

Operating Instructions

Cubis® Mass Comparator

Electronic Mass Comparators

Model MCM32002LE



Contents

User Information	4
About these Installation Instructions	4
Warning Danger Symbols	4
Explanation of Symbols	4
Intended Use	5
Operation	6
Overview of Display and Control Panel	6
Basic Weighing Function	7
Level the Mass Comparator (Q-Level)	8
Calibration and Adjustment	9
Configuration (Operating Menu)	11
Functions of the Keys in the Menu:	11
Menu Navigation	11
Menu Structure (Overview)	12
Parameter Settings: Overview	13
Application Programs	19
Density Determination	19
Mass Unit Conversion	22
ISO/GLP-compliant Printout	24
Operation	25
Data Interfaces	26
USB Port (PC)	27
Pin Assignment Chart	29
Data Output	31
Data Output Format with 22 Characters	33
Data Input	34
Overview of SBI Commands	35
Error Messages	36

User Information

About these Installation Instructions

- ▶ Please read these instructions carefully and completely before using the device.
- ▶ Read the Safety Instructions carefully.
- ▶ These instructions are part of the product. Keep them in a safe and easily accessible location.
- ▶ If the instructions should be lost or misplaced, please contact Sartorius for a replacement or download the latest version from our website: www.sartorius.com

Warning | Danger Symbols

The following symbols are used in this manual:



This symbol denotes hazards which are highly likely to cause death or serious injury unless avoided.



This symbol denotes hazards which may lead to moderate or minor injury unless avoided.



These notes identify hazards associated with the risk of material damage.



This symbol identifies useful information and tips.



Note regarding device operation

Explanation of Symbols

The following symbols are used in these instructions:

- ▶ Indicates a required action
- ▷ Describes what happens after you have performed a particular step
 1. Perform steps in the specified order
 - 2.
- Indicates an item in a list

Other Documents

In addition to this quick reference guide, there is also an installation manual which is supplied along with the device (enclosed as a hard copy).

Intended Use

This high-precision mass comparator is designed to be used exclusively in laboratories, indoors, and under normal atmospheric conditions. It was specially developed for the exact determination of the mass of weights.

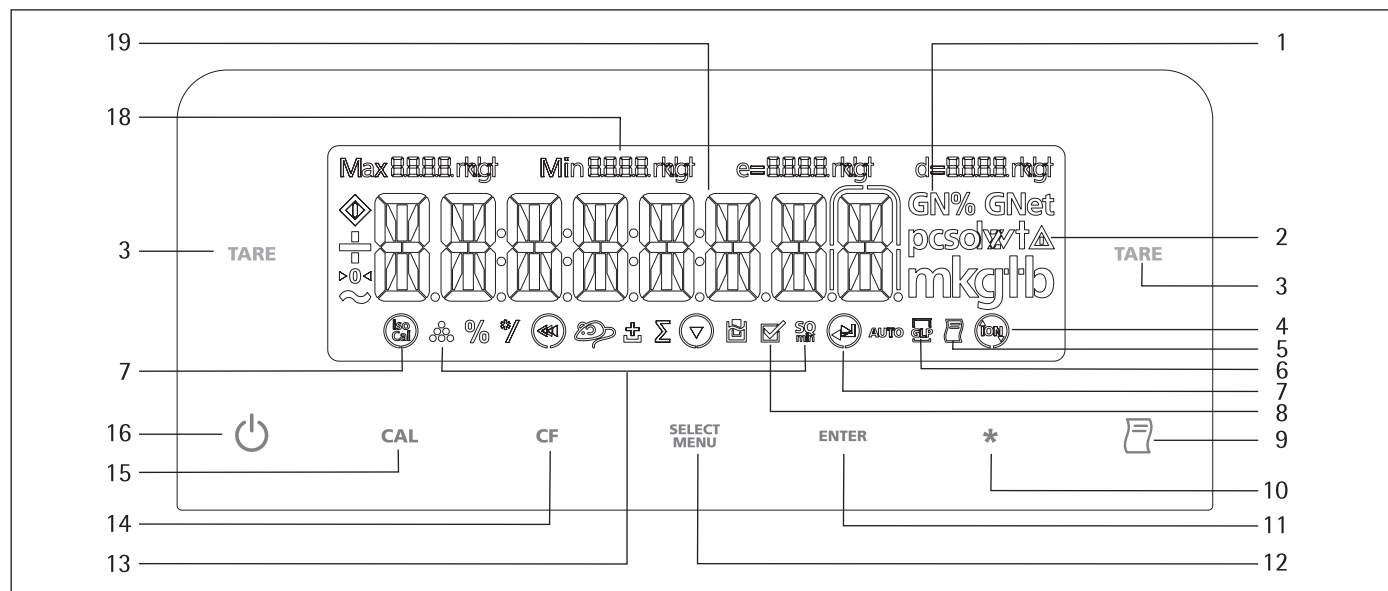
The Cubis® models MCM were developed as mass comparators especially for use in testing institutes and calibration services.

They are designed to be used exclusively indoors.

Cubis® models can be operated as standalone devices, connected to a PC or used in a network.

Operation

Overview of Display and Control Panel



Position Description

Position	Description
1	Weight units
2	Calculated-value indicator: not a weight value
3	Tare
4	○ symbol flashes: Balance is not level, leveling is required; n: open/close draft shield using key *; m: ionizer active
5	Symbol for "Printing mode active"
6	Symbol for "GLP printing mode active"
8	Symbol for "Application program active"
9	Data output: Press this key to send readout values to the built-in data interfaces.
10	Level balance, open/close draft shield or turn on/off ionizer
11	Start an application program
12	Select an application program Access the menu
13	Symbols for an active application (⌘, %, ⌘, ±, %, ⌘, ⌘)

Position Description

Position	Description
14	Clear Function This key is generally used to cancel functions: – Quit application program – Cancel calibration/adjustment routine Exit the menu – GLP-compliant printout
15	Start the calibration process
16	On/off key
17	Display: "isoCAL:" Calibration/adjustment function
18	Metrological data
19	Weight value displayed in selected weight unit

Symbol:

19	◀◀	Exit the menu
19	◀	Select previous menu level
17	▼	Select menu item
7	▶	Select next item in current menu level
7	↵	Confirm menu item

Basic Weighing Function

Features

- Tare the balance
- Print weight value

Preparation

Turn balance on: Press the () key

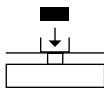
- Level the balance if required
- Tare the balance if necessary: Press the (TARE) key

- ▷ If necessary, change the configuration settings: see "Configuration"
- ▷ If desired, load the factory settings: see "Configuration"

Additional functions:

Turn balance off: Press the () key

Quick Guide: First Weighing

Step	Press key	Display/Printout
1. Turn mass comparator on Self-test runs. Then the mass comparator performs an automatic initial tare.	()	
2. Tare the mass comparator The mass comparator is tared and the value displayed is zero.	(TARE)	0.00 g
3. Carefully place the sample on the weighing pan (e.g. 20 kg) You can read the measured value as soon as the weight value stops changing and the unit is displayed.		+ 20000.00 g
4. Print weight value	()	N + 20000.00 g

Level the Mass Comparator (Q-Level)

It is essential for exact weighing results that the mass comparator is absolutely level. The front leveling feet can be used to level out small tilts in the floor. An integrated sensor detects the alignment of the mass comparator and triggers a warning message when leveling is required. When "O" flashes on the display, you must level the mass comparator.

Leveling with the inclination sensor:

Step	Press key	Display
1. O flashes on the display: Start leveling.		O flashes SCREW IN
2. Fully screw in both back leveling feet and confirm.	(*)	TURN
3. Directional arrow on the right of TURN: Turn right leveling foot. Directional arrow on the left of TURN: Turn left leveling foot. Directional arrow : Turn the respective leveling foot to the right until the directional arrow disappears. Directional arrow : Turn the respective leveling foot to the left until the directional arrow disappears.		TURN TURN SCREW OUT
4. Screw out both back leveling feet (depends on the model) until they touch the setup surface.	(*)	0.0 g

▷ You can continue when the mass comparator displays a weight value.

IMPORTANT

Each time the mass comparator is leveled, the mass comparator must be calibrated/adjusted (see Calibrating/Adjusting, page 9).

Calibration and Adjustment

Purpose

Adjustment is the correction of the difference between the measured value displayed and the true weight of a sample, or the reduction of the difference to an allowable level within maximum permissible error limits.

Features

The adjustment procedure should only be started when

- The mass comparator is unloaded
- The mass comparator is tared
- The weighing signal is stable

- The sensitivity of the mass comparator can be corrected a max. of 2%.

If these settings are not made, the error message "ERR 02" appears.

Adjustment can be made using different weight units: *CAL.UNIT - GRAMS, KILOGR*)

- You can also configure the mass comparator to perform calibration/adjustment automatically (isoCAL), when the preset time or temperature limit has been exceeded.

To block calibration/adjustment:

- Select *CAL./ADJ. - BLOCKED*
- Close the menu access switch on the back of the balance

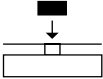
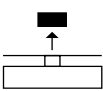
Calibration and adjustment results can be printed in an ISO/GLP-compliant printout: settings and printout templates are listed starting on page 24.

Application parameters are deleted after calibration/adjustment.

Configuration:

SETUP - BAL.SCAL - CAL./ADJ. - CAL.EXT.

The mass comparator has a factory-set calibration weight value (see "Specifications").

Step	Key	Display/ Printout
1. Tare the mass comparator	(TARE)	0.00 g
2. Start the calibration process	(CAL)	CAL EXT.
Once you store the zero point, the display prompts for the required calibration weight (flashing display).		- 10000.00 g
3. Place displayed calibration weight on mass comparator (in this example: 10000 g). Weight too low: a minus sign "-" is shown Weight too high: a plus sign "+" is shown		- 10000.00 g
The display stops flashing as soon as the weight value is within the defined limit.		
4. Calibration/Adjustment executed; then the calibration weight value is displayed		CAL END + 10000.00 g
5. Remove calibration weight		0.00 g

Functions of the Keys in the Menu:

Symbol displayed	Key	Function
▼	(SELECT MENU)	Scroll through menu items
▶	(ENTER)	Select next item on current menu level (use right cursor to scroll through up to 4 menu levels)
↵	(ENTER)	Confirm menu item
	(CF) (Press and hold)	Save settings and exit menu from any position
◀◀	(CF)	Save settings and exit menu
◀	(CF)	Select previous menu level (left cursor)
2. 3. 1. 1		Indicates menu level

Example: Setting the Language

Step	Press key	Display/Printout
1. Open the menu: Display the 1st menu item in the weighing mode	(SELECT MENU) Hold	APPLIC.
2. Scroll upward within the menu level; After the last menu code, the first code is displayed again (scroll)	Press repeatedly (SELECT MENU)	INPUT ... LANGUAGE
3. Select next menu level (scrolls to the right)	Press repeatedly (ENTER)	ENGLISH °
4. Change setting: Select the menu item by scrolling up	(SELECT MENU)	ENGLISH
5. Confirm setting; "o" indicates the menu item you have set	(SELECT MENU)	ENGLISH °
6. Go back to the previous menu level (from menu level 4)	(CF)	LANGUAGE
► If required, select further menu items	(SELECT MENU), ↓	
7. Save setting and exit the menu	Press repeatedly (CF)	
▷ Restart your application		0.0 g

Menu Structure (Overview)

Level 1	Level 2	Level 3	Info about Menu Level
1) SETUP	BAL.SCAL. Mass comparator parameters	AMBIENT conditions APP.FILT. Application filter STAB.RNG. Stability range STABIL.DLY. STABILITY delay TARE 1) AUTOZER. Auto zero WT.UNIT Basic weight unit DISP.DIG. Display accuracy CAL.ADJ. Function of the (CAL) key CAL.ROUTINE ZERO.RNG. Zero range INIT.ZERO Zero at Power On ON.TARE Tare/zero at Power On CYC.RATE Output rate ISO.CAL Autom. calibration/adjustment EXT.CAL. External adjustment CAL.UNIT Weight unit for calibration	1. 1. 1. 1. 1. 2. 1. 1. 3. 1. 1. 4. 1. 1. 5. 1. 1. 6. 1. 1. 7. 1. 1. 8. 1. 1. 9. 1. 1. 10. 1. 1. 11. 1. 1. 12. 1. 1. 13. 1. 1. 14. 1. 1. 15. 1. 1. 16. 1. 1. 17.
	GEN.SERV. General Service	MEN.RESET Factory settings	1. 9. 1.
2) DEVICE	EXTRAS (Additional functions)	MENU Menu read only/can edit SIGNAL Acoustic Signal KEYS (Keypad) EXT.KEY External switch function ON.MODE Power-on mode LEVEL LEVELING	2. 1. 1. 2. 1. 2. 2. 1. 3. 2. 1. 4. 2. 1. 6. 2. 1. 12. 2. 1. 13.
	PERIPHER. (25-pin "Peripherals" interface)	DAT.REC. Communication mode BAUDrate PARITY Parity STOPBIT Number of stop bits HANDSHK. Handshake mode DATABIT Number of data bits	2. 2. 1./2. 3. 1. 2. 2. 2./2. 3. 2. 2. 2. 3./2. 3. 3. 2. 2. 4./2. 3. 4. 2. 2. 5./2. 3. 5. 2. 2. 6./2. 3. 6.
	PC-USB (USB port "PC")		
3) DATA OUT (data output)	COM.SBI (PC communication)	COMMunications OUTput STOP automatic output AUT.CYCL. Time-dependent automatic data output FORMAT (Line format) AUTO.TARE Autom. taring after data output	3. 1. 1. 3. 1. 2. 3. 1. 3. 3. 1. 4. 3. 1. 5.
	PRINT.PARA for printing	RESolution (manual/automatic) FORMAT Line format for printout PRT.INIT. Printout of appl. parameters GLP ISO/GLP -compliant printout TAR./PRT. Tare bal./scale after ind. print TIME: 12h/24h DATE format	3. 2. 1. 3. 2. 2. 3. 2. 3. 3. 2. 4. 3. 2. 5. 3. 2. 6. 3. 2. 7.
4) APPLIC. Application programs	WEIGH UNIT Toggle DENSITY determination	DEC.PLCS Decimal places	4. 1. 4. 2. 4. 9. 1.
5) INPUT Input	ID. ID input; max. 7 characters DATE Set date TIME Set time PASSWORD Password entry (for Service) CAL.WT. Enter weight value		5. 1. 5. 2. 5. 3. 5. 4. 5. 5.
6) INFO Information	VERSION, SER.NR., MODEL, LOBS, KBC VERS, DR.SHIELD, if OPT.MOD	Display software version, serial no., model	6. 1. to 6. 5.
7) LANGUAGE (LANGUAGE)	ENGLISH (factory setting) DEUTSCH (German) FRAN.çais (French) ITAL.iano (Italian) ESPAÑOL (Spanish) РУССКИЙ (Russian) POLSKI (Polish)		7. 1. 7. 2. 7. 3. 7. 4. 7. 5. 7. 6. 7. 7.

Parameter Settings: Overview

o = Factory setting ✓ = User-defined setting

Level 1		Level2		Level 3	Info about Menu Level
1) <i>SETUP</i>	<i>BAL.SCAL.</i> mass comparator parameters	<i>AMBIENT</i> conditions (adapt filter)	☒	<i>V.STABLE</i> Very stable	1.1.1.1
			☐	<i>STABLE</i>	1.1.1.2
			☐	<i>UNSTABL</i>	1.1.1.3
			☒	<i>V.UNSTBL</i> Very unstable	1.1.1.4
		<i>APP.FILT.</i> Application filter	☐	<i>FINAL.RD</i> Final readout mode	1.1.2.1
			☐	<i>FILLING</i> Filling mode	1.1.2.2
			☐	<i>REDUC.</i> Reduced	1.1.2.3
			☐	<i>OFF</i>	1.1.2.4
		<i>STAB.RNG.</i> Stability range	☐	<i>MAX.ACC.</i> Maximum accuracy	1.1.3.1
			☐	<i>V.ACC.</i>	1.1.3.2
			☐	<i>ACC.</i>	1.1.3.3
			☐	<i>FAST</i>	1.1.3.4
			☐	<i>V.FAST</i>	1.1.3.5
			☒	<i>MAX.FAST</i>	1.1.3.6
		<i>ST.DEL.</i> Delay	☐	<i>NO</i>	1.1.4.1
			☐	<i>SHORT</i>	1.1.4.2
			☐	<i>AVERG.</i>	1.1.4.3
			☐	<i>LONG</i>	1.1.4.4
		<i>TARE</i>	☐	<i>WIDSTB</i> W/o stability	1.1.5.1
			☐	<i>WISTB</i> After stability	1.1.5.2
			☐	<i>ATSTAB</i> At stability	1.1.5.3
		<i>AUT.ZERO</i> Auto zero	☐	<i>ON</i>	1.1.6.1
			☐	<i>OFF</i>	1.1.6.2
		<i>WT.UNIT</i> Basic weight unit	☐	For list of units, see "Toggling Between Weight Units"	1.1.7.2
			☐		to 1.1.7.13
		<i>DISP.DIG.</i> Display accuracy	☐	<i>ALL</i>	1.1.8.1
			☐	<i>LP.ON.OFF</i> (last digit after load change)	1.1.8.2
	☐		<i>DIV. 1</i> 1 interval	1.1.8.6	
	☐		<i>MINUS 1</i> Reduced by 1 digit	1.1.8.7	
	<i>CAL.ADJ.</i> Function of (<i>CAL</i>) key	☐	<i>EXT.CAL.</i> External calibration with standard weight	1.1.9.1	
		☐	<i>E.CAL.USR.</i> External calibr./adjustment with user-defined weight	1.1.9.3	
		☐	<i>LINE.EXT.</i> External linearization with default weights ²⁾	1.1.9.6	
		☐	<i>LINE.USR.</i> External linearization with user-defined weight ²⁾	1.1.9.7	
☐		<i>SET.PREL.</i> Setting the Preload	1.1.9.8		
☐		<i>DEL.PREL.</i> Clearing the Preload	1.1.9.9		
☐		<i>BLOCKED</i> (<i>CAL</i>) Blocked	1.1.9.10		
☐		<i>SELECT</i>	1.1.9.12		
<i>CAL.ADJ.ON</i>	☐	<i>SEQUENCE</i> adjustment	1.1.10.1		
	☐	<i>CAL.ADJ.</i> Adjustment as needed	1.1.10.2		
<i>ZERO.RNG.</i> Zero range	☐	<i>1 PERC.ent</i>	1.1.11.1		
	☐	<i>2 PERC.ent</i>	1.1.11.2		
<i>INIT.ZERO</i> Zero at Power On	☐	<i>DEFAULT</i> Factory setting	1.1.12.1		
	☐	<i>2 PERC.ent</i>	1.1.12.2		
<i>ON TARE</i> Tare/zero at power on	☐	<i>ON</i>	1.1.13.1		
	☐	<i>OFF</i>	1.1.13.2		
<i>CYC.RATE</i> Output rate	☐	<i>NORMAL</i>	1.1.14.1		
	☐	<i>HIGHVAR.</i>	1.1.14.2		
	☐	<i>SLOW</i>	1.1.14.3		
	☐	<i>MEDIUM</i>	1.1.14.4		
	☐	<i>FAST</i>	1.1.14.5		
	☐	<i>VERYFAST</i>	1.1.14.6		
	☐	<i>MAXIMUM</i>	1.1.14.7		
<i>ISO.CAL</i> Autom. calibration/adjustment	☐	<i>OFF</i>	1.1.15.1		
	☐	<i>NOTE</i>	1.1.15.2		
<i>EXT.CAL.</i> External calibration	☐	<i>FREE</i>	1.1.16.1		
	☐	<i>LOCKED</i> (blocked)	1.1.16.2		
<i>CAL.UNIT</i> for calibration weight	☐	<i>GRAM</i>	1.1.17.1		
	☐	<i>KILOGR.</i> Kilograms	1.1.17.2		
	☐	<i>USERDEF.</i> (factory setting: pound)	1.1.17.4		
<i>GEN.SERV.</i> General servicing	<i>MEN.RESET</i> Menu reset (Factory Settings)	☐	<i>YES</i> Restore fcty. settings	1.9.1.1	
		☐	<i>NO</i> Do not restore settings	1.9.1.2	
		☐	<i>STANDARD</i>	1.9.1.3	

Level 1	Level 2	Level 3	Level 4	Info about Menu Level
2) DEVICE	EXTRAS (Additional functions)	MENU	CANEDIT RD.ONLY Read only	2.1.1.1 2.1.1.2
		SIGNAL Acoustic Signal	OFF o ON	2.1.2.1 2.1.2.2
		KEYS (Keypad)	o FREE LOCKED	2.1.3.1 2.1.3.2
		EXT.KEY External switch function	o PRINT key () Z/TARA key (TARE) CAL. key () CF key () ENTER key (ENTER) APPL. key ASTERISK key ()	2.1.4.1 2.1.4.2 2.1.4.3 2.1.4.5 2.1.4.6 2.1.4.11 2.1.4.12
		ON MODE Power-on mode	o OFF/ON/SD off/on/standby OFF/ON/SD off/on/autom. shut-off ON/SD On/Standby AUTO ON Auto on	2.1.6.1 2.1.6.2 2.1.6.3 2.1.6.4
		LEVEL	OFF o NOTE TO ERR.MSG. Error message	2.1.12.1 2.1.12.2 2.1.12.3
		LEVELING	o KEY (manual start)	2.1.13.1
	PERIPHER (25-pin "Peripherals" interface)	DAT.REC. Operating mode	# SBI (ASCII) XBPI REM.DISPL. UNI.PRINT. UNIVERSAL PRINTER o LAB.PRINT (parameters for YDP10 printer) OFF	Periphery/PC USB: 2.2.1.1 / 2.3.1.1 2.2.1.2 / 2.3.1.2 2.2.1.4 / 2.3.1.4 2.2.1.7 / 2.3.1.7 2.2.1.8 / 2.3.1.8 2.2.1.10 / 2.3.1.10
	PC-USB (USB port "PC")	BAUDrate	600 1200 2400 4800 o 9600 19200 38400 57600 115200	2.2.2.3 / 2.3.2.3 2.2.2.4 / 2.3.2.4 2.2.2.5 / 2.3.2.5 2.2.2.6 / 2.3.2.6 2.2.2.7 / 2.3.2.7 2.2.2.8 / 2.3.2.8 2.2.2.9 / 2.3.2.9 2.2.2.10 / 2.3.2.10 2.2.2.11 / 2.3.2.11
	PERIPHER PC-USB	PARITY Parity	o ODD EVEN NONE	Periphery/PC USB: 2.2.3.3 / 2.3.3.3 2.2.3.4 / 2.3.3.4 2.2.3.5 / 2.3.3.5
		STOPBIT Number of stop bits	o 1 STOP 2 BITS	2.2.4.1 / 2.3.4.1 2.2.4.2 / 2.3.4.2
		HANDSHK. Handshake mode	SOFTW.are HARDW.are o NONE	2.2.5.1 / 2.3.5.1 2.2.5.2 / 2.3.5.2 2.2.5.3 / 2.3.5.3
		DATABIT Number of data bits	7 BITS o 8 BITS	2.2.6.1 / 2.3.6.1 2.2.6.2 / 2.3.6.2

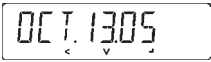
Level 1	Level 2	Level 3	Level 4	Info about Menu Level
3) <i>DATAOUT</i> (data output)	<i>COMM.SBI</i> (computer communication)	<i>COM.OUTPUT</i> (manual/automatic)	☐ <i>IN.WID</i> Stability	3. 1. 1. 1
			☐ <i>IN.AFTER</i> Stability	3. 1. 1. 2
			☐ <i>IN.AT</i> Stability	3. 1. 1. 3
			☐ <i>AUTO.WID</i> Auto w/o stability	3. 1. 1. 4
			☐ <i>AUT.WITH</i> Stability	3. 1. 1. 5
		<i>STOP</i> Auto output	☐ <i>OFF</i>	3. 1. 2. 1
			☐ <i>ON</i>	3. 1. 2. 2
		<i>AUTO.CYCL.</i> Time-dependent automatic data output	☐ <i>EVERY</i>	3. 1. 3. 1
			☐ <i>2NDVALUE</i>	3. 1. 3. 2
		<i>FORMAT</i> (Line format)	☐ <i>16 CHARS</i> (digit is not identified)	3. 1. 4. 1
			☐ <i>22 CHARS</i> (digit is identified)	3. 1. 4. 2
			☐ <i>EXTR.LINE</i> (date, time and weight value)	3. 1. 4. 4
	<i>PRINT.PARA</i> for printing	<i>AUTO.TARE</i> Autom. taring after data output	☐ <i>OFF</i>	3. 1. 5. 1
			☐ <i>ON</i>	3. 1. 5. 2
		<i>RES.</i> (manual/autom.)	☐ <i>MANUAL WITHOUT</i> Stability	3. 2. 1. 1
			☐ <i>MAN.AFTER.</i> Stability	3. 2. 1. 2
			☐ <i>MAN.AT</i> Stability	3. 2. 1. 3
			☐ <i>AUTO.LC</i> (autom. at load change)	3. 2. 1. 6
		<i>FORMAT</i> Line format for printout	☐ <i>16 CHARS</i> (digit is not identified)	3. 2. 2. 1
			☐ <i>22 CHARS</i> (digit is identified)	3. 2. 2. 2
			☐ <i>EXTR.LINE</i> (date, time and weight value)	3. 2. 2. 4
		<i>PRT.INIT.</i> Printout of application parameters	☐ <i>OFF</i>	3. 2. 3. 1
			☐ <i>ALL</i> Parameters	3. 2. 3. 2
			☐ <i>MAINPAR.</i> Main parameters	3. 2. 3. 3
<i>GLP ISO/GLP-compliant</i> printout	☐ <i>OFF</i>	3. 2. 4. 1		
	☐ <i>CAL.ADJ.</i> For calibration/adjustment only	3. 2. 4. 2		
	☐ <i>ALWAYS</i> on	3. 2. 4. 3		
<i>TAR./PRT.</i> Tare bal./scale after ind. print	☐ <i>OFF</i>	3. 2. 5. 1		
	☐ <i>ON</i>	3. 2. 5. 2		
<i>TIME</i>	☐ <i>24H</i> display	3. 2. 6. 1		
	☐ <i>12H</i> display "AM/PM"	3. 2. 6. 2		
<i>DATE</i>	☐ <i>DD.MMM.YY</i> format	3. 2. 7. 1		
	☐ <i>MMM.DD.YY</i> format	3. 2. 7. 2		
4) <i>APP-LIC.</i> Application programs	<i>WEIGH.</i> <i>UNIT</i> Toggle		4. 1.	
			4. 2.	
	<i>DENSITY</i> determination	<i>DEC.PLCS</i> Decimal places	☐ <i>NONE</i> No decimal places	4. 9. 1. 1
			☐ <i>1 DEC.PL.</i> 1 decimal place	4. 9. 1. 2
			☐ <i>2 DEC.PL.</i> 2 decimal places	4. 9. 1. 3
			☐ <i>3 DEC.PL.</i> 3 decimal places	4. 9. 1. 4

= Factory setting for "PC-USB" interface

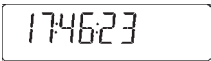
Input: ID number, date and time

Level 1	Level 2	Level 3	Info about Menu Level
5) <i>INPUT</i> Input	<i>ID.</i>	ID input, max. 7 characters Possible characters: 0-9, A-Z, dash hyphen and space	5. 1.
	<i>DATE</i>	Set date	5. 2.
	<i>TIME</i>	Set time	5. 3.
	<i>PASSWORD</i>	Password entry (for Service)	5. 4.
	<i>CAL.WT.</i>	Enter weight value	5. 5.

Depending on the setting of the "*PRINT - PRINT.PARA - DATE*" menu item, the date is displayed in the following format:

Format	Display: Date
DD.MMM.YY	
MMM.DD.YY	

Depending on the setting of the "*PRINT - PRINT.PARA - TIME*" menu item, the time is displayed in the following format:

Time	Display: Time
24h mode	
12h mode	

Level 1	Level 2	Level 3	Level 4	Info about Menu Level
Device-specific information				
6) INFO Info	VER.NO.	Displays the software version	00-39-13	6. 1.
	SER.NO.	Displays the serial number (to toggle between the upper/lower part of the display: press the (SELECT MENU) key)	1080 1234	6. 2.
	MODEL	Displays the model ID (to toggle between the upper, middle and lower part of the display: Press the (SELECT MENU) key)	MCM32002LE	6. 3.
	LOGS	Displays the software version	REL. 19.03	6.4.1.
	KBC VERS	Displays the software version	REL. 10.02	6.5.1.
Menu display: Selecting languages or codes				
7) LANGUAGE (LANGUAGE)	ENGLISH (factory setting)			7. 1.
	DEUTSCH (German)			7. 2.
	FRANçais (French)			7. 3.
	ITALiano (Italian)			7. 4.
	ESPAÑOL (Spanish)			7. 5.
	РУССКИЙ (Russian)			7. 6.
	POLSKI (Polish)			7. 7.

Setting the ID number, date and time

Step	Press key	Display
1. Starting the Menu: 1. Display menu level	(SELECT MENU) Hold	APPLIC.
2. Select "Input"	(SELECT MENU)	INPUT
3. ID no.: Select input for ID	2× (ENTER)	ID.
4. Set or change ID number – With auto key repeat:	(SELECT MENU) (SELECT MENU) Press and hold	3-----
5. Moving within the 7-digit number Move ID no.	(ENTER) or (CF)	3-ABC 12
6. Save at the last position of the ID no.	(ENTER)	ID.
7. Date: Select and confirm "Date"	(SELECT MENU), (ENTER)	08.FEB. 15
8. Change setting – With auto key repeat:	(SELECT MENU) (SELECT MENU) Press and hold	10.FEB. 15
9. Change position between the day/month/year	(ENTER) or	10.FEB. 15
10. Save setting at "Year" position	(ENTER)	DATE
11. Time: Select "Time"	(SELECT MENU), (ENTER)	10.46.23
12. Change setting – With auto key repeat:	(SELECT MENU) (SELECT MENU) Press and hold	11.46.23
13. Change position between hour/minute/second	(ENTER) or	11.46.32
14. Set seconds to "zero"	(SELECT MENU)	11.47.00
15. Save setting at "Second" position	(ENTER)	TIME
16. Save settings and exit menu	Press repeatedly (CF)	
> Restart your application		0.00 g

Application Programs

Density Determination

Display symbol: 

Purpose

This application program can be used to determine the density of solid materials according to the buoyancy method.

Features

The density of liquid (g/cm³) can be set to a corresponding temperature via the ^(SELECT MENU) key. See the next page for a table on water density values. Factory setting is 1 g/cm³.

The following formula is used:

$$\text{Density of sample} = \frac{\text{Weight in air}}{(\text{weight in air} - \text{weight in water})} \cdot \text{Density of liquid}$$

The liquid density is displayed briefly when you start the density calculation.

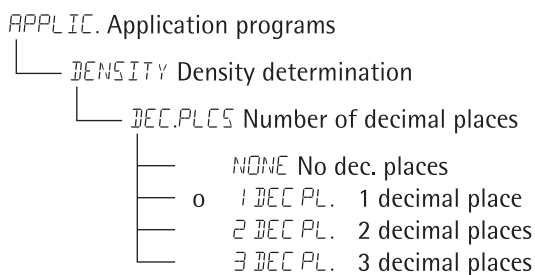
Positive and negative weight values can be applied for the sample in the air and water. The value in water, however, must be less than the value in the air; otherwise, this will trigger an error message.

The results can be displayed with 0 to 3 decimal places:

See the chapter entitled "Configuration" page 11. Not part of the scope of delivery: sample holder and suspension wire.

Preparation

- Select the "Density Determination" application in the menu:
See "Configuration", page 11
- Configuring parameters:



Note on using 3 decimal places:

Using three decimal places for density can result in a high measurement error rate because corrections to the air density and the density calculation sets are not taken into account, for example.

o = Factory settings

Printout for Density Determination

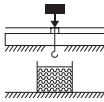
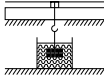
R h o F L	0 . 9 9 8 2 3	o	: Liquid density (g/cm ³)
W a	+	2 0 . 0	g : Weight in air
W f l	+	1 5 . 0	g : Weight in liquid
R h o		4 . 0	o : Result: Density of sample

Table:
Density values of H₂O at temperature T (in °C)

T/°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
10.	0.99973	0.99972	0.99971	0.99970	0.99969	0.99968	0.99967	0.99966	0.99965	0.99964
11.	0.99963	0.99962	0.99961	0.99960	0.99959	0.99958	0.99957	0.99956	0.99955	0.99954
12.	0.99953	0.99951	0.99950	0.99949	0.99948	0.99947	0.99946	0.99944	0.99943	0.99942
13.	0.99941	0.99939	0.99938	0.99937	0.99935	0.99934	0.99933	0.99931	0.99930	0.99929
14.	0.99927	0.99926	0.99924	0.99923	0.99922	0.99920	0.99919	0.99917	0.99916	0.99914
15.	0.99913	0.99911	0.99910	0.99908	0.99907	0.99905	0.99904	0.99902	0.99900	0.99899
16.	0.99897	0.99896	0.99894	0.99892	0.99891	0.99889	0.99887	0.99885	0.99884	0.99882
17.	0.99880	0.99879	0.99877	0.99875	0.99873	0.99871	0.99870	0.99868	0.99866	0.99864
18.	0.99862	0.99860	0.99859	0.99857	0.99855	0.99853	0.99851	0.99849	0.99847	0.99845
19.	0.99843	0.99841	0.99839	0.99837	0.99835	0.99833	0.99831	0.99829	0.99827	0.99825
20.	0.99823	0.99821	0.99819	0.99817	0.99815	0.99813	0.99811	0.99808	0.99806	0.99804
21.	0.99802	0.99800	0.99798	0.99795	0.99793	0.99791	0.99789	0.99786	0.99784	0.99782
22.	0.99780	0.99777	0.99775	0.99773	0.99771	0.99768	0.99766	0.99764	0.99761	0.99759
23.	0.99756	0.99754	0.99752	0.99749	0.99747	0.99744	0.99742	0.99740	0.99737	0.99735
24.	0.99732	0.99730	0.99727	0.99725	0.99722	0.99720	0.99717	0.99715	0.99712	0.99710
25.	0.99707	0.99704	0.99702	0.99699	0.99697	0.99694	0.99691	0.99689	0.99686	0.99684
26.	0.99681	0.99678	0.99676	0.99673	0.99670	0.99668	0.99665	0.99662	0.99659	0.99657
27.	0.99654	0.99651	0.99648	0.99646	0.99643	0.99640	0.99637	0.99634	0.99632	0.99629
28.	0.99626	0.99623	0.99620	0.99617	0.99614	0.99612	0.99609	0.99606	0.99603	0.99600
29.	0.99597	0.99594	0.99591	0.99588	0.99585	0.99582	0.99579	0.99576	0.99573	0.99570
30.	0.99567	0.99564	0.99561	0.99558	0.99555	0.99552	0.99549	0.99546	0.99543	0.99540

Example: Determining the density of a solid sample. The density at 20.0 degrees Celsius is 0.99823 g/cm³.

Parameter configuration: *APPLIC. - DENSITY - DEC.PLCS. - 1 DEC.PL.*

Step	Press key	Display/Printout
1. Attach sample holder and suspension wire		
2. Tare the mass comparator	(TARE)	0.0 g
3. Change density of buoyancy liquid	(SELECT MENU)	- 1.00000
4. Set density value (in this example: 0.99823) Enter numerals in increments of 1 briefly or press and hold:	Repeatedly press (SELECT MENU), press and hold the (ENTER) key	- 0.99823
5. Set the density value and start the application. (ENTER) The current density value will be saved in protected memory until the setting is changed.	(ENTER)	
6. Confirm "AIR" display	(ENTER)	LUFT
7. Determining the weight of the sample in air: Place sample on the mass comparator		+ 20.0 g
8. Save weight in air	(ENTER)	
9. Remove sample from the mass comparator		WASSER
10. Determining weight value in liquid: Place sample in basket		
11. Confirm "WATER" display	(ENTER)	0.0 g
12. Place sample in liquid		+ 15.0 g
13. Save weight value in liquid, display and print results	(ENTER)	+ 4.0 ° Rho FL 0.99823 ° Wa + 20.0 g Wfl + 15.0 g
14. Delete results	(CF)	Rho 4.0 °
15. Repeat as needed, starting from Step 5		

Mass Unit Conversion

Purpose

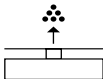
This application is used to change the weight value displayed from the basic weight unit to any of 4 application weight units (see table on next page).

Features

- Set the basic unit and display accuracy in the Setup menu: See "Configuration."
- Set the application weight units and display accuracies for all 4 units in the Application menu.
- The units selected are saved to protected memory.
- The basic unit is always active once the mass comparator is turned on.

Example: Change display from grams [g] (basic unit) to pounds [lb] and then to Troy ounces [ozt] reduced by 1 digit.

Configuration: *APPLIC. - UNIT*

Step	Press key	Display/Printout
Preparation:		
1. Start selection of an application weight unit	(<i>SELECT MENU</i>)	<i>EINHEIT 1</i>
2. Confirm unit 1	(<i>ENTER</i>)	<i>KEINE °</i>
3. Select an application unit (in this example: pounds) Units and display accuracy: Press repeatedly See table on the next page	Press repeatedly (<i>SELECT MENU</i>)	<i>POUND</i>
4. Confirm pounds weight unit	(<i>ENTER</i>)	<i>POUND °</i>
5. Select next application unit, Units and display accuracy: See table on the next page	(<i>CF</i>) (<i>SELECT MENU</i>), (<i>ENTER</i>) Repeatedly press (<i>SELECT MENU</i>), (<i>ENTER</i>)	<i>EINHEIT 2</i> <i>KEINE °</i> <i>TROY.OZ.</i>
6. Confirm troy ounces weight unit	(<i>ENTER</i>)	<i>TROY.OZ. °</i>
7. Reduce display unit by 1	Repeatedly press (<i>SELECT MENU</i>), (<i>ENTER</i>)	<i>MINUS 1 °</i>
8. You can select an additional 4 units, if desired (otherwise, confirm " <i>NO</i> " using (<i>ENTER</i>))		
9. Save selection	Repeatedly press (<i>CF</i>)	<i>0.00 g</i>
Operation:		
10. Place the sample on the scale		+ <i>100.00 g</i>
11. Change weight unit	Press repeatedly (<i>ENTER</i>)	+ <i>0.22046 lb</i> + <i>3.527 ozt</i>

The mass comparator can operate using the following units and display accuracies:

Menu item ¹⁾	Unit ²⁾	Conversion factor	Symbol displayed	Display accuracy
0) <i>NO</i>	Unit same as used in menu under basic unit			0) <i>NO</i> (display accuracy same as basic unit) 1) <i>ALL</i> Show all decimal places 2) <i>LP.ON.OFF</i> Last digit after load change 6) <i>DIV. 1</i> 1 interval 7) <i>MINUS 1</i> Reduced by 1 digit
2) <i>GRAMS</i> (factory setting)	Grams	1.000000000000	g	<i>NONE</i> to <i>MINUS 1</i>
3) <i>KILOGR.</i>	Kilograms	0.001000000000	kg	<i>NONE</i> to <i>MINUS 1</i>
4) <i>CARATS</i>	Carats	5.000000000000	o	<i>NONE</i> to <i>MINUS 1</i>
5) <i>POUNDS</i>	Pounds	0.00220462260	lb	<i>NONE</i> to <i>MINUS 1</i>
6) <i>OUNCES</i>	Ounces	0.03527396200	oz	<i>NONE</i> to <i>MINUS 1</i>
7) <i>TROY.OZ.</i>	Troy ounces	0.03215074700	ozt	<i>NONE</i> to <i>MINUS 1</i>
11) <i>GRAINS</i>	Grains	15.4323583500	GN	<i>NONE</i> to <i>MINUS 1</i>
12) <i>PENNY.WT.</i>	Pennyweights	0.64301493100	dwt	<i>NONE</i> to <i>MINUS 1</i>
13) <i>MILLIGR.</i>	Milligrams	1000.000000000	mg	<i>NONE</i> to <i>MINUS 1</i>

¹⁾ = Depending on the country-specific model version, not all weight units listed may be available.

ISO/GLP-compliant Printout

Features

You can have the device information, ID and the current date printed before (GLP header) and after (GLP footer) the values from the weighing series. These parameters include:

GLP Header:

- Date
- Time at the start of a weighing series
- Mass comparator manufacturer
- Mass comparator model
- Model serial number
- Software version number
- ID number (of weighing series)

GLP footer:

- Date
- Time at the end of a weighing series
- Field for signature

Configuration

- Set the following menu items (Setup mode, see “Configuration”), page 11:
 - Line format for printout with ID – 22 characters (factory setting): `PRINT - PRNT.PARA. - FORMAT - 22 CHARS`
 - ISO/GLP-compliant printout or record for calibration/adjustment only: `DATA OUT - PRNT.PARA. - GLP - CAL. ADJ.`
or
ISO/GLP-compliant printout or record always on: `DATA OUT - PRNT.PARA. - GLP - ALWAYS ON`
 - Time formats: `DATA OUT - PRNT.PARA. - TIME - 24H`
or
`DATA OUT - PRNT.PARA. - TIME - 12H`
with “Ahh:mm” or “Phh:mm”
 - Date formats: `DATA OUT - PRNT.PARA. - DATE - DD.MMM.YY`
or
`DATA OUT - PRNT.PARA. - DATE - MMM.DD.YY`

IMPORTANT

No ISO|GLP-compliant record is output if any of the following settings are configured:

`DATA OUT - PRNT.PARA. - FORMAT - 16 CHARS`

Operation

- ▶ To print the header and the first measurement value:
Press the () key.
- ▷ The header is included with the 1st printout.
- ▶ To print the header and reference data automatically when an application program is active: Press the (ENTER) key
- ▶ Print the footer/Exit the application:

Application	Functional process
Density Determination	Print footer and quit application program: 1× Press the () key

The ISO/GLP-compliant printout can have the following lines:

-----	Dash line
17-Aug-2015 10:30	Date/Time (start of measurement)
SARTORIUS	Mass comparator manufacturer
Mod. MCM32002LE	Mass comparator type
Ser. no. 10105352	Mass comparator serial number
Ver. no. 00-39-04	Software version
ID 690 923	ID no.
-----	Dash line
Cal. Ext. Test	Calibration/adjustment mode
Set + 10000.00 g	Calibration weight value
Diff. + 0.02 g	Difference after calibration
Cal. Ext. Complete	Confirmation of completed calibration process
Diff. 0.00 g	Difference between current and target values after calibration
Level ok	Mass comparator level
-----	Dash line
17-Aug-2015 10:32	Date/Time (end of measurement)
Name:	Field for signature
	Space line
-----	Dash line

Data Interfaces

Purpose

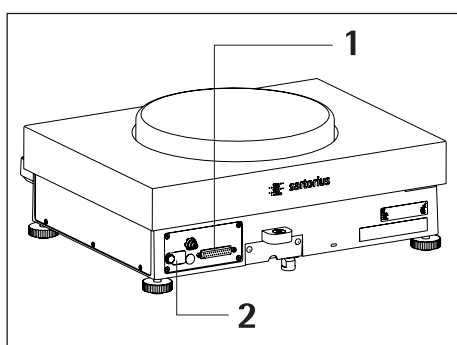
Interfaces are used to exchange data with connected peripheral devices: Measured values and calculated values can be output to a printer or PC; conversely, control commands and data inputs can be sent to connected devices (PC, keyboard, foot switch, barcode scanner).

Each interface has to be configured according to the peripheral device and desired function. No error messages are generated when no devices are connected to an interface port (open data port).

Features

Cubis series mass comparators have at least two interfaces:

1. Peripheral port (25-pin interface)
2. USB socket for PC connection



Protocols

For data exchange, the interfaces are configured with the following protocols:

- **Printer output**
- **SBI** (Sartorius Balance Interface): Sartorius standard protocol for output to a PC or control unit. This simple ASCII-based protocol allows you to use ESC commands from your PC to control the basic weighing functions.
- **xBPI** (eXtended Balance Processor Interface, also called X-Bus): binary protocol with extended command volume. This protocol lets you control numerous weighing functions. For further information on this, please contact Sartorius.

To use the protocols, application software must be installed on the PC, e. g., SartoTerminal.

Synchronization

During data communication between mass comparator and PC, messages consisting of ASCII or binary characters are transmitted via the interface. For error-free data exchange, parameters for baud rate, parity, handshake mode, and character format must be identical for both units.

You can configure the respective settings in System Settings (menu). In addition to these settings, data output for the mass comparator can also be made dependent on several conditions that are defined in the individual tasks. These conditions are described under each of the tasks.

USB Port (PC)

Purpose

Any Cubis mass comparator can be connected to a PC equipped with a USB port. A virtual serial interface (virtual COM port) is set up as a device type at the USB port. This virtual serial interface is identified and operated by the application program.

The protocols xBPI, SBI, and SICS can be transmitted via the USB port.

IMPORTANT

The USB port is designed for the laboratory environment and is not suitable for use in rough industrial environments. Full IP protection is only guaranteed when the USB cover is closed.

System Requirements

- Computer (PC) with Windows 98SE®, Windows ME®, Windows 2000®, Windows XP®, Windows Vista® or Windows 7® or Windows 8*
- Available USB port on the PC
- USB cable

Software Driver and Installation Guides

The VCP driver, used to set up the virtual interface on the computer, can be downloaded from the internet: <http://www.ftdichip.com/FTDrivers.htm>

The installation guides for the drivers can be found here:
<http://www.ftdichip.com/Documents/InstallGuides.htm>

Connecting the Mass Comparator via USB



The current USB port for the computer is established when the software driver is being installed. The driver must be re-installed every time you wish to change the port.

Therefore, choose one USB port that can permanently or regularly be used to connect the mass comparator.

- ▶ Switch off the mass comparator.
- ▶ Unplug the mass comparator from the mains.
- ▶ Connect the USB cable to the mass comparator and to the USB port on the computer.
- ▶ Plug the mass comparator into the mains again and switch it on.
- ▷ Windows detects the device connected to the USB port.
If the device is being connected for the first time, the Windows Installation Wizard will run.

Installing Software Drivers

- ▶ Run the Installation Wizard for the driver.
- ▶ Follow the instructions that appear.
- ▶ To complete the installation, click on Finish.
- ▶ The virtual interface is now ready for operation.

Windows® usually adds the virtual port in the position following your highest-numbered COM port.

Example:

For a PC with up to 4 COM ports, the new virtual port would then be COM5 (see Device Manager).

Installation Guides for Windows XP® and Newer Versions

Changing the Port Number

If you use the USB interface with a program that limits the number of COM port designations (e.g., only COM1, 2, 3, 4), you may have to assign one of these port numbers to the new virtual port.

- ▶ Open the setting for the USB serial port in the Windows® Control Panel:
 - START > My Computer > Control Panel
 - System > Hardware > Device Manager
- ▶ Open the **Connections** submenu.
- ▶ Double-click on **USB Serial Port**.
- ▶ Select **Port Settings > Advanced**.

Changing Latency Time

- ▶ Open the settings for the USB serial port, following the above instructions.
- ▶ For a faster rate of communication, change the setting for the latency timer to 1 msec.

Plug & Play Mode in Autoprint (SBI)

- ▶ Open the settings for the USB serial port, following the above instructions.
- ▶ Stop the Plug & Play mode from running.

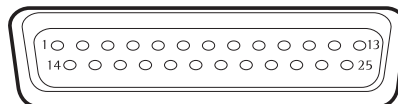
Uninstalling the Driver

The software driver for the USB connection can be uninstalled with the Windows® Uninstaller.

Pin Assignment Chart

"Peripherals" Interface and Optional RS-232 Interface (25-pin)

Female Interface Connector:



Pin Assignment Chart, 25-pin socket, RS-232:

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 used	
Pin 7:	Internal ground (GND)	
Pin 8:	Internal ground (GND)	
Pin 9:	Not used	
Pin 10:	Not used	
Pin 11:	+ 12 V output	
Pin 12:	Reset _ Out*)	
Pin 13:	+ 5 V output	
Pin 14:	Internal ground (GND)	
Pin 15:	Universal switch	
Pin 16:	Not used	
Pin 17:	Not used	
Pin 18:	Not used	
Pin 19:	Not used	
Pin 20:	Data terminal ready (DTR)	
Pin 21:	No function	
Pin 22:	No function	
Pin 23:	No function	
Pin 24:	No function	
Pin 25:	+ 5 V output	

For remote
switch

*) = Hardware restart

Preparation

You can set these parameters for other devices in the Setup menu:
See "Configuration (Menu), page 11."

The many and versatile properties of these mass comparator can be fully utilized for printing out records of the results when you connect your mass comparator to a Sartorius data printer.

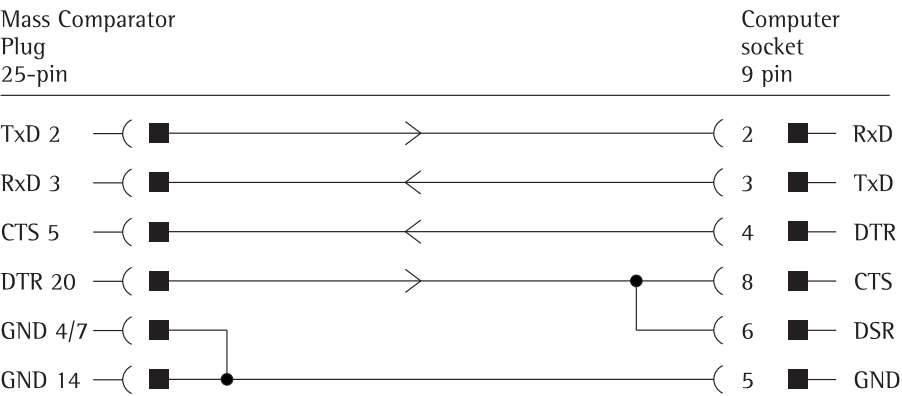
The recording capability for printouts makes it easy for you to work in compliance with GLP.

Cabling Diagram 25-pin Interface

Diagram for interfacing a computer or other peripheral device to the mass comparator using the RS-232/V24 standard and cables up to 15 m (50 ft.) long



Do not connect any other pins to the cable connector of the balance.



Cable type: AWG 2 specification

Data Output

You can define the data output parameter so that output is activated either when a print command is received or automatically synchronized with the display or at defined intervals (see application programs and autoprint settings).

Data Output by Print Command

The print command can be transmitted by pressing () or by a software command (EscP).

Automatic Data Output

In autoprint mode, data is output to the data interface port without an extra print command. You can have synchronized data output automatically at defined display update intervals, with or without the stability parameter. The interval time depends on the mass comparator operating status.

If the automatic data output is activated in the Device Configuration, it starts immediately after the mass comparator is turned on. You can also configure whether the automatic data output can be stopped and started by pressing the () key.

Data Output Formats

You can output the values displayed in the line for measured values and weight units with or without an ID code. Configure this output parameter in the Device Parameters menu (Menu > Device parameters > Configure data output > Line format).

Example: Output Without an ID Code

+ 20000.00 g 16 characters are printed

Example: Output With an ID Code

N + 20000.00 g 22 characters are printed

Data Output Format with 16 Characters

Display segments that are blank are output as spaces.

Display values without a decimal point are printed without a decimal point.

The type of character that can be printed depends on the character's position.

Normal Operation

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

*: Space

A: Displayed characters

S: Characters for the unit

CR: Carriage return

LF: Line feed

Special Outputs

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

Error Message

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 code number
1) For causes and solutions, please refer to "Error Messages", page 36

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

Position 1:	Plus + or space
Position 2:	Space
Positions 3 – 10:	Weight value with decimal point; leading zeros are output as spaces
Position 11:	Space
Position 12 – 14:	Characters for unit of measure or space
Position 15:	Carriage Return
Position 16:	Line Feed

Data Output Format with 22 Characters

Here, the data output format with 16 characters is preceded by an ID code with 6 characters. These 6 characters identify the subsequent value.

Normal Operation

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
K	K	K	K	K	K	+	A	A	A	A	A	A	A	A	A	*	E	E	E	CR	LF
*	*	*	*	*	*	-	.	.	.	.	.	.	.	.	.	*	*	*	*		
						*	*	*	*	*	*	*	*	*	*						

K: ID code character1)	S: Unit symbol character1)
*: Space	See Section "Mass Unit Conversion"
A: Displayed characters	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

SBI setting:

In the SBI setting (code 1. 5. 6. 1), the unverified values are not automatically identified. Please take appropriate measures or adjust the settings on the peripheral device.

Special Outputs

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

Error Message

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 ²⁾	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	D	I	S	.	E	R	R ²⁾	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	P	R	T	.	E	R	R ²⁾	*	*	*	*	CR	LF
*: Space											# # #:					Error code number					

²⁾ For causes and solutions, please refer to "Error Messages", page 36

Data Input

SBI Commands (Data Input Format)

The computer connected via the data port can send control commands to the mass comparator to control mass comparator and application program functions.

These control commands may have different formats and contain up to 20 characters. Each of these characters must be sent based on the setup configuration for data transmission.

Formats for Control Commands (Syntax)

Format 1: Esc ! CR LF									
Format 2: Esc ! # _ CR LF									
Esc:	Escape								
!:	Command character								
#:	Digit								
&t:	Parameter (number or letter)								
_:	Underline (ASCII: 95)								
CR:	Carriage return (optional)								
LF:	Line feed (optional)								

Examples:

Format 1: Esc P
Format 2: Esc x1_

Overview of SBI Commands

Format	Command	Action/Function	Comments
1	ESC P	Print to the interface where the prompt originated	Corresp. to menu, with/without stability
1	ESC T	"TARE" key taring and zeroing	
1	ESC K	Filter "Very stable conditions"	
1	ESC L	Filter "Stable conditions"	
1	ESC M	Filter "Unstable conditions"	
1	ESC N	Filter "Very unstable conditions"	
1	ESC O	Block keys	
1	ESC Q	Acoustic signal	
1	ESC R	Unblock keys	
1	ESC S	Restart	
1	ESC U	Tare	
1	ESC V	Zero	
1	ESC W	Ext. Adjustment with default weight	Depending on menu, 1/2 step increments
2	ESC f0_	(SELECT MENU) key	
2	ESC f1_	Start calibration	
2	ESC f2_	(ENTER) key	
2	ESC kP_	Print as with "PRINT" key (e.g., to several interfaces)	
2	ESC s3_	(CF) key: Back, exit, cancel	
2	ESC x1_	Print device type	
2	ESC x2_	Output serial number of	
2	ESC x3_	Print device software version	
2	ESC s0_	Press and hold the (SELECT MENU) key	

Error Messages

Error codes are displayed for about 2 seconds. The program then returns automatically to the weighing mode.

Display	Cause	Solution
No segments appear	No power Power supply not plugged in	Check power supply Connect power supply to the wall outlet (mains)
HIGH	Weighing capacity exceeded	Unload the weighing pan
LOW or ERR 54	Contact between load plate and environment	Move the object that is touching the weighing pan
APP.ERR.	Cannot save data: load is too light or no sample on the weighing pan while application is active	Increase load
DIS.ERR.	Data output not compatible with output format	Change the configuration with output format in the operating menu
PRT.ERR.	Interface port for printer output is blocked	Reset the menu factory settings or Contact your local Sartorius Service Center
ERR 02	Adjustment condition was not met, e.g., – Tare with the (TARE) key – Load on weighing pan	Calibrate only when zero is displayed Unload the mass comparator
ERR 10	The (TARE) key is blocked when the "Net-total Formulation" application is active; only 1 tare function can be used at a time	The (TARE) key can be used again after the tare memory has been deleted using the (CF) key
ERR 11	Tare memory not allowed	Press the (TARE) key
LEVEL.ERR.	You should level the mass comparator	Level mass comparator
○ flashes	Mass comparator not level	Level the mass comparator using the leveling feet
The weight readout changes constantly	Setup location unstable (excessive vibration or draft) Foreign object is caught between weighing pan and mass comparator housing	Set up mass comparator in another area Change Setup Configurations Remove the foreign object
The weight readout is obviously wrong	The mass comparator was not calibrated/adjusted Mass comparator was not tared before weighing	Adjustment Tare

If any other errors occur, contact your local Sartorius Service Center.

Contact information: Please point your Internet browser to: <http://www.sartorius.com>

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