rack option or conveyor-belt system, analysis begins sequentially as ordered regardless of that function. Therefore, interruption samples for these systems should be set on the Sample Tray.

- Registration data box

  "0" New Request
  A new request is unconditionally registered as a new test selection. In case of an already registered sample, its information is deleted and overwritten, thereby erasing the analysis-result data. If you cannot judge whether it is a new request or registered test on the host side, specify all of the tests in the next box as "'1' test addition, rerun."

  "1" Test addition and rerun
  If the sample is an unregistered sample, it is registered as a new request. If the sample is a registered test, the information of the registered test and test selection order from the host are subjected to the "OR" condition and then analyzed. If there is an order for an analyzed test, the test is analyzed again under rerun conditions. If an order is an uninspected test, the test is analyzed under initial-inspection conditions.

"2" No request
Applicable when there is no sample information is on the host side or no new order for analysis exists. In this case, the request test box is omitted.

"3" Sample deletion
Sample registration is normally deleted from the system. Use this box when deleting orders by batch test registration from the host.

Test-selection instruction text – previous value exits

Applicable communication function:	Batch-test registration (page 14)
	Automatic test registration (page 16)
	Real test registration (page 18)
Communication direction:	ADVIA Chemistry system ← Host Computer

Maximum frame size	Maximum number of blocks
256 bytes	24 blocks
512 bytes	11 blocks

Table 20 Test-selection Text – Previous Value Exists (first block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"o" (6FH), lowercase alphabetic oh
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"01" to "24" (no zero suppression)
Block number	2	"01" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Sample classification	1	"N" (4EH) General sample "I" (49H) Interruption sample
Registration data	1	"0" (30H) New request. (If a registered sample [workorder] already exists, it is overwritten.) "1" (31H) Test addition, re-run. (In case of an unregistered sample, same as a new request.) "2" (32H) No request. (The ADVIA Chemistry system does not perform registration.) "3" (33H) Sample deletion. (Deletion of a previously registered sample)
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end Be sure to set unique sample numbers, even for an order of position No. designation.

Data Test	Bytes	Code
Position number	7	Filled with blank spaces when not used (20H).
		Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end
		Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified
		Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end
Comment 1	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Comment 2	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Sex	1	"M" (4DH) male or "F" (46H) female: When not used, set to "M".
Age	3	999 (right-justified): When not used, all three characters are 20H. Zero years old is 20H, 20H, "0".
Blood sampling date	8	YYYYMMDD Example: 19990229 Filled with blank spaces (20H) when not used.
Dilution coefficient	4	Format: 99.9 (right-justified): When not used, be sure to insert Format: ^1.0 (^0.1 - 99.9). ^ : blank space
Sample classification	1	"1" (31H) blood serum, "2" (32H) urine: When not used, be sure to input "1".
Container classification	1	"1" to "9" : When not used, "1".
Request test	(3+1+8+ 3) x n[1]	Test number 3 bytes, "999" (right-justified)
		Sample volume and dilution determined via the Analytical Parameters (Chemistry) window. One byte "M" or "D" or "U". Normally set to "M".
		"M" = Analytical conditions values
		"D" or "U" = Reanalysis condition values
		Previous value: 8 bytes for 8-digit number (including "-" sign) and floating decimal point, right-justified[2] Filled with blank spaces (20H) when not used.
		Mark: 3 bytes Refer to mark specifications, page 36.
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] When the maximum frame size is 256 bytes, the maximum number of tests is n = 11. When the maximum frame size is 512 bytes, the maximum number of tests is n = 28.

[2] Previous values are as follows.

    123.45 → ^^123.45
    –6.7 → ^^^^–6.7
    ^ : Blank space (20H)

Table 21 Test-selection Text – Previous Value Exists (second to last block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"o" (6FH), lowercase alphabetic oh
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"02" to "24" (no zero suppression)
Block number	2	"02" to "24" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Spare	2	Not used (20H)
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end
		Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end
		Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end
		Be sure to set unique sample numbers, even for an order of position No. designation.
Position number	7	Filled with blank spaces when not used (20H).
		Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end
		Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified
		Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end
Request test	(3+1+8+ 3)x n[1]	Test number 3 bytes, "999" (right-justified)
		Sample volume and dilution determined via the Analytical Parameters (Chemistry) window. One byte "M" or "D" or "U". Normally set to "M".
		"M" = Analytical conditions values
		"D" or "U" = Reanalysis condition values
		Previous value: 8 bytes for 8-digit number (including "-" sign) and floating decimal point, right-justified[2] Filled with blank spaces (20H) when not used.
		Mark: 3 bytes Refer to mark specifications, page 36.
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] When the maximum frame size is 256 bytes, the maximum number of tests is n = 11. When the maximum frame size is 512 bytes, the maximum number of tests is n = 28.

[2] Previous values are as follows.

  123.45 → ^^123.45
  –6.7 → ^^^^–6.7
  ^ : Blank space (20H)

Operational Notes:

- If the ID is classified as a sample ID for a batch-test inquiry or an test inquiry, set the sample ID in the test-selection instruction text, and leave the position number unused (barcode operation or creation of worksheets using the ADVIA Chemistry system).

- If the ID is classified as a Sample Tray ID or rack-number ID for a batch-test inquiry or an test inquiry, set the position number to which the inquiry was addressed, and also set the sample number to be controlled by the host in the sample ID test (creation of worksheet using the host).

- At the start of Sample Tray analysis, the sample classified "I" as an interruption sample on sample classification is analyzed first. The ADVIA Chemistry system also has a built-in function to give priority to interruption samples for Sample Tray analysis. When the samples are analyzed on the rack option or conveyor-belt system, analysis begins sequentially as ordered regardless of that function. Therefore, interruption samples for these systems should be set on the Sample Tray.

- Registration data box

  "0" New Request
  A new request is unconditionally registered as a new test selection. In case of an already-registered sample, its information is deleted and overwritten, thereby erasing the analysis-result data. If you cannot judge whether it is a new request or registered test on the host side, specify all of the tests in the next box as "'1' test addition, rerun."

  "1" Test addition and rerun
  If the sample is an unregistered sample, it is registered as a new request. If the sample is a registered test, the information of the registered test and test selection order from the host are subjected to the "OR" condition and then analyzed. If an analyzed test has an order, the test is analyzed again under rerun conditions. If an uninspected test has an order, the test is analyzed under initial-inspection conditions.

  "2" No request
  Applicable for no sample information on the host side or no new order for analysis. In this case, the request test box is omitted.

  "3" Sample deletion
  Sample registration is normally deleted from the system. Use this box when deleting orders by batch test registration from the host.

■ Measurement Data Text

Applicable communication function: Batch data output (page 20)
                                       Real data output (page 21)

Communication direction: ADVIA Chemistry system → Host Computer

Maximum frame size	Maximum number of blocks
256 bytes	25 blocks
512 bytes	11 blocks

Table 22 Measurement Data Text (first block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"R" (52H)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"01" to "25"
Block number	2	"01" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Inspection date	8	YYYYMMDD Example: 19990229
Sample classification	1	"N" (4EH) General sample "C" (43H) Control sample "I" (49H) Interruption sample[1]
ID specification	1	"0" (30H) New request. (If a registered sample [workorder] already exists, it is overwritten.) "1" (31H) Test addition, re-run. (In case of an unregistered sample, same as a new request.) "2" (32H) Rack number. (Not used.) "3" (33H) Sample deletion. (Deletion of a previously registered sample.)
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end Be sure to set unique sample numbers, even for an order of position No. designation.
Position number	7	Filled with blank spaces when not used (20H). Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end

Table 22 Measurement Data Text (first block, variable length) (Cont)

Data Test	Bytes	Code
Comment 1	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Comment 2	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Sex	1	"M" (4DH) male or "F" (46H) female: When not used, set it to "M".
Age	3	999 (right-justified): When not used, age is always "0."
Blood sampling date	8	YYYYMMDD Example: 19990229
Dilution coefficient	4	Format: 99.9 (right-justified): When not used, be sure to insert Format: ^1.0 (^0.1 - 99.9). ^ : blank space
Sample classification	1	"1" (31H) blood serum, "2" (32H) urine: When not used, be sure to set "1".
Container classification	1	"1" to "9" : When not used, "1".
Request test	$(3+1+8+3) \times n^2$	Test number 3 bytes, "999" (right-justified)
		Analysis condition 1 byte "M" or "D" or "U" Normally set to "M"
		Previous value: 8 bytes for 8-digit number (including "-" sign) and floating decimal point, right-justified Filled with blank spaces (20H) when not used.
		Mark: 3 bytes Refer to mark specifications, page 45.
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] Control samples are sent with the sample classification and a unique alphanumeric ID assigned by the ADVIA Chemistry system.
 Control ID: 4 characters (PA001 to PZ200) no zero suppression, left justified, 20H at end.

[2] When the maximum frame size is 256 bytes, the maximum number of tests is n = 8. When the maximum frame size is 512 bytes, the maximum number of tests is n = 21.

Table 23 Measurement Data text (second to last block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"R" (52H)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"02" to "25" (no zero suppression)
Block number	2	"02" to "25" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Inspection date	8	YYYYMMDD Example: 19990229
Sample classification	1	"N" (4EH) General sample "C" (43H) Control sample "I" (49H) Interruption sample

Table 23 Measurement Data text (second to last block, variable length) (Cont)

Data Test	Bytes	Code	
ID specification	1	"0" (30H)	New request. (If a registered sample [workorder] already exists, it is overwritten.)
		"1" (31H)	Test addition, re-run. (In case of an unregistered sample, same as a new request.)
		"2" (32H)	Change attribute. (The system does not perform registration.)
		"3" (33H)	Sample deletion. (Deletion of a previously registered sample.)
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end	
		Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end	
		Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end	
		Be sure to set unique sample numbers, even for an order of position No. designation.	
Position number	7	Filled with blank spaces when not used (20H).	
		Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end	
		Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified	
		Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end	
Request test	(3+1+8+3) x n[1]	Test number 3 bytes, "999" (right-justified)	
		Analysis condition 1 byte "M" or "D" or "U". Normally set to "M".	
		Previous value: 8 bytes for 8-digit number (including "-" sign) and floating decimal point, right-justified[2] Filled with blank spaces (20H) when not used.	
		Mark: 3 bytes Refer to mark specifications, page 45.	
Spare	1	Not used (20H)	
Termination code	5	(ETX or ETB) + checksum + CR + LF	

[1] When the maximum frame size is 256 bytes, the maximum number of tests is n = 8. When the maximum frame size is 512 bytes, the maximum number of tests is n = 21.

[2] Result formats are as follows.

> $123.45 \rightarrow$ ^^123.45
> $-6.7 \rightarrow$ ^^^^-6.7
> Overflow $\rightarrow$ ////////
> No measurement value $\rightarrow$ ^^^^^^^^
> ^ : Blank space (20H)

Tests that are set to output qualitative measurement data are as follows:

- Each of the tests is fixed at 8 characters in length. Up to 6 characters are used for analysis-condition settings and they are right-justified. The first 2 characters are used for spaces. Setting 3 two-byte characters is possible, and in this case, SHIFT JIS codes are output.

- The position-number box of the sample that was subjected to barcode analysis using a sample ID is invalid.

■ Measurement Data Text - New Format

Applicable communication function: Batch data output (page 23)   Real data output (page 24)

Communication direction: ADVIA Chemistry System → Host Computer

Maximum frame size	Maximum number of blocks
256 bytes	8 blocks
512 bytes	21 blocks

Table 24 Measurement Data Text − New Format (first block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"R" (52H)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"01" to "25"
Block number	2	"01" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Inspection date	8	YYYYMMDD Example: 19990229
Inspection time	6	HHMMSS Example: (18:55:33) 185533
Sample classification	1	"N" (4EH) General sample "C" (43H) Control sample "I" (49H) Interruption sample[1]
ID specification	1	"0" (30H) New request. (If a registered sample [workorder] already exists, it is overwritten.) "1" (31H) Test addition, re-run. (In case of an unregistered sample, same as a new request.) "2" (32H) Rack number. (Not used.) "3" (33H) Sample deletion. (Deletion of a previously registered sample.)
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end Be sure to set unique sample numbers, even for an order of position No. designation.

Table 24 Measurement Data Text – New Format (first block, variable length) (Cont)

Data Test	Bytes	Code
Position number	7	Filled with blank spaces when not used (20H).
		Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end
		Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified
		Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end.
Comment 1	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Comment 2	16	ASCII or shift JIS. Filled with blank spaces (20H) when not used.
Sex	1	"M" (4DH) male or "F" (46H) female: When not used, set it to "M".
Age	3	999 (right-justified): When not used, age is always "0."
Blood sampling date	8	YYYYMMDD Example: 19990229
Dilution coefficient	4	Format: 99.9 (right-justified): When not used, be sure to insert Format: ^1.0 (^0.1 - 99.9). ^ : blank space
Sample classification	1	"1" (31H) blood serum, "2" (32H) urine: When not used, be sure to set "1".
Container classification	1	"1" to "9" : When not used, "1".
Request test	$((3+1+8+3)$ $+(1+3))$ $\times n^2$	Test number 3 bytes, "999" (right-justified)
		Analysis condition 1 byte "M" or "D" or "U" Normally set to "M"
		Previous value: 8 bytes for 8-digit number (including "-" sign) and floating decimal point, right-justified Filled with blank spaces (20H) when not used.
		Mark: 3 bytes Refer to mark specifications, page 44.
		Mark: 1 byte. An uppercase "E" will be sent in this position when the operator manually enters the measurement value.
		User code: 3 bytes. The user code is sent for each measurement value.
Spare	1	Not used (20H)
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] Control samples are sent with the sample classification and a unique alphanumeric ID assigned by the ADVIA Chemistry system.
   Control ID: 4 characters (PA001 to PZ200) no zero suppression, left justified, 20H at end.

[2] When the maximum frame size is 256 bytes, the maximum number of tests is n = 8. When the maximum frame size is 512 bytes, the maximum number of tests is n = 21.

Table 25 Measurement Data text - New Format (second to last block, variable length)

Data Test	Bytes	Code
Starting code	1	STX
Frame number	1	"1" – "7", "0"
Text classification	1	"R" (52H)
Equipment identification number	1	Not used, space (20H)
Total number of blocks	2	"02" to "25" (no zero suppression)
Block number	2	"02" to "25" (no zero suppression)
Number of tests in a block	3	"001" to "999" (no zero suppression)
Inspection date	8	YYYYMMDD Example: 19990229
Inspection time	6	HHMMSS Example: (18:55:33) 185533
Sample classification	1	"N" (4EH) General sample "C" (43H) Control sample "I" (49H) Interruption sample
ID specification	1	"0" (30H) New request. (If a registered sample [workorder] already exists, it is overwritten.) "1" (31H) Test addition, re-run. (In case of an unregistered sample, same as a new request.) "2" (32H) Change attribute. (The system does not perform registration.) "3" (33H) Sample deletion. (Deletion of a previously registered sample.)
Sample ID	13	Arbitrary-sample ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Barcode ID: Up to 13 alphanumeric characters, no zero suppression, left-justified, 20H at the end Sequential ID: Up to 9 digits, no zero suppression, left-justified, 20H at the end Be sure to set unique sample numbers, even for an order of position No. designation.
Position number	7	Filled with blank spaces when not used (20H). Sample Tray: Fixed-length, 5 digits, no zero suppression, left-justified, 20H at the end Rack No.: Fixed-length, 7 digits, no zero suppression, left-justified Independent holder No.: Fixed-length, 4 digits, no zero suppression, left-justified, 20H at the end.
Request test	$((3+1+8+3 +(1+3)) \times n^1$	Test number 3 bytes, "999" (right-justified) Analysis condition 1 byte "M" or "D" or "U". Normally set to "M". Previous value: 8 bytes for 8-digit number (including "-" sign) and floating decimal point, right-justified[2] Filled with blank spaces (20H) when not used. Mark: 3 bytes Refer to mark specifications, page 44. Mark: 1 byte. An uppercase "E" will be sent in this position when the operator manually enters the measurement value. User code: 3 bytes. The user code is sent for each measurement value.
Spare	1	Not used (20H)

Table 25 Measurement Data text - New Format (second to last block, variable length) (Cont)

Data Test	Bytes	Code
Termination code	5	(ETX or ETB) + checksum + CR + LF

[1] When the maximum frame size is 256 bytes, the maximum number of tests is n = 8. When the maximum frame size is 512 bytes, the maximum number of tests is n = 21.

[2] Result formats are as follows.

123.45 → ^^123.45
-6.7 → ^^^-6.7
Overflow   → ////////
No measurement value → ^^^^^^^

^ : Blank space (20H)

Tests that are set to output qualitative measurement data are as follows:

- Each of the tests is fixed at 8 characters in length. Up to 6 characters are used for analysis-condition settings and they are right-justified. The first 2 characters are used for spaces. Setting 3 two-byte characters is possible, and in this case, SHIFT JIS codes are output.

- The position-number box of the sample that was subjected to barcode analysis using a sample ID is invalid.

■ Mark (Result Flag) Specifications

A mark or result flag consists of a total of 3 bytes: judgment, status, and rerun, each 1 byte.

Judgment (first byte)		Status (second byte)				Rerun (third byte)	
		Photometric Flag		Electrolyte Flag			
C	Calibration not possible	s	Insufficient sample	s	Insufficient sample	R	Rerun value
L, H	Abnormal value limit	t	Insufficient diluent liquid	S	Safety error	Space	first run value
l, h	Normal value limit	S	Safety	B	Liquid remaining in dilution cup		
Space	No mark (flag)	r	Insufficient reagent	T	Abnormal thermistor		
		u, d	Light absorption limit	r	Insufficient reagent		
		p	Prozone limit	u	Selectivity abnormal		
		*	Dispersion abnormality	*	CAL allowable value		
		n	Abnormal number of effective points	Space	No mark (flag)		
		N	Cell-blank abnormality				
		U, D	Light absorption limit				
		Space	No mark (flag)				

In the above table, the higher the position in the mark (result flag) column, the higher the degree of priority.

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