DENVER INSTRUMENT®

Description of the Interface for S and SI Balances (Summit)

Operating Instructions

Contents

Intended Use

Your balance 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 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:
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:
HANDSK. Hardware Handshake (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.

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[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
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
*: 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 (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[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) 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	PRINT key (print, auto print; activate or block)
R	Unblock keys
S	Restart/self-test
T	TARE key
W	Calibration/adjustment (depending on the menu setting) 1)
Z	Internal calibration/adjustment*

Command character !#	Format 2: Meaning
f0_	Function key SELECT
f1_	Function key CAL
f2_	Function key ENTER
s3_	CF 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

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 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 PRINT 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. In the operating menu, you can define whether automatic printing can be stopped by pressing PRINT.

Pin Assignment Chart

Handware Handshake
With a 4-conductor interface, 1 or 2 characters can be transmitted after CTS.

These connections must be made when the balance is connected through the RS-232C port.

Pin Assignment Chart for Data Interface

Summit Series Balance 9-pin port	**Standard RS-232 9-pin connector**
RxD **2**	**3** TxD
TxD **3**	**2** RxD
DTR **4**	**4** DTR
Signal ground **5**	**5** Signal ground
CTS **8**	**8** CTS

Summit Series Balance 9-pin port	**Standard RS-232 25-pin connector**
RxD **2**	**2** TxD
TxD **3**	**3** RxD
DTR **4**	**20** DTR
Signal ground **5**	**7** Signal ground
CTS **8**	**5** CTS

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