

**HumaLyte Plus 3**  
**HumaLyte Plus 5**  
| LIS Interface Manual



## Revision list

| Revision | Date       | Description    | Editor           |
|----------|------------|----------------|------------------|
| 1        | 2013/03/28 | First revision | Mathias Kamprath |

## Contents

|      |   |   |
|------|---|---|
| 1.   | Data transmission to host computer.....                     | 3 |
| 2.   | LIS connection.....   | 3 |
| 2.1. | RS-232 setup.....   | 3 |
| 2.2. | Connecting cable .....                                      | 3 |
| 3.   | Data format .....   | 4 |
| 4.   | Transmission examples.....                                  | 5 |
| 4.1. | Single result transmission while test result printing ..... | 5 |
| 4.2. | Transmission of results by Send function.....               | 5 |

## 1. Data transmission to host computer

The HumaLyte Plus allows to send data to a laboratory information system (LIS) via the RS-232 port.

Two options are available:

1. Each time when a result is printed, the data is automatically sent to the RS-232 port.
2. The operator can also send the data manually by touching the **[Send]** key in the **[Service]** menu.

## 2. LIS connection

### 2.1. RS-232 setup

The HumaLyte Plus has a built-in RS-232 interface for data exchange via the RS-232 port.

The settings are as following:

|           |       |
|-----------|-------|
| Baudrate  | 19200 |
| Parity    | N     |
| Data bits | 8     |
| Stop bits | 1     |
| Protocol  | None  |

### 2.2. Connecting cable

The LIS must be connected to the RS-232 port of the HumaLyte Plus with a serial cable, having the following connections:

| LIS     |       | HumaLyte Plus |
|---------|-------|---------------|
| Sub-D 9 |       | Sub-D 9       |
| 2       | ----- | 2             |
| 3       | ----- | 3             |
| 5       | ----- | 5             |

### 3. Data format

The data format describes a single test result output to the RS-232 port.

| Field           | Length [byte] | Description   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
|-----------------|---------------|---|-----|-------|-------------|---|--------|--|---|--------|--|---|--------|--|---|--------|--|---|---------|---|---|---------|---|---|---------|---------------|---|----------|---|
| Sequence Number | 3             | The test sequence number with leading ASCII characters "0" (48 dec / 30 hex). Starts with "001" upto "200".   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Spaces          | 2             | Two ASCII characters " " (32 dec / 20 hex).   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| ID Number       | 18            | The test ID number with leading ASCII characters "0" (48 dec / 30 hex). Defaults to "00000000000000000000" if not specified.  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Spaces          | 2             | Two ASCII characters " " (32 dec / 20 hex).   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Flag Byte       | 1             | <p>Each of the eight bits of the flag byte indicates a different flag information.</p> <table border="1"> <thead> <tr> <th>Bit</th><th>Value</th><th>Description</th></tr> </thead> <tbody> <tr> <td>a</td><td>0 or 1</td><td>0 = K electrode passed STD<br/>1 = K electrode failed STD</td></tr> <tr> <td>b</td><td>0 or 2</td><td>0 = Na electrode passed STD<br/>2 = Na electrode failed STD</td></tr> <tr> <td>c</td><td>0 or 4</td><td>0 = Cl electrode passed STD<br/>4 = Cl electrode failed STD</td></tr> <tr> <td>d</td><td>0 or 8</td><td>0 = Ca electrode passed STD<br/>8 = Ca electrode failed STD</td></tr> <tr> <td>e</td><td>0 or 16</td><td>0 = pH electrode passed STD<br/>16 = pH electrode failed STD</td></tr> <tr> <td>f</td><td>0 or 32</td><td>0 = AB electrode passed STD<br/>32 = AB electrode failed STD</td></tr> <tr> <td>g</td><td>0 or 64</td><td>Not described</td></tr> <tr> <td>h</td><td>0 or 128</td><td>0 = No error(s)<br/>128 = An error affecting all test results, such as aspiration abnormal or bubbles inside the sample.</td></tr> </tbody> </table> | Bit | Value | Description | a | 0 or 1 | 0 = K electrode passed STD<br>1 = K electrode failed STD | b | 0 or 2 | 0 = Na electrode passed STD<br>2 = Na electrode failed STD | c | 0 or 4 | 0 = Cl electrode passed STD<br>4 = Cl electrode failed STD | d | 0 or 8 | 0 = Ca electrode passed STD<br>8 = Ca electrode failed STD | e | 0 or 16 | 0 = pH electrode passed STD<br>16 = pH electrode failed STD | f | 0 or 32 | 0 = AB electrode passed STD<br>32 = AB electrode failed STD | g | 0 or 64 | Not described | h | 0 or 128 | 0 = No error(s)<br>128 = An error affecting all test results, such as aspiration abnormal or bubbles inside the sample. |
| Bit             | Value         | Description   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| a               | 0 or 1        | 0 = K electrode passed STD<br>1 = K electrode failed STD  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| b               | 0 or 2        | 0 = Na electrode passed STD<br>2 = Na electrode failed STD  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| c               | 0 or 4        | 0 = Cl electrode passed STD<br>4 = Cl electrode failed STD  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| d               | 0 or 8        | 0 = Ca electrode passed STD<br>8 = Ca electrode failed STD  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| e               | 0 or 16       | 0 = pH electrode passed STD<br>16 = pH electrode failed STD   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| f               | 0 or 32       | 0 = AB electrode passed STD<br>32 = AB electrode failed STD   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| g               | 0 or 64       | Not described   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| h               | 0 or 128      | 0 = No error(s)<br>128 = An error affecting all test results, such as aspiration abnormal or bubbles inside the sample.   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| K Result        | Not fixed     | Result of the K test. Format: 9.99 <sup>1)</sup> .  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Space           | 1             | The ASCII character " " (32 dec / 20 hex).  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Na Result       | Not fixed     | Result of the Na test. Format: XX9.99 <sup>1)</sup> .   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Space           | 1             | The ASCII character " " (32 dec / 20 hex).  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Cl Result       | Not fixed     | Result of the Cl test. Format: XX9.99 <sup>1)</sup> .   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Space           | 1             | The ASCII character " " (32 dec / 20 hex).  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Ca Result       | Not fixed     | Result of the Ca test. Format: 9.99 <sup>1)</sup> .   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Space           | 1             | The ASCII character " " (32 dec / 20 hex).  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| pH Result       | Not fixed     | Result of the pH test. Format: 9.99 <sup>1)</sup> .   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Spaces          | 3             | Three ASCII characters " " (32 dec / 20 hex).   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| AB Result       | Not fixed     | Result of the AB test. Format: 9.9 <sup>1)</sup> .  |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |
| Newline         | 2             | The carriage return ASCII character (13 dec / 0D hex), followed by the line feed ASCII character (10 dec / 0A hex).   |     |       |             |   |        |  |   |        |  |   |        |  |   |        |  |   |         |   |   |         |   |   |         |               |   |          |   |

1) Formatting:

Placeholder Characters

|   |              |
|---|--------------|
| X | Space, 0 - 9 |
| 9 | 0 - 9        |
| . | .            |

## 4. Transmission examples

In the examples space, carriage return and line feed characters are shown as following:

|                 |      |
|-----------------|------|
| Space           | □    |
| Carriage Return | <CR> |
| Line Feed       | <LF> |

### 4.1. Single result transmission while test result printing

002□□00000000000000000000□□032□7.45□174.1□126.0□1.45□6.90□□□0.0<CR><LF>

### 4.2. Transmission of results by Send function

Ten tests had been performed in this example.

001□□00000000000000000000□□160□6.86□136.1□100.5□1.13□7.47□□□0.0<CR><LF>  
 002□□00000000000000000000□□032□7.45□174.1□126.0□1.45□6.90□□□0.0<CR><LF>  
 003□□000000000000000003□□160□0.97□153.8□101.6□1.21□7.41□□□0.0<CR><LF>  
 004□□000000000000000004□□160□-0.43□138.7□101.5□0.99□7.42□□□0.0<CR><LF>  
 005□□000000000000000005□□032□7.63□174.8□126.8□1.44□6.92□□□0.0<CR><LF>  
 006□□000000000000000006□□032□7.48□174.4□126.8□1.50□6.97□□□0.0<CR><LF>  
 007□□000000000000000007□□032□0.81□16.6□12.0□0.28□7.23□□□0.0<CR><LF>  
 008□□000000000000000008□□032□0.70□17.3□□□9.3□0.24□7.24□□□0.0<CR><LF>  
 009□□000000000000000009□□032□0.66□16.1□□□9.2□0.24□7.24□□□0.0<CR><LF>  
 010□□000000000000000010□□032□0.64□16.7□□□9.9□0.25□7.24□□□0.0<CR><LF>