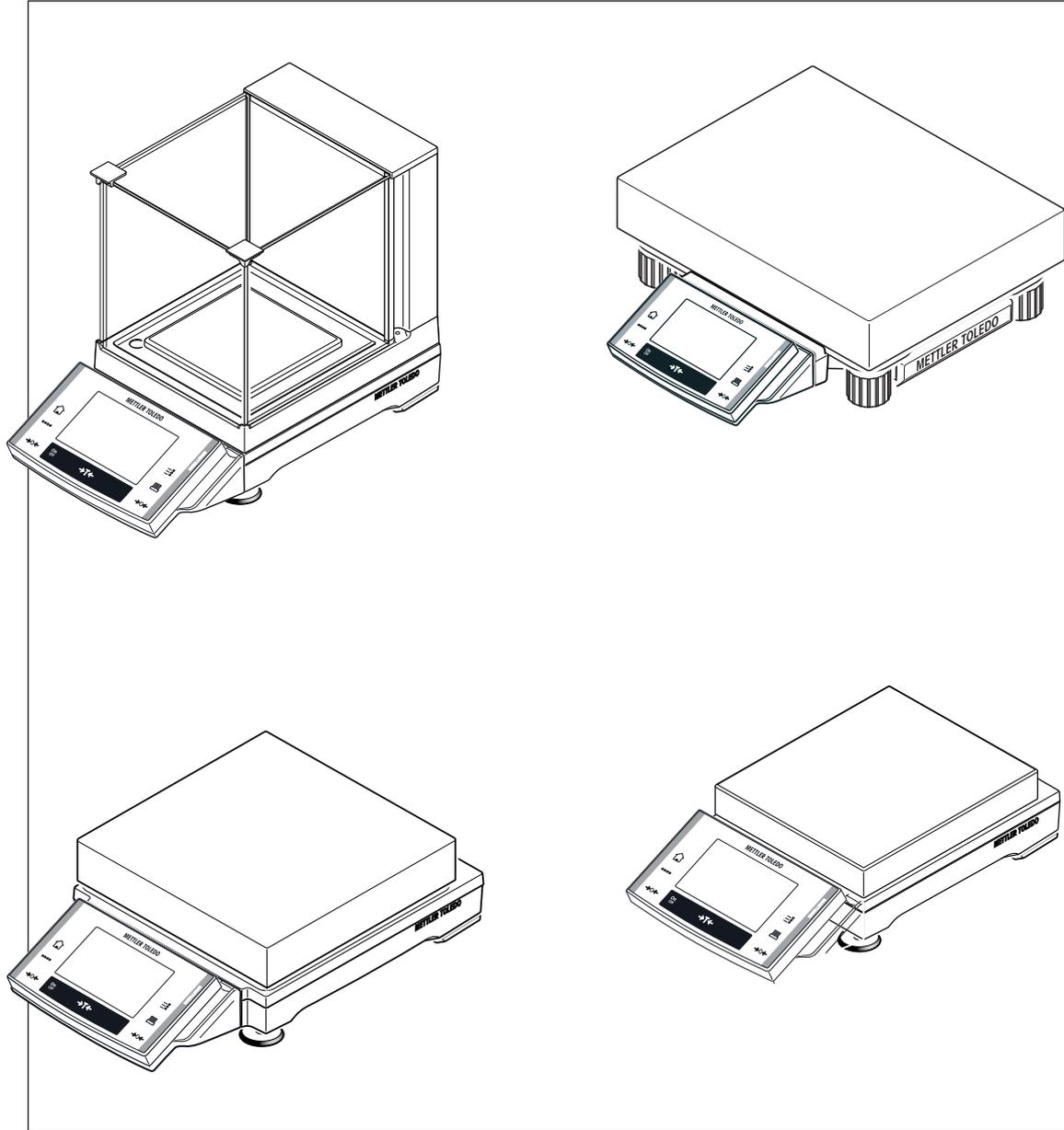


Excellence Precision Balances

XA Models – Part 1



METTLER TOLEDO

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1 Introduction

Thank you for choosing a METTLER TOLEDO balance.

The balances of the XA line combine a large number of weighing and adjustment possibilities with exceptionally convenient operation.

In this chapter you will be given basic information about your balance. Please read right through this chapter carefully even if you already have experience with METTLER TOLEDO balances. Please pay special attention to the safety warnings!

The different models have different characteristics regarding equipment and performance. Special notes in the text indicate where this makes a difference to operation.

The XA line comprises a range of balances which differ from each other in relation to their weighing range and resolution.

The following features are common to all models of the XA lines:

- Fully automatic adjustment "FACT" using internal weight.
- Built-in applications for normal weighing, statistics, percent weighing and piece counting.
- Integral RS232C interface.
- Slot for second interface (optional).
- Touch-sensitive graphics terminal ("Touch Screen") for easy, convenient operation.

A brief word about standards, guidelines, and methods of quality assurance: The balances comply with usual standards and guidelines. They support standard procedures, specifications, working methods, and reports according to **GLP (Good Laboratory Practice)**. In this connection, records of working procedures and adjustments become very important; for this purpose we recommend you to use a printer from the METTLER TOLEDO range, since these are optimally adapted to your balance. The balances conform to the applicable standards and guidelines and possess a EC declaration of conformity. METTLER TOLEDO is certified as manufacturer according to ISO 9001 and ISO 14001.

The Operating Instructions for the XA balances consist of 2 separate documents, whose contents are listed below.

Part 1, This Document

Contents

- Introduction
- Safety Information
- Setting up the Balance
- Leveling the Balance
- Cleaning and Service
- Technical Data
- Interface commands and MT-SICS functions
- Accessories
- Spare Parts

Part 2, Separate Document

Contents: Terminal, System and Applications

- Basic Principles for Using the Terminal and the Firmware
- System Settings
- Adjustments/Tests
- Applications
- Firmware (Software) Updates
- Error and Status Messages

- Conversion Table for Weight Units
- Recommended Printer Settings

Finding More Information

Internet <http://www.mt.com/excellence>

1.1 Conventions and Symbols Used in These Operating Instructions

The following conventions apply to the operating instructions: Part 1 and Part 2.

Key designations are indicated by a picture or text in double angular parentheses (e.g. «» or «**On/Off**»).



This symbol indicates press key briefly (less than 1.5 s).



This symbol indicates press and hold key down (longer than 1.5 s).

These symbols indicate an instruction:

- ▶ prerequisites
- 1 steps
- 2 ...
- ⇒ results

2 Safety Information

2.1 Definition of Signal Warnings and Symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the balance, malfunctions and false results.

Signal Words

WARNING	for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	for a hazardous situation with low risk, resulting in damaged to the device or the property or in losing of data or minor or medium injuries if not avoided.
Attention	(no symbol) for important information about the product.
Note	(no symbol) for useful information about the product.

Warning Symbols



General hazard



Electrical shock

2.2 Product Specific Safety Notes

Always operate and use your balance only in accordance with the Operating Instructions Part 1 and Part 2. The instructions for setting up your new balance must be strictly observed.

If the instrument is not used according to the manufacturer's Operating Instructions (Part 1 and Part 2), protection of the instrument may be impaired.

Intended Use

Your balance is used for weighing. Use the balance exclusively for this purpose. Any other type of use and operation beyond the limits of technical specifications without written consent from Mettler-Toledo AG, is considered as not intended.



It is not permitted to use the instrument in explosive atmosphere of gases, steam, fog, dust and flammable dust (hazardous environments).



CAUTION

Damage of Device

- For use only in dry interior rooms.
 - Do not use sharply pointed objects to operate the keyboard! Although your balance is very ruggedly constructed, it is nevertheless a precision instrument. Treat it with corresponding care.
 - Do not open the balance: It does not contain any parts which can be maintained, repaired, or replaced by the user. If you ever have problems with your balance, contact your METTLER TOLEDO dealer.
 - Use only balance accessories and peripheral devices from METTLER TOLEDO; they are optimally adapted to your balance.
-



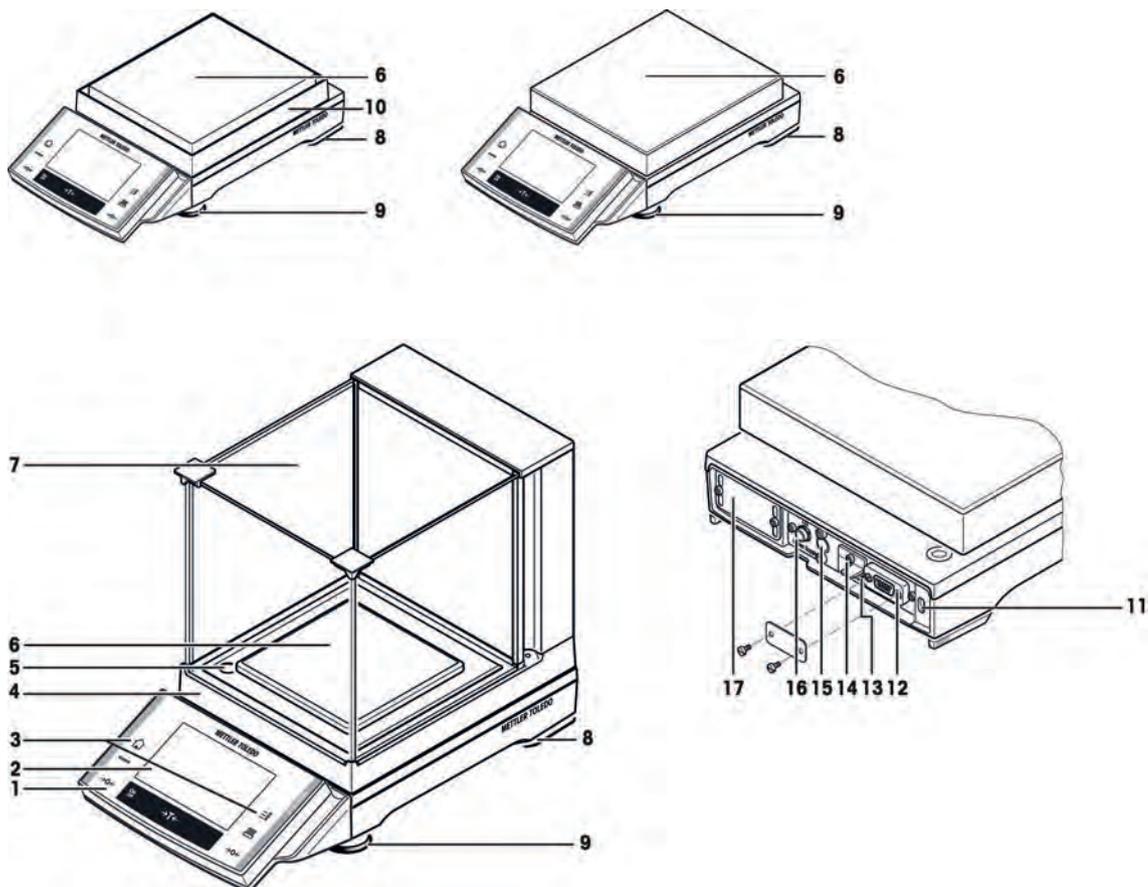
CAUTION

Damage of Device

Use only the original universal AC adapter delivered with your balance, and check that the voltage printed on it is the same as your local power supply voltage. Only plug the adapter into a socket which is grounded.

3 Overview XA Precision Balances

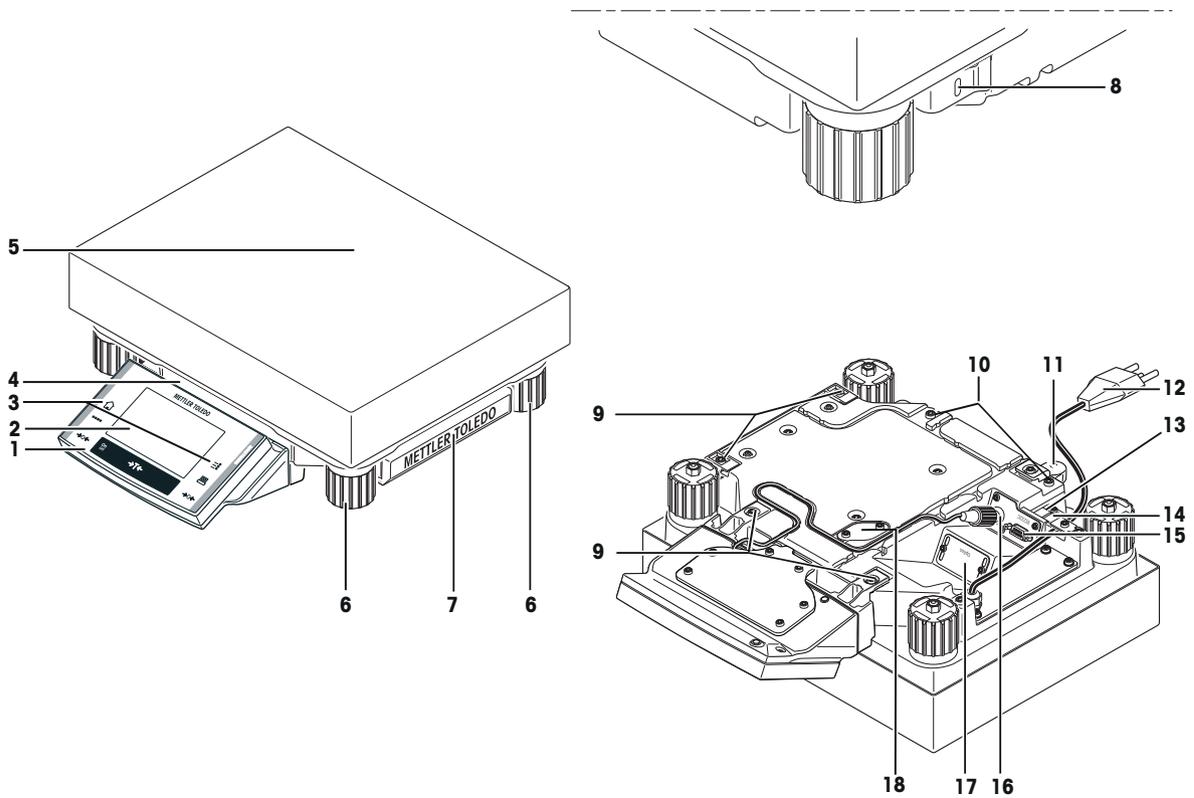
3.1 Overview "S" and "M" Weighing Platform



Overview

1	Terminal (details see Operating Instruction – Part 2)	2	Display (Touch-sensitive "Touch Screen")
3	Operating keys	4	Type name
5	Level indicator	6	Weighing pan
7	Glass draft shield	8	Safety feet (10 mg, 0.1 g + 1 g models)
9	Foot screws	10	Draft shield element
11	Fastening point for anti-theft device	12	RS232C serial interface
13	Aux 1 (connection for "ErgoSens", hand- or foot-switch)	14	Aux 2 (connection for "ErgoSens", hand- or foot-switch)
15	Fastening for auxiliary display stand or terminal stand (optional)	16	Socket for AC adapter
17	Slot for second interface (optional)		

3.2 Overview "L" Weighing Platform



Overview

1	Terminal with terminal support (details see Operating Instruction – Part 2)	2	Display (Touch-sensitive "Touch Screen")
3	Operating keys	4	Type name
5	Weighing pan	6	Foot screws
7	Cover	8	Fastening point for anti-theft device
9	Points of attachment for terminal or cover	10	Fastening for terminal stand (optional)
11	Level indicator	12	Power cable
13	Aux 1 (connection for "ErgoSens", hand- or foot-switch)	14	Aux 2 (connection for "ErgoSens", hand- or foot-switch)
15	RS232C serial interface	16	Connector for terminal cable
17	Slot for second interface (optional)	18	Cover plate for below-the-balance weighing (hook optional)

4 Setting up the Balance

This chapter describes how to unpack your new balance, set it up and prepare it for operation. On completion of the steps described in this chapter, your balance is ready for operation.



CAUTION

Electrical shock

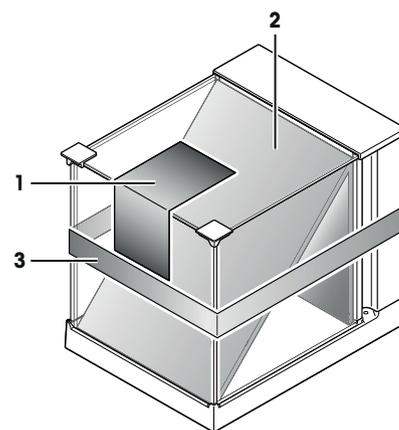
The balance must be disconnected from the power supply when carrying out all setup and mounting work.

4.1 Unpacking and Checking the Delivered Items

Open the packaging and carefully remove all components.

4.1.1 Unpacking the "Magic Cube" Draft Shield

- 1 Place the draft shield horizontally on a clean surface.
- 2 Remove the adhesive tape (1).
- 3 Open the draft shield cover.
- 4 Pull the cardboard (2) upwards out of the weighing chamber.
- 5 When removing the cardboard (2), hold the U-shaped draft shield glass so that it is not pulled away with it.
- 6 Close the draft shield cover.
- 7 Release the holding strip (3) and pull it upwards to remove it.



4.2 Scope of Delivery

The standard scope of delivery contains the following items:

Components	S platform			L platform
	1 mg	10 mg	0.1 g	0.1 g
Weighing platform	✓	✓	✓	✓
RS232C interface	✓	✓	✓	✓
Slot for second interface (optional)	✓	✓	✓	✓
Feedthroughs for below-the-balance weighing	✓	✓	✓	✓
Feedthroughs for antitheft device	✓	✓	✓	✓
AC adapter	✓	✓	✓	✓
Country-specific power cable	✓	✓	✓	✓
Terminal	✓	✓	✓	✓
Protective cover for terminal	✓	–	–	✓
Protective cover for weighing platform	–	✓	✓	–
Terminal support	–	–	–	✓
"Magic Cube" draft shield with an additional draft shield door	✓	–	–	–

Components		S platform			L platform
Bottom plate		✓	–	–	–
Weighing pan support		✓	✓	✓	–
Weighing pan	127 x 127 mm	✓	–	–	–
	170 x 205 mm	–	✓	–	–
	190 x 223 mm	–	–	✓	–
	237 x 237 mm	–	–	–	–
	280 x 360 mm	–	–	–	✓
Operating Instructions Part 1 (this document) and Part 2		✓	✓	✓	✓
Production certificate		✓	✓	✓	✓
CE declaration of conformity		✓	✓	✓	✓

4.3 Selecting the Location and Level of the Balance

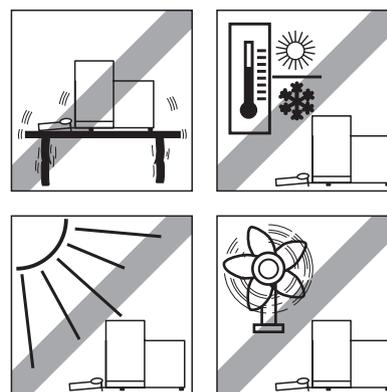
4.3.1 Selecting the Location

Choose a position which is stable, free from vibration, and as nearly horizontal as possible. The supporting surface must be able to bear the weight of the fully loaded balance safely.

Avoid the following:

- Direct sunlight
- Draft (e.g. from fans or air conditioning)
- Excessive fluctuations in temperature.

Further information can be found in Weighing the Right Way.

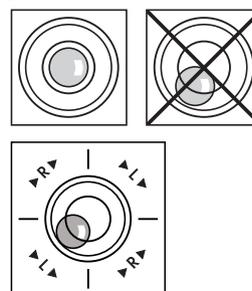


Observe ambient conditions, **see** Technical Data (page 23).

4.3.2 Leveling the Balance

Balances with readability of 1 mg "S" platform and balances with "L" platform

- 1 Align the balance horizontally.
- 2 Turning the leveling screws of the housing until the air bubble is in the inner circle of the level indicator.
 - ⇒ The position of the air bubble illustrates which leveling screw you need to turn (L = left leveling screw, R = right leveling screw) and in which direction so that the air bubble moves to the center.



Example

In this example, turn the left leveling screw counterclockwise.

Balances with readability of 10 mg, 0.1 g and 1 g "S" platforms

- 1 Remove the clamps (1) for the safety feet by turning them outwards.

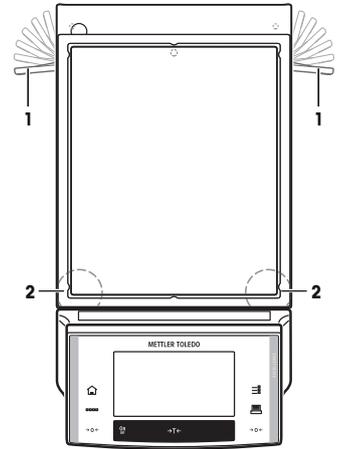
Attention

Turn the clamps (1) outwards as far as they will go (~ 90°), so that the safety feet can move freely.

- 2 Now level the balance by turning both leveling screws (2) as shown above until the air bubble is in the inner circle of the level indicator.
- 3 Secure the safety feet by turning the clamps (1) inwards as far as they will go.

Note

The balance must be leveled and adjusted each time it is moved to a new location.



4.4 Assembling the Balance

4.4.1 Installing the "Magic Cube" Draft Shield and Weighing Pan

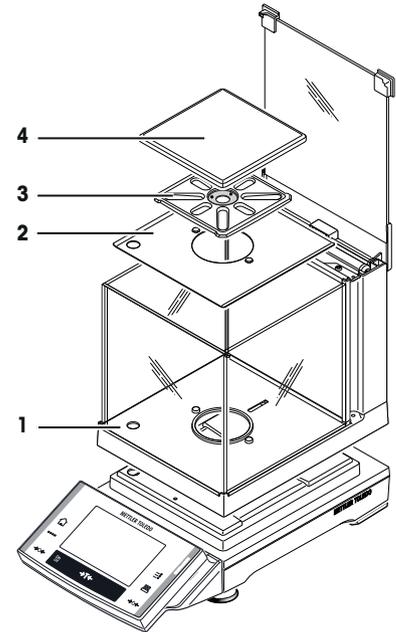
Balances with readability of 1 mg, "S" platform with draft shield

- 1 Place the following components on the balance in the specified order:
- 2 Place draft shield (1) with closed cover, and then open.

Attention

The U-shaped draft shield glass is not permanently connected to the draft shield housing.

- 1 Always close the cover before picking up the draft shield.
 - 2 Hold the entire draft shield by the housing at the back.
 - 3 Always hold the draft shield with both hands and keep in a horizontal position.
- Bottom plate (2).
 - Pan support (3).
 - Weighing pan (4).



Note

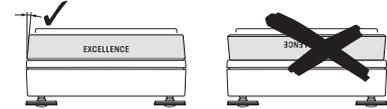
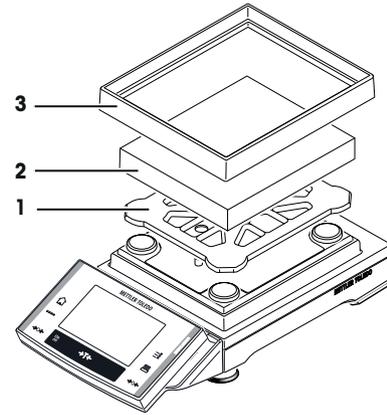
For setting options for the draft shield, **see** Setting Options with the Draft Shield Glass (1 mg Models) (page 16).

Balances with readability of 10 mg, "S" platform with draft shield element

- Place the following components on the balance in the specified order:
 - Pan support (1).
 - Weighing pan (2).
 - Draft shield element (3).

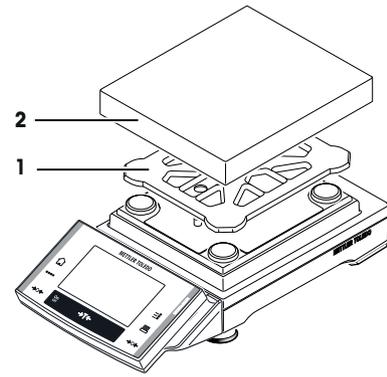
Note

It is also possible to work without the draft shield element (3). However, depending on the ambient conditions, the display of the results may be slightly more unstable.



Balances with readability of 0.1 g, "S" platform

- Place the following components on the balance in the specified order:
 - Pan support (1).
 - Weighing pan (2).



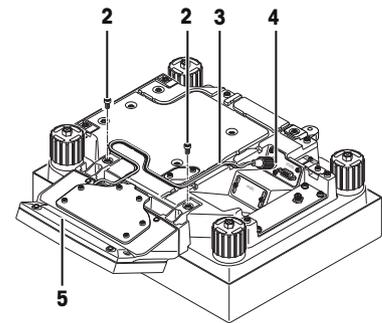
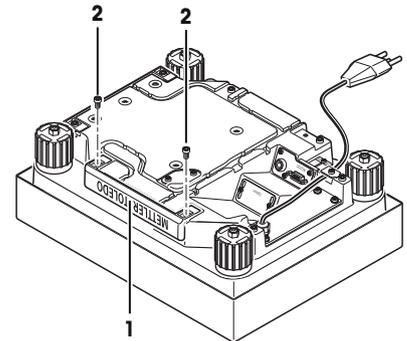
4.4.2 Placing the Terminal on the "L" Weighing Platform

The terminal can be attached to the long or short side of the balance.

- 1 Mount the weighing pan.
- 2 Carefully turn the weighing platform over onto the weighing pan.

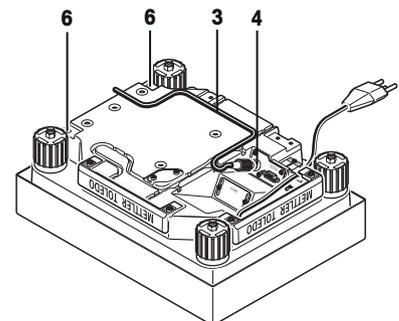
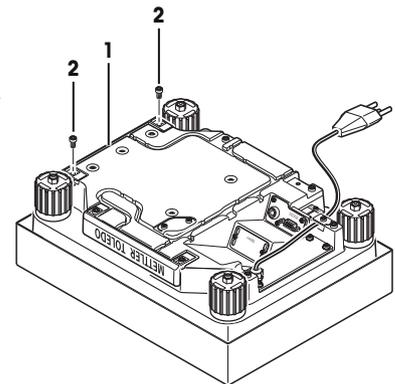
Attaching the terminal to the long side

- 1 Dismantle the cover (1) by removing the 2 screws (2).
- 2 Attach the terminal to the terminal support (5) as shown, using the screws (6) from the cover that was removed.
- 3 Insert the terminal cable (3) into the cable channel, as shown.
- 4 Screw the connector of the terminal cable into the socket (4).
- 5 Turn the balance back over into position.



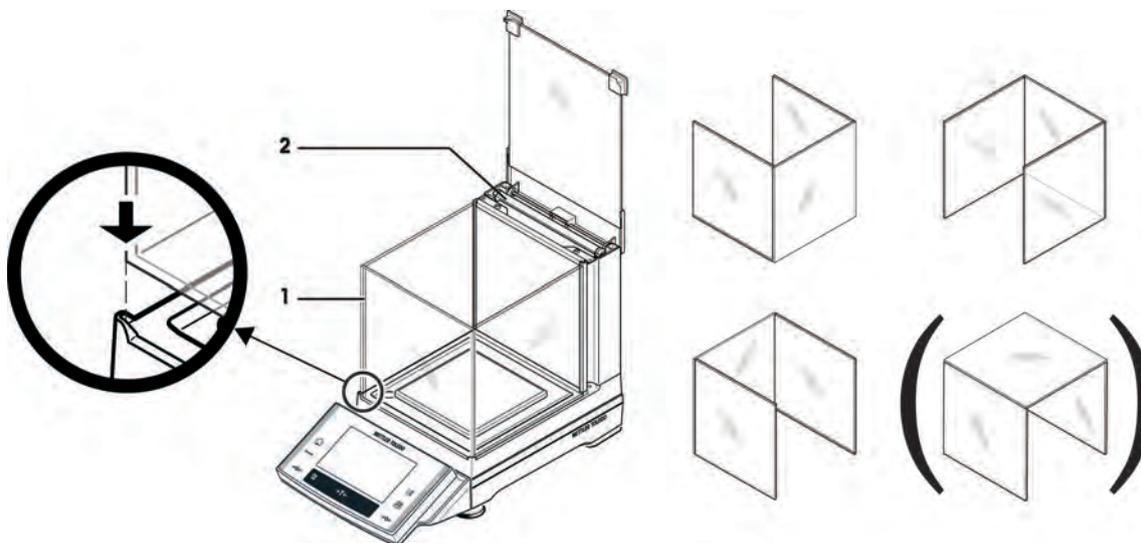
Attaching the terminal to the short side

- 1 Dismantle the cover (1) by removing the 2 screws (2).
- 2 Attach the terminal with terminal support to the points of attachment (6) with the screws (2).
- 3 Insert the terminal cable (3) into the cable channel, as shown.
- 4 Screw the connector of the terminal cable into the socket (4).
- 5 Turn the balance back over into position.



4.4.3 Setting Options with the Draft Shield Glass (1 mg Models)

The U-shaped draft shield glass (1) supports different setting options. The draft shield housing contains an additional draft shield pane (2), which can be used as required, **see** Using the Additional Draft Shield Door (1 mg Models) (page 16)).

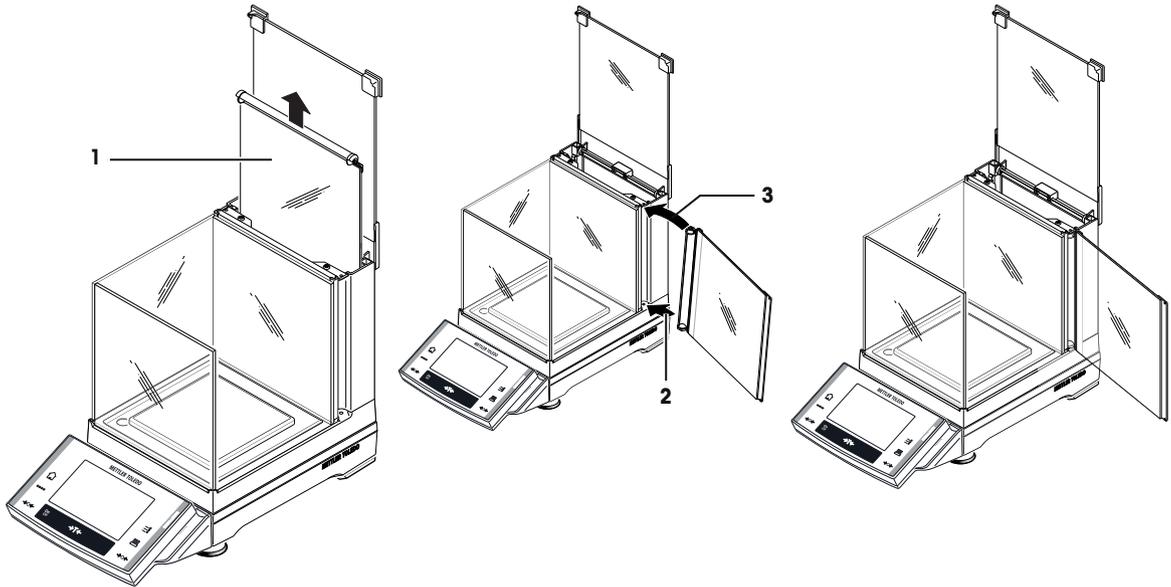


4.4.4 Using the Additional Draft Shield Door (1 mg Models)

- 1 Open the draft shield cover.
- 2 Pull the draft shield door (1) upwards out of the rear panel.
- 3 Insert the draft shield door into the housing from the side (left or right).
- 4 First position the draft shield door at the bottom (2) and then swivel it upwards (3) until you **feel it snap into place, see** diagram.

Attention

Check that the draft shield door is inserted correctly. The door must close easily. When transporting the balance, except for the terminal, also hold the draft shield, as this is fitted and not permanently connected to the weighing platform.



4.5 Power Supply



WARNING

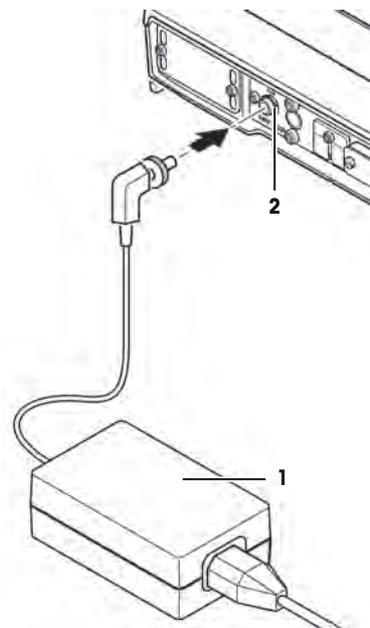
Risk of electric shock

- Ensure that the AC power pack for the balance is only used in accordance with the specifications listed in chapter General Data.
- Your instrument is supplied with a 3-pin power cable with an equipment grounding conductor. Only extension cables which meet this relevant standards and also have an equipment grounding conductor may be used. Intentional disconnection of the equipment grounding conductor is prohibited.

4.5.1 Power Supply for the "S" Weighing Platforms

- Your balance is delivered complete with an AC adapter and a country-specific power supply cable. The AC adapter is suitable for all power supply voltages in the range of: 100 – 240 VAC, 50/60 Hz, for exact specifications, **see** Technical Data (page 23).
- First, check whether the voltage of the power supply matches your local line voltage. If this is not the case, on no account connect the balance to the power, but contact your METTLER TOLEDO sales representative or dealer.
- Guide the cables so that they cannot become damaged and will not be in your way during your daily work! Take care that the AC adapter cannot come into contact with liquids!
- The power plug must be always accessible.
- Before operating, check all cables for damage.

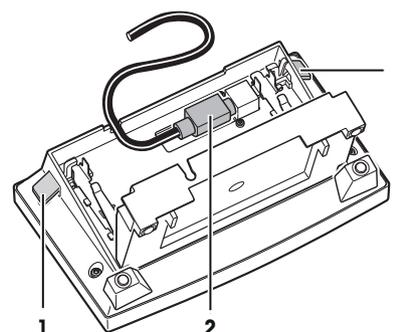
- Plug the AC adapter (1) into the socket (2) in the back of your balance and into the power supply.
- ⇒ After the balance has been connected to the power supply, it carries out a self test and is then ready for operation.



Note

If the display field remains dark, even though the power supply connection functions.

- 1 First disconnect the balance from the power supply.
- 2 Open the terminal.
- 3 Press both buttons (1) on the back of the terminal and open the upper part of the terminal.
- 4 Check that the plug for the terminal cable (2) is connected correctly inside the terminal.



4.5.2 Power Supply for the "L" Weighing Platform

- Your balance is delivered with a country-specific power supply cable.
- First, check whether the voltage of the power supply matches your local line voltage. If this is not the case, on no account connect the balance to the power, but contact your METTLER TOLEDO sales representative or dealer.
- Guide the cables so that they cannot become damaged and will not be in your way during your daily work! Take care that the AC adapter cannot come into contact with liquids!
- The power plug must be always accessible.
- Before operating, check all cables for damage.
- Connect the balance to the power supply.
- ⇒ After the balance has been connected to the power supply, it carries out a self test and is then ready for operation.

Note

If the display field remains dark, even though the power supply connection functions.

- 1 First disconnect the balance from the power supply.
- 2 Check that the plug for the terminal cable is connected correctly inside the terminal, **see** Placing the Terminal on the "L" Weighing Platform (page 15).

4.6 Transporting the Balance

Observe the following instructions to transport your balance to a new location.

- 1 Switch off the balance.
- 2 The balance must be disconnected from the power supply.
- 3 Remove any interface cable from the balance.

4.6.1 Transporting Over Short Distances

If you wish to move your balance over a short distance to a new location, proceed as follows.

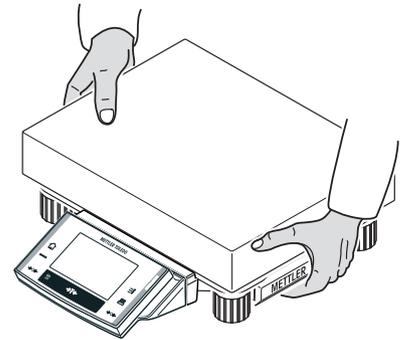


CAUTION

Damage of Device

Never lift the balance by the glass draft shield, as this can cause damage! The draft shield is not fastened to the balance.

- 1 Hold the weighing platform with both hands and lift horizontally.
- 2 Carry the balance horizontally to the new location, observe the notes in chapter Selecting the Location (page 12).



4.6.2 Transporting Over Long Distances

If you want to transport or ship your balance over long distances, or if it is not certain that the balance will be transported upright, use the complete original packaging.

4.7 Below-the-Balance Weighing

Your balance is equipped with a hanger for carrying out weighings below the work surface (weighing below the balance).

- 1 Switch off the balance.
- 2 The balance must be disconnected from the power supply.
- 3 Remove any interface cable from the balance.

- 1 Remove the draft shield element (10 mg models).
- 2 Remove the weighing pan and pan support.
- 3 Remove the bottom plate (1 mg models with draft shield).

4 **Attention**

Models with a glass draft shield:

Carefully lift the draft shield from the weighing platform and put it aside.

- 5 Tilt the weighing platform backwards until the cover plate (2) is visible.

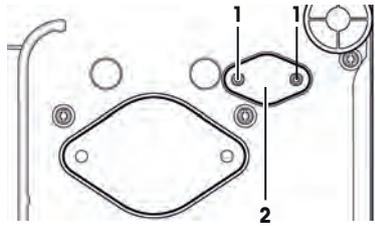
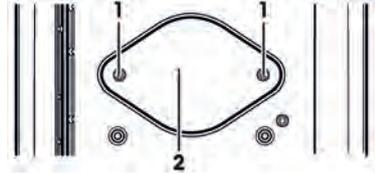
Attention

Do not place the weighing platform on the location bolt for the pan support (1 mg models).

- 6 Remove the 2 screws (1) and the cover plate (2).

⇒ The hanger is now accessible.

- 7 Return the balance to its normal position and simply reinstall all components in the reverse order.



Note

For below-the-balance weighing with the L model (XA16001L/XA32001L), you will need hook 11132565 from the accessories range.

5 Maintenance

5.1 Cleaning

Periodically clean the weighing pan, draft shield element, draft shield (depending on the model), housing and terminal of your balance using a damp cloth. The maintenance interval depends on your standard operating procedure (SOP).

Please observe the following notes



WARNING

Damage of balance

- The balance must be disconnected from the power supply.
- Ensure that no liquid comes into contact with the balance, the terminal or the AC adapter. The balance is protected against dust and water when it is fully set up (with pan support and weighing pan).
- Never open the balance, terminal or AC adapter – they contain no components, which can be cleaned, repaired or replaced by the user.



CAUTION

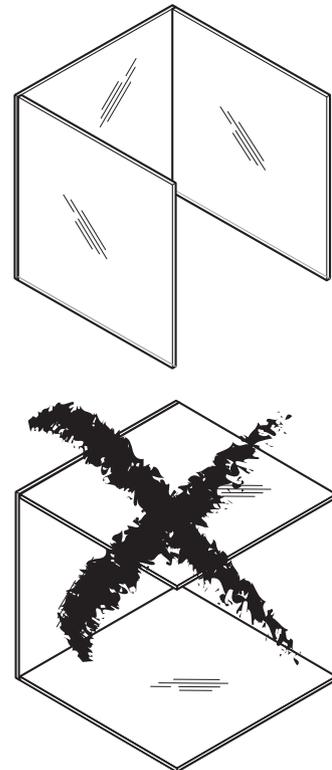
Damage of balance

On no account use cleaning agents which contain solvents or abrasive ingredients, as this can result in damage to the terminal overlay.

Cleaning

Your balance is made from high quality, resistant materials and can therefore be cleaned with a commercially available, mild cleaning agent.

- 1 To thoroughly clean the U-shaped draft shield glass, carefully remove it from the draft shield.
- 2 Place it on a clean, soft surface, as illustrated in the diagram.
- 3 When reinserting the glass, ensure that it is in the correct position.



Note

Please contact your METTLER TOLEDO dealer for details of the available service options. Regular servicing by an authorized service engineer ensures constant accuracy for years to come and prolongs the service life of your balance.

5.2 Disposal

In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.



Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

6 Technical Data

6.1 General Data "S" Weighing Platform



CAUTION

Use only with a tested AC Adapter with SELV output current.
Ensure correct polarity

Power supply

Power supply connector with AC/DC adapter:	1 1 1 0 7 9 0 9 Primary: 100-240 VAC, -15%/+10%, 50/60 Hz Secondary: 12 VDC \pm 3%, 2.0 A (with electronic overload protection)
Cable to AC adapter:	Design: 3-core, with country-specific plug
Power supply to the balance:	Note Make sure the power supply plug is freely accessible 12 VDC \pm 3%, 2.0 A, maximum ripple: 80 mVDCpp

Protection and standards

Overvoltage category:	Class II
Degree of pollution:	2
Protection:	IP54, in use with weighing pan inserted, protected against dust and water
Standards for safety and EMC:	See Declaration of Conformity
Range of application:	For use only in closed interior rooms

Environmental conditions

Height above mean sea level:	Up to 4000 m
Ambient temperature:	5-40 °C
Relative air humidity:	Max. 80% at 31 °C, linearly decreasing to 50% at 40 °C, non-condensing

Materials

Housing:	Die-cast aluminum, laquered, plastic and chrome steel
Terminal:	Die-cast zinc, chromed and plastics
Weighing pan:	Chrome-nickel steel X2CrNiMo-17-12-2
Draft shield:	Plastic, chrome steel and glas
Draft shield element:	Die-cast zinc, chromed

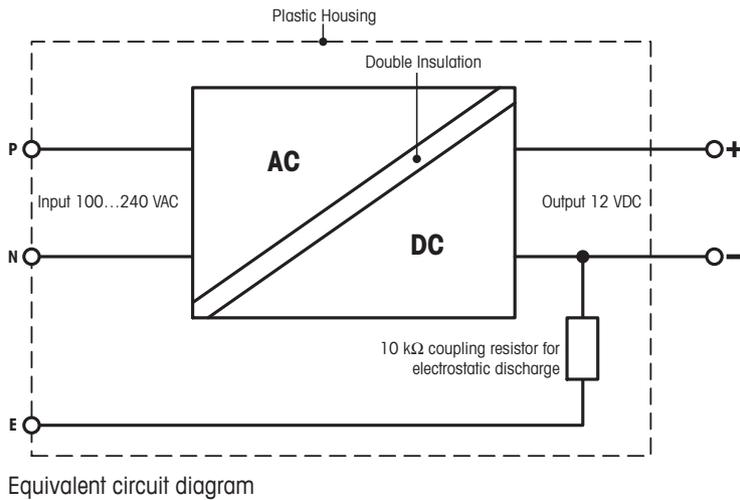
6.2 Explanatory Notes for the METTLER TOLEDO AC Adapter

The certified external power supply which conforms to the requirements for Class II double insulated equipment is not provided with a protective earth connection but with a functional earth connection for EMC purposes. This earth connection IS NOT a safety feature. Further information about conformance of our products can be found in the brochure "Declaration of Conformity" which is coming with each product.

In case of testing with regard to the European Directive 2001/95/EC the power supply and the balance have to be handled as Class II double insulated equipment.

Consequently an earth bonding test is not required. Similarly it is not necessary to carry out an earth bonding test between the supply earth conductor and any exposed metalwork on the balance.

Because the balance are sensitive to static charges a leakage resistor, typically 10 k Ω , is connected between the earth connector and the power supply output terminals. The arrangement is shown in the equivalent circuit diagram. This resistor is not part of the electrical safety arrangement and does not require testing at regular intervals.



6.3 General Data "L" Weighing Platform

Power supply

Power supply: 115-240 VAC, -15%/+10%, 50/60 Hz, 0.4 A
 Power cable: 3-core, with country-specific plug

Protection and standards

Overvoltage category: Class II
 Degree of pollution: 2
 Protection: IP54, in use with weighing pan inserted, protected against dust and water
 Standards for safety and EMC: See Declaration of Conformity
 Range of application: For use only in closed interior rooms

Environmental conditions

Height above mean sea level: Up to 4000 m
 Ambient temperature: 5-40 °C
 Relative air humidity: Max. 80% at 31 °C, linearly decreasing to 50% at 40 °C, non-condensing

Materials

Housing: Sheet aluminum, die cast, laquered, plastic and chrome steel
 Terminal: Die-cast zinc, chromed and plastics
 Weighing pan: Chrome-nickel steel X5CrNi18-10

6.4 Model-specif Data

6.4.1 Balances with Readability of 1 mg, "S" Platform with Draft Shield

		XA303S	XA503S
Limit values			
Maximum capacity		310 g	510 g
Readability		1 mg	1 mg
Tare range (from...to)		0 ... 310 g	0 ... 510 g
Repeatability (at nominal load)	sd	0.9 mg	0.9 mg
Linearity deviation		2 mg	2 mg
Eccentricity deviation (test load)		3 mg (100 g)	3 mg (200 g)
Sensitivity offset (test weight)		6 mg (300 g)	10 mg (500 g)
Sensitivity temperature drift ¹⁾		0.0005%/°C	0.0002%/°C
Sensitivity stability		0.0025%/a	0.001%/a
Typical values			
Repeatability	sd	0.5 mg	0.5 mg
Linearity deviation		1.1 mg	1.3 mg
Eccentric deviation (test load)		1.2 mg (100 g)	2 mg (200 g)
Sensitivity offset (test load)		2.4 mg (300 g)	2.5 mg (500 g)
Minimum sample weight (according to USP)		1.5 g	1.5 g
Minimum sample weight (U=1%, k=2)		100 mg	100 mg
Settling time		1.5 s	1.5 s
Dimensions			
Balance dimensions (WxDxH)		198x366x276 mm	198x366x276 mm
Weighing pan dimensions		27x127 mm (WxD)	27x127 mm (WxD)
Typical uncertainties and supplementary data			
Repeatability	sd	0.5mg+0.0001%·Rgr	0.5mg+0.00006%·Rgr
Differential linearity deviation	sd	$\sqrt{(1\text{ng}\cdot\text{Rnt})}$	$\sqrt{(0.8\text{ng}\cdot\text{Rnt})}$
Differential eccentric load deviation	sd	0.0006%·Rnt	0.0005%·Rnt
Sensitivity offset	sd	0.0004%·Rnt	0.00025%·Rnt
Minimum sample weight (according to USP)		1.5g+0.3%·Rgr	1.5g+0.18%·Rgr
Minimum sample weight (U=1%, k=2)		100mg+0.02%·Rgr	100mg+0.012%·Rgr
Interface update rate		23 /s	23 /s
Usable height of draft shield		175 mm	175 mm
Weight of balance		7.6 kg	7.6 kg
Number of built-in reference weights		1	1
Weights for routine testing			
OIML CarePac		200 g F2, 10 g F1	500 g F2, 20 g F1
	Weights	#11123001	#11123007
ASTM CarePac		200 g 1, 10 g 1	500 g 1, 20 g 1
	Weights	#11123101	#11123107

sd = Standard deviation

Rnt = Net weight (sample weight)

Rgr = Gross weight

a = Year (annum)

¹⁾ In the temperature range 10...30 °C

6.4.2 Balances with Readability of 10 mg, "S" Platform with Draft Shield Element

		XA1502S	XA3002S	XA5002S
Limit values				
Maximum capacity		1.51 kg	3.1 kg	5.1 kg
Readability		10 mg	10 mg	10 mg
Tare range (from...to)		0 ... 1.51 kg	0 ... 3.1 kg	0 ... 5.1 kg
Repeatability (at nominal load)	sd	8 mg	8 mg	8 mg
Linearity deviation		20 mg	20 mg	20 mg

		XA1502S	XA3002S	XA5002S
Eccentricity deviation (test load)		20 mg (0.5 kg)	30 mg (1 kg)	30 mg (2 kg)
Sensitivity offset (test weight)		45 mg (1.5 kg)	45 mg (3 kg)	100 mg (5 kg)
Sensitivity temperature drift ¹⁾		0.0003%/°C	0.0003%/°C	0.0003%/°C
Sensitivity stability		0.0025%/a	0.0015%/a	0.0015%/a
Typical values				
Repeatability	sd	4 mg	4 mg	4 mg
Linearity deviation		12 mg	12 mg	13 mg
Eccentric deviation (test load)		12 mg (0.5 kg)	20 mg (1 kg)	20 mg (2 kg)
Sensitivity offset (test load)		24 mg (1.5 kg)	24 mg (3 kg)	25 mg (5 kg)
Minimum sample weight (according to USP)		12 g	12 g	12 g
Minimum sample weight (U=1%, k=2)		800 mg	800 mg	800 mg
Settling time		1.2 s	1.2 s	1.2 s
Dimensions				
Balance dimensions (WxDxH)		194x366x96 mm	194x366x96 mm	194x366x96 mm
Weighing pan dimensions		170x205 mm (WxD)	170x205 mm (WxD)	170x205 mm (WxD)
Typical uncertainties and supplementary data				
Repeatability	sd	4mg+0.00012%·Rgr	4mg+0.00006%·Rgr	4mg+0.00004%·Rgr
Differential linearity deviation	sd	$\sqrt{(25ng \cdot Rnt)}$	$\sqrt{(12ng \cdot Rnt)}$	$\sqrt{(8ng \cdot Rnt)}$
Differential eccentric load deviation	sd	0.0012%·Rnt	0.001%·Rnt	0.0005%·Rnt
Sensitivity offset	sd	0.0008%·Rnt	0.0004%·Rnt	0.00025%·Rnt
Minimum sample weight (according to USP)		12g+0.36%·Rgr	12g+0.18%·Rgr	12g+0.12%·Rgr
Minimum sample weight (U=1%, k=2)		800mg+0.024%·Rgr	800mg+0.012%·Rgr	800mg+0.008%·Rgr
Interface update rate		23 /s	23 /s	23 /s
Weight of balance		6.9 kg	6.9 kg	6.9 kg
Number of built-in reference weights		1	1	1
Weights for routine testing				
OIML CarePac		1000 g F2, 50 g F2	2000 g F2, 100 g F2	5000 g F2, 200 g F2
	Weights	#11123008	#11123009	#11123011
ASTM CarePac		1000 g 1, 50 g 1	2000 g 1, 100 g 1	5000 g 4, 200 g 4
	Weights	#11123108	#11123109	#11123111

sd = Standard deviation

Rnt = Net weight (sample weight)

Rgr = Gross weight

a = Year (annum)

¹⁾ In the temperature range 10...30 °C

6.4.3 Balances with Readability of 0.1 g, "S" Platform

		XA3001S
Limit values		
Maximum capacity		3.1 kg
Readability		100 mg
Tare range (from...to)		0 ... 3.1 kg
Repeatability (at nominal load)	sd	80 mg
Linearity deviation		60 mg
Eccentricity deviation (test load)		200 mg (1 kg)
Sensitivity offset (test weight)		180 mg (3 kg)
Sensitivity temperature drift ¹⁾		0.0015%/°C
Sensitivity stability		0.005%/a
Typical values		
Repeatability	sd	40 mg
Linearity deviation		38 mg
Eccentric deviation (test load)		120 mg (1 kg)
Sensitivity offset (test load)		120 mg (3 kg)
Minimum sample weight (according to USP)		120 g

		XA3001S
Minimum sample weight (U=1%, k=2)		8 g
Settling time		0.8 s
Dimensions		
Balance dimensions (WxDxH)		194x366x96 mm
Weighing pan dimensions		190x223 mm (WxD)
Typical uncertainties and supplementary data		
Repeatability	sd	40mg+0.0006%·Rgr
Differential linearity deviation	sd	$\sqrt{(120\text{ng}\cdot\text{Rnt})}$
Differential eccentric load deviation	sd	0.006%·Rnt
Sensitivity offset	sd	0.002%·Rnt
Minimum sample weight (according to USP)		120g+1.8%·Rgr
Minimum sample weight (U=1%, k=2)		8g+0.12%·Rgr
Interface update rate		23 /s
Weight of balance		6.4 kg
Number of built-in reference weights		1
Weights for routine testing		
OIML CarePac		2000 g F2, 100 g F2
	Weights	#11123009
ASTM CarePac		2000 g 1, 100 g 1
	Weights	#11123109

sd = Standard deviation

Rnt = Net weight (sample weight)

Rgr = Gross weight

a = Year (annum)

¹⁾ In the temperature range 10...30 °C

6.4.4 Balances with Readability of 0.1 g, "L" Platform

		XA16001L	XA32001L
Limit values			
Maximum capacity		16.1 kg	32.1 kg
Readability		100 mg	100 mg
Tare range (from...to)		0 ... 16.1 kg	0 ... 32.1 kg
Repeatability (at nominal load)	sd	80 mg	80 mg
Linearity deviation		200 mg	300 mg
Eccentricity deviation (test load)		300 mg (5 kg)	300 mg (10 kg)
Sensitivity offset (test weight)		800 mg (16 kg)	960 mg (32 kg)
Sensitivity temperature drift ¹⁾		0.0015%/°C	0.001%/°C
Sensitivity stability		0.005%/a	0.003%/a
Typical values			
Repeatability	sd	40 mg	40 mg
Linearity deviation		130 mg	200 mg
Eccentric deviation (test load)		200 mg (5 kg)	200 mg (10 kg)
Sensitivity offset (test load)		260 mg (16 kg)	320 mg (32 kg)
Minimum sample weight (according to USP)		120 g	120 g
Minimum sample weight (U=1%, k=2)		8 g	8 g
Settling time		1.5 s	1.5 s
Dimensions			
Balance dimensions (WxDxH)		360x404x130 mm	360x404x130 mm
Weighing pan dimensions		360x280 mm (WxD)	360x280 mm (WxD)
Typical uncertainties and supplementary data			
Repeatability	sd	40mg+0.00012%·Rgr	40mg+0.00006%·Rgr
Differential linearity deviation	sd	$\sqrt{(250\text{ng}\cdot\text{Rnt})}$	$\sqrt{(300\text{ng}\cdot\text{Rnt})}$
Differential eccentric load deviation	sd	0.002%·Rnt	0.001%·Rnt
Sensitivity offset	sd	0.0008%·Rnt	0.0005%·Rnt

	XA16001L	XA32001L
Minimum sample weight (according to USP)	$120g + 0.36\% \cdot Rgr$	$120g + 0.18\% \cdot Rgr$
Minimum sample weight ($U=1\%$, $k=2$)	$8g + 0.024\% \cdot Rgr$	$8g + 0.012\% \cdot Rgr$
Interface update rate	23 /s	23 /s
Weight of balance	12.4 kg	12.4 kg
Number of built-in reference weights	2	2
Weights for routine testing		
OIML Single Weights	500 g F2	1000 g F2
Small	#11118203	#11118204
OIML Single Weights	10000 g F2	20000 g F2
Large	#11118211	#11118212

sd = Standard deviation

Rnt = Net weight (sample weight)

Rgr = Gross weight

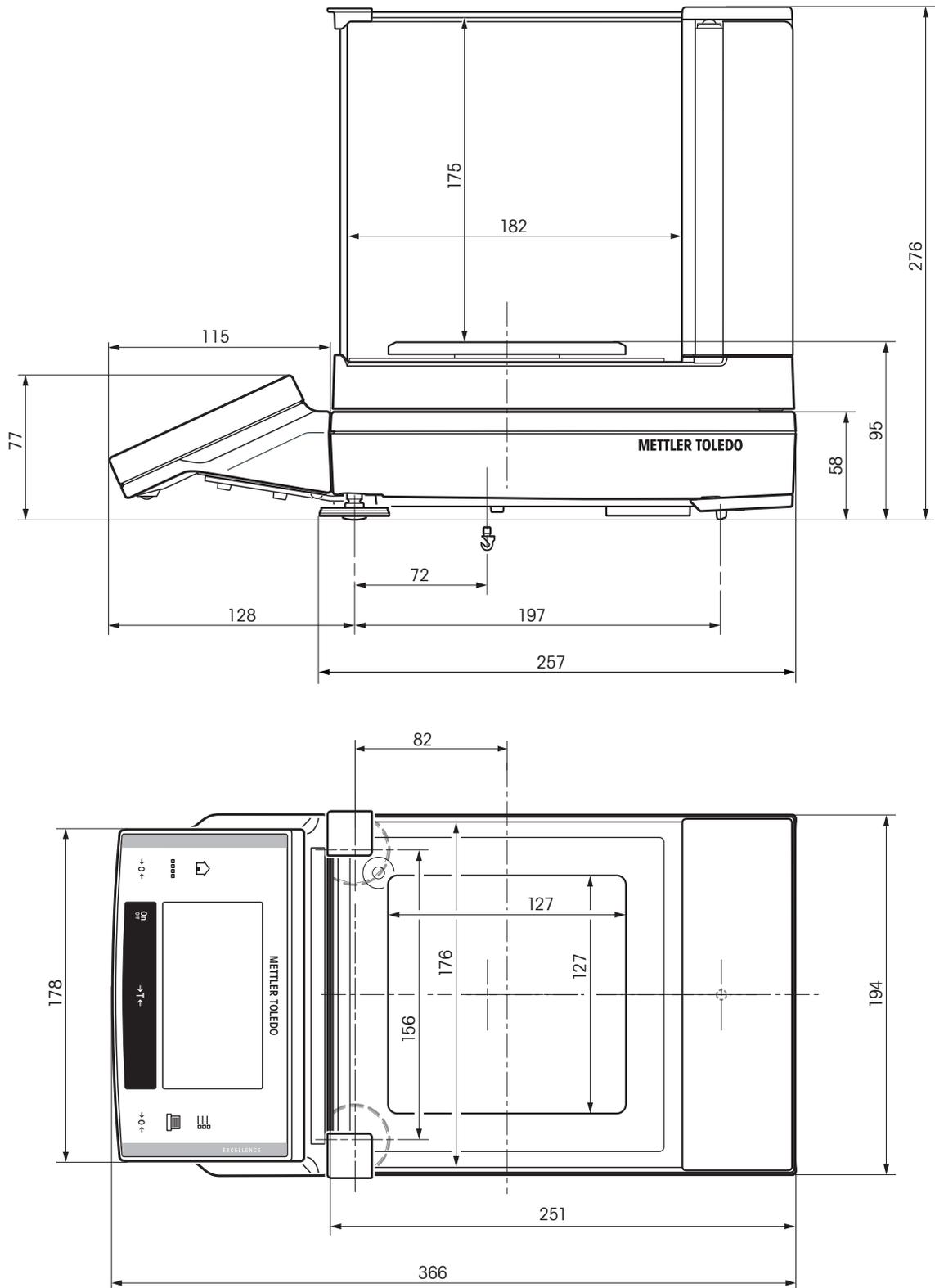
a = Year (annum)

1) In the temperature range 10...30 °C

6.5 Dimensions

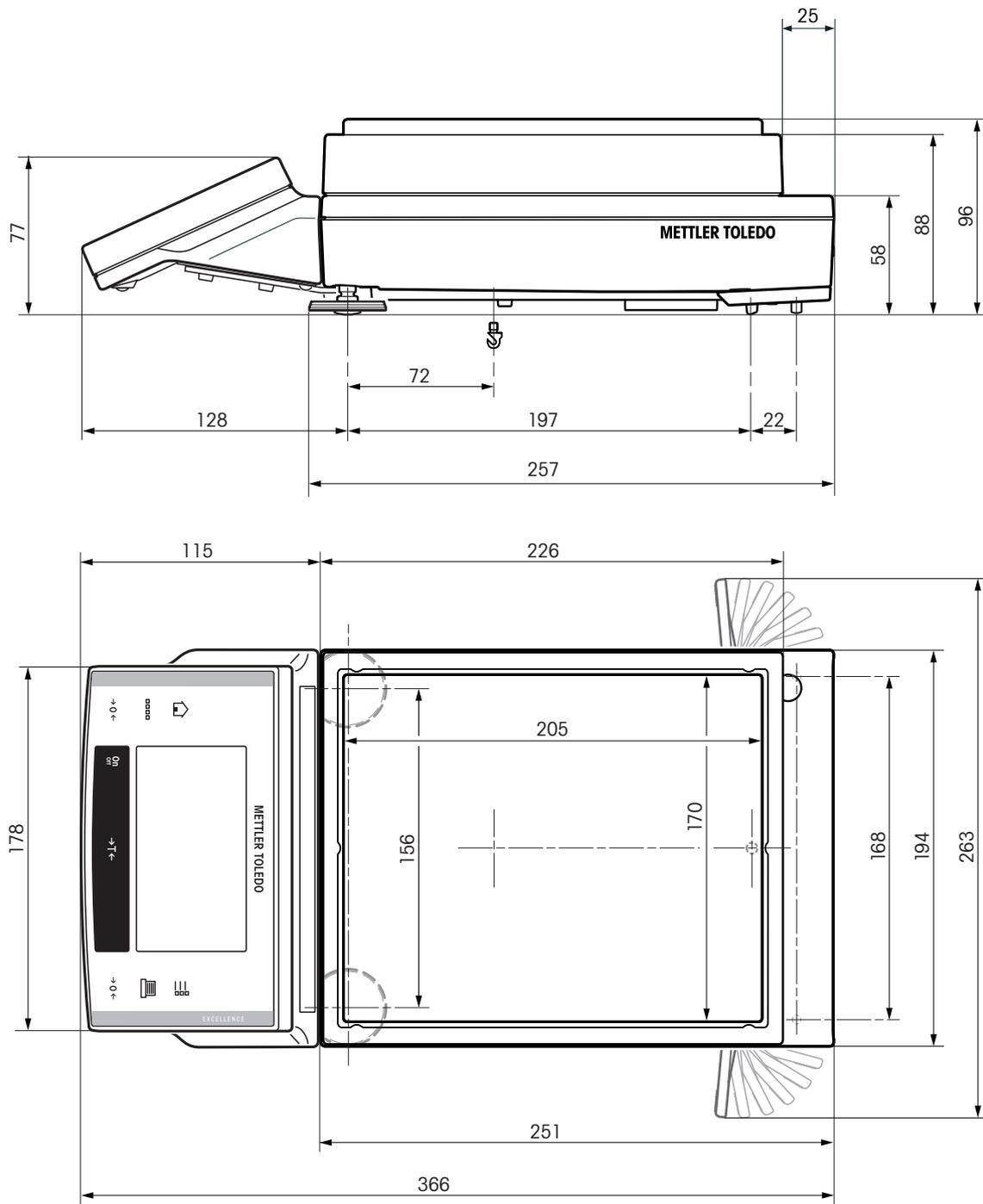
Dimensions in mm.

6.5.1 Balances with Readability of 1 mg, "S" Platform with Draft Shield



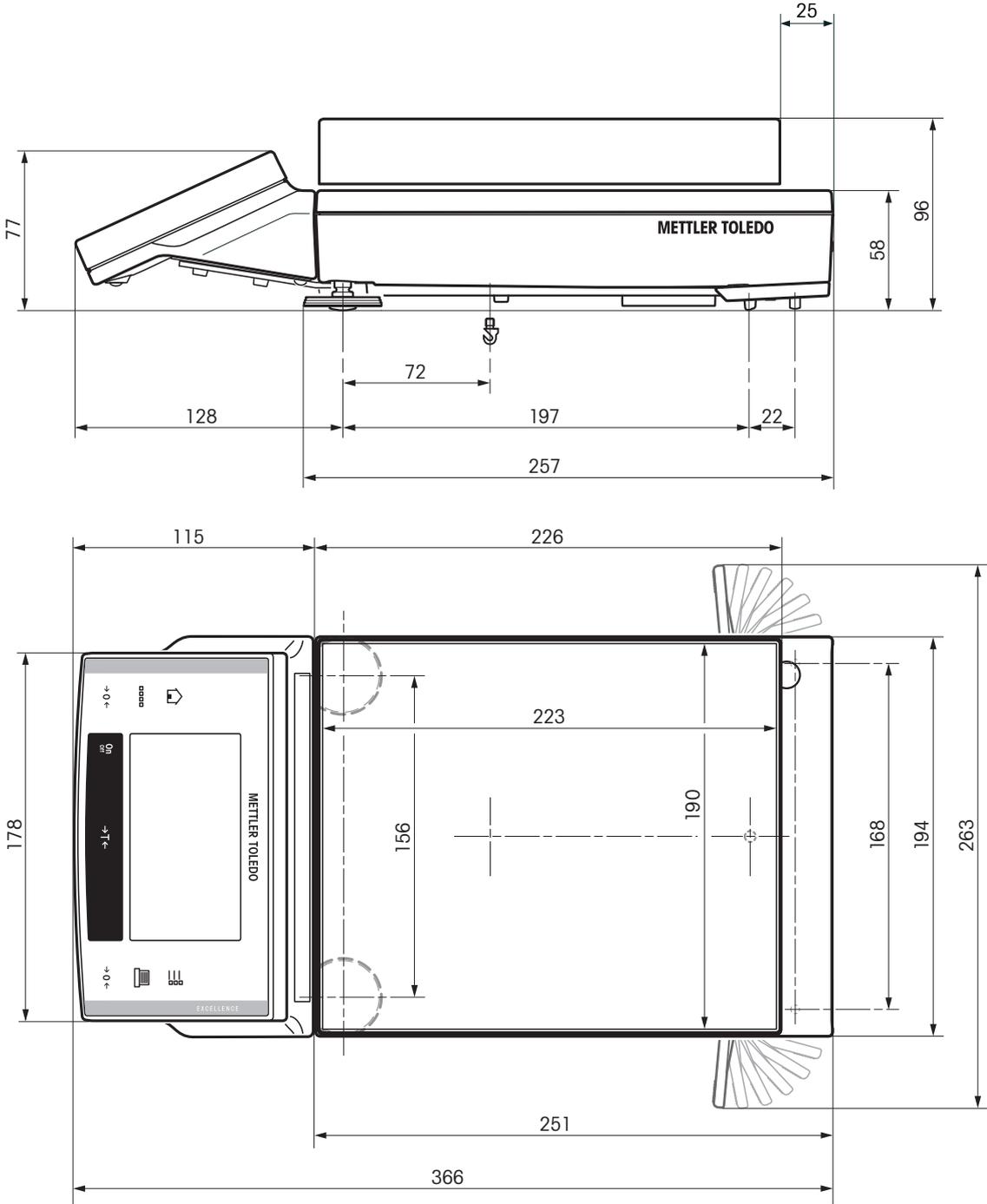
Models: XA303S, XA503S

6.5.2 Balances with Readability of 10 mg, "S" Platform with Draft Shield Element



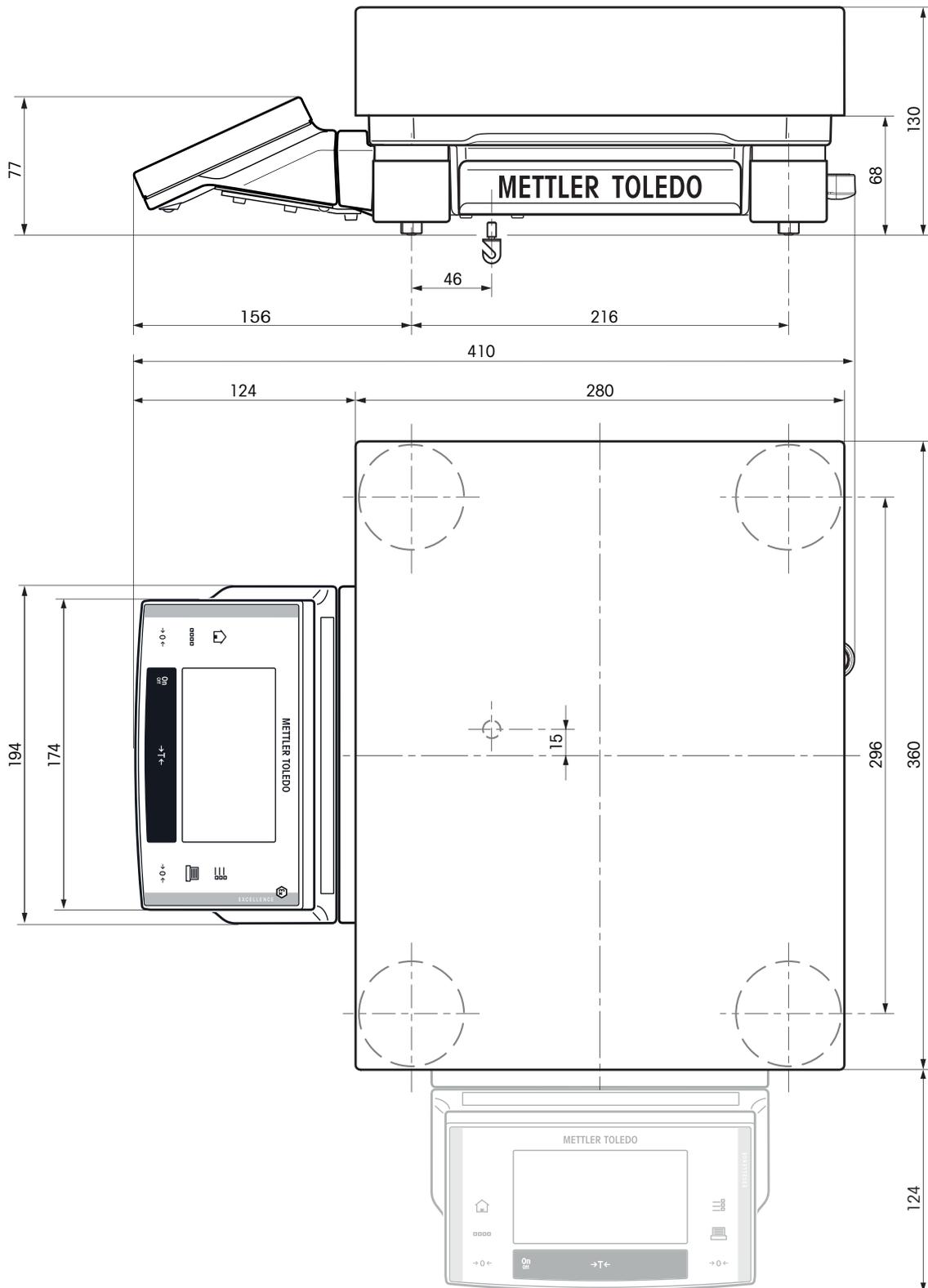
Models: XA1502S, XA3002S, XA5002S

6.5.3 Balances with Readability of 0.1 g, "S" Platform



Models: XA3001S

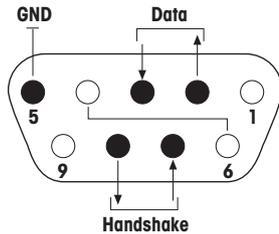
6.5.4 Balances with Readability of 0.1 g, "L" Platform



Models: XA16001L, XA32001L

6.6 Interfaces

6.6.1 Specifications of RS232C

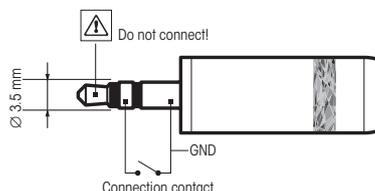
Interface type:	Voltage interface according to EIA RS-232C/DIN 66020 (CCITT V24/V.28)	
Max. cable length:	15 m	
Signal level:	Outputs: +5 V ... +15 V (RL = 3 – 7 kΩ) –5 V ... –15 V (RL = 3 – 7 kΩ)	Inputs: +3 V ... 25 V –3 V ... 25 V
Connector:	Sub-D, 9-pole, female	
Operating mode:	Full duplex	
Transmission mode:	Bit-serial, asynchronous	
Transmission code:	ASCII	
Baud rates:	600, 1200, 2400, 4800, 9600, 19200, 384001) (firmware selectable)	
Bits/parity:	7-bit/even, 7-bit/odd, 7-bit/none, 8-bit/none (firmware selectable)	
Stop bits:	1 stop bit	
Handshake:	None, XON/XOFF, RTS/CTS (firmware selectable)	
End-of-line:	<CR><LF>, <CR>, <LF> (firmware selectable)	
	Pin 2: Balance transmit line (TxD) Pin 3: Balance receive line (RxD) Pin 5: Ground signal (GND) Pin 7: Clear to send (hardware handshake) (CTS) Pin 8: Request to send (hardware handshake) (RTS)	

6.6.2 Specifications of "Aux" Connection

You can connect the METTLER TOLEDO "ErgoSens" or an external switch to sockets "Aux 1" and "Aux 2". This allows you to start functions such as taring, zeroing, printing and others.

External connection

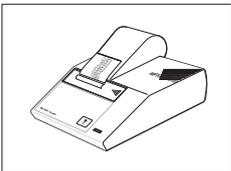
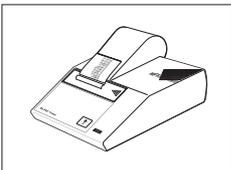
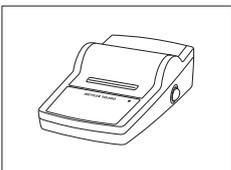
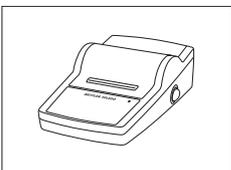
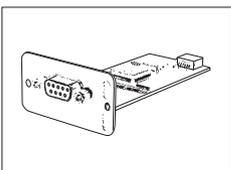
Connector:	3.5 mm stereo jack connector	
Electrical data:	Max. voltage	12 V
	Max. current	150 mA



7 Accessories and Spare Parts

7.1 Accessories

You can increase the functionality of your balance with accessories from the METTLER TOLEDO range. The following options are available:

	Description	Part No.
Printers		
	BT-P42 printer with Bluetooth connection to instrument	11132540
	Paper roll, set of 5 pcs	00072456
	Paper roll, self-adhesive, set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975
	RS-P42 printer with RS232C connection to instrument	00229265
	Paper roll, set of 5 pcs	00072456
	Paper roll, self-adhesive, set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975
	RS-P25 printer with RS232C connection to instrument	11124300
	Paper roll, set of 5 pcs	00072456
	Paper roll, self-adhesive, set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975
	RS-P26 printer with RS232C connection to instrument (with date and time)	11124303
	Paper roll, set of 5 pcs	00072456
	Paper roll, self-adhesive, set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975
	LC-P45 application printer with additional functions	00229119
	Paper roll, set of 5 pcs	00072456
	Paper roll, self-adhesive, set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975
Optional interfaces		
	Second RS232C Interface	11132500



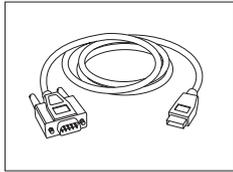
BT option: Bluetooth Interface for multipoint connection for up to 6 Bluetooth devices

11132530



BTS option: Bluetooth Interface, single-point connection

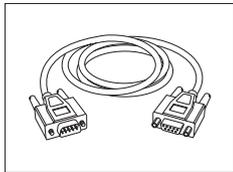
11132535



RS232 - USB converter cable – Cable with converter to connect a balance (RS232) to a USB port

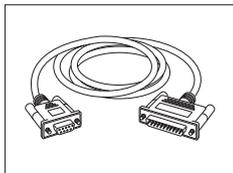
64088427

Cables for RS232C interface



RS9 – RS9 (m/f): connection cable for PC, length = 1 m

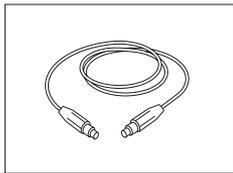
11101051



RS9 – RS25 (m/f): connection cable for PC, length = 1 m

11101052

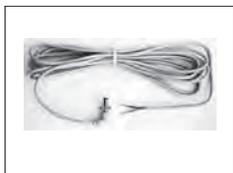
Cables for Terminal



Terminal extension cable, length = 4.5 m

11600517

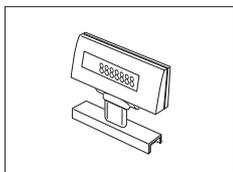
Cable, one-sided open (2-pin)



Cable between balance and AC adapter, length = 4 m

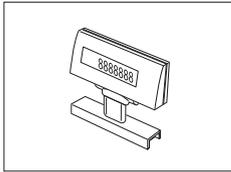
11132037

Auxiliary displays



BT-BLD Bluetooth auxiliary display for table mounting, 168 mm, LCD display with backlighting

11132555



LC/RS-BLD auxiliary display on bench stand, backlit (incl. RS cable and separate AC adapter)

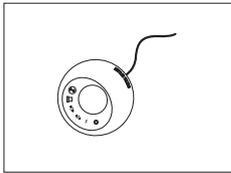
00224200



RS/LC-BLDS auxiliary display for table or balance mounting, 480 mm, LCD display with backlighting

11132630

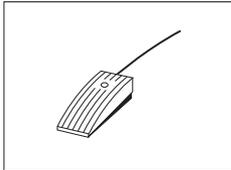
Sensors



ErgoSens, optical sensor for hands-free operation

11132601

Footswitches



Footswitch with selectable function for balances (Aux 1, Aux 2)

11106741

Filling-Process Control



LV11 automatic feeder for automatic loading of small items on the balance

21900608

Draft shield door for "Pro" Draft shield with opening for LV11

11132711

SQC14 filling process control

Compact instrument with printer for control of up to 16 articles

00236210

Compact instrument with printer for control of up to 60 articles

00236211

Universal AntiStatic Kit



Universal antistatic kit complete U-shaped, including electrode and power supply

11107767

Optional: Second U-electrode*

11107764

Optional: Point-electrode*

11107765

* Power supply for optional, second U-elektrode

11107766

11107764, or for optional point-electrode
11107765

ErgoClips



ErgoClip Sieve-S for 0.1 g models, "S" platform

30039096



ErgoClip Sieve-L for "L" platform

30005760

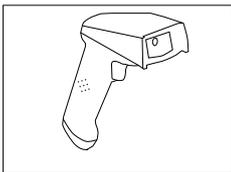
Anti-theft devices



Steel cable

11600361

Barcode Reader



RS232C Barcode Reader

21901297

The following accessories are needed for operation (not included):

RS232 F cable 21901305

Null modem adapter 21900924

Plus one of the following:

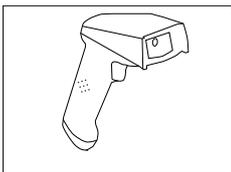
AC adapter 5 V for EU 21901370

AC adapter 5 V for US 21901372

AC adapter 5 V for GB 21901371

AC adapter 5 V for AU 21901370

+ 71209966



RS232C Barcode Reader – Cordless

21901299

The following accessories are needed for operation (not included):

Cradle 21901300

RS232 F cable 21901305

Null modem adapter 21900924

Plus one of the following:

AC adapter 12 V for EU 21901373

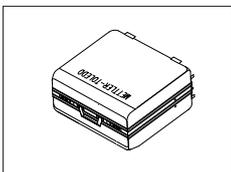
AC adapter 12 V for US 21901375

AC adapter 12 V for GB 21901374

AC adapter 12 V for AU 21901373

+ 71209966

Transport Cases



Transport case for precision balances for 10 mg and 0.1 g models, "S" platform

11132595

Protective Covers



Protective cover for terminal, "S" platform

11106870



Protective cover for terminal, "L" platform

11132573



Protective cover for weighing platform for 10 mg / 0.1 g models, "S" platform

11133034



Protective cover for balance with "S" platform 10 mg / 0.1 g models

11132571



Protective cover for weighing pan with draft shield element for 10 mg models, "S" platform

30034950



Protective cover for weighing pan for 0.1 g models, "S" platform

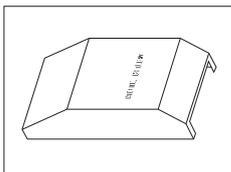
30034949



Protective cover for weighing pan, "L" platform

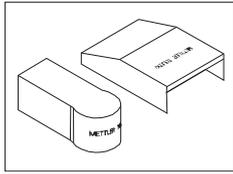
30034951

Dust covers



Dust cover for 0.1 g models, "S" platform

30035839



Dust cover

30038799

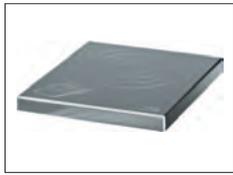
Production Certificate



Production Certificate "PRO"

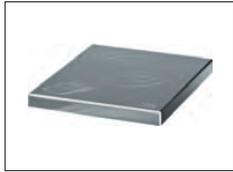
11106895

Weighing pans



MPS (Magnetic Protection Shield) weighing pan for 0.1 g models 190 x 223 mm, "S" platform

11132625



MPS (Magnetic Protection Shield) weighing pan for 10 mg models 170 x 205 mm, "S" platform

11132626



Weighing pan 190 x 223 mm, incl. pan support, "S" platform

11132655



Weighing pan 170 x 205 mm, incl. pan support and draft shield element, "S" platform

11132660

Draft shields



"Pro" Draft shield glass free for 1 mg models (food industry), usable height 248 mm, "S" platform

11131652



"Pro" Draft shield for 1 mg models, usable height 248 mm, "S" platform

11131651



"MagicCube" Draft shield glass free for 1 mg models, usable height 175 mm, "S" platform

11131650



Simple Draft shield glass free for 0.1 g and 10 mg models, usable height 175 mm, "S" platform
For 0.1 g model the weighing pan set must be ordered additionally

11131653

11132660



Draft shield to cover the entire balance "XP-W12"
300 x 450 x 450 mm (W x D x H), "S" platform

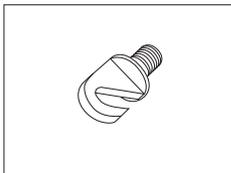
11134430



Draft shield to cover the entire balance "XP-W64"
550 x 470 x 580 mm (W x D x H), "L" platform

11134470

Weighing Below the Balance



Hook for Platform L

11132565

Various



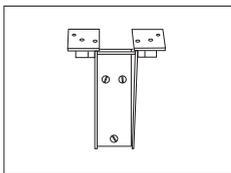
Terminal stand for placement of the terminal 30 cm above the weighing pan, "S" platform

11132636



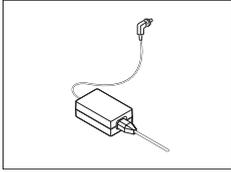
Terminal stand for placement of the terminal 30 cm above the weighing pan, "L" platform

11132653



Wall fixture for terminal

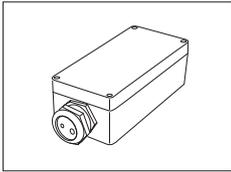
11132665



AC/DC adapter (without power cable) 100–240 VAC,
50/60 Hz, 0.3 A, 12 VDC 2.25 A

11107909

Power cable CH	00087920
Power cable EU	00087925
Power cable US	00088668
Power cable IT	00087457
Power cable DK	00087452
Power cable GB	00089405
Power cable AU	00088751
Power cable ZA	00089728
Power cable BR	30015268
Power cable JL	00225297
Power cable IN	11600569
Power cable JP	11107881
Power cable TH, PE	11107880

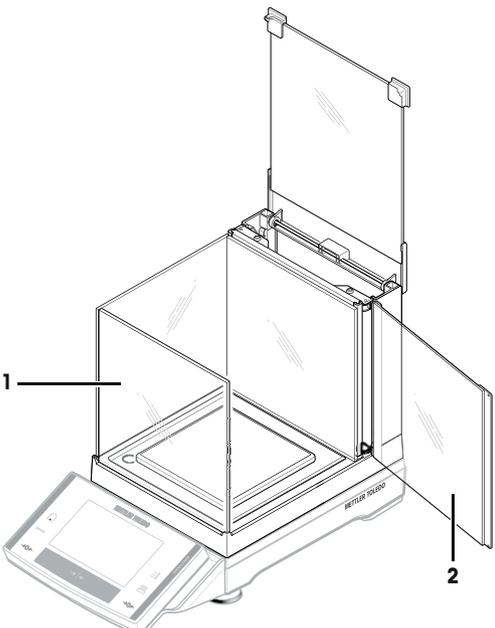


IP54 protective housing for AC adapter

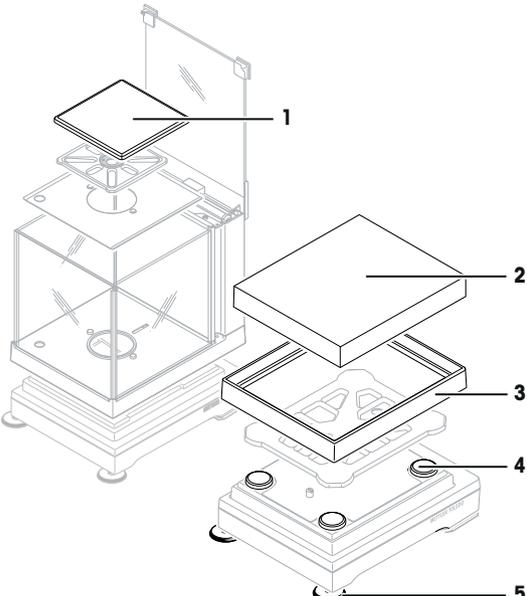
11132550

7.2 Spare Parts

Draft Shield, "Magic Cube"

	Pos	Description	Part No.
	1	U-Glass	11133035
	2	Side door	11133037

Various

	Pos	Description	Part No.	
	Weighing pans, "S" platform			
	1	1 mg	Weighing pan 127 x 127 mm	11131022
	2	10 mg	Weighing pan 170 x 205 mm	11131030
	3	10 mg	Draft shield element	11131040
	4	0.1 g	Weighing pan 190 x 223 mm	11131031
	Weighing pans, "L" platform			
	2		Weighing pan 280 x 360 mm	00239105
	Various			
	4	≥ 10 mg	Pan support, "S" platform	11131029
	4		Pan support, "L" platform	00239104
5		Foot screw, "S" platform	11106323	

Packaging

	Pos	Description	Part No.
	"S" balances, Type XAxx3S (1 mg)		
		Packaging	11133053
		Export box	11132834
		Packaging Draft shield	11133049
		Export carton Draft shield	11132824
	"S" balances, Type XAxx2S (10 mg)		
		Packaging	11133050
		Export box	11132839
	"S" balances, Type XAxx1S (0.1 g)		
		Packaging	11133051
		Export box	11132839
	"L" balances, Type XAxxxxL		
		Packaging	11133057
		Export box	11132912

8 Appendix

8.1 MT-SICS Interface Commands and Functions

Many of the instruments and balances used have to be capable of integration in a complex computer or data acquisition system.

To enable you to integrate balances in your system in a simple manner and utilize their capabilities to the full, most balance functions are also available as appropriate commands via the data interface.

All new METTLER TOLEDO balances launched on the market support the standardized command set "METTLER TOLEDO Standard Interface Command Set" (MT-SICS). The commands available depending on the functionality of the balance.

For further information please refer to the Reference Manual MT-SICS downloadable from the Internet under

► www.mt.com/xa-precision

8.2 Procedure for Certified Balances

Preface

Certified balances are subject to the national, legal requirements of "non-automatic balances".

Switching on the balance

- **Switching on**
 - Immediately after being switched on, the balance displays 0.000.. g.
 - The balance is always started up with the "Factory setting" unit.
- **Switch-on range**
 - At maximum 20% of the type load, otherwise overload is displayed (OIML R76 4.5.1).
- **Stored value as switch-on zero point**
 - It is not permissible to use a stored value as a switch-on zero point; the MT-SICS M35 command is not available (OIML R76 T.5.2).

Display

- **Display of the weight value**
 - The "e" certification value is always shown in the display and is specified at the model designation plate (OIML R76 T.3.2.3 and 7.1.4).
 - If the display increment is lower than the "e" certification value, this is variably displayed for the net, gross and weighed tare. (Graying of the digits or certification brackets) (OIML R76 T.2.5.4 and 3.4.1).
- In accordance with guidelines, the tested display increment (certification value) is never lower than 1 mg (OIML R76 T.3.4.2).
- At balances with $d = 0.1$ mg, the digits below 1 mg are displayed in gray. These digits in brackets are printed. In accordance with legal metrology requirements, this illustration does not affect the accuracy of the weighing results.
- **Units of measurement**
 - The display and info unit are firmly set to g or mg (depending on the model).
 - The following applies for the "Custom unit":
 - No certification brackets.
 - The following names are blocked, this applies to upper and lower case letters.
 - All official units (g, kg, ct etc.).
 - c, ca, car, cm, crt, cart, kt, gr, gra, gram, grm, k, kilo, to, ton.
 - All names with "o" which can be replaced by a zero (Oz, Ozt etc.).

- **Identification of the weight display**

- Gross, net, tare and other weight values are accordingly marked (OIML R76 4.6.5).
 - Net for net when a tare value has been used.
 - B or G for gross.
 - T for the weighed tare.
 - PT for the specified tare.
 - * or diff for the difference between the net or gross.

- **Info field**

- The info weight value is handled metrologically in the same way as the weight value in the main display.

Printout (OIML R76 4.6.11)

- If a tare value is entered manually (PreTare), the PreTare value is always printed along with the net value (PT 123.45 g).
- The printed weight values are identified in the same way as the weight value on the display. I.e. N, B or G, T, PT, diff or *, with differentiation.

Example:

Single-range balance.

N	123.4[5] g
PT	10.00 g → for PreTare
G	133.4[5] g

DR balance with 100.00 g fine range.

N	80.4[0] g
T	22.5[6] g → for weighed tare
G	102.9[] g

Balance functions

- **Reset to zero**

- The zero range is limited to a maximum of $\pm 2\%$ of the full load (OIML R76 4.5.1).

- **Tare**

- No negative tare values are permitted.
- Tare immediate (TI) is not permitted, the MT-SICS `TI` command is not available (OIML R76 4.6.4).

- **1/xd**

- **e = d**

The 1/xd switchover is not permitted (OIML R76 3.1.2).

- **e = 10d**

This is only permitted in the case of the 1/10d switchover.

- **e = 100d**

Only the 1/10d and 1/100d switchover are permitted.

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GWP® – Good Weighing Practice™

The global weighing guideline GWP® reduces risks associated with your weighing processes and helps to

- choose the appropriate balance
- reduce costs by optimizing testing procedures
- comply with the most common regulatory requirements

► www.mt.com/GWP

www.mt.com/excellence

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Subject to technical changes.

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