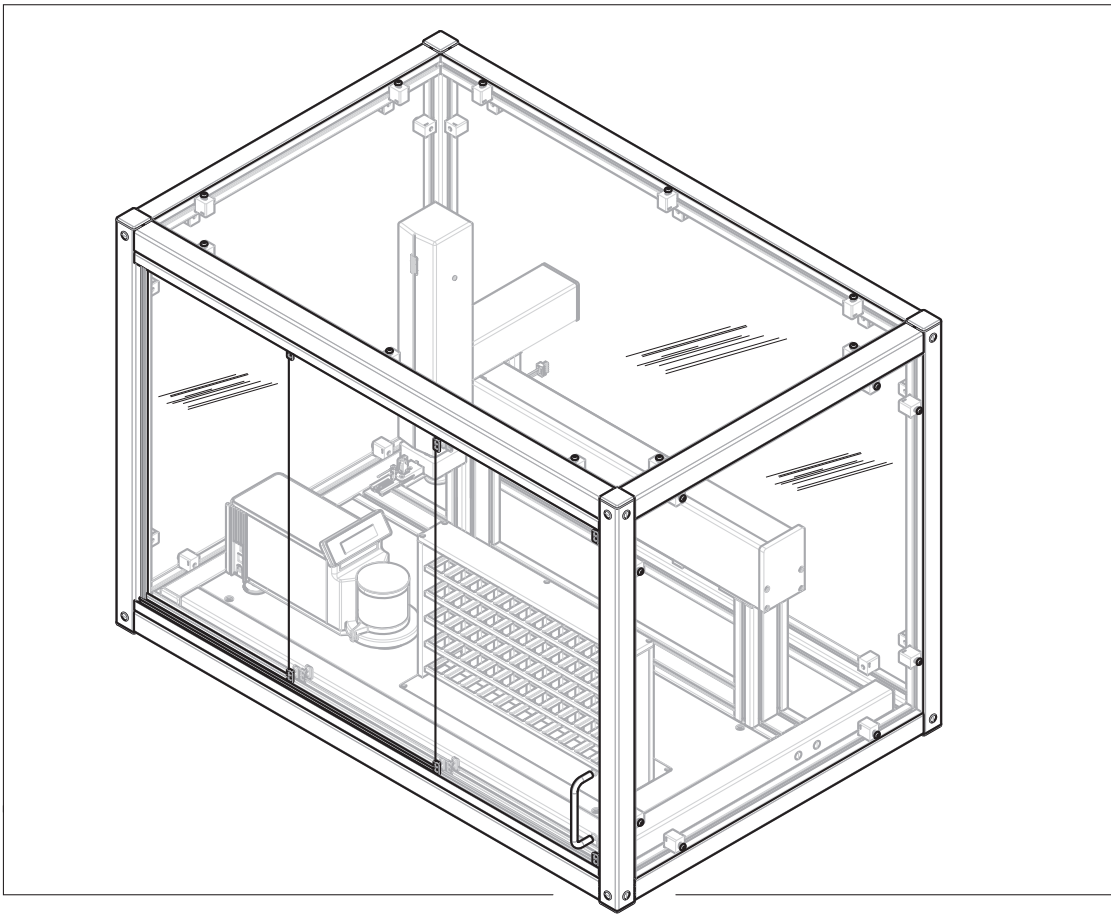
Reference Manual

Robotic Mass Comparator

e10



METTLER TOLEDO

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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

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

Instructions for the balance:

▸ www.mt.com/XPR-micro-RM

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 Explanation of conventions and symbols used

Conventions and symbols

Key and/or button designations and display texts are shown in graphic or bold text, e.g., ⌂, **OK**.

Note For useful information about the product.

Refers to an external document.

Elements of instructions

In this manual, step-by-step instructions are presented as follows. The action steps are numbered and can contain prerequisites, intermediate results and results, as shown in the example. Sequences with less than two steps are not numbered.

- Prerequisites that must be fulfilled before the individual steps can be executed.

1 Step 1

➡ Intermediate result

2 Step 2

➡ Result

1.3 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.

⚠ 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.

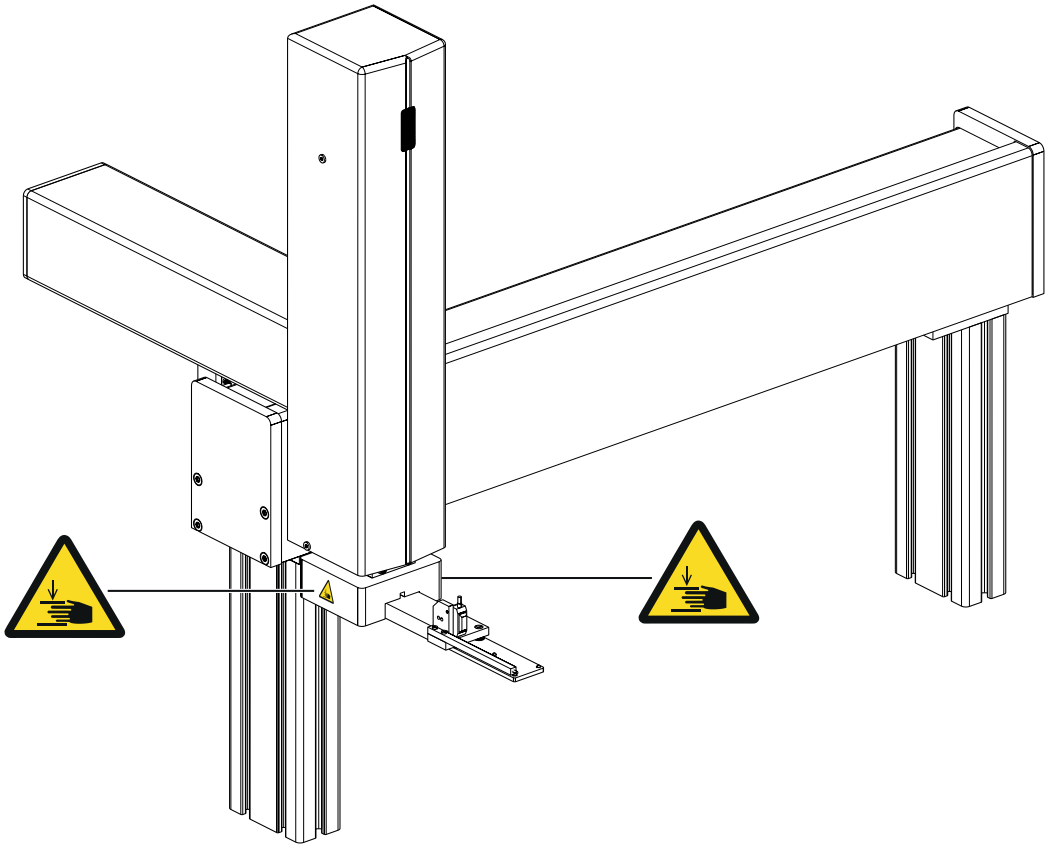
2.3 Warning symbols on the robot arm

⚠ 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.

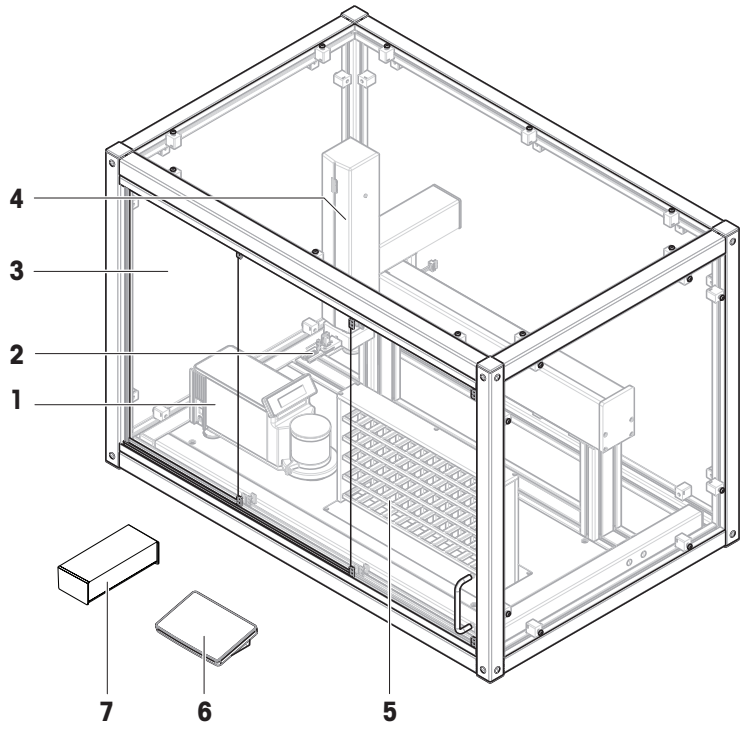


2.4 Switching off in case of an emergency

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

3 Design and Function

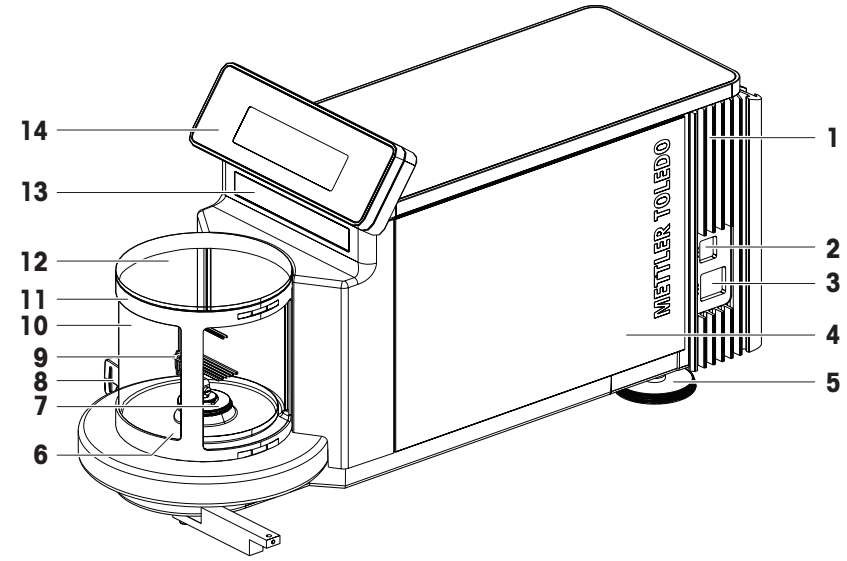
3.1 Overview instrument



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

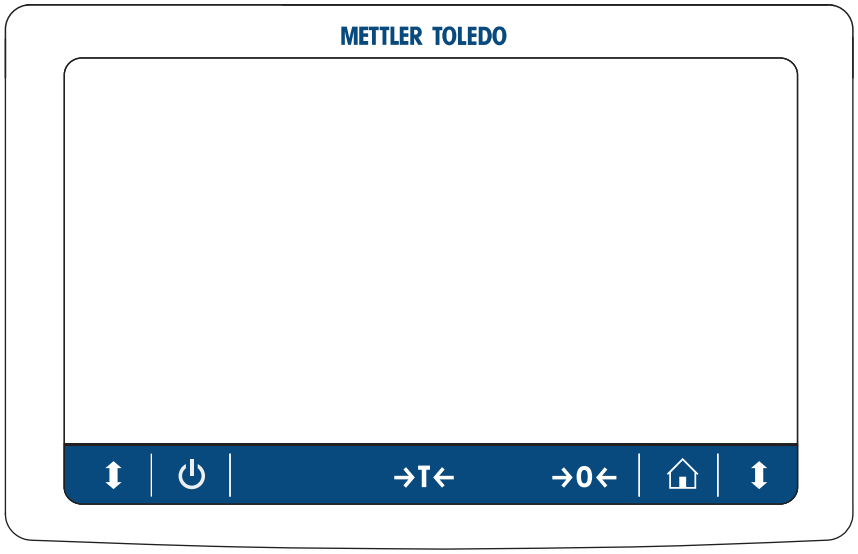


1	Cooling element	**8**	Door handle
2	USB-B port (to host)	**9**	Weighing pan
3	USB-A ports (to device)	**10**	Weighing chamber
4	Weighing unit	**11**	Draft shield
5	Leveling foot	**12**	Draft shield cover
6	Weighing chamber plate	**13**	Model plate
7	Drip tray	**14**	Weighing display (SmartView)

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

www.mt.com/XPR-micro-RM

3.2.2 Overview terminal

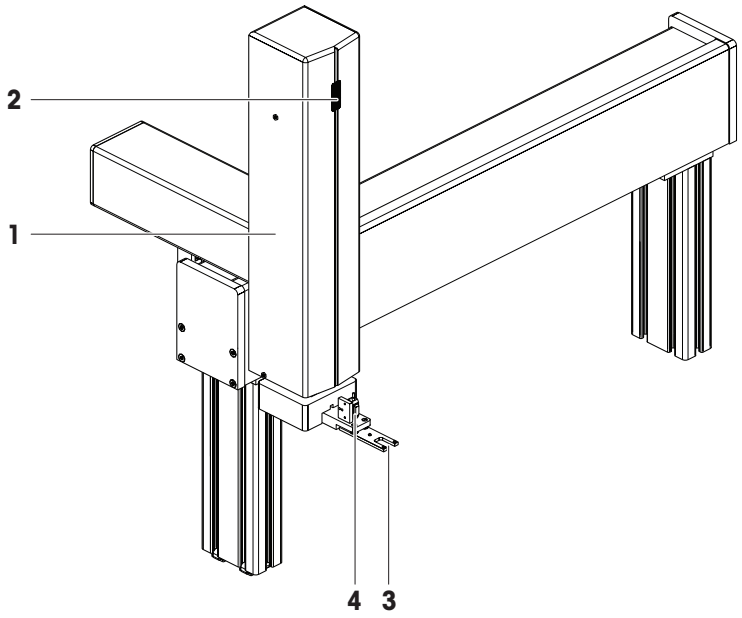


	Name	Description
⏻	**Standby**	By tapping ⏻, the balance is not completely switched off but goes into standby mode. To switch the balance completely off, it must be unplugged from the power supply. **Note** Do not disconnect the balance from the power supply unless the balance is not used for an extended period of time. After switching on the instrument, it must warm up before giving accurate results.
→T←	Tare	Tares the balance. This function is used when the weighing process involves containers. After taring the balance, the screen shows Net which indicates that all displayed weights are net.
→0←	Zero	Zeroes the balance. The balance must always be zeroed before starting the weighing process. After zeroing, the balance sets a new zero point.
⌂	Home	To return from any menu level to the main weighing screen.
⬍	Open/close door	Opens the weighing chamber door to the left or to the right (default value).

Note

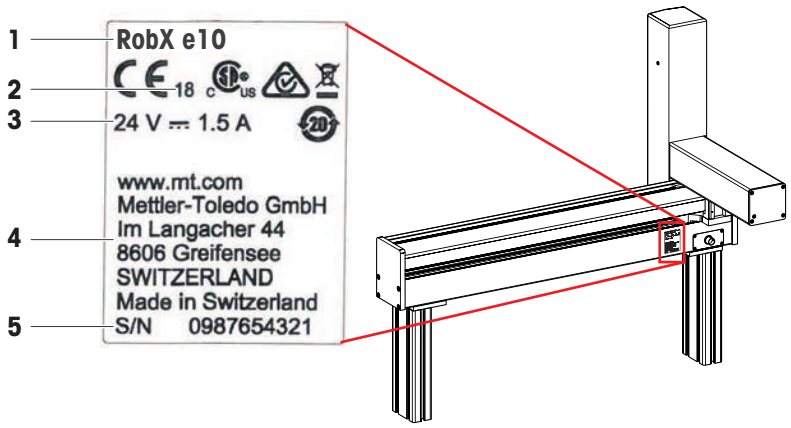
No changes must be made on the terminal of the balance. During weighing, the terminal of the balance is disabled.

3.2.3 Overview robot system



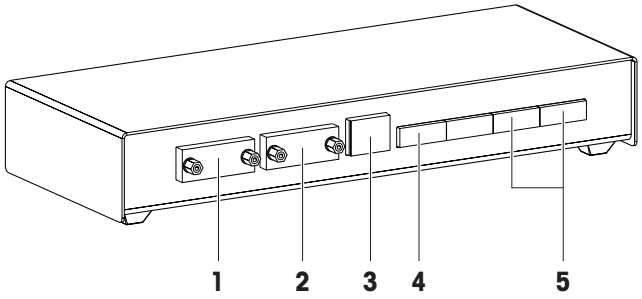
1	Robot arm	**3**	Robot hand
2	Status indicator	**4**	Light barrier

3.2.4 Overview type label



1	Model designation	**4**	Manufacturer
2	Year of manufacture	**5**	Serial number
3	Power supply		

3.2.5 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		

3.2.6 Control software

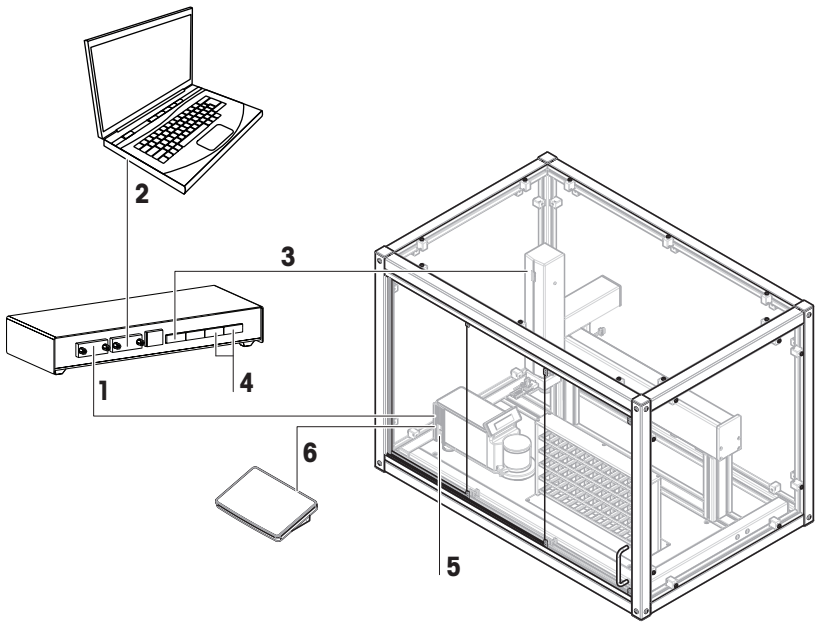
e10control is a software that serves to operate the instrument. It displays measuring results and other data, and it serves to manage the instrument settings.

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

See also

Operation ▸ Page 22

3.3 Cable connections

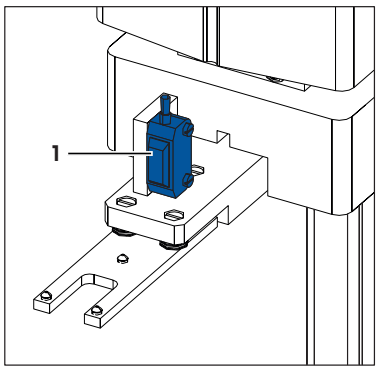


1	Cable to balance (RS232C – USB)	**4**	AC/DC adapter
2	Cable to computer (RS232C – USB)	**5**	AC/DC adapter
3	Cable to robot system	**6**	Terminal cable

3.4 Sensors and status indicator

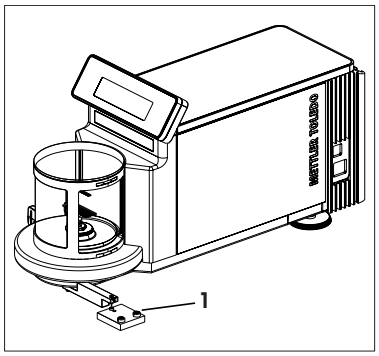
Light barrier

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.



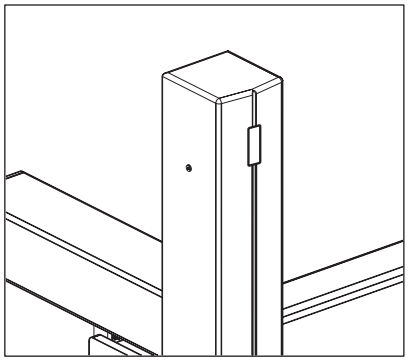
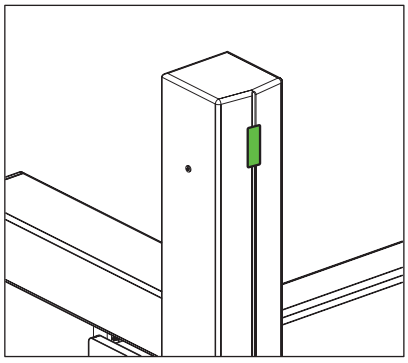
Balance position sensor

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
	**Status indicator is off** • The robot system is switched off. • The robot arm does not move automatically.
	**Status indicator is on** • The robot system is switched on. • The robot arm can move automatically. – ⚠ **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.**

4 Installation and Putting into Operation

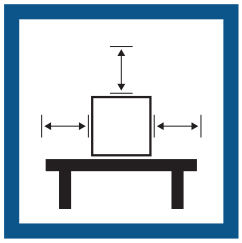
4.1 Selecting the location

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

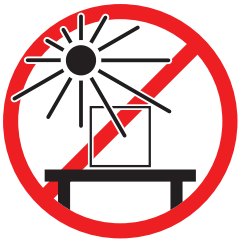
Ensure sufficient spacing



Level the instrument

Provide adequate lighting

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
- Production certificate
- Declaration of Conformity

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 5

4.4 Putting into operation

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

See also

General data ▸ Page 70

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.

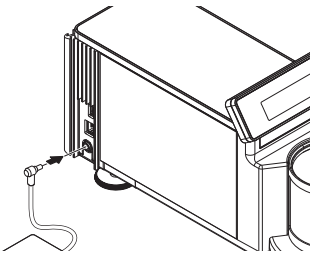
1 Install the cables in such a way that they cannot be damaged or interfere with operation.

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.

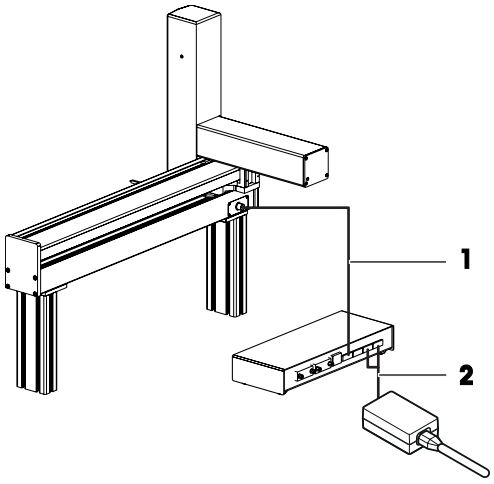


5 Check that the robot system and the control unit are connected (1).

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

See also

General data ▸ Page 70

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 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.

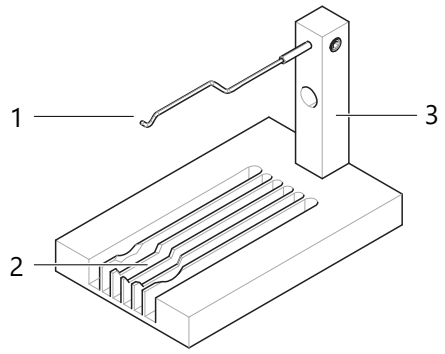
In order to ensure a trouble-free operation of the comparator and to minimize corner load errors, strict rules must be followed when choosing the carrier type.

Note

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

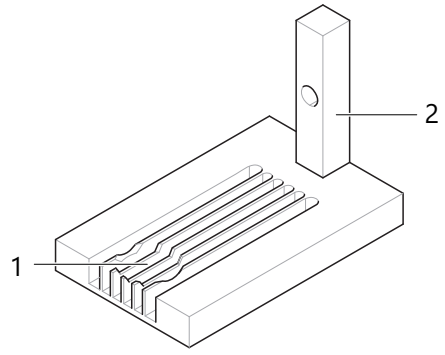
4.4.3.1 Available weight carriers

Design 1



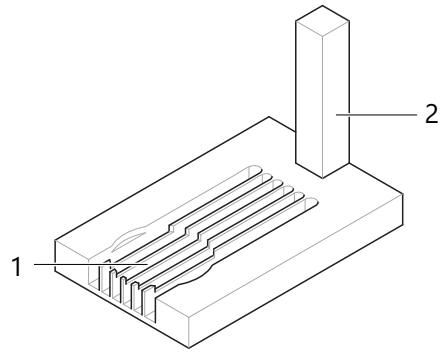
1	Hook for wire weights	**3**	Handle (grey) for design 1
2	Indent for cylindrical and sheet weights		

Design 2



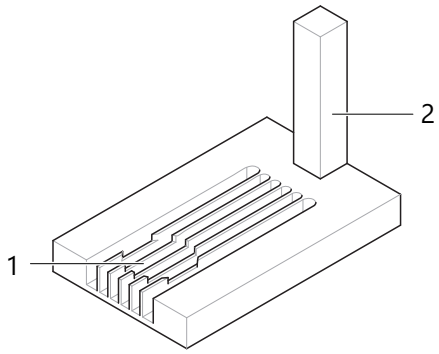
1	Indent for cylindrical and sheet weights	**2**	Handle (grey) for design 2

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

4.4.3.2 Selecting a suitable weight carrier

Note

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

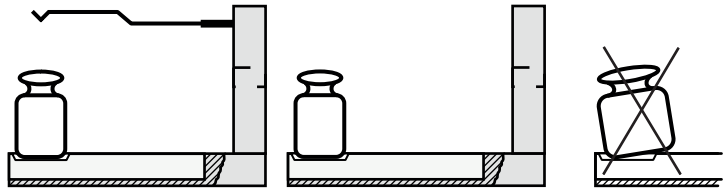
Note

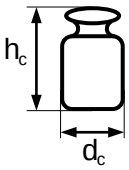
Make sure to place the weights correctly on the corresponding carrier. Weights must never be placed over the edge of the indent.

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

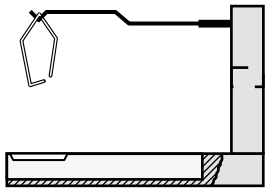
- Design 1 or 2: up to three weights, each placed on its own carrier
- Design 1 or 2, in combination with design 3 or 4: up to two weights, each placed on its own carrier

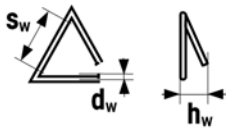
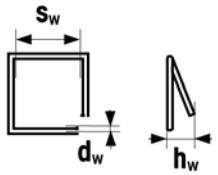
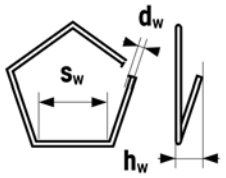
Cylindrical weight with knob



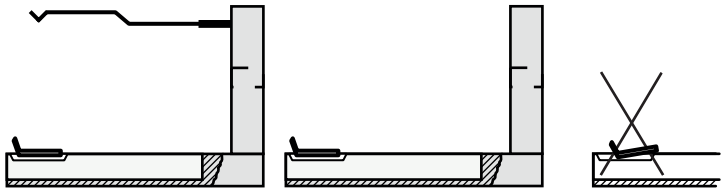
Weight shape	Weight dimension	Suitable weight carrier
	**diameter:** $4 \text{ mm} \le d_c \le 8.2 \text{ mm}$ **height:** $h_c \le 16 \text{ mm}$	Design 1 Design 2
	diameter: $8.2 \text{ mm} \le d_c \le 14 \text{ mm}$ **height:** $h_c \le 19 \text{ mm}$	Design 3
	diameter: $8.2 \text{ mm} \le d_c \le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

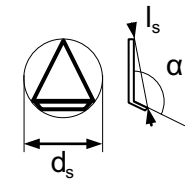
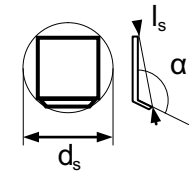
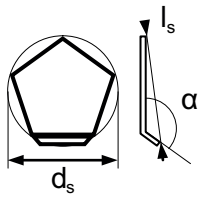
Wire weight



Weight shape	Weight dimension	Suitable weight carrier
triangular 	**triangle inner side:** 5.5 mm ≤ s_w ≤ 18 mm **wire diameter:** 0.05 mm ≤ d_w ≤ 1.5 mm **height:** h_w ≤ 6 mm	Design 1
square 	**square inner side:** 5.5 mm ≤ s_w ≤ 12 mm **wire diameter:** 0.05 mm ≤ d_w ≤ 1.5 mm **height:** h_w ≤ 6 mm	Design 1
pentagonal 	**pentagon inner side:** 5.5 mm ≤ s_w ≤ 12 mm **wire diameter:** 0.05 mm ≤ d_w ≤ 1.5 mm **height:** h_w ≤ 6 mm	Design 1

Sheet weight, polygonal



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

See also

Available weight carriers ▸ Page 17

4.4.3.3 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.

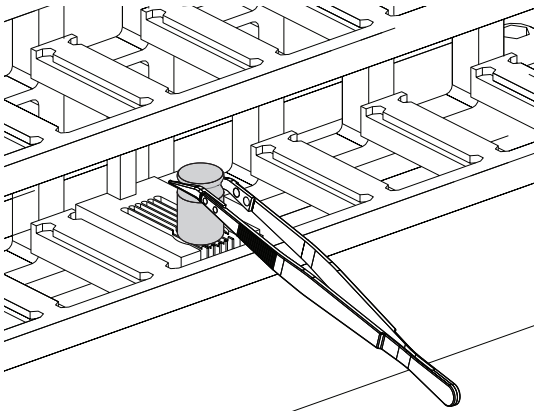
3 Center the weight carriers in the provided space on the magazine.

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 16



4.4.4 Switching off the instrument

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

5 Operation

5.1 Starting e10control

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

5.1.1 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.

5.1.2 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. For details, see [Remote-controlling the e10 comparator ▸ Page 49].
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: • **Standards data for selected sets**, see [Adding standards data ▸ Page 23] • **Test weights data**, see [Adding test weights data ▸ Page 25] • **Magazine places allocation**, see [Allocating the weight magazine places ▸ Page 26] • **Weighing process settings**, see [Weighing process settings ▸ Page 29] • **Series scheme**, see [Series scheme ▸ Page 31] • **Report heading**, see [Performing a weighing ▸ Page 36]
Exit	Saves any changes and quits **e10control**.

5.2 Entering and editing the weights data

Navigation: e10control > Weights

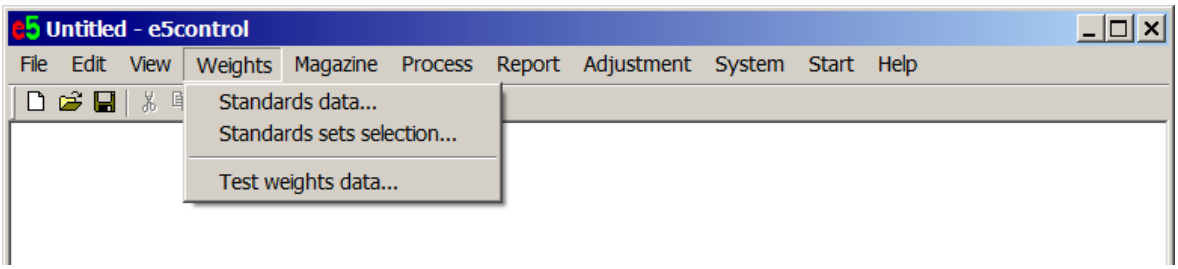
The **Weights** menu gives access to the standards data and the test weights data.

Test weights data are process-specific and included in the current settings file (**.e10**).

Standards data are saved to the database **MyStandards.std**. They are specific to the mass standards laboratory and need to be accessible from any settings file.

Note

The database **MyStandards.std** must be stored in the same directory as the software executable (**e10control.exe**) and the settings files. METTLER TOLEDO recommends creating a backup of **MyStandards.std**.



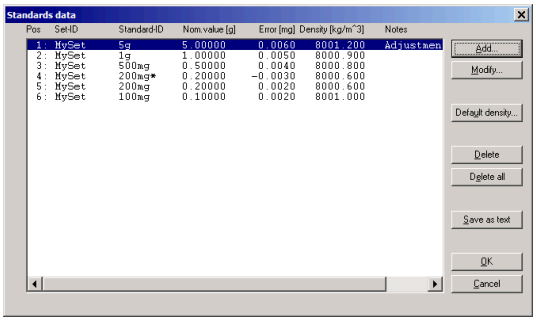
5.2.1 Adding standards data

Navigation: e10control > Weights > Standards data...

1 Select **Weights** > **Standards data...**.

➡ The standards data are displayed. The entries are numbered (column **Pos**) and alphabetically sorted by **Set-ID** (limited to 8 characters). Standards of the same **Set-ID** are sorted by descending nominal value (**Nom.value [g]**). Each entry has assigned a **Standard-ID** (limited to 8 characters), an error (**Error [mg]**), and notes (**Notes**, limited to 35 characters).

2 Optional: Change the standards data by clicking the **Add...**, **Modify...**, **Delete**, or **Delete all** button.



3 Enter the password when prompted.

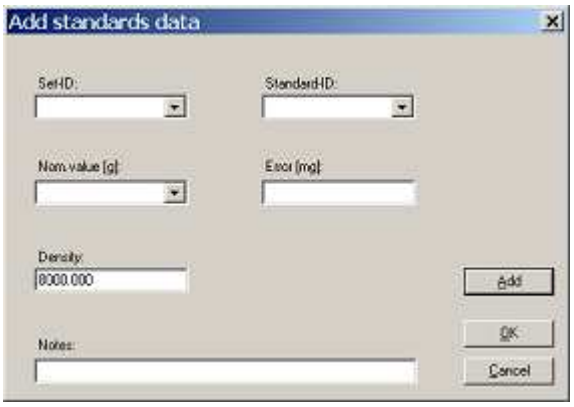
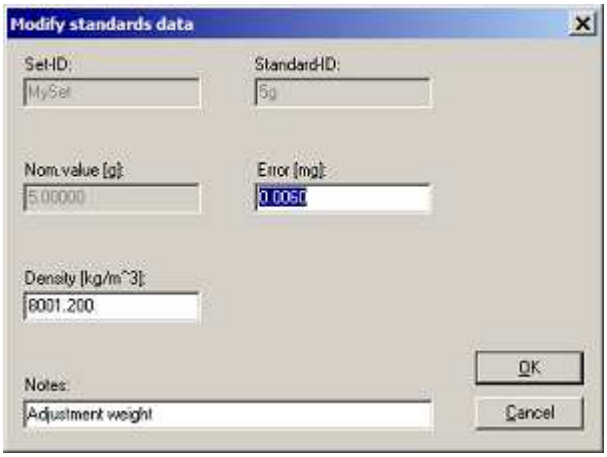
Note

By default, there is no password. To change the password, click **Change...** and follow the instructions in the software. The password is limited to 12 characters.

4 Click **OK** to return to the main window.

➡ The standards data are saved to **MyStandards.std**.

Available options

Option	Description
Add…	Opens the **Add standards data** window which allows you to enter a new record in the standards database. Click **OK** to return to the **Standards data** window. 
Modify…	Opens the **Modify standards data** window which allows you to modify the error and the notes. Click **OK** to return to the **Standards data** window. 
Default density…	Opens a window where the default density can be entered. This default density is used when a new standard is added. The button is inactive if standards and test weights have no density values, see [Selecting the application mode ▸ Page 57].
Delete	Deletes the selected record.
Delete all	Deletes all database records.
Save as text	Saves the standards data as a separate text file (**MyStandards.txt**) in the current directory.

5.2.2 Selecting a standards set

Navigation: e1Ocontrol > Weights > Standards sets selection…

Each standard belongs to a standards set with a **Set-ID**. It is possible to use more than one set in a weighing process.

1 Select **Weights** > **Standards sets selection…**.

➡ The **Standards sets selection** opens.

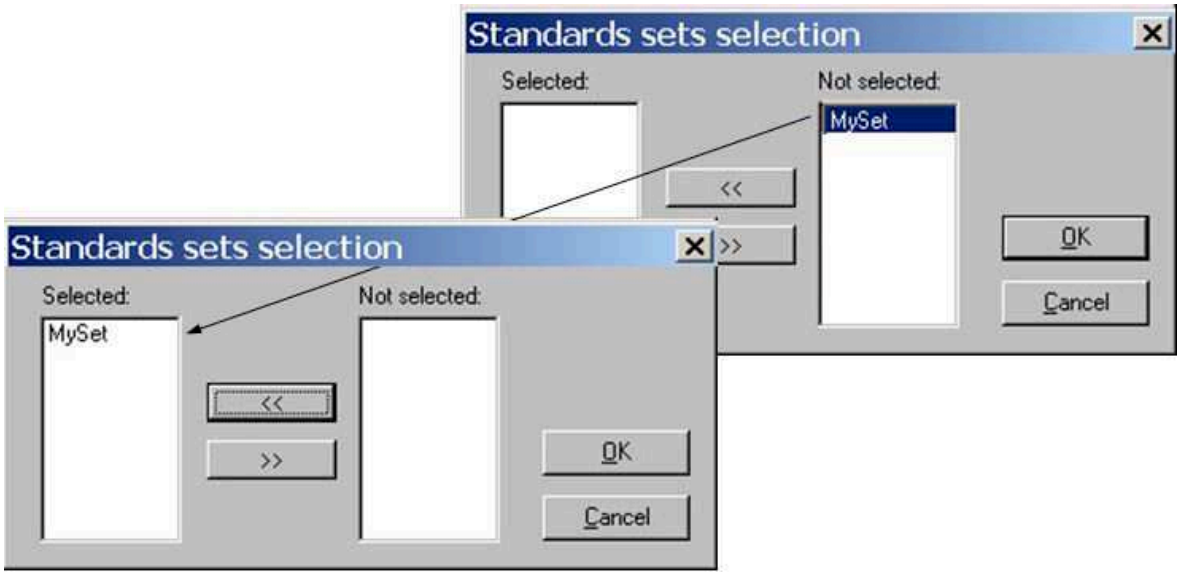
2 Select a standards set listed under **Not selected**.

3 Click the double arrow **«** to move the selected set to the left side.

➡ The selected sets are listed under **Selected**.

Note

The weights of the non-selected sets do not appear in this weighing process. This applies, for example, to the allocation of magazine places, or the design of the series scheme.



5.2.3 Adding test weights data

Navigation: e10control > Weights > Test weights data...

1 Select **Weights** > **Test weights data...**.

➡ The **Test weights data** are displayed. It includes a list with all test weights that are to be determined during the weighing process. The entries are numbered (column **Pos**) and alphabetically sorted by **Set-ID** (limited to 8 characters). Test weights of the same **Set-ID** are sorted by descending nominal value (**Nom.value [g]**). Each entry has assigned a **Weight-ID** (limited to 8 characters), and notes (**Notes**, limited to 35 characters).

2 Optional: Change the **Test weights data** by clicking the **Add...**, **Modify...**, **Change Set ID...**, **Default density...**, **Delete**, or **Delete all** button.

3 Enter the password when prompted.

Note

By default, there is no password. To change the password, click **Change...** and follow the instructions in the software. The password is limited to 12 characters.

4 Click **OK** to return to the main window.

➡ The **Test weights data** are saved.

Available options

Option	Description
Add...	Opens the **Add test weights data** window which serves to add a new record to the list of test weights. **Note** After entering a **Set-ID** and a nominal value, use the **auto numbering** button to create up to 100 test weights with the same **Set-ID** and nominal value. Example: Entering "00145" as first number and "00180" as last number creates 36 test weights. The following weight IDs are generated: "00145", "00146", ..., "00179", "00180".
Modify...	Opens the **Modify test weights data** window which allows you to modify the notes.
Change Set ID...	Opens the **Change Set ID** window which allows you to change the **Set-ID** of all test weights belonging to one test weights set.

Option	Description
Default density…	Opens a window where the default density can be entered. The default density is used when a new test weight is added. The option is inactive if standards and test weights have no density values, see [Selecting the application mode ▸ Page 57].
Delete	Deletes the record currently selected in the list box.
Delete all	Deletes all records.

See also

Adding standards data ▸ Page 23

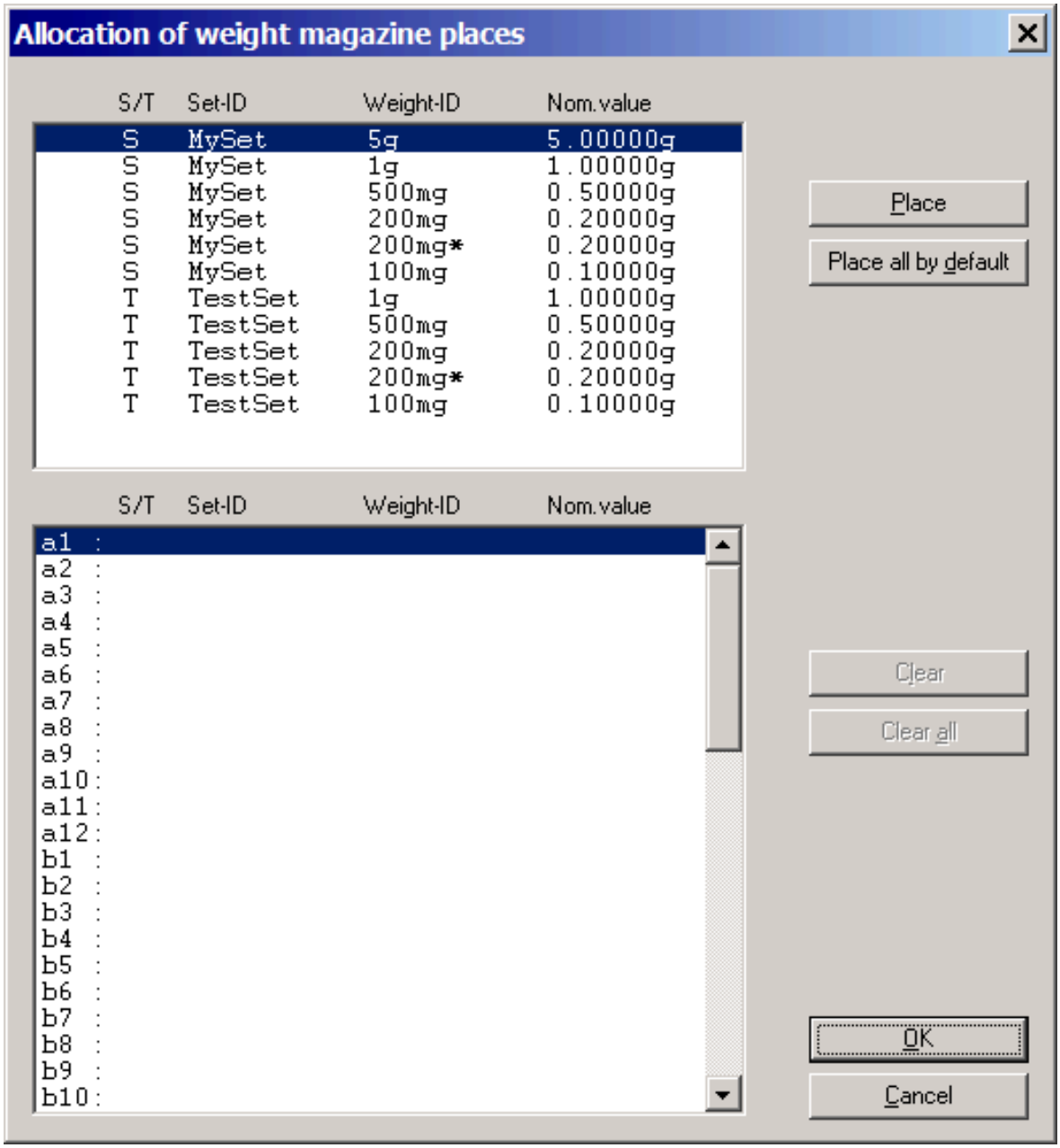
5.3 Allocating the weight magazine places

Navigation: e10control > Magazine > Places allocation…

Once the standards and test weights are defined in their respective database, their position on the weight magazine needs to be identified and registered in **e10control**.

– Select **Magazine** > **Places allocation…**.

➡ The window **Allocation of weight magazine places** is displayed.



Sections

- upper part of the window: defined standards S and test weights T
- lower part of the window: available magazine places
  - a, b, c, ...: magazine row (top to bottom)
  - 1, 2, 3, ...: magazine column (left to right)

To allocate a weight to a magazine place, proceed as follows.

1 Select the weight from the upper part of the window.

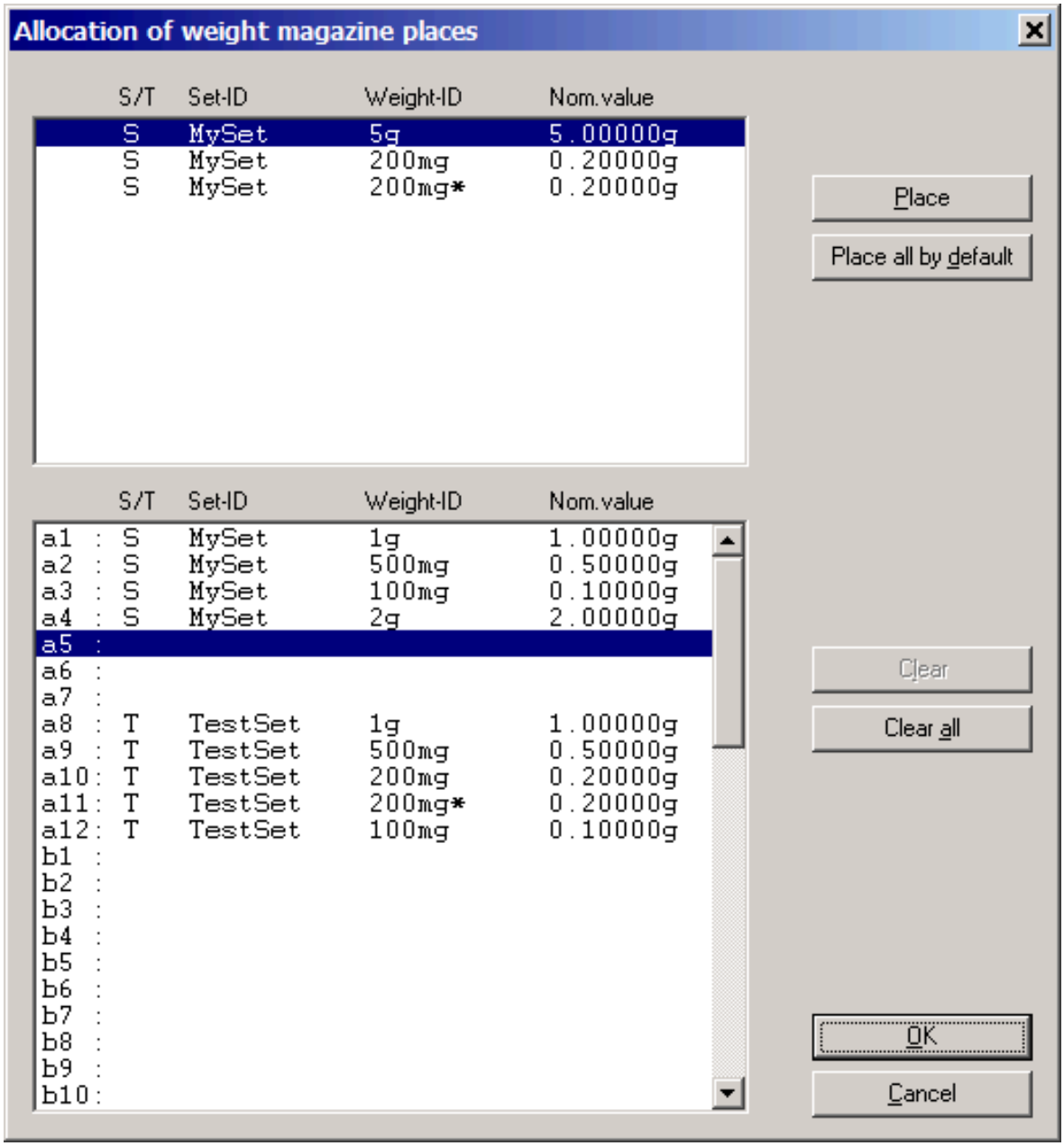
2 Select the target magazine place in the lower part of the window.

3 Click **Place**.

➡ The selected weight is allocated to the target magazine place, as shown in the lower part of the window. The weight is removed from the upper part of the window.

Note

A weight with a nominal value exceeding 6.1 g is rejected.



4 Optional: To undo an allocation, select the corresponding magazine place and click **Clear**. To undo all allocations, click **Clear all**.

➡ The weights that are no longer allocated are transferred to the upper part of the window.

5 Click **OK**.

Note

Alternatively, click **Place all by default** to allocate all weights to the magazine places automatically.

See also

- Adding standards data ▸ Page 23
- Adding test weights data ▸ Page 25

5.4 Determining the weighing process settings and series scheme

At this stage, standards and test weights are defined, and the weights are allocated to the weight magazine places. In a next step, the comparison of weights can be defined.

The following terms are used.

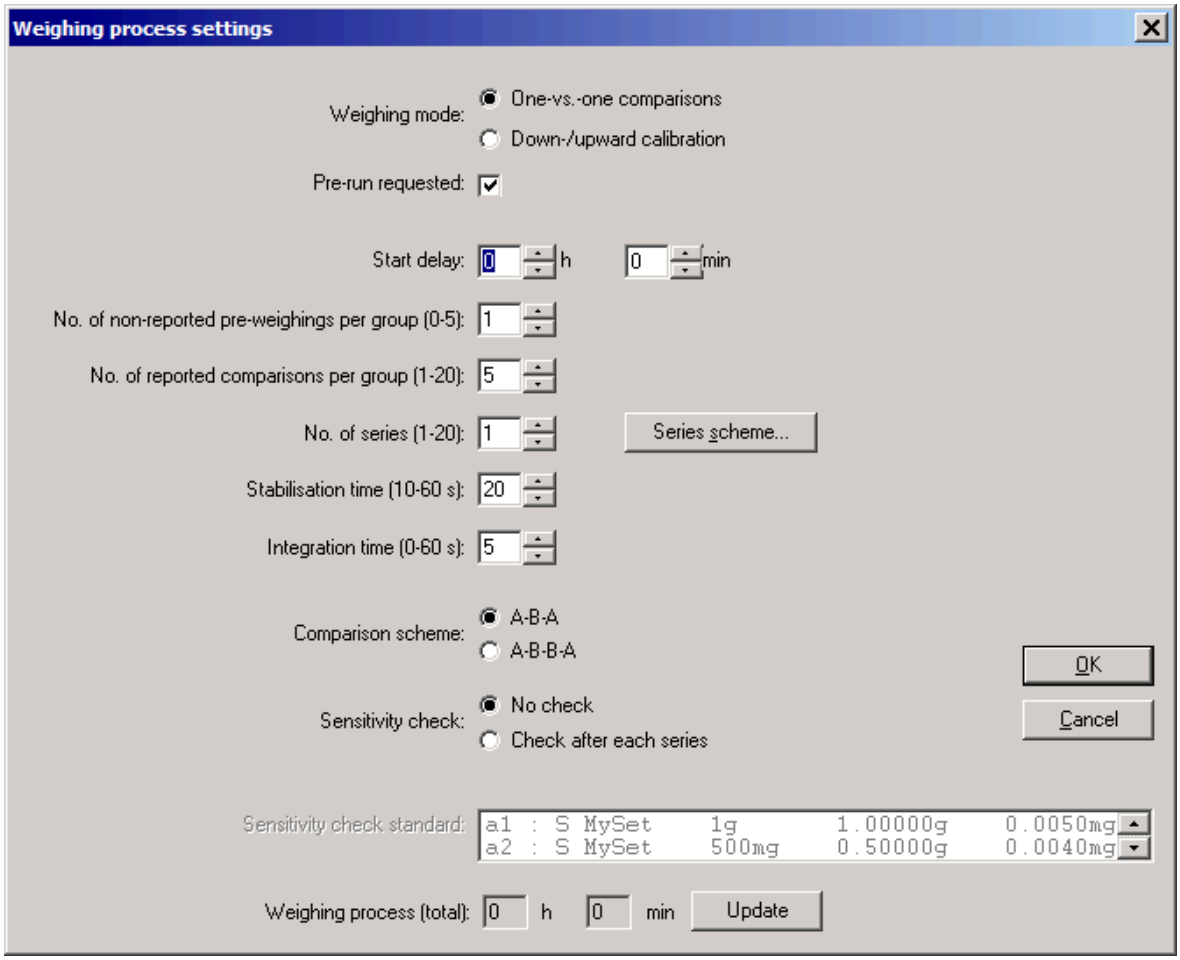
Term	Description
Comparison or (comparison) weighing	A comparison between two weights or combinations of weights.
Group	A sequence of n identical and consecutive comparisons whose results are statistically evaluated.
Series	A sequence of groups. **Note** The comparison of weights performed in each group, and the sequence of groups, are defined in the series scheme.
(Weighing) process	A sequence of n identical and consecutive series.

5.4.1 Weighing process settings

Navigation: e10control > Process > Settings...

1 Select **Process** > **Settings...**.

➡ The window **Weighing process settings** is displayed.



2 Define the required parameters.

Parameter	Description
Weighing mode	Which options are available depends on the edition of **e1Ocontrol**: • **One-vs.-one comparisons**: direct comparison between two single weights • **Down-/upward calibration**: comparison between two weight combinations; a weight combination can consist of up to three weights Default setting: **One-vs.-one comparisons** selected
Pre-run requested	When this option is activated, the instrument carries out an initial check. The measured value of each weight is compared to its defined nominal value. Placing errors are reported, and the process is aborted. Default setting: **Pre-run requested** activated (strongly recommended)
Start delay	Defines the time between the initial check(s) and the start of the first series. Default setting: 0 h 0 min, with a maximum of 99 h 59 min
No. of nonreported preweighings per group (0-5)	To reduce the "first-weighing effect" (drift), namely after a change of the nominal value, the instrument can do pre-weighings without reporting the data. Each pre-weighing consists of the sequence **A-B**, regardless of the selected comparison scheme. Default setting: 3 (recommended)
No. of reported comparisons per group (1-20)	Defines the number of statistically independent comparative weighings per group. Default setting: 5
No. of series (1-20)	Defines the number of series. Default setting: 1
Stabilisation time (10-60 s)	Defines the time between loading the balance pan and the start of the measurement, see **Integration time (0-60 s)**. Default setting: 25 s
Integration time (0-60 s)	Defines the duration of the measurement period during which the instrument records one measurement per second. The result in the measurement report is calculated from the average of the recorded values. Default setting: 5 s
Comparison scheme	The following options are available: • comparison scheme **A-B-A** • comparison scheme **A-B-B-A** Default setting: **A-B-A** selected For details, see [Calculations ▶ Page 44]
Sensitivity check	The following options are available: • **No check**: no sensitivity check is performed • **Check after each series**: a sensitivity check is performed prior to the first series, and after every series **Note** A sensitivity check consists of a non-reported sequence **0-B** (pre-check), followed by a reported sequence **0-B-0**. Default setting: **No check** selected
Sensitivity check standard	This section is only active if **Check after each series** is selected. It shows all standards with an allocated magazine place, and whose nominal value does not exceed 11 g. To select a standard, click on the corresponding line.

Note

The **Weighing process (total)** is an estimation of the total time needed to complete the weighing process. To save a changed parameter, click **Update**.

5.4.2 Series scheme

Navigation: e10control > Process > Settings… > Series scheme…

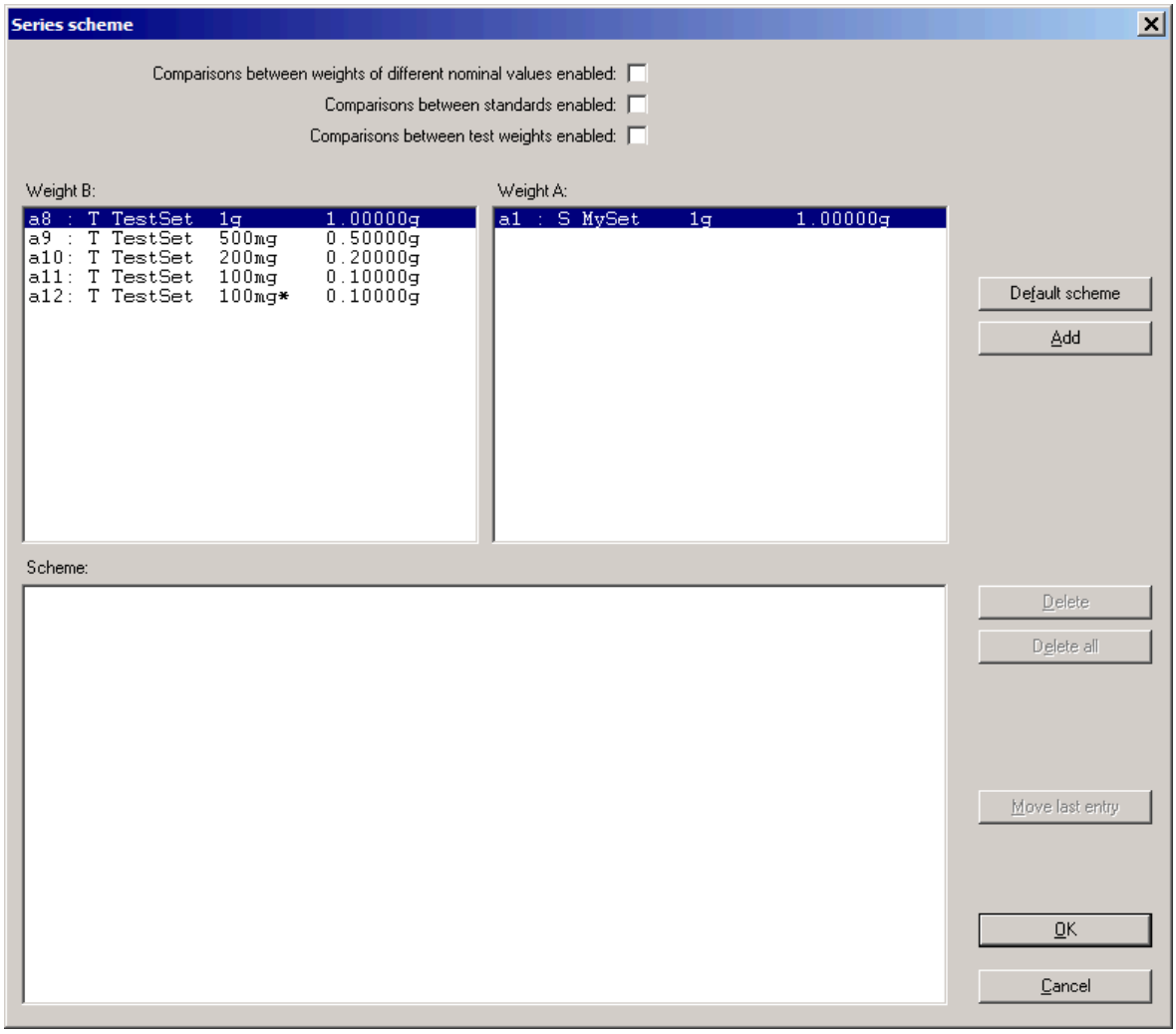
A series scheme defines which weight comparisons are performed in which sequence.

– Select **Process** > **Settings…** > **Series scheme…**.

➡ The window **Series scheme** is displayed.

5.4.2.1 Series scheme in mode One-vs.-one comparisons

In the mode **One-vs.-one comparisons**, the following window is displayed:



Sections

- **Weight B:** contains a list of available "test weights"
- **Weight A:** contains a list of available standards for the selected "test weight"
- **Scheme:** contains a list of comparisons between two single weights (weight B versus weight A) The comparisons are performed in the order of their entry.

To set up a comparison, proceed as follows:

1 Select a weight from **Weight B:**.

2 Select a weight from **Weight A:**.

3 Click **Add**.

➡ The comparison is added to **Scheme:**.

4 Repeat the steps to define the required series scheme.

5 Click **OK**.

➡ The new series scheme is created.

Available options

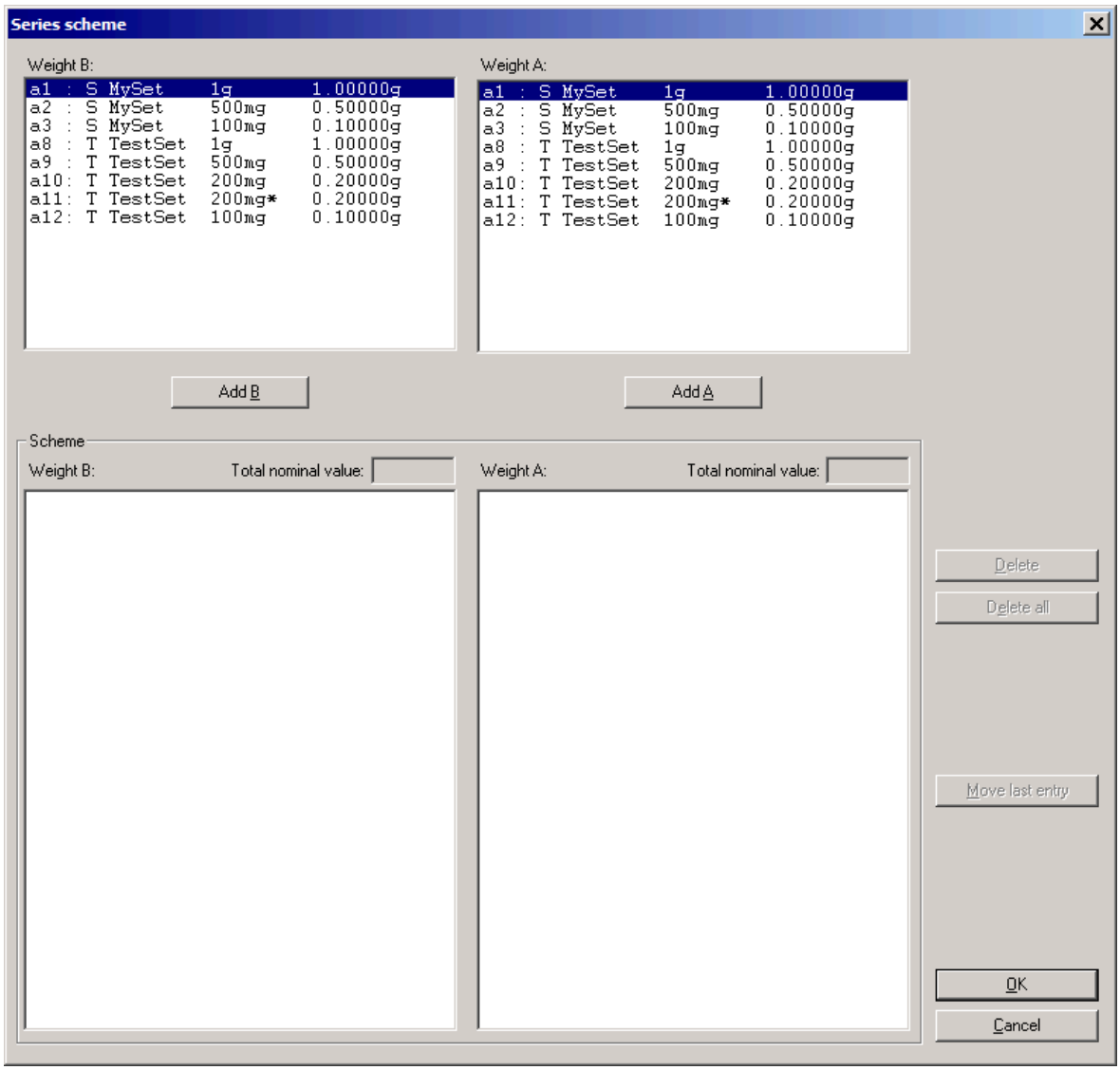
Option	Description
Comparisons between weights of different nominal values enabled	Enables the comparison of weights with different nominal values.
Comparisons between standards enabled	If not activated, available test weights with an allocated magazine place are displayed. If activated, available test weights and selected standards with an allocated magazine place are displayed.
Comparisons between test weights enabled	Enables the comparison between test weights.
Default scheme	**e1Ocontrol** automatically creates a series scheme (alternative to manual setup). This option is only available if none of options in the upper part of the window are selected.
Delete	Deletes an entry in the scheme
Delete all	Deletes all entries in the scheme
Move last entry	The sequence of comparisons can be changed by moving the last entry up: 1 Define the target line for the last entry. 2 Select the line below the target line. 3 Click **Move last entry**. ➡ The last entry appears above the selected line.

See also

🔗 Allocating the weight magazine places ▸ Page 26

5.4.2.2 Series scheme in mode Down-/upward calibration

In the mode **Down-/upward calibration**, the following window is displayed:



Sections

- **Weight B:** and **Weight A:** contain all available weights. That is, all test weights and standards to which a magazine place is allocated.
- **Scheme** shows the series scheme. **Weight B:** and **Weight A:** contain a list of comparisons between two weight combinations. A combination can consist of up to three weights. The comparisons are performed in the order of their entry.

To add a comparison, proceed as follows:

1 Select a weight from **Weight B:** in the upper part of the window.

2 Click **Add B**.

➡ The selected weight B is added to **Scheme** - **Weight B:**.

3 To combine weights, repeat the two previous steps.

➡ Weight combinations are indicated by a **'+'** symbol. The total nominal value of the combination is displayed above the **Scheme** lists.

4 Select a weight A from **Weight A:** in the upper part of the window.

5 Click **Add A**.

➡ The selected weight A is added to **Scheme** - **Weight A:**.

6 To combine weights, repeat the two previous steps.

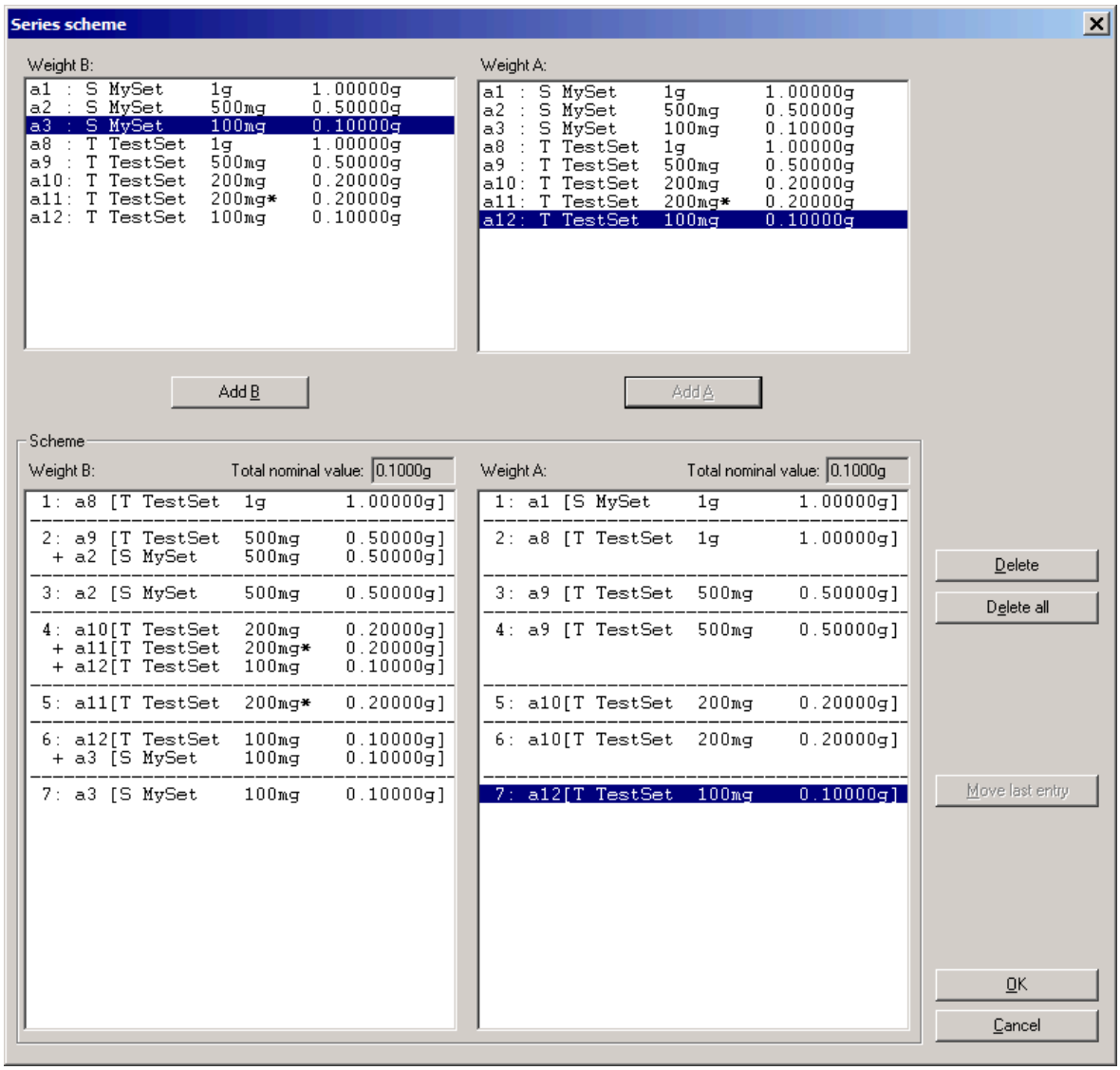
➡ Weight combinations are indicated by a **'+'** symbol. The total nominal value of the combination is displayed above the **Scheme** lists.

7 Repeat the procedure until the series scheme is defined.

8 Click **OK**.

Note

If the nominal value of a weight combination exceeds 6.1 g, the scheme entry is rejected.



Available options

Option	Description
Delete	Deletes an entry in the scheme
Delete all	Deletes all entries in the scheme
Move last entry	The sequence of comparisons can be changed by moving the last entry up: 1 Define the target line for the last entry. 2 Select the line below the target line. 3 Click **Move last entry**. ➡ The last entry appears above the selected line.

See also

Allocating the weight magazine places ▸ Page 26

5.5 Choosing the report contents

Navigation: e10control > Report > Contents...

Before starting the weighing process, the contents of the report file can be defined.

1 Select **Report** > **Contents...**.

➡ The window **Report contents** is displayed.

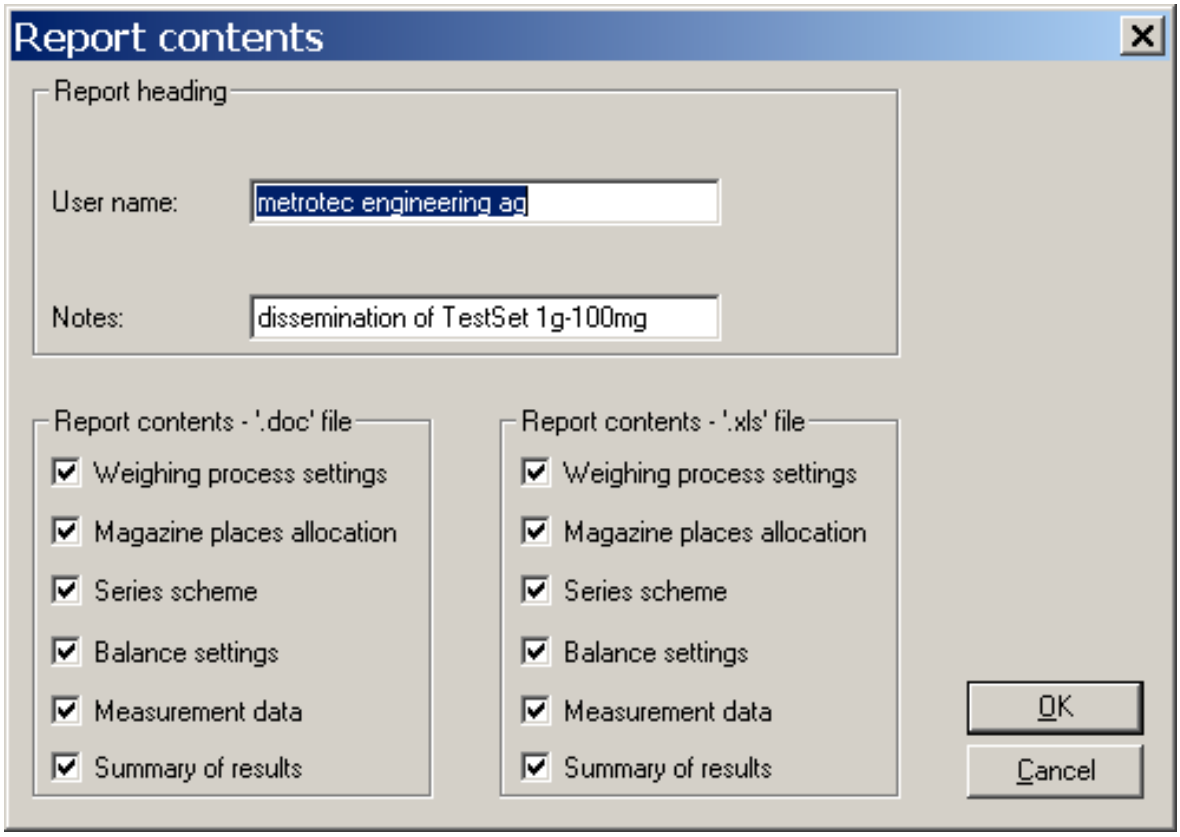
2 Enter a **User name**.

3 Add **Notes** that help identifying the report.

4 Tick off the content to be included in the report (Word, Excel).

Note

The file name of the report is defined when starting the measurement.



See also

Performing a weighing ▸ Page 36

Measurement report ▸ Page 40

5.6 Modifying system settings

Navigation: e10control > System

For details about the topics in the **System** menu, refer to the corresponding chapter.

Menu topic	Description
Comparator serial port...	see [Preparing a weighing ▸ Page 36]
Import/Export mode...	see [Importing a settings file into e10control ▸ Page 53]

Menu topic	Description
Application mode…	see [Selecting the application mode ▸ Page 57]
Software upgrade…	see [Upgrading e1Ocontrol ▸ Page 49]
Corner load error measurement…	see [Measuring the corner load error ▸ Page 47]
Email sender configuration…	see [Sending emails ▸ Page 63]
ReportTransmitter configuration…	For information on how to transmit measurement report data to a TCP/IP server using **ReportTransmitter configuration…**, see [Transmitting measurement report data to a TCP/IP server ▸ Page 65].
Standard's centering history…	For information on how to reduce pre-run/centering time using **Standard's centering history…**, see [Reducing pre-run/centering time using 'Standard's centering history' ▸ Page 64].
Support weights calibration data limits...	see [Setting calibration data limits for support weights ▸ Page 66]

5.7 Performing and monitoring a weighing

5.7.1 Preparing a weighing

Navigation: e1Ocontrol > System > Comparator serial port…

Before starting a weighing process, establish the serial communication between **e1Ocontrol** and the instrument.

1 Open the **System** menu and choose **Comparator serial port…**.
   ➡ The **Serial port** window opens.
2 Activate the port to which the interface cable 1 is connected.

➡ The instrument communication is set up.

5.7.2 Performing a weighing

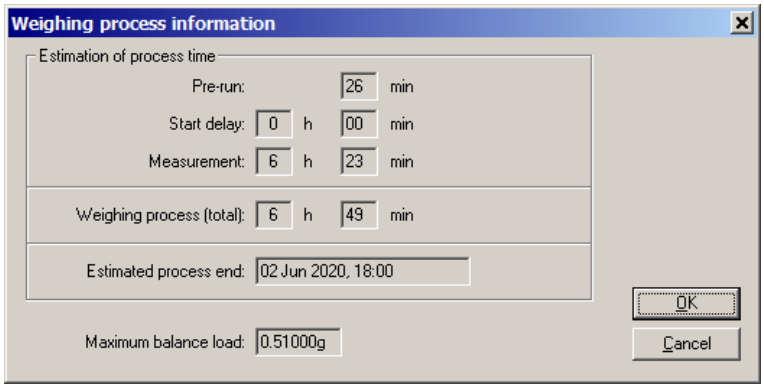
5.7.2.1 Performing a regular weighing

Navigation: e1Ocontrol > Start > Start measurement

- The weights are loaded on the weight carriers in the weight magazine.
- The weights data are entered.
- The weight magazine places are allocated.
- The weighing process settings and the series scheme are determined.
- If required: The report content is defined.
- The system settings are defined.

1 Open the **Start** menu and choose **Start measurement**.
   ➡ The **Enter report file name** dialog appears.
2 Select a target location and enter a file name.
3 Click **Save**.
   ➡ A report file is created.
   ➡ The weighing process information is displayed.
4 Click **OK**.

➡ The weighing process starts.



See also

- Monitoring the weighing process ▸ Page 38
- Preparing the weight magazine ▸ Page 16
- Entering and editing the weights data ▸ Page 23
- Allocating the weight magazine places ▸ Page 26
- Determining the weighing process settings and series scheme ▸ Page 29
- Choosing the report contents ▸ Page 35
- Modifying system settings ▸ Page 35

5.7.2.2 Performing a weighing using combined weights

It is possible to combine weights by placing a weight on a support weight.

1 Start the weighing process, see [Performing a regular weighing ▸ Page 36].

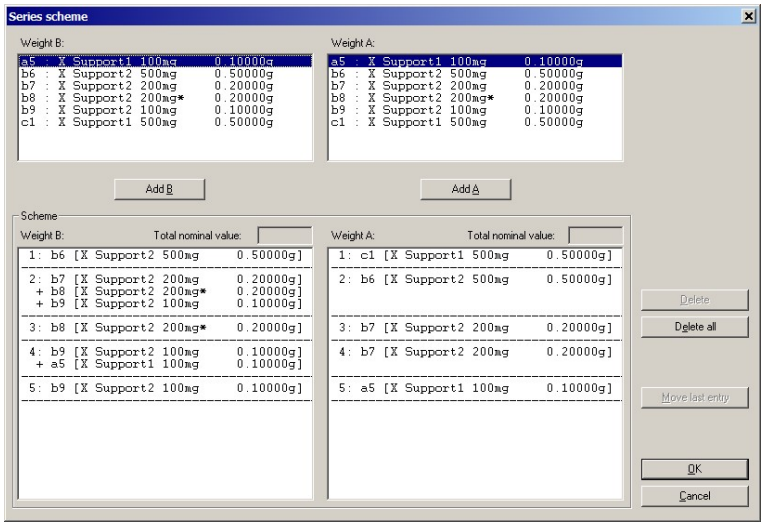
➡ The software checks the calibration database for valid calibration data. If no valid calibration data is found, an error message appears.

2 Read the provided information and click through the messages.

➡ The software generates a new calibration measurement.

The software uses the current process parameters to generate the new calibration measurement, but it checks some parameters to reach the minimum values for support weight calibration processes, as entered under **Support weights calibration data limits** in the **System** menu. The software indicates if parameters were increased.

The series scheme contains all missing support weight calibration measurements for the current measurement.



The following rules apply:

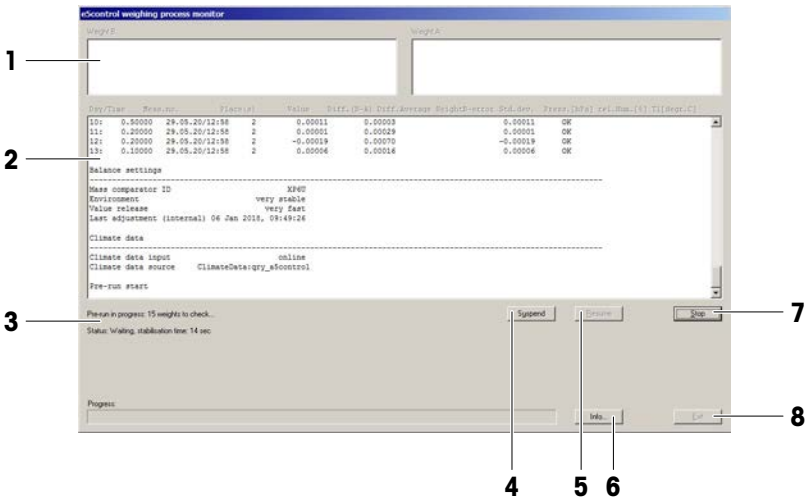
- The support weights must be calibrated if there is no entry in the support weights calibration database, or if the calibration data are not valid anymore. This depends on the values defined under **Support weights calibration data limits** in the **System** menu.
- A warning is generated if the calibration data shortly expires. This depends on the value defined under **Support weights calibration data limits** in the **System** menu. Optionally, these recalibrations can be included in the measurement.
- If a support weight is used as weight A and as weight B in a comparison, the weight is excluded from the comparison.
- If a comparison contains the same support weight(s) as weight A and B, like a 1:1 comparison of a weight on a support weight against itself, no support weight calibration is needed. The weighing difference is assumed to be 0.0000 mg.

See also

- Setting calibration data limits for support weights ▸ Page 66
- Performing a regular weighing ▸ Page 36

5.7.3 Monitoring the weighing process

After starting the weighing process, **e1Ocontrol** opens the weighing process monitor.



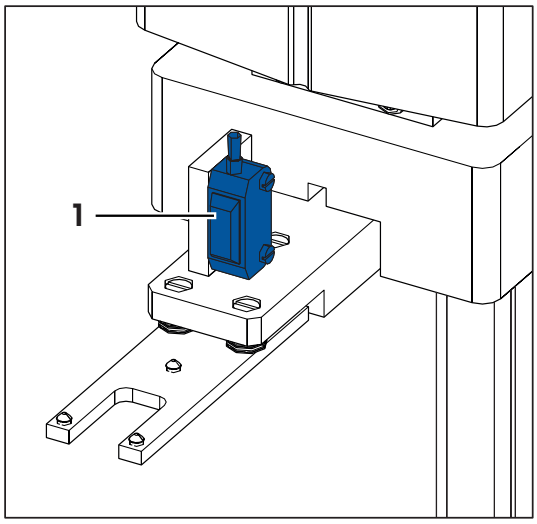
	Name	Description
1	Comparison weighing	Displays the weights to be compared.
2	Balance settings and measurement data	Displays the defined balance settings and shows the executed process steps, including measurement data.
3	Status information	Provides information about the current status of the weighing process. Shows hints in the event of an error.
4	**Suspend**	Interrupts the weighing process and allows access to the weighing chamber.
5	**Resume**	Resumes the interrupted weighing process.
6	**Info…**	Indicates the remaining time until completion of the weighing process. Indicates the estimated date and time of completion. **Note** Clicking **Info…** suspends the weighing process.
7	**Stop**	Aborts the weighing process. The available measurement results are written to the report file.

	Name	Description
8	**Exit**	Closes the weighing process monitor.

5.7.3.1 Monitoring before a weighing

The process starts with a centering phase.

- Each weight carrier is checked using the light barrier on the robot hand (1).
- Each weight carrier is centered on its magazine position.
- Optional: During a pre-run, the instruments weighs the weights and checks their nominal value.



Initial checks performed during the centering and pre-run phase:

- The serial communication is established.
- The authorization was duly given for **Down-/upward calibration** if selected.
- The authorization was duly given for **Online climate data input** if selected.
- The robot hand is free of any weight carrier.
- The balance dead load has been stable within an acceptable range since the last process start.
- Each allocated magazine place carries a weight carrier.
- If **Down-/upward calibration** is selected, the weight carrier design 3 or design 4 does not include more than two weights.
- Pre-run phase: The difference between measured and nominal weight value does not exceed 10% of the nominal value. If the nominal value is less than 1 mg, no check is performed.

Note

If an error occurs, the process is aborted. This does not apply to the dead load check.

See also

Preparing the weight magazine ▸ Page 16

5.7.3.2 Monitoring during a weighing

Checks performed during a weighing:

- The carrier type (design) was not changed.
- The difference between measured and nominal weight value does not exceed 10% of the nominal value. If the nominal value is less than 1 mg, no check is performed.
- The current group standard deviation does not exceed 10 µg. The calculation starts with the second comparison.
- The balance shows neither overload nor underload when a weight or weight combination is placed on the weighing pan.

Note

If an error occurs, the process is aborted.

5.7.3.3 Monitoring the balance position sensor

The status of the balance position sensor is permanently monitored.

Note

The balance must stay in the original position, as defined during system installation. If a position error occurs, contact a METTLER TOLEDO representative.

See also

Sensors and status indicator ▸ Page 13

5.8 Analyzing measurement data and report

5.8.1 Measurement report

The following figures show a report generated by **e10control** after running a weighing process consisting of one series of 7 groups of 5 **A-B-A** comparison weighings. The selected weighing mode is **Down-/upward calibration**.

Figure 'Report - Part 1' shows the report heading, comprising the following information:

- name of report file (**.doc**)
- The name of the settings file (**.e10**)
- The process start date and start time
- The duration of the process
- The user identification
- Some notes
- The weighing process settings
- The magazine places allocation
- The series scheme
- The balance settings

Figure 'Report - Part 2' shows the measurement data. Each table line consists of the following fields:

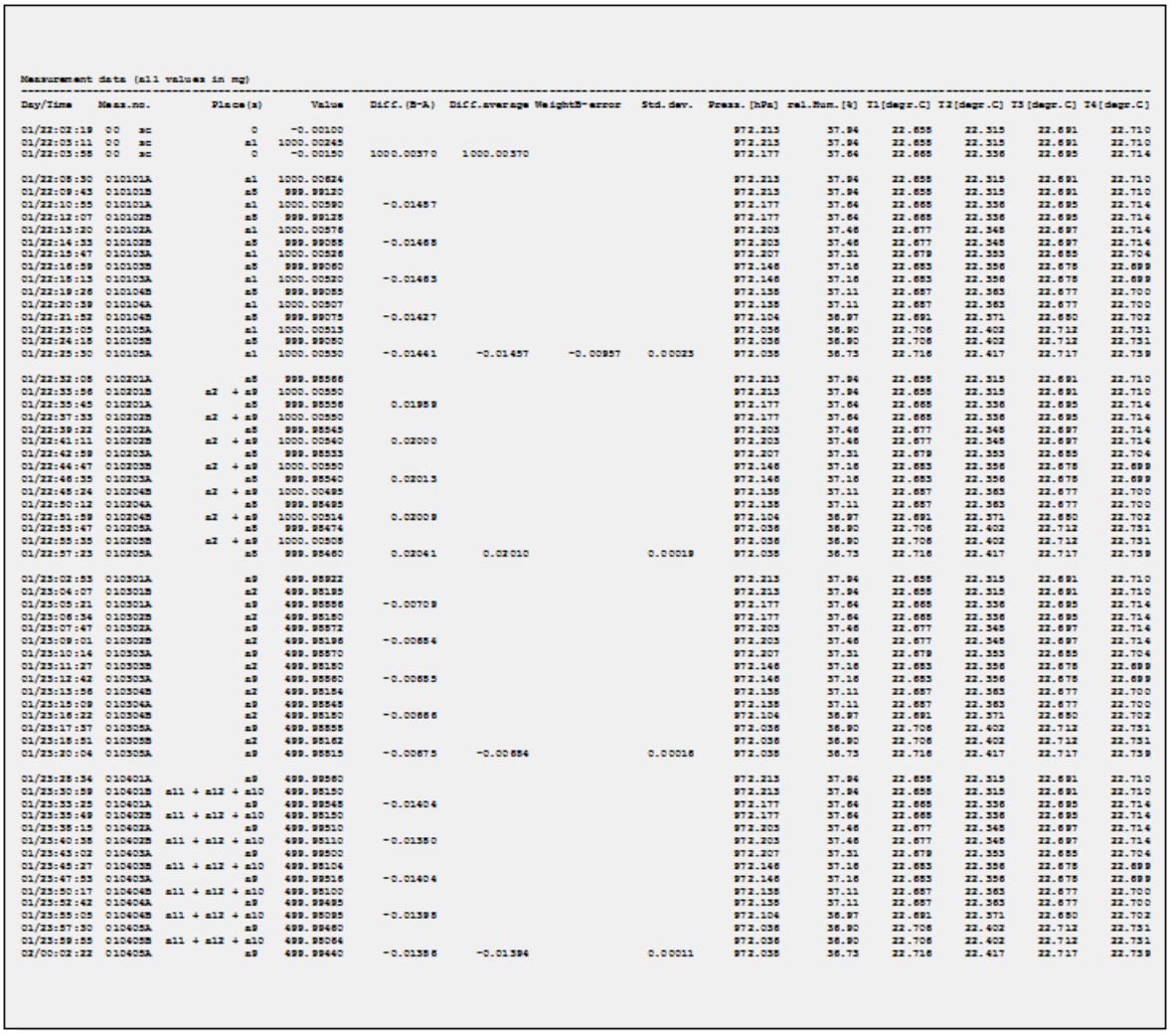
Field	Description
Day/Time	Measurement day and time recorded in day/hours:minutes:seconds.
Meas.no.	Measurement number that indicates the series number, the group number and the weighing number. Example: "010203A" stands for series no. 01, group no. 02, comparison no. 03 and weight A. When a sensitivity check is carried out, the measurement number shows the series number and **sc** (for sensitivity check).
Place(s)	Indicates the magazine place(s) of the weight(s). **Note** For weight combinations, the reported combination (e. g., "a11 + a12 + a10") differs from the combination entered in the series scheme ("a11 + a12 + a10"). It indicates in which order the weights were put onto the balance pan. **e10control** chooses the order such that the error due to corner load is minimized.
Value	Indicates the recorded weight(s) value in mg. This value is the calculated average of all values collected during the integration time and shows an extra decimal place, see [Weighing process settings ▸ Page 29].
Diff. (B-A)	Indicates for each comparison the calculated difference between weight B and weight A. The differences listed for a particular group are statistically independent, see [Calculations ▸ Page 44].
Diff.average	Indicates for each group the calculated average of all differences, see [Calculations ▸ Page 44].
WeightB-error	Indicates for each group the calculated error of the weight B, provided the error of the weight A is known. This applies to a single standard only, see [Calculations ▸ Page 44].
Std.dev.	Indicates for each group the calculated standard deviation of the difference average, see [Calculations ▸ Page 44].

If the climate data input source is **online via serial port**, the program collects online climate data. The measurement data table includes additional fields for the selected sensors. See [Selecting the application mode ▸ Page 57].

Figure 'Report - Part 3' shows the results in a summary table. If the process consists of more than one series, the summary table indicates the average of the difference averages.

```
e5control v4.95 - measurement report

File: D:\mettotec\e5comparator\e5control\e5control reports\TestReport.doc

e5comparator settings defined in: D:\mettotec\e5comparator\e5control\1g-100mg.e05

Start date                          11 Apr 2016      User                      Mettler-Toledo AG
Start time                             18:24:05      Notes     determination of TestSet 1g - 100mg
Weighing process time [h:min]             06:22

Weighing process
-----------------------------------------------------------------------------------------------------
Pre-run done                                Yes
Start delay [h:min]                       03:00
No. of non-reported pre-weighings per group    1
No. of reported comparisons per group          5
No. of series                                  1
Comparison scheme                         A-B-A
Stabilisation time [s]                       20
Integration time [s]                          5
Sensitivity check done                      Yes       a1 : S MySet    1g      1.00000g    0.0050mg  8000.900kg/m^3

Magazine places allocation
-----------------------------------------------------------------------------------------------------
    a1 : S MySet    1g      1.00000g    0.0050mg  8000.900kg/m^3
    a2 : S MySet    500mg   0.50000g    0.0030mg  8000.800kg/m^3
    a3 : S MySet    100mg   0.10000g   -0.0030mg  8001.000kg/m^3
    a8 : T TestSet  1g      1.00000g              8001.200kg/m^3
    a9 : T TestSet  500mg   0.50000g              8000.000kg/m^3
    a10: T TestSet  200mg   0.20000g              8000.000kg/m^3
    a11: T TestSet  200mg*  0.20000g              8000.000kg/m^3
    a12: T TestSet  100mg   0.10000g              8000.000kg/m^3

Series scheme (B vs. A)
-----------------------------------------------------------------------------------------------------
 1: a8 : T TestSet  1g      1.00000g              8000.000kg/m^3
vs. a1 : S MySet    1g      1.00000g    0.0050mg  8000.900kg/m^3
-----------------------------------------------------------------------------------------------------
 2: a9 : T TestSet  500mg   0.50000g              8000.000kg/m^3
  + a2 : S MySet    500mg   0.50000g    0.0030mg  8000.800kg/m^3
vs. a8 : T TestSet  1g      1.00000g
-----------------------------------------------------------------------------------------------------
 3: a2 : S MySet    500mg   0.50000g    0.0030mg  8000.800kg/m^3
vs. a9 : T TestSet  500mg   0.50000g              8000.000kg/m^3
-----------------------------------------------------------------------------------------------------
 4: a10: T TestSet  200mg   0.20000g              8000.000kg/m^3
  + a11: T TestSet  200mg*  0.20000g              8000.000kg/m^3
  + a12: T TestSet  100mg   0.10000g              8000.000kg/m^3
vs. a9 : T TestSet  500mg   0.50000g              8000.000kg/m^3
-----------------------------------------------------------------------------------------------------
 5: a11: T TestSet  200mg*  0.20000g              8000.000kg/m^3
vs. a10: T TestSet  200mg   0.20000g              8000.000kg/m^3
-----------------------------------------------------------------------------------------------------
 6: a12: T TestSet  100mg   0.10000g              8000.000kg/m^3
  + a3 : S MySet    100mg   0.10000g   -0.0030mg  8001.000kg/m^3
vs. a10: T TestSet  200mg   0.20000g              8000.000kg/m^3
-----------------------------------------------------------------------------------------------------
 7: a3 : S MySet    100mg   0.10000g   -0.0030mg  8001.000kg/m^3
vs. a12: T TestSet  100mg   0.10000g              8000.000kg/m^3
-----------------------------------------------------------------------------------------------------

Balance settings
-----------------------------------------------------------------------------------------------------
Mass comparator ID                          UMX5
Environment                          very stable
Value release                          very fast
Last adjustment (internal) 31 Jan 2003, 15:05:05

Climate data
-----------------------------------------------------------------------------------------------------
Climate data input                          online
Climate measuring instrument          Klimet A30
```

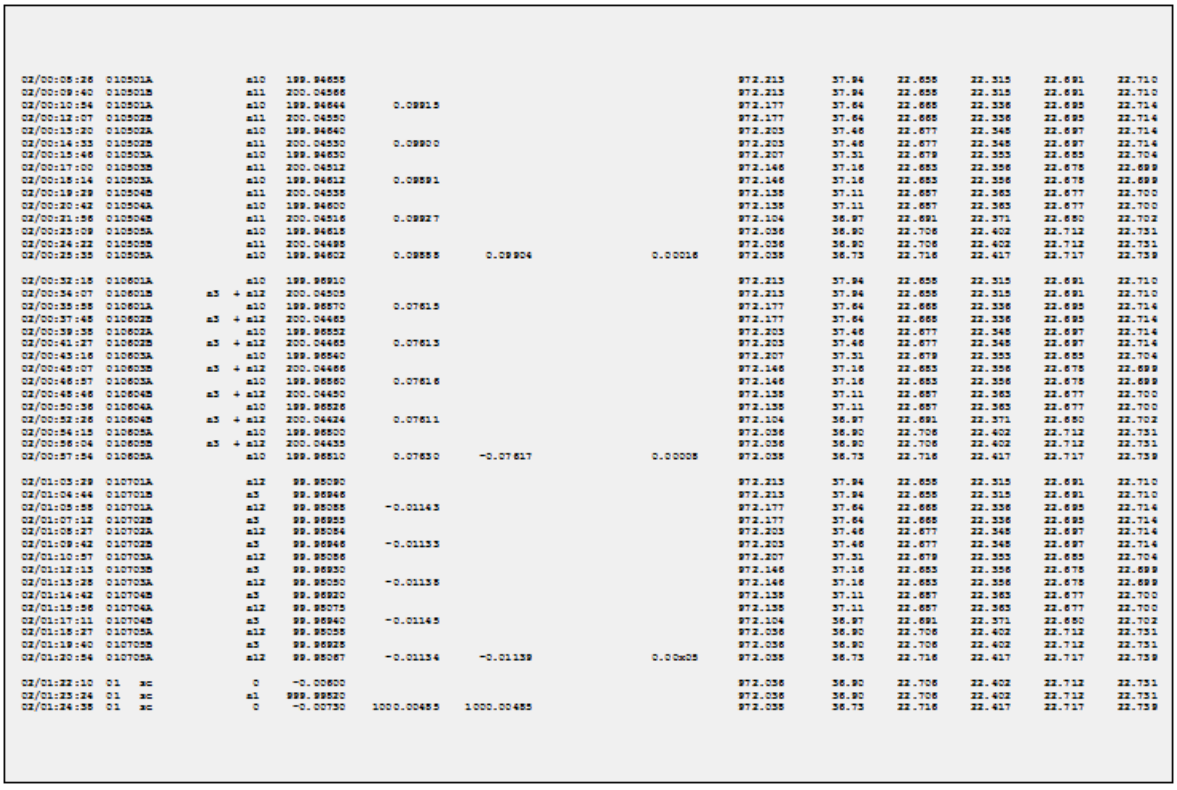
Report - Part 1: heading and process settings



Measurement data (all values in mg)

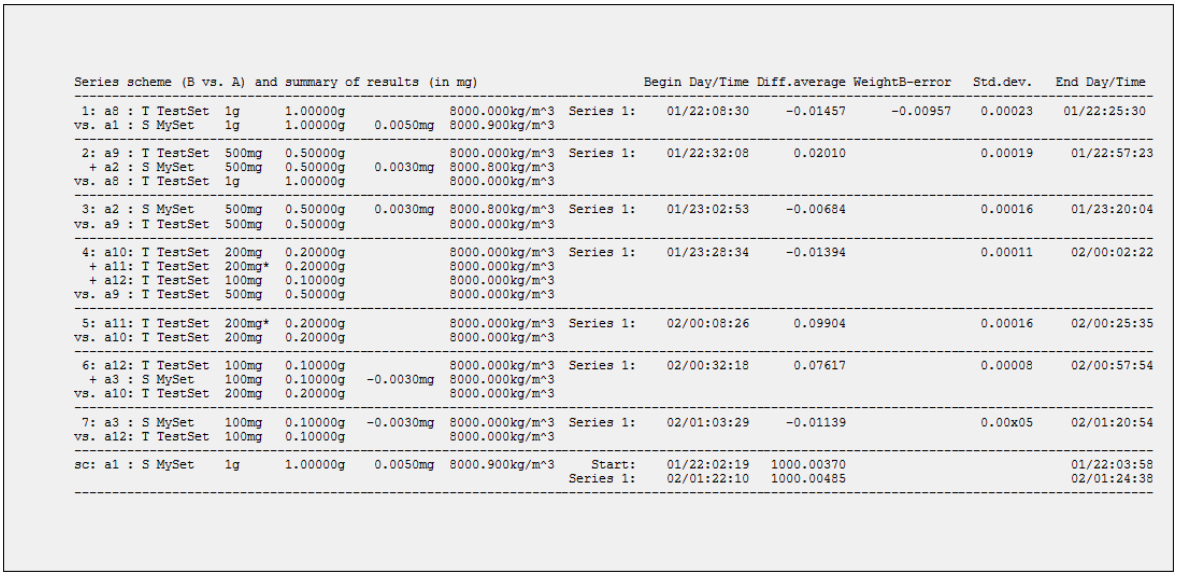
Day/Time	Meas.no.	Place(s)	Value	Diff.(B-A)	Diff.average	WeightB-error	Std.dev.	Press.[hPa]	rel.Hum.[%]	T1[degr.C]	T2[degr.C]	T3[degr.C]	T4[degr.C]
01/22:02:19	00 ac	a0	-0.00100					972.213	37.94	22.658	22.315	22.691	22.710
01/22:03:11	00 ac	a1	1000.00245					972.213	37.94	22.658	22.315	22.691	22.710
01/22:03:55	00 ac	a0	-0.00150	1000.00370	1000.00370			972.177	37.64	22.665	22.336	22.695	22.714
01/22:08:30	010101A	a1	1000.00624					972.213	37.94	22.658	22.315	22.691	22.710
01/22:09:43	0101015	a5	999.99120					972.213	37.94	22.658	22.315	22.691	22.710
01/22:10:55	010101A	a1	1000.00590	-0.01457				972.177	37.64	22.665	22.336	22.695	22.714
01/22:12:07	0101025	a5	999.99125					972.177	37.64	22.665	22.336	22.695	22.714
01/22:13:20	0101024	a1	1000.00576					972.203	37.46	22.677	22.348	22.697	22.714
01/22:14:33	0101025	a5	999.99055	-0.01465				972.203	37.46	22.677	22.348	22.697	22.714
01/22:15:47	0101035	a1	1000.00526					972.207	37.31	22.679	22.353	22.685	22.704
01/22:16:59	0101035	a5	999.99060					972.146	37.16	22.653	22.356	22.675	22.699
01/22:18:13	0101034	a1	1000.00520	-0.01463				972.146	37.16	22.653	22.356	22.675	22.699
01/22:19:26	0101045	a5	999.99085					972.138	37.11	22.657	22.363	22.677	22.700
01/22:20:39	0101044	a1	1000.00507					972.138	37.11	22.657	22.363	22.677	22.700
01/22:21:52	0101045	a5	999.99075	-0.01427				972.104	36.97	22.691	22.371	22.680	22.702
01/22:23:05	0101055	a1	1000.00515					972.036	36.90	22.706	22.402	22.712	22.731
01/22:24:18	0101055	a5	999.99080					972.036	36.90	22.706	22.402	22.712	22.731
01/22:25:30	0101054	a1	1000.00530	-0.01441	-0.01457	-0.00857	0.00025	972.036	36.73	22.716	22.417	22.717	22.739
01/22:32:05	0102014	a5	999.99566					972.213	37.94	22.658	22.315	22.691	22.710
01/22:33:56	0102015	a2 + a9	1000.00550					972.213	37.94	22.658	22.315	22.691	22.710
01/22:35:45	0102014	a5	999.99556	0.01959				972.177	37.64	22.665	22.336	22.695	22.714
01/22:37:33	0102025	a2 + a9	1000.00550					972.177	37.64	22.665	22.336	22.695	22.714
01/22:39:22	0102024	a5	999.99545					972.203	37.46	22.677	22.348	22.697	22.714
01/22:41:11	0102025	a2 + a9	1000.00540	0.02000				972.203	37.46	22.677	22.348	22.697	22.714
01/22:42:59	0102034	a5	999.99533					972.207	37.31	22.679	22.353	22.685	22.704
01/22:44:47	0102035	a2 + a9	1000.00550					972.146	37.16	22.653	22.356	22.675	22.699
01/22:46:35	0102034	a5	999.99540	0.02015				972.146	37.16	22.653	22.356	22.675	22.699
01/22:48:24	0102045	a2 + a9	1000.00495					972.138	37.11	22.657	22.363	22.677	22.700
01/22:50:12	0102044	a5	999.99495					972.138	37.11	22.657	22.363	22.677	22.700
01/22:51:59	0102045	a2 + a9	1000.00514	0.02009				972.104	36.97	22.691	22.371	22.680	22.702
01/22:53:47	0102054	a5	999.99474					972.036	36.90	22.706	22.402	22.712	22.731
01/22:55:35	0102055	a2 + a9	1000.00505					972.036	36.90	22.706	22.402	22.712	22.731
01/22:57:23	0102054	a5	999.99480	0.02041	0.02010		0.00019	972.036	36.73	22.716	22.417	22.717	22.739
01/23:02:53	0103014	a9	499.99922					972.213	37.94	22.658	22.315	22.691	22.710
01/23:04:07	0103015	a2	499.99195					972.213	37.94	22.658	22.315	22.691	22.710
01/23:05:21	0103014	a9	499.99886	-0.00709				972.177	37.64	22.665	22.336	22.695	22.714
01/23:06:34	0103025	a2	499.99180					972.177	37.64	22.665	22.336	22.695	22.714
01/23:07:47	0103024	a9	499.99872					972.203	37.46	22.677	22.348	22.697	22.714
01/23:09:01	0103025	a2	499.99196	-0.00684				972.203	37.46	22.677	22.348	22.697	22.714
01/23:10:14	0103035	a9	499.99870					972.207	37.31	22.679	22.353	22.685	22.704
01/23:11:27	0103035	a2	499.99180					972.146	37.16	22.653	22.356	22.675	22.699
01/23:12:42	0103034	a9	499.99860	-0.00665				972.146	37.16	22.653	22.356	22.675	22.699
01/23:13:56	0103045	a2	499.99184					972.138	37.11	22.657	22.363	22.677	22.700
01/23:15:09	0103044	a9	499.99845					972.138	37.11	22.657	22.363	22.677	22.700
01/23:16:22	0103045	a2	499.99180	-0.00666				972.104	36.97	22.691	22.371	22.680	22.702
01/23:17:37	0103054	a9	499.99855					972.036	36.90	22.706	22.402	22.712	22.731
01/23:18:51	0103055	a2	499.99162					972.036	36.90	22.706	22.402	22.712	22.731
01/23:20:04	0103054	a9	499.99815	-0.00675	-0.00654		0.00016	972.036	36.73	22.716	22.417	22.717	22.739
01/23:25:34	0104014	a9	499.99560					972.213	37.94	22.658	22.315	22.691	22.710
01/23:30:59	0104015	all + a12 + a10	499.99190					972.213	37.94	22.658	22.315	22.691	22.710
01/23:33:25	0104014	a9	499.99545	-0.01404				972.177	37.64	22.665	22.336	22.695	22.714
01/23:35:49	0104025	all + a12 + a10	499.99190					972.177	37.64	22.665	22.336	22.695	22.714
01/23:38:15	0104024	a9	499.99510					972.203	37.46	22.677	22.348	22.697	22.714
01/23:40:38	0104025	all + a12 + a10	499.99110	-0.01380				972.203	37.46	22.677	22.348	22.697	22.714
01/23:43:02	0104035	a9	499.99500					972.207	37.31	22.679	22.353	22.685	22.704
01/23:45:27	0104035	all + a12 + a10	499.99104					972.146	37.16	22.653	22.356	22.675	22.699
01/23:47:53	0104034	a9	499.99516	-0.01404				972.146	37.16	22.653	22.356	22.675	22.699
01/23:50:17	0104045	all + a12 + a10	499.99100					972.138	37.11	22.657	22.363	22.677	22.700
01/23:52:42	0104044	a9	499.99495					972.138	37.11	22.657	22.363	22.677	22.700
01/23:55:05	0104045	all + a12 + a10	499.99095	-0.01395				972.104	36.97	22.691	22.371	22.680	22.702
01/23:57:30	0104054	a9	499.99480					972.036	36.90	22.706	22.402	22.712	22.731
01/23:59:55	0104055	all + a12 + a10	499.99084					972.036	36.90	22.706	22.402	22.712	22.731
02/00:02:22	0104054	a9	499.99440	-0.01356	-0.01394		0.00011	972.036	36.73	22.716	22.417	22.717	22.739

Report - Part 2: measurement data



02/00:05:26	0105021A		a10	199.94655				972.213	37.94	22.655	22.315	22.691	22.710
02/00:09:40	0105021B		a11	200.04566				972.213	37.94	22.655	22.315	22.691	22.710
02/00:10:54	0105021A		a10	199.94644	0.09915			972.177	37.64	22.665	22.336	22.695	22.714
02/00:12:07	0105022B		a11	200.04550				972.177	37.64	22.665	22.336	22.695	22.714
02/00:13:20	0105022A		a10	199.94640				972.203	37.46	22.677	22.345	22.697	22.714
02/00:14:33	0105023B		a11	200.04550	0.09900			972.203	37.46	22.677	22.345	22.697	22.714
02/00:15:46	0105023A		a10	199.94630				972.207	37.31	22.679	22.353	22.685	22.704
02/00:17:00	0105033B		a11	200.04512				972.146	37.16	22.683	22.356	22.678	22.699
02/00:18:14	0105033A		a10	199.94612	0.09891			972.146	37.16	22.683	22.356	22.678	22.699
02/00:19:29	0105034B		a11	200.04535				972.135	37.11	22.687	22.363	22.677	22.700
02/00:20:42	0105034A		a10	199.94600				972.135	37.11	22.687	22.363	22.677	22.700
02/00:21:56	0105045B		a11	200.04516	0.09927			972.104	36.97	22.691	22.371	22.680	22.702
02/00:23:09	0105045A		a10	199.94615				972.036	36.90	22.706	22.402	22.712	22.731
02/00:24:22	0105055B		a11	200.04495				972.036	36.90	22.706	22.402	22.712	22.731
02/00:25:35	0105055A		a10	199.94602	0.09888	0.09904	0.00016	972.035	36.73	22.716	22.417	22.717	22.739
02/00:32:18	0106011A		a10	199.96910				972.213	37.94	22.655	22.315	22.691	22.710
02/00:34:07	0106011B	a3 + a12		200.04505				972.213	37.94	22.655	22.315	22.691	22.710
02/00:35:55	0106012A		a10	199.96570	0.07615			972.177	37.64	22.665	22.336	22.695	22.714
02/00:37:45	0106022B	a3 + a12		200.04465				972.177	37.64	22.665	22.336	22.695	22.714
02/00:39:35	0106022A		a10	199.96552				972.203	37.46	22.677	22.345	22.697	22.714
02/00:41:27	0106023B	a3 + a12		200.04465	0.07613			972.203	37.46	22.677	22.345	22.697	22.714
02/00:43:16	0106023A		a10	199.96540				972.207	37.31	22.679	22.353	22.685	22.704
02/00:45:07	0106033B	a3 + a12		200.04486				972.146	37.16	22.683	22.356	22.678	22.699
02/00:46:57	0106033A		a10	199.96560	0.07616			972.146	37.16	22.683	22.356	22.678	22.699
02/00:48:48	0106034B	a3 + a12		200.04450				972.135	37.11	22.687	22.363	22.677	22.700
02/00:50:38	0106034A		a10	199.96526				972.135	37.11	22.687	22.363	22.677	22.700
02/00:52:26	0106045B	a3 + a12		200.04424	0.07611			972.104	36.97	22.691	22.371	22.680	22.702
02/00:54:15	0106045A		a10	199.96500				972.036	36.90	22.706	22.402	22.712	22.731
02/00:56:04	0106055B	a3 + a12		200.04435				972.036	36.90	22.706	22.402	22.712	22.731
02/00:57:54	0106055A		a10	199.96510	0.07630	-0.07617	0.00008	972.035	36.73	22.716	22.417	22.717	22.739
02/01:03:29	0107011A		a12	99.95090				972.213	37.94	22.655	22.315	22.691	22.710
02/01:04:44	0107011B		a3	99.95946				972.213	37.94	22.655	22.315	22.691	22.710
02/01:05:55	0107012A		a12	99.95055	-0.01143			972.177	37.64	22.665	22.336	22.695	22.714
02/01:07:12	0107012B		a3	99.95853				972.177	37.64	22.665	22.336	22.695	22.714
02/01:08:27	0107022A		a12	99.95054				972.203	37.46	22.677	22.345	22.697	22.714
02/01:09:42	0107022B		a3	99.95946	-0.01153			972.203	37.46	22.677	22.345	22.697	22.714
02/01:10:57	0107033A		a12	99.95056				972.207	37.31	22.679	22.353	22.685	22.704
02/01:12:13	0107033B		a3	99.95930				972.146	37.16	22.683	22.356	22.678	22.699
02/01:13:28	0107034A		a12	99.95050	-0.01135			972.146	37.16	22.683	22.356	22.678	22.699
02/01:14:42	0107044B		a3	99.95920				972.135	37.11	22.687	22.363	22.677	22.700
02/01:15:56	0107044A		a12	99.95075				972.135	37.11	22.687	22.363	22.677	22.700
02/01:17:11	0107045B		a3	99.95940	-0.01145			972.104	36.97	22.691	22.371	22.680	22.702
02/01:18:27	0107055A		a12	99.95055				972.036	36.90	22.706	22.402	22.712	22.731
02/01:19:42	0107055B		a3	99.95925				972.036	36.90	22.706	22.402	22.712	22.731
02/01:20:54	0107055A		a12	99.95067	-0.01134	-0.01139	0.00x05	972.035	36.73	22.716	22.417	22.717	22.739
02/01:22:10	01	ac	0	-0.00600				972.036	36.90	22.706	22.402	22.712	22.731
02/01:23:24	01	ac	a1	999.99520				972.036	36.90	22.706	22.402	22.712	22.731
02/01:24:38	01	ac	0	-0.00730	1000.00485	1000.00485		972.035	36.73	22.716	22.417	22.717	22.739

Report - Part 2: measurement data (continued)

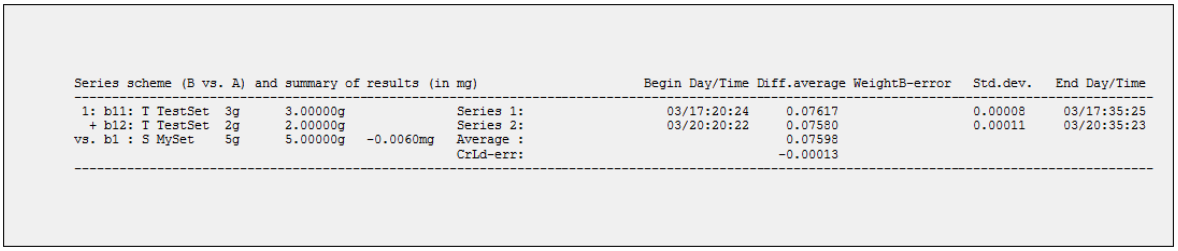


Series scheme (B vs. A) and summary of results (in mg)						Begin Day/Time	Diff.average	WeightB-error	Std.dev.	End Day/Time
1: a8 : T TestSet	1g	1.00000g		8000.000kg/m^3	Series 1:	01/22:08:30	-0.01457	-0.00957	0.00023	01/22:25:30
vs. a1 : S MySet	1g	1.00000g	0.0050mg	8000.900kg/m^3						
2: a9 : T TestSet	500mg	0.50000g		8000.000kg/m^3	Series 1:	01/22:32:08	0.02010		0.00019	01/22:57:23
+ a2 : S MySet	500mg	0.50000g	0.0030mg	8000.800kg/m^3						
vs. a8 : T TestSet	1g	1.00000g		8000.000kg/m^3						
3: a2 : S MySet	500mg	0.50000g	0.0030mg	8000.800kg/m^3	Series 1:	01/23:02:53	-0.00684		0.00016	01/23:20:04
vs. a9 : T TestSet	500mg	0.50000g		8000.000kg/m^3						
4: a10: T TestSet	200mg	0.20000g		8000.000kg/m^3	Series 1:	01/23:28:34	-0.01394		0.00011	02/00:02:22
+ a11: T TestSet	200mg*	0.20000g		8000.000kg/m^3						
+ a12: T TestSet	100mg	0.10000g		8000.000kg/m^3						
vs. a9 : T TestSet	500mg	0.50000g		8000.000kg/m^3						
5: a11: T TestSet	200mg*	0.20000g		8000.000kg/m^3	Series 1:	02/00:08:26	0.09904		0.00016	02/00:25:35
vs. a10: T TestSet	200mg	0.20000g		8000.000kg/m^3						
6: a12: T TestSet	100mg	0.10000g		8000.000kg/m^3	Series 1:	02/00:32:18	0.07617		0.00008	02/00:57:54
+ a3 : S MySet	100mg	0.10000g	-0.0030mg	8000.000kg/m^3						
vs. a10: T TestSet	200mg	0.20000g		8000.000kg/m^3						
7: a3 : S MySet	100mg	0.10000g	-0.0030mg	8000.000kg/m^3	Series 1:	02/01:03:29	-0.01139		0.00x05	02/01:20:54
vs. a12: T TestSet	100mg	0.10000g		8000.000kg/m^3						
sc: a1 : S MySet	1g	1.00000g	0.0050mg	8000.900kg/m^3	Start:	01/22:02:19	1000.00370			01/22:03:58
					Series 1:	02/01:22:10	1000.00485			02/01:24:38

Report - Part 3: summary of results

Indication of corner load error

e10control automatically handles the comparison of two weight combinations in such a way (placing sequence) that the remaining corner load error is minimized. In the case of a comparison '2 g + 2 g + 1 g' vs. '5 g', the combination entered as '2 g + 2 g + 1 g' will be placed onto the balance pan in the sequence '2 g + 1 g + 2 g': the center of gravity of the weights combination is located on the same vertical axis as the 5 g weight and, consequently, the remaining corner load error equals zero. In certain cases, in particular when non OIML weights are involved in a combination (e.g. '3 g + 2 g' vs. '5 g'), a certain error due to corner load remains. Knowing the measured corner load error, **e10control** calculates for each comparison the remaining error due to corner load and, if not zero, indicates it under 'CrLd-err' in the results summary table of the measurement report. The corrected difference average (not indicated in the report) equals 'Diff.average' minus 'CrLd-err'.



Series scheme (B vs. A) and summary of results (in mg)					Begin Day/Time	Diff.average WeightB-error	Std.dev.	End Day/Time
1: b11: T TestSet	3g	3.00000g		Series 1:	03/17:20:24	0.07617	0.00008	03/17:35:25
+ b12: T TestSet	2g	2.00000g		Series 2:	03/20:20:22	0.07580	0.00011	03/20:35:23
vs. b1 : S MySet	5g	5.00000g	-0.0060mg	Average :		0.07598		
				CrLd-err:		-0.00013		

See also

- Choosing the report contents ▸ Page 35
- Weighing process settings ▸ Page 29
- Selecting the application mode ▸ Page 57
- Calculations ▸ Page 44

5.8.2 Calculations

The figure below represents the reported measurement data and the differences **B-A** calculated during a weighing process, where the comparison scheme was set to **A-B-A** and **A-B-B-A**. The calculations are given below for the series 1, group 01 as example.

The differences **B-A** are reported in the column **Diff.(B-A)** and, if the comparison scheme **A-B-A** was selected, calculated as follows (see the figure below, top diagram):

$$Diff_{010101} = \frac{(Val\_B_{010101} - Val\_A_{010101}) + (Val\_B_{010101} - Val\_A_{010101'})}{2}$$

$$Diff_{010102} = \frac{(Val\_B_{010102} - Val\_A_{010102}) + (Val\_B_{010102'} - Val\_A_{010102})}{2}$$

$$Diff_{010103} = \frac{(Val\_B_{010103} - Val\_A_{010103}) + (Val\_B_{010103} - Val\_A_{010103'})}{2}$$

etc.

If the comparison scheme **A-B-B-A** was selected, the differences **B-A**, reported in the column **Diff.(B-A)**, are calculated as follows (see the figure below, bottom diagram):

$$Diff_{010101} = \frac{(Val\_B_{010101} + Val\_B_{010101'}) - (Val\_A_{010101} + Val\_A_{010101'})}{2}$$

$$Diff_{010102} = \frac{(Val\_B_{010102} + Val\_B_{010102'}) - (Val\_A_{010102} + Val\_A_{010102'})}{2}$$

etc.

The difference average is reported, for each group of n comparisons, in the column **Diff.average**, and calculated as follows (for both comparison schemes):

$$\text{Diff.average}_{0101} = (1 / n) \sum_{i=01}^{n} \text{Diff}_{0101\,i}$$

The standard deviation of the difference average is reported, for each group, in the column **Std.dev.**, and calculated as follows (for both comparison schemes):

$$\text{Std.dev.}_{0101} = \sqrt{[1 / (n-1)] \sum_{i=01}^{n} (\text{Diff}_{0101\,i} - \text{Diff.average}_{0101})^2}$$

Provided the error of the weight A is known, the error of the weight B is reported, for each group, in the column **WeightB-error**, and calculated as follows (for both comparison schemes):

$$\text{WeightB-error}_{0101} = \text{WeightA-error}_{0101} + \text{Diff.average}_{0101}$$

If a sensitivity check was requested, the value of the selected check standard is reported in the column **Diff.(B-A)**, and calculated as follows:

$$\text{Diff\_SC}_{00} = \frac{(\text{Val\_SC}_{00} - \text{Val\_0}_{00}) + (\text{Val\_SC}_{00} - \text{Val\_0}_{00'})}{2} \quad \text{(initial check)}$$

$$\text{Diff\_SC}_{01} = \frac{(\text{Val\_SC}_{01} - \text{Val\_0}_{01}) + (\text{Val\_SC}_{01} - \text{Val\_0}_{01'})}{2} \quad \text{(check done after series 01)}$$

etc.

Val_SC_i stands for the value measured after loading the check standard. Val_0_i stands for the zero point before loading the check standard, $\text{Val\_0}_{i'}$ stands for the zero point after loading the check standard.

The corner load error **CrLd-err** reported in the results summary table is calculated as follows (**CrLd_err** is used here to avoid confusion with the minus sign):

$$CrLd\_err = CrLd\_err_B - CrLd\_err_A$$

$$\begin{cases} CrLd\_err_{A,B} = \frac{1}{2} \cdot (CrLd\_err_{measured,\,back} + CrLd\_err_{measured,\,front}) \cdot \frac{(M_{A,B})^2}{(M_{measured})^2} \\ \qquad + \frac{1}{2} \cdot (CrLd\_err_{measured,\,back} - CrLd\_err_{measured,\,front}) \cdot \frac{M_{A,B}}{M_{measured}} \end{cases}$$

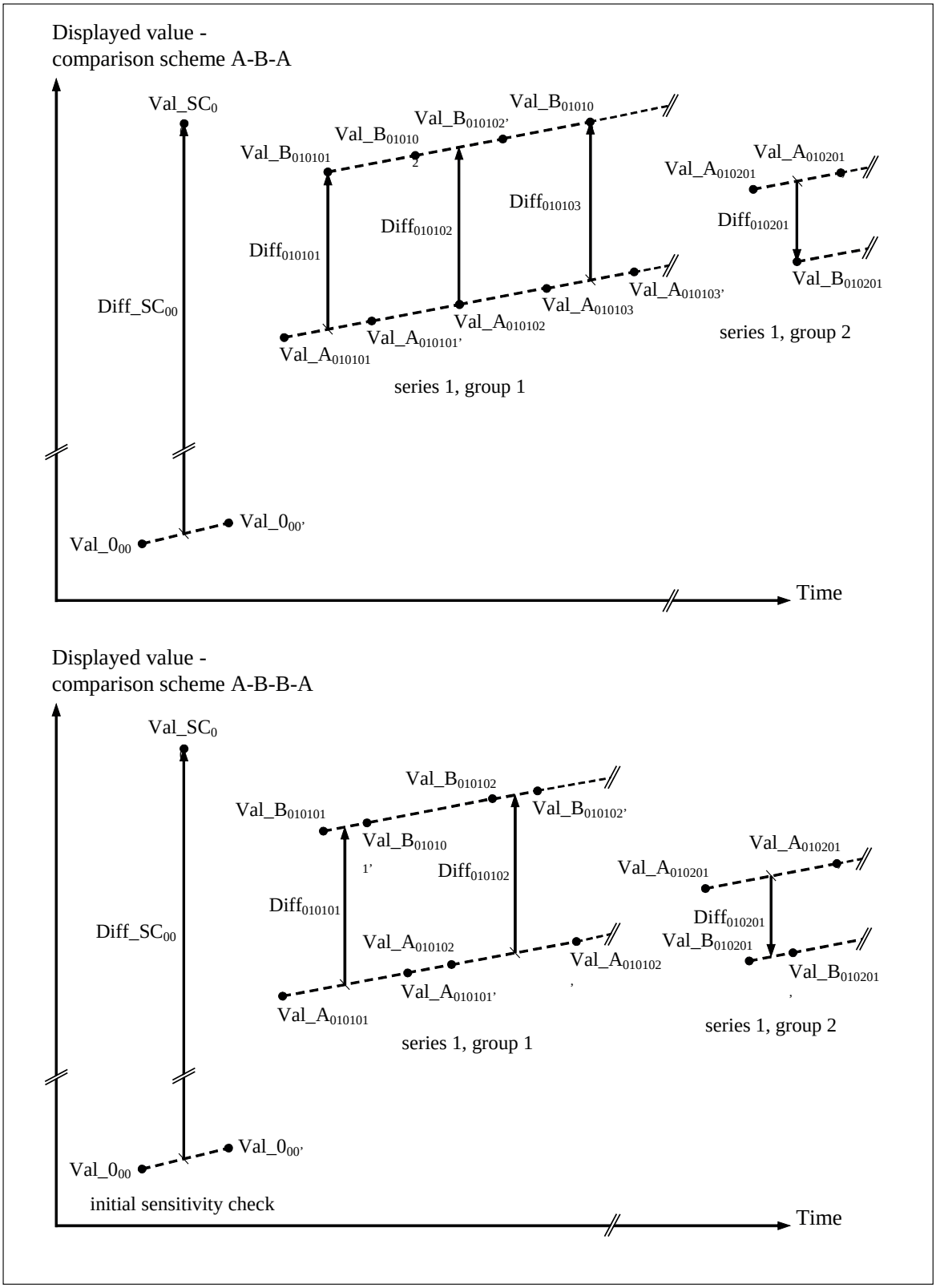
with: $$M_A = \sum_{i=0}^{n-1} (weight\_A_i \cdot ecc\_A_i), \quad M_B = \sum_{j=0}^{m-1} (weight\_B_j \cdot ecc\_B_j),$$

and $$M_{measured} = weight_{measured} \cdot ecc_{measured}$$

Key to formulas

$CrLd\_err_{measured,\,front}$	Measured corner load error, front position
$CrLd\_err_{measured,\,back}$	Measured corner load error, back position
$weight\_A_i$, $weight\_B_j$	Nominal value in g of the weight i or j, in the combination A of n weights, or in the combination B of m weights
ecc_A_i, ecc_B_j	Eccentricity of weight i or j, in the combination A or B. That is, the distance in mm between the center of gravity of the weight and the vertical central axis of the balance pan. This distance is positive for back position and negative for front position.
$weight_{measured}$	Nominal value in g of the check weight used for the measurement of the corner error
$ecc_{measured}$	Eccentricity of the check weight used for the measurement of the corner load error. That is, the distance in mm between the center of gravity of the check weight and the vertical central axis of the balance pan. This distance is positive for back position and negative for front position.

The corner load error **CrLd-err** is not reported in the results summary table if its calculated value equals zero. If the measurement of the corner load error was not done, and the calculated corner load error differs from zero, the results summary table indicates **CrLd-err: unknown**.



Weighing process and reported measurement data - top diagram: **A-B-A** scheme, bottom diagram: **A-B-B-A** scheme

5.9 Measuring the corner load error

Navigation: e10control > System > Corner load error measurement...

For direct weight comparisons with appropriate weight carriers selected, the error due to corner load is negligible.

When using weight combinations in a comparison, the weight combinations must be arranged on the balance pan such that the centers of gravity of both combinations are located on the same vertical axis, see **Indication of corner load error** in [Measurement report ▸ Page 40].

In the example "3 g + 2 g" versus "5 g", the error due to corner load cannot be neglected. This is indicated in the report. The corner load error is calculated from the measured corner load error. This value should be regularly determined and updated. **Measured corner load error (front, back)** is the difference between the measured value of a 2 g weight centered on the weighing pan, and the measured value of the same weight moved 10 mm or 7.5 mm towards the front or towards the back of the weighing pan.

Measuring the corner load error

To determine or update the values of the measured corner load error, proceed as follows:

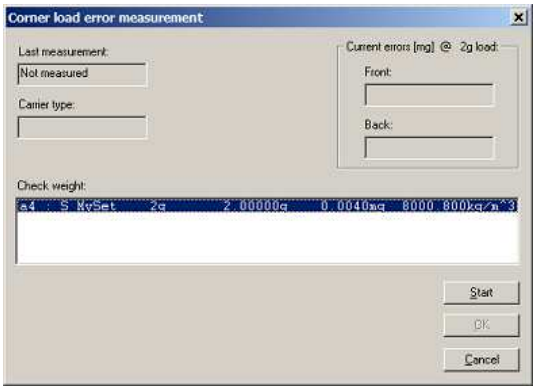
1 Select **System** > **Corner load error measurement…**.

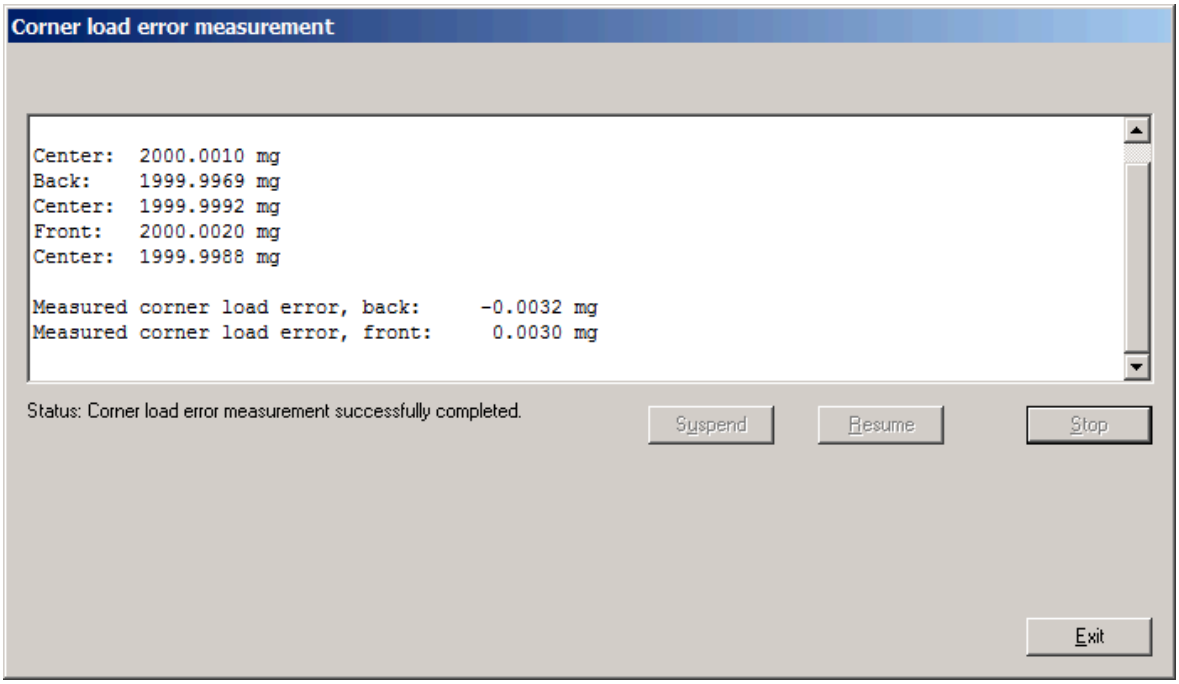
➡ The window **Corner load error measurement** is displayed. The following data is shown: date of the last measurement, current measured error values, type of weight carrier used. **Check weight** lists the standard weights with a nominal value of 2 g, and with an allocated magazine place.

2 Select a weight from **Check weight**.

3 Click **Start**.

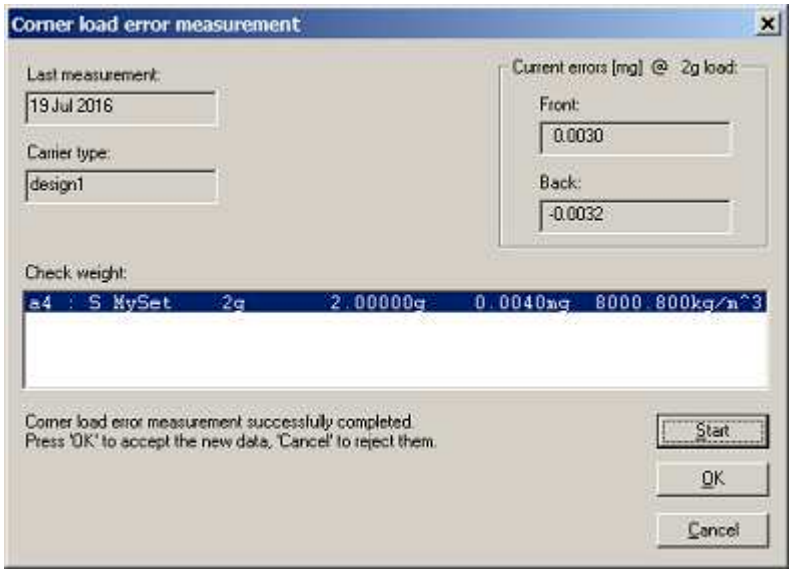
➡ The corner load error measurement is executed. The results are displayed in the **Corner load error measurement - Report** window.





4 When the procedure is completed, click **Exit**.

5 Click **OK** to store the new values. The old values are overwritten.



See also

Measurement report ▸ Page 40

5.10 Upgrading e10control

Navigation: e10control > System > Software upgrade…

The standard edition of **e10control** can be upgraded to the professional edition.

1 Select **System** > **Software upgrade…**.
   ➡ The window **Software upgrade** is displayed.
2 **Handler ID**: Enter the ID provided by METTLER TOLEDO.
3 **Password**: Enter the password provided by METTLER TOLEDO.
4 Click **OK**.

➡ **e10control** is upgraded.

5.11 Remote-controlling the e10 comparator

The settings for a weighing process can be generated by a laboratory information management system (LIMS), and imported into **e10control**. To remote-control the **e10 comparator**, certain commands can be sent to **e10control** from the LIMS.

Example of a LIMS: Automated Mass Measurement System (AMMS), supplied by Measurement Technology Laboratories (Minneapolis, USA)

For a settings file generated outside of **e10control**, the following rules apply:

- The value of each parameter must be within the allowed range.
- The document version is currently 3. The document version is an internal reference to the settings definition and its history.
- For a sensitivity check, the indicated magazine position must be allocated to a particular weight.
- An error must be specified for all standard weights.
- The number of weights in each combination must not exceed three. The total nominal value of each weight combination must not exceed 6.1 g.
- All magazine positions mentioned in the scheme must be allocated to a particular weight.
- The path given for the output file must exist on the controller of the **e10 comparator**.

Note

The imported settings file contains relevant data for the definition of the standards involved in this specific weighing process. The local standards database (**MyStandards.std**) is not affected when importing a settings file.

5.11.1 Generating a settings file outside of e10control

A settings file from a LIMS must be in a specific format (**.imp**) that can be converted by **e10control**.

Example of a settings file generated by a LIMS:

```
JOB: ImportDemo
e5control 3
HEADER:
<This is an optional 3-line text block which appears in a message box
when the new settings file (imported and converted into e5control)
is loaded>
END HEADER
PROCESS:
1 1 3 0 1 5 1 A-B-A 20 5 a3
END PROCESS
MAGAZINE:
a1 S MySet 1g 1 0.005 8000.9
a2 S MySet 500mg 0.5 0.003 8000.8
a3 S MySet 100mg 0.1 -0.003 8001.0
a8 T TestSet 1g 1
a9 T TestSet 500mg 0.5
a10 T TestSet 200mg 0.2
a11 T TestSet 200mg* 0.2
a12 T TestSet 100mg 0.1
END MAGAZINE
SCHEME:
a8 VS. a1
a9+a2 VS. a8
a2 VS. a9
a10+a11+a12 VS. a9
a11 VS. a10
a12+a3 VS. a10
a3 VS. a12
END SCHEME
REPORT:
metrotec engineering ag
C:\Program files(x86)\e5control\DemoOutput
END REPORT
END JOB ImportDemo
```

The format of this text file is defined in the following example. The words written in bold, for example, **REPORT:** and **END REPORT**, are fixed identifiers that indicate the beginning and the end of a parameter definition. The other characters are variables or parameters that determine the information and settings specific to a weighing process.

The values of the following variables or parameters must be determined within their respective range.

Prefix	Description
`str`	`string`: string of characters, without spaces unless otherwise specified
`bln`	boolean (0 or 1)
`int`	`integer`: exact whole number
`dec`	decimal (number with decimal places)

```
JOB: strJobID<CR LF>
strAppName intDocVersion<CR LF>
[HEADER:<CR LF>
strHeaderLine<CR LF>
[strHeaderLine<CR LF>
[strHeaderLine<CR LF>]]
END HEADER]
PROCESS:<CR LF>
blnWeighingMode blnPreRun intStartDelayHours intStartDelayMinutes
intNonReportedPreweighings intReportedComparisons intSeries
strComparisonScheme intStabilisationTime intIntegrationTime
strSensitivityCheck intHistorySpecificPause<CR LF>
END PROCESS<CR LF>
MAGAZINE:<CR LF>
strPosID strWeightType strSetID strWeightID decNominal[ decError]
[decDensity]<CR LF>
[…]
END MAGAZINE<CR LF>
SCHEME:<CR LF>
strCombination VS. strCombination<CR LF>
[…]
END SCHEME<CR LF>
REPORT:<CR LF>
strUserName<CR LF>
strFileName<CR LF>
END REPORT<CR LF>
END JOB strJobID<CR LF>
```

Parameters

Parameter designation	Value (range)	Description
strJobID	<no limitation>	string of characters used as job identification
strAppName	'**e1Ocontrol**'	designation of control software used
intDocVersion	3	document version used as internal reference to the settings definition and its history
strHeaderLine	<no limitation>	text appearing in a message box when loading the imported and converted settings file
blnWeighingMode	0 | 1	"0" = **One-vs.-one comparisons**, "1" = **Down-/ upward calibration**
blnPrerun	0 | 1	"0" = pre-run not requested, "1" = pre-run requested
intStartDelayHours	0 – 99	integer, number of hours in time requested as start delay
intStartDelayMinutes	0 – 59	integer, number of minutes in time requested as start delay
intNonReported-Preweighings	0 – 5	integer, number of non-reported pre-weighings per group
intReportedComparisons	1 – 20	integer, number of reported comparisons per group
intSeries	1 – 20	integer, number of series
strComparisonScheme	**A-B-A** | **A-B-B-A**	comparison scheme
intStabilisationTime	10 – 60	integer, stabilisation time in seconds
intIntegrationTime	0 – 60	integer, integration time in seconds
strSensitivityCheck	strPosID | NO	magazine position of sensitivity check standard if check done, NO if not done

Parameter designation	Value (range)	Description
intHistorySpecificPause	0 – 60	integer, duration of history-specific pause in minutes
strPosID	a | b | c | d | & 1 | 2 | … | 20	magazine position number: a1 to a12, b1 to b12, c1 to c12, d1 to d12 and e1 to e12
strWeightType	S | T	"S" = standard, "T" = test weight
strSetID	<maximum 8 characters>	string of maximum 8 characters, weight set identification
strWeightID	<maximum 8 characters>	string of maximum 8 characters, weight identification
decNominal	0 – 6.1	number (with decimal), weight nominal value in g
decError	<no limitation, in principle>	number (with decimal), error in mg given for standards only (i.e. strWeightType = "S")
decDensity	<no limitation, in principle>	number (with decimal), density in kg/m^3
strCombination	strPosID[+strPosID [+strPosID]]	string consisting of up to 3 different magazine positions, separated by the "+" sign
strUserName	<maximum 54 characters>	string of maximum 54 characters (including spaces), user identification
strFileName	<file location path and name>	name of report file, without extension, and its location on disk

Symbols

Symbol	Description
"< >"	delimiter for a comment on the value of a parameter
"–"	up to
"|"	or
"[ ]"	delimiter for an optional block
"&"	concatenation of two strings of characters

See also

Determining the weighing process settings and series scheme ▸ Page 29

5.11.2 Importing a settings file into e10control

The settings file (**.imp**) generated by a LIMS can be imported into **e10control** and converted into a settings file (**.e10**).

See also

Generating a settings file outside of e10control ▸ Page 51

5.11.2.1 Selecting the import source

Navigation: e10control > System > Import/Export mode… > Import source

Before importing the settings file, define the import mode.

1 Select **System** > **Import/Export mode…** > **Import source**.
   ➡ The window **Import/Export mode** is displayed.
2 Select the appropriate mode (**File** or **Serial port**).
3 Click **OK**.

Note

If **Serial port** is selected, an additional serial communication port is required. The serial communication port must be different than the one established for the communication with the instrument.

See also

Preparing a weighing ▸ Page 36

5.11.2.2 Importing the settings file

Navigation: e10control > File > Import...

The settings file (**.imp** or **.txt**) can be imported into **e10control** from any location, for example, a storage device.

- The import source **File** is selected.

1 Select **File** > **Import...**.
   ➡ The window **Select import file** is displayed.
2 Select the settings file to be imported.
3 Click **Open**.
   ➡ The selected file is parsed and checked.
   ➡ The file is converted into an **e10control** settings file (**.e10**).
   ➡ The window **Save imported file** opens.
4 When prompted, enter a name for the settings file.

➡ The settings file is imported into **e10control**.

See also

Generating a settings file outside of e10control ▸ Page 51
Selecting the import source ▸ Page 53

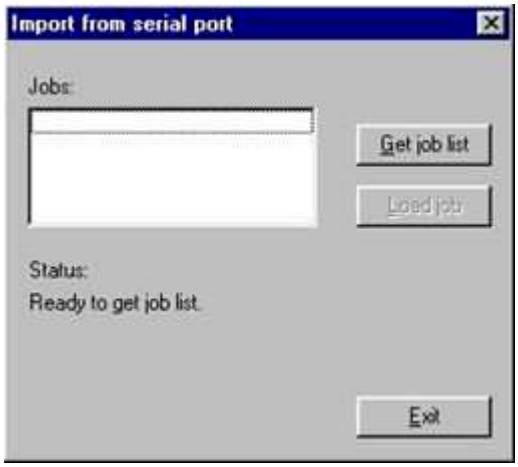
5.11.2.3 Importing the settings file using a serial port

The settings file (**.imp**) can be imported into **e10control** using a serial communication port.

- The import source **Serial port** is selected.

1 Select **File** > **Import...**.
   ➡ The window **Import from serial port** is displayed.

2 Click **Get job list** to get a list of pending jobs (settings files) from the LIMS.
3 Select the job to be imported.
4 Click **Load job**.
   ➡ The selected file is parsed and checked.
   ➡ The file is converted into an **e10control** settings file (**.e10**).
   ➡ The window **Save imported file** opens.
5 When prompted, enter a name for the settings file.
6 Optional: Repeat the procedure to import further jobs.
7 Click **Exit**.
➡ The settings file is imported into **e10control**.



See also

🔗 Generating a settings file outside of e10control ▸ Page 51
🔗 Communicating via the serial port ▸ Page 55
🔗 Selecting the import source ▸ Page 53

5.11.3 Communicating via the serial port

The communication protocol is set: 2400 baud, 7 data bits, 1 stop bit, parity even. A reply to a data request must be sent within 3 seconds. For a smooth exchange of information between a LIMS and **e10control**, the following commands are available:

Task, description	Command e10control to LIMS	Command LIMS to e10control
Requesting list of pending jobs, clicking [**Get job list**]	JOB ?<CR LF>	
Sending list of pending jobs (empty list if none available)		JOB[strJobID[strJobID[…]]]<CR LF>
Requesting one particular job, clicking [**Load job**]	JOB strJobID<CR LF>	
Sending one particular job		<text file as described in [Generating a settings file outside of e10control ▸ Page 51]>
Accepting job (file syntax and consistency OK), saving job as settings file	JOB strJobID OK<CR LF>	
Rejecting job (file syntax and consistency not OK)	JOB strJobID DENIED<CR LF>	
Advising of job start and estimated duration, before pre-run/centering starts	JOB strJobID STARTS DURATION: intHours:intMinutes<CR LF>	
Advising of job end, after job successfully completed	JOB strJobID SUCCESSFULLY ENDED<CR LF>	
Advising of job end due to program failure, after program aborted	JOB strJobID ABORTED<CR LF>	
Advising of job end due to 'Abort' command given by user	JOB strJobID ABORTED BY USER<CR LF>	

Data can be sent to a LIMS using a serial communication port.

1 Select **System** > **Import/Export mode…** > **Import source**.
   ➡ The window **Import/Export mode** is displayed.

2 Activate **Online output via serial port**.

Note

The same port is used for import and export.

During the weighing process, **e1Ocontrol** exports the measurement data as shown in the following example. The columns shown are: Time, Measurement number, Place(s), Value.

```
01/22:02:19  00   sc              0     -0.00100<CR LF>
01/22:03:11  00   sc             a1   1000.00245<CR LF>
01/22:03:58  00   sc              0     -0.00150<CR LF>
01/22:08:30  010101A              a1   1000.00624<CR LF>
01/22:09:43  010101B              a8    999.99120<CR LF>
01/22:10:55  010101A              a1   1000.00590<CR LF>
...
02/01:22:10  01   sc              0     -0.00600<CR LF>
02/01:23:24  01   sc             a1    999.99820<CR LF>
02/01:24:38  01   sc              0     -0.00730<CR LF>
```

After the weighing process has been successfully completed, **e1Ocontrol** exports the corner load error in mg, calculated for each measurement group, see [Measurement report ▸ Page 40] and [Calculations ▸ Page 44]):

```
CORNERLOAD decCrLd_err1[ decCrLd_err2[ decCrLd_err3[ …]]]<CR LF>
```

`decCrLd_err1` is the corner load error calculated for the first measurement group, `decCrLd_err2` for the second measurement group, etc. If an error is zero or not measured, the indicated value is `NO` or `UNKNOWN`.

Example:

```
CORNERLOAD NO 0.00014 -0.00013 UNKNOWN<CR LF>
```

- first group: corner load error = 0
- second group: corner load error = 0.00014 mg
- third group: corner load error = -0.00013 mg
- fourth group: corner load error not measured

See also

- Importing the settings file using a serial port ▸ Page 54
- Calculations ▸ Page 44
- Measurement report ▸ Page 40

5.12 Selecting the application mode

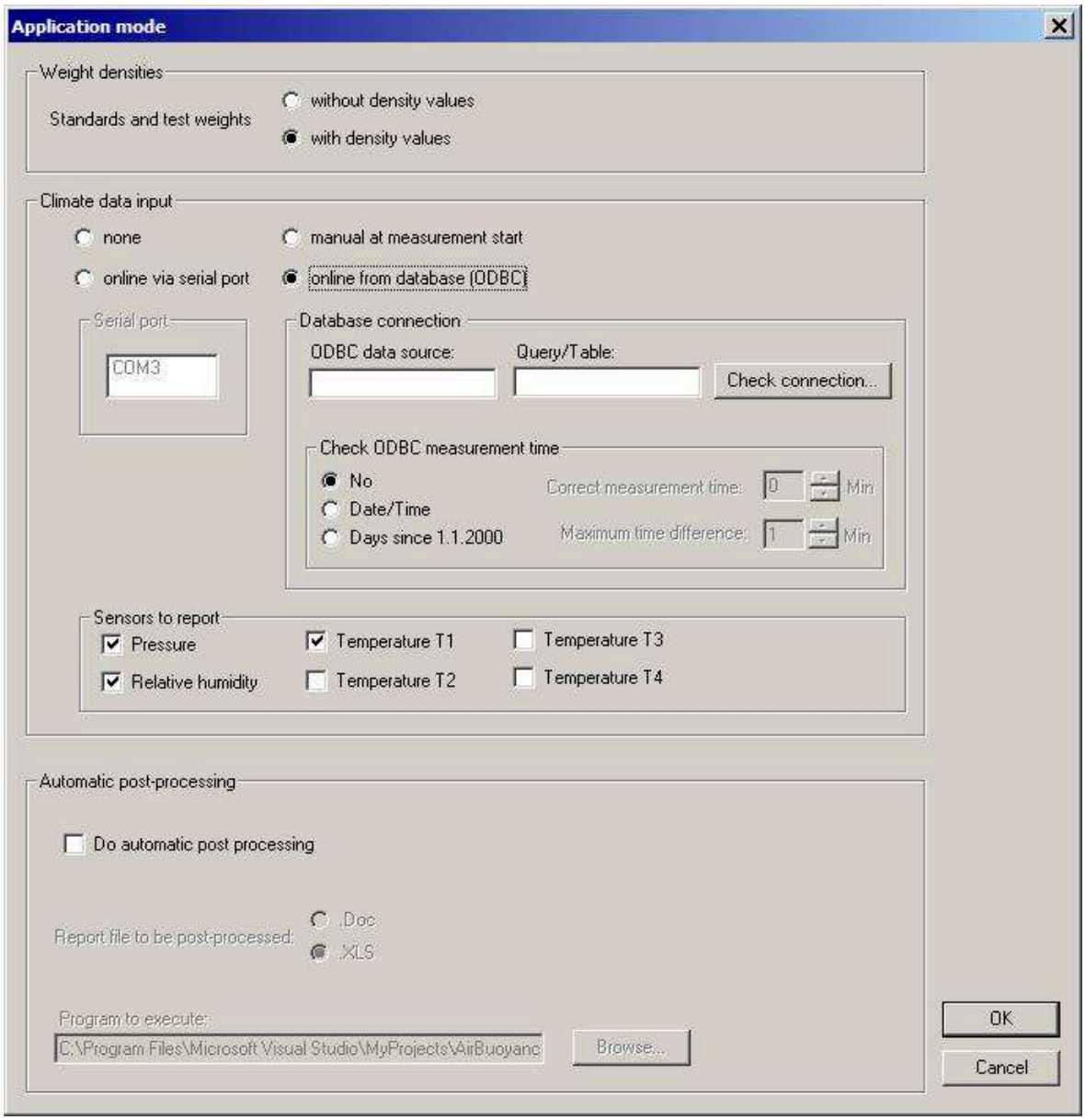
Navigation: e10control > System > Application mode…

1 Select **System** > **Application mode…**.

➡ The window **Application mode** is displayed.

2 Select the required options.

3 Click **OK**.



Section	Description
Weight densities	Serves to specify if the standard weights and test weights have a density value or not. If **with density value** is selected, a valid density value must be entered for each standard weight and test weight. **Note** If **with density value** is selected and the standards database or the test weights database contains weights without density values, a warning is generated. The density of these weights is automatically set to 8000 kg/m^3.

Section	Description
Climate data input	Serves to specify the climate data input source. Available options: • **none**: No climate data input • **manual at measurement start**: Enter the climate data manually at measurement start. • **online via serial port**: Connect a climate measurement instrument (Klimet A30 or compatible) to a serial port to collect the climate data. Choose a serial port from the **Serial port** list. • **online from database (ODBC)**: Retrieve data from an **ODBC** data source. Enter the name of the **ODBC** data source, the name of the **Table/Query**. If applicable, enter the values for **Correct measurement time** and **Maximum time difference**. Click **Check connection** to test if the **ODBC** data can be accessed. • Select the sensors to be reported.
Automatic post-processing	If **with density value** and **online via serial port** are selected, the measurement report contains the information needed to perform a buoyancy correction calculation for mass and conventional mass calibration. These calculations can be performed with a post-processing program (not included in the delivery). Select **Do automatic post-processing** and click **Browse...** to select the post-processing program. When the weighing process is completed, the report is sent to the post-processing program.

5.12.1 Interface to ODBC climate data sources

ODBC data sources can be installed on a computer to read data from various data sources like text files, Microsoft Excel data sheets, or any database system like Microsoft Access, SQL-Server, Firebird, Oracle, etc.

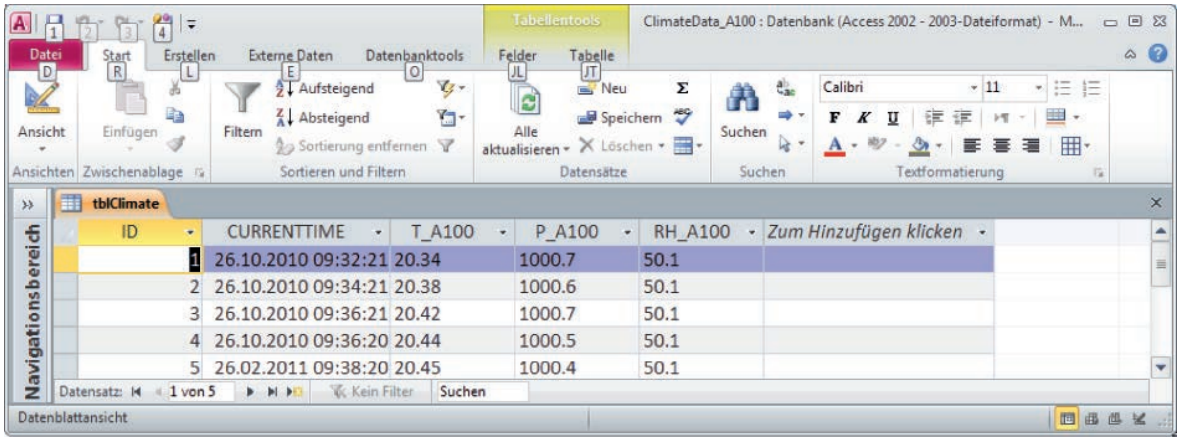
e10control has an interface to receive climate data from any **ODBC** source. This interface has the following characteristics:

- Reads data of all sensors selected to be reported. The names of the data fields correspond to the names of the sensors: T1, T2, T3, T4, P, RH.
- Data is read as text, not as numerical values. Therefore, the data source can specify the number of decimal places of the data. The data is checked to be numerical, and not more than 4 decimal places will be displayed.
- Data fields **STATUSNO** and **STATUSText**:
  - **STATUSNO** = 1 halts the control program when a measurement group is finished.
  - **STATUSNO** = 2 aborts the control program.
  - **STATUSText** provides additional information about the reason for the interruption.
- Data field **MEASTIME**:
  - Optional, to check measurement time
  - Can be read as date/time value, or as float value that indicates the expired days since 1.1.2000
  - **Maximum time difference** specifies the maximum time difference between the local time on the computer when the climate data was read, and the timestamp of the climate data which was imported from the **ODBC** data source. If the climate data is updated periodically, use the maximum time period as input.
- **Correct measurement time** serves to shift the measurement time of the **ODBC** source if the climate data database and the computer have different time bases.

5.12.2 Read data via ODBC from an Access database

Suppose your climate measurement system collects data periodically and saves the data to a Microsoft Access database. The sensors used for the comparator might be named **T_A100**, **P_A100** and **RH_A100**. Each sensor is stored in an individual field of the database table **tblClimate**. The field name is equal to the name of the sensor. There is a timestamp generated whenever the data is stored, and this value is stored in the table field **CURRENTTIME**.

Example of the data table **tblClimate** in Access:



We want to read the current data from this Access database table and use it as climate data for **e1Ocontrol**.

Step 1: Create a database query

We have to create a database query in the Access database to let the **ODBC** driver access the appropriate data. The **ODBC** driver reads the climate data of all sensors selected to be reported. The corresponding field names are **T1**, **T2**, **T3**, **T4**, **P**, and **RH**. The **ODBC** driver also reads the fields **STATUSNO**, **STATUSText**, and **MEASTIME**, see [Interface to ODBC climate data sources ▸ Page 58].

- The query in Access has to rename all database fields and to add **STATUSNO** and **STATUSText** fields.
- The query should export only the latest data record. Use **ORDER BY** to order the records descending.
- The following **SELECT** query performs the following tasks:

  SELECT TOP 1 tblClimate.ID, tblClimate.T_A100 AS T1, tblClimate.P_A100 AS P, tblClimate.RH_A100 AS RH, 0 AS STATUSNO, "OK" AS STATUSTEXT, tblClimate.CURRENTTIME AS MEASTIME FROM tblClimate ORDER BY tblClimate.CURRENTTIME DESC;

1 Create a database query as described above.
2 Save the query to Access, for example, as qry_ClimateData.
3 Save the database to a file like ClimateData.mdb.

Step 2: Create an ODBC data source to access the database

- This step depends on the Windows operating system and on the operating system language.

1 Open the control panel and go to **administrative tools** to find the **ODBC** data sources.
2 Add a **System DSN**.
3 Select the appropriate driver: Driver for Microsoft Access (**.mdb**).
4 Select an appropriate name, for example, ClimateServer.
5 Select the database path and choose the database fiel (**.mdb**).

Step 3: Access the data in e1Ocontrol

1 Start **e1Ocontrol**.
2 Select **System** > **Application mode...**.
3 Select **online from database (ODBC)**.
4 Enter the name of the **ODBC** data source, for example, ClimateServer.
5 As **Table/Query**, enter the name of the query in brackets, for example, [qry_ClimateData].

6 Select the sensors **Temperature T1**, **Pressure** and **Relative Humidity** to be reported.

7 Select **Check ODBC measurement time** = **No** and click **Check connection** to check the connection.

➡ A message box displays the current values, or an error message.

8 If a **MEASTIME** value is exported, select **Check ODBC measurement time**. Choose the appropriate format of the value. In the example above, choose **Date/Time**. If the connection fails, refer to the information below.

Problems with different day/time formatting

ODBC drivers may have problems with the translation of **Date/Time** values on different platforms. If you have problems with checking measurement time in **Date/Time** format, you can translate the **Date/Time** value in your database to a float number and export/check this number instead.

1 Convert the **Date/Time** value to a real number. In Microsoft Access, you can use the function CDbl() to perform this task. Other database system have similar functions.

2 Subtract the corresponding function value of a fixed date: 1.1.2000. In Access, you can use the function CDbl(CDate(#2000.1.1#)) to calculate this value.

3 The calculated difference is named **MEASTIME**.

With this procedure, the **MEASTIME** value indicates the days, and fractions of a day, since 1.1.2000. This value will be exported as a real value, which should be easier to read for the **ODBC** driver.

If the problem remains, skip the measurement time checking by setting **Check ODBC measurement time** to **No**.

See also

Interface to ODBC climate data sources ▸ Page 58

5.12.3 Read data via ODBC from an Excel sheet

You can enter climate data in an Excel sheet and import them via **ODBC** into **e10control**.

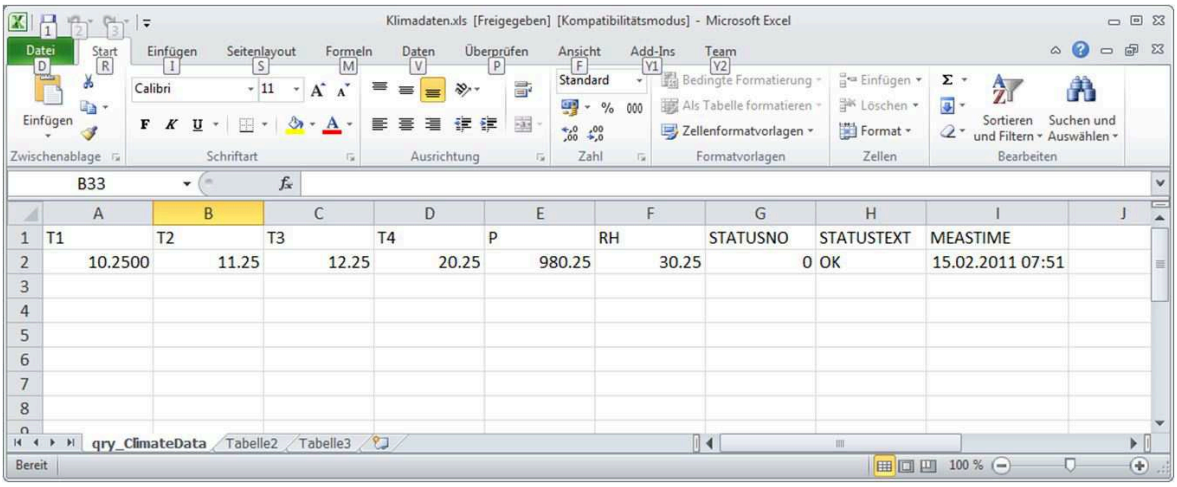
Step 1: Create the Excel sheet

1 Open a new Excel file.

2 Create a new Excel sheet and name it qry_ClimateData.

➡ The first row contains the name of the sensors as named in **Application mode** dialog in **e10control**.

➡ The second row contains the data.



3 Select **Share Workbook**. If you do not share the workbook, the **ODBC** driver will report an error when the data is changed in the worksheet and the **ODBC** driver tries to retrieve the new data before the data is saved manually.

4 Save the file. Name it Climatedata.xls, for example.

Step 2: Create an ODBC data source to access the Excel file

- This step depends on your Windows operating system as well as on your operation system language.

1 Open the control panel and go to **administrative tools** to find the **ODBC** data sources.
2 Add a **System DSN**.
3 Select the appropriate driver (Microsoft excel driver (.xls)).
4 Select an appropriate name (like ClimateServerFromExcel).
5 Select the database path and choose the database (Climatedata.xls in the example above).

Step 3: Access the data in e1Ocontrol

Navigation: e1Ocontrol > System > Application mode...

1 Start **e1Ocontrol**.
2 Select **System** > **Application mode...**.
3 Select **online from database (ODBC)**.
4 Enter the name of the **ODBC** data source as created above (ClimateServerFromExcel in the example above).
5 As **Table/Query**, enter the name of the Excel worksheet in brackets, and add $ at the end: [qry_ClimateData$] in the example above.
6 Select the sensors **Temperature T1**, **Pressure** and **Relative Humidity** to be reported.
7 Select **Check ODBC measurement time** = **No** and click **Check connection** to check the connection.
   ➡ A message box displays the current values, or an error message.
8 If a **MEASTIME** value is exported, select **Check ODBC measurement time**. Select the appropriate format of the value. In the example above, choose **Date/Time**.

Note

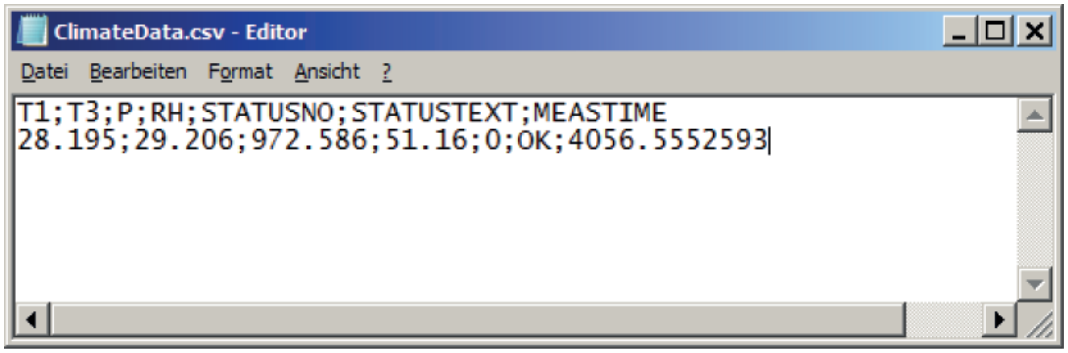
If the connection fails, see [Read data via ODBC from an Access database ▸ Page 59].

5.12.4 Read data via ODBC from a .csv text file

Suppose your climate measurement system exports the current climate data into one **.csv** file for each comparator. These data can be imported to the control program.

Step 1: Manually create the .csv file

1 Use an editor to create a file looking like the following:
   ➡ The first row contains the name of the sensors as named in **Application mode** dialog in **e1Ocontrol**.
   ➡ The second row contains the data. Separate the values with a semicolon (;).



2 Save the file. Choose an appropriate file name, for example, ClimateData.csv.

If your climate measurement system automatically updates the data in the file, proceed as follows:

1 Create a new, temporary file.
2 Write the new data to this new temporary file, close the file.
3 Copy the temporary file and paste it into the location where the original file (**ClimateServer.csv**) is stored.
   ➡ The temporary file replaces the original file.
4 If copying fails, wait a moment and try again.

If you write directly to the **ClimateData.csv** file, the file is temporarily blocked for **ODBC** access. This could force the control program to stop and generate an **ODBC** read error.

Step 2: Create an ODBC data source to access the .csv file

- This step depends on your Windows operating system as well as on your operation system language.

1 Open the control panel and go to **Administrative tools**.
2 Open **ODBC Data Sources**.
3 In **System DSN**, add a data source.
4 Select the appropriate driver (**Microsoft Access text driver (*.txt, *.csv)**).
5 Enter an appropriate name, such as "ClimateServerTest".
6 Click **Select Directory** and choose the directory where your **.csv** file is located.
7 Select **Options**.
8 Click **Define Format**.
➡ On the left hand side, you get a list with all tables (files) in the directory.
9 Select the file you have created before (**ClimateData.csv**).
10 Activate **Column Name Header**.
11 Under **Format:**, select **Custom Delimited**
12 Under **Delimiter:**, type ";".
13 On the right hand side, click **Guess**.
➡ The field **Columns** should get populated with the name of each field.
14 Select **T1** in the list.
15 Under **Data Type**, select **Char**.
16 Under **Width**, enter the value "255".
17 Click **Change**.
18 Do the same for all climate values (if used): **T2**, **T3**, **T4**, **P**, and **RH**.
19 Check the format of the other parameters (they should be already correctly set):

➡ **STATUSNO**: **Data Type** = **Integer**
➡ **STATUSText**: **Data Type** = **Char** , **Width** = "255"
➡ **MEASTIME** (if used): **Data Type** = **Float**

Note

Microsoft text drivers do not support **Date/Time** values. Therefore, **MEASTIME** must be exported with type **Float**.

Step 3: Access the data in e1Ocontrol

Navigation: e1Ocontrol > System > Application mode...

1 Start **e1Ocontrol**.
2 Select **System** > **Application mode...**.
3 Select **online from database (ODBC)**.
4 Enter the name of the **ODBC** data source as created above (ClimateServerTest in the example).
5 As **Table/Query**, enter the name of the CSV file: **ClimateData.csv** in the example above.
6 Select the sensors **Temperature T1**, **Pressure** and **Relative Humidity** to be reported.
7 Select **Check ODBC measurement time** = **No** and click **Check connection** to check the connection.
➡ A message box displays the current values, or an error message.
8 If a **MEASTIME** value is exported, select **Check ODBC measurement time**. Select **Days since 1.1.2000**.

Note

If the connection fails, see [Read data via ODBC from an Access database ▸ Page 59].

5.12.5 Read data via ODBC from other database systems

Any other database system can be treated similar to an Access database system, see [Read data via ODBC from an Access database ▸ Page 59].

Make sure to use the latest **ODBC** driver from your database vendor. For example, always use the **ODBC** driver from Oracle. Do not use the Microsoft driver ODBC for Oracle to access an Oracle database.

5.13 Sending emails

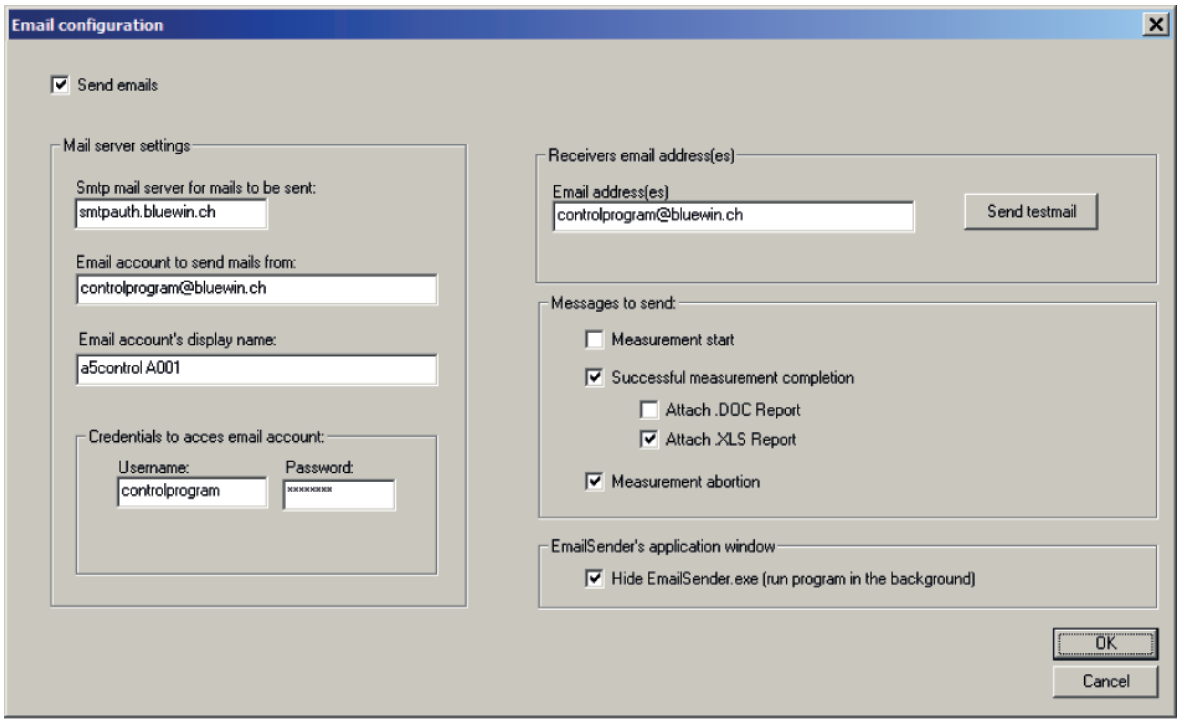
Navigation: e10control > System > Email sender configuration...

The program is able to send emails to inform the operator about measurement starts, successful measurement completions as well as measurement abortions.

1 Select **System** > **Email sender configuration...**.

➡ The window shown below is displayed.

2 Configure how to send emails.



Section	Description
Send emails	Enables or disables the sending of emails.
Mail server settings	Requires an email account on a mail server. Ask your IT department to get the access information for an email account. The **Mail server settings** contain information about the email account: • **Smtp mail server for mails to be sent**: address of the smtp mail server • **Email account to send mails from**: email address of the account on the smtp mail server • **Email account's display name**: name of the sender displayed in the header of the email • **Credentials to access the email account**: username and password to access the email account on the smtp mail server
Receivers email address(es)	To enter the email address of a recipient. If more than one address is entered, separate the addresses with a semicolon ";".

Section	Description
Messages to send	To define for which event an email message is generated. • **Measurement start**: After successful initialization, an email is sent, giving the estimated measurement end time. • **Successful measurement completion**: An email is sent if the measurement is successfully completed. In addition, a report file can be attached to the email. The report file is sent before **Automatic post-processing** is executed. Therefore, the report file attached to the email is not post-processed. • **Measurement abortion**: An error message is sent.
Email sender's application window	• The email is sent using a separate application. This requires the installation of **EmailSender.exe** on the computer. • By default, the **EmailSender** application window is hidden, the program runs in the background.

Sending test emails, troubleshooting

1 Click **Send testmail** to send a test email.
   ➡ The **EmailSender** application is briefly displayed.
2 If an error occurs, consult the log file of the **EmailSender** application.
   Note
   Typically, the log file is stored under C:\Program Files\Mettler-Toledo\EmailSender\EmailSender_log.txt.

Important note on mail server settings

An email is sent as follows:

- The control program writes the email data, including all information about mail server settings and receivers addresses, into the file **EmailSenderMessageToSend.txt**.
- The control program starts the application **EmailSender.exe**.
- **EmailSender.exe** opens the file and sends the email to the email account on the smtp mail server.
- The smtp mail server sends the email to the receivers email addresses.

NOTICE

The credentials to access the email account are stored in files and transferred to the smtp mail server in plain text. No encryption is applied.

Strongly recommended:

1 Use an email account on a mail server that is accessible via intranet (in-house). Never use an email account that is accessible only via internet.
2 Open a new account on the mail server, do not use an existing personal account.

5.14 Reducing pre-run/centering time using 'Standard's centering history'

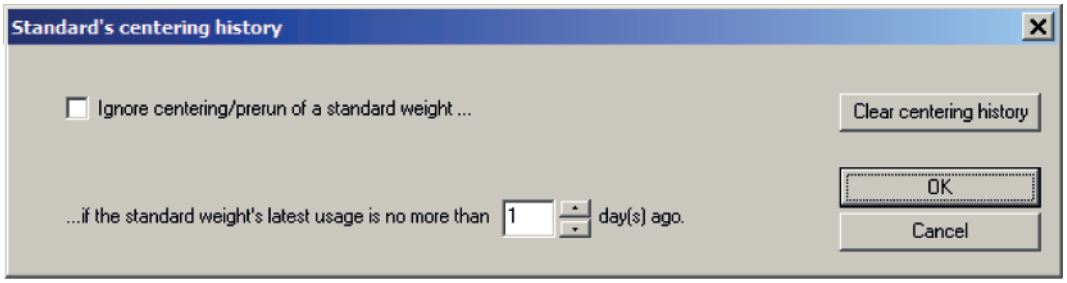
Navigation: e1Ocontrol > System > Standard's centering history...

The measurement starts with a centering/pre-run phase of all weights included in the weighing process.

Generally, the standard weights included in the process are re-used for many measurements. Therefore the centering/pre-run of these standard weights could be skipped.

Whenever a standard weight is used in the measurement process, the program stores (in a separate **centering history database**) date and time, magazine position, **Set-ID**, **Standard-ID** and nominal value of the standard weight. If the weight is re-used within a certain (maximum) period of days, the standard weight's centering/pre-run can be ignored.

1 Select **System** > **Standard's centering history...**.
   ➡ The window shown below is displayed.



2 Select **Ignore centering/prerun of a standard weight** to ignore the centering/pre-run of standard weights.

3 Select the maximum period of days under **if the standard weight's latest use is no more than … day(s) ago**.

The **Clear centering history** button clears all entries in the **centering history database**. This forces the program to redo the centering/pre-run of all standard weights.

By default, **Ignore centering/prerun of a standard weight** is not enabled, and the maximum period of days is 1.

If **Ignore centering/prerun of a standard weight** is enabled, consider the following.

Note

Never touch weight carriers of standard weights in the magazine.

When accidentally touching a weight carrier of a standard weight, click **Clear centering history** to delete the **centering history database**. Otherwise, the measurement process might be aborted.

If the carriers are touched, and therefore not centered before the measurement starts, the program might detect wrong carrier types. The measurement process is aborted, and one of the following error messages is displayed:

- Error: Weight carrier changed. Type detected during pre-run different from currently detected one.
- Error: Use of weight carriers of design 3 or design 4 (red handle) not allowed in case of 3-weight combinations.
- Error: A weight combination in the scheme cannot be loaded on the balance: The load exceeds the balance maximum excentric load.

If one of these errors occurs, the program automatically deletes the **centering history database**. The measurement can be restarted. The standard weight(s) will be centered, and the carrier type should be correctly detected.

5.15 Transmitting measurement report data to a TCP/IP server

Navigation: e1Ocontrol > System > ReportTransmitter configuration

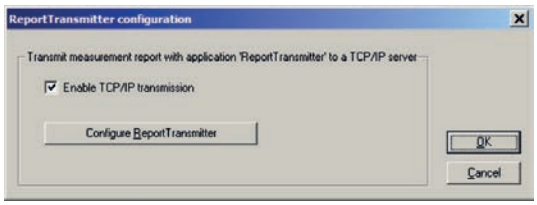
The measurement report data can be sent continuously to a TCP/IP server using the special application called **ReportTransmitter**. To enable this feature, proceed as follows:

Note

To use this feature, the application **ReportTransmitter** must be installed on the computer.

1 Select **System** > **ReportTransmitter configuration**.

➡ The window shown below is displayed.



2 Select **Enable TCP/IP transmission**.

3 Click **Configure ReportTransmitter**.

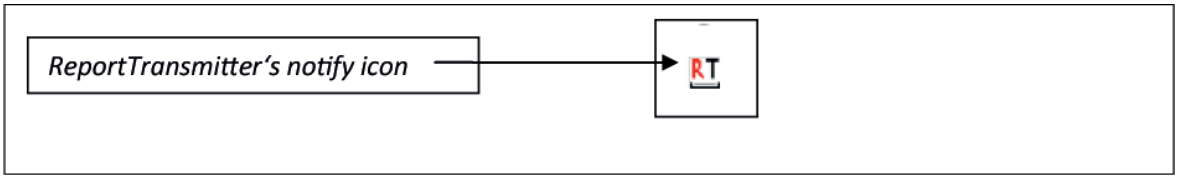
➡ The application **ReportTransmitter** opens and lets you enter the IP address and the IP port of the TCP/IP server to which you want to send the measurement report data.

4 Optional: Click **Check connection** to check the connection to the TCP/IP server.

5 Click **OK** to save the configuration.

➡ If **Enable TCP/IP transmission** is selected, the control program launches **ReportTransmitter** automatically at measurement start. This is indicated by an icon in the computer's task bar. **ReportTransmitter** stays hidden.

6 To get access to **ReportTransmitter**, right-click on the notify icon and select **Show ReportTransmitter** from the context menu.



The control program writes measurement data to a special new report file, **CurrentReport.txt**, located in an application specific folder. This file is regularly parsed by **ReportTransmitter**, and new report data is sent to the TCP/IP server. If **ReportTransmitter** detects the end of the measurement in the report file, it automatically shuts down.

5.16 Setting calibration data limits for support weights

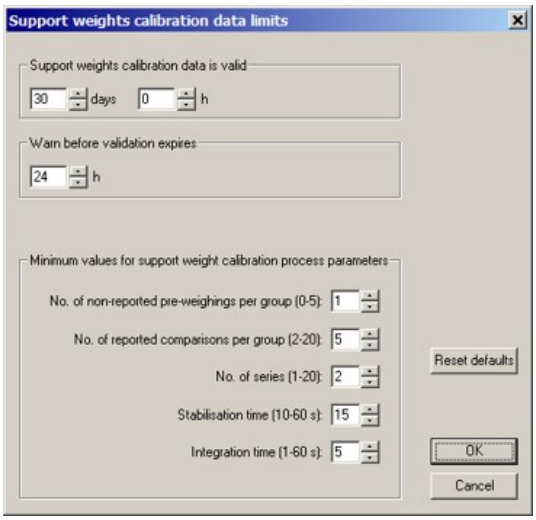
Navigation: e1Ocontrol > System > Support weights calibration data limits...

Support weights must be recalibrated regularly. Users can define the duration of the calibration cycle.

1 Select **System** > **Support weights calibration data limits...**

➡ The window **Support weights calibration data limits** is displayed.

2 Define the required parameters.



Parameter	Description
Support weights calibration data is valid	Defines how long a calibration value is valid. Default: 30 days
Warn before validation expires	Defines when a warning is generated before the calibration data becomes invalid. Default: 24 hours
Minimum values for support weight calibration process parameters	Serves to set limits for process parameters.

6 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.

6.1 Maintenance of the balance

6.1.1 Maintenance tasks

Maintenance action	Recommended interval	Remarks
Performing an internal adjustment	• 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.	• 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	• 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

6.2 Maintenance of the robot system

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

6.3 Cleaning

6.3.1 Cleaning agents

In the following table, cleaning tools and cleaning agents recommended by METTLER TOLEDO are listed. Pay attention to the concentration of the agents specified in the table.

		Tools				Cleaning agents				
		Air bellow	Paper tissue	Brush	Dishwasher	Water	Acetone	Ethanol (70%)	Isopropanol (70%)	Hydrochloric acid (3-10%)
Around the balance	Balance housing	✓	—	R	—	—	—	—	—	—
	Feet	✓	—	R	—	—	—	—	—	—

		Air bellow	Paper tissue	Brush	Dishwasher	Water	Acetone	Ethanol (70%)	Isopropanol (70%)	Hydrochloric acid (3-10%)
Balance terminal	Terminal	✓	✓	R	—	✓	PR	R	R	R
	Display	✓	✓	—	—	✓	PR	R	R	R
	Terminal cover	✓	✓	R	—	✓	—	R	R	R
Balance draft shield	Glass panels	✓	—	R	—	—	—	—	—	—
	Non-removable handles and frames	✓	—	R	—	—	—	—	—	—
Weighing area	Weighing pan	✓	—	—	—	—	—	—	—	—
	Drip tray	✓	—	—	—	—	—	—	—	—

Legend

✓ Best recommendation by METTLER TOLEDO; can be used without limitation.

R Recommended by METTLER TOLEDO; can be used without limitation.

PR Partially recommended by METTLER TOLEDO: individual resistance to acid and alkali must be evaluated, including dependence to the time exposure.

— Not recommend. High risk for damage.

6.3.2 Cleaning the components

Overview

Periodically, clean the following parts of the instrument:

System part	Task	Tool	Notes
Weighing chamber	Remove dust.	Air bellow	
Balance: • Weighing pan • Drip tray • Housing • Terminal	Remove dust.	Air bellow	The position of the balance must remain absolutely unchanged.
Weight magazine: • Weights • Weight carriers	Remove dust.	Air bellow	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: • Robot hand • 3 carrier-centering cones	Remove dust.	Air bellow	Do not use compressed air or petroleum-based solvents.

System part	Task	Tool	Notes
• Light barrier	If a problem with the light barrier on the robot hand occurs, clean the light barrier.	Air bellow	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%.

6.4 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.

7 Technical Data

7.1 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 ≤ 0.15 µg • 1-2 g: s ≤ 0.25 µg • 2-6 g: s ≤ 0.40 µg • 6-10 g: s ≤ 0.60 µg
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 ±3%, 2.5 A (with electronic overload protection)
Balance power consumption:	12 V DC ±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, ±10%, 50/60 Hz Secondary: 24 V DC, ±5%, 2.1 A (with electronic overload protection)
Robot power consumption:	24 V DC ±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 18

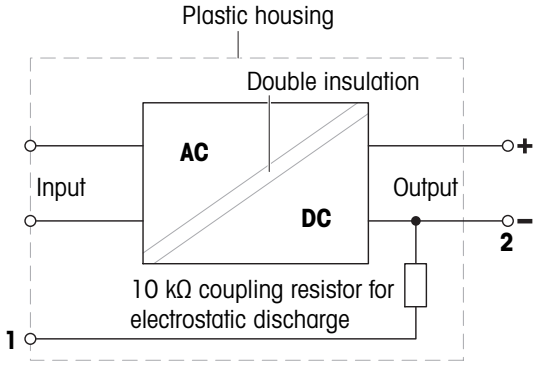
7.2 Explanatory notes for the METTLER TOLEDO AC/DC adapter

The certified external AC/DC adapter complies to the requirements for Class II double insulated equipment. It 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 the compliance of our products can be found in the "Declaration of Conformity" delivered with every product.

In case of testing with regard to the European Directive 2001/95/EC, the AC/DC adapter and the instrument have to be handled as Class II double insulated equipment.

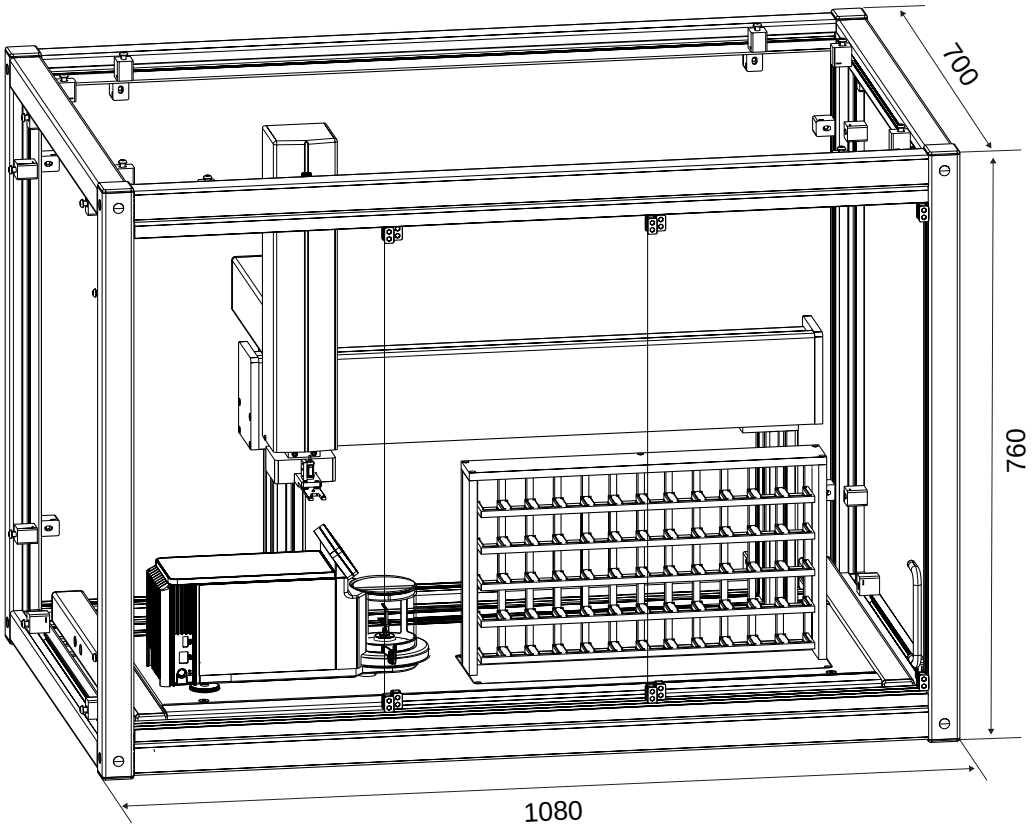
Consequently, a grounding test is not required. It is not necessary to carry out a grounding test between the earth connector of the power plug and any exposed part of the metallic housing of the instrument.

Because the instrument is sensitive to static charges, a leakage resistor of 10 kΩ is connected between the earth connector (**1**) and the negative pole (**2**) of the AC/DC adapter. 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.



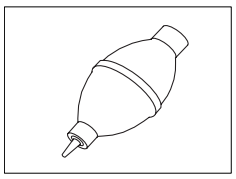
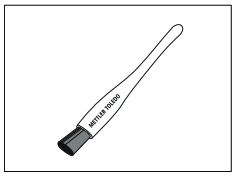
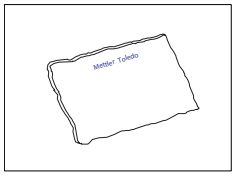
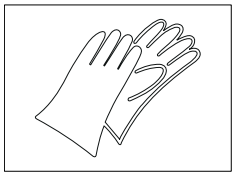
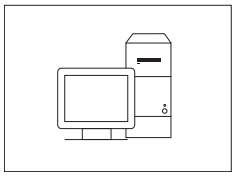
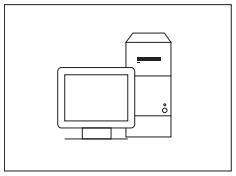
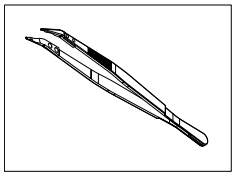
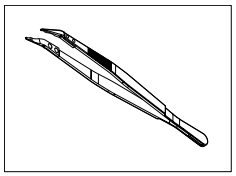
7.3 Dimensions

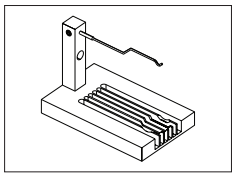
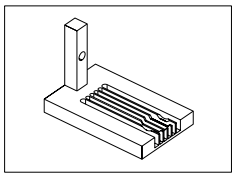
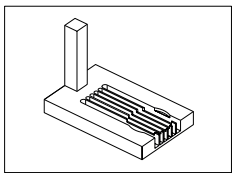
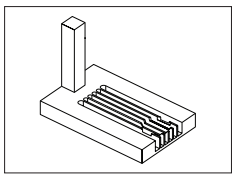
Dimensions in mm.



8 Accessories

Accessories are additional components that could help you in your workflow.

	Air bellow, for weight cleaning	11116548
	Brush, suitable for all environments	158799
	Micro fibre cloth, suitable for all environments	158798
	Nylon gloves, pair, suitable for all environments	11123098
	Software control professional (for dissemination / weight combinations)	11107519
	Software efficiency pack (calculation of True Mass and Conventional Mass + execution of multiple weights sets sequentially)	11116875
	Tweezers, straight tips, for weights 1 mg – 50 g, length 130 mm	15900
	Tweezers, straight tips, for weights 1 mg – 500 mg, length 130 mm	30040321

	Weight carrier design 1	30088746
	Weight carrier design 2	11147515
	Weight carrier design 3	11147520
	Weight carrier design 4	30088748
	ClimaLog30 certified	30078423
	DataLog30 certified with 2 temperature sensors	30078424
	Weight set 1 mg – 200 g E1 wooden box - certified	159341

9 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.

10 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

Contact METTLER TOLEDO for questions about the country-specific compliance of your instrument.

▶ www.mt.com/contact

United States of America

This equipment has been tested and found to comply with the limits for a **Class A** digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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GWP®

Good Weighing Practice™

GWP® is the global weighing standard, ensuring consistent accuracy of weighing processes, applicable to all equipment from any manufacturer It helps to:

- Choose the appropriate balance or scale
- Calibrate and operate your weighing equipment with security
- Comply with quality and compliance standards in laboratory and manufacturing

www.mt.com/GWP

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For more information

Mettler-Toledo GmbH
Im Langacher 44
8606 Greifensee, Switzerland
www.mt.com/contact

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