# Data Communication Protocol for MEK-8222J/K Automated Hematology Analyzer

If you have any comments or suggestions
on this manual, please contact us at:
www.nihonkohden.com

0614-008739A

# LICENSE AGREEMENT (Sample)

_____(hereafter called the "LICENSEE") and Nihon Kohden Corporation (hereafter called LICENSOR) shall conclude an agreement reading as follows:

**1. Definition**

The technical information subject to this agreement is "Technical Reference Manual: All communication protocol provided for connecting LICENSOR's Product to Third party's Product". This technical information is to be treated as confidential knowledge between the two parties and will remain the property of LICENSEE.

**2. Licensing**

LICENSOR shall license use of the subject technical information to LICENSEE only for the purpose of obtaining said connecting LICENSOR's Product to Third party's Product. LICENSEE shall not use the subject technical information for any other purpose.

**3. Entrustment to a third party**

Regarding application and use of the subject technical information, LICENSEE shall not entrust or subcontract the subject technical information to a third party without the express written consent of LICENSOR.

**4. Confidentiality**

LICENSEE shall maintain confidentiality of the subject technical information disclosed by LICENSOR. Also, neither LICENSEE or LICENSOR shall disclose confidential information to a third party after conclusion of this agreement.

**5. Improved techniques**

5-1. If LICENSOR improves the subject technical information, such as through upgrading, LICENSOR shall notify LICENSEE and said improved technical information shall, after notification, become included in the subject technical information as stipulated in Article 1 of this agreement.

5-2. Any expense which becomes necessary for application of said improved technical information created by LICENSOR shall be borne by the "LICENSEE".

**6. Obligations**

6-1. LICENSEE shall, when using or applying the subject technical information, sufficiently learn the appropriate application of said technical information in relation to the subject equipment and take carefully planned safety measures. It is the responsibility of LICENSEE to take all necessary safety measures in regard to use of the technical information. In addition, LICENSOR shall in no way be held responsible for any death, injury or damage resulting from use of the subject technical material.

6-2. LICENSOR shall not guarantee that the use or application of the subject technical information does not infringe upon patent rights, copyrights or any other rights being owned by a third party.

6-3 When it becomes necessary to obtain permits or to make notifications in relation with use or application of the subject technical information, on the basis of the relevant national laws and regulations, LICENSEE shall obtain said permits or make said notifications at its own risk and expense.

**7. Transfer**

LICENSEE shall not, under any circumstances, transfer any right, obligation or portion thereof arising from this agreement to a third party.

**8. Termination**

When either LICENSEE or LICENSOR infringes upon any condition of this agreement, the other party has the right to demand fulfillment of the condition or correction of the infringing act. Should the subject party fail to perform demanded fulfillment or correction within 30 days from the date of filling of said demand, the other party reserves the right to effectively terminate this agreement by written notification to the other party.

**9. Duration**

9-1. This agreement shall be valid for one year from the date of signing and concluding the present agreement unless said agreement is terminated in accordance with Article 8. The present agreement shall be automatically renewed on a yearly basis unless either party proposes otherwise.

9-2. Even after effective validity of this agreement or after authentic termination by either of the two parties to this agreement, the stipulations in Article 4, Article 6 and Paragraph 2 of the Article 8 subject circumstances cease to exist.

**10. Procedures to be taken after discontinuation of the efficacy of this agreement**

When this agreement has been canceled according to the stipulation of the aforementioned Article 8, owing to reasons attributable to the "LICENSEE", or when the efficacy of this agreement has been discontinued, LICENSEE shall immediately discontinue use of the subject technical information and return the subject technical information disclosed by LICENSOR.

**11. Consultations**

When any discrepancy occurs in the interpretation of the stipulations of this agreement or when any discrepancy occurs between the two parties in regards to matters not converted by the stipulations of this agreement, the two arties shall discuss the matter amicably in order to reach a solution in good faith. To prove conclusion of the present agreement, two copies of this agreement shall be made and signed by each party. Each party shall maintain one copy of the signed agreements.

LICENSEE Date:

Hospital installed:

Product Model: Company:

(Signature):

LICENSEE's Name:

Title:

LICENSOR Date:

Engineering Operations

Nihon Kohden Corporation,

1-31-4, Nishiochiai, Shinjuku-ku, Tokyo

(Signature):

LICENSOR's Name:

Title:

# Contents

# RS-232C Data Transfer

## General

Sample data can be transferred to the optional printer or a personal computer via the RS-232C socket on the rear panel of the hematology analyzer. One sample data is transferred each time the counting is complete. One stored sample data is transferred when the PRINT or TRANSFER key on the screen is pressed.

**CAUTION**

- In order to avoid any safety hazard, only connect personal computers which are approved by IEC 60950.
- The hematology analyzer should only be connected to an external instrument which complies with the CISPR 11 (1997), Group 1 and Class B standard.

**CAUTION**

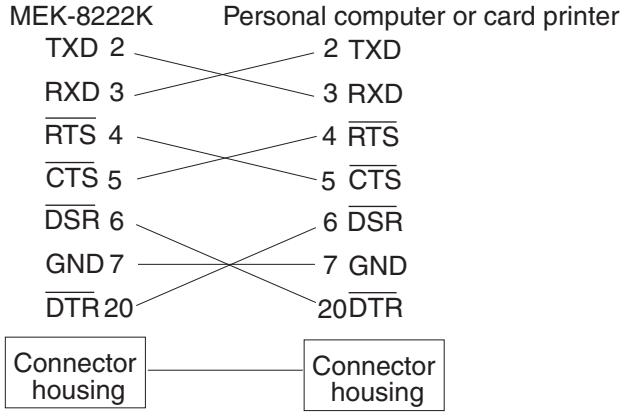
Connect only the specified instrument to the hematology analyzer and follow the specified procedure. Failure to follow this instruction may result in electrical shock or injury to the operator, and cause fire or instrument malfunction.

**NOTE**

- To transfer the sample data to a personal computer, change the settings on the personal computer to match the data transfer conditions with this hematology analyzer beforehand.
- To transfer data to a personal computer, select PC for OUTPUT TO on the OUTPUT FORMAT screen.

**Wiring (conforms to RS-232C specifications)**

25 pin D sub connector



## Transfer Format

There are five formats for transferring data: LQ-300+, LX-300+, TM-L90, TMU295 and PC. The default setting is LQ-300+.

The following examples show the PC format.

- Data transfer starts from 02 (STX: Start of text) and ends with 03 (ETX: End of text)
- Each data separated by 0D H (CR)
- ASCII code
- Transferring order
  1. Common data block
     - Hematology analyzer information
     - Measurement data
     - Flag data
  2. Expanded data block
     - Work list data
     - Normal range setting data

**NOTE**

The transfer format is fixed. Set the receiving instrument to the same format as the hematology analyzer. Before sending the data, you must prepare the receiving instrument.

**Data Transfer Character Code**

| Lower Bit (Hexadecimal) | Upper Bit (Hexadecimal) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 0 | | | SP | 0 | @ | P | | p | | | | | | | | |
| 1 | | | ! | 1 | A | Q | a | q | | | | | | | | |
| 2 | | | “ | 2 | B | R | b | r | | | | | | | | |
| 3 | | | # | 3 | C | S | c | s | | | | | | | | |
| 4 | | | $ | 4 | D | T | d | t | | | | | | | | |
| 5 | | | % | 5 | E | U | e | u | | | | | | | | |
| 6 | | | & | 6 | F | V | f | v | | | | | | | | |
| 7 | | | ‘ | 7 | G | W | g | w | | | | | | | | |
| 8 | | | ( | 8 | H | X | h | x | | | | | | | | |
| 9 | | | ) | 9 | I | Y | i | y | | | | | | | | |
| A | | | * | : | J | Z | j | z | | | | | | | | |
| B | | | + | ; | K | [ | k | { | | | | | | | | |
| C | | | , | < | L | \ | l | | | | | | | | | |
| D | | | − | = | M | ] | m | } | | | | | | | | |
| E | | | . | > | N | ^ | n | ~ | | | | | | | | |
| F | | | / | ? | O | _ | o | | | | | | | | | |

: no character

SP: space

### Transfer Format for PC

When you set the output format to “PC” and the software version of the automated hematology analyzer is V03-01 or later, you can choose from 3 transfer formats.

- Transfer format V03-01 has flag data of SNC and PRI, expanded data, etc.
- Transfer format V02-07 is the same as V02-03. Only the sample code of the common data block is same as the V03-01.
- When the software version of the analyzer is V02-07 or before, transfer format is fixed to V02-03.

The relation of the software version and transfer format version is as follows. The default setting is underlined.

| Software version of hematology analyzer | Analysis version | Transfer format version |
|---|---|---|
| V01-07 | V01-01 | V02-03 (Fixed) |
| V02-01 to V02-06 | V02-01 | V02-03 (Fixed) |
| V02-07 to V02-09 | V02-01 | V02-07 (Fixed) |
| V03-01 or later | V03-01 | V02-03, V02-07 or V03-01<br>The transfer format can be changed in the SERVICE MAINTENANCE screen. Consult your Nihon Kohden representative. |

### Distinguishing the Hematology Analyzer

When connecting more than one hematology analyzer to the receiving instruments, you can distinguish the analyzer as follows.

- Transfer format V02-03 and V02-07:
  Distinguish the analyzer by the COM port No.
- Transfer format V03-01:
  - When connecting two analyzers
    You can distinguish the analyzer by the Unit No. of the extended data block. Set UNIT 1 or UNIT 2 in the SETTINGS screen. Refer to Section 3 “Changing Settings” of the operator’s manual.
  - When connecting three or more analyzers
    Distinguish the analyzer by the COM port No.

## Transfer Format Example (version V03-01)

| Transfer Items | Example | No. of Byte | Transferred Data in Characters | Transferred Data in Hexadecimal |
|---|---|---|---|---|
| <Start> Common data block | | | | |
| Start of Text | 0x02 | 1 | STX | 02 |
| Hematology analyzer information | | | | |
| Type | "MEK-8222" | 11 | M E K - 8 2 2 2 CR | 4D 45 4B 2D 38 32 32 32 20 20 0D |
| Parameter no. | "22" | 6 | 2 2 CR | 20 20 20 32 32 0D |
| Send data bytes | "01024" | 6 | 0 1 0 2 4 CR | 30 31 30 32 34 0D |
| Sampling mode | "CLOSED" | 13 | C L O S E D CR | 43 4C 4F 53 45 44 20 20 20 20 20 20 0D |
| Parameter | "CBC + Diff" | 13 | C B C + D i f f CR | 43 42 43 20 2B 20 44 69 66 66 20 20 0D |
| Sample code | "01" | 3 | 0 1 CR | 30 31 0D |
| Sample label | "GROUP1" | 17 | G R O U P 1 CR | 47 52 4F 55 50 31 20 20 20 20 20 20 20 20 20 20 0D |
| Rack location | "01" | 5 | 0 1 CR | 20 30 31 20 0D |
| Seq# | "0000001" | 11 | 0 0 0 0 0 0 1 CR | 30 30 30 30 30 30 31 20 20 20 0D |
| Software version | "V03-03" | 9 | V 0 3 - 0 3 CR | 56 30 33 2D 30 33 20 20 0D |
| Analysis program version | "V03-02" | 9 | V 0 3 - 0 2 CR | 56 30 33 2D 30 32 20 20 0D |
| Format version | "V03-01" | 9 | V 0 3 - 0 1 CR | 56 30 33 2D 30 31 20 20 0D |
| Total data bytes | "01536" | 6 | 0 1 5 3 6 CR | 30 31 35 33 36 0D |
| Data block pattern | "1" | 6 | 1 CR | 31 20 20 20 20 0D |
| Reserve data | | 4 | SP × 3 Byte + CR × 1 Byte | 20 × 3 Byte + 0D × 1 Byte |
| Measurement data | | | | |
| Date | "20050101" | 17 | 2 0 0 5 CR 0 1 CR 0 1 CR | CR 32 30 30 35 0D 30 31 0D 30 31 0D 20 20 20 20 0D |
| Time | "153000" | 9 | 1 5 CR 3 0 CR 0 0 CR | 31 35 0D 33 30 0D 30 30 0D |
| ID | "ABCDEFGH:0001" | 16 | A B C D E F G H : 0 0 0 1 | CR 41 42 43 44 45 46 47 48 3A 30 30 30 31 20 20 0D |
| WBC | "6.2" | 7 | 6 . 2 CR | 20 36 2E 32 20 20 0D |
| NE% | "70.6" | 7 | 7 0 . 6 CR | 37 30 2E 36 20 20 0D |
| LY% | "21.2" | 7 | 2 1 . 2 CR | 32 31 2E 32 20 20 0D |
| MO% | "2.5" | 7 | 2 . 5 CR | 20 32 2E 35 20 20 0D |
| EO% | "5.4H" | 7 | 5 . 4 H CR | 20 35 2E 34 48 20 0D |
| BA% | "0.3" | 7 | 0 . 3 CR | 20 30 2E 33 20 20 0D |
| NE | "4.4" | 7 | 4 . 4 CR | 20 34 2E 34 20 20 0D |
| LY | "1.3" | 7 | 1 . 3 CR | 20 31 2E 33 20 20 0D |
| MO | "0.2" | 7 | 0 . 2 CR | 20 30 2E 32 20 20 0D |
| EO | "0.2" | 7 | 0 . 2 CR | 20 30 2E 32 20 20 0D |
| BA | "0.0" | 7 | 0 . 0 CR | 20 30 2E 30 20 20 0D |
| RBC | "5.10" | 7 | 5 . 1 0 CR | 35 2E 31 30 20 20 0D |
| HGB | "14.4" | 7 | 1 4 . 4 CR | 31 34 2E 34 20 20 0D |
| HCT | "42.3" | 7 | 4 2 . 3 CR | 34 32 2E 33 20 20 0D |
| MCV | "86.2" | 7 | 8 6 . 2 CR | 38 36 2E 32 20 20 0D |
| MCH | "28.5" | 7 | 2 8 . 5 CR | 32 38 2E 35 20 20 0D |
| MCHC | "33.1" | 7 | 3 3 . 1 CR | 33 33 2E 31 20 20 0D |
| RDW | "11.5" | 7 | 1 1 . 5 CR | 31 31 2E 35 20 20 0D |
| PLT | "280" | 7 | 2 8 0 CR | 20 32 38 30 20 20 0D |
| PCT | "0.15" | 7 | 0 . 1 5 CR | 30 2E 31 35 20 20 0D |
| MPV | "7.2" | 7 | 7 . 2 CR | 20 37 2E 32 20 20 0D |
| PDW | "18.5" | 7 | 1 8 . 5 CR | 31 38 2E 35 20 20 0D |
| Reserve data | | 210 | SP × 209 Byte + CR × 1 Byte | 20 × 210 Byte |
| Flag data (with flag +, without flag (space)) (ex 20 0D) | | | | |
| Leukocytosis | "+" | 2 | + CR | 2B 0D |
| Leukopenia | "+" | 2 | + CR | 2B 0D |
| Neutrophilia | "+" | 2 | + CR | 2B 0D |
| Neutropenia | "+" | 2 | + CR | 2B 0D |
| Lymphocytosis | "+" | 2 | + CR | 2B 0D |
| Lymphopenia | "+" | 2 | + CR | 2B 0D |
| Monocytosis | "+" | 2 | + CR | 2B 0D |
| Eosinophilia | "+" | 2 | + CR | 2B 0D |
| Basophilia | "+" | 2 | + CR | 2B 0D |
| Blasts | "+" | 2 | + CR | 2B 0D |
| Immature granulocyte | "+" | 2 | + CR | 2B 0D |
| Left Shift | "+" | 2 | + CR | 2B 0D |
| Atypical lymphocytes | "+" | 2 | + CR | 2B 0D |
| Poor hemolyzation | "+" | 2 | + CR | 2B 0D |
| Small nucleated cell | "+" | 2 | + CR | 2B 0D |
| Ly-Mo interference | "+" | 2 | + CR | 2B 0D |
| Ne-Eo interference | "+" | 2 | + CR | 2B 0D |
| Reserve data | | 14 | SP × 13 Byte + CR × 1 Byte | 20 × 13 Byte + 0D × 1 Byte |
| Erythrocytosis | "+" | 2 | + CR | 2B 0D |
| Anemia | "+" | 2 | + CR | 2B 0D |
| Anisocytosis | "+" | 2 | + CR | 2B 0D |
| Microcytosis | "+" | 2 | + CR | 2B 0D |
| Macrosytosis | "+" | 2 | + CR | 2B 0D |
| Hypochromia | "+" | 2 | + CR | 2B 0D |
| Abnormal MCHC | "+" | 2 | + CR | 2B 0D |
| Reserve data | | 10 | SP × 9 Byte + CR × 1 Byte | 20 × 9 Byte + 0D × 1 Byte |
| Thrombocytosis | "+" | 2 | + CR | 2B 0D |
| Thrombocytopenia | "+" | 2 | + CR | 2B 0D |
| PLT Clumps | "+" | 2 | + CR | 2B 0D |
| PLT-RBC interference | "+" | 2 | + CR | 2B 0D |
| Reserve data | | 8 | SP × 7 Byte + CR × 1 Byte | 20 × 7 Byte + 0D × 1 Byte |
| Reserve data | | | | |
| Reserve data | | 400 | SP × 399 Byte + CR × 1 Byte | 20 × 399 Byte + 0D × 1 Byte |
| <End> Common data block | | | | |
| End of Text | 0x03 | 1 | ETX | 03 |

| Transfer Items | Example | No. of Byte | Transferred Data in Characters | Transferred Data in Hexadecimal |
|---|---|---|---|---|
| <Start> Extended data block | | | | |
| Start of Text | 0x02 | 1 | STX | 02 |
| Hematology analyzer information | | | | |
| Identifier | “EXP” | 4 | E X P CR | 45 58 50 0D |
| Send data bytes | “00512” | 6 | 0 0 5 1 2 CR | 30 30 35 31 32 0D |
| Type | “MEK-8222” | 11 | M E K - 8 2 2 2 CR | 4D 45 4B 2D 38 32 32 32 20 20 0D |
| Unit no | “1” | 3 | 1 CR | 20 31 0D |
| Work list data | | | | |
| Name | “DAVID” | 27 | D A V I D ... … CR | 44 41 56 49 44 … … 20 20 20 20 … … 0D |
| Sex | “MALE” | 7 | M A L E CR | 4D 41 4C 45 20 20 0D |
| Date of birth | “19800219” | 11 | 1 9 8 0 CR 0 2 CR 1 9 CR | 31 39 38 30 0D 30 32 0D 31 39 0D |
| Age | “22” | 4 | 2 2 CR | 20 32 32 0D |
| Department | “INTERNAL” | 14 | I N T E R N A L CR | 49 4E 54 45 52 4E 41 4C 20 20 20 20 20 0D |
| Physician | “WATSON” | 27 | W A T S O N ... ... CR | 57 57 41 54 53 4F … … 20 20 20 … … 0D |
| Operator name | “STEVE” | 9 | S T E V E CR | 53 54 45 56 45 20 20 20 0D |
| Comments | “No problem.” | 129 | N o p r o b l e m . ... ... CR | 4E 4E 6F 20 70 72 6F 62 6C 65 6D … … 20 20 20 20 20 20 … … 0D |
| Normal range table no | “0” | 2 | 0 CR | 30 0D |
| Work list flag | “1” | 2 | 1 CR | 31 0D |
| Control mode flag | “” | 2 | CR | 20 0D |
| Reserve data for work list data | | 32 | SP × 31 Byte + CR × 1 Byte | 20 × 31 Byte + 0D × 1 Byte |
| Normal range setting data | | | | |
| WBC-LOW | “4.0” | 5 | 4 . 0 CR | 20 34 2E 30 0D |
| WBC-HIGH | “9.0” | 5 | 9 . 0 CR | 20 39 2E 30 0D |
| NE%-LOW | “42.0” | 5 | 4 2 . 0 CR | 34 32 2E 30 0D |
| NE%-HIGH | “85.0” | 5 | 8 5 . 0 CR | 38 35 2E 30 0D |
| LY%-LOW | “11.0” | 5 | 1 1 . 0 CR | 31 31 2E 30 0D |
| LY%-HIGH | “49.0” | 5 | 4 9 . 0 CR | 34 39 2E 30 0D |
| MO%-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| MO%-HIGH | “9.0” | 5 | 9 . 0 CR | 20 39 2E 30 0D |
| EO%-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| EO%-HIGH | “3.0” | 5 | 3 . 0 CR | 20 33 2E 30 0D |
| BA%-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| BA%-HIGH | “2.0” | 5 | 2 . 0 CR | 20 32 2E 30 0D |
| NE-LOW | “1.7” | 5 | 1 . 7 CR | 20 31 2E 37 0D |
| NE-HIGH | “7.7” | 5 | 7 . 7 CR | 20 37 2E 37 0D |
| LY-LOW | “0.4” | 5 | 0 . 4 CR | 20 30 2E 34 0D |
| LY-HIGH | “4.4” | 5 | 4 . 4 CR | 20 34 2E 34 0D |
| MO-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| MO-HIGH | “0.8” | 5 | 0 . 8 CR | 20 30 2E 38 0D |
| EO-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| EO-HIGH | “0.3” | 5 | 0 . 3 CR | 20 30 2E 33 0D |
| BA-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| BA-HIGH | “0.2” | 5 | 0 . 2 CR | 20 30 2E 32 0D |
| RBC-LOW | “3.80” | 5 | 3 . 8 0 CR | 33 2E 38 30 0D |
| RBC-HIGH | “5.30” | 5 | 5 . 3 0 CR | 35 2E 33 30 0D |
| HGB-LOW | “11.0” | 5 | 1 1 . 0 CR | 31 31 2E 30 0D |
| HGB-HIGH | “17.0” | 5 | 1 7 . 0 CR | 31 37 2E 30 0D |
| HCT-LOW | “36.0” | 5 | 3 6 . 0 CR | 33 36 2E 30 0D |
| HCT-HIGH | “56.0” | 5 | 5 6 . 0 CR | 35 36 2E 30 0D |
| MCV-LOW | “80.0” | 5 | 8 0 . 0 CR | 38 30 2E 30 0D |
| MCV-HIGH | “100” | 5 | 1 0 0 CR | 20 31 30 30 0D |
| MCH-LOW | “28.0” | 5 | 2 8 . 0 CR | 32 38 2E 30 0D |
| MCH-HIGH | “36.0” | 5 | 3 6 . 0 CR | 33 36 2E 30 0D |
| MCHC-LOW | “31.0” | 5 | 3 1 . 0 CR | 33 31 2E 30 0D |
| MCHC-HIGH | “37.0” | 5 | 3 7 . 0 CR | 33 37 2E 30 0D |
| RDW-LOW | “11.5” | 5 | 1 1 . 5 CR | 31 31 2E 35 0D |
| RDW-HIGH | “16.5” | 5 | 1 6 . 5 CR | 31 36 2E 35 0D |
| PLT-LOW | “120” | 5 | 1 2 0 CR | 20 31 32 30 0D |
| PLT-HIGH | “380” | 5 | 3 8 0 CR | 20 33 38 30 0D |
| PCT-LOW | “0.10” | 5 | 0 . 1 0 CR | 30 2E 31 30 0D |
| PCT-HIGH | “1.00” | 5 | 1 . 0 0 CR | 31 2E 30 30 0D |
| MPV-LOW | “5.0” | 5 | 5 . 0 CR | 20 35 2E 30 0D |
| MPV-HIGH | “10.0” | 5 | 1 0 . 0 CR | 31 30 2E 30 0D |
| PDW-LOW | “12.0” | 5 | 1 2 . 0 CR | 31 32 2E 30 0D |
| PDW-HIGH | “18.0” | 5 | 1 8 . 0 CR | 31 38 2E 30 0D |
| <End> Extended data block | | | | |
| End of Text | 0x03 | 1 | ETX | 03 |

- “0x0D” is at the end of each item as separating character.
- Each item is entered by ASCII code. Only “Start of Text” and “ End of Text” are entered by control code.
- Each item is initialized at space (0x20). Unused items are also initialized at space and have “0x0D” in the end.

Transferring Item Description

Common data block

<table>
<tr><th>Item No.</th><th>Item</th><th>No. of Bytes</th><th>Description</th></tr>
<tr><td colspan="4">Hematology analyzer information</td></tr>
<tr><td>1</td><td>Type</td><td>11</td><td>Sets the model of the hematology analyzer “MEK-8222”.</td></tr>
<tr><td>2</td><td>Parameter No.</td><td>6</td><td>Sets the number of measurable parameters “22”.</td></tr>
<tr><td>3</td><td>Send data bytes</td><td>6</td><td>Set the total number of transferring data “01024”.</td></tr>
<tr><td>4</td><td>Sampling mode</td><td>13</td><td>Sets the sampling method.<br>Closed mode: “CLOSED”<br>Closed high dilution mode 1: “HIGH (C)”<br>Closed high dilution mode 2: “HIGHER (C)”<br>Open mode: “MANUAL”<br>Open high dilution mode 1: “HIGH (M)”<br>Open high dilution mode 2: “HIGHER (M)”<br>Open low dilution mode: “LOW (M)”<br>Pre-dilution mode (20 µL): “PreDIL 20”<br>Pre-dilution mode (10 µL): “PreDIL 10”</td></tr>
<tr><td>5</td><td>Parameter</td><td>13</td><td>Sets the measuring parameters.<br>When measuring 22: CBC + Diff<br>When measuring 8: CBC</td></tr>
<tr><td>6</td><td>Sample code</td><td>3</td><td>Sets the code for sample type.<br>When measuring the normal sample, the No. of the normal range is set.
<table>
<tr><th>Normal range name</th><th>No.</th><th>Normal range name</th><th>No.</th></tr>
<tr><td>GROUP 1</td><td>01</td><td>GROUP 4</td><td>04</td></tr>
<tr><td>GROUP 2</td><td>02</td><td>GROUP 5</td><td>05</td></tr>
<tr><td>GROUP 3</td><td>03</td><td></td><td></td></tr>
</table>
• X-R (NORMAL) or L & J (NORMAL):<br>“21” (first time) or “22” (second time)<br>• X-R (LOW) or L & J (LOW):<br>“23” (first time) or “24” (second time)<br>• X-R (HIGH) or L & J (HIGH):<br>“25” (first time) or “26” (second time)</td></tr>
<tr><td>7</td><td>Sample label</td><td>17</td><td>Sets the sample type.<br>When measuring the normal sample, the name of the normal range (GROUP 1 to GROUP 5) is set.<br>• X-R (NORMAL) or L & J (NORMAL): “X-R NORMAL”<br>• X-R (LOW) or L & J (LOW): “X-R LOW”<br>• X-R (HIGH) or L & J (HIGH): “X-R (HIGH)”</td></tr>
</table>

| | | | |
|---|---|---|---|
| 8 | Rack location | 5 | Sets the rack ID and rack position.<br>1 Bytes: rack ID: "1" to "9"<br>Emergency sample: "E"<br>Open mode: "M"<br>Not use rack ID (other than emergency sample and open mode): space (0x20)<br>2 to 3 bytes: rack position: "01" to "50"<br>Open mode: "MM"<br>4 bytes: space (0x20)<br>5 bytes: CR (0x0D)<br><Setting example><br>• Rack position 10: 10<br>• Emergency sample, rack position 1: "E01"<br>• Open mode: "MMM" |
| 9 | Seq# | 11 | Sets the sequence number. |
| 10 | Software version | 9 | Sets the software version. |
| 11 | Analysis program version | 9 | Sets the analysis program version. |
| 12 | Format version | 9 | Sets the RS-232C output format version. |
| 13 | Total data bytes | 6 | Sets the all sent data size "01536" including common data block and extended data block. |
| 14 | Data clock pattern | 6 | Sets the data block that is send after common data block. When the extended data block is send, "1" is set. |
| 15 | Reserve data | 4 | Sets space (0x20) × 3 + CR (0x0D).. |
| Measurement data | | | |
| 1 | Date | 17 | Sets date. Year, month and day are separated by CR (0x0D). A day of the week is not set. Space (0x20) is set. |
| 2 | Time | 9 | Sets time. Hour, minute and second are separated by CR (0x0D). |
| 3 | ID | 16 | Sets the sample ID number. |
| 4 | WBC to PDW | 7 each | Sets as follows.<br>1 to 4 bytes: measurement value<br>when over the limits: "OVER"<br>when measurement is impossible: space (0x20)<br>5 to 6 bytes: abnormal value mark<br>7 bytes: CR (0x0D) |
| 5 | Reserve data | 210 | Sets space (0x20) × 209 + CR (0x0D). |
| Flag data | | | |
| 1 | Leukocytosis to Ne-Eo interference | 2 each | Sets "+" when there is a flag, space (0x20) when there is no flag. |
| 2 | Reserve data | 14 | Sets space (0x20) × 13 + CR (0x0D). |
| 3 | Erythrocytosis to abnormal MCHC | 2 each | Sets "+" when there is a flag, space (0x20) when there is no flag. |
| 4 | Reserve data | 10 | Sets space (0x20) × 9 + CR (0x0D). |
| 5 | Thrombocytosis to PLT-RBC interference | 2 each | Sets "+" when there is a flag, space (0x20) when there is no flag. |
| 6 | Reserve data | 8 | Sets space (0x20) × 7 + CR (0x0D). |
| Reserved data | | | |
| 1 | Reserve data | 400 | Sets space (0x20) × 399 + CR (0x0D). |

**NOTE**

In the reserved data, new items by character codes may be set when the software is upgraded in the future.

Extended data block

| Item No. | Item | No. of Bytes | Description |
|---|---|---|---|
| Hematology analyzer information | | | |
| 1 | Identifier | 4 | Sets the data block identifier “EXP”. |
| 2 | Send data bytes | 6 | Sets the total number of transferred extended data block “00512”. |
| 3 | Type | 11 | Sets the model of the hematology analyzer “MEK-8222”. |
| 4 | Unit No. | 3 | Sets the analyzer name.<br>When set to “UNIT 1”: 1<br>When set to “UNIT 2”: 2 |
| Work list data | | | |
| 1 | Name | 27 | Sets the patient name. When not using the work list, a space (0x20) × 26 + CR (0x0D) is set. |
| 2 | Sex | 7 | Sets the patient sex, MALE or FEMALE. When not using the work list, a space (0x20) × 6 + CR (0x0D) is set. |
| 3 | Date of birth | 11 | Sets the patient date of birth. When not using the work list, a space (0x20) × 10 + CR (0x0D) is set. |
| 4 | Age | 4 | Sets the patient age. When not using the work list, a space (0x20) × 3 + CR (0x0D) is set. |
| 5 | Department | 14 | Sets the department of the patient. When not using the work list, a space (0x20) × 13 + CR (0x0D) is set. |
| 6 | Physician | 27 | Sets the name of the physician. When not using the work list, a space (0x20) × 26 + CR (0x0D) is set. |
| 7 | Operator name | 9 | Sets the name of the operator. |
| 8 | Comments | 129 | Sets the comment. When not using the work list, a space (0x20) × 128 + CR (0x0D) is set. |
| 9 | Normal range table no. | 2 | Sets the group number of the normal range used for measurement.<br>GROUP 1: 0<br>GROUP 2: 1<br>GROUP 3: 2<br>GROUP 4: 3<br>GROUP 5: 4 |
| 10 | Work list flag | 2 | Sets the work list flag.<br>When measured using the work list: 1<br>When measured without work list: 0 |
| 11 | Control mode flag | 2 | Sets space (0x20)+CR (0x0D). |
| 12 | Reserve data | 32 | Sets space (0x20) × 31 + CR (0x0D). |
| Normal range data | | | |
| 1 | WBC-HIGH to PDW-LOW | 5 each | Sets 4 bytes + CR (0x0D) for normal range data used for measurement. |

### Abnormal mark

Abnormal mark shows following error.

| Item | Mark | Description | Item | Mark | Description |
|---|---|---|---|---|---|
| All | H | Over normal range | LY | ? | Room temp high, room temp low or optical count error |
| | L | Under normal range | | * | Blasts, atypical Ly or Ly-Mo interference |
| WBC | ? | WBC sample error | LY% | ? | Room temp high, room temp low or optical count error |
| | ! | Poor hemolyzation | | * | Blasts, atypical Ly or Ly-Mo interference |
| | C | PLT clumps | MO | ? | Optical count error |
| | * | Small nucleated cell or WBC previous data OVER | | * | Blasts, immature Gr, left shift, atipical Ly or Ly-Mo interference |
| RBC | ? | RBC sample error | MO% | ? | Optical count error |
| | * | RBC-PLT interference or RBC previous data OVER | | * | Blasts, immature Gr, left shift, atipical Ly or Ly-Mo interference |
| HGB | ! | HGB voltage high | EO | ? | Optical count error |
| | ? | HGB voltage low | | * | Blasts or Ne-Eo interference |
| | * | HGB circuit error, WBC OVER or WBC/ HGB previous data OVER | EO% | ? | Optical count error |
| HCT | * | HCT previous data OVER | | * | Blasts or Ne-Eo interference |
| MCHC | ! | RBC sample error | BA | ? | Optical count error |
| PLT | ? | RBC sample error | | * | Blasts, immature Gr or left shift |
| | C | PLT clumps | BA% | ? | Optical count error |
| | * | RBC-PLT interference or PLT previous data OVER | | * | Blasts, immature Gr or left shift |
| NE | ? | Room temp high, room temp low or optical count error | | | |
| | * | Blasts, immature Gr, left shift or Ne-Eo interference | | | |
| NE% | ? | Room temp high, room temp low or optical count error | | | |
| | * | Blasts, immature Gr, left shift or Ne-Eo interference | | | |

### Data indication

Data indication (alarm/flag) and their description is as follows.

| Classification | | Description |
|---|---|---|
| 1 | Data cannot be analyzed | Data cannot be analyzed. |
| 2 | Measurement alarm (data not displayed) | Error found during measurement. |
| 3 | Measurement alarm (data displayed) | Measurement error due to surrounding temperature out of specified range. Measured data is displayed but measurement accuracy is not reliable. |
| 4 | Out of measuring range | Out of measuring range. |
| 5 | Data with low reliability | Abnormal flag detected in the sample. Measurement accuracy is not reliable due to abnormal cell.<br>• When WBC flag appears, all WBC parameters are affected by the abnormal cell. "*" is displayed beside the parameter which is greatly affected.<br>• When there is possibility of PLT coagulation, "C" is displayed beside the parameter.<br>• When there is possibility of poor hemolyzation, "!" is displayed beside the parameter. |
| 6 | Out of normal range | Out of normal range setting. |

**Data, alarm, flag and data transfer**

| Classification | | Data display | Symbol display | Alarm message/ flag display | Data transfer |
|---|---|---|---|---|---|
| 1 | Data cannot be analyzed | None | None | None | None |
| 2 | Measurement alarm (data not displayed) | None | None | Alarm code no. and message | Abbreviation of the alarm |
| 3 | Measurement alarm (data displayed) | Data displayed | “?” beside numeric data | Alarm code no. and message | Data and identifier |
| 4 | Out of measuring range | “OVER” message displayed | None | None | Abbreviation of “OVER” |
| 5 | Data with low reliability | Data displayed | “*”, “!” or “C”beside numeric data | Flag name | Data and identifier |
| 6 | Out of normal range | Data displayed | “H” or “L” beside numeric data | None | Data and identifier |

**Abbreviation of the alarm and example of the RS-232C data output format**

Example: PLT clumps

WBC LEVEL 1 Transfer code: 0x4C, 0x45, 0x56, 0x45, 0x4C, 0x31, 0x0D

| Alarm name | code | WBC | RBC |
|---|---|---|---|
| WBC fluid level 1 | A021 | LEVEL 1 | |
| WBC fluid level 2 | A022 | LEVEL 2 | |
| WBC fluid level 3 | A023 | LEVEL 3 | |
| WBC bubble 1 | A024 | BBL 1 | |
| WBC bubble 2 | A025 | BBL 2 | |
| WBC bubble 3 | A026 | BBL 3 | |
| WBC bubble 4 | A027 | BBL 4 | |
| WBC clogged | A029 | CLOG | |
| WBC hardware noise | A031 | NOISE 2 | |
| WBC software noise | A032 | NOISE 1 | |
| RBC fluid level 1 | A041 | | LEVEL 1 |
| RBC fluid level 2 | A042 | | LEVEL 2 |
| RBC fluid level 3 | A043 | | LEVEL 3 |
| RBC bubble 1 | A044 | | BBL 1 |
| RBC bubble 2 | A045 | | BBL 2 |
| RBC bubble 3 | A046 | | BBL 3 |
| RBC bubble 4 | A047 | | BBL 4 |
| RBC clogged | A049 | | CLOG |
| RBC hardware noise | A051 | | NOISE 2 |
| RBC software noise | A052 | | NOISE 1 |

**Explanation of low reliable indicator and example of RS-232C data output**

Example: PLT clumps

WBC 7.3C Transfer code: 0x20, 0x37, 0x2E, 0x33, 0x43, 0x20, 0x0D

PLT 280C Transfer code: 0x20, 0x32, 0x38, 0x30, 0x43, 0x20, 0x0D

| Flag | Flag Class. | Parameters | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NE% NE# | LY% LY# | MO% MO# | EO% EO# | BA% BA# | WBC | RBC | HGB | HCT | MCHC | PLT | PCT MPV PDW |
| Blasts | WBC | * | * | * | * | * | | | | | | | |
| Immature Granulocyte | | * | | * | | * | | | | | | | |
| Left Shift | | * | | * | | * | | | | | | | |
| Atypical Lymphocytes | | | * | * | | | | | | | | | |
| Small Nucleated Cell | | | | | | | * | | | | | | |
| Ly-Mo Interference | | | * | * | | | | | | | | | |
| Ne-Eo Interference | | * | | | * | | | | | | | | |
| PLT-RBC Interference | RBC/PLT | | | | | | | * | | | | * | |
| PLT Clumps | | | | | | | C | | | | | C | C |
| WBC previous data OVER | Other | | | | | | * | | * | | | | |
| RBC previous data OVER | | | | | | | | * | | | | | |
| HGB previous data OVER | | | | | | | | | * | | | | |
| HCT previous data OVER | | | | | | | | | | * | | | |
| PLT previous data OVER | | | | | | | | | | | | * | |
| WBC OVER | | | | | | | | | * | | | | |
| Abnormal MCHC | Specimen | | | | | | | | | | ! | | |
| Poor hemolyzation | | | | | | | ! | | | | | | |

| Alarm message | Code No. | Parameters | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NE% NE# | LY% LY# | MO% MO# | EO% EO# | BA% BA# | WBC | RBC | HGB | HCT | MCHC | PLT |
| WBC sample error | A030 | | | | | | ? | | | | | |
| RBC sample error | A050 | | | | | | | ? | | | | ? |
| HGB voltage low | A061 | | | | | | | | ? | | | |
| HGB voltage high | A062 | | | | | | | | ! | | | |
| HGB circuit error | A063 | | | | | | | | * | | | |
| Room temp high | A091 | ? | ? | | | | | | | | | |
| Room temp low | A092 | ? | ? | ? | | | | | | | | |
| Optical count error | A082 | ? | ? | ? | ? | ? | | | | | | |

## Transfer Format Example (version V02-07 and V02-03)

| Transfer Items | Example | No. of Byte | Transferred Data in Characters | Transferred Data in Hexadecimal |
|---|---|---|---|---|
| <Start> Common data block | | | | |
| Start of Text | 0x02 | 1 | STX | 02 |
| Hematology analyzer information | | | | |
| Type | “MEK-8222” | 11 | MEK-8222 CR | 4D 45 4B 2D 38 32 32 32 20 20 0D |
| Parameter no. | “22” | 6 | 22 CR | 20 20 20 32 32 0D |
| Send data bytes | “1024” | 6 | 0102 4 CR | 30 31 30 32 34 0D |
| Sample type | “CLOSED” | 13 | CLOSED CR | 43 4C 4F 53 45 44 20 20 20 20 20 20 0D |
| Parameter | “CBC + Diff” | 13 | CBC + Diff CR | 43 42 43 20 2B 20 44 69 66 66 20 20 0D |
| Sample code | “00” | 3 | 00 CR | 30 30 0D |
| Sample type name | “” | 17 | CR | 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 0D |
| Rack location | “01” | 5 | 01 CR | 30 31 20 20 0D |
| Seq# | “0000001” | 11 | 00000001 CR | 30 30 30 30 30 30 31 20 20 20 0D |
| Reserve data | | 43 | SP × 43 Byte | 20 × 43 Byte |
| Measurement data | | | | |
| Date | “20020725” | 17 | 20020725 CR | 32 30 30 32 0D 30 37 0D 32 35 0D 20 20 20 20 20 0D |
| Time | “153000” | 9 | 153000 CR | 31 35 0D 33 30 0D 30 30 0D |
| ID | “ABCDEFGH:0001” | 16 | ABCDEFGH:0001 CR | 41 42 43 44 45 46 47 48 3A 30 30 30 31 20 20 0D |
| WBC | “6.2” | 7 | 6.2 CR | 20 36 2E 32 20 20 0D |
| NE% | “70.6” | 7 | 70.6 CR | 37 30 2E 32 20 20 0D |
| LY% | “21.2” | 7 | 21.2 CR | 32 31 2E 32 20 20 0D |
| MO% | “2.5” | 7 | 2.5 CR | 20 32 2E 35 20 20 0D |
| EO% | “5.4H” | 7 | 5.4H CR | 20 35 2E 34 48 20 0D |
| BA% | “0.3” | 7 | 0.3 CR | 20 30 2E 33 20 20 0D |
| NE | “4.4” | 7 | 4.4 CR | 20 34 2E 34 20 20 0D |
| LY | “1.3” | 7 | 1.3 CR | 20 31 2E 33 20 20 0D |
| MO | “0.2” | 7 | 0.2 CR | 20 30 2E 32 20 20 0D |
| EO | “0.2” | 7 | 0.2 CR | 20 30 2E 32 20 20 0D |
| BA | “0.0” | 7 | 0.0 CR | 20 30 2E 30 20 20 0D |
| RBC | “5.10” | 7 | 5.10 CR | 35 2E 31 30 20 20 0D |
| HGB | “14.4” | 7 | 14.4 CR | 31 34 2E 34 20 20 0D |
| HCT | “42.3” | 7 | 42.3 CR | 34 32 2E 33 20 20 0D |
| MCV | “86.2” | 7 | 86.2 CR | 38 36 2E 32 20 20 0D |
| MCH | “28.5” | 7 | 28.5 CR | 32 38 2E 35 20 20 0D |
| MCHC | “33.1” | 7 | 33.1 CR | 33 33 2E 31 20 20 0D |
| RDW | “11.5” | 7 | 11.5 CR | 31 31 2E 35 20 20 0D |
| PLT | “280” | 7 | 280 CR | 20 32 38 30 20 20 0D |
| PCT | “0.15” | 7 | 0.15 CR | 30 2E 31 35 20 20 0D |
| MPV | “7.2” | 7 | 7.2 CR | 20 37 2E 32 20 20 0D |
| PDW | “18.5” | 7 | 18.5 CR | 31 38 2E 35 20 20 0D |
| Reserve data | | 210 | SP × 210 Byte | 20 × 210 Byte |
| Flag data (with flag +, without flag (space)) | | | | |
| Leukocytosis | “+” | 2 | + CR | 2B 0D |
| Leukopenia | “+” | 2 | + CR | 2B 0D |
| Neutrophilia | “+” | 2 | + CR | 2B 0D |
| Neutropenia | “+” | 2 | + CR | 2B 0D |
| Lymphocytosis | “+” | 2 | + CR | 2B 0D |
| Lymphopenia | “+” | 2 | + CR | 2B 0D |
| Monocytosis | “+” | 2 | + CR | 2B 0D |
| Eosinophilia | “+” | 2 | + CR | 2B 0D |
| Basophilia | “+” | 2 | + CR | 2B 0D |
| Blasts | “+” | 2 | + CR | 2B 0D |
| Immature | “+” | 2 | + CR | 2B 0D |
| Left Shift | “+” | 2 | + CR | 2B 0D |
| Atypical | “+” | 2 | + CR | 2B 0D |
| WBC hemolysing | “+” | 2 | + CR | 2B 0D |
| Reserve data | | 20 | SP × 20 Byte | 20 × 20 Byte |
| Erythrocytosis | “+” | 2 | + CR | 2B 0D |
| Anemia | “+” | 2 | + CR | 2B 0D |
| Anisocytosis | “+” | 2 | + CR | 2B 0D |
| Microcytosis | “+” | 2 | + CR | 2B 0D |
| Macrocytosis | “+” | 2 | + CR | 2B 0D |
| Hypochromia | “+” | 2 | + CR | 2B 0D |
| MCHC error | “+” | 2 | + CR | 2B 0D |
| Reserve data | | 10 | SP × 10 Byte | 20 × 10 Byte |
| Thrombocytosis | “+” | 2 | + CR | 2B 0D |
| Thrombocytopenia | “+” | 2 | + CR | 2B 0D |
| PLT Clumps | “+” | 2 | + CR | 2B 0D |
| Reserve data | | 10 | SP × 10 Byte | 20 × 10 Byte |
| Reserve data | | | | |
| Reserve data | | 400 | SP × 400 Byte | 20 × 400 Byte |
| <End> Common data block | | | | |
| End of Text | 0x03 | 1 | ETX | 03 |

| Transfer Items | Example | No. of Byte | Transferred Data in Characters | Transferred Data in Hexadecimal |
|---|---|---|---|---|
| <Start> Extended data block | | | | |
| Start of Text | 0x02 | 1 | STX | 02 |
| Hematology analyzer information | | | | |
| Identifier | “EXP” | 4 | E X P CR | 45 58 50 0D |
| Send data bytes | “512” | 6 | 0 0 5 1 2 CR | 30 30 35 31 32 0D |
| Type | “MEK-8222” | 11 | M E K - 8 2 2 2 CR | 4D 45 4B 2D 38 32 32 32 20 20 0D |
| Unit no | “1” | 3 | 1 CR | 20 31 0D |
| Work list data | | | | |
| Name | “DAVID” | 27 | D A V I D ... … CR | 44 41 56 49 44 … … 20 20 20 20 … … 0D |
| Sex | “MALE” | 7 | M A L E CR | 4D 41 4C 45 20 20 0D |
| Date of birth | “19800219” | 11 | 1 9 8 0 CR 0 2 CR 1 9 CR | 31 39 38 30 0D 30 02 0D 31 39 0D |
| Age | “22” | 4 | 2 2 CR | 20 32 32 0D |
| Department | “INTERNAL” | 14 | I N T E R N A L CR | 49 4E 54 45 52 4E 41 4C 20 20 20 20 20 0D |
| Physician | “WATSON” | 27 | W A T S O N ... ... CR | 57 41 54 53 4F 4E … … 20 20 20 … … 0D |
| Operator name | “STEVE” | 9 | S T E V E CR | 53 54 45 56 45 20 20 20 0D |
| Comments | “No problem.” | 129 | N o p r o b l e m . ... ... CR | 4E 6F 20 70 72 6F 62 6C 65 6D … … 20 20 20 20 20 20 … … 0D |
| Normal range table | “0” | 2 | 0 CR | 30 0D |
| Work list flag | “0” | 2 | 0 CR | 30 0D |
| Control mode flag | “” | 2 | CR | 20 0D |
| Reserve data for work list data | | 32 | SP × 32 Byte | 20 × 32 Byte |
| Normal range setting data | | | | |
| WBC-LOW | “4.0” | 5 | 4 . 0 CR | 20 34 2E 30 0D |
| WBC-HIGH | “9.0” | 5 | 9 . 0 CR | 20 39 2E 30 0D |
| NE%-LOW | “42.0” | 5 | 4 2 . 0 CR | 34 32 2E 30 0D |
| NE%-HIGH | “85.0” | 5 | 8 5 . 0 CR | 38 35 2E 30 0D |
| LY%-LOW | “11.0” | 5 | 1 1 . 0 CR | 31 31 2E 30 0D |
| LY%-HIGH | “49.0” | 5 | 4 9 . 0 CR | 34 39 2E 30 0D |
| MO%-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| MO%-HIGH | “9.0” | 5 | 9 . 0 CR | 20 39 2E 30 0D |
| EO%-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| EO%-HIGH | “3.0” | 5 | 3 . 0 CR | 20 33 2E 30 0D |
| BA%-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| BA%-HIGH | “2.0” | 5 | 2 . 0 CR | 20 32 2E 30 0D |
| NE-LOW | “1.7” | 5 | 1 . 7 CR | 20 31 2E 37 0D |
| NE-HIGH | “7.7” | 5 | 7 . 7 CR | 20 37 2E 37 0D |
| LY-LOW | “0.4” | 5 | 0 . 4 CR | 20 30 2E 34 0D |
| LY-HIGH | “4.4” | 5 | 4 . 4 CR | 20 34 2E 34 0D |
| MO-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| MO-HIGH | “0.8” | 5 | 0 . 8 CR | 20 30 2E 38 0D |
| EO-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| EO-HIGH | “0.3” | 5 | 0 . 3 CR | 20 30 2E 33 0D |
| BA-LOW | “0.0” | 5 | 0 . 0 CR | 20 30 2E 30 0D |
| BA-HIGH | “0.2” | 5 | 0 . 2 CR | 20 30 2E 32 0D |
| RBC-LOW | “3.80” | 5 | 3 . 8 0 CR | 33 2E 38 30 0D |
| RBC-HIGH | “5.30” | 5 | 5 . 3 0 CR | 35 2E 33 30 0D |
| HGB-LOW | “11.0” | 5 | 1 1 . 0 CR | 31 31 2E 30 0D |
| HGB-HIGH | “17.0” | 5 | 1 7 . 0 CR | 31 37 2E 30 0D |
| HCT-LOW | “36.0” | 5 | 3 6 . 0 CR | 33 36 2E 30 0D |
| HCT-HIGH | “56.0” | 5 | 5 6 . 0 CR | 35 36 2E 30 0D |
| MCV-LOW | “80.0” | 5 | 8 0 . 0 CR | 38 30 2E 30 0D |
| MCV-HIGH | “100” | 5 | 1 0 0 CR | 20 31 30 30 0D |
| MCH-LOW | “28.0” | 5 | 2 8 . 0 CR | 32 38 2E 30 0D |
| MCH-HIGH | “36.0” | 5 | 3 6 . 0 CR | 33 36 2E 30 0D |
| MCHC-LOW | “31.0” | 5 | 3 1 . 0 CR | 33 31 2E 30 0D |
| MCHC-HIGH | “37.0” | 5 | 3 7 . 0 CR | 33 37 2E 30 0D |
| RDW-LOW | “11.5” | 5 | 1 1 . 5 CR | 31 31 2E 35 0D |
| RDW-HIGH | “16.5” | 5 | 1 6 . 5 CR | 31 36 2E 35 0D |
| PLT-LOW | “120” | 5 | 1 2 0 CR | 20 31 32 30 0D |
| PLT-HIGH | “380” | 5 | 3 8 0 CR | 20 33 38 30 0D |
| PCT-LOW | “0.10” | 5 | 0 . 1 0 CR | 30 2E 31 30 0D |
| PCT-HIGH | “1.00” | 5 | 1 . 0 0 CR | 31 2E 30 30 0D |
| MPV-LOW | “5.0” | 5 | 5 . 0 CR | 20 35 2E 30 0D |
| MPV-HIGH | “10.0” | 5 | 1 0 . 0 CR | 31 30 2E 30 0D |
| PDW-LOW | “12.0” | 5 | 1 2 . 0 CR | 31 32 2E 30 0D |
| PDW-HIGH | “18.0” | 5 | 1 8 . 0 CR | 31 38 2E 30 0D |
| <End> Common data block | | | | |
| End of Text | 0x03 | 1 | ETX | 03 |

Transferring Item Description

Common data block

| Item No. | Item | No. of Bytes | Description |
|---|---|---|---|
| Hematology analyzer information | | | |
| 1 | Type | 11 | Sets the model of the hematology analyzer “MEK-8222”. |
| 2 | Parameter no | 6 | Sets the number of measurable parameters “22”. |
| 3 | Send data bytes | 6 | Set the total number of transferring data “1024”. |
| 4 | Sample type | 13 | Sets the sampling method.<br>Closed mode: “CLOSED”<br>Manual mode: “MANUAL”<br>Capillary mode: “CAPILLARY”<br>High WBC mode: “HIGH WBC”<br>Low WBC mode: “LOW WBC” |
| 5 | Parameter | 13 | Sets the measuring parameters.<br>When measuring 22: CBC + Diff<br>When measuring 8: CBC |
| 6 | Sample code | 3 | Sets the code for sample type.<br>When measuring hematology control: “00” |
| 7 | Sample type name | 17 | Sets the sample type. |
| 8 | Rack location | 5 | Sets the sample rack location number. |
| 9 | Seq# | 11 | Sets the sequence number. |
| 10 | Reserve data | 43 | Sets space (0x20)×43. |
| Measurement data | | | |
| 1 | Date | 17 | Sets date. Year, month and day are separated by CR (0x0D). |
| 2 | Time | 9 | Sets time. Hour, minute and second are separated by CR (0x0D). |
| 3 | ID | 16 | Sets the sample ID number. |
| 4 | WBC to PDW | 7 each | Sets measured data (4 bytes) and flag (2 bytes). |
| 5 | Reserve data | 210 | Sets space (0x20)×210. |
| Flag data | | | |
| 1 | Leukocytosis to Atypical | 2 each | Sets “+” when there is a flag, space (0x20) when there is no flag. |
| 2 | Reserve data | 20 | Sets space (0x20)×20. |
| 3 | Erythrocytosis to MCHC error | 2 each | Sets “+” when there is a flag, space (0x20) when there is no flag. |
| 4 | Reserve data | 10 | Sets space (0x20)×10. |
| 5 | Thrombocytosis to PLT Clumps | 2 each | Sets “+” when there is a flag, space (0x20) when there is no flag. |
| 6 | Reserve data | 10 | Sets space (0x20)×10. |
| Reserved data | | | |
| 1 | Reserve data | 400 | Sets space (0x20)×400. |

**NOTE**

- It is recommended to program the PC to receive data from the hematology analyzer so that the received items are differentiated by the No. of Bytes for each item and the total no. of bytes and not by CR.
- New sample codes may be added when the software is upgraded.
- In the reserved data, new items by character codes may be set when the software is upgraded in the future.

Extended data block

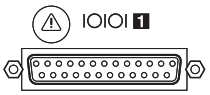
| Item No. | Item | No. of Bytes | Description |
|---|---|---|---|
| Hematology analyzer information | | | |
| 1 | Identifier | 4 | Sets the data block identifier “EXP”. |
| 2 | Send data bytes | 6 | Sets the total number of transferred extended data block “512”. |
| 3 | Type | 11 | Sets the model of the hematology analyzer “MEK-8222”. |
| 4 | Unit No. | 3 | Sets the analyzer name.<br>When set to “UNIT 1”: 1<br>When set to “UNIT 2”: 2 |
| Work list data | | | |
| 1 | Name | 27 | Sets the patient name. When not using the work list, a space (0x20) is set. |
| 2 | Sex | 7 | Sets the patient sex, MALE or FEMALE. When not using the work list, a space (0x20) is set. |
| 3 | Date of birth | 11 | Sets the patient date of birth. When not using the work list, a space (0x20) is set. |
| 4 | Age | 4 | Sets the patient age. When not using the work list, a space (0x20) is set. |
| 5 | Department | 14 | Sets the department of the patient. When not using the work list, a space (0x20) is set. |
| 6 | Physician | 27 | Sets the name of the physician. When not using the work list, a space (0x20) is set. |
| 7 | Operator name | 9 | Sets the name of the operator. |
| 8 | Comments | 129 | Sets the comment. When not using the work list, a space (0x20) is set. |
| 9 | Normal range table no. | 2 | Sets the group number of the normal range used for measurement.<br>GROUP 1: 0<br>GROUP 2: 1<br>GROUP 3: 2<br>GROUP 4: 3<br>GROUP 5: 4 |
| 10 | Work list flag | 2 | Sets the work list flag.<br>When measured using the work list: 1<br>When measured without work list: 0 |
| 11 | Control mode flag | 2 | Sets space (0x20)+CR (0x0D). |
| 12 | Reserve data | 32 | Sets space (0x20)×32. |
| Normal range data | | | |
| 1 | WBC-HIGH to PDW-LOW | 5 each | Sets 4 bytes for normal range data used for measurement. |

# Socket Pin Assignment

**CAUTION**

Connect only the specified instrument to the hematology analyzer and follow the specified procedure. Failure to follow this instruction may result in electrical shock or injury to the operator, and cause fire or instrument malfunction.

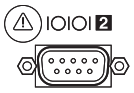
## RS-232C Socket



D sub 25 pin (female)
SDBB-25S-SL-LNK (02)

| Pin No. | Signal | Pin No. | Signal | Pin No. | Signal |
|---|---|---|---|---|---|
| 1 | NC | 10 | NC | 19 | NC |
| 2 | TXD | 11 | NC | 20 | (To pin 6) |
| 3 | RXD | 12 | NC | 21 | NC |
| 4 | RTS | 13 | NC | 22 | NC |
| 5 | CTS | 14 | NC | 23 | NC |
| 6 | (To pin 20) | 15 | NC | 24 | NC |
| 7 | SG | 16 | NC | 25 | NC |
| 8 | NC | 17 | NC | | |
| 9 | NC | 18 | NC | | |

## ZK-820V Socket



| Pin No. | Signal | Pin No. | Signal | Pin No. | Signal |
|---|---|---|---|---|---|
| 1 | FG | 4 | (To pin 6) | 7 | CTS |
| 2 | TXD | 5 | SG | 8 | RTS |
| 3 | RXD | 6 | (To pin 4) | 9 | VCC |

## USB Socket

| Pin No. | Signal |
|---|---|
| 1 | NC |
| 2 | USB-D+ |
| 3 | USB-D− |
| 4 | ED |