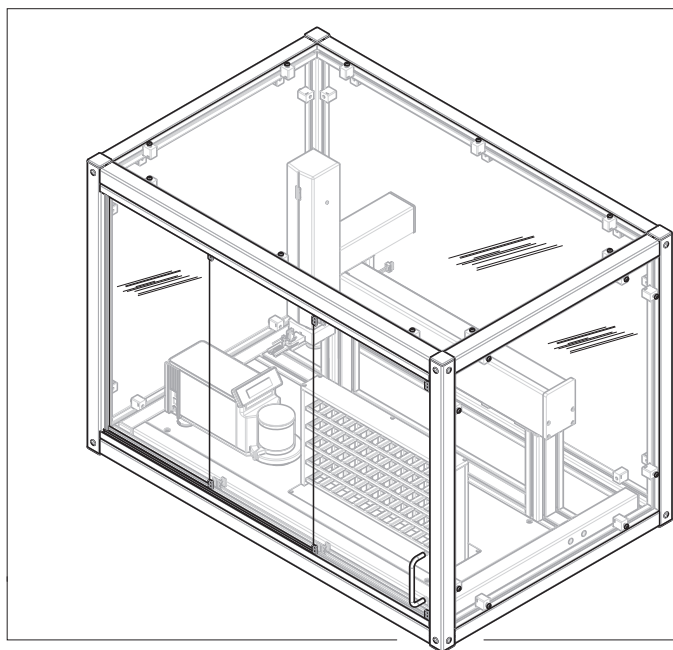


English
简体中文

User Manual **Robotic Mass Comparator e10**

用户手册 **机器人质量比较器 e10**



METTLER TOLEDO

en



This User Manual provides brief instructions about the first steps to take with the instrument. This ensures safe and efficient handling. Personnel must have carefully read and understood this manual before performing any task.

For full information, always refer to the Reference Manual (RM).

▶ www.mt.com/e10-RM

zh



本《用户手册》提供了关于使用该仪器的第一步的简要说明。这样可确保安全与高效的
操作。操作人员在执行任何任务之前必须仔细阅读并理解本手册。

有关完整信息，请查阅《参考手册（RM）》。

▶ www.mt.com/e10-RM

User Manual **Robotic Mass Comparator**

English

用户手册 **机器人质量比较器**

简体中文

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1 Introduction

Thank you for choosing a METTLER TOLEDO instrument. The instrument combines high performance with ease of use.

Disclaimer for comparators

In this document, the term "balance" is used to describe comparators.

Comparators are characterized by their higher resolution compared to balances. They are mainly used for differential weighing applications, such as the calibration of standard weights. Beside standard balance tests, comparators have also been tested with differential repeatability (ABA repeatability) during production.

EULA

The software in this product is licensed under the METTLER TOLEDO End User License Agreement (EULA) for Software.

When using this product you agree to the terms of the EULA.

▶ www.mt.com/EULA

1.1 Further documents and information

This document is available in other languages online.

Product page:

▶ <http://www.mt.com/lab-robotic-MC>

Instructions for cleaning a balance, "8 Steps to a Clean Balance":

▶ www.mt.com/lab-cleaning-guide

Search for documents:

▶ www.mt.com/library

For further questions, please contact your authorized METTLER TOLEDO dealer or service representative.

▶ www.mt.com/contact

1.2 Acronyms and abbreviations

Original term	Explanation
AC	Alternating Current
ASTM	American Society for Testing and Materials
DC	Direct Current
EMC	Electromagnetic Compatibility
FACT	Fully automatic time- and temperature-controlled internal adjustment
FCC	Federal Communications Commission
GWP	Good Weighing Practice
ID	Identification
NA	Not Applicable
OIML	Organisation Internationale de Métrologie Légale (International Organization of Legal Metrology)
RM	Reference Manual
SELV	Safety Extra Low Voltage
SOP	Standard Operating Procedure
UM	User Manual
USB	Universal Serial Bus

2 Safety Information

Two documents named "User Manual" and "Reference Manual" are available for this instrument.

- The User Manual is printed and delivered with the instrument.

- The electronic Reference Manual contains a full description of the instrument and its use.
- Keep both documents for future reference.
- Include both documents if you transfer the instrument to other parties.

Only use the instrument according to the User Manual and the Reference Manual. If you do not use the instrument according to these documents or if the instrument is modified, the safety of the instrument may be impaired and Mettler-Toledo GmbH assumes no liability.

2.1 Definition of signal words and warning symbols

Safety notes contain important information on safety issues. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results. Safety notes are marked with the following signal words and warning symbols:

Signal words

DANGER	A hazardous situation with high risk, resulting in death or severe injury if not avoided.
WARNING	A hazardous situation with medium risk, possibly resulting in death or severe injury if not avoided.
CAUTION	A hazardous situation with low risk, resulting in minor or moderate injury if not avoided.
NOTICE	A hazardous situation with low risk, resulting in damage to the instrument, other material damage, malfunctions and erroneous results, or loss of data.

Warning symbols



General hazard



Heavy object



Bruising



Notice

2.2 Product-specific safety notes

Intended use

This instrument is designed to be used by trained staff. The automated mass comparator is intended for measuring calibration weights using direct comparison or down-/upward calibration.

Any other type of use and operation beyond the limits of use stated by Mettler-Toledo GmbH without consent from Mettler-Toledo GmbH is considered as not intended.

Responsibilities of the instrument owner

The instrument owner is the person holding the legal title to the instrument and who uses the instrument or authorizes any person to use it, or the person who is deemed by law to be the operator of the instrument. The instrument owner is responsible for the safety of all users of the instrument and third parties.

Mettler-Toledo GmbH assumes that the instrument owner trains users to safely use the instrument in their workplace and deal with potential hazards. Mettler-Toledo GmbH assumes that the instrument owner provides the necessary protective gear.

Safety notes



⚠ WARNING

Death or serious injury due to electric shock

Contact with parts that carry a live current can lead to death or injury.

- 1 Only use the METTLER TOLEDO power cable and AC/DC adapter designed for your instrument.
- 2 Connect the power cable to a grounded power outlet.
- 3 Keep all electrical cables and connections away from liquids and moisture.
- 4 Check the cables and the power plug for damage and replace them if damaged.



⚠ WARNING

Injury from lifting heavy objects

The instrument weighs more than what should be lifted by a single person.

- Do not move or lift this equipment without assistance.



NOTICE

Damage to the instrument due to incorrect installation or incorrect repair

- 1 Installation and repairs must be carried out by specially trained METTLER TOLEDO personnel.
- 2 Do not open the balance, the control unit, or the robot system.



NOTICE

Damage to the instrument or malfunction due to the use of unsuitable parts

- Only use parts from METTLER TOLEDO that are intended to be used with your instrument.

2.3 Warning symbols on the robot arm

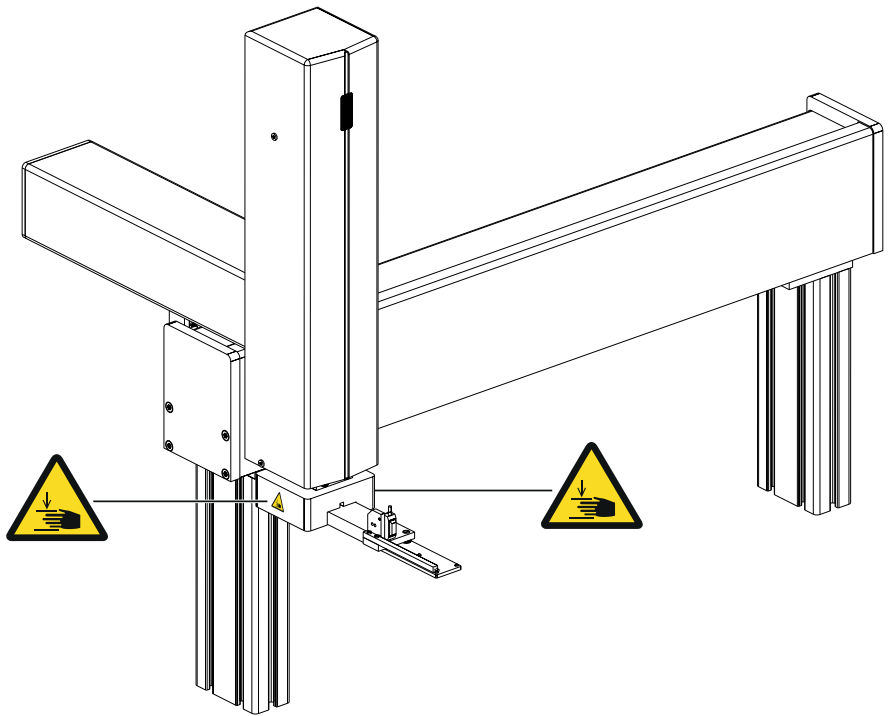


⚠ CAUTION

Injury due to moving parts

The robot arm may move unexpectedly.

- Do not reach into the working area while parts of the instrument are moving.



2.4 Switching off in case of an emergency

- 1 Unplug the power cable to switch off the instrument.
- 2 Contact your METTLER TOLEDO representative.

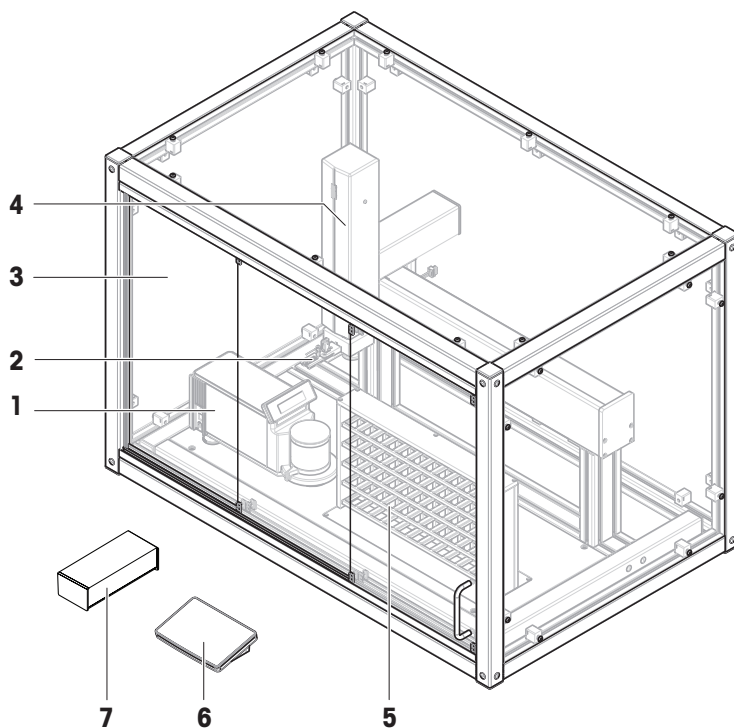
3 Design and Function



For further information, consult the Reference Manual (RM).

► www.mt.com/e10-RM

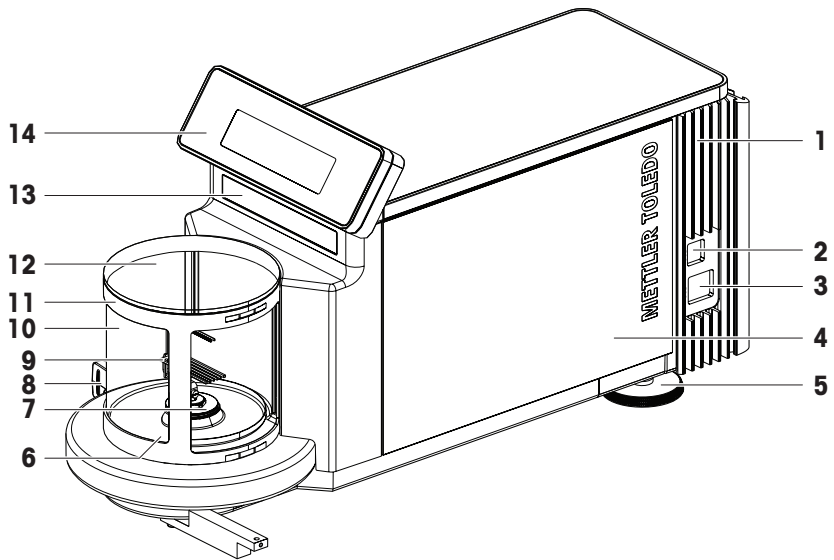
3.1 Overview instrument



1	Balance (XPR10U mass comparator)	5	Weight magazine, with weight carriers (60 pcs)
2	Robot hand, with light barrier	6	Terminal for balance
3	Weighing chamber, with sliding door	7	Control unit for robot system
4	Robot system (3 axes)		

3.2 Components description

3.2.1 Overview XPR10U balance



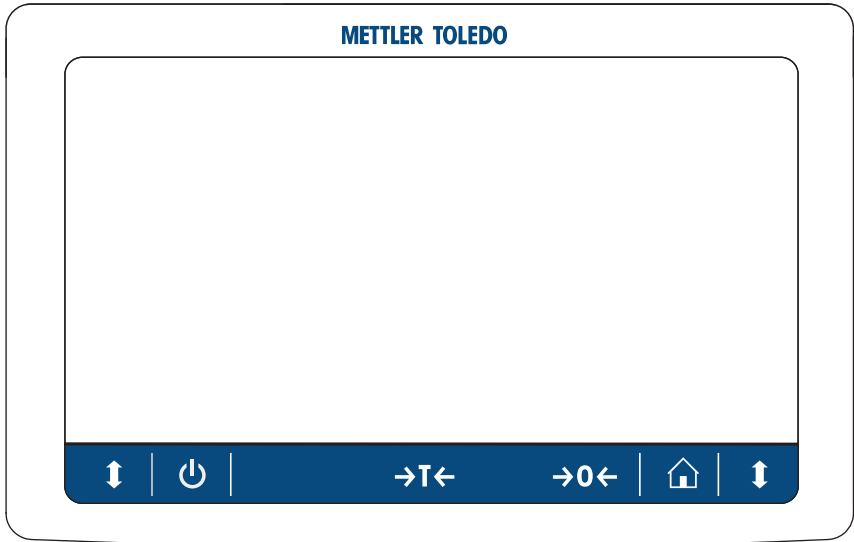
1	Cooling element	8	Door handle
2	USB-B port (to host)	9	Weighing pan
3	USB-A ports (to device)	10	Weighing chamber
4	Weighing unit	11	Draft shield
5	Leveling foot	12	Draft shield cover
6	Weighing chamber plate	13	Model plate
7	Drip tray	14	Weighing display (SmartView)








For further information, consult the Reference Manual (RM).

► www.mt.com/XPR-micro-RM

3.2.2 Overview terminal

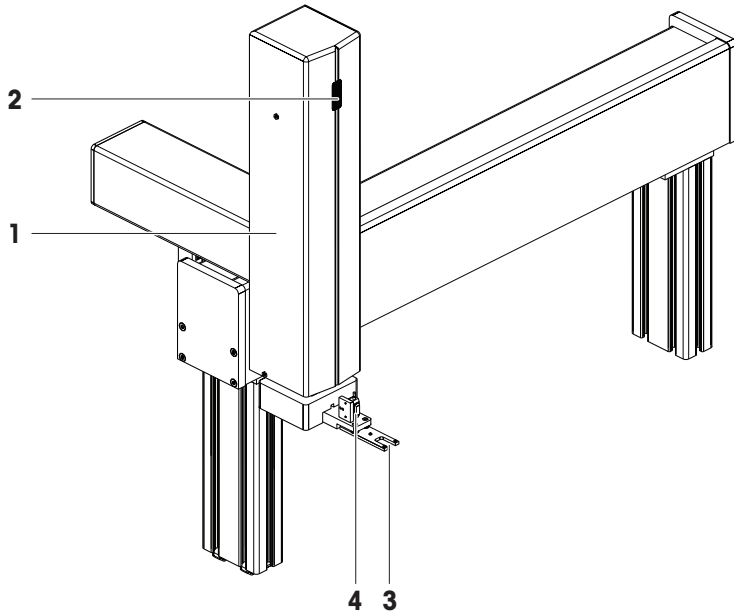


	Standby		Tare
	Home screen		Zero
	Open/close door		

 **Note**

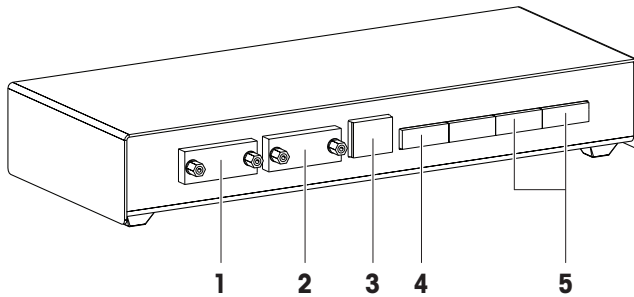
No changes must be made on the terminal of the balance. During weighing, the terminal of the balance is disabled.

3.2.3 Overview robot system



1	Robot arm	3	Robot hand
2	Status indicator	4	Light barrier

3.2.4 Overview control unit



1	RS232C serial port (to balance)	4	Socket for interface cable to robot system
2	RS232C serial port (to computer)	5	Socket for AC/DC adapter
3	Ethernet port		

3.2.5 Control software

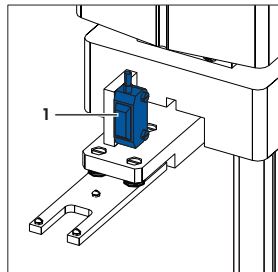
e10control is a software that serves to operate the instrument. It displays measuring results and other data, and it serves to manage the instrument settings.

The software is installed on a computer provided by METTLER TOLEDO.

3.3 Sensors and status indicator

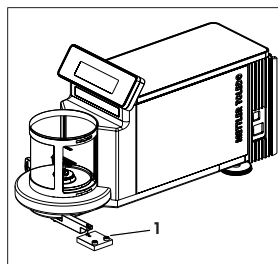
Light barrier

The light barrier (1) checks the weight carrier before each measurement. It is located on the robot hand. If an unsuitable weight carrier is detected, the measuring process stops.



Balance position sensor

The balance position sensor (1) monitors the position of the balance. The exact position is defined during the installation of the instrument. Do not change the position of the balance, for example, during cleaning. In the event of a position error, contact a METTLER TOLEDO representative.



Status indicator

The robot system is equipped with a status indicator. It indicates whether the robot system is switched off or switched on.

Status indicator	Description
	<p>Status indicator is off</p> <ul style="list-style-type: none"> • The robot system is switched off. • The robot arm does not move automatically.
	<p>Status indicator is on</p> <ul style="list-style-type: none"> • The robot system is switched on. • The robot arm can move automatically. <p>– ⚠ CAUTION: When the status indicator is on, the robot arm can move unexpectedly. Do not reach into the working area while parts of the instrument are moving.</p>

4 Installation and Putting into Operation

4.1 Selecting the location

A balance is a sensitive precision instrument. The location where it is placed will have a profound effect on the accuracy of the weighing results.

Requirements of the location

Place indoors on stable table

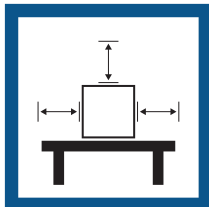
Ensure sufficient spacing

Level the instrument

Provide adequate lighting table



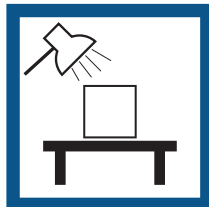
Avoid direct sunlight



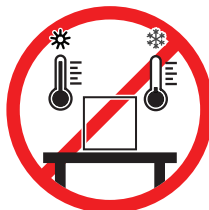
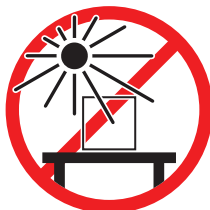
Avoid vibrations



Avoid strong drafts



Avoid temperature fluctuations



Sufficient spacing: > 30 cm all around the instrument

Note

Place the computer on a separate table to avoid interferences due to vibrations.

Take into account the environmental conditions. See "Technical Data".

4.2 Scope of delivery

Instrument and accessories

- Robot system
- Balance (XPR10U micro comparator)
- Draft shield
- Weight magazine (60 positions)
- Weight carrier, design 1, 30 pcs
- Weight carrier, design 2, 12 pcs
- Weight carrier, design 3, 12 pcs
- Weight carrier, design 4, 6 pcs
- Tweezers, for weights of 1 mg to 50 g
- Tweezers, for weights of 1 g to 200 g
- Air bellow

Instrument control

- Computer
- **e10control** software

Documentation

- User Manual
- Declaration of Conformity
- Production certificate

4.3 Installation




NOTICE

Damage to the instrument and property due to incorrect installation

Incorrect installation and commissioning can lead to damage of the instrument and property.

- Installation and commissioning must be carried out by METTLER TOLEDO specialists or authorized personnel.

See also

 Product-specific safety notes ▶ Page 4

4.4 Putting into operation

After switching on the instrument, it must warm up before giving accurate results.

See also

 General data ▶ Page 23

4.4.1 Connecting the instrument



⚠ WARNING

Death or serious injury due to electric shock

Contact with parts that carry a live current can lead to death or injury.

- 1 Only use the METTLER TOLEDO power cable and AC/DC adapter designed for your instrument.
- 2 Connect the power cable to a grounded power outlet.
- 3 Keep all electrical cables and connections away from liquids and moisture.
- 4 Check the cables and the power plug for damage and replace them if damaged.



NOTICE

Damage to the AC/DC adapter due to overheating

If the AC/DC adapter is covered or in a container, it is not sufficiently cooled and will overheat.

- 1 Do not cover the AC/DC adapter.
- 2 Do not put the AC/DC adapter in a container.



NOTICE

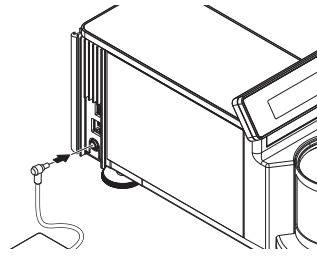
Damage to the balance during startup due to weight carriers or weights

If the robot hand or the balance are equipped with a weight carrier or a weight during the startup procedure, the balance can get damaged.

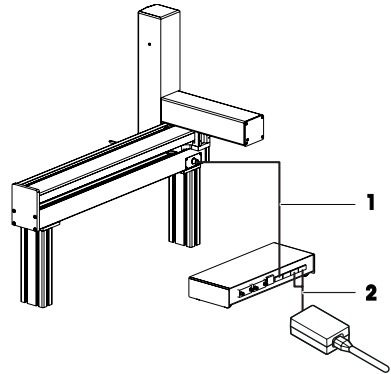
- Remove weight carriers and weights from the robot hand and the balance before switching on the instrument.

- The instrument is installed by the manufacturer.
 - The instrument is not yet connected to the power supply.
 - The robot hand and the weighing pan of the balance are free of weight carriers or weights.
- 1 Install the cables in such a way that they cannot be damaged or interfere with operation.

- 2 Insert the plug of the AC/DC adapter in the power inlet of the balance.
- 3 Secure the plug by firmly tightening the knurled nut.
- 4 Insert the plug of the power cable into a grounded power outlet that is easily accessible.
 - ➔ The balance is switched on.



- 5 Check that the robot system and the control unit are connected (1).
- 6 Insert the plug of the AC/DC adapter in the power inlet of the control unit (2).
- 7 Insert the plug of the power cable into a grounded power outlet that is easily accessible.
 - ➔ The robot system is switched on.



Note

Do not connect the instrument to a power outlet controlled by a switch. After switching on the instrument, it must warm up before giving accurate results.

To ensure optimum weighing conditions, leave the robot system on all the time.

Note

If any of the following situations is detected, each robot axis moves to its home position:

- balance is turned off
- interface connection is inactive
- balance was moved from its original position

4.4.2 Switching on the instrument

When the instrument is connected to the power supply, it automatically switches on.

Acclimatization and warm up

Before the balance gives reliable results, it must:

- acclimatize to the room temperature
- warm up by being connected to the power supply

The acclimatization time and warm-up time for the balance are available in "General data".

4.4.3 Starting e10control

- Double-click the **e10control** icon (**e10control.exe**).
 - ➔ The software opens.
 - ➔ A blank settings file named **Untitled.e10** is displayed.

4.4.3.1 Main menus at a glance

Menu	Description
File	Contains file-related topics, for example creating a new file.
Edit	Serves to edit a file.
View	Serves to adapt the software view.
Weights	Gives access to the weights database, including all relevant data on your standards and test weights.
Magazine	Serves to identify and register the weights placed on the weight magazine.
Process	Serves to set up the weighing process.
Report	Serves to define the content of the report file.
Adjustment	Serves to start the adjustment procedure, using the internal adjustment weights of the balance.
System	Serves to adjust system settings.
Start	Serves to start a weighing process.
Help	Contains the help file and further information about the software.

4.4.3.2 File menu

Command	Description
New	Closes the current settings file and opens a new, blank file named Untitled.e10 .
Open...	Serves to open an existing file. Once a particular file is selected, the currently open settings file closes.
Import...	Serves to import an existing text file (extension .imp or .txt). During the import, the text file is converted into a new standard settings file (extension: .e10). The new settings file is immediately loaded.
Save	Saves the changes made to the current settings file under the current file name (extension: .e10).
Save As...	Serves to save a settings file under a new name (extension: .e10).
Save as Text...	Serves to save the settings as a text file (current name with extension .txt). The following options are available: <ul style="list-style-type: none"> • Standards data for selected sets • Test weights data • Magazine places allocation • Weighing process settings • Series scheme • Report heading
Exit	Saves any changes and quits e10control .



For further information, consult the Reference Manual (RM).

► www.mt.com/e10-RM

4.4.4 Preparing the weight magazine

Each test weight or standard used during the weighing process needs to be placed onto one weight carrier. The selection of an adequate weight carrier is determined by the weight geometry.

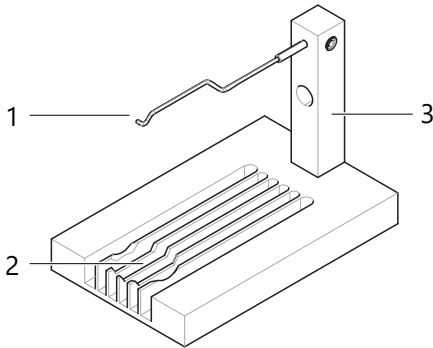
In order to ensure a trouble-free operation of the comparator and to minimize corner load errors, strict rules must be followed when choosing the carrier type.

Note

Do not touch the weight carriers or the weights with bare hands. Use the provided tweezers or powder-free gloves.

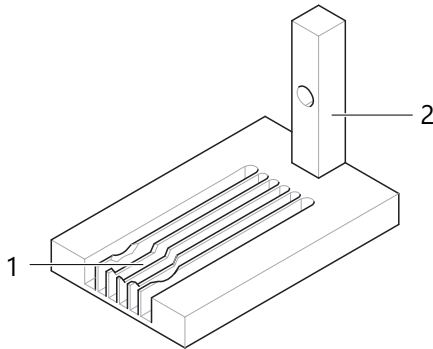
4.4.4.1 Available weight carriers

Design 1



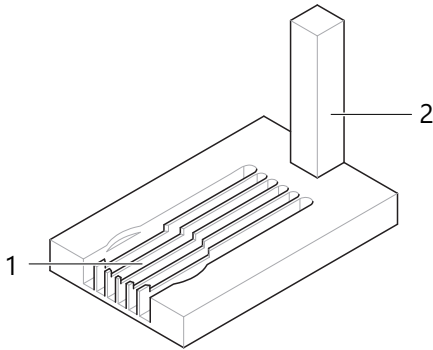
1	Hook for wire weights	3	Handle (grey) for design 1
2	Indent for cylindrical and sheet weights		

Design 2



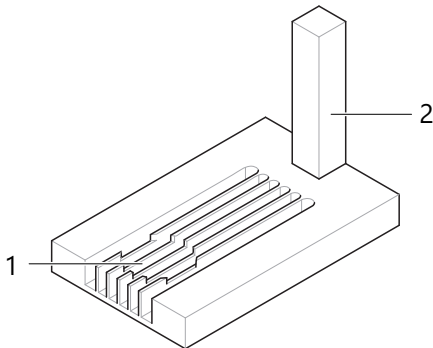
1	Indent for cylindrical and sheet weights	2	Handle (grey) for design 2
----------	--	----------	----------------------------

Design 3



1	Indent for cylindrical and sheet weights	2	Handle (red) for design 3 and design 4
----------	--	----------	--

Design 4



1	Indent for cylindrical and sheet weights	2	Handle (red) for design 3 and design 4
----------	--	----------	--

4.4.4.2 Selecting a suitable weight carrier

Note

Only use weights that fit into one of the listed categories.

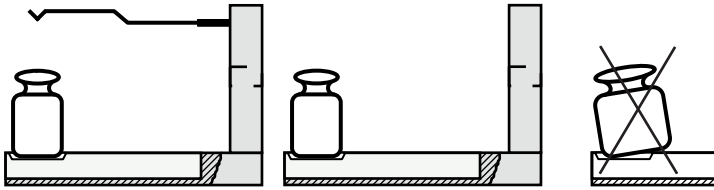
Note

Make sure to place the weights correctly on the corresponding carrier. Weights must never be placed over the edge of the indent.

In the mode **down-/upward calibration**, combinations of up to three weights can be weighed:

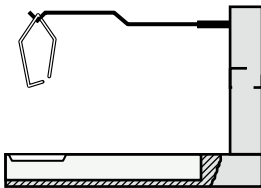
- Design 1 or 2: up to three weights, each placed on its own carrier
- Design 1 or 2, in combination with design 3 or 4: up to two weights, each placed on its own carrier

Cylindrical weight with knob

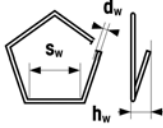


Weight shape	Weight dimension	Suitable weight carrier
	diameter: $4 \text{ mm} \leq d_c \leq 8.2 \text{ mm}$ height: $h_c \leq 16 \text{ mm}$	Design 1 Design 2
	diameter: $8.2 \text{ mm} \leq d_c \leq 14 \text{ mm}$ height: $h_c \leq 19 \text{ mm}$	Design 3
	diameter: $8.2 \text{ mm} \leq d_c \leq 10 \text{ mm}$ height: $h_c \leq 19 \text{ mm}$	Design 4

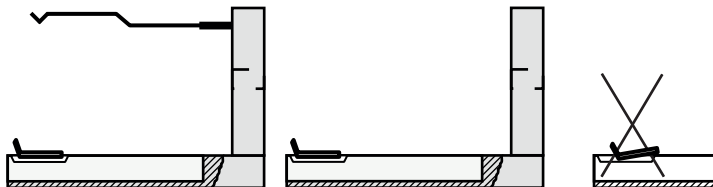
Wire weight

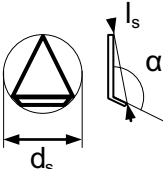
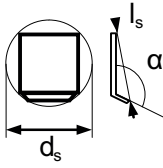
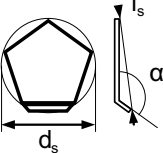


Weight shape	Weight dimension	Suitable weight carrier
triangular 	triangle inner side: $5.5 \text{ mm} \leq s_w \leq 18 \text{ mm}$ wire diameter: $0.05 \text{ mm} \leq d_w \leq 1.5 \text{ mm}$ height: $h_w \leq 6 \text{ mm}$	Design 1
square 	square inner side: $5.5 \text{ mm} \leq s_w \leq 12 \text{ mm}$ wire diameter: $0.05 \text{ mm} \leq d_w \leq 1.5 \text{ mm}$ height: $h_w \leq 6 \text{ mm}$	Design 1

Weight shape	Weight dimension	Suitable weight carrier
pentagonal 	pentagon inner side: $5.5 \text{ mm} \leq s_w \leq 12 \text{ mm}$ wire diameter: $0.05 \text{ mm} \leq d_w \leq 1.5 \text{ mm}$ height: $h_w \leq 6 \text{ mm}$	Design 1

Sheet weight, polygonal



Weight shape	Weight dimension	Suitable weight carrier
	diameter circumscribed circle: $d_s \leq 4 \text{ mm}$ distance l_s: $l_s \geq 3 \text{ mm}$ angle sheet-handle: $\alpha \geq 90^\circ$	Design 1 Design 2
	diameter circumscribed circle: $4 \text{ mm} \leq d_s \leq 8.2 \text{ mm}$	Design 1 Design 2
	diameter circumscribed circle: $8.2 \text{ mm} \leq d_s \leq 14 \text{ mm}$	Design 3

See also

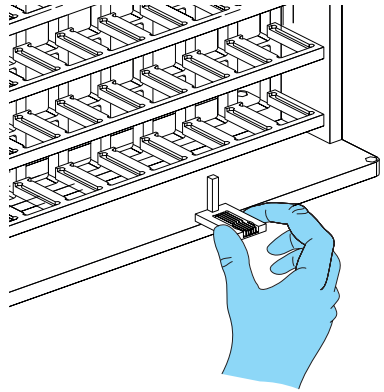
 Available weight carriers ▶ Page 16

4.4.4.3 Loading the weight magazine

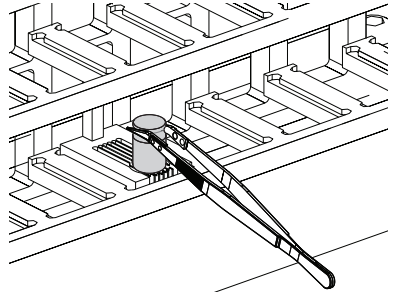
To place the weights onto their respective weight carrier in the magazine, proceed as follows:

- The instrument is switched on.
- 1 Open the doors of the weighing chamber.

- 2 Insert the required weight carriers into the weight magazine.
Note
 The carriers must be placed with their handle on the side opposite to the position numbers.
Note
 User tweezers or wear gloves to handle the weights and the weight carriers. Do not touch the weights or the weight carriers with bare hands.
- 3 Center the weight carriers in the provided space on the magazine.



- 4 Correctly place the weights on the appropriate weight carriers.
- 5 Once the magazine is loaded, close the weighing chamber doors.



See also

Switching on the instrument ▶ Page 14

4.4.5 Switching off the instrument

To completely switch off the instrument, it must be disconnected from the power supply.

4.5 Performing a simple weighing

Connecting software with system

- 1 Select **System > Comparator serial port... > Serial port** to connect the software with the system.
- 2 Enter the port to which the interface cable is connected.
- 3 Fill in the required information for **Robot system controller type** and for **Balance type**.

Starting the weighing process

- 1 Select **Start > Start measurement** to start the weighing process.
 - ➔ A window to enter a name for the report file opens.
- 2 Enter the name and the target location of the report file.
- 3 Click **Save**.
 - ➔ The window **Weighing process settings** opens.
- 4 Click **OK**.
 - ➔ The weighing process starts.
 - ➔ The weighing process monitor opens.

Adjust settings

- 1 Start **e10control**.
 - ➔ A new blank setting file opens.
- 2 Select **Weights** to enter and edit standards data and test weights data. The default password to change the currently stored data is "" (empty character string = no character).

- 3 Select **Magazine > Places allocation... > Allocation of weight magazine places** to identify and register the position of the test weights on the weight magazine.
- 4 Select **Process > Settings... > Weighing process settings** to set the comparisons for this weighing process, the precise timing, and the sequence.
- 5 Set the following parameters:
 - **Weighing mode**
 - **Pre-run requested**
 - **History-specific pause requested**
 - **Start delay**
 - **No. of nonreported preweighings per group (0-5)**
 - **No. of reported comparisons per group (1-20)**
 - **No. of series (1-20)**
 - **Stabilisation time (10-60 s)**
 - **Integration time (0-60 s)**
 - **Comparison scheme**
 - **Sensitivity check**
 - **Sensitivity check standard**
- 6 Select **Process > Settings... > Weighing process settings > Series scheme** to determine the series scheme.
- 7 Select **Report > Contents...** to define the contents of the report file.



For further information, consult the Reference Manual (RM).

► www.mt.com/e10-RM

5 Maintenance

To guarantee the functionality of the balance and the accuracy of the weighing results, a number of maintenance actions must be performed by the user.



For further information, consult the Reference Manual (RM).

► www.mt.com/e10-RM

5.1 Maintenance of the balance

5.1.1 Maintenance tasks

Maintenance action	Recommended interval	Remarks
Performing an internal adjustment	<ul style="list-style-type: none"> • Daily • After cleaning • After leveling • After changing the location 	see "Performing an internal adjustment" in the Reference Manual for the balance
Performing routine tests (eccentricity test, repeatability test, sensitivity test). METTLER TOLEDO recommends to at least perform a sensitivity test.	<ul style="list-style-type: none"> • After cleaning • After assembling the balance • After a software update • Depending on your internal regulations (SOP) 	see "Tests" in the Reference Manual for the balance
Cleaning	<ul style="list-style-type: none"> • After every use • Depending on the degree of pollution • Depending on your internal regulations (SOP) 	see "Cleaning"



For further information, consult the Reference Manual (RM).

► www.mt.com/XPR-micro-RM

5.2 Maintenance of the robot system

Apart from cleaning no regular maintenance is required by the instrument owner.

5.3 Cleaning

5.3.1 Cleaning the components

Overview

Periodically, clean the following parts of the instrument:

System part	Task	Tool	Notes
Weighing chamber	Remove dust.	Air bellows	
Balance: <ul style="list-style-type: none"> • Weighing pan • Drip tray • Housing • Terminal 	Remove dust.	Air bellows	The position of the balance must remain absolutely unchanged.
Weight magazine: <ul style="list-style-type: none"> • Weights • Weight carriers 	Remove dust.	Air bellows	The centering holes underneath the carriers should also be clean. Store weight carriers that are not in use in a dust-free environment. Do not leave these weight carriers in the weight magazine.
Robot system: <ul style="list-style-type: none"> • Robot hand • 3 carrier-centering cones 	Remove dust.	Air bellows	Do not use compressed air or petroleum-based solvents.
<ul style="list-style-type: none"> • Light barrier 	If a problem with the light barrier on the robot hand occurs, clean the light barrier.	Air bellows	Do not use any solvent or ethanol!



NOTICE

Damage to the instrument due to inappropriate cleaning methods

If liquid enters the housing, it can damage the instrument. The surface of the instrument can be damaged by certain cleaning agents, solvents, or abrasives.

- 1 Do not spray or pour liquid on the instrument.
- 2 Only use the cleaning agents specified in the Reference Manual (RM) of the instrument or the guide "8 Steps to a Clean Balance".
- 3 Only use a lightly moistened, lint-free cloth or a tissue to clean the instrument.
- 4 Wipe off any spills immediately.



For further information on cleaning a balance, consult "8 Steps to a Clean Balance".

► www.mt.com/lab-cleaning-guide

Cleaning around the balance

- Remove any dirt or dust around the balance and avoid further contaminations.

Cleaning the terminal

- Clean the terminal with a damp cloth or a tissue and a mild cleaning agent.

Cleaning the removable parts

- Clean the removed part with a damp cloth or a tissue and a mild cleaning agent or clean in a dishwasher up to 80 °C.

Cleaning the weighing unit

- 1 Disconnect the balance from the AC/DC adapter.
- 2 Use a lint-free cloth moistened with a mild cleaning agent to clean the surface of the balance.
- 3 Remove powder or dust with a disposable tissue first.
- 4 Remove sticky substances with a damp lint-free cloth and a mild solvent, e.g., isopropanol or ethanol 70%.

5.4 Service

Regular servicing by an authorized service technician ensures reliability for years to come. Contact your METTLER TOLEDO representative for details about the available service options.

6 Technical Data

6.1 General data

Automated weight handler

Weight handler

For automatic determination of test weights. This can be done by comparison of one test weight against one standard weight. Comparisons of weight combinations, consisting of up to three weights, are also possible.

Measuring time (typical)

15 min for a series of five comparisons of one weight against another weight (**One-vs.-one comparisons**). 30 min for a series of five comparisons of one weight against a weight combination. Typically, a 5 × **A-B-A** comparative weighing applies.

Test weights / standards

Knob weights, wire weights, and sheet weights in various shapes and sizes. Nominal value: 1 mg up to 5 g

Weight magazine

60 places

Control software

e10control

Data interface

RS232C to controller

Balance - XPR10U Comparator

Readability:

0.1 µg

Maximum capacity:

10.1 g

Electrical weighing range:

10.1 g

Repeatability:

Determined as standard deviation of 5 × **A-B-A** comparative weighing:

- 0-1 g: $s \leq 0.15 \mu\text{g}$
- 1-2 g: $s \leq 0.25 \mu\text{g}$
- 2-6 g: $s \leq 0.40 \mu\text{g}$
- 6-10 g: $s \leq 0.60 \mu\text{g}$

Linearity:

± 2 µg

Setting time (typical):

20 s

Adjustment:

Automated internal adjustment using built-in weights of the balance, or external adjustment using external weights.

Power supply

Balance AC/DC adapter:	Primary: 100 – 240 V AC, -15%/+10%, 50/60 Hz Secondary: 12 V DC $\pm 3\%$, 2.5 A (with electronic overload protection)
Balance power consumption:	12 V DC $\pm 3\%$, 2.25 A, maximum ripple: 80 mVpp
Polarity:	⊖ ⊕ with a current limited SELV output
Robot system AC/DC adapter:	Primary: 100 – 240 V AC, $\pm 10\%$, 50/60 Hz Secondary: 24 V DC, $\pm 5\%$, 2.1 A (with electronic overload protection)
Robot power consumption:	24 V DC $\pm 5\%$, 1.5 A
Cable for AC/DC adapter:	3-core, with country-specific plug
Power consumption robot system:	36 VA max. (24 V DC 1.5 A)

Protection and standards

Overvoltage category:	II
Degree of pollution:	2
Protection:	Protected against dust and water
Standards for safety and EMC:	See Declaration of Conformity
Range of application:	For use in closed interior rooms only

Environmental conditions

Height above mean sea level:	Up to 2000 m
Ambient temperature:	17 – 27 °C (± 0.5 °C / 12 hour)
Relative air humidity:	45 – 60 %, non-condensing
Vibrations:	Set up in a room free of vibrations
Acclimatization time:	At least 24 hours after placing the instrument in the same location where it will be put into operation.
Warm-up time:	At least 4 hours after connecting the balance to the power supply. When switched on from standby, the instrument is ready for operation immediately.

Instrument (robot system and balance)

Weight:	50 kg
---------	-------

See also

🔗 Selecting a suitable weight carrier ▶ Page 17

7 Disposal

In conformance with the European Directive 2012/19/EU 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, the content of this regulation must also be related.



8 Compliance Information

National approval documents, e.g., the FCC Supplier Declaration of Conformity, are available online and/or included in the packaging.

▶ www.mt.com/ComplianceSearch



For further information, consult the Reference Manual (RM).

► www.mt.com/e10-RM

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1 简介

感谢您选择METTLER TOLEDO仪器。这款仪器具有卓越性能且易于使用。

质量比较器免责声明

本文档中的术语“天平”是指质量比较器。

与天平相比，质量比较器分辨率更高。它们主要用于差异称量应用场景，例如校准标准砝码。除标准天平测试之外，在生产期间，还对比较器进行了差异重复性（ABA重复性）测试。

EULA

本产品中的软件按照METTLER TOLEDO软件的最终用户许可证协议（EULA）获得授权。

使用本产品表明您同意EULA的条款。

▶ www.mt.com/EULA

1.1 更多文档和信息

公司网站提供本文档的其他语言版本。

产品页：

▶ <http://www.mt.com/lab-robotic-MC>

天平清洁说明，“8 Steps to a Clean Balance”：

▶ www.mt.com/lab-cleaning-guide

搜索文档：

▶ www.mt.com/library

如有更多疑问，请与您的授权 METTLER TOLEDO 经销商或服务代表联系。

▶ www.mt.com/contact

1.2 缩略语

原文	译文	说明
AC		Alternating Current (交流电)
ASTM		American Society for Testing and Materials (美国试验与材料协会)
DC		Direct Current (直流电)
EMC		Electromagnetic Compatibility (电磁兼容)
FACT		Fully automatic time- and temperature-controlled internal adjustment (全自动时间和温度控制的内部校正)
FCC		Federal Communications Commission (美国联邦通讯委员会)
GWP		Good Weighing Practice
ID		Identification (标识)
NA		Not Applicable

	(不适用)
OIML	Organisation Internationale de Métrologie Légale (国际法制计量组织)
RM	Reference Manual (参考手册)
SELV	Safety Extra Low Voltage (额定安全低电压)
SOP	Standard Operating Procedure (标准操作程序)
UM	User Manual (简明用户手册)
USB	Universal Serial Bus

2 安全须知

本仪器随附《用户手册》和《参考手册》两个文档。

- 《用户手册》随本仪器打印并交付。
- 电子版《参考手册》包含本仪器及其使用的全面描述。
- 请妥善保管上述两份手册，以供将来参考。
- 将本仪器传递给其他方时应附上两个文档。

必须按照《用户手册》和《参考手册》使用本仪器。如果不按照这些文档说明使用本仪器，或者如果本仪器已改动，那么仪器的安全性就有可能受到损坏，Mettler-Toledo GmbH 我们对此将不承担任何责任。

2.1 提示语和警告标志的定义

安全说明中包含关于安全问题的重要信息。忽视安全说明有可能造成人员受伤、仪器损坏、故障与结果错误。安全说明标注有下列警示语与警告标志：

警示语

危险 存在高风险的危险情况，如不加以避免，则会导致死亡或严重伤害。

警告 中等风险性危险情况，如不加以避免，可能会造成死亡或严重伤害。

小心 风险性较低的危险情况，如不规避会造成轻微或中度受伤。

注意 存在低风险的危险情况，有可能损坏仪器和导致其他实质性损坏、故障、错误结果或数据丢失。

警告标志



一般风险



重物



当心压伤



注意

2.2 产品安全说明

目标用途

本仪器供经过培训的人员使用。全自动质量比较器可通过直接比较或向下/向上校准来测量校准砝码。

未经 Mettler-Toledo GmbH 许可，超过 Mettler-Toledo GmbH 规定限制的任何其他类型的使用和操作均视为非目标用途。

仪器所有者的责任

仪器所有者指对仪器具有合法所有权、使用仪器或授权任何人使用仪器，或者在法律上认定为仪器操作人员的个人。仪器所有者负责仪器所有使用者与第三方的安全。

Mettler-Toledo GmbH 假定仪器所有者对用户进行培训，使其了解如何在工作场所安全使用仪器和处理潜在危险。Mettler-Toledo GmbH 假定仪器所有者提供必要的防护装备。

安全注意事项



警告

触电会造成重伤或死亡

接触带电零件有可能造成伤亡。

- 1 仅使用仪器专用METTLER TOLEDO电源线和交流/直流适配器。
- 2 将电源线连接至接地电源插座。
- 3 将所有电缆与接头放置在远离液体和潮湿的地方。
- 4 检查电缆与电源插头有无损坏，如有损坏请更换。



警告

因搬运重物造成的伤害

仪器的重量超过个人的搬运能力。

- 移动或提升该设备时必须有人协助。



注意

安装不当或维修不当会导致仪器损坏

- 1 安装和维修必须由经过专门培训的METTLER TOLEDO人员执行。
- 2 请勿打开天平、控制装置或自动系统。



注意

因使用不合适的部件而损坏仪器或发生故障

- 仅可使用METTLER TOLEDO提供的专用于您的仪器的部件。

2.3 机械臂上的警告标志

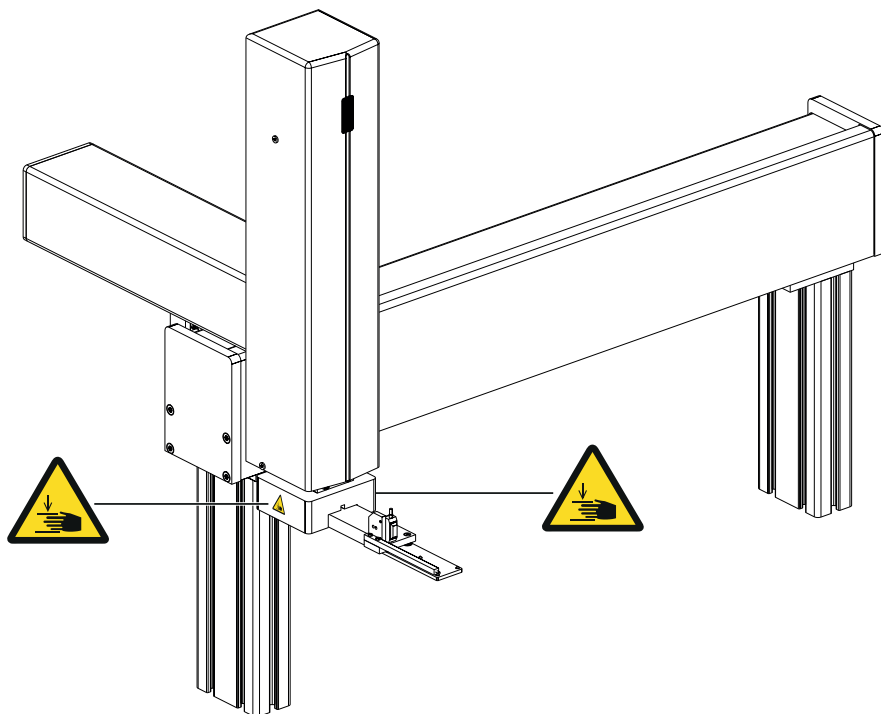


小心

可移动件造成的伤害

机械臂可能会意外移动。

- 当仪器的部件移动时，请勿将手伸入工作区域！



2.4 发生紧急情况时请关闭仪器

- 1 拔下电源线，关闭仪器。
- 2 请联系您的METTLER TOLEDO代表。

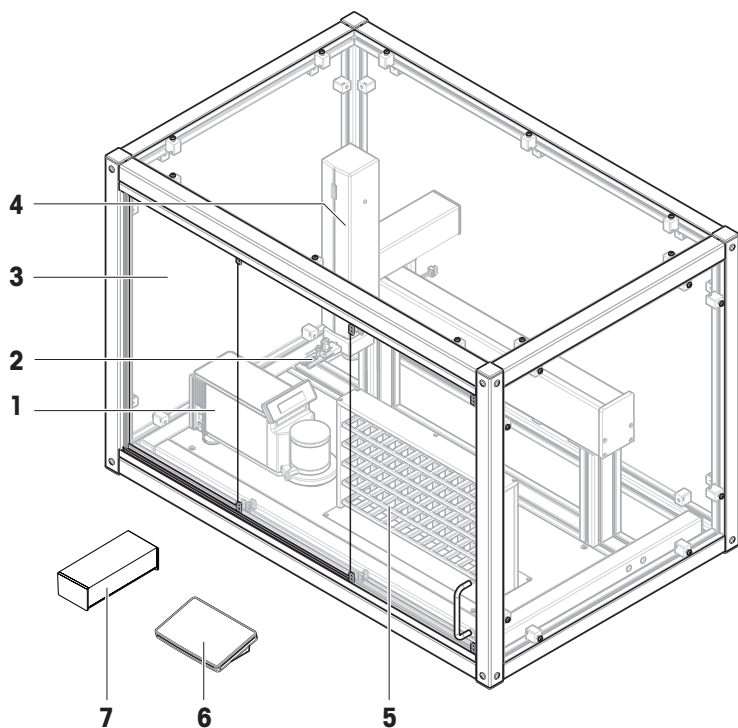
3 设计和功能



如需更多信息，请查阅《参考手册（RM）》。

► www.mt.com/e10-RM

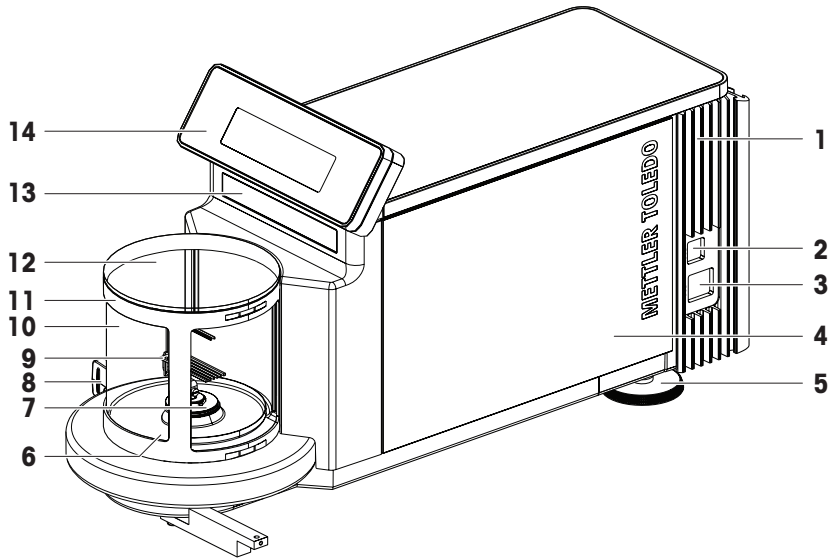
3.1 仪器概述



1	比较器 (XPR10U质量比较器)	5	砝码库, 含砝码托架 (60个)
2	机械手, 含光电传感器	6	比较器显示操作终端
3	称量室, 带滑动门	7	机器人系统的控制单元
4	机器人系统 (3坐标轴)		

3.2 组件说明

3.2.1 XPR10U天平概述



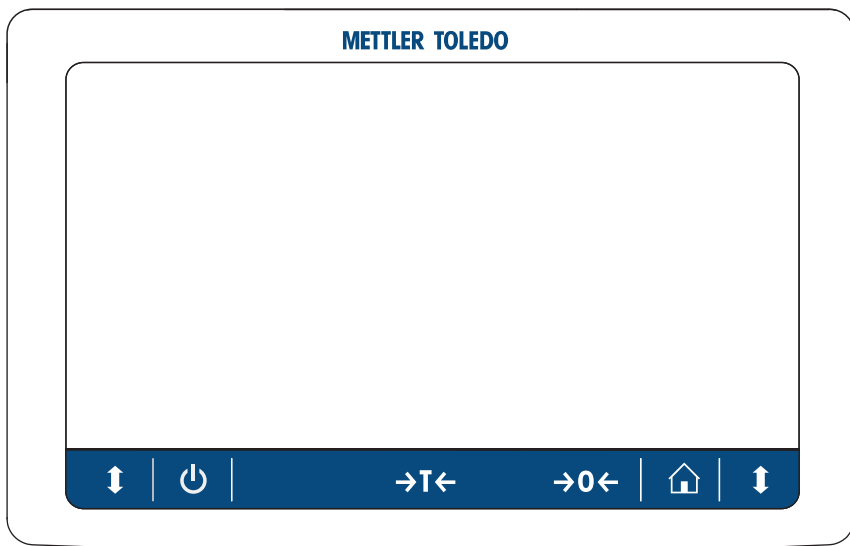
1	冷却单元	8	门把手
2	USB-B端口（连接至主机）	9	称盘
3	USB-A端口（连接至设备）	10	称量室
4	称量装置	11	防风罩
5	水平调节脚	12	防风罩盖
6	称量室底盘	13	铭牌
7	盛水盘	14	称量显示器（SmartView）



有关完整信息，请查阅《参考手册（RM）》。

▶ www.mt.com/XPR-micro-RM

3.2.2 显示操作终端概述

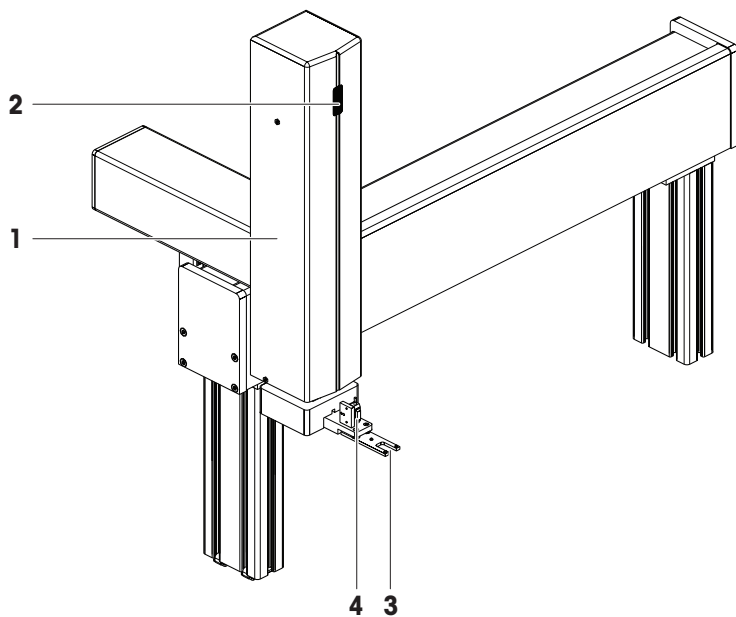


🔌	待机	→T←	皮重
🏠	主屏幕	→0←	归零
↕	开门/关门		

i 信息

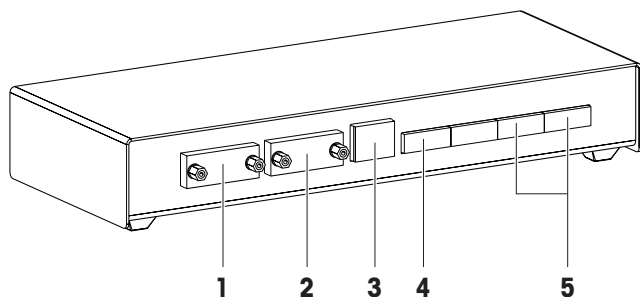
不得对比较器显示操作终端进行任何更改。称量过程中，比较器显示操作终端被禁用。

3.2.3 机器人系统概述



1	机械臂	3	机械手
2	状态指示灯	4	光电传感器

3.2.4 控制单元概述



1	RS232C串行端口（连接至天平）	4	自动系统接口电缆插座
2	RS232C串行端口（连接至计算机）	5	交流/直流适配器插座
3	以太网端口		

3.2.5 控制软件

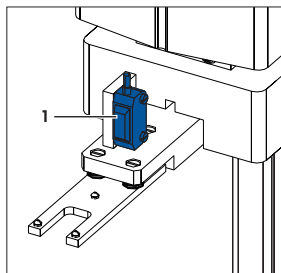
e10control是用来操作仪器的软件。它显示测量结果和其他数据，可用于设置仪器。

软件安装在由METTLER TOLEDO提供的计算机上。

3.3 传感器和状态指示灯

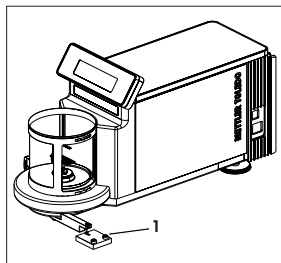
光电传感器

光电传感器 (1) 会在每次测量之前检查砝码架。它位于机械手上。如果检测到不合适的砝码架，则测量过程停止。



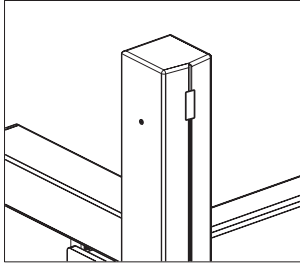
质量比较器位置传感器

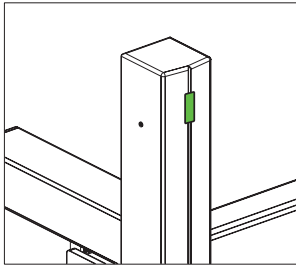
质量比较器位置传感器 (1) 可监测质量比较器的位置。在仪器安装过程中找到确切位置。请勿改变质量比较器的位置，例如在清洁过程中。如果发生位置错误，请联系METTLER TOLEDO代表。



状态指示灯

机器人系统配有状态指示灯，可以指示机器人系统是处于关闭状态还是开启状态。

状态指示灯	说明
	<p>状态指示灯熄灭</p> <ul style="list-style-type: none">• 机器人系统已关闭。• 机械臂不会自动移动。

状态指示灯	说明
	<p>状态指示灯亮起</p> <ul style="list-style-type: none"> • 机器人系统已开启。 • 机械臂会自动移动。 <p>— ⚠️ 小心: 当状态指示灯亮起时, 机械臂可能会意外移动。当仪器的部件在移动时, 请勿将手伸入工作区域!</p>

4 安装与投入使用

4.1 选择位置

天平是灵敏的精密仪器。它所处的位置将对称重结果的准确性产生重要影响。

位置要求

放在室内稳定的工作台上

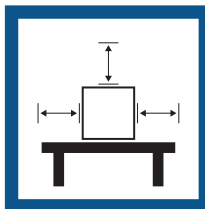
确保足够的空间

将仪器调平

提供充足照明



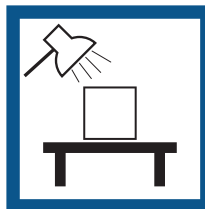
避免阳光直射



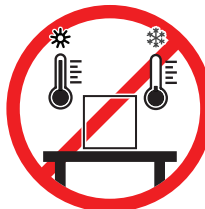
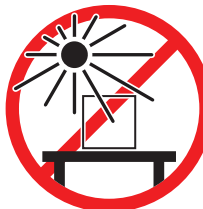
避免震动



无强烈气流



避免温度波动



足够的间距: 与周围的仪器至少相距30cm

信息

将计算机放在单独的桌子上, 以免振动造成干扰。

考虑环境条件。请参阅"技术参数"。

4.2 交货清单

仪器与配件

- 机器人系统
- 天平 (XPR10U微量比较器)
- 防风罩
- 砝码库 (60个库位)
- 砝码架, 设计1, 30个
- 砝码架, 设计2, 12个
- 砝码架, 设计3, 12个
- 砝码架, 设计4, 6个
- 镊子, 适用于1mg至50g砝码
- 镊子, 适用于1g至200g砝码
- 吹耳球

仪器控制

- 计算机
- e10control软件

文档记录

- 《用户手册》
- 产品证书
- 一致性声明

4.3 安装



注意

安装不当会导致仪器和财产损失

安装和调试不当可能会导致仪器和财产损失。

- 安装和调试必须由METTLER TOLEDO专业人员或授权人员执行。

可参阅

[产品安全说明](#) ▶ 第5页

4.4 投入使用

开启仪器后, 必须先进行预热, 才能获得准确的结果。

可参阅

[通用数据](#) ▶ 第24页

4.4.1 连接仪器



警告

触电会造成重伤或死亡

接触带电零件有可能造成伤亡。

- 1 仅使用仪器专用METTLER TOLEDO电源线和交流/直流适配器。
- 2 将电源线连接至接地电源插座。
- 3 将所有电缆与接头放置在远离液体和潮湿的地方。
- 4 检查电缆与电源插头有无损坏, 如有损坏请更换。



注意

过热会造成交流/直流适配器损坏

如果交流/直流适配器被遮盖或位于容器中，则无法充分冷却而导致过热。

- 1 请勿遮盖交流/直流适配器。
- 2 请勿将交流/直流适配器置于容器中。



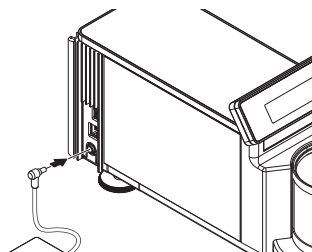
注意

在启动过程中由于砝码架或砝码而损坏质量比较器

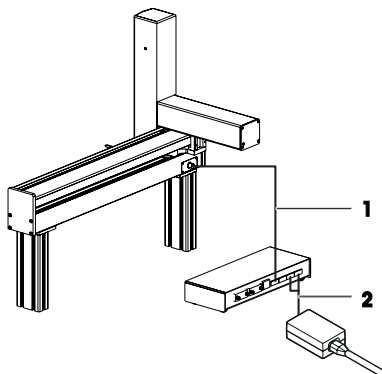
如果在启动过程中机械手或质量比较器配有砝码架或砝码，则可能会损坏质量比较器。

- 开启仪器之前，请从机械手和质量比较器上取下砝码架和砝码。

- 仪器由制造商安装。
 - 仪器尚未接通电源。
 - 机械手和质量比较器的秤盘均无法码架或砝码。
- 1 以这种方式安装电缆，确保其不会受损或干扰操作。
 - 2 将交流/直流适配器插头插入质量比较器的电源口。
 - 3 用力拧紧螺母，紧固插头。
 - 4 将电源插头插入接地电源插座中。
 - ➔ 开启质量比较器。



- 5 检查机器人系统和控制单元是否已连接 (1)。
- 6 将交流/直流适配器插头插入控制单元 (2) 的电源口。
- 7 将电源插头插入接地电源插座中。
 - ➔ 机器人系统已开启。



信息

切勿将此仪器连接至由开关控制的电源插座。开启仪器后，必须先对其进行预热，才能获得准确的结果。

为了确保良好的称量条件，请始终保持机器人系统开启。

信息

如果检测到以下任何情况，每个机器轴都将移动到其原始位置：

- 质量比较器已关闭
- 接口连接未激活
- 质量比较器已从其原始位置移开

4.4.2 启动仪器

仪器接通电源后，会自动开启。

适应环境和预热

在确保其能提供可靠结果前，天平必须：

- 适应室温条件
- 接通电源进行预热

质量比较器适应环境的时间和预热时间请参见“通用数据”。

4.4.3 启动e10控制

- 双击e10control图标（e10control.exe）。
 - ➔ 打开软件。
 - ➔ 显示一个名为Untitled.e10的空白设置文件。

4.4.3.1 主菜单概览

菜单	说明
File	包含与文件相关的主题，例如创建新文件。
Edit	用于编辑文件。
View	用于调整软件视图。
Weights	提供访问砝码数据库的权限，包括您的标准和测试砝码的所有相关数据。
Magazine	用于识别和记录放置在砝码库上的砝码。
Process	用于设置称量过程。
Report	用于定义报告文件的内容。
Adjustment	用于使用质量比较器的内部校正砝码来启动校正程序。
System	用于调整系统设置。
Start	用于启动称量过程。
Help	包含帮助文件和有关软件的更多信息。

4.4.3.2 文件菜单

命令	说明
New	关闭当前设置文件并打开一个名为Untitled.e10的新空白文件。
Open...	用于打开现有文件。选择特定文件后，当前打开的设置文件会关闭。
Import...	用于导入现有文本文件（扩展名.imp或.txt）。导入期间，文本文件将转换为新的标准设置文件（扩展名：.e10）。将立即加载新的设置文件。
Save	以当前文件名保存对当前设置文件所做的更改（扩展名：.e10）。

命令	说明
Save As...	用于以新名称保存设置文件（扩展名：.e10）。
Save as Text...	用于将设置另存为文本文件（当前名称带扩展名.txt）。 以下选项可用： <ul style="list-style-type: none"> • Standards data for selected sets • Test weights data • Magazine places allocation • Weighing process settings • Series scheme • Report heading
Exit	更改后保存并退出e10control。



如需更多信息，请查阅《参考手册（RM）》。

► www.mt.com/e10-RM

4.4.4 准备砝码库

称量过程中使用的每个测试或标准砝码都需要放在一个砝码架上。选择的砝码托架是否合适取决于砝码的几何形状。

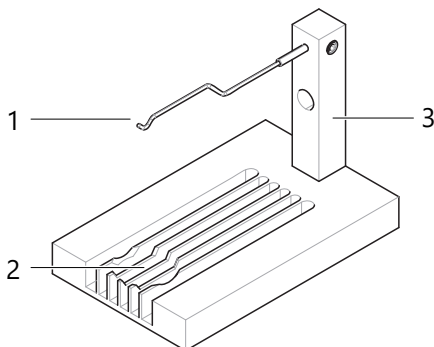
为了确保比较器的无故障运行以及更大限度降低偏载误差，在选择砝码托架规格时必须遵守严格的规则。

信息

请勿徒手触摸砝码托架或砝码。使用配套的镊子或无尘手套。

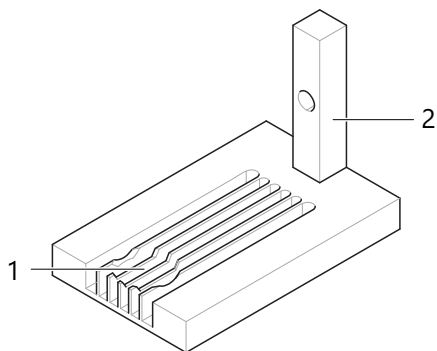
4.4.4.1 可用的砝码托架

设计1



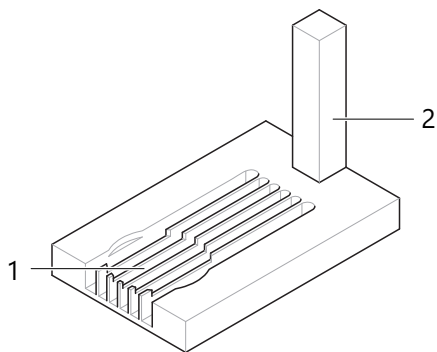
1	用于线状砝码的挂钩	3	设计1的托架（灰色）
2	圆柱形和片状砝码的凹槽		

设计2



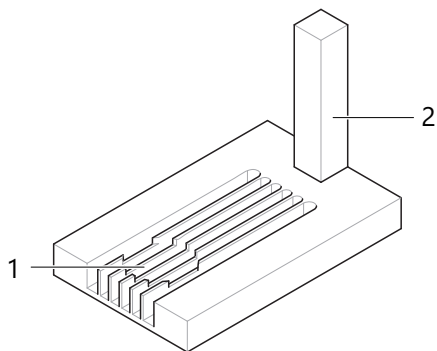
1 圆柱形和片状砝码的凹槽	2 设计2的托架（灰色）
---------------	--------------

设计3



1 圆柱形和片状砝码的凹槽	2 设计3和设计4的托架（红色）
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设计4



1 圆柱形和片状砝码的凹槽	2 设计3和设计4的托架（红色）
---------------	------------------

4.4.4.2 选择合适的砝码托架

① 信息

仅使用适合所列规格之一的砝码。

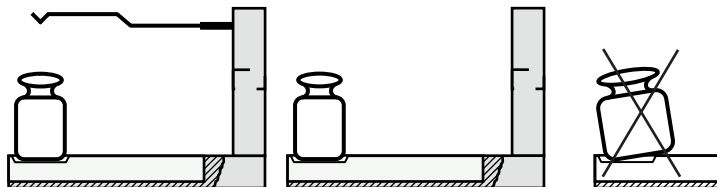
① 信息

确保将砝码正确放置在相应的砝码架上。砝码不得放在凹槽边缘上。

在下/上校准模式下，可以称量最多三个砝码的组合：

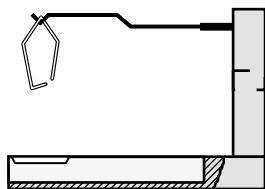
- 设计1或2：最多三个砝码，分别放置在各自的砝码架上
- 设计1或2，结合设计3或4：最多两个砝码，分别放置在各自的砝码架上

带旋钮的圆柱形砝码



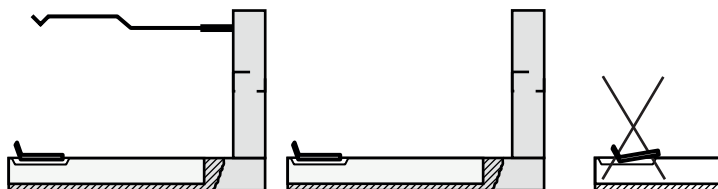
砝码形状	砝码尺寸	合适的砝码架
	直径： $4 \text{ mm} \leq d_c \leq 8.2 \text{ mm}$ 高度： $h_c \leq 16 \text{ mm}$	设计1 设计2
	直径： $8.2 \text{ mm} \leq d_c \leq 14 \text{ mm}$ 高度： $h_c \leq 19 \text{ mm}$	设计3
	直径： $8.2 \text{ mm} \leq d_c \leq 10 \text{ mm}$ 高度： $h_c \leq 19 \text{ mm}$	设计4

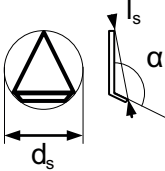
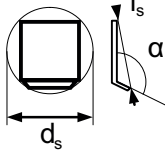
线状砝码




砵码形状	砵码尺寸	合适的砵码架
三角形 	三角形内侧: $5.5 \text{ mm} \leq s_w \leq 18 \text{ mm}$ 线状直径: $0.05 \text{ mm} \leq d_w \leq 1.5 \text{ mm}$ 高度: $h_w \leq 6 \text{ mm}$	设计1
正方形 	正方形内侧: $5.5 \text{ mm} \leq s_w \leq 12 \text{ mm}$ 线状直径: $0.05 \text{ mm} \leq d_w \leq 1.5 \text{ mm}$ 高度: $h_w \leq 6 \text{ mm}$	设计1
五边形 	五边形内侧: $5.5 \text{ mm} \leq s_w \leq 12 \text{ mm}$ 线状直径: $0.05 \text{ mm} \leq d_w \leq 1.5 \text{ mm}$ 高度: $h_w \leq 6 \text{ mm}$	设计1

多边形片式砵码





砝码形状	砝码尺寸	合适的砝码架
	外圆的直径: $d_s \leq 4 \text{ mm}$ 距离 l_s : $l_s \geq 3 \text{ mm}$ 有角度片码托架: $\alpha \geq 90^\circ$	设计1 设计2
	外圆的直径: $4 \text{ mm} \leq d_s \leq 8.2 \text{ mm}$	设计1 设计2
	外圆的直径: $8.2 \text{ mm} \leq d_s \leq 14 \text{ mm}$	设计3

可参阅

 可用的砝码托架 ▶ 第16页

4.4.4.3 装载砝码库

要将砝码放在砝码库中相应的砝码架上，请按以下步骤操作：

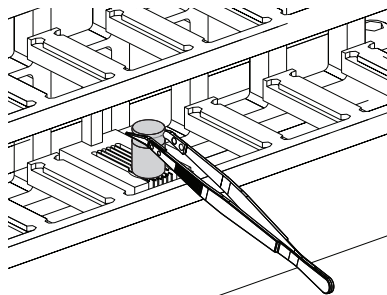
- 仪器已打开。
- 1 打开称量室的门。
- 2 将所需的砝码架加载到砝码库。
 -  **信息**
含支架的托架必须放在与位置编号相对的一侧。
 -  **信息**
使用者用镊子或手套操作砝码和砝码架。请勿徒手触摸砝码或砝码架。
- 3 将砝码架居中放置在砝码库的指定空间中。



- 4 将砝码正确放置在适合的砝码架上。
- 5 砝码库装载完毕后，关闭称量室门。

可参阅

🔗 启动仪器 ▶ 第15页



4.4.5 关闭仪器

如果要完全关闭仪器，则必须断开电源。

4.5 执行一项基础称量

将软件与系统连接

- 1 选择**System>Comparator serial port...>Serial port**，将软件与系统连接。
- 2 输入接口电缆连接的端口。
- 3 填写**Robot system controller type**和**Balance type**的必要信息。

启动称量过程

- 1 选择**Start>Start measurement**，开始称量过程。
 - ➔ 打开为报告文件输入名称的窗口。
- 2 输入报告文件的名称和目标位置。
- 3 单击**Save**。
 - ➔ 窗口**Weighing process settings**打开。
- 4 单击**OK**。
 - ➔ 称量过程启动。
 - ➔ 打开称量过程监视器。

调整设置

- 1 启动**e10control**。
 - ➔ 打开一个新的空白设置文件。
- 2 选择**Weights**输入和编辑标准砝码数据和测试砝码的数据。更改当前存储数据的默认密码为"（空字符串=无字符）。
- 3 选择**Magazine>Places allocation...>Allocation of weight magazine places**来识别和记录砝码库上测试砝码的位置。
- 4 选择**Process>Settings...>Weighing process settings**，设置该称量过程、精确计时和顺序的比较。
- 5 设置以下参数：
 - **Weighing mode**
 - **Pre-run requested**
 - **History-specific pause requested**
 - **Start delay**
 - **No. of nonreported preweighings per group (0-5)**
 - **No. of reported comparisons per group (1-20)**

- No. of series (1-20)
- Stabilisation time (10-60 s)
- Integration time (0-60 s)
- Comparison scheme
- Sensitivity check
- Sensitivity check standard

6 选择Process>Settings...>Weighing process settings>Series scheme，确定系列方案。

7 选择Report>Contents...，定义报告文件的内容。



如需更多信息，请查阅《参考手册（RM）》。

▶ www.mt.com/e10-RM

5 维护

为了保证天平的功能性和称量结果的准确性，用户必须执行一些保养。



如需更多信息，请查阅《参考手册（RM）》。

▶ www.mt.com/e10-RM

5.1 天平的维护

5.1.1 维护任务

维护作业	推荐的维护间隔	备注
进行内部校正	<ul style="list-style-type: none"> • 每天 • 清洁后 • 调平后 • 更换位置后 	请参阅《天平参考手册》中的“执行内部调整”
进行日常测试（偏载测试、重复性测试、灵敏度测试）。 METTLER TOLEDO 建议至少进行一次灵敏度测试。	<ul style="list-style-type: none"> • 清洁后 • 安装天平后 • 软件升级后 • 取决于您的内部规定（SOP） 	请参阅《天平参考手册》中的“测试”
清洁	<ul style="list-style-type: none"> • 每次使用后 • 根据污染等级 • 取决于您的内部规定（SOP） 	请参阅“清洁”



如需更多信息，请查阅《参考手册（RM）》。

▶ www.mt.com/XPR-micro-RM

5.2 机器人系统的维护

除了清洁之外，仪器所有者无需进行定期维护。

5.3 清洁

5.3.1 清洁部件

概述

定期清洁仪器的以下部件：

系统部件	任务	工具	注意
称量室	清除灰尘。	吹耳球	
天平： <ul style="list-style-type: none"> • 秤盘 • 滴水盘 • 外壳 • 显示操作终端 	清除灰尘。	吹耳球	天平的位置必须保持绝对不变。
砝码库： <ul style="list-style-type: none"> • 砝码 • 砝码架 	清除灰尘。	吹耳球	支架下方的定心孔也应清洁。 将不使用的砝码架存放在无尘环境中。请勿将这些砝码架留在砝码库内。
机器人系统： <ul style="list-style-type: none"> • 机械手 • 3个支架对中锥体 	清除灰尘。	吹耳球	请勿使用压缩空气或石油为基础的溶剂。
<ul style="list-style-type: none"> • 光电传感器 	如果机械手上的光电传感器出现问题，请予以清洁。	吹耳球	请勿使用任何溶剂或乙醇！



注意

因清洗方法不正确而损坏仪器

如果液体进入外壳，则有可能损坏仪器。某些清洗剂、溶剂或研磨剂可能会损坏仪器表面。

- 1 请勿向仪器喷洒或倾倒液体。
- 2 仅使用仪器参考手册（RM）或指南“8 Steps to a Clean Balance”中指定的清洁剂。
- 3 务必使用略微湿润的无绒布或纸巾清洁仪器。
- 4 立即拭去任何溅出物。



关于清洁天平的更多信息，请参阅“8 Steps to a Clean Balance”。

► www.mt.com/lab-cleaning-guide

清洁天平的周围

- 去除天平周围的任何灰尘或污垢，避免进一步的污染。

清洁终端

- 使用湿布或纸巾及温和清洗剂清洁终端。

清洁可拆卸部件

- 使用湿布或纸巾和温和清洗剂清洁拆下的部件，或者在最高80 °C的洗碗机中进行清洁。

清洁称量单元

- 1 断开天平与AC/DC适配器的连接。
- 2 使用沾湿温和清洗剂的无绒布清洁天平表面。
- 3 首先使用一次性纸巾清除粉末或灰尘。
- 4 使用湿的无绒软布和温和溶剂（如70%的异丙醇或乙醇）清除粘性物质。

5.4 服务

由获授权的服务技术人员定期进行维护，以确保未来数年可靠运行。有关可用服务选项的详细信息，请联系当地METTLER TOLEDO代表。

6 技术资料

6.1 通用数据

全自动砝码操作装置

砝码操作装置	用于自动测量测试砝码。通过它可以将一个测试砝码与一个标准砝码进行比较。还可以比较最多由三个砝码组成的组合。
测量时间（典型）	15分钟内连续五次一个砝码与另一个砝码的比较（ One-vs.-one comparisons ）。30分钟内连续五次一个砝码与组合砝码的比较。通常情况下，采用5次 A-B-A 比较称量。
测试砝码/标准砝码	各种形状和尺寸的圆柱型砝码、线状砝码和片状砝码。标称值：1mg至5g
砝码库	60个库位
控制软件	e10control
数据接口	RS232C至控制器

质量比较器—XPR10U比较器

读数精度：	0.1 µg
最大秤量：	10.1 g
电子称量范围：	10.1 g
重复性：	确定为5次 A-B-A 比较称量的标准偏差： <ul style="list-style-type: none">• 0-1 g: $s \leq 0.15 \mu\text{g}$• 1-2 g: $s \leq 0.25 \mu\text{g}$• 2-6 g: $s \leq 0.40 \mu\text{g}$• 6-10 g: $s \leq 0.60 \mu\text{g}$
线性：	$\pm 2 \mu\text{g}$
设定时间（典型）：	20 s
校正：	使用质量比较器的内置砝码自动进行内部校正，或使用外部砝码进行外部校正。

电源

天平交流/直流适配器:	主适配器: 100 – 240V交流, -15%/+10%, 50/60Hz 辅适配器: 12V直流±3%, 2.5A (带有电子过载保护装置)
天平功耗:	12V直流±3%, 2.25A, 最大波纹: 80 mVpp
极性:	⊖—⊕ ⊕ 带电流受限的SELV输出
机器人系统交流/直流适配器:	主适配器: 100 – 240V交流, ±10%, 50/60Hz 辅适配器: 24V直流, ±5%, 2.1A (带有电子过载保护装置)
机器人功耗:	24V直流±5%, 1.5A
交流/直流适配器用电缆:	3芯, 配有国家专用插头
机器人系统功耗:	最大36VA (24V直流, 1.5A)

保护与标准

过压类别:	II
污染度:	2
防护等级:	防尘防水
安全性和EMC标准:	请参阅符合性声明
应用范围:	仅用于封闭的室内房间

环境条件

平均海拔高度:	最高2,000 m
环境温度:	17 – 27 °C (±0.5 °C/12小时)
空气相对湿度:	45 - 60%, 无冷凝
振动:	在无振动的房间内设置
适应环境的时间:	仪器放置在与投入使用位置相同的位置后至少 24小时 。
预热时间:	天平接通电源后至少 4小时 。从待机模式开启后, 仪器随即做好操作准备。

仪器 (机器人系统和天平)

砝码:	50 kg
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可参阅

🔗 选择合适的砝码托架 ▶ 第18页

7 废弃处理

根据关于废弃电气和电子设备 (WEEE) 的欧洲指令 2012/19/EU, 此设备不得作为生活垃圾处理。这也适用于欧盟以外的国家, 参照他们的具体要求。

请在电气和电子设备指定的收集点按照当地规定处理此产品。如有任何疑问, 请与相关部门或您购买的经销商联系。



8 合规性信息

国家审批文档, 例如FCC供应商一致性声明, 可在线获取和/或包含在包装中。

▶ www.mt.com/ComplianceSearch



如需更多信息，请查阅《参考手册（RM）》。

▶ www.mt.com/e10-RM

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