SARTORIUS

Entris® II

Description of the Interface

Technical Note

Your balance is equipped with a serial RS232 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 and the application programs.

Features
- Type of interface: Serial interface
- Operating mode: Full duplex
- Standard: RS-232
- Transmission rates: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 baud
- Parity: odd, even, none
- Number of data bits: 7 or 8 bits
- Character format:
  1 start bit, 7-bit ASCII, parity, 1 Stop bit
- Handshake:
  For 2-wire interface: Software
  For 4-wire interface: Hardware (CTS/RTS)
- Data output format of the balance:
  16 or 22 characters

Factory Settings
- Transmission rate: **9600** baud (Code 2.1.2.7.)
- Parity: **ODD** (Code 2.1.3.3.)
- Stop bits: **1 STOP BIT** (Code 2.1.4.1.)
- Handshake:
  HRDWARE. Hardware (Code 2.1.5.2.)
- Operating mode: **SBI** (Code 2.1.1.1.)
- Printing: **IND.NO.** Manual without stability (Code 3.1.1.1.)

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.

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	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[1]	*	*	*	*	CR	LF
				D	I	S	.	E	R	R[1]	*	*	*	*	CR	LF
				P	R	T	.	E	R	R[1]	*	*	*	*	CR	LF

*: Space
#: Error number

[1] See "Troubleshooting Guide" in the installation and operating instructions supplied with your balance.

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	][1]	g	*	*	CR	LF

Position 1: Plus or minus sign or space
Position 2: Space
Positions 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
*: 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	][1]	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** (YDP20-0CE, YDP30) (Code 2.1.1.x).
Non-verified digits are marked by square brackets [ ].

SBI mode:
When the »**SBI**« (Code 2.1.1.1.) mode is active, 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[1]	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	D	I	S	.	E	R	R[1]	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	P	R	T	.	E	R	R[1]	*	*	*	*	CR	LF

*: Space   # # #: Error code number

[1] See "Troubleshooting Guide" in the installation and operating instructions supplied with your balance.

Commands (Data Input Format)

You can connect a computer to your balance to send commands via the balance interface port for controlling balance 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)
!#: Command character
_: Underline

CR: Carriage Return
LF: Line Feed (optional)

Command character	Format 1	Command character	Format 2
!	Meaning	!#	Meaning
?	Loading the internal adjustment weight [1, 2]	f0_	Function key **V** [3]
@	Lifting the internal adjustment weight [1, 2]	f1_	Function key **CAL** [3]
kP	Key PRINT output to all interfaces	f2_	Function key **ENTER** [3]
K	Ambient conditions: very stable	f3_	**ZERO** key
L	Ambient conditions: stable	f4_	**TARE** key
M	Ambient conditions: unstable	s3_	**CANCEL FUNCTION** key
N	Ambient conditions: very unstable	s9_	Create a screenshot on USB stick [4]
O	Block keys	x0_	Internal calibration [1]
P	Print, auto print; activate or block	x1_	Print model number
Q	Beep	x2_	Print serial number
R	Unblock keys	x3_	Print BAC software version (old notation)
S	Restart/self-test	x4_	Print APC software version (old notation)
T	Zero/Tare command	x5_	Print balance ID
U	**TARE** key	x20_	Print BAC software version (new notation)
V	**ZERO** key	x21_	Print APC software version (new notation)
W	Adjustment (depending on the menu setting) [2]		
Z	Perform internal adjustment [1]		

[1] = only for balances with internal weight
[2] = may be inaccessible on verified balances
[3] = only for Essential Line
[4] = only for Advanced Line

Synchronization

During data communication between the balance 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 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 interface (Sartorius Balance Interface = SBI) has transmit and receive buffers. You can define the handshake parameter in the Setup menu:
- Hardware Handshake (CTS/RTS)
- 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 **PRINT** or by a software command (Esc P or Esc kP).

Automatic Data Output

Activate the "auto print" (Code 3.1.1.4., 3.1.1.5.) operating code 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.
In the operating menu, you can define whether automatic printing can be stopped by pressing.

Pin Assignment Chart

Female Interface Connector:
Sub-D female connector 9-pin with screw lock hardware

Warning When Using Pre-wired RS232 Connecting Cable:
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. Failure to do so may damage or even completely ruin your balance and/or peripheral device(s).
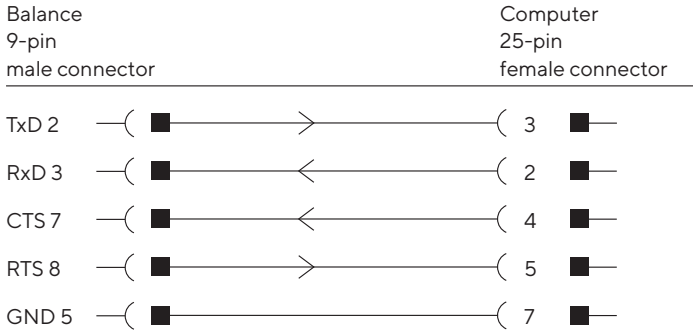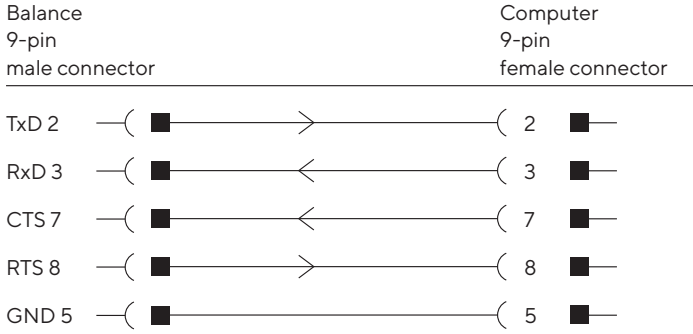
Pin Assignments:
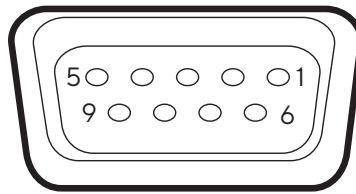
Pin 1: Not assigned
Pin 2: Data output (T × D)
Pin 3: Data input (R × D)
Pin 4: Not assigned
Pin 5: Internal ground
Pin 6: Not assigned
Pin 7: Clear to Send (CTS)
Pin 8: Request to Send (RTS)
Pin 9: Universal key

Cabling Diagram

For connecting a computer or other peripheral device to the balance using the standard DCE 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.

Balance 9-pin male connector		Computer 9-pin female connector
TxD 2	——→	2
RxD 3	←——	3
CTS 7	←——	7
RTS 8	——→	8
GND 5	———	5

Balance 9-pin male connector		Computer 25-pin female connector
TxD 2	——→	3
RxD 3	←——	2
CTS 7	←——	4
RTS 8	——→	5
GND 5	———	7

Cable type: AWG 24 specification