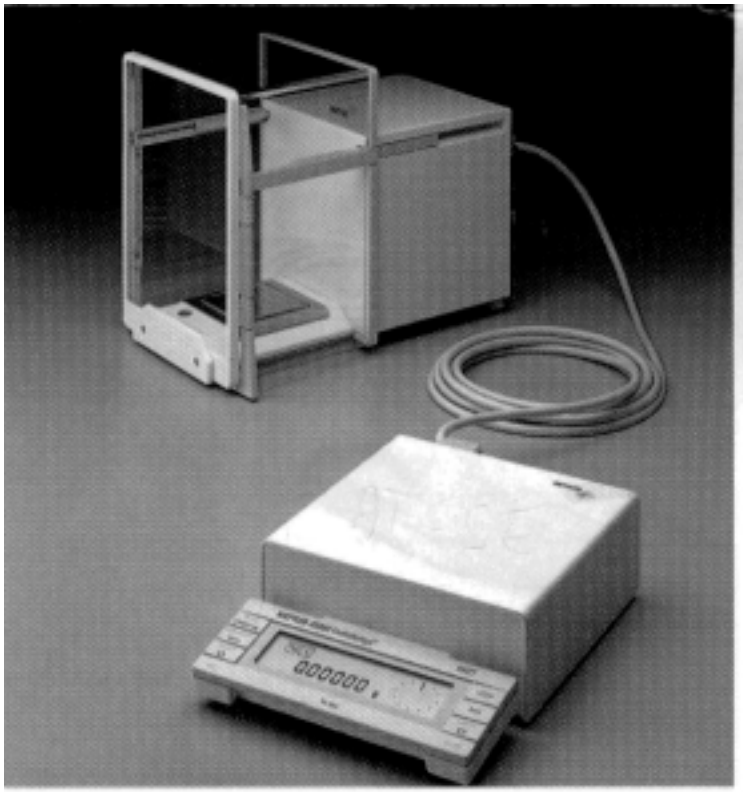
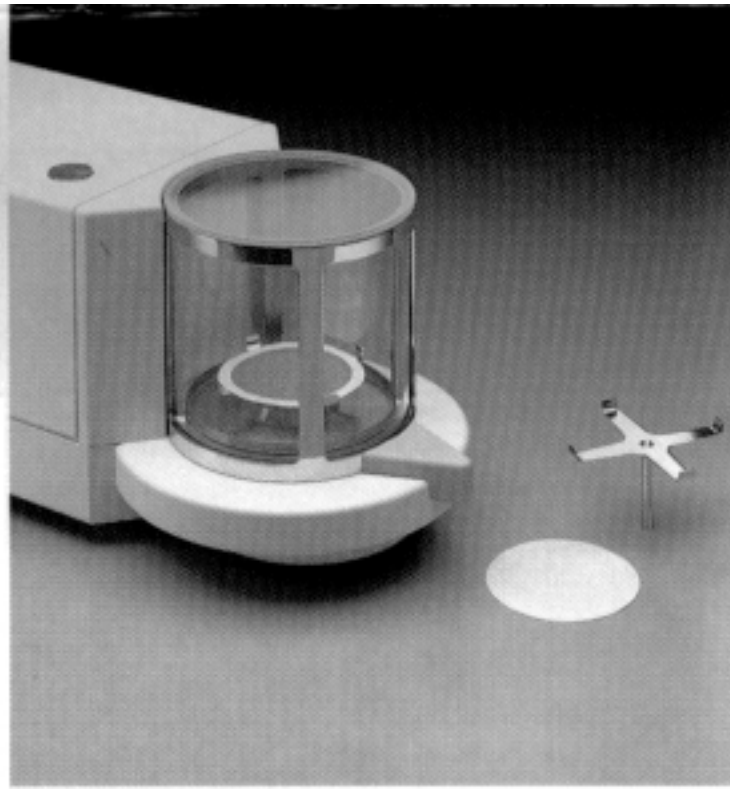
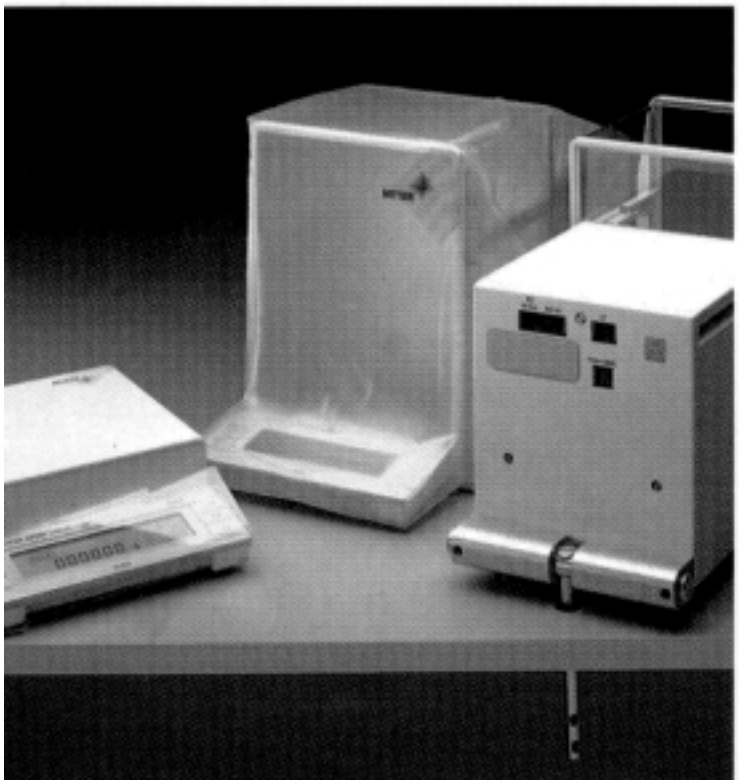
Technical specifications and accessories

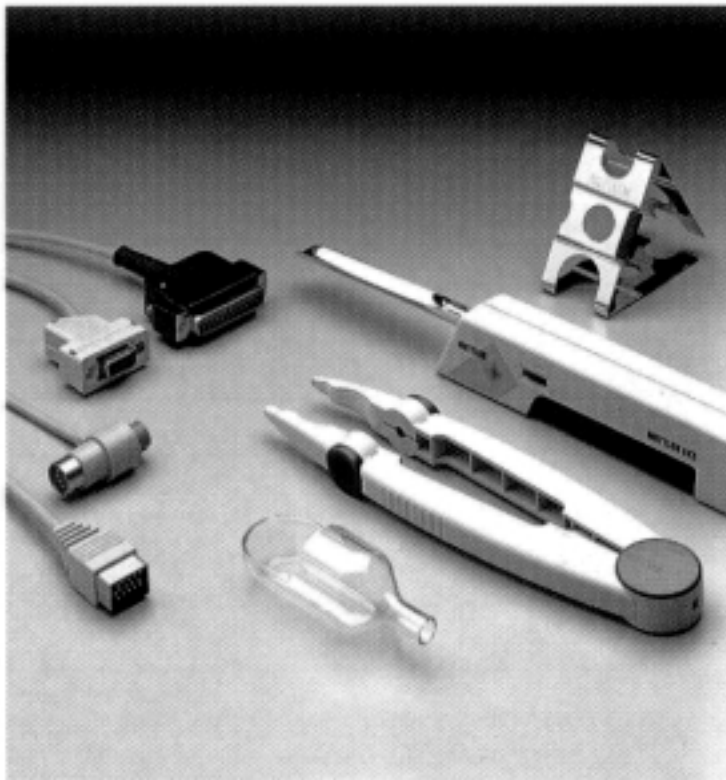
METTLER TOLEDO AT/MT/UMT Balances

METTLER TOLEDO









Contents

1. Technical specifications of AT Balances

Model	**AT21** Comparator	**AT20**	**AT201**	**AT261 DeltaRange** 60 g DeltaRange 200 g		**AT200**	**AT400**	**AT460 DeltaRange** 60 g DeltaRange 400 g	
Readability	1 µg	2 µg	0.01 mg	0.01 mg	0.1 mg	0.1 mg	0.1 mg	0.1 mg	1 mg
Weighing capacity	22 g	22 g	205 g	62 g	205 g	205 g	405 g	62 g	405 g
Taring range (by subtraction)	0…22 g	0…22 g	0…205 g	0…205 g	0…205 g	0…205 g	0…405 g	0…405 g	0...405 g
Reproducibility (s) 0...20 g	2 µg	3 µg							
Reproducibility (s) 0...50 g			0.015 mg	0.015 mg		0.04 mg	0.05 mg	0.05 mg	
Reproducibility (s) 50...100 g			0.02 mg	0.02mg	0.03 mg	0.05 mg	0.07 mg	0.07 mg	0.1 mg
Reproducibility (s) 100...200 g			0.03 mg	0.03mg	0.05 mg	0.07 mg	0.09 mg	0.09 mg	0.2 mg
Reproducibility (s) 200...400 g							0.15 mg	0.15 mg	0.3 mg
Linearity	± 8µg	± 8µg	± 0.12mg	± 0.03mg	± 0.15mg	± 0.15mg	± 0.5mg	± 0.1mg	± 0.8mg
Linearity referred to 5 g	± 5 µg	± 5 µg	± 0.02 mg	± 0.02 mg					
Stabilization time (typical) variable with vibration adapter	14,18,24 s	10,14,24 s	10,14,20 s	8,12,18 s	3,5,7 s	3,5,7 s	4,6,10 s	4,6,8 s	3,5,7 s
Built-in calibration weights	2x10 g	2x10 g	2x100 g	2x100 g		2x100 g	2x100 g	2x100 g	
	Measured to ±0.1 mg (±0.01 mg AT20/21) at an air density of 1200 mg/l on virtual mass with density 8.0 g/cm3.								
Calibration FACT	Fully automatic motorized self-calibration with two built-in weights (manual triggering also possible). Test possibility to check the calibration.								
Calibration with external weight:	20 g	20 g	200 g	200 g		200 g	400 g	400 g	
Display with METTLER Deltatrac	LCD (liquid crystal)					VFD (vacuum fluorescent)			
Display sequence	0.2...0.4 s variable								
Sensitivity drift (5...40°C)	Maximum deviation with automatic self-calibration ±0.00015%, (with automatic self-calibration switched off) 1 ppm/°C.								
Linearization	Automatic self-linearization of the weighing curve (simultaneously with motorized calibration FACT).								
Data interface	CL and RS232C, bidirectional, built in as standard, all lines galvanically separated.								
Glass draft shield	No hindering guideways; automatic motorized opening or at a keystroke.								
Inner draft shield AT	Standard					Accessory			
AC adapter (to national codes)	Voltage 115 V or 230 V, admissible voltage fluctuations: +15...-20%. Frequency: 50...60 Hz; power consumption 15,5W max.								
Admissible ambient conditions	Temperature: 5...40 °C; relative humidity: 25...85% (non-condensing). Height above sea level: -500...+6000 m.								
Weighing pan feedthrough for below-the-balance weighing.	ø 28 mm suspended	ø 32 mm	80x80 [mm]; stainless steel						
Measures Weight	Free height above weighing pan 239 mm, Balance housing 241x433x289 (WxLxH), AC adapter 115x140x53mm (WxLxH) Balance 9.3 kg, AC adapter 1.2kg								

Freely selectable in the configuration file

Vibration adapter (symbol [~]) Weighing process adapt. (symbol [ ]) Stability detection (ASD)	3 settings for matching to location: suppression of the effect of vibrations. 4 settings for matching to weighing application: dispensing, universal setting, absolute weighing, special applications. 8 settings with different tolerance thresholds (off, 1...7).
Weight unit 1 Weight unit 2 (incl. applications) Applications	Freely selectable in the configuration register: g, mg, oz, ozt, tl, GN, dwt, ct, C.M., mo. Freely selectable in the configuration register: g, mg, oz, ozt, tl, GN, dwt, ct, C.M., mo, PCS, Stk, %. The selected weight units 1 and 2 can be switched at a keystroke. PCS, Stk. (piece counting, reference 10, 20, 50, 100) and % (percent weighing) are built-in applications.
Data interface (built-in)	Current loop interface, 20 mA passive (CL) and RS-232C interface. Bidirectional, asynchronous, 7 data bits, alphanum. ASCII character set. Receptacle: 15-pin, MiniMettler, all lines galvanically separated. *Interface settings in the configuration register:* Send mode: stable, all, auto, cont. Baudrate: 150, 300, 600, 1200, 2400, 4800, 9600 Bd. Parity: even, odd, off (= mark), space. Handshake: pause, CL, off, hard (CTS/DTR), soft (XON/XOFF). End-of-line: CRLF, CR.

Certified version on request

2. Technical specifications of MT/UMT Balances

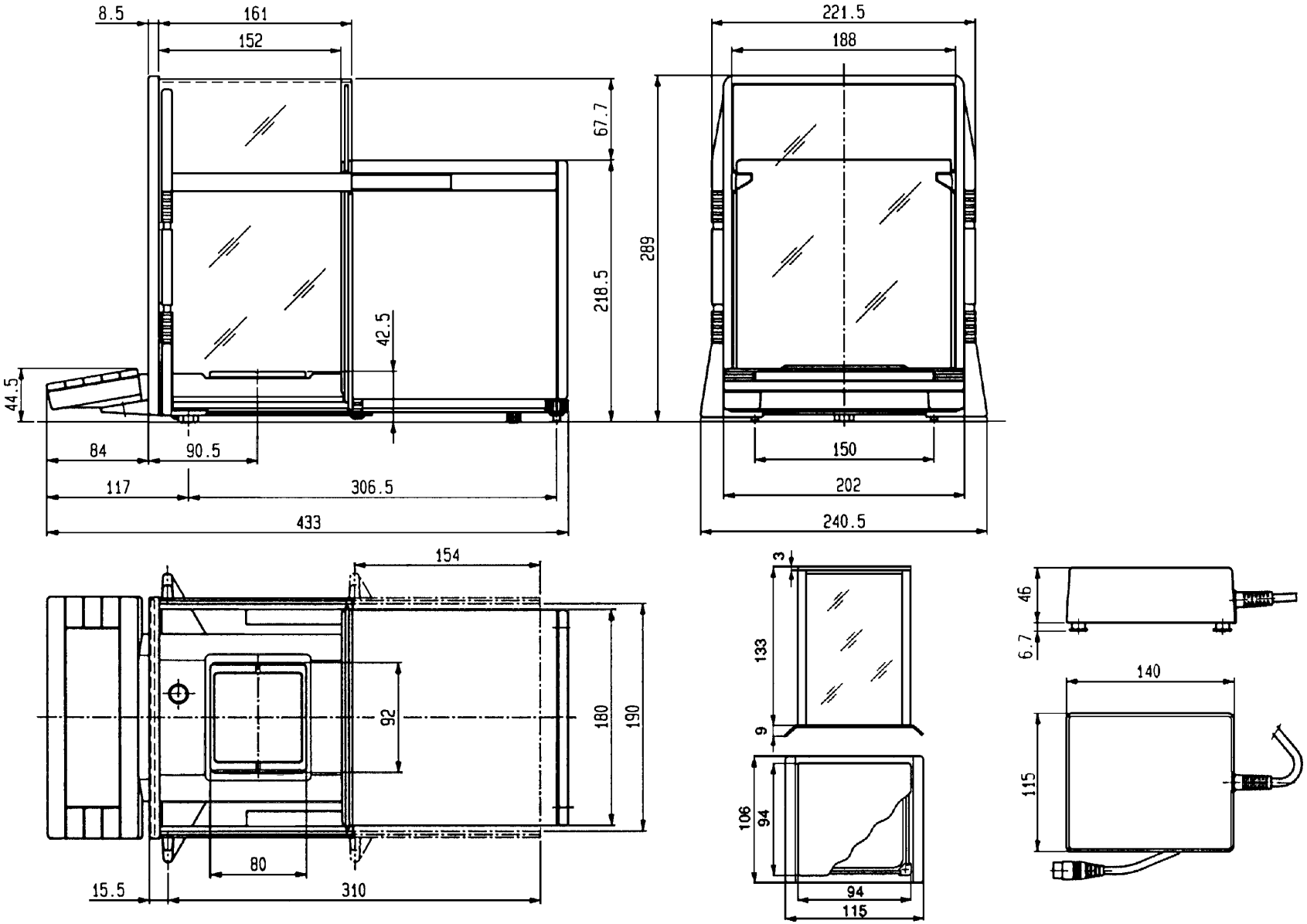
Modell	**UMT2**	**UMT5 Comparator**	**MT 5**
Readability	0.1 µg	0.1 µg	1 µg
Weighing capacity	2100 mg	5100 mg	5100 mg
Taring range (by subtraction)	0...2100 mg	0...5100 mg	0...5100 mg
Reproducibility (s) 0...2 g	0.25 µg	0.25 µg	0.8 µg
Reproducibility (s) 2...5 g		0.4 µg	0.9 µg
Linearity	±1 µg	±4 µg	±4 µg
Linearity referred to 500 mg	±0.5 µg	±2 µg	±2 µg
Stabilization time (typical)	10, 16, 24 s	15, 20, 30 s	9, 12, 16 s
	Corresponding to setting of vibration adapter.		
Built-in calibration weights	2 x 1 g	2 x 2.5 g	2 x 2.5 g
	Measured to ±5 µg at an air density of 1200 mg/l on virtual mass with density 8.0 g/cm3.		
Calibration FACT	Fully automatic motorized self-calibration with two built-in weights (manual triggering also possible). Test possibility to check the calibration.		
Calibration with external weight:	2 g	5 g	5 g
Display with METTLER Deltatrac	LCD (liquid crystal)		
Display sequence	0.2...0.4 s variable		
Sensitivity drift (5...40°C)	Maximum deviation with automatic self-calibration ±0.00015%, (with automatic self-calibration switched off) 1 ppm/°C.		
Linearization	Automatic self-linearization of the weighing curve (simultaneously with motorized calibration FACT).		
Data interface	CL and RS232C, bidirectional, built in as standard, all lines galvanically separated.		
Glass draft shield	Automatic motorized opening or at a keystroke.		
AC adapter (to national codes)	Voltage 115 V or 230 V, admissible voltage fluctuations: +15...-20%. Frequency: 50...60 Hz; power consumption 15.5W max.		
Admissible ambient conditions	Temperature: 5...40 °C; relative humidity: 25...85% (non-condensing). Height above sea level: -500...+6000 m.		
Weighing pan with feedthrough for	ø 16 mm	ø 16 mm	ø 27 mm
below-the-balance weighing	Surface-treated aluminum		
Measures (W x L x H)	Cell 128 x 287 x 113, evaluation unit 202 x 294 x 92 mm		
AC adapter (W x L x H)	115 x 140 x 53 mm		
Weight	Cell 2.4 kg, evaluation unit 2.5 kg, AC adapter 1.2 kg		

The configuration register is freely selectable corresponding to the AT models

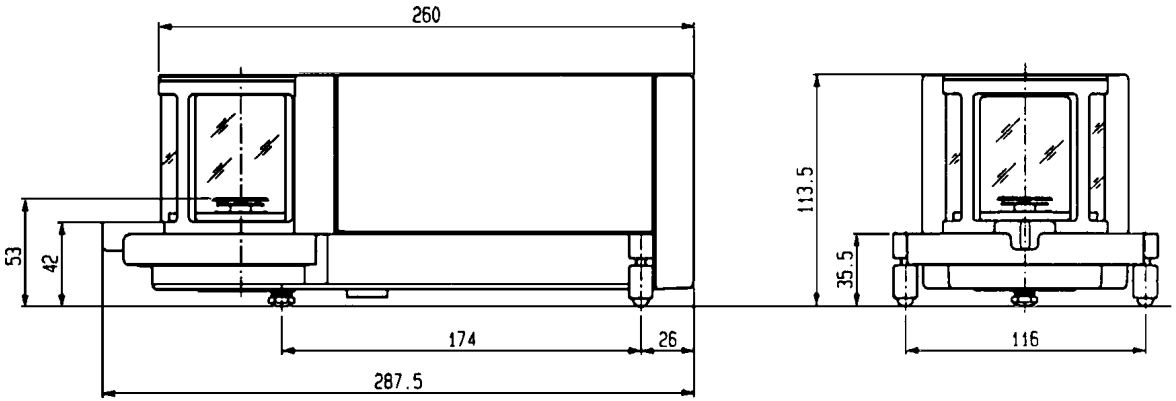
3. Technical specifications of AT Comparator

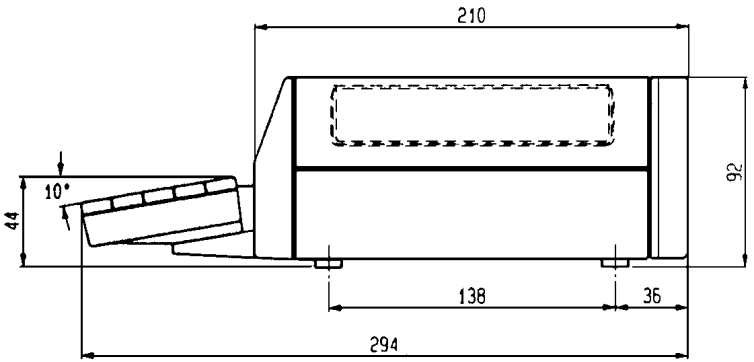
Technical data	AT106 Comparator	AT1005 Comparator	AT1004 Comparator
Readability Weighing capacity Electrical weighing range Taring range (by subtraction)	1 µg 111 g 11 g 0. . . 11 g	0.01 mg 1109 g 109 g 0. . . 109 g	0.1 mg 1109 g 109 g 0. . . 109 g
Reproducibility (Standard deviation of 10 comparative weighings)	3 µg	0.02 mg	0.07 mg
Linearity (electrical weighing range)	± 8 µg	± 0.12 mg	± 0.15 mg
Stabilization time (typical) variable with vibration adapter	20 s	20 s	20 s
Built-in dial weights (tare weights)	50 g, 30 g, 10 g, 10 g	500 g, 300 g, 100 g, 100 g	500 g, 300 g, 100 g, 100 g
Built-in calibration weights	2 x 10 g	2 x 100 g	2 x 100 g
	measured to ±0.1 mg (±0.01 mg/AT106) to a virtual mass of density 8.0 g/cm3 at an air density of 1200 mg/l		
Calibration with external weight	10 g	100 g	100 g
Sensitivity drift (10. . . 30 °)	± 1 ppm/ °C	± 1 ppm/ °C	± 1 ppm/ °C
Admissible ambient conditions			
Temperature (& admissible constancy) Relative humidity (& admissible constancy) Location	10. . . 30 °C (± 1 °C) 40. . . 70 % (± 10 %) with few vibrations	10. . . 30 °C (± 1 °C) 40. . . 70 % (± 10 %) with few vibrations	10. . . 30 °C (± 1 °C) 40. . . 70 % (± 10 %) with few vibrations
Standard equipment			
Display	Control unit incl. LCD (liquid crystal)	Control unit incl. LCD (liquid crystal)	LCD (liquid crystal)
Glass draft shield	CL and RS232C, bidirectional, all lines galvanically separated		
	with inner draft shield ME-210270	With inner draft shield ME-222159	–
Data interface	CL and RS232C, bidirectional, all lines galvanically separated		
AC adapter (to national codes) – Voltage (& admissible voltage fluctuations) – Frequency – Power consumption	115 V or 230 V (+ 15. . . - 20%) 50. . . 60 Hz 15.5 VA max.		
Weighing pan	ø 45 mm (suspended ø 60 mm)	suspended ø 100 mm	suspended ø 100 mm
– Free height above weighing pan	120 mm (85 mm)	135 mm	135 mm
	feed through for below-the-balance weighing		
Cylindrical weight with knob	100 g, accuracy class OIML E2	1 kg, accuracy class OIML E2	1 kg, accuracy class OIML F1
Dimensions (width x depth x height)			
Balance housing	241 x 433 x 289 mm; 11 kg		
Control unit	202 x 294 x 92 mm; 2.5 kg		–
AC adapter	115 x 140 x 53 mm; 1.2 kg		

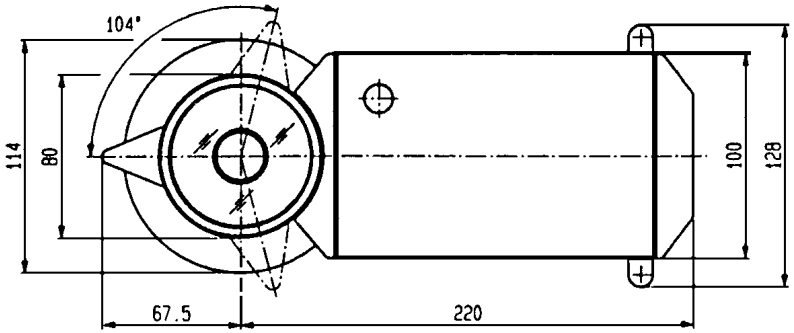
4. Dimension diagrams of AT Balances

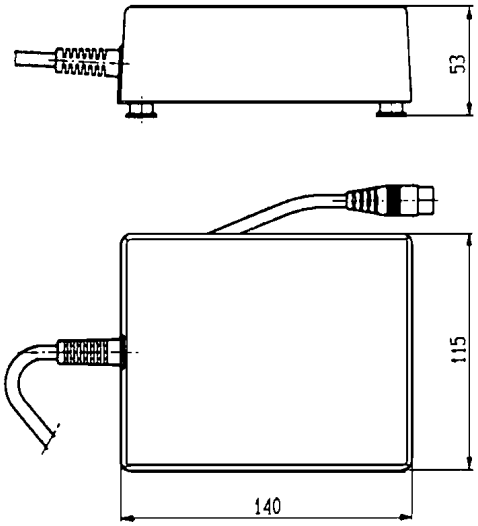


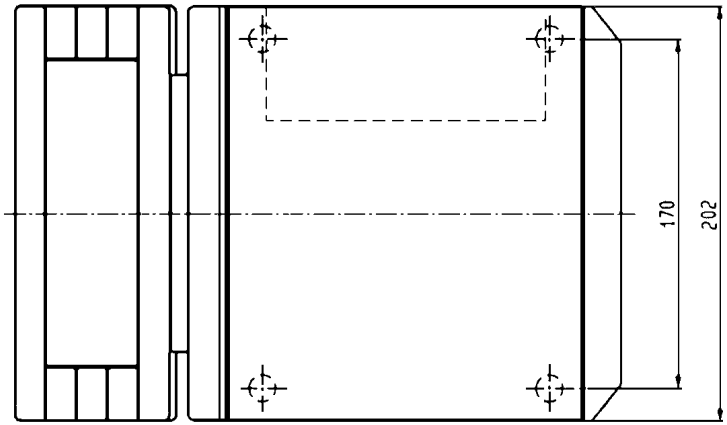
5. Dimension diagrams of MT/UMT Balances



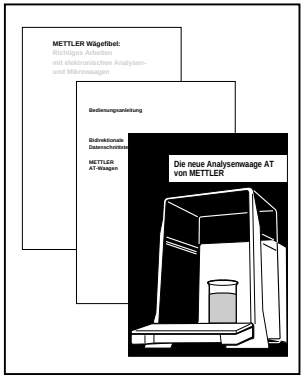








6. General references



When analytical balances are used, the influences of the surroundings must be taken into account if reliable weighing results are to be obtained.

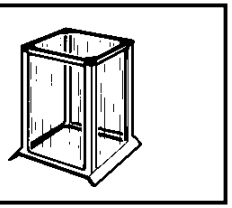
You will find useful tips on this subject in the following books and brochures.

Weighing the right way

A copy is enclosed with every AT/MT/UMT balance. See list of standard accessories at the back.

		Language	Order No.
AT – The new analytical balance from METTLER TOLEDO	Description in book from of the history of the origins of the AT, elucidation and interpretation of specialist terms as well as an explanation of the functional principles.	German English French Spanish Italian	720781 720782 720783 720784 720785
Fundamentals of Mass Determination	Introduction to metrology and mass determination, with useful tables.	German English	721074 721118
Dictionary of Weighing Terms	Weighing terms and technical expressions are listed alphabetically and explained in detail.	German English	721158 721159

7. Ambient influences



Inner draft shield

With balances with readability of 0.01 mg and unfavorable ambient conditions (air conditioning, drafts), it is advisable to use the inner draft shield. This can be opened on the right, left or at the top, depending on the application.

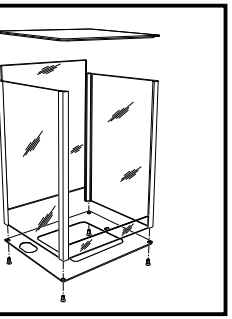
The inside dimensions are:

Order No.

Base area 87 x 87 mm, height 124 mm. 210270

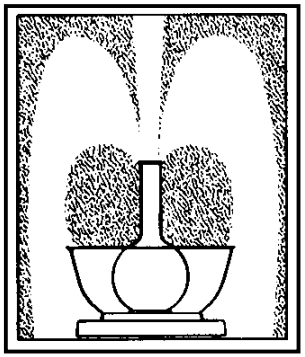
The inner draft shield minimizes disturbing air movements in the weighing chamber. This in turn shortens the stabilization time of the balance and improves the stability of the results.

For AT201, AT261, AT200, AT400, AT460.
The inner draft shield is supplied as standard with the AT201 and AT261 models.



Large inner draft shield

For AT1005 and AT1004. 222159
The large inner draft shield is supplied as standard with the AT1005.



Electrostatic problems, magnetism

With weighing samples or weighing vessels that are electrically charged, e.g. plastic or in dry air also glass vessels, it is advantageous to use a metal screen to neutralize the electrostatic forces.

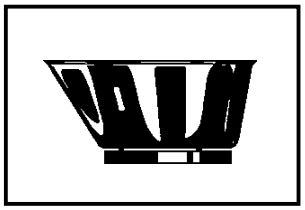
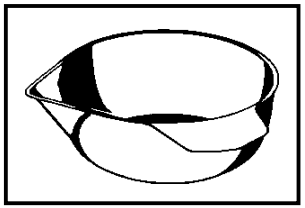
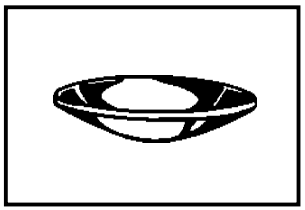
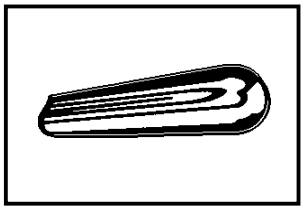
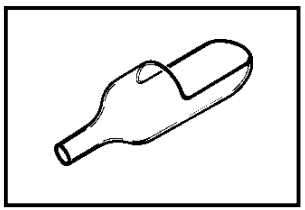
Suitable pans for screening (stainless steel)	**Order No.**
Pan, large, d = 86 mm, tare 35 g	1153
Pan, small, d = 58 mm, tare 15 g	43851

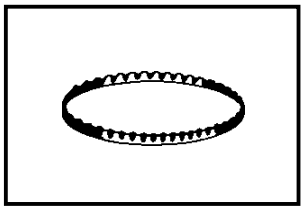
Weighing the right way

A copy is enclosed with every AT/MT/UMT balance. See list of standard accessories at the back.

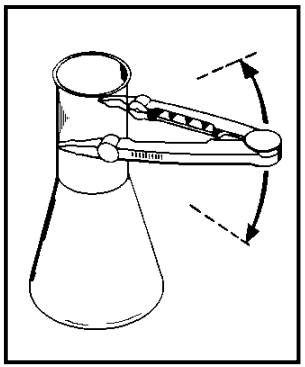
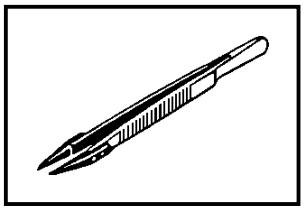
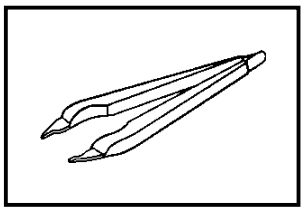
8. Weighing aids

8.1 Weighing vessels

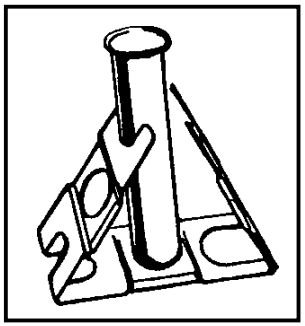
	Order No.
 Beaker 230 ml, stainless steel, tare 50 g, d = 70 mm	15020
 Carat pan 1000 ct, stainless steel, tare 35 g, d = 86 mm	1153
Carat pan 300 ct, stainless steel, tare 15 g, d = 58 mm	43851
 Glass dish 20 g ± 1 mg, d = 70 mm	2013
Glass dish 10 g ± 1 mg, d = 50 mm	4506
 Weighing boat, stainless steel, 10 g ± 1 mg, l = 78 mm	4507
Weighing boat, stainless steel, 20 g ± 1 mg, l = 107 mm	4508
 Weighing boat, glass d = 20 x 60 mm, set of 5	23951
Weighing boat, glass d = 30 x 80 mm, set of 5	23952

		Order No.
	Weighing pan, set of 80, d = 100 mm, height = 8 mm Al foil, 0.1 mm, mirror finish	13865

8.2 Tweezers

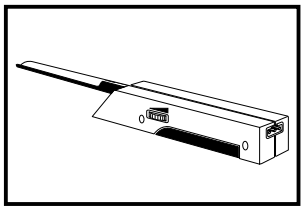
	METTLER TOLEOD weighing tweezers, adjustable, plastic Opening 65 mm, length 200 mm	210421
	Straight tweezers with fiber tip, length 210 mm	70209
	Plastic tweezers for weights, length 160 mm	6515

8.3 Miscellaneous working aids



METTLER TOLEDO triangular holder **Order No.**

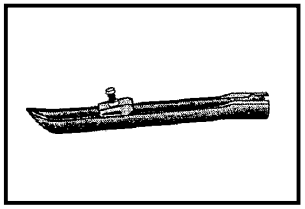
An adjustable stand which is placed on the balance pan so that weighing samples with awkward contact surfaces such as round-bottom flasks, test tubes, pipettes or syringes can be weighed. It replaces cork and plastic holders as well as other unsuitable materials, which owing to electrostatic charging or moisture uptake often lead to instability in the weighing results. 210435



METTLER TOLEDO LV3 Vibrospatula.

For the accurate weighing-in of powders and granules.

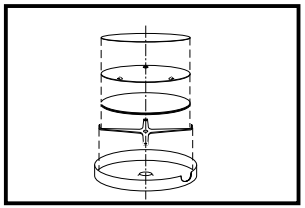
- Continuously adjustable vibration intensity during weighing-in.
- Comfortable to hold.
- Stainless steel spoon.
- 4-6 hours line-independent operation with built-in rechargeable battery.
- Simultaneous operation and charging possible.
- Battery charger included in standard equipment.



Special spoon

For the weighing-in of very fine substances with the LV3 Vibrospatula. 9769

- flow rate adjustable



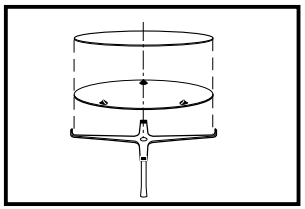
AT filter set

Order No.

Set for the weighing of filters up to 105 mm diameter. For weighings with electrostatically charged filters, 2 metal plates are enclosed that neutralize the electrostatic forces. The complete set can be mounted simply and rapidly. With a few manual operations the balance can be reconverted for normal operation. The diameter of the filter holder is 106 mm.

For AT21, AT20, AT201, AT261, AT200.

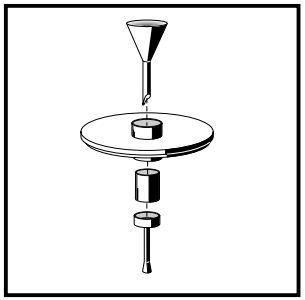
210470



MT filter set

Set for the weighing of filters up to 50 mm diameter. For weighings with electrostatically charged filters, 2 metal plates are enclosed that neutralize the electrostatic forces. The complete set can be mounted simply and rapidly. With a few manual operations the balance can be reconverted for normal operation. The diameter of the filter holder is 52 mm.

211214

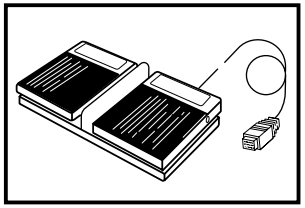
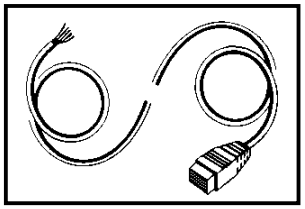
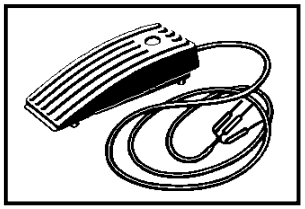
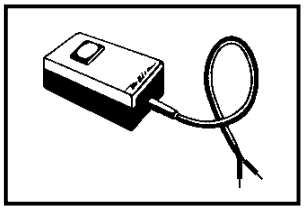


MT/UMT Funnel Set

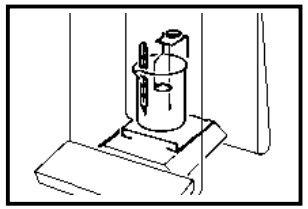
Set for the very fast weighing of solid materials of diameter up to 2.5 mm. The samples are added to a vessel on the weighing pan through the glass funnel. No further operations are needed. Taring allows the next sample to be weighed very quickly. Ideal for the content determination of gold pellets in precious metal mines.

211220

9. Other accessories

	9.1 Remote control: door operation, data transfer, tare command	Order No.
	Twin foot switch for data transfer (print command) and tare command. The automatic door function ("door auto" in the menu) is thus included. Other combinations through rewiring. Cable (2 m) should be plugged into the balance at "Re-Zero".	210580
	Control cable for robot or computer attachment. This cable can be used if certain functions have to be controlled externally. Functions: Door closing, door opening, taring, data transfer. Acknowledgements: Door is open, door is closed. Auxiliary voltage balance side: 5 V (20 mA). Cable (2 m) should be plugged into the balance at "Re-zero".	210494
	Foot switch for data transfer (print command). The automatic door function ("door auto" in the menu) is thus included. Cable (3 m) must be plugged into the balance at Data I/O by means of the transfer adapter 47473. Additional data receivers are attachable. Can be used simultaneously with control cable or twin foot switch.	46278
	Hand switch for data transfer (print command). The automatic door function ("door auto" in the menu) is thus included. Cable (3 m) must be plugged into the balance at Data I/O by means of the transfer adapter 47473. Additional data receivers are attachable. Can be used simultaneously with control cable or twin foot switch.	42500
	Transfer adapter, length 0.3 m, for foot and hand switch.	47473

9.2 Density determination

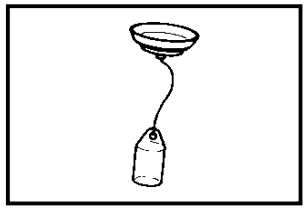


AT density determination kit for solids — **Order No.**

This kit contains: 250 ml beaker, platform for beaker, thermometer, gem holder, bracket, operating instructions (E, G, F, Sp), short-form operating instructions and wetting agent (surfactant). The wetting agent lowers the surface tension of the water thus leading to an appreciable improvement in the results. 210250

For AT201, AT261, AT200, AT400, AT460

For reorders: Wetting agent Pervitro 75% 72409



Density determination of liquids

This requires:

Density determination kit for solids (see above) 210250
and a sinker 210260

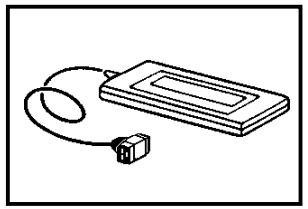
FO3220 Formula Weighing System

The METTLER TOLEDO FO3220 Formula Weighing System is a software package written for MS-DOS computers to simplify formula weighing operations as these are usually associated with extensive computational and recording work. 200 starting materials and 100 formulas comprising up to 20 different starting materials can be stored. The functions are selected from easily surveyed menus. Up to 3 METTLER TOLEDO balances of the AT series or METTLER TOLEDO scales employing the M-technology can be attached.

Standard equipment:

FO3220-1: Software on 3.5" diskette and installation information
FO3220-2: Software on 5.25" diskette and installation information

9.3 Demo display, school experiments



METTLER TOLEDO GT53 Demo Display

Overhead projection display for overhead projectors for demonstration purposes (e.g. in schools, conferences). This is an auxiliary, liquid crystal display. To be attached to the balance at the GT connection.
Cable length 3 m.

		Language	Order No.
School experiments	Book: Natural science laws: experience live – learn easily. Experiments from physics, chemistry and biology.	German English	721265 721266

9.4 Piece counting with reference balance

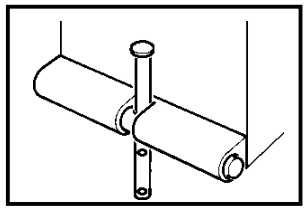
Piece counting: METTLER TOLEDO PM, SM, PE as counting balances

The AT/MT balances have the normal piece counting for the reference piece numbers 10, 20, 50 and 100 already built in. With large piece quantities, i.e. when the load range no longer suffices, an additional balance from METTLER TOLEDO can be used as a counting balance. With small parts and large quantities, use of the AT as a reference balance is optimum.
To connect the data I/Os of the two balances, use a reference balance cable. (Plug T-piece into counting balance, configure the AT balance to “send continuous”.)

The following is needed:

AT as reference balance	
Counting balance from METTLER TOLEDO (e.g. PM)	33868
Reference cable	
METTLER TOLEDO CountPac-M with software version 14.47 or higher.	

9.5 Anti-theft safeguard AT of section aluminum



This can be retrofitted to the rear of the AT balance. The type of fastening allows free pivoting of the balance on the bench.

Order No.

Standard equipment without padlock 210440

Assembly instructions:

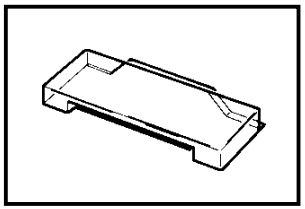
– Benchtop thickness 100 mm max.

– Hole needed perpendicular to bench surface d = 12.5 mm min.

  Balance center point, 20 mm behind rear panel.

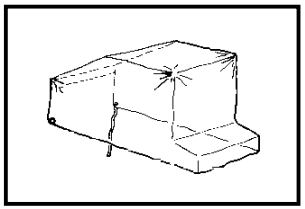
– available hole for padlock d = 6.5 mm

9.6 In-use covers, demo case



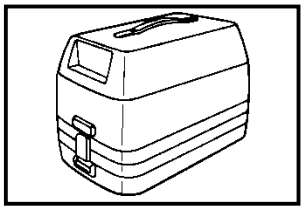
In-use cover AT/MT/UMT terminal — **Order No.**

Plastic cover for the display and keys. Protects these against dirt. 210422

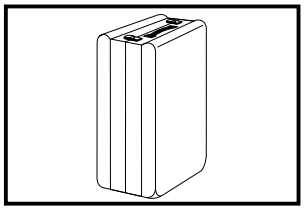


In-use cover AT

Plastic cover for the entire balance as protection against dust when not in use for relatively long periods. 210437

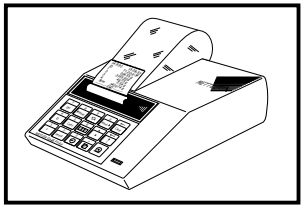


Demo case for AT balances with shoulder strap. 71655
Dimensions (LxWxH): 49x30x34 cm, weight empty: 3.8 kg



Demo case for MT/UMT balances. 211212
Dimensions (LxWxH): 50x17x40 cm, weight empty: 4.5 kg

10. Peripherals



METTLER TOLEDO LC-P45

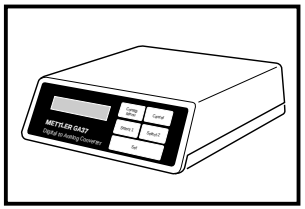
The LC-P45 is a versatile dot matrix printer with advanced print functions for normal paper. It can supplement the weight value by the date and time and is fitted with an RS232C interface.

The various print functions of the LC-P45 are selectable in the dialog mode (English, German, French, Spanish, Italian). The settings are secured against power failure by battery buffering.

A record meeting GLP requirements can be printed using the calibration and adjustment function. The LC-P45 is compatible with METTLER TOLEDO balances and instruments. Cable supplied 229029, RS232C, bidirectional, length 1.5 m.

Functions: • Weight printout • Date • Time • Lot identification • Balance identification • Number of current sample • Sample code • Statistics • Totalization • Multiplication • Division • Balance check • Balance calibration.

	Order No.
Spare paper rolls, set of 5	72456



GA37 Digital-Analog Converter

- To plot the time dependence of the weight profile as a curve.
- For the continuous conversion of results and values from the RS-232 serial interface of the balance or a computer into a corresponding analog voltage or current signal.

Attachment of Epson P40 with serial RS-232 interface

Thermal printer with NiCd rechargeable battery. Charging with AC adapter. **Order No.**

METTLER TOLEDO data cable 1.5 m: to be attached at Data I/O of the balance. 33688

Epson thermal paper rolls P40TRP (112 mm).

Setting of the DIP switches, see also operating instructions of the printer.
No. 1 is left, "on" is down:

1	Auto Feed	off	*)
2	Parity Valid	on	
3	Parity Even	on	
4	7 bits	on	
5	Bit rate 2400 bd	off	
6	Bit rate 2400 bd	on	
7	Bit rate 2400 bd	on	
8	Bit rate 2400 bd	off	

33688

The configuration at the balance under "Int-FACE":

Baud rate	2400 bd
Parity (P)	-E- (even)
Handshake (HS)	HArd
Line end (EOL)	cr-LF

**) Auto Feed to "on" results in blank lines after every printing*

Attachment of Epson LX800 with serial RS-232 interface type 8143

Matrix printer for single A4 sheets. Power supply connection. Optional for continuous paper.

Order No.

Attach METTLER TOLEDO data cable, 1.5 m, to Data I/O of the balance. 33640

Wiring for data terminal equipment (DTE), handshake line at pin 20.

Installation of interface after opening the printer and setting the DIP switches (see also instructions for serial interface):

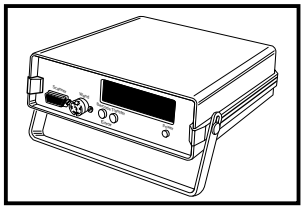
1	Bit rate 2400 bd	on
2	7 bits	on
3	Bit rate 2400 bd	off
4	Bit rate 2400 bd	on
5	Parity even	on
6	Parity check	on
7	Bit rate 2400 bd	off
8	Serial interface	on

Desired printer functions with 12 additional switches at rear of printer. Setting,

The configuration at the balance under "Int-FACE":

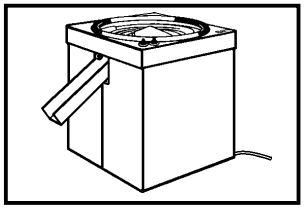
Baud rate	2400 bd
Parity (P)	-E- (even)
Handshake (HS)	HArd
Line end (EOL)	cr-LF

Warning: *plug only one interface cable (either parallel or serial) into the printer!*



METTLER TOLEDO GA50 Peripheral Controller

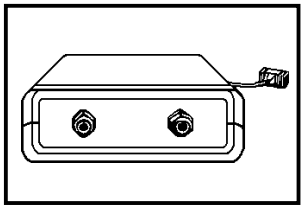
Allows reading of bar codes, with auxiliary display and printer sorting switch



METTLER TOLEDO LV10 Automatic Feeder

Automatic feeding for small weighing samples in SQC applications.

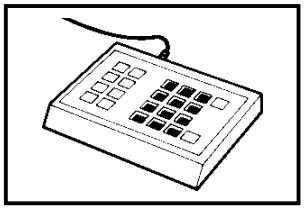
	Order No.
For attachment to AT/MT/UMT balances, use GM/AT adapter.	210498



METTLER TOLEDO GM54 Output Module

With an external direct voltage source (max. 36 V DC) 8 outputs, e.g. relays, valves, low-power motors or signal lamps (each max. 100 mA), can be controlled by software. The commands can be found in the brochure:

Bidirectional data interface of METTLER TOLEDO AT/MT/UMT balances.	German	704017
	English	704018
	French	704019
	Spanish	704020
	Italian	704021
For attachment to AT/MT/UMT balances, use GM/GT adapter.		210498



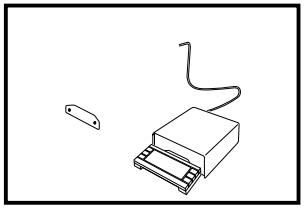
METTLER TOLEDO DataPac-M

This terminal between balance and printer allows dialog between user, METTLER TOLEDO balance and computer via the bidirectional CL/RS232C data interface built in as standard. In real-time dialog operation, on the one hand computer controls the balance, whereas on the other hand via the Pac you have access to the computer from the balance.

You can develop a variety of programs tailored precisely to your needs and then activate these via the Pac.

Thanks to the clearly arranged keys of the terminal, incorrect operation is practically impossible. Once these have been defined, the Pac functions at a keystroke: It transmits identifications, function instructions, weighing results, etc. to the computer. Operating instructions can be transferred from here to the balance display.

The membrane keypad can be written on. The cable of the terminal must be attached to the GT connection of the balance; the connector matches not only T balances but also M scales.



AT-SE Kit (separate electronics)

Order No.

210680

The kit contains all parts needed to install the balance electronics and the display unit in a housing separated from the balance. This allows use of the weighing cell at exposed locations (e.g. radioactively or chemically contaminated surroundings). The evaluation electronics are located outside the hazard zone and are attached to the weighing cell by a 5 m connection cable. All functions typical of the AT (FACT, automatic doors, command set for balance control) are usable. The conversion must be performed by a METTLER TOLEDO agency.
For AT21, AT20, AT201, AT261, AT200, AT400, AT460.

11. Interface

11.1 General information regarding interface

To ensure faultless data communication between balances and data receivers, both must be configured correctly before starting operation. With the AT/MT/UMT balance, the parameters can be set in the sector "Int-FACE" of the configuration register.

Bidirectional data interface of METTLER TOLEDO AT/MT/UMT

Brochure with detailed description of the interface and each possible command. You will also find examples of computer connections to METTLER AT/MT/UMT balances.
A copy is enclosed with every AT/MT/UMT balance.

	Order No.
German	704017
English	704018
French	704019
Spanish	704020
Italian	704021
Japanese	704209

11.2 CL interface

The AT/MT/UMT balances can be installed in weighing systems and in addition to outputting data can also receive and execute commands = full duplex operation. CL = Current Loop.

Balance configuration

Under "Int-FACE" of the configuration register of the AT/MT/UMT balances:

Baud rate	2400 bd
Parity (P)	-E- (even)
Handshake (HS)	CL

				Order No.
Cable installations for weighing systems	Practical tips for interference-proof installation can be found in the Engineering Support Bulletin (ESB).		German English French Spanish Italian	702785 702786 702787 702788 702789
Cable for CL instruments	CL data cable, 1.5 m, to be attached to Data I/O of the balance.			47936
	Additional cables for its extension are available:			
	Extension cable 2 m			42555
	Extension cable 5 m			42556
	Extension cable 15 m			42557
	Extension cable 20 m			42558
Cable for METTLER TOLEDO titrators	CL data cable, 1.5 m,	for DL18, DL20, DL25/21, DL40GP		23618
		for DL70		214103
Material for cable connection	For individual cable lengths and permanent installations, the following materials are available:			
	Shielded computer cable, 4-wire, minimum order 100 m			88156
	CL cable coupler, 5-pin, minimum order 5			89005
	CL cable plug, 5-pin, minimum order 5			89011
	Installation kit for 1 CL line, housing and plug for wall mounting			59096
I/O MiniMETTLER Connector (solderable)	For the individual preparation of data cables (with pin assignment)			33930

11.3 RS-232 interface

			Order No.
Cable 25-pin for RS-232	METTLER TOLEDO data cable, 1.5 m female (bidirectional handshake)	*	210491
	METTLER TOLEDO data cable, 1.5 m male (bidirectional handshake)	*	210492
	METTLER TOLEDO data cable, 1.5 m female (unidirectional handshake)	*	33995
	METTLER TOLEDO data cable, 1.5 m male (unidirectional handshake)	*	33640
Cable 9-pin for RS-232	METTLER TOLEDO data cable, 1.5 m female (bidirectional handshake)	*	210493
	METTLER TOLEDO data cable, 1.5 m female (unidirectional handshake)	*	33783
Attachment of METTLER TOLEDO balances to IBM Personal Computer	Engineering Support Bulletin (ESB) German		702780
	English		702781
	French		702782
	Spanish		702783
	Italian		702784
Use of METTLER TOLEDO instruments with Lotus 1-2-3 and Measure	Engineering Support Bulletin (ESB) German		703191
	English		703192
	French		703193
Cable for IBM PC and IBM PC-XT	METTLER TOLEDO data cable, 1.5 m with 25-pin computer connector female (bidirectional handshake)	*	210491
Cable for IBM PC-AT, Toshiba T1000 etc.	METTLER TOLEDO data cable, 1.5 m with 9-pin computer connector female (bidirectional handshake)	*	210493
	* Use of the insertion and removal tool for D-subminiature plug connectors is recommended for assembly.		73629

Attachment of METTLER TOLEDO balances to Apple Macintosh Plus	Engineering Support Bulletin (ESB)	German English French Spanish Italian	703209 703210 703211 703212 703213
Cable for Macintosh Plus, Macintosh II	METTLER TOLEDO data cable, 1.5 m (bidirectional handshake)		210495
Attachment of METTLER TOLEDO balances to Epson PX-4 (HX-40)	Engineering Support Bulletin (ESB)	German English French Spanish Italian	702790 702791 702792 702793 702794
Attachment to hand-held computer Epson HX-20	Engineering Support Bulletin (ESB) German/English/French		701245
Cable for Epson	METTLER TOLEDO data cable, 1.5 m for PX-4, PX-8 (HX-40) METTLER TOLEDO data cable, 1.5 m for HX-20		33982 33955
Dust cover for Epson	Data cable and dust cover for HX-20		59719
I/O MiniMETTLER Connector (solderable)	For the individual preparation of data cables (with pin assignment)		33930
Extension cable	For Data I/O MiniMETTLER	2 m 5 m 10 m	216151 216152 216153

11.4 CL interface converter

METTLER TOLEDO CL310 5-channel line selector	For simultaneous attachment of several balances to a computer.
METTLER TOLEDO CL241, CL-IEEE488 interface	Interface converter for data conforming to IEEE488 standard.
METTLER TOLEDO CL250, CL-RS-232 interface	For conversion of CL data to RS-232 when the transmission path is long and the attached instrument has only an RS-232 interface.
METTLER TOLEDO CL249, CL-RS-232 adapter	As CL250, but without conversion of the RS-232 handshake.

			Order No.
Cable for METTLER TOLEDO interfaces	Interface specification bulletin	German	720687
		English	720688
		French	720689
		Spanish	720690
		Italian	720691
Non-METTLER TOLEDO units	*Here it must be noted that the non-METTLER TOLEDO units must accept the loop current supply. The balances are passive in the send and receive direction.*		

12. List of cables with accessories

Order No.	Designation	Remarks	Price/unit
23618	CL data cable 1.5 m	DL18/20/25/21/40GP	.....
33640	RS cable 1.5 m	LX800	.....
33688	RS cable 1.5 m	P40	.....
33783	RS cable 1.5 m, 9-pin female		.....
33868	Reference balance cable, 1.5 m		.....
33930	I/O MiniMETTLER connector (solderable)		.....
33955	RS cable 1.5 m	HX-20	.....
33982	RS cable 1.5 m	PX4 (HX40)	.....
33995	RS cable 1.5 m, 25-pin female		.....
42555	Extension cable, 2 m	CL	.....
42556	Extension cable, 5 m	CL	.....
42557	Extension cable, 15 m	CL	.....
42558	Extension cable, 30 m	CL	.....
47473	Transfer adapter		.....
47936	CL cable bidirectional, 1.5 m		.....
59096	Installation kit	1 CL line	.....
59719	Cable adapter kit Epson	HX20	1) .....
88156	Computer cable, shielded	4-wire	2) .....
89005	CL cable coupler		3) .....
89011	CL cable plug		3) .....

1) 2 cables + dust cover for HX20
2) Minimum order 100 m (unit m)
3) Minimum order 5

Continuation: List of cables with accessories

Order No.	Designation	Remarks	Price/unit
210491	RS cable 1.5 m, female (bidir. handshake)	IBM-XT	.....
210492	RS cable 1.5 m, male (bidir. handshake)		.....
210493	RS cable 1.5 m, female (bidir. handshake)	IBM-AT	.....
210494	Control cable 2 m		.....
210495	RS cable 1.5 m	Macintosh	.....
210498	GM/GT adapter		.....
210688	Connection cable 5 m	AT-SE/MT/UMT	.....
214103	CL data cable 1.5 m	DL70	.....
216151	Extension cable Data I/O 15-pin 2 m		.....
216152	Extension cable Data I/O 15-pin 5 m		.....
216153	Extension cable Data I/O 15-pin 10 m		.....
229029	RS cable, 1.5 m, 9-pin male	LC-P45 - Balance (MiniMETTLER)	.....

13. List of general accessories

Order No.	Designation	Remarks		Price/unit
1153	Pan,1000 ct	stainless steel		.....
2013	Glass dish, 20 g ± 1 mg			.....
4506	Glass dish, 10 g ± 1 mg			.....
4507	Weighing boat, 10 g ± 1 mg	stainless steel		.....
4508	Weighing boat, 20 g ± 1 mg	stainless steel		.....
6515	Tweezers for weights			.....
9769	Special spoon for vibrospatula	LV3		.....
13865	Weighing pan, set of 80	Al foil		.....
15020	Beaker, 230 ml	stainless steel		.....
23951	Weighing boat, set of 5, ø 20 x 60 mm	glass		.....
23952	Weighing boat, set of 5, ø 30 x 80 mm	glass		.....
42500	Hand switch		5)	.....
43851	Pan, 300 ct	stainless steel		.....
46278	Foot switch		5)	.....
70209	Straight tweezers			.....
71655	Demo case			.....
72409	Wetting agent Pervitro 75%			.....
72456	Paper rolls, set of 5	LC-P45		.....
73629	Insertion and removal tool			.....
210250	Density determination kit AT			.....
210260	Sinker			.....
210270	Inner draft shield AT			.....

5) Transfer adapter 47473 also needed

Continuation: List of the general accessories

Order No.	Designation	Remarks	Price/unit
210421	Weighing tweezers, adjustable		.....
210422	In-use cover AT/MT/UMT terminal		.....
210435	Triangular holder		.....
210437	Dust cover AT		.....
210440	Anti-theft safeguard AT		.....
210580	Twin foot switch		.....
210680	AT-SE Kit (separate electronics)		.....

14. List of peripherals from METTLER TOLEDO

Order No.	Designation	Remarks	Price/unit
CL241	CL-IEEE 488 interface		.....
CL249	CL-RS232 adapter		.....
CL250	CL-RS232 interface		.....
CL310	5-channel line selector		.....
DataPac-M	Terminal		.....
GA37	Digital-Analog Converter		.....
GA50	Peripheral controller		.....
GT53	Demo Display		.....
GM54	Output-Module	6)	.....
LC-P45	Thermal printer		.....
LV3	Vibrospatula		.....
LV10	Automatic Feeder	6)	.....

6) GM/GT adapter 210498 also needed

15. List of Engineering Support Bulletins (ESB)

Order No.	Designation	Remarks	Price/unit
701245	Weighing systems with hand-held computer HX20	German/Eng./French	.....
702780	Attachment of METTLER TOLEDO balances to IBM-PC	German	.....
702781		English	.....
702782		French	.....
702783		Spanish	.....
702784		Italian	.....
702785	Cable installation for weighing systems	German	.....
702786		English	.....
702787		French	.....
702788		Spanish	.....
702789		Italian	.....
702790	Attachment of METTLER TOLEDO balances to Epson PX4 (HX40)	German	.....
702791		English	.....
702792		French	.....
702793		Spanish	.....
702794		Italian	.....
703191	Use of METTLER TOLEDO instruments with Lotus 1-2-3 and Measure	German	.....
703192		English	.....
703193		French	.....
703209	Attachment of METTLER TOLEDO balances to Apple Macintosh Plus	German	.....
703210		English	.....
703211		French	.....
703212		Spanish	.....
703213		Italian	.....

Continuation: List of Engineering Support Bulletins (ESB)

Order No.	Designation	Remarks	Price/unit
704017	Bidirectional data interface of METTLER TOLEDO AT/MT/UMT balances	German	.....
704018		English	.....
704019		French	.....
704020		Spanish	.....
704021		Italian	.....
704209		Japanese	.....
720905	Weighing the right way	German	.....
720906		English	.....
720907		French	.....
720908		Spanish	.....
720909		Italian	.....
720911		Japanese	.....

16. List of Technical Information Bulletins (TIB)

Order No.	Designation	Remarks	Price/unit
720309	School experiments	German	.....
720310		English	.....
720311		French	.....
720687	Interface specifications bulletin	German	.....
720688		English	.....
720689		French	.....
720690		Spanish	.....
720691		Italian	.....
721152	AT – the new analytical balance from METTLER TOLEDO	German	.....
721153		English	.....
721154		French	.....
721155		Spanish	.....
721156		Italian	.....
721158	Dictionary of Weighing Terms	German	.....
721159		English	.....

17. List of standard accessories

Order No.	Designation	Remarks	Price/unit
70661	Tweezers		.....
71650	Hair brush for cleaning balance		.....
210385	AC adapter holder		.....
210390	AC adapter, Europe	230 V	.....
210391	AC adapter, USA	115 V	.....
210392	AC adapter, Australia	230 V	.....
210393	AC adapter, GB	230 V	.....
210422	In-use cover	Terminal AT/MT/UMT	.....
210456	AC adapter, Switzerland	230 V	.....
210457	AC adapter, Italy	230 V	.....
210458	AC adapter, Denmark	230 V	.....
211124	Cleaning tweezers MT/UMT		.....
11780208	Operating instructions AT	German	.....
11780209		English	.....
11780210		French	.....
11780211		Spanish	.....
11780212		Italian	.....
11780213		Japanese	.....
703465	Technical specifications and accessories AT/MT/UMT balances	German	.....
703466		English	.....
703467		French	.....
703468		Spanish	.....
703469		Italian	.....

Continuation: List of standard accessories

Order No.	Designation	Remarks	Price/unit
703470	Technical specifications and accessories AT/MT/UMT balances	Japanese	.....
703471		Dutch	.....
11780215	Short-form operating instructions AT	German	.....
11780216		English	.....
11780217		French	.....
11780218		Spanish	.....
11780219		Italian	.....
11780220		Japanese	.....
704017	Bidirectional data interface AT/MT/UMT balances	German	.....
704018		English	.....
704019		French	.....
704020		Spanish	.....
704021		Italian	.....
704209		Japanese	.....
11780227	Short-form operating instructions MT/UMT	German	.....
11780228		English	.....
11780229		French	.....
11780230		Spanish	.....
11780231		Japanese	.....
11780222	Operating instructions MT/UMT	German	.....
11780223		English	.....
11780224		French	.....
11780225		Spanish	.....
11780226		Japanese	.....

Continuation: List of standard accessories

Order No.	Designation	Remarks	Price/unit
720905	Weighing the right way	German	.....
720906		English	.....
720907		French	.....
720908		Spanish	.....
720909		Italian	.....
720911		Japanese	.....

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METTLER TOLEDO Service assures the quality, measuring accuracy and preservation of value of all METTLER TOLEDO products for years to come.
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P703466

Subject to technical changes and to the availability of the accessories supplied with the instruments.

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