Operating Instructions

Sartorius

Description of the Interface
for EA, EB, GD, GE and TE Balances/Scales

Contents

Intended Use

The interface can be used to connect the balance/scale to a computer (or other peripheral device).

You can use a computer to change, start and monitor balance/scale functions and applications.

Available Features

- Type of interface: Serial interface
- Operating mode: Full duplex
- Standard: RS-232
- Transmission rates: 150, 300, 600, 1,200, 2,400, 4,800, 9,600 baud
- Parity: Mark, space, odd, even
- Character format: Start bit, 7-bit ASCII, parity, 1 or 2 stop bits
- Handshake:
  2-wire interface: via software (XON/XOFF)
  4-wire interface: via hardware (CTS/DTR)
- Protocol: SBI (Sartorius Balance Interface)
- Data output format of the balance/scale: 16 or 22 characters

Configuring the Interface

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

Data Output Functions

Printing a Data Record

Purpose
You can generate a printout of weights as well as other measured values and IDs for documentation purposes. You can format the printout to meet individual requirements.

Available Features
Print individual values

Line format: You can configure a data ID code of up to 6 characters for each of the values printed; this data ID code is printed at the beginning of a line

Printouts are generated automatically or by pressing (⎙), depending on or regardless of the balance/scale stability parameter.

You can have the following values output automatically when using the application programs if menu code 7.1.2 (printout with data ID codes) is configured:

- Second tare memory: last net value
- Counting: Reference weight for one piece (average piece weight)
- Weighing in percent:
  Reference weight for the percentage selected
- Averaging: Result of measurement

Examples of Data Records:

Printout without Data ID Codes (Menu Code 7.1.1):
The value currently displayed is printed (weight or calculated value with unit)

`+  1530.0 g`	Weight in grams
`+  58.562 ozt`	Weight in Troy ounces
`+  253 pcs`	Piece count
`+  88.2 %`	Percentage
`+  105.8 o`	Calculated value

Printout with Data ID Codes (Menu Code 7.1.2):
The current value displayed can be printed with a data ID code of up to 6 characters at the beginning of a line. You can use this data ID code, e.g., to designate a weight readout as a net weight (N) or a calculated value as a quantity (Qnt).

`N  +  153.0 g`	Current net weight
`N1  +  153.0 g`	Current net weight (with data in 2nd tare memory)
`T1  +  10.2 g`	Value in 2nd tare memory
`Qnt  +  253 pcs`	Calculated quantity (piece count)
`Prc  +  88.2 %`	Calculated percentage
`Res  +  153.0 g`	Calculated result

Print Application Parameters (Menu Code 7.1.2):
You can generate a printout of one or more of the values configured for initialization of an application as soon as you initialize the balance/scale.

`wRef  +  1.432 g`	Counting: average piece weight
`Wxx%  + 120.12  g`	Weighing in percent: reference weight for the selected percentage

Auto Print (Menu Code 6.1.3 or 6.1.4):
You can have the weight readout printed automatically. The display update interval depends on the operating status of the balance/scale and on the balance/scale model.

`N  +  153.9 g`	Net weight
`Stat`	Display blank
`Stat  L`	Display underload
`Stat  H`	Display overload

Interface Description
Factory Settings

Transmission rate: 1,200 baud (5.1.4)

Parity: Odd (5.2.3)

Stop bits: 1 stop bit (5.3.1)

Handshake:
Hardware, 1 character after CTS (5.4.3)

Protocol: Standard SBI (5.5.1)

Print manually/automatically:
Manual after stability (6.1.2)

Line format:
For other applications (7.1.2)

Data Output Format
You can output the values displayed in the measured value line and the weight unit with or without a data ID code.

Example: Without data ID code
```
+      253 pcs
```

Example: With data ID code
```
Qnt    +      253 pcs
```

Configure this parameter in the Setup menu (Menu: Printout format 7.1.1 or 7.1.2).

The output without data ID code has 16 characters; with data ID code, 22 characters.

Output Format With 16 Characters
Display segments that are not activated are output as spaces.
Characters without a decimal point are output without a decimal point.

The following characters can be output, depending on the characters displayed on the balance/scale:

Normal Operation

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	+	*	D	D	D	D	D	D	D	D	*	U	U	U	CR	LF
or	–		.	.	.	.	.	.	.	.		*	*	*		
or	*		*	*	*	*	*	*	*	*						
or			0	0	0	0	0	0								

*: Space
D: Digit or displayed character
U: Unit symbol
. : Decimal point
0: Zero
CR: Carriage return
LF: Line feed

Special Codes

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	*	*	*	*	*	*	–	–	*	*	*	*	*	*	CR	LF
or							H	*								
or							L	*								

*: Space
– –: Final readout mode
H: Overload
L: Underload

Error Codes

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	*	*	*	E	*	*	*	#	#	#	*	*	*	*	CR	LF

*: Space
#: Error code number

Example: Data output + 1255.7 g at stability

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

Output Format with 22 Characters

When data with an ID code is output, the ID code consisting of 6 characters precedes the data with the 16-character format. These 6 characters identify the following value.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
I	I	I	I	I	I	+	*	D	D	D	D	D	D	D	D	*	U	U	U	CR	LF
		*	*	*	*	–		.	.	.	.	.	.	.	.		*	*	*		
						*		*	*	*	*	*	*	*	*						
										0	0	0	0	0	0						

I: ID code character
*: Space
D: Digit or displayed character
. : Decimal point
0: Zero

U: Unit symbol
CR: Carriage return
LF: Line feed

Special Codes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
S	T	A	T	*	*	*	*	*	*	*	*	–	–	*	*	*	*	*	*	CR	LF
												H	*								
												L	*								

*: Space
– –: Final readout mode (readout has not yet stabilized)
H: Overload
L: Underload

Error Codes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
S	T	A	T	*	*	*	*	*	E	r	r	*	#	#	#	*	*	*	*	CR	LF

*: Space
#: Error code number

ID code characters	Meaning
`Stat`	Status
`N`	Net N
`N1`	Net N1 (when data in the 2nd tare memory)
`Qnt`	Counting: quantity (piece count)
`Prc`	Weighing in percent: percentage
`Res`	Calculation, averaging: result
`wRef`	Automatic printout: average piece weight
`Wxx%`	Automatic printout: reference percentage weight

Data Input Format
You can connect a computer to your balance/scale to send commands via the balance/scale interface port to control balance/scale functions and applications.

A control command can have up to 4 characters. Each character must be transmitted according to the settings configured in the Setup menu for data transmission.

Format for Control Commands

Format :	Esc	!	CR	LF

Esc: Escape
!: Command char.
CR: Carriage return (optional)
LF: Line feed (optional)

Command character !	Meaning
K	Weighing mode 1
L	Weighing mode 2
M	Weighing mode 3
N	Weighing mode 4
O	Block keys
P	Print
R	Release keys
S	Restart
T	Tare and zero (combined)
U	Tare (“tare only”)
V	Zero
W	External calibration/adjustment (depends on menu setting)

Synchronization
During data communication between the balance/scale and an on-line 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 on-line 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 described for each of the application programs.

If you do not plug a peripheral device into the balance/scale 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 or 2 more characters can be transmitted after CTS.

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.

Activating Data Output
You can define the data output parameter so that output is activated either when a print command is received or automatically and synchronously with the balance/scale display (see application program descriptions and auto-print setting).

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

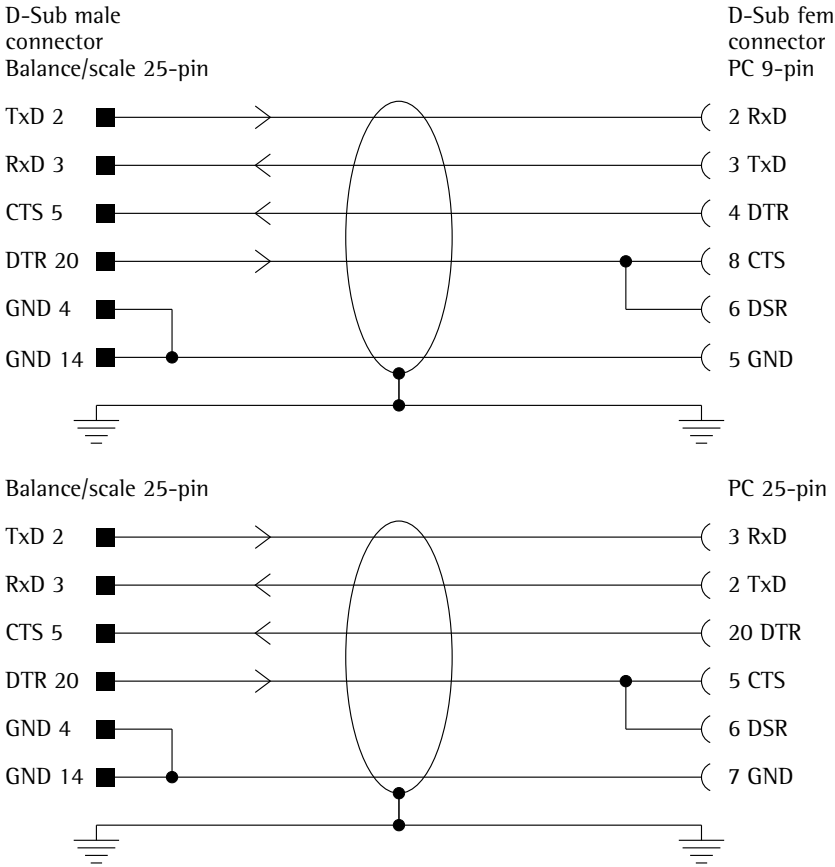
Automatic Data Output
In the “auto print” operating mode, data is output to the interface port without a print command. You can choose to have data output automatically and synchronously with the balance/scale display at defined print intervals with or without the stability parameter. Whichever parameter you select, the data will be output as the readouts appear on the balance/scale display. The display update frequency depends on the setting for “Adapting the Filter” (code 1.1.x.).

When the “auto print” menu code is activated, this function starts immediately after the balance/scale has been turned on.

Pin Assignment Chart
Please refer to the installation and operating instructions supplied with your balance/scale.

Cabling Diagram
Diagram for interfacing a computer or different peripheral device to the balance/scale using the RS-232/V24 standard and cables up to 15 m (~50 ft.) long

No other pins may be assigned in the balance/scale.



Type of cable: AWG 24 specification

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