Operating Instructions

Sartorius

Description of the Interface for Entris, ED, GK and GW Balances/Scales
Your balance/scale is equipped with an interface port for connection to a computer or other peripheral device. You can connect a computer to change, start and/or monitor the functions of the balance/scale and the application programs.

**Features**
- Type of interface: Serial interface
- Operating mode: Full duplex
- Standard: RS-232
- Transmission rates: 600, 1200, 2400, 4800, 9600 and 19,200 baud
- Parity: odd, even, none
- Number of data bits: 7 or 8 bits
- Character format:
  - 1 start bit, 7-bit ASCII, parity, 1 or 2 stop bits
- Handshake:
  - For 2-wire interface: software (XON/XOFF)
  - For 4-wire interface: hardware (CTS/DTR)
- Data output format of the balance/scale: 16 or 22 characters

**Factory Settings**
- Transmission rate: 1200 baud (menu code 1. 5. 1. 4)
- Parity: ODD (1. 5. 2. 3)
- Stop bits: 1STOP bit (1. 5. 3. 1)
- Handshake: HANDSHK. Hardware, (1. 5. 4. 2)
- Operating mode: PRINTER (1. 5. 6. 2)
- Printing: MAN. WITH Manual after stability (1. 6. 1. 2)

**Preparation**
See “Pin Assignments” and “Pin Assignment Chart”

**Configuring the Interface**

**Parameter Settings (Menu)**
Please refer to the installation and operating instructions supplied with your balance/scale.
# Data Output Functions

## Data Output Format with 16 Characters

Display segments that are not activated are output as spaces.

The type of character that can be output depends on the character’s position:

<table>
<thead>
<tr>
<th>Position</th>
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</tbody>
</table>

*: Space
D: Digit or letter
U: Unit symbol
CR: Carriage return
LF: Line feed

## Special Codes

<table>
<thead>
<tr>
<th>Position</th>
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</tbody>
</table>

*: Space
High: Overload
Low: Underload
Cal. Ext.: Calibration, external

## Error Codes

<table>
<thead>
<tr>
<th>Position</th>
<th>1</th>
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<th>16</th>
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<tbody>
<tr>
<td>Error</td>
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</tbody>
</table>

*: Space
# # #: Error number

1) See “Troubleshooting Guide” in the installation and operating instructions supplied with your balance/scale
Example: Output of the weight value +123.56 g

Position 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
+ * * * 1 2 3 . 5 6 * g * * CR LF
+ * * 1 2 3 . 5 [ 6 ] g * * CR LF

Position 1: Plus or minus sign or space
Position 2: Space
Position 3–10: Weight with a decimal point; leading zeros = space
Position 11: Space
Position 12–14: Unit symbol or space
Position 15: Carriage return
Position 16: Line feed

Data Output Format with 22 Characters

When data is output with an ID code, the 6-character code precedes the 16-character string described above. The code identifies the subsequent value.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
1 1 1 1 1 1 + * D D D D D D D * U U U CR LF
* * * * * * * * * * * * * *

I: ID code character
*: Space
D: Digit or letter
U: Unit symbol 1)
CR: Carriage return
LF: Line feed

Example:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
N + 1 2 3 . 5 6 * g * * CR LF
N + 1 2 3 . 5 [ 6 ] g * * CR LF

1) Identification of Non-Verified Digits
To have non-verified digits (when “e # d”) automatically identified on the printout, set the following parameters: Communication: PRINTER (menu code 1.5.6.2)
Non-verified digits are marked by square brackets [ ].

SBI mode:
When the SBI mode is active (menu code 1.5.6.1), non-verified digits are not marked.
To mark non-verified digits, configure the auxiliary device as needed.
### Special Codes

<p>| | | | | | | | | | | | | | | | | | | | | | | |</p>
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*: Space
Cal. Ext.: Calibration, external
High: Overload
Low: Underload

### Error Codes

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</table>

*: Space
# #: Error code number

1) See “Troubleshooting Guide” in the installation and operating instructions supplied with your balance/scale
**Commands (Data Input Format)**

You can connect a computer to your balance/scale to send commands via the balance/scale interface port for controlling balance/scale functions and applications. The commands sent are control commands and may have different formats. Control commands consist of up to 13 characters. Each character must be transmitted according to the settings configured in the operating menu for data transmission.

### Format for Control Commands

<table>
<thead>
<tr>
<th>Format 1:</th>
<th>Esc</th>
<th>!</th>
<th>CR</th>
<th>LF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format 2:</td>
<td>Esc</td>
<td>!</td>
<td>#</td>
<td>_</td>
</tr>
</tbody>
</table>

- **Esc**: Escape (optional)
- **!**: Command character
- **CR**: Carriage return
- **LF**: Line feed (optional)
- **_**: Underline

#### Command character  Format 1:

<table>
<thead>
<tr>
<th>Command character</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Ambient conditions: very stable</td>
</tr>
<tr>
<td>L</td>
<td>Ambient conditions: stable</td>
</tr>
<tr>
<td>M</td>
<td>Ambient conditions: unstable</td>
</tr>
<tr>
<td>N</td>
<td>Ambient conditions: very unstable</td>
</tr>
<tr>
<td>O</td>
<td>Block keys</td>
</tr>
<tr>
<td>P</td>
<td>Print key (print, auto print; activate or block)</td>
</tr>
<tr>
<td>R</td>
<td>Unblock keys</td>
</tr>
<tr>
<td>S</td>
<td>Restart/self-test</td>
</tr>
<tr>
<td>T</td>
<td>Tare key</td>
</tr>
</tbody>
</table>
| W                 | Calibration/adjustment (depending on the menu setting)  
| Z                 | Internal calibration/adjustment* |

#### Command character  Format 2:

<table>
<thead>
<tr>
<th>Command character</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| f0_               | Function key  
| f1_               | Function key |
| f2_               | Function key |
| s3_               | key |
| x1_               | Print balance/scale model |
| x2_               | Print weighing cell serial number |
| x3_               | Print software version |

* = only on models with built-in motorized calibration weight

1) May be inaccessible on verified balances/scales
Synchronization
During data communication between the balance/scale and a connected device (computer), messages consisting of ASCII characters are transmitted via the interface. For error-free data communication, the parameters for baud rate, parity, handshake mode and character format must be the same for both units.

You can set these parameters in the Setup menu so that they match those of the connected device. You can also define parameters in the balance/scale to make data output dependent on various conditions. The conditions that can be configured are listed in the descriptions of the application programs.

If you do not connect a peripheral device to the interface port, this will not generate an error message.

Handshake
The balance/scale interface (Sartorius Balance Interface = SBI) has transmit and receive buffers. You can define the handshake parameter in the Setup menu:
- Hardware handshake (CTS/DTR)
- Software handshake (XON, XOFF)

Hardware Handshake
With a 4-wire interface, 1 more character can be transmitted after CTS (Clear to Send).

Software Handshake
The software handshake is controlled via XON and XOFF. When a device is switched on, XON must be transmitted to enable any connected device to communicate.

Data Output by Print Command
The print command can be transmitted by pressing Esc P or by a software command (Esc P).

Automatic Data Output
Activate the “auto print” operating mode to have data output to the interface port without a print command. You can have data output automatically at defined display update intervals, with or without the stability parameter. The length of a print interval depends on the operating menu settings for AMBIENT (ambient conditions) (menu code 1.1.1.x) and AUT.CYCL. (time-dependent autom. printing; menu code 1.6.3.x).

If you activate the auto print setting, data will be transmitted immediately the moment you turn on the balance/scale. In the operating menu, you can define whether automatic printing can be stopped by pressing Esc P.
Pin Assignment Chart

Female Interface Connector:  
25-contact D-Submini (DB25S) with screw lock hardware

Male connector used (please use connectors with the same specifications):  
25-contact D-Submini (DB25S) with integrated shielded cable clamp assembly  
(Amp 826 985-1C) and fastening screws (Amp 164 868-1)

⚠️ Warning When Using Pre-wired RS-232 Connecting Cables:  
The pin assignments in RS-232 cables purchased from other manufacturers may be  
incompatible with Sartorius weighing instruments. Be sure to check the pin assignments  
against the chart below before connecting the cable, and disconnect any lines identified  
differently from those specified by Sartorius (e.g., pin 6).  
Failure to do so may damage or even completely ruin your balance/scale and/or peripheral  
device(s).

Pin assignments:
Pin  1: Signal ground
Pin  2: Data output (TxD)
Pin  3: Data input (RxD)
Pin  4: Internal ground (GND)
Pin  5: Clear to send (CTS)
Pin  6: Not connected
Pin  7: Internal ground (GND)
Pin  8: Internal ground (GND)
Pin  9: Not connected
Pin 10: Not connected
Pin 11: +12 V (Power supply  
for Sartorius printer)
Pin 12: Reset _ Out *)
Pin 13: +5 V
Pin 14: Internal ground (GND)
Pin 15: Universal remote switch
Pin 16: Not connected
Pin 17: Not connected
Pin 18: Not connected
Pin 19: Not connected
Pin 20: Data terminal ready (DTR)
Pin 21: Not connected
Pin 22: Not connected
Pin 23: Not connected
Pin 24: Not connected
Pin 25: +5 V

*) = Hardware restart
Cabling Diagram

For connecting a computer or other peripheral device to the balance/scale using the RS-232C/V24 protocol and cable lengths of up to 15 m (approx. 50 ft).

**Important: do not connect any other pins to the cable connector of the balance/scale.**

<table>
<thead>
<tr>
<th>Balance/scale 25-pin male connector</th>
<th>Computer, 9-contact female connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TxD 2</td>
<td>2</td>
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<tr>
<td>RxD 3</td>
<td>3</td>
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<tr>
<td>CTS 5</td>
<td>4</td>
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<tr>
<td>DTR 20</td>
<td>8</td>
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<tr>
<td>GND 4/7</td>
<td>6</td>
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<tr>
<td>GND 14</td>
<td>5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Balance/scale 25-pin male connector</th>
<th>Computer, 25-contact female connector</th>
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</thead>
<tbody>
<tr>
<td>TxD 2</td>
<td>3</td>
</tr>
<tr>
<td>RxD 3</td>
<td>2</td>
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<tr>
<td>CTS 5</td>
<td>20</td>
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<tr>
<td>DTR 20</td>
<td>5</td>
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<tr>
<td>GND 4/7</td>
<td>6</td>
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<tr>
<td>GND 14</td>
<td>7</td>
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</table>

Cable type: AWG 24 specification