

## **Operating Instructions**

# **Sartorius**

Description of the Interface  
for ED, GK and GW Balances/Scales

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# Intended Use

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: *1 STOP* 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:

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

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

### Special Codes

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	*	*	*	*	*	*	*	*	*	*	*	*	*	*	CR	LF
or							H	i	g	h						
or							L	o	w							
or				C	a	l	.	E	x	t	.					

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

### Error Codes

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				E	r	r	*	#	#	#	*	*	*	*	CR	LF
				A	P	P	.	E	R	R <sup>1)</sup>	*	*	*	*	CR	LF
				D	l	S	.	E	R	R <sup>1)</sup>	*	*	*	*	CR	LF
				P	R	T	.	E	R	R <sup>1)</sup>	*	*	*	*	CR	LF

\*: Space  
 # # #: Error number

<sup>1)</sup> 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
I	I	I	I	I	I	+	*	D	D	D	D	D	D	D	D	*	U	U	U	CR	LF
	*	*	*	*	*	-	.	.	.	.	.	.	.	.	.	*	*	*			
						*	*	*	*	*	*	*	*	*	*						

- I: ID code character
- U: Unit symbol<sup>1)</sup>
- \*: Space
- CR: Carriage return
- D: Digit or letter
- 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

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		i		g		h							
											L		o			w								
									C		a		l		.		E		x		t		.	

\*: Space

Cal. Ext.: Calibration, external

High:

Overload

Low:

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
S	t	a	t	*	*	*	*	*	A	P	P	.	E	R	R <sup>1)</sup>	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	D	I	S	.	E	R	R <sup>1)</sup>	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	P	R	T	.	E	R	R <sup>1)</sup>	*	*	*	*	CR	LF

\*: Space

# # #: Error code number

<sup>1)</sup> 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

Format 1:	Esc	!	CR	LF		
Format 2:	Esc	!	#	_	CR	LF

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

Command character	Format 1:	Meaning
	!	
	K	Ambient conditions: very stable
	L	Ambient conditions: stable
	M	Ambient conditions: unstable
	N	Ambient conditions: very unstable
	O	Block keys
	P	 key (print, auto print; activate or block)
	R	Unblock keys
	S	Restart/self-test
	T	 key
	W	Calibration/adjustment (depending on the menu setting) <sup>1)</sup>
	Z	Internal calibration/adjustment*

Command character	Format 2:	Meaning
	!#	
	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

<sup>1)</sup> May be inaccessible on verified balances/scales

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### 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  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 .

# 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)

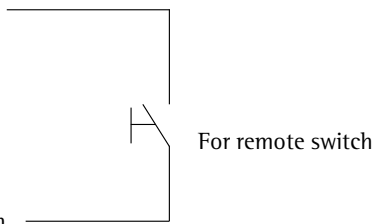
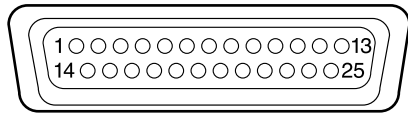
### ⚠ Warning When Using Pre-wired RS-232 Connecting Cables:

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 (Rx/D)
- 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



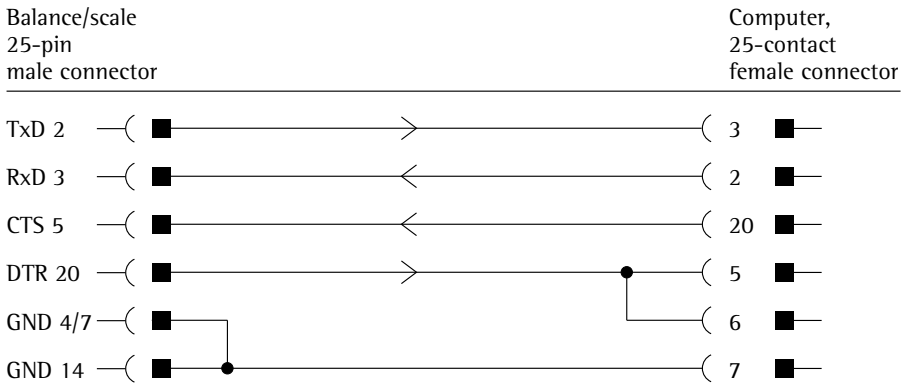
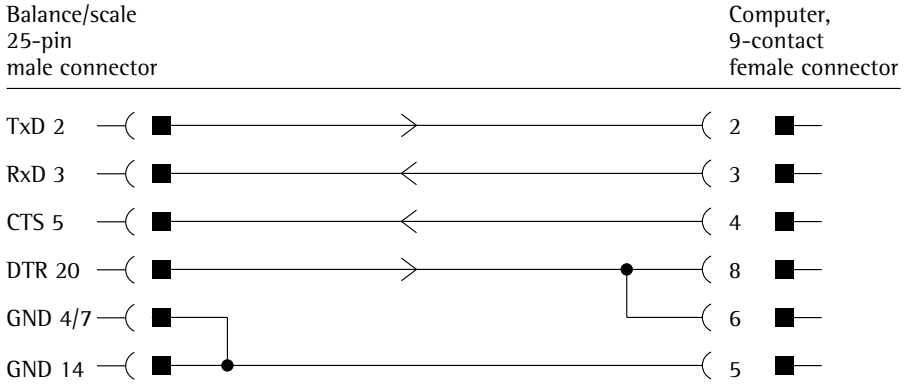
\*) = Hardware restart



# 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.**



Cable type: AWG 24 specification

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