

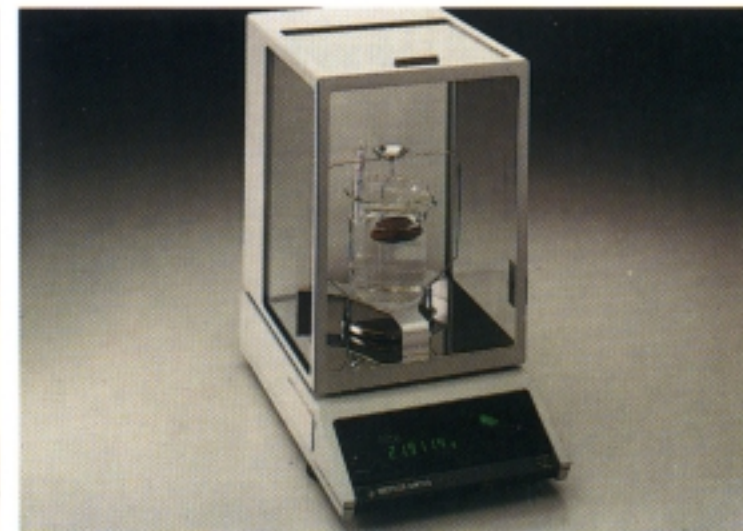
Applications
Technical data
Accessories



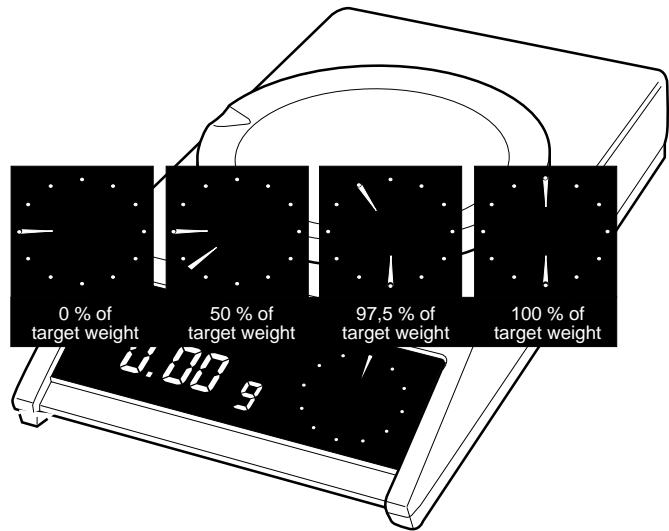
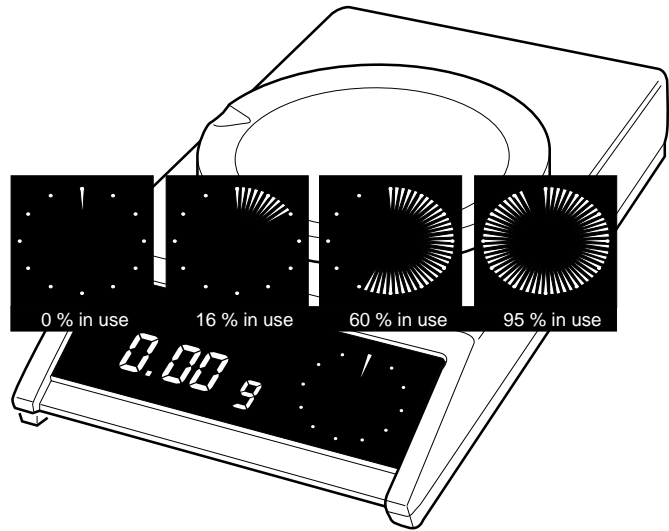
METTLER TOLEDO
AM/PM/SM
Balances and scales



METTLER TOLEDO



A first glance at the M balances and scales



- Matching the balance or scale to the surroundings – **vibration adapter**
- Matching the balance or scale to the type of weighing – **weighing process adapter**
- METTLER **DeltaTrac** – **the graphic indicator**
- Up to 9 (nine) **different weighing units**
- **Weighing in %** (percentage) of a selectable reference weight
- **Plus/minus weighing** with METTLER **DeltaTrac**
- Simple **piece counting**
- **Animal weighing**
- **Data I/O** – the built-in **serial interfaces** (RS232C and CL)
- **Data I/O** – **controlling the balance or scale** using a specified command set
- **GM bus** – a gateway to the **METTLER TOLEDO peripherals**

1. Applications

Page 1.1

You just have to know how – suggestions for solutions to your special weighing problems!

2. Result recording and data transfer

Page 2.1

The connection to the outside world – attachment of printers, computers, bar code readers ...

3. Application Pacs and software

Page 3.1

The choice is yours – all systems at a glance!

4. Accessories

Page 4.1

From aluminum weighing pan to weighing tongs – everything you need to make weighing more convenient!

5. Technical data

Page 5.1

Concerning the METTLER balance or scale – complete technical information on balances and scales

6. Documentation and literature references

Page 6.1

You just have to know where – (short-form) operating instructions, bulletins and brochures

7. Index

Page 7.1

1. Applications

Precision, weighing convenience and absolute **dependability** are features you as the owner of a METTLER TOLEDO balance or scale are accustomed to.

But be honest:

Are you so well acquainted with their capabilities that you can also make optimum use of them?

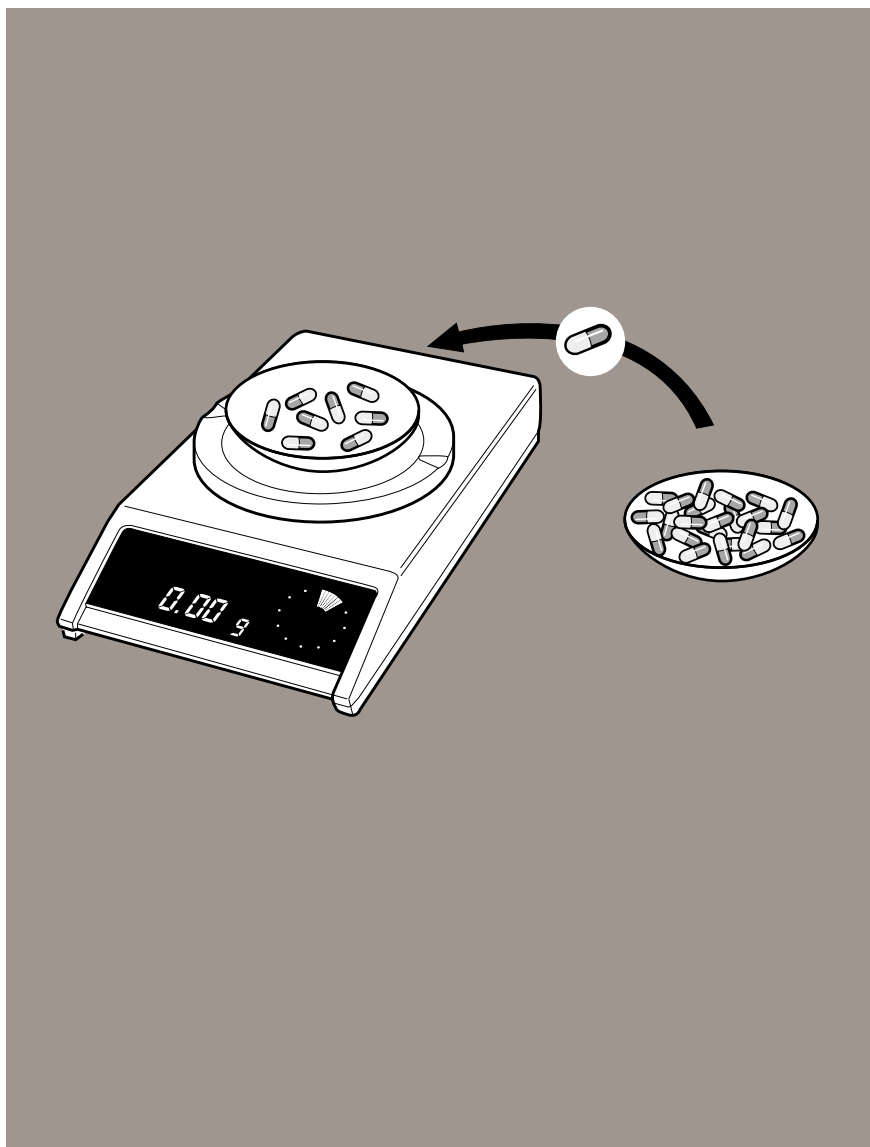
The aim of the following section is to provide you with information and suggestions on how you can make especially effective use of METTLER TOLEDO technology to solve your special weighing task.

You will see:

Even a METTLER TOLEDO balance or scale can improve its performance!

Together with METTLER TOLEDO **software** and appropriate **peripheral units**, complete, user-friendly and cost-saving solutions also exist for quite specific application needs.

- **Additive weighing** Page 1.2
 - Totalization of weight values
- **Density determination** 1.3
- **Differential weighing** 1.4
 - Backweighing
 - Moisture content and dry weight determination
- **Dispensing – Weighing-in to a target weight – Formula weighing** 1.7
 - Mixing of substances
 - Net total weighing
 - Formula weighing by weight and by percent
- **Weight control** 1.11
 - Simple tolerance check with the METTLER DeltaTrac
 - Plus/minus weighing
 - Fill process control, pharmacopeia
 - Statistical quality control
- **Calculating with weight data and constants** 1.15
- **Statistical evaluation** 1.16
- **Piece counting** 1.17
- **Special weighing tasks, freely programmable** 1.20
- **Animal weighing – weighing in an unstable environment** 1.21
- **Weighing under difficult conditions** 1.22
 - Below-the-balance weighing
 - Weighing in a contaminated environment
- **Weighing with extremely high accuracy** 1.23

Additive weighing**Weigh – add one more part, weigh – add one more part, weigh – ...**

You wish to determine **individual weights** of several components or parts, but **without** having to **remove** the samples already weighed from the weighing pan. You can achieve this with every M balance or scale by taring after reading off the result.

Particularly well suited to this type of weighing are **METTLER DeltaRange balances and scales**, however, as after taring the ten times more accurate **fine range** is fully accessible for every individual weighing.

And don't forget:

Irrespective of the individual weight currently displayed, every AM, PM or SM balance or scale with the dynamic graphic indicator – the **METTLER DeltaTrac** – shows you how much of the total weighing range is in use and how much is still available.

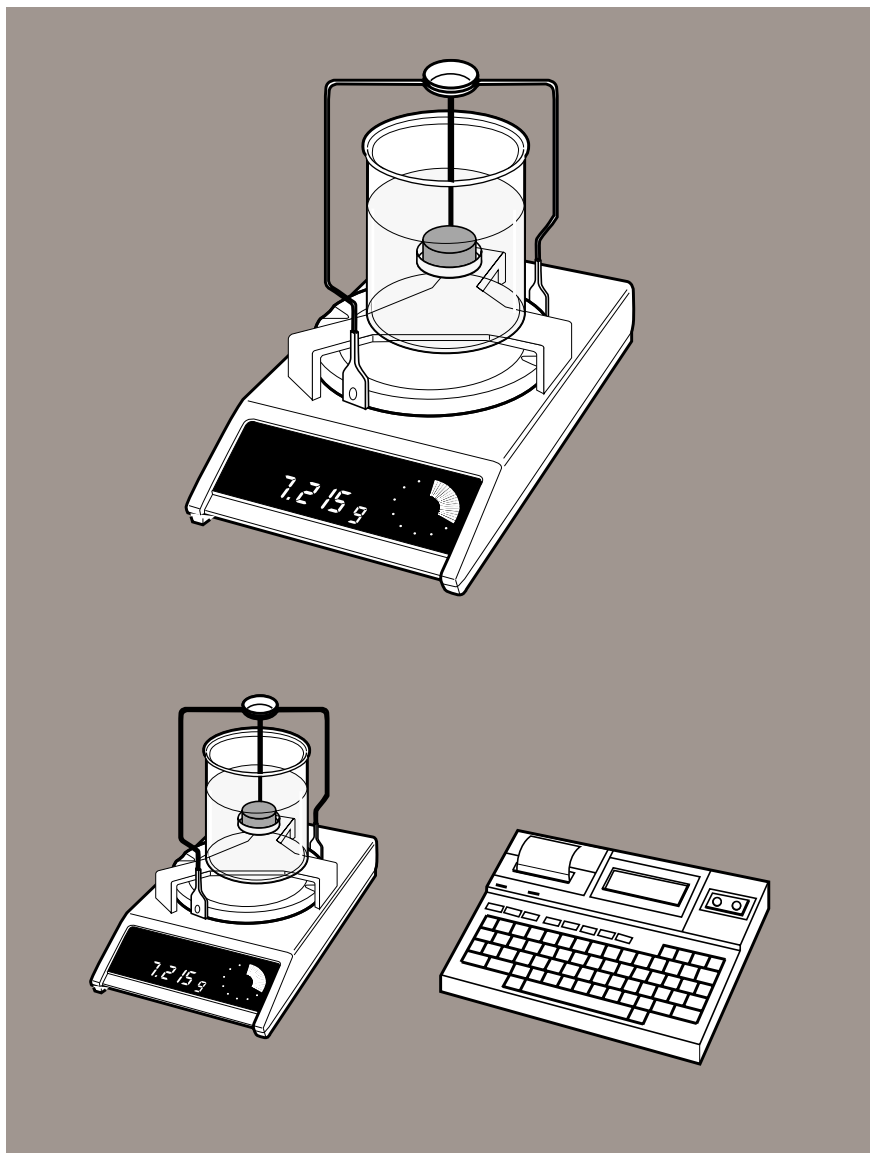
But what should you do if you also need to know the **total of the individual** weights exactly? Even this poses no problem:

One of the features of the **Net total** function of the **LabPac-M** and **PharmaPac-M** allows the additive weighing of components and continuously calculates the total of the individual weights.

Additive weighing can be used to particular effect in weight controls of several identical parts, e.g. in the case of a **pharmacopeia**, and is equally well suited to the **statistical evaluation** of individual weights and for use in **piece counting**.

Details are given in the appropriate subsections on the following pages.

Density determination



Density determination – convenient and time-saving!

Little acorns – great oaks: the **Density Determination Kit** from METTLER TOLEDO.

- Simple installation and
- sophisticated design

assure high reproducibility of the density determination of **solids** by the buoyancy method. You can also determine the density of **liquids** by using a displacement body.

Incidentally:

For large bodies or liquid containers, you have the possibility of below-the-balance weighing. You will find the appropriate information on page 1.22.

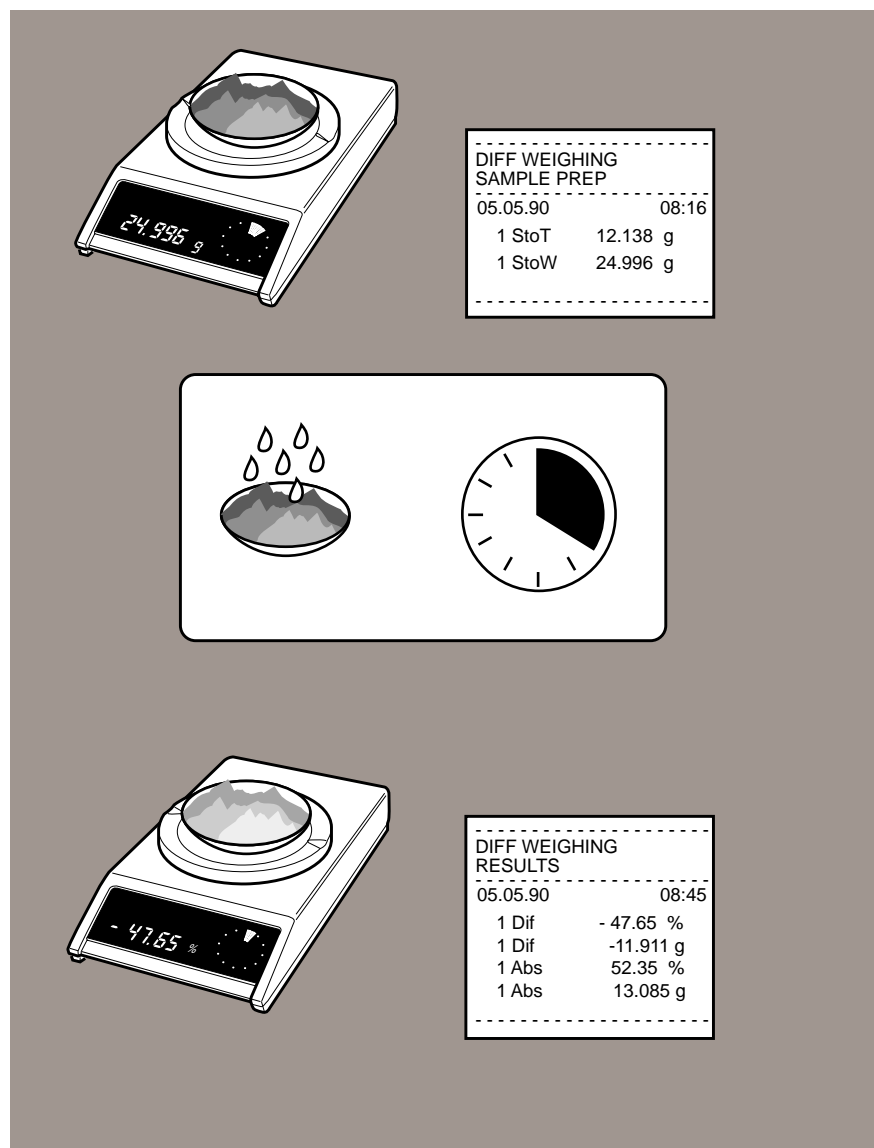
Automatic density calculation – always the right method!

Whether **solid, liquid or porous** samples – even more flexibility and convenience is offered by the Density Determination Kit in combination with the **LabWare “Density determination”** software package for the EPSON HX-20:

- uncomplicated user guidance (menu)
- density determination by the buoyancy method or with a pycnometer
- **automatic density calculation**
- calibration of the pycnometer or displacement body
- statistical evaluation (\bar{X} , s) of measurement series
- **detailed result record** with date, time, article, code and method

See section 3 for a complete description of the capabilities of the METTLER TOLEDO LabWare “Density determination”.

Differential weighing



DIFF WEIGHING SAMPLE PREP	
05.05.90	08:16
1 StoT	12.138 g
1 StoW	24.996 g

DIFF WEIGHING RESULTS	
05.05.90	08:45
1 Dif	- 47.65 %
1 Dif	-11.911 g
1 Abs	52.35 %
1 Abs	13.085 g

Differential weighing – moisture content and dry weight determination

Quality, shelf-life and stability of many products are decisively affected by their moisture content.

Are you already using the optimum method to check this important value?

Take a minute to discover what METTLER TOLEDO can offer you here for quality assurance and lab analysis!

Backweighing – mere child's play with every balance or scale of the M series!

The unit **percent** is built into every AM, PM and SM balance or scale as a basic function. You set the initial weight of your sample as reference (100 %), process the sample and then reload on the balance. The **result** appears directly in **percent of the initial weight**.

Whether you need to backweigh filters or determine ignition residues

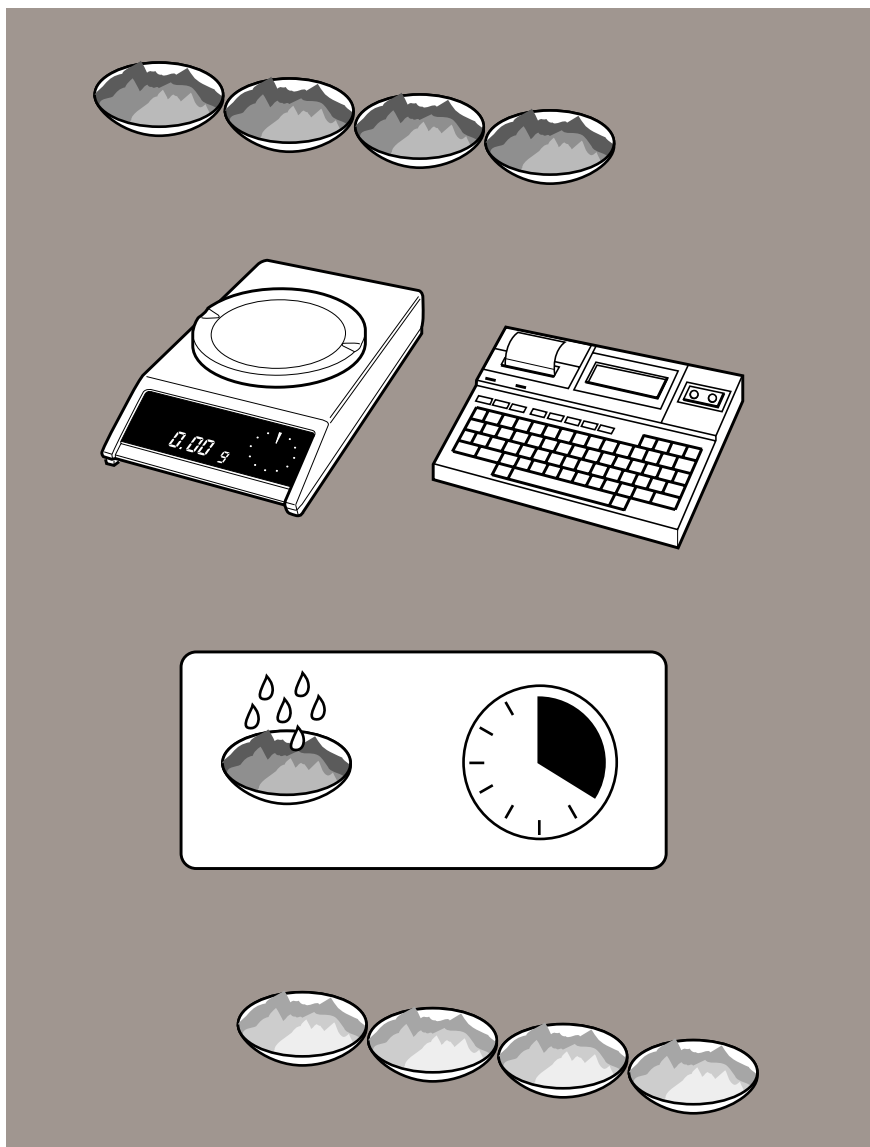
– the **LabPac-M** can handle up to **20 samples** in backweighing:

- the individual tare weights and initial weights of 20 samples can be stored
- the results of the backweighing can be displayed in 4 forms
- the samples can be processed and backweighed several times.

In combination with the GA44 Printer, the LabPac-M provides you with accurate records of all intermediate stages and results.

Incidentally:

During sample treatment, you can use the balance for other weighings!



Backweighing in routine operation with even greater flexibility!

Do you need a system that makes an efficient backweighing routine possible in any order even with a large number of samples?

Then you need the **LabWare "Moisture determination"** – with

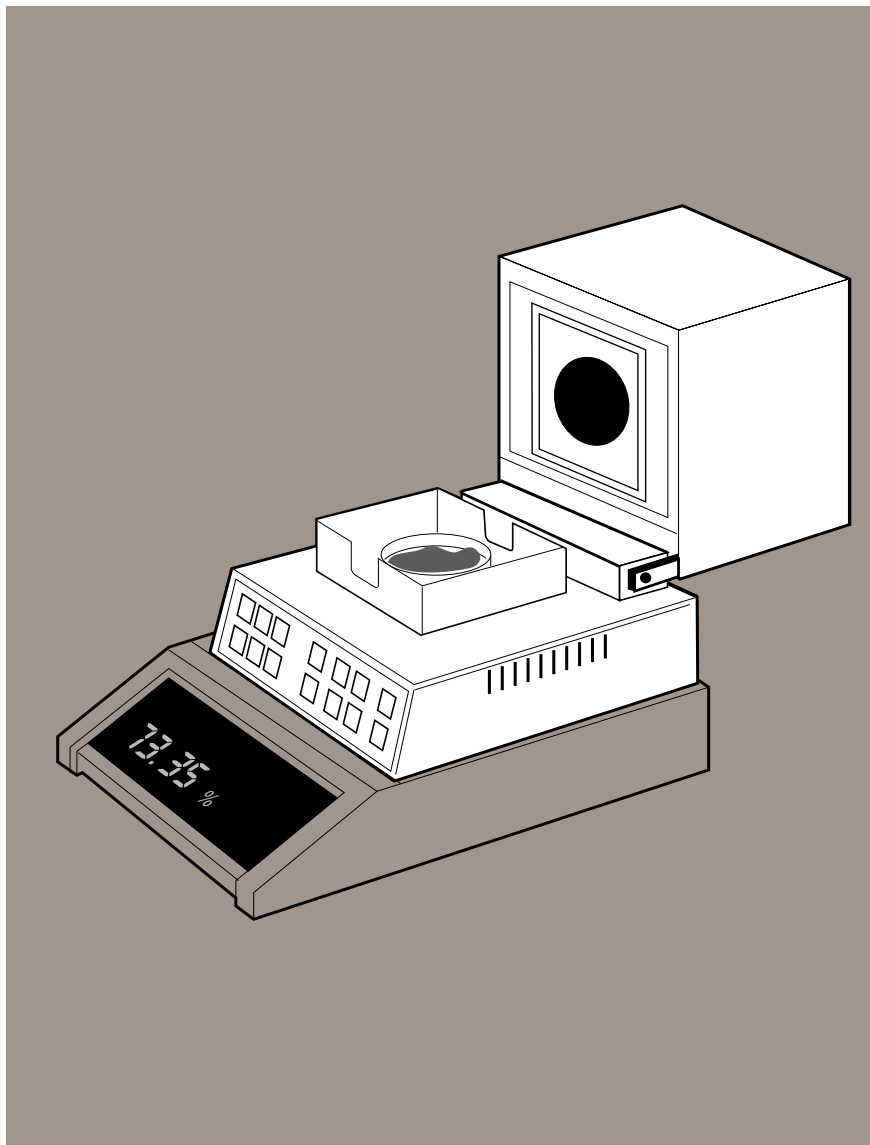
- a capacity of up to **300 samples**,
- an uncomplicated user guidance (menu) and
- a particularly detailed backweighing record.

Incidentally:

Even inexperienced personnel can work rapidly and dependably with this system in routine operation!

The METTLER TOLEDO LabWare "Moisture determination" runs on the EPSON HX-20.

See section 3 for a complete description of the capabilities of the LabPac-M and LabWare "Moisture determination".



Rapid moisture content determination for every sample

Whether you wish to analyze chemicals or foodstuffs, coffee or wood – the **LP16 Infrared Dryer** is equipped to handle all possibilities!

You define various parameters in advance **in accordance with the analysis sample**, for instance

- drying time and temperature,
- evaluation program and
- type of record.

Thanks to clear key symbols and convenient user guidance, as easy as winking!

But it is not only in routine operation that you will appreciate the wide variety of possibilities to **configure** the LP16 **especially** for each type of sample!

For routine work in the lab and in production, the simple compact LJ16 instrument is available.

Via the data output built in as standard, the LP16 and LJ16 can be connected to the GA44 Printer, which then records all results and settings.

Incidentally:

With the **Thermometer Set** available as an accessory, you can always check the sample temperature.

The **LP16 Application Brochure** with its 50 examples provides you with information on the optimum drying parameters for a wide range of situations.

You will find further details regarding the LP16 and LJ16 in section 4.

Dispensing – Weighing-in to a target weight – Formula weighing



Day-to-day weighing, without stress!

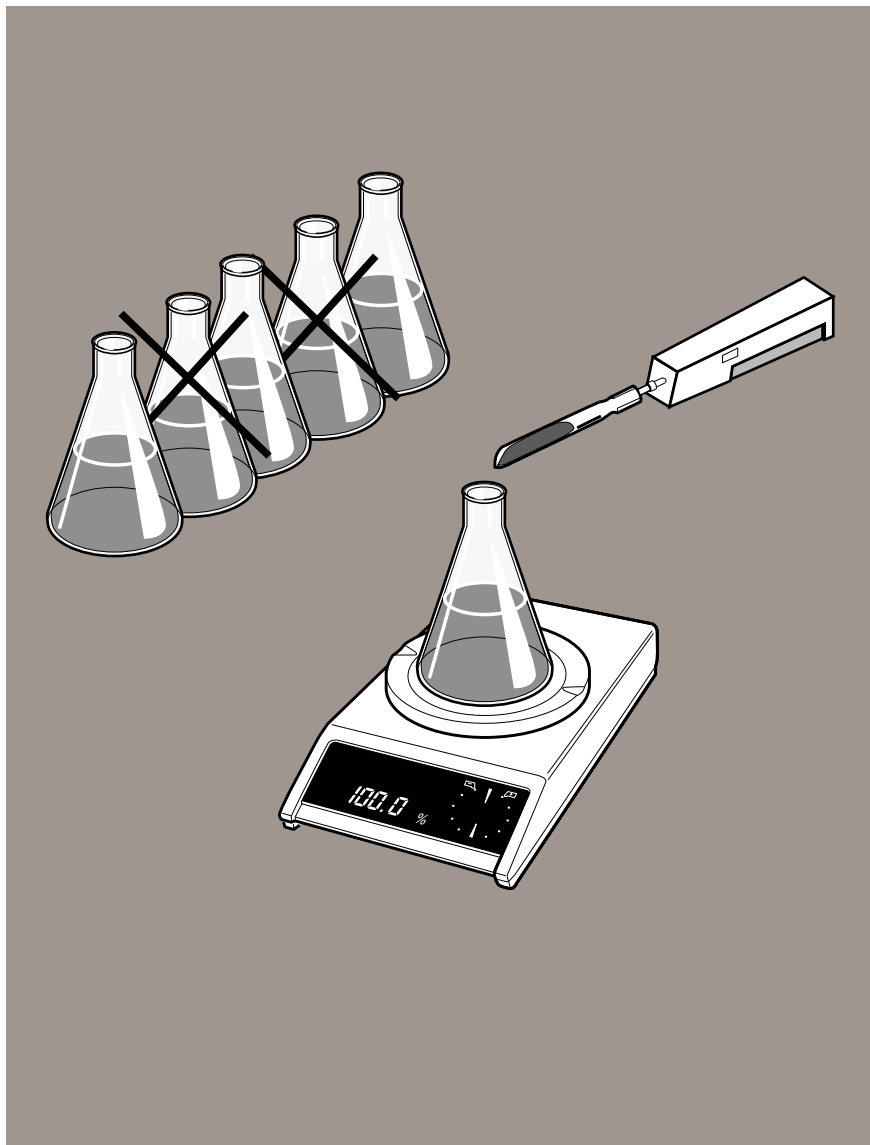
You are looking to considerably **ease the load in everyday weighing operations** in the lab or in production.

And in this connection your prime aims are presumably as follows:

- reliable **weighing-in** or dispensing within a reasonable time,
- dependable **compliance with the formulation instructions** in weight units or in percent,
- minimal reject quotas,
- error-free **result recording** and transfer of the weighing results.

And you envisage that such routine work should progress in a simplified yet accelerated manner, naturally without meticulousness and precision falling by the wayside. You also wish to keep an eye on the cost factor.

Here, METTLER TOLEDO can offer you problem-oriented, user-friendly solutions.



The solo balance – a wealth of features!

For example, **setting** the balance to “**fine dispensing**” where the display reacts particularly fast to the weight change and you always have all decimal places in view.

Or the METTLER **DeltaTrac**, a dynamic graphic indicator with 60 segments. In its basic function it **marks** the **weighing range already in use**. It is thus virtually impossible for you to exceed the maximum range and no longer be able to read off the weight when mixing substances or totalizing weight values.

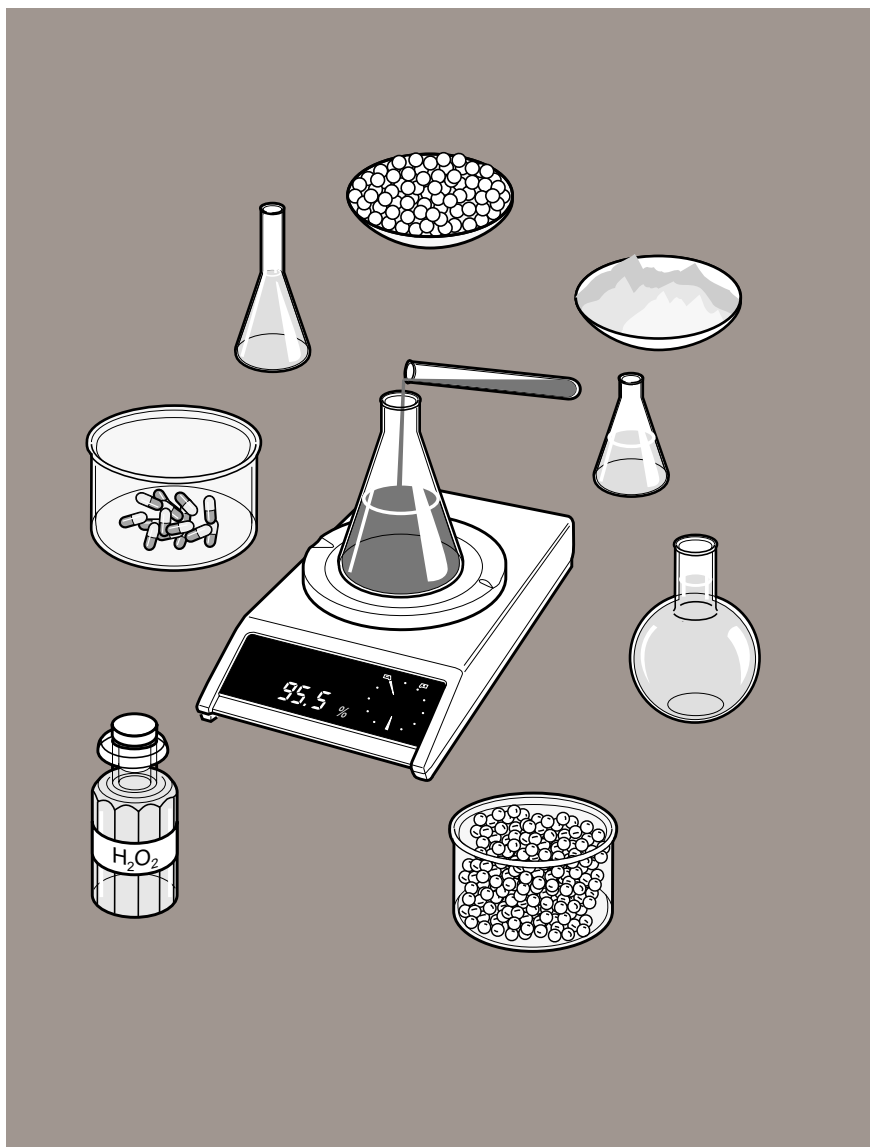
Repeated weighing-in to a target weight – so simple, yet nevertheless accurate!

For this you set the balance to %, weigh in the target weight once and set it as reference (100 %). The DeltaTrac now changes into a **plus/minus display** with two tolerance vanes and two pointers.

Each new weighing-in is now referred to the target weight. When the pointers are in the “6 o'clock” position, the target weight has been reached with an **accuracy of $\pm 0.25\%$** .

Incidentally:

For particularly precise additions, you have the **LV3 Vibrospatula** available.



Mixing and formula weighing made simple!

With the “**Net total**” function of the **LabPac-M** or **PharmaPac-M**, you can

- accurately **weigh in additively** any number of components from zero,
- **enter the target weight** of each component,
- weigh in each component to the target weight using the **DeltaTrac** and
- **call up the total** of components already added or weighed as a net total.

And all this without any calculation!

Incidentally:

Totalization is also possible with the **NetEasy-M** software cassette, see GM303 Control Unit in section 4.

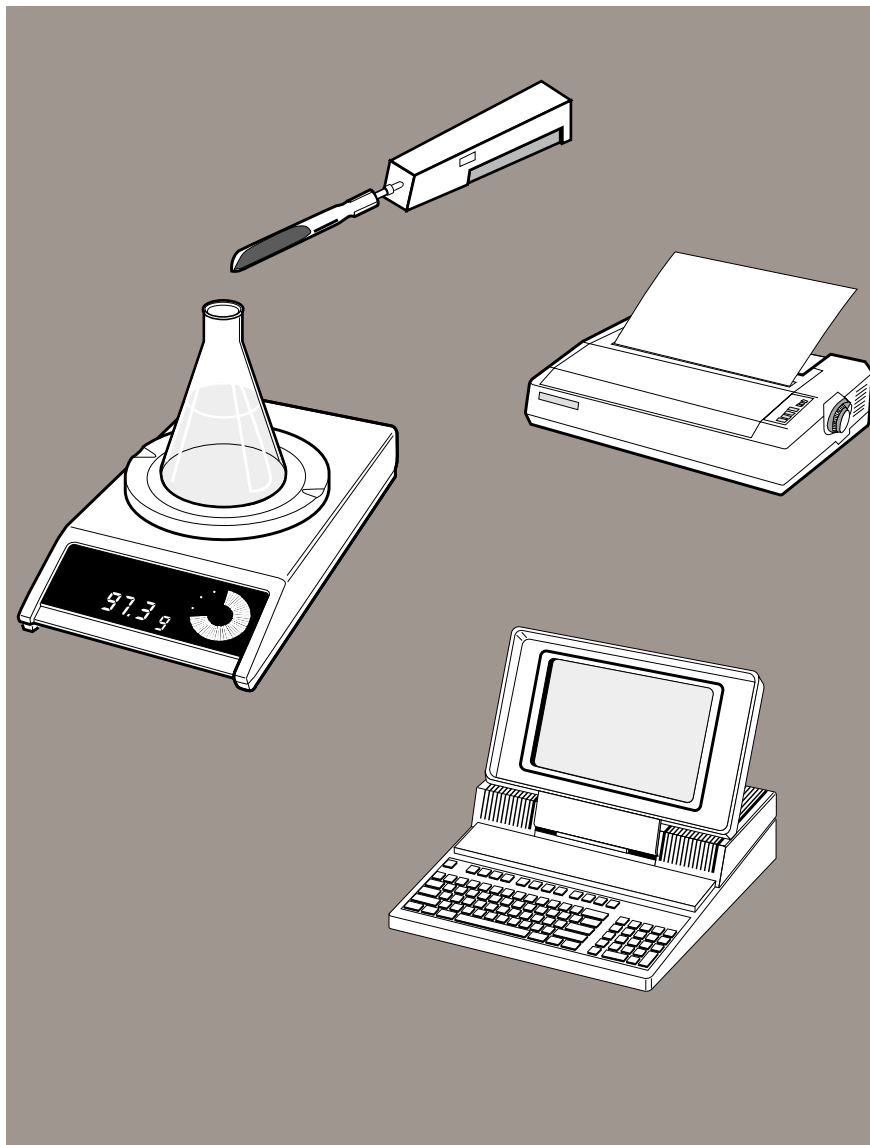
Are the **mixing proportions** available **in percent** of the total weight?

With the “**% formula**” function of the **LabPac-M** you can

- enter the component weights in %,
- call up the **total** of the components already weighed **in percent** of the target weight or in a weight unit,
- weigh in the first component only approximately yet achieve the **exact concentration** – a possibility that you will certainly appreciate with substances difficult to dispense – as well as
- make up the mixture to 100 % (= final weight).

And you wish to have all this on paper? With date, time and identification?

No problem! With the GA44 Printer you obtain all results as well in black and white, e.g. the **target weights** and the actual **weighed-in amounts** of the individual components.



Formula weighing in routine operation – without a book of formulas!

For you have the **F03220 Formulation Program** for MS-DOS computers available.

- 100 formulations and 200 different components (raw materials) and
- 20 components per formulation with tolerance details can be stored and recorded in detail in formula weighing.

Additional plus points are:

- formulation in weight units or in %
- weighing of all components into a vessel or weighing of each component into a single vessel (up to 10 batches)
- **consumption calculation** of the individual raw materials
- **attachment of 3 balances or scales** of the AT, M or MMR series
- password protection

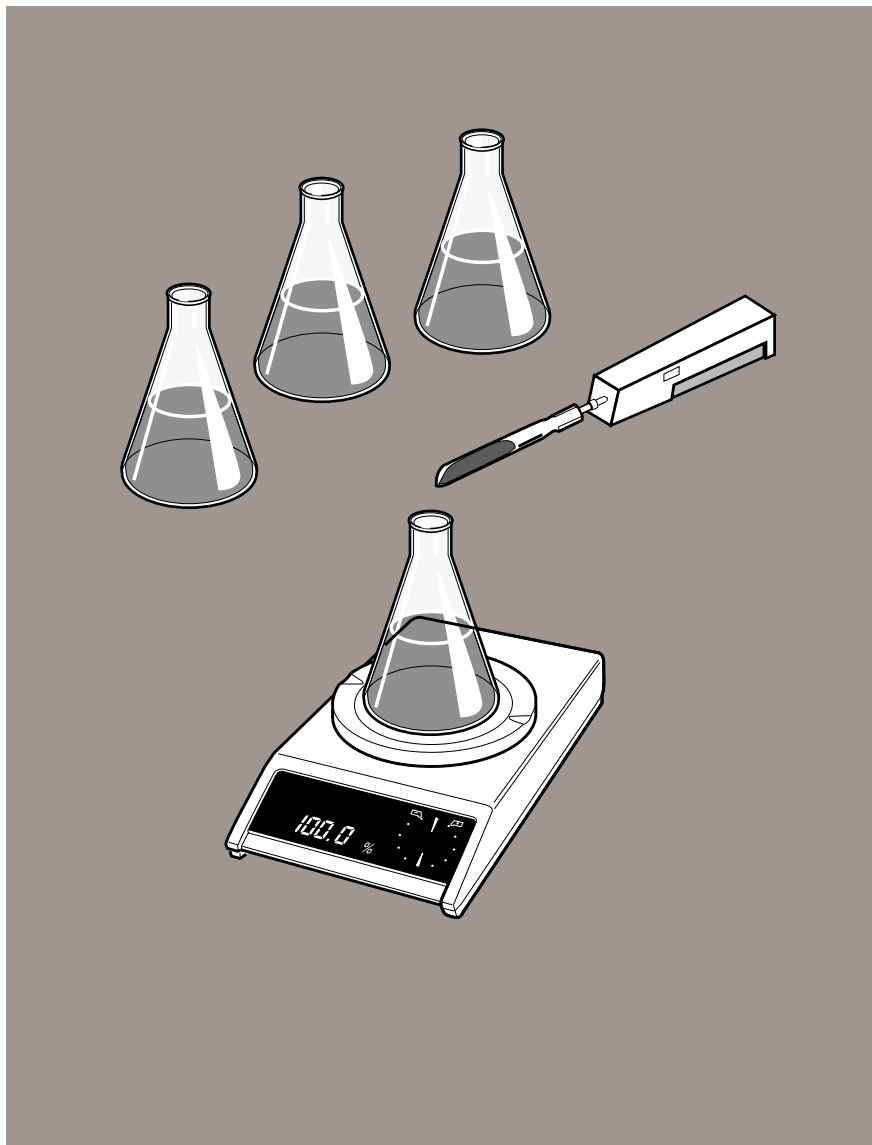
Incidentally:

Yet another case where you will find the **LV3 Vibrospatula** extremely useful.

An A4 printer can be used not only to provide result records, but also to **print out** appropriate **labels** for the finished products.



See section 3 for a complete description of the capabilities of the LabPac-M, the Pharma-Pac-M and F03220.

Weight control



Simple tolerance check with the METTLER DeltaTrac

Built into every AM/PM/SM balance or scale as standard, this graphic indicator marks the used and available weighing range.

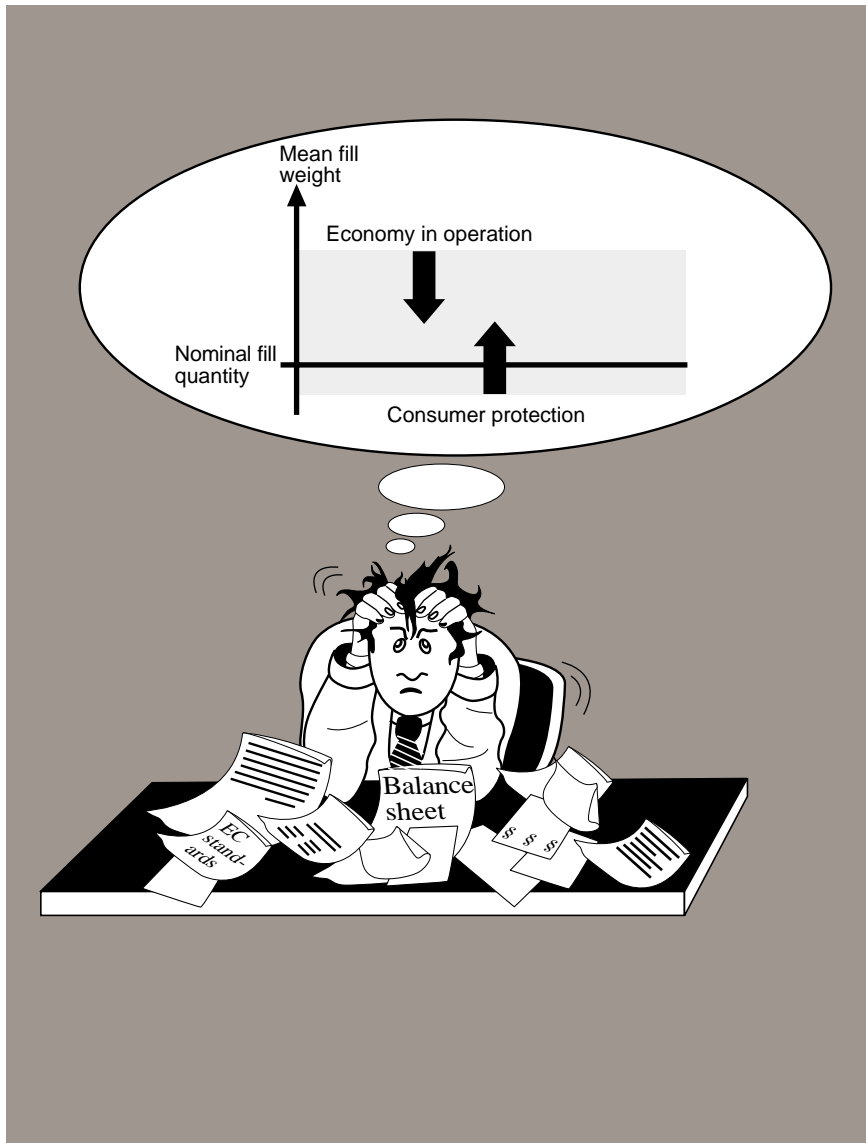
If, on the other hand, the balance is set to the unit "%", the target weight can be set as reference (100 %). **The DeltaTrac display** now becomes a **plus/minus display** with two tolerance vanes [ ]. These mark the **fixed tolerance range** of $\pm 2.5\%$.

Tolerances – freely selected!

Would you like to select the plus/minus tolerances freely, and perhaps have asymmetrical tolerances? Or do you perhaps wish to even **classify** your **products** as a function of the result?

The **"Plus/minus weighing"** function of the **ProPac-M**, if need be supplemented by the **GM54 Output Module**, offers you these and other possibilities.

You will find further information in sections 3 and 4.



Fill process control

There is no escape route – the **legislative authorities** stipulate exact filling tolerances!

Make therefore a virtue out of necessity:

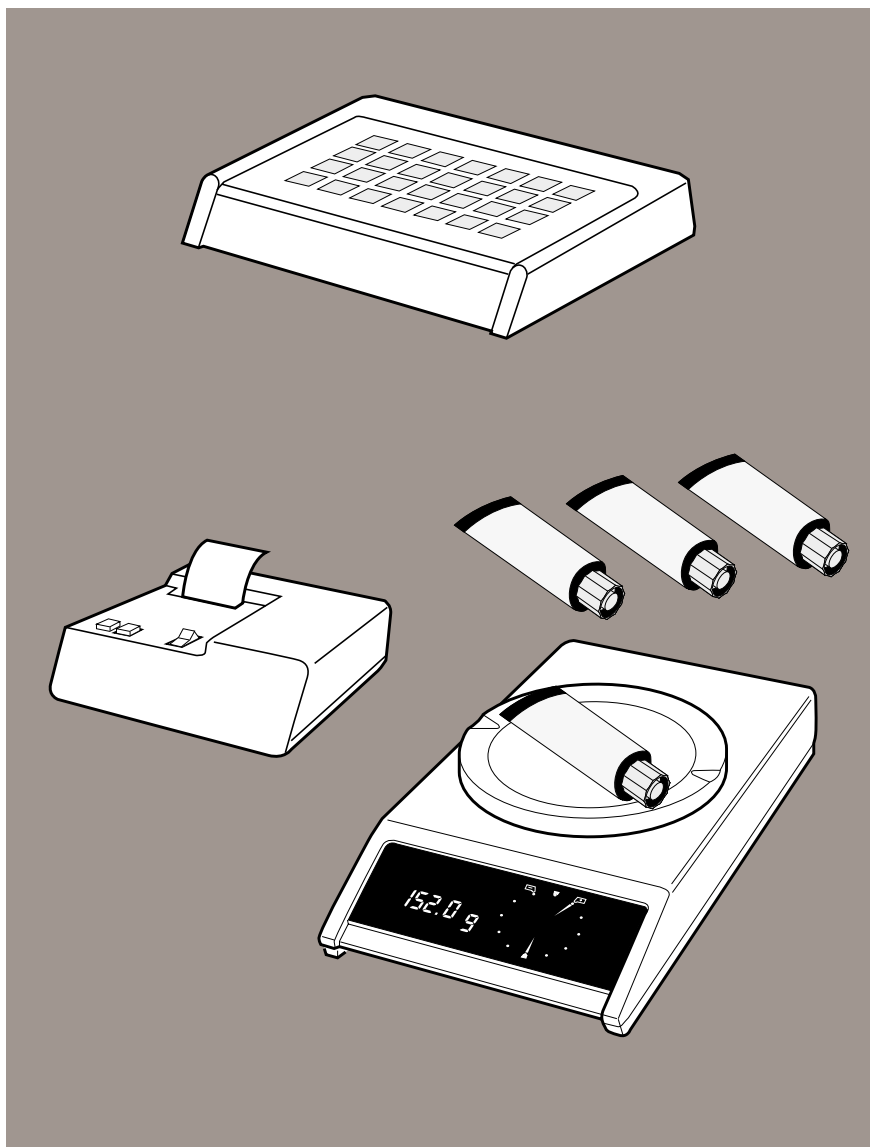
Look for a control system that, from the managerial economics point of view, can even bring you a plus instead of the worrying additional costs.

Hard to believe?

Take our word for it. You will discover that this need not necessarily be a contradiction in terms!

On the following pages METTLER TOLEDO introduces you to a range of systems for fill process control – from the effective, small system up to the complex control system.

Select the optimum performance class for your plant and your requirements!



Fill process control in compliance with the law – without an additional computer!

You produce pharmaceutical products, fill solids or liquids or package them. And you are looking for a small, but powerful **system for your checkweighings**. For instance to

- check product data by random sampling right next to the filling machine and
- to summarize these samples in a records of totals, or also to
- be able to call up default values of the fill process control (e.g. violations of lower tolerance limits) at any time.

Then you should take a closer look at the **SQC12 StatPac-M¹⁾**. It has been especially designed for use as a small system in the field of **fill process control** and with **pharmaco-
peia** and needs no additional computer.

Among other things, the SQC12 StatPac-M offers

- dependable prepackage inspection without time-consuming checking of single items,
- a choice of **7 tolerance systems** (e.g. EC systems, EUR pharmacopeia, freely selectable tolerances).

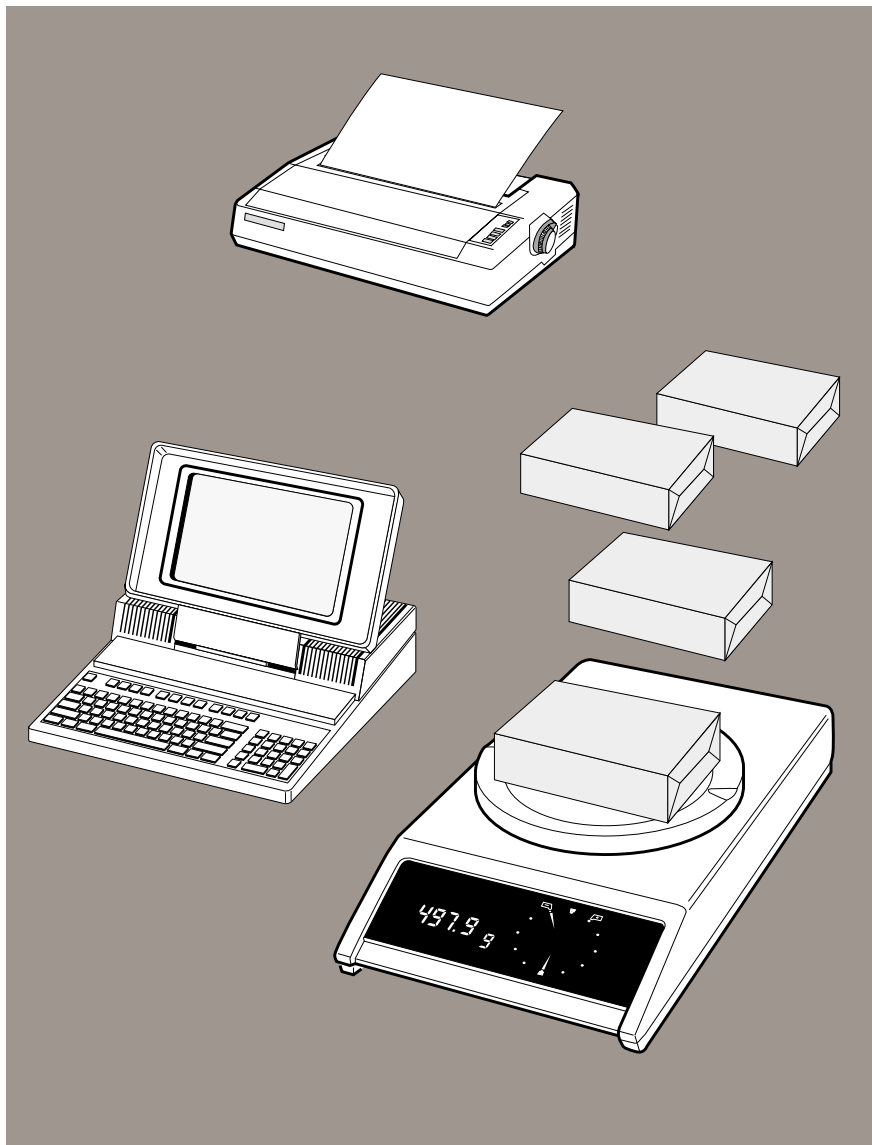
Incidentally:

With the appropriate setting, the balance can be used for normal weighings in between sampling operations.

In combination with the **GM54 Output Module**, you can **sort** your **products** or **control indicators** (lamps etc.) as a function of the result.

See section 3 for a complete description of the capabilities of the SQC12 StatPac-M.

¹⁾ SQC = Statistical Quality Control



Highly complex quality control for your entire product line!

Should the control system be capable of handling a wide variety of products?

In combination with a MS-DOS computer, the **SQC33** can manage up to **300** different **articles** and each article can be assigned a tolerance system (e.g. EC standards, pharmacopeia).

And there is no need to worry – the operation is extremely simple thanks to menu guidance!

Incidentally:

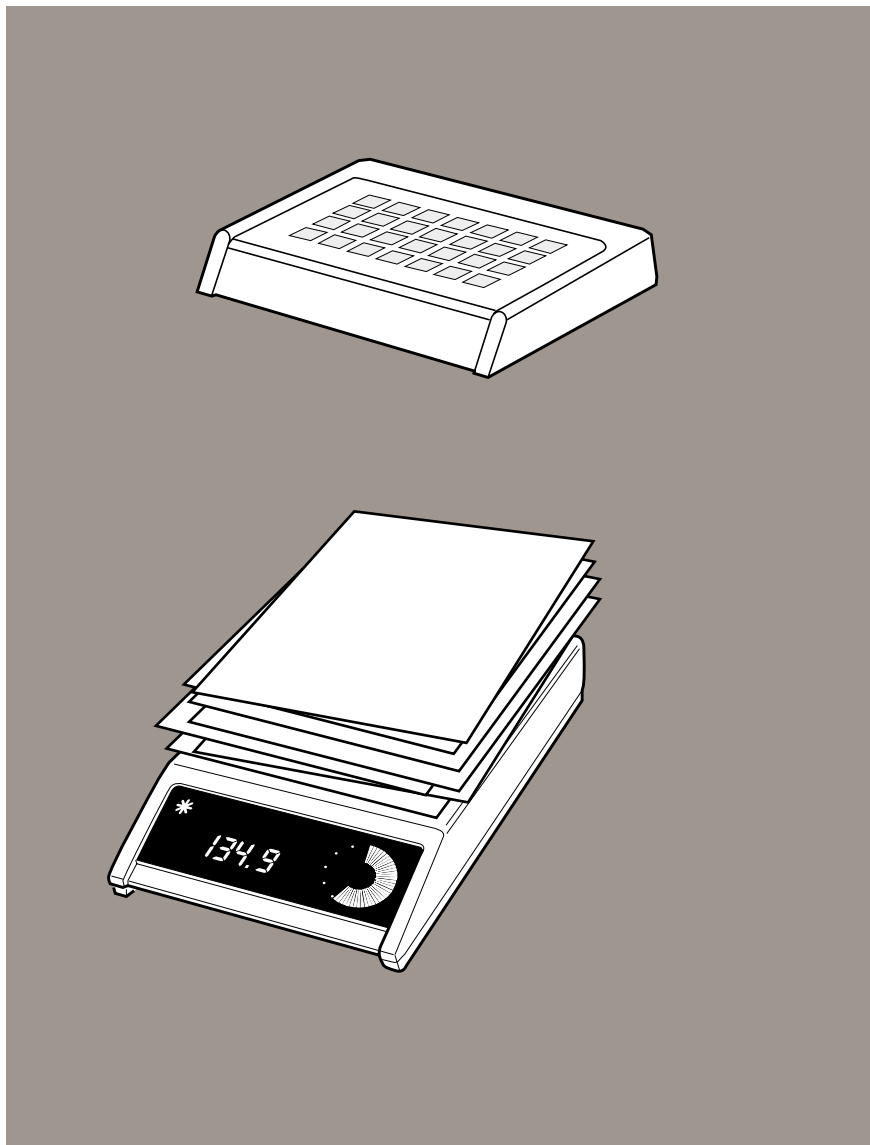
Since the sampling operation runs automatically, it is possible to set up the balance and the computer at separate locations.

See section 3 for a complete description of the capabilities of the SQC33.

Even more powerful features are offered by the METTLER TOLEDO **control systems with several weighing stations**, e.g. the **SQC52** quality control system.

Ask your METTLER TOLEDO dealer for more information!

Calculating with weight data and constants



Flexible working with current weighing data

– without transcription and calculation errors!

Do you have **to convert your weighing results**, for instance to determine the weight/m² of a sheet of paper or the density of a liquid?

Would you like to prepare a 0.1 M saline solution and weigh out the requisite 5.85 g salt per liter water only approximately to **save time**? Yet you subsequently desire reliable indication of the exact amount of water!

METTLER TOLEDO **CalcPac-M**, the pocket calculator at the balance, achieves this!

With this you can perform all basic mathematical functions, store weight values, constants or intermediate results; you can even evaluate measurement series statistically (calculation of mean value and standard deviation).

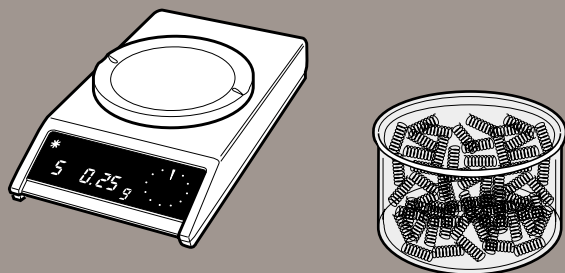
Do you weigh precious stones, gold or expensive chemicals and do you then wish to know the **price of the weighed material** immediately?

We recommend the METTLER TOLEDO **GoldPac-M**, especially for the jewelry and goldsmith trades.

The selectable weight units are oriented to the special needs of these branches. Thus, you can weigh precious stones **in carats** and gold **in grams** and then at a simple keystroke effortlessly calculate, for instance, the **material value** of a piece of jewelry.

See section 3 for a complete description of the capabilities of the CalcPac-M and the GoldPac-M.

Statistical evaluation



$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

$$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$$

Mean value and standard deviation – at a simple keystroke!

You wish to check the **uniformity** of tablets, mechanical parts, packages, etc. For this you must be familiar with the two most important statistical quantities, **mean value \bar{x}** and **standard deviation s** .

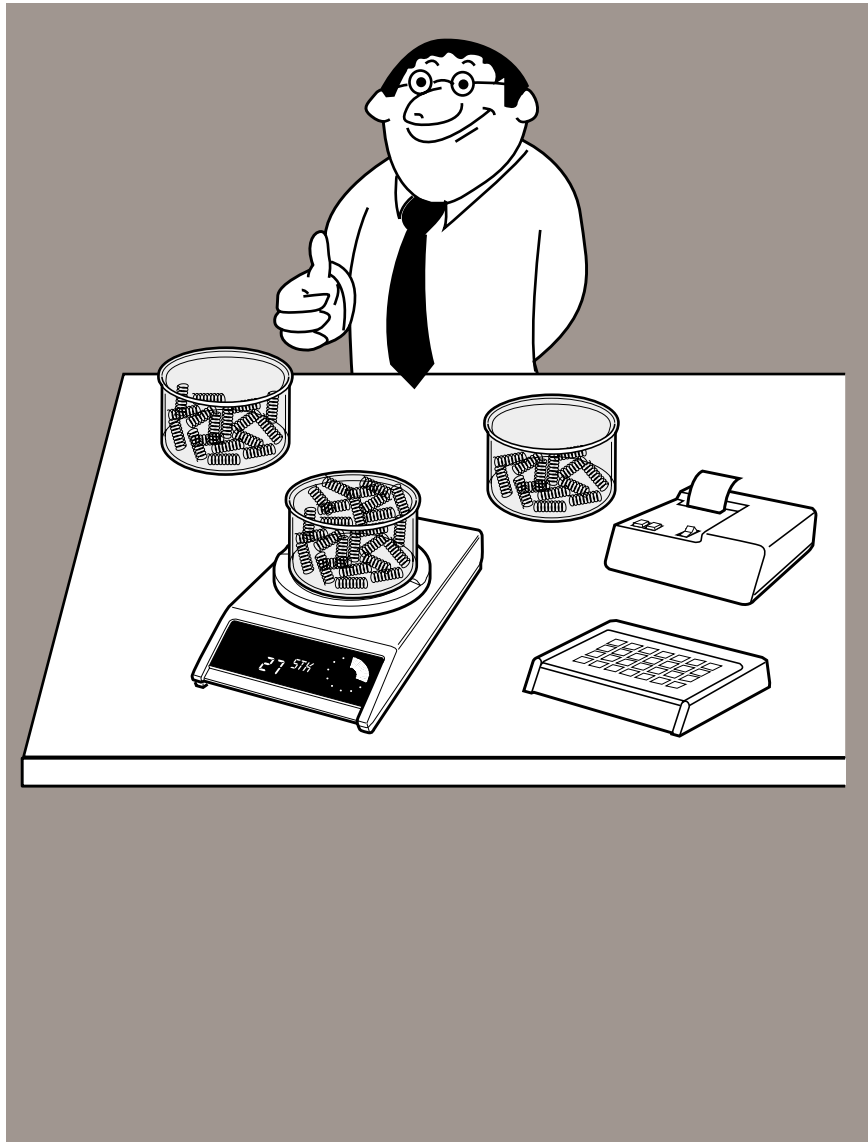
Or you need the two values in order to quantify the **scatter** of the weighing results within a series of measurements.

Just take a look at which METTLER TOLEDO products offer statistics functions for different weighing tasks – you can then forget paper, pencil and pocket calculator without further ado!

- With **StatEasy-M** you can calculate mean value and standard deviation, see GM303 Control Unit in section 4.
- **CalcPac-M** calculates the total, mean value and standard deviation of the individual weights and shows the number of weighings.
- Mean value, standard deviation and number of samples are available with the **CountPac-M** as functions for **quality assessment** of the counted parts.
- The “Statistics” function of the **PharmaPac-M** and **ProPac-M** calculates \bar{x} , s and n for **simple quality control** in the lab or in production.
- **SQC12 StatPac-M** and other SQC systems for **quality control** provide not only \bar{x} , s and n , but also the minimum and maximum value, their difference as well as the number of violations of the lower and upper tolerance limits.
- If you work with the **LabWare “Density determination”** software package with **several samples**, you can also calculate \bar{x} and s .
- In **backweighings** with the **LabWare “Moisture determination”**, you obtain the mean value of **up to 300 samples**.

See section 3 for a complete description of the capabilities of the Pacs and software.

Piece counting



From the scale to an efficient piece counting system

– rapidly, accurately and reliably with METTLER TOLEDO counting systems?

How do you determine the piece count at present?

Estimation is not synonymous with knowing!

Counting manually means wasting time!

Using counters means product dependency!

Using mechanical counting balances demands patience!

Do you really wish to reconcile yourself to the disadvantages of these counting methods?

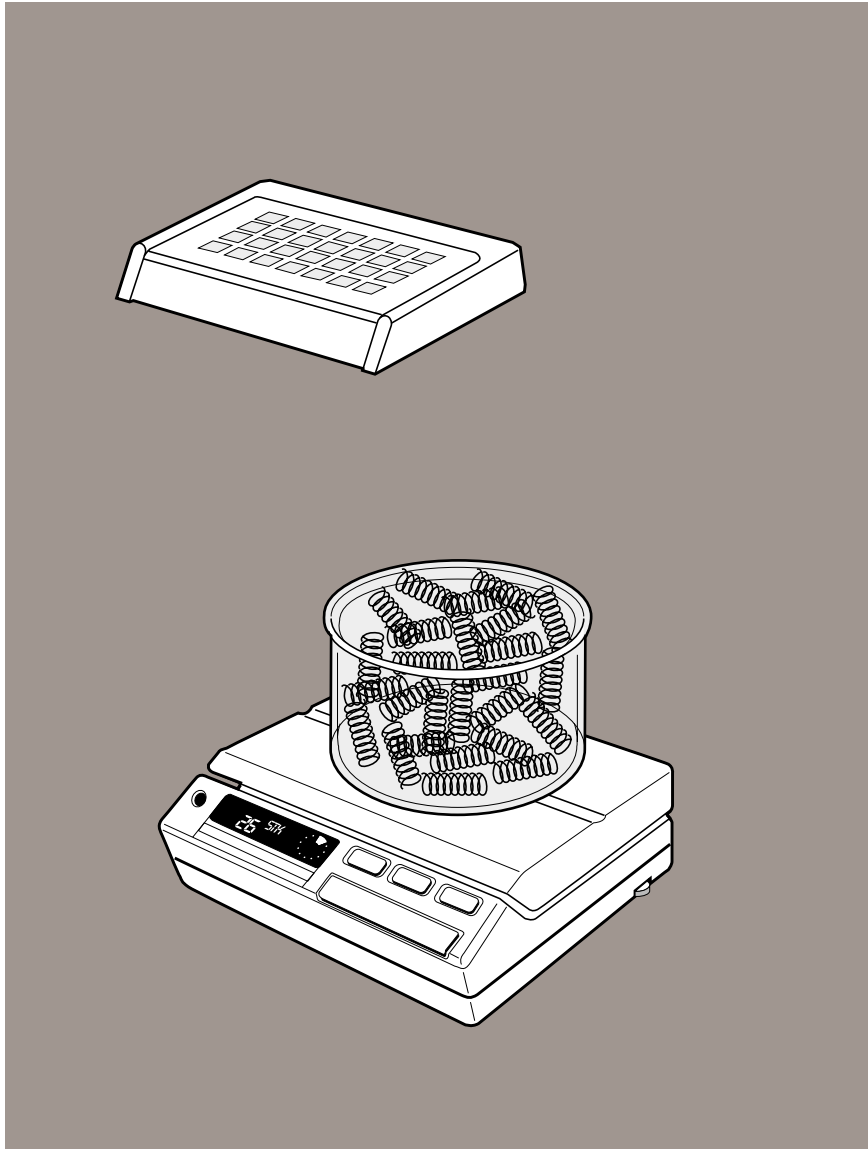
METTLER TOLEDO balances allow you to forget such imponderables.

The balance determines the weight of a single part from a reference quantity. The net weight and the piece weight are then used to calculate the total piece count. This offers enormous advantages compared with traditional counting methods thanks to

- marked time saving,
- greater accuracy and
- outstanding user convenience.

If you wish to count **small parts very accurately**, you need a high resolution balance. But you need have no fear of high costs!

Thanks to the recallable fine range of METTLER **DeltaRange balances and scales**, you can determine the piece count just as **accurately** as with a high resolution balance or scale of the same capacity.



Piece counting – quite simply with any scale!

For simple applications, the very thing: a scale of the M series with piece counting built in as standard.

The **reference piece number 10** is programmed in firmware. After the reference has been set, the sample to be counted is loaded and you can immediately read off the total piece count on the scale display. That's all there is to it!

Piece counting – with more flexibility regarding the reference weight!

Perhaps you need greater scope in regard to the reference piece number – with the **CountEasy-M** software cassette you can expand the possibilities of your balance or scale, see also GM303 Control Unit in section 4.

Whether you are packaging or portion counting tablets and capsules or counting and batching piece goods – the solution now goes under the name **PharmaPac-M** for the lab and **ProPac-M** for the production sector.

Both Pacs offer the "Piece counting" function; in addition to the fixed reference piece number 10, you now have available

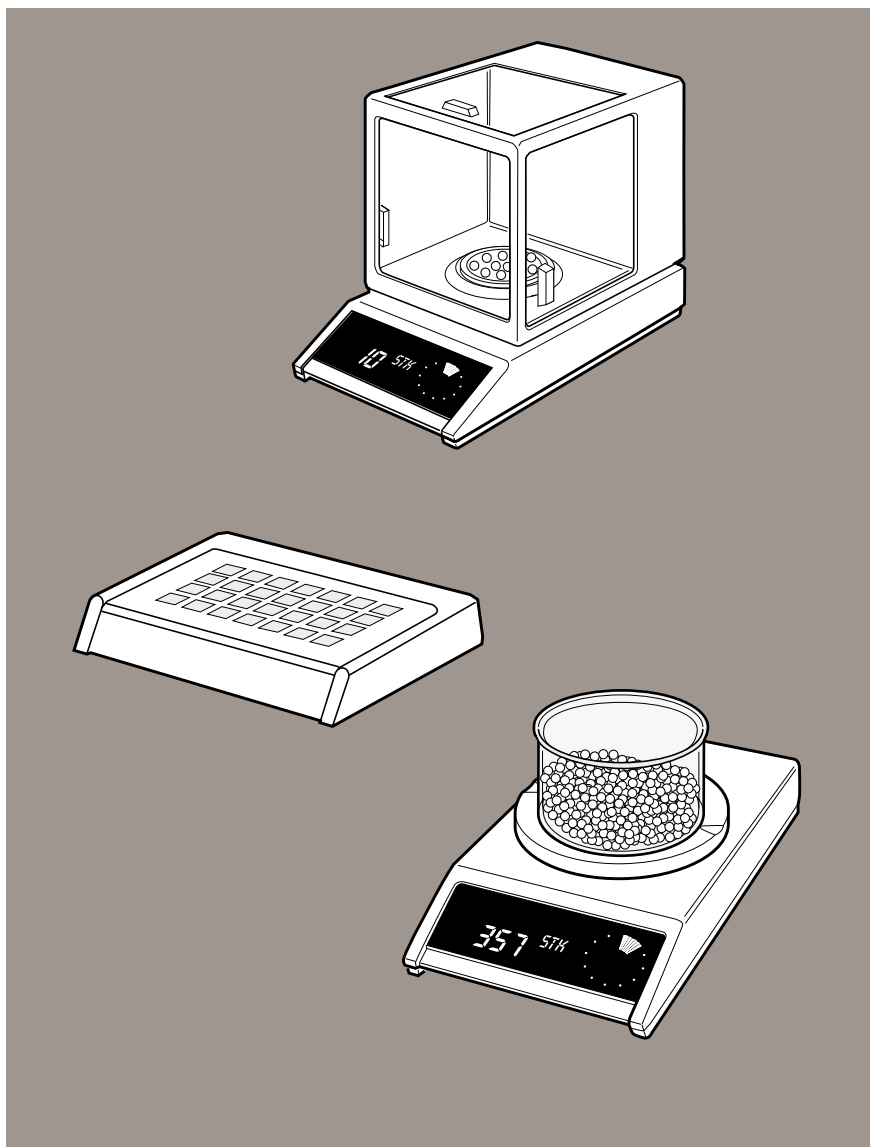
- a **free selection** of the reference piece number and
- the possibility to **optimize the reference weight**.

This means:

marked easing of the load with one of the most frequent and nerve-racking routine operations and at the same time greater accuracy in counting.

CountEasy-M, PharmaPac-M and ProPac-M automatically provide a hardcopy, detailed record of each piece counting operation if a GA44 Printer is attached.

See section 3 for a complete description of the capabilities of the PharmaPac-M and the ProPac-M.



Piece counting – for demanding tasks

Whether you are taking inventory or packaging piece goods – for counting tasks in these areas the solution is called **CountPac-M**.

The range of available possibilities includes

- labelling articles using a 14-digit identification number,
- subtraction of the weight of the tare container first,
- direct recall, entry or correction of the piece weight,
- totalizing partial quantities or portions via weight or piece count.

Very small parts in large amounts – a problem or not?

In the counting of numerous, extremely light parts, the accuracy of your counting balance is possibly not sufficient.

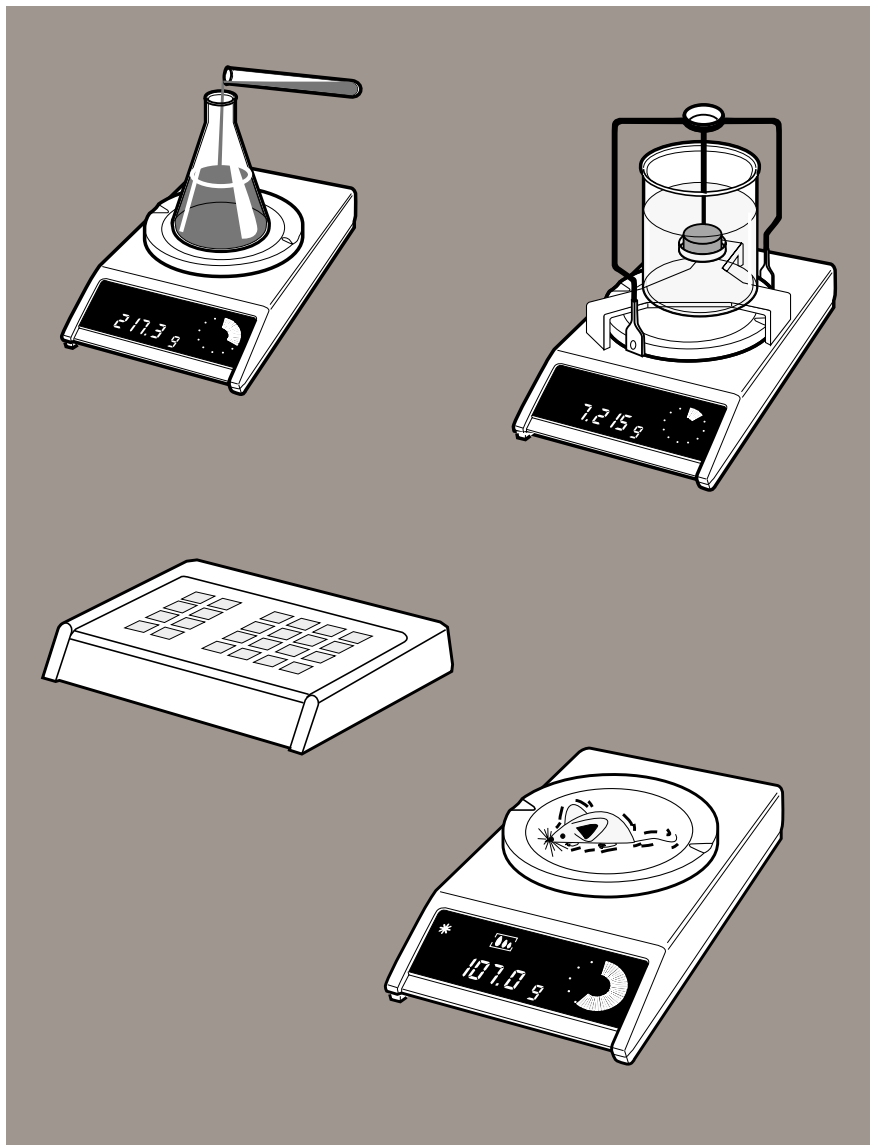
Here, the CountPac-M allows a **counting system with 2 balances**:

With an attached reference balance, the piece weight can be read in by the counting balance up to two decimal places more accurately. Thus, for example, with an **AE, AM or AT balance as reference balance**, up to **several million parts** weighing 0.1 g can be counted.

An attached printer provides a record of the counting process.

See section 3 for a complete description of the capabilities of the CountPac-M.

Special weighing tasks, freely programmable

**Custom-tailored instead of ready-made – even with the software!**

Have you still not found a solution for your special application problem in the METTLER TOLEDO product range?

Then make use of the innumerable possibilities stored by the **XPac-M** for the solution of weighing tasks not found in day-to-day operations:

It is **freely programmable** and thus handles even out-of-the-way problems: For instance,

- with a program that allows the performance of aerosols to be tested, or
- with a program that allows an automatic start in animal weighing and automatic taring after removal of the animal, or
- with a program that has ready a custom-tailored solution to **your** special application program!

How does this function?

You define the weighing application and **write** the appropriate **program** on a **DOS computer** or an EPSON PX-4. The METTLER TOLEDO **XPac compiler**, which is available to separate order, then **translates** the program into the XPac code.

Once your desired program has been loaded in the memory of the balance, your work becomes convenience itself.

Incidentally:

If you do not wish to write the program yourself, METTLER TOLEDO will be pleased to do it for you!

See section 3 for a complete description of the capabilities of the XPac-M.

Animal weighing – weighing in an extremely unstable environment

Whether you weigh white mice or black cats

– with the weighing technology from METTLER TOLEDO, you have complete mastery even of **unstable weighing samples!**

The **cycle time** for the determination of a measured value can be **adjusted stepwise**. Measurements are made during this time and then their mean value determined.

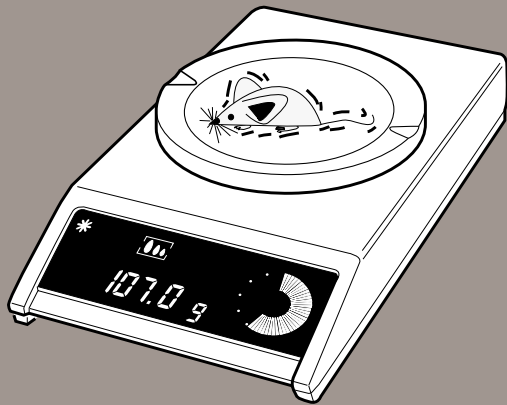
Weight fluctuations due to movements of the animals are thus **irrelevant**.

Even severe shocks in the vicinity can no longer influence the weighing results.

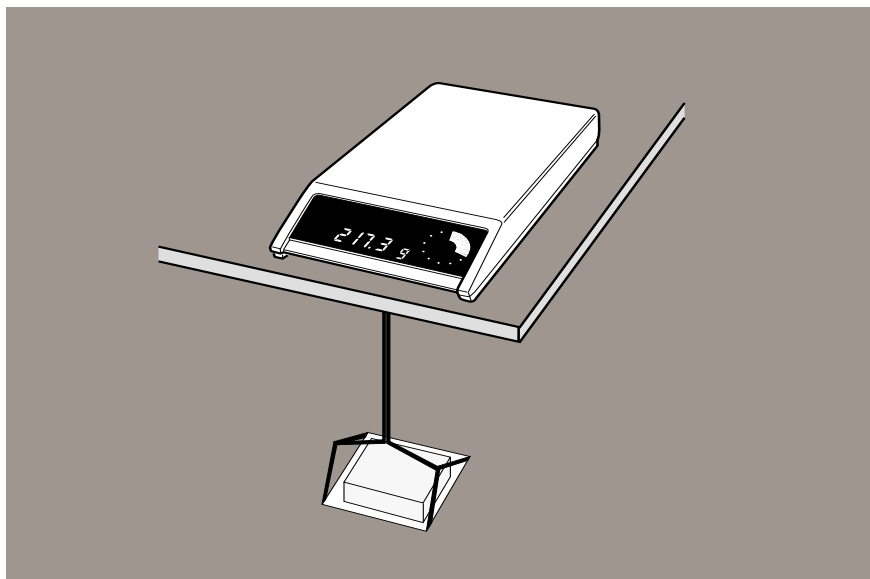
Incidentally:

This dynamic weighing is in principle possible with all scales of the M series.

Special animal weighing pans are available as accessories – see the “Accessories” section for further information.



Weighing under difficult conditions



Below-the-balance weighing

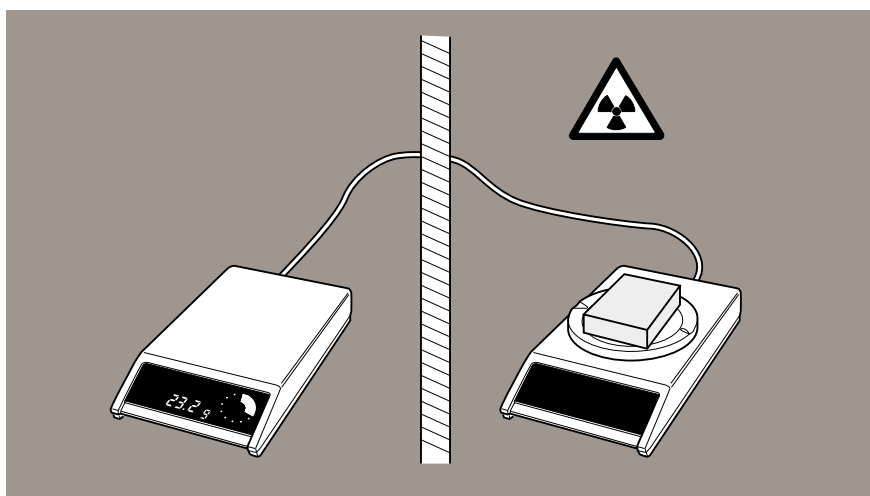
Do you wish

- to weigh **magnetic weighing samples**,
- to weigh under **exceptional ambient conditions** (e.g. dust, vibrations, extremes of temperature) or
- to perform **density determinations** for **large bodies** or **liquid containers**?

Then make use of the possibilities offered by below-the-balance weighing!

For this, the weighing pan or platform is separated from the balance and suspended from the balance hanger.

With most of the PM and SM balances and scales, the hanger is part of the standard equipment or available as an accessory. See the table "Standard equipment" in section 5 for more information.



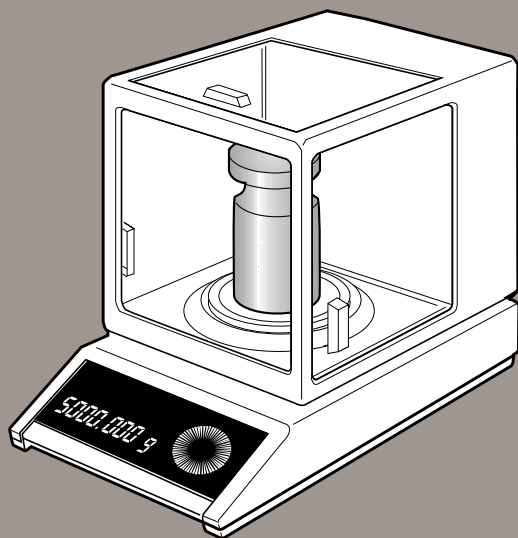
Weighing in a contaminated environment (toxic substances, radioactivity)

Hazardous substances at the scale location cause problems which require special solutions:

- in such cases, weighing pan and **weighing cell** can be **separated from the electronics** and the display thereby minimizing disposal problems.

The PM-SE Conversion Kit is available for PM balances up to 6.1 kg. See section 4 "METTLER TOLEDO Optional accessories" for further information.

Weighing with extremely high accuracy



As a weighing professional

you are responsible for applications that require extremely high accuracy. You thus primarily demand **outstanding reproducibility** from your balance.

You work

- with **valuable weighing samples** or **heavy tare vessels** – for example in quality control or in the verification and calibration service.

You are familiar with the **requirements** needed to obtain optimum weighing results and thus create the necessary conditions for this regarding the

- **surroundings** (e.g. vibration-free work room, atmospheric conditions as constant as possible, avoidance of drafts) and
- **operation** (e.g. work in a constant time cycle, weighing sample acclimatized and not electrostatically chargeable).

In this case you certainly appreciate the particular advantage of the METTLER TOLEDO **PM5003 Comparator**: as an unparalleled balance of the METTLER TOLEDO PM range, it also weighs accurately in the weight class 5 kg down to the milligram range.

The **draft shield** prevents air currents and helps keep the weighing chamber atmosphere constant. The **circular weighing pan** helps ensure exact centering of the weighing sample.

You will find further information in the METTLER TOLEDO booklet “Weighing the Right Way” (720906).

2. Result recording and data transfer

The AM/PM/SM balances and scales are fitted with two interface connections "**Data I/O**" and "**GM**" as standard.

The "**Data I/O**" connection can be used for the **serial transfer** of data to and from the balance or scale (bidirectional).

This connection facilitates the simple attachment of devices

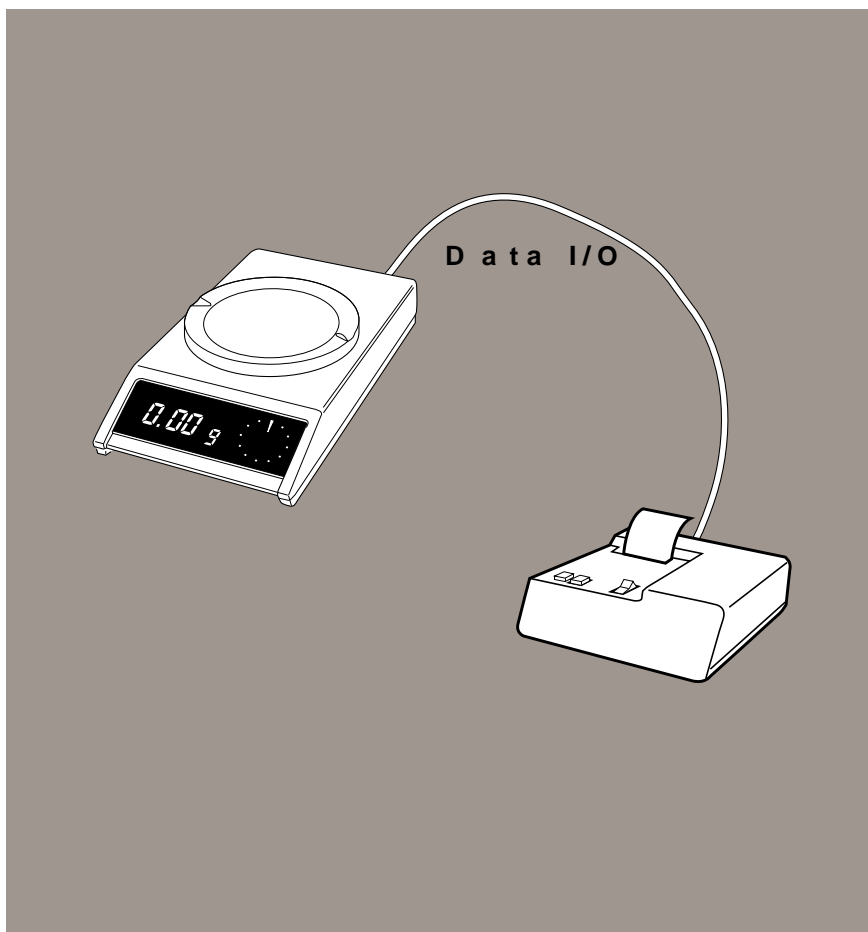
- with an RS232C interface
- with an active current loop data interface (METTLER TOLEDO CL interface) or
- with other interfaces via the appropriate METTLER TOLEDO interface converters.

The connection is point-to-point; **only one device** can be attached.

The "**GM**" connection can be used to expand the weighing station for special applications with METTLER TOLEDO peripherals such as auxiliary displays and the GM54 Output Module. This output is designed to allow **several devices** to be attached **simultaneously**.

METTLER TOLEDO offers suggestions for problem solving in the following applications:

	Page
• Attachment of a printer – result recording	2.2
• Attachment of a computer – bidirectional communication	2.4
• Hand or foot switch for the print and/or tare command	2.5
• Attachment of several balances or scales to a central data station	2.6
• Acquisition and processing of bar-coded information	2.7
• Data transfer to devices with different interfaces	2.8
• Control of peripherals by the balance or scale	2.9
• Protection of the system against electrical power line disturbances	2.10
• Overview of the connection possibilities	2.11

Attachment of a printer – result recording

- Printout of data and weighing records,
- automatic documentation of the weighing results,
- printout of the balance parameter settings.

– with the METTLER TOLEDO **GA44 Printer**.

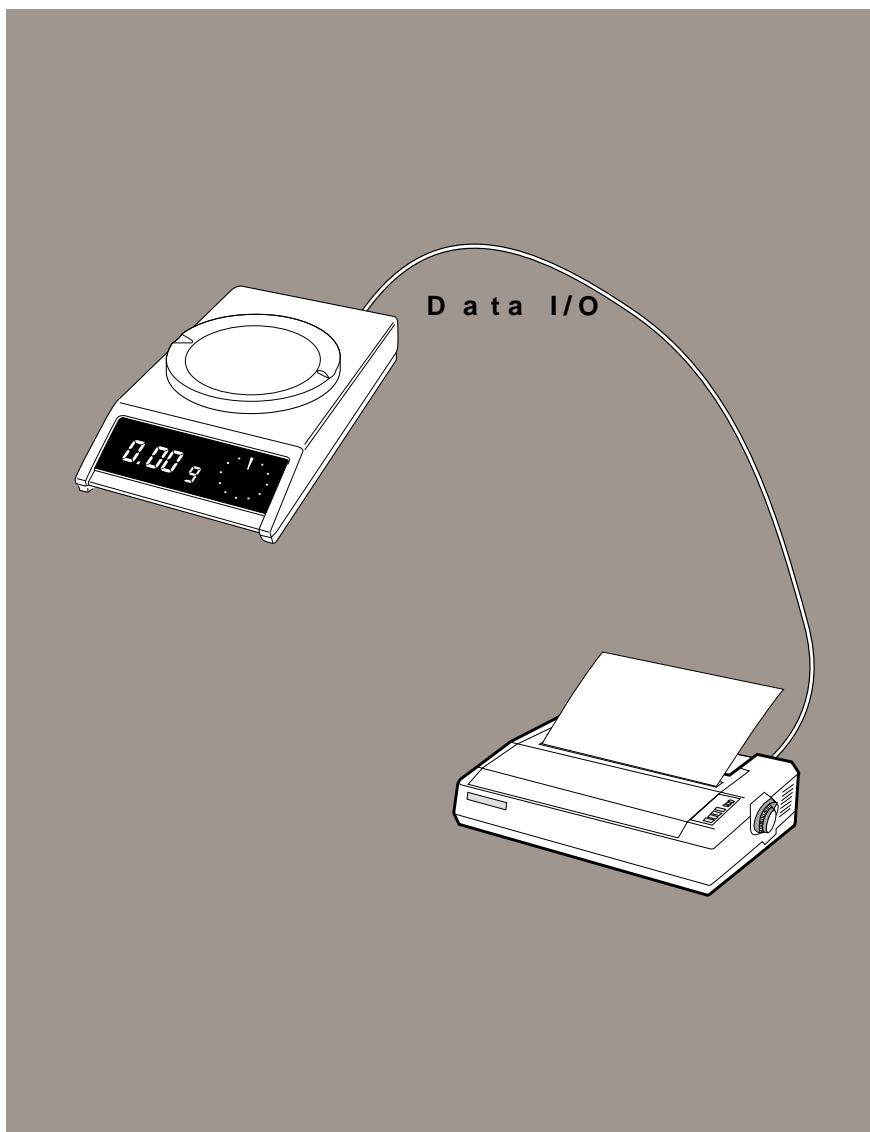
The alphanumeric GA44 Thermal Printer for attachment to the CL interface is supplied with a balance connection cable (1.5 m).

Data transfer is possible when the settings of the balance under "I-FACE" match the factory settings (see operating instructions of the balance).

The **print command** can be **triggered** as follows:

- with the "PRT" command of the GA44 Printer
- via the control bar of the balance (with AM/PM balances up to 6.1 kg)
- via the "PRINT" key (with high-capacity PM scales, SM scales and with the GM303 Control Unit available as an accessory)
- via an external hand or foot switch available as an accessory
- automatically with the appropriate balance configuration

You will find further details regarding the GA44 Printer in section 4.



– with printers of other manufacturers including printers with an **RS232C interface**, e.g. EPSON FX-80, LX-800

The print command can be triggered from the balance in the same manner as with the GA44 Printer.

Data transfer is possible when the following settings

- transmission rate (baud rate, 110 to 9600 baud),
- control characters (parity E, O, N, M, S) and
- communications protocol (handshake with "PAUSE" or hardware handshake through line)

are the same for the balance and printer.

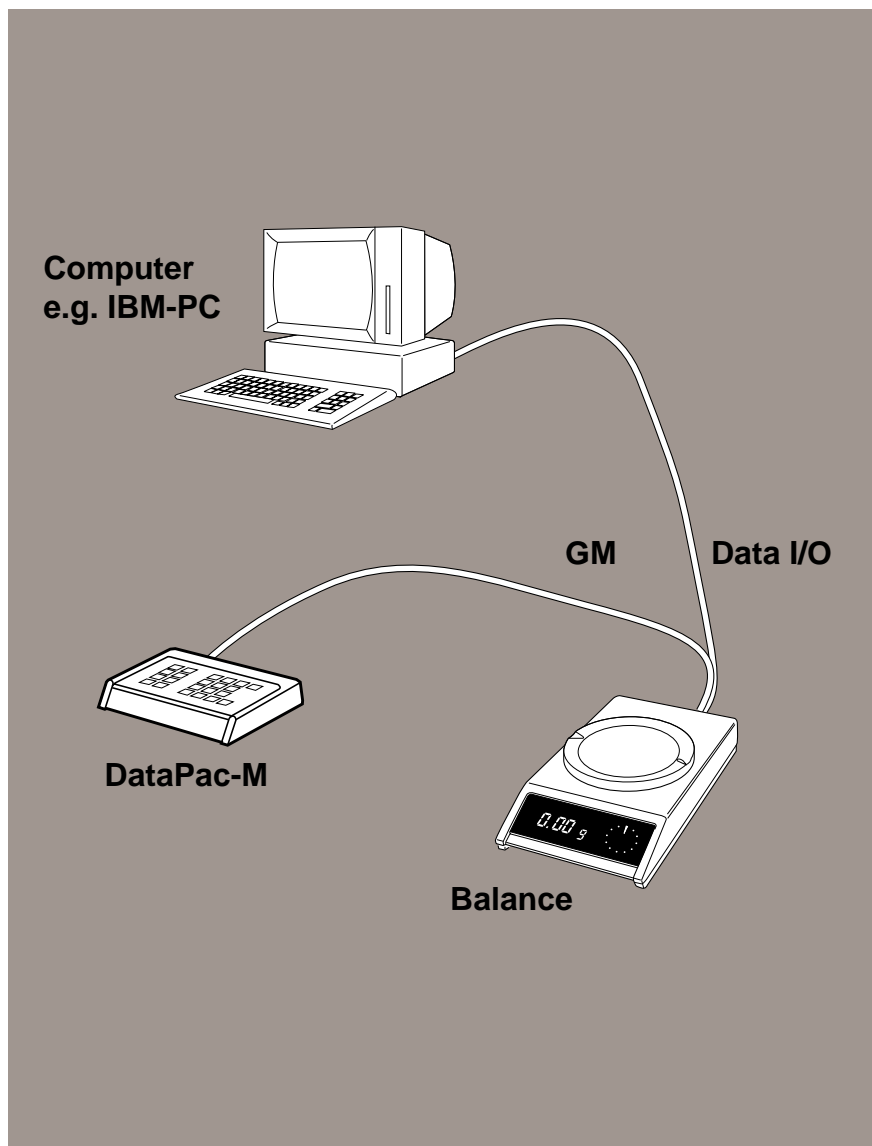
Further requisite settings of the printer interface:

- number of data bits: 7
- number of stop bits: 1
- line feed: "off" (AutoFeed "off" or CR "off" or "invalid")
- character set: to national codes

For the attachment of a printer, METTLER TOLEDO offers the following cables:

SubD 25-pin, female	1.5 m	33995
SubD 25-pin, male	1.5 m	33640
Cable for EPSON P-40	1.5 m	33688
Extension cable ("MiniMettler" both ends)	2 m	216151
Extension cable	5 m	216152
Extension cable	10 m	216153

Attachment of a computer – bidirectional communication



- Data and result transfer from the balance to the computer,
- control of the balance from the computer,
- mutual control (dialog operation) with the **DataPac-M** operating terminal.

Data interchange is possible when the following settings

- transmission rate (baud rate, 110 to 9600 baud),
- control characters (parity E, O, N, M, S) and
- communications protocol (handshake with "PAUSE" or hardware handshake through line)

are the same for the balance and computer.

Further requisite settings of the computer interface:

- number of data bits: 7
- number of stop bits: 1

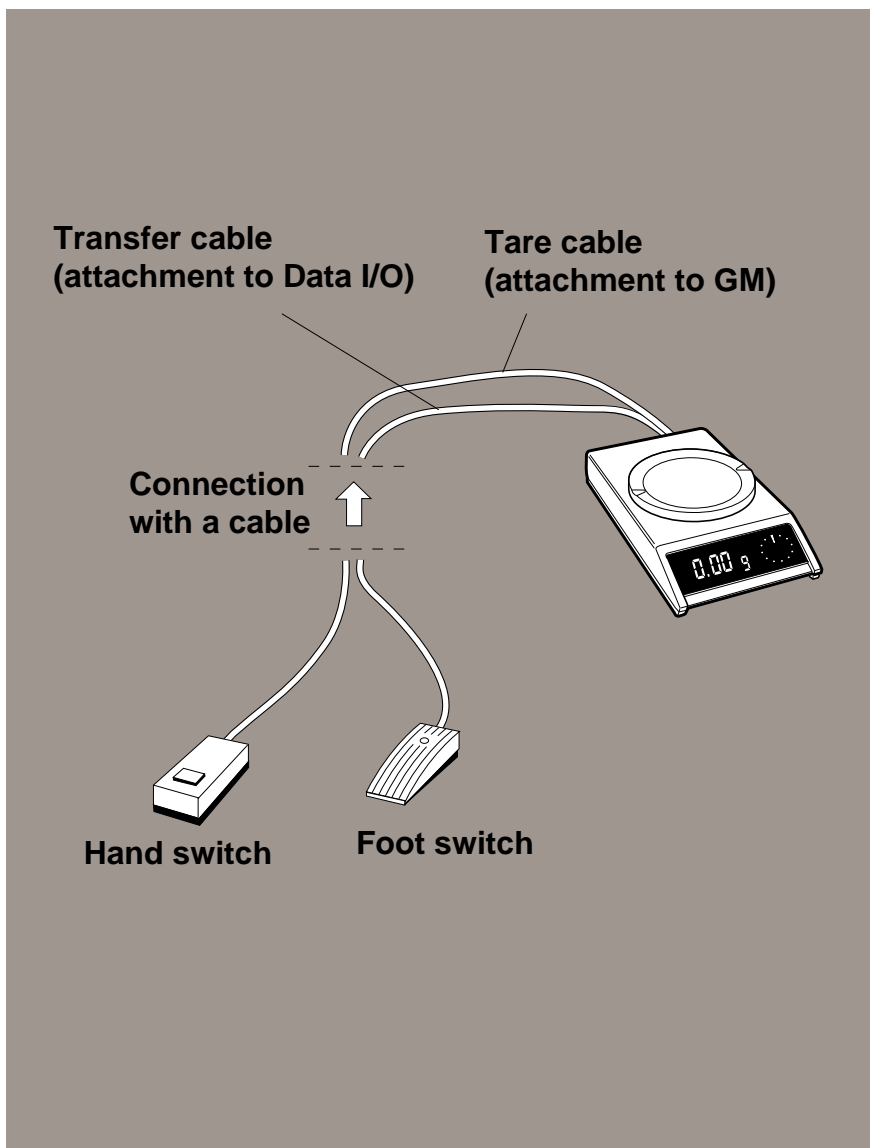
The **command set for control of the balance** by the computer is described in the operating instructions "Bidirectional data interface of the PM balances", see section 6.

For the attachment of a computer, METTLER TOLEDO offers the following cables:

SubD 25-pin, male (e.g. IBM-XT)	1.5 m	33995
SubD 9-pin, male (e.g. IBM-AT or laptop)	1.5 m	33783
Extension cable ("MiniMettler" both ends)	2 m	216151
Extension cable	5 m	216152
Extension cable	10 m	216153

See section 3 for a complete description of the capabilities of the DataPac-M.

Hand or foot switch for the print and/or tare command



- For triggering the print or tare command if the balance
 - is remote,
 - is difficult to reach or,
 - should not be subjected to shocks (above all with 0.1 mg balances).
- Foot switch for triggering the print or tare command when both hands are needed for weighing.

- Hand switch with neutral cable (length 1 m): 42500
- Foot switch with neutral cable (length 3 m): 46278

Print command

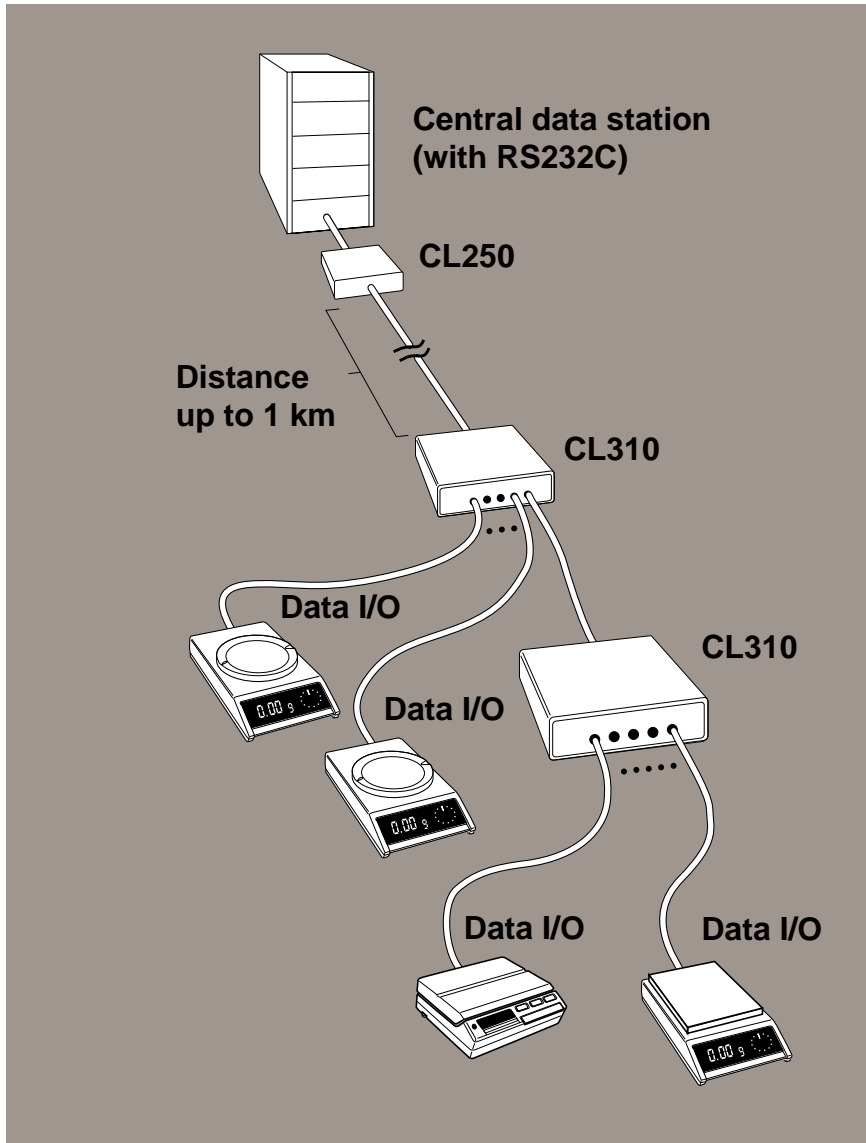
Attachment of the hand or foot switch to DATA I/O of the balance with the **transfer cable** (length 30 cm) 47473

Tare command

Attachment of the hand or foot switch to the GM interface of the balance with the **tare cable** (length 30 cm) 33872

Both cables have a T-connector; this allows the attachment of additional devices.

Attachment of several balances or scales to a central data station



- Transfer and evaluation of data from several weighing stations,
- combination of the data lines at the data sources (balances),
- reduction of the serial data lines to a minimum.

The **CL310** 5-Channel Line Selector (Multiplexer) allows bidirectional data communication (full duplex operation) of **5 serial data lines** over 1 serial line.

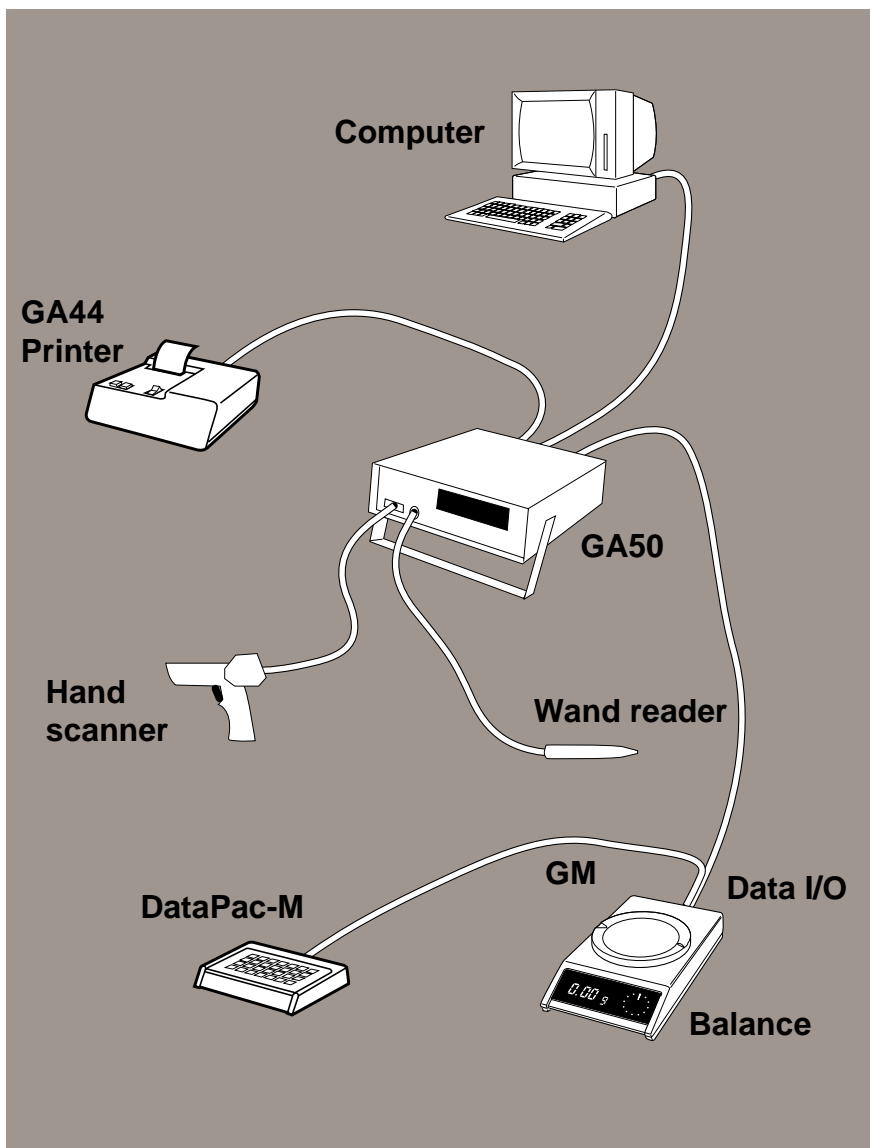
The balance is attached to the CL310 Multiplexer with the 47936 cable.

For attachment of the CL310 Multiplexer to a **computer with an RS232C interface**, the **CL250** Interface Converter is needed.

For system expansion, the CL310 Multiplexers can be connected in series if more than 5 instruments have to be attached.

You will find further details regarding CL devices in section 4.

Acquisition and processing of bar-coded information



- ❑ Reading-in, editing and further processing of bar-coded information in weighing systems.
- ❑ Coordination of bar-coded information and weighing data for
 - communication with a central data station,
 - result recording on a local printer.

A central **weighing system for the acquisition of bar codes** can comprise the following units:

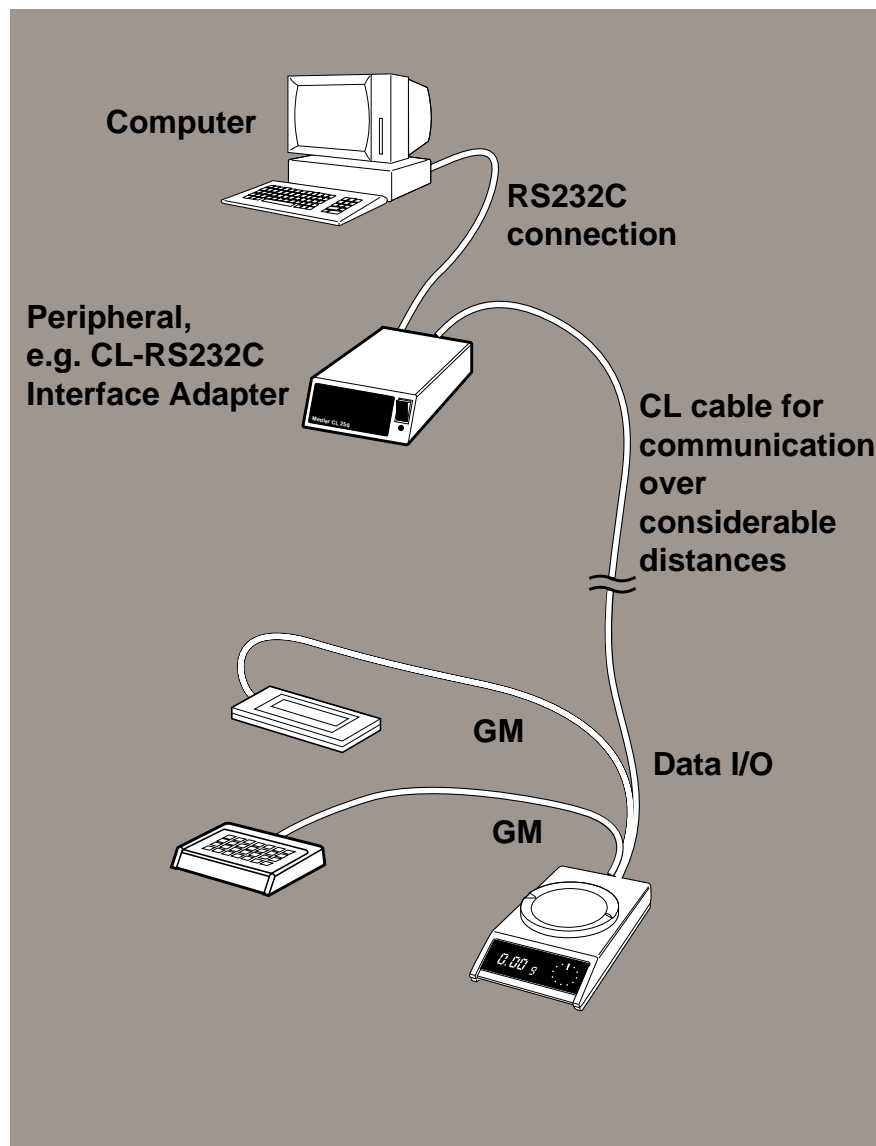
- balance (as appropriate, with DataPac-M terminal)
- bar code readers,
e.g. hand scanners (LS7000, LS8100) or wand readers (HP6000 series)
- central data station (computer)
- GA44 Printer
- GA50 Peripheral Controller

The **GA50** takes over the **editing** of the coded information and the **data distribution**. The individual units do not need their own data line to the central data station.

You will find further details regarding the GA50 Peripheral Controller in section 4.

For attachment to the GA50 Peripheral Controller, various cables are available from METTLER TOLEDO (see "Cables and connectors" in section 4).

Data transfer to devices with different interfaces



- Matching the data interfaces of the balance to other interfaces used in industry.
- Data transfer over long distances (up to 1 km).

The METTLER TOLEDO **CL interface converters** are available for this.

The following interface standards can be matched to the CL interface:

- | | | |
|---------------------------------|--------------|----------------------|
| • BCD parallel | CL240 | CL-BCD Interface |
| • IEEE488 (IEC bus, HP-IB) | CL241 | CL-IEEE488 Interface |
| • RS232C | CL249 | CL-RS232C Adapter |
| • RS232C (selectable handshake) | CL250 | CL-RS232C Interface |

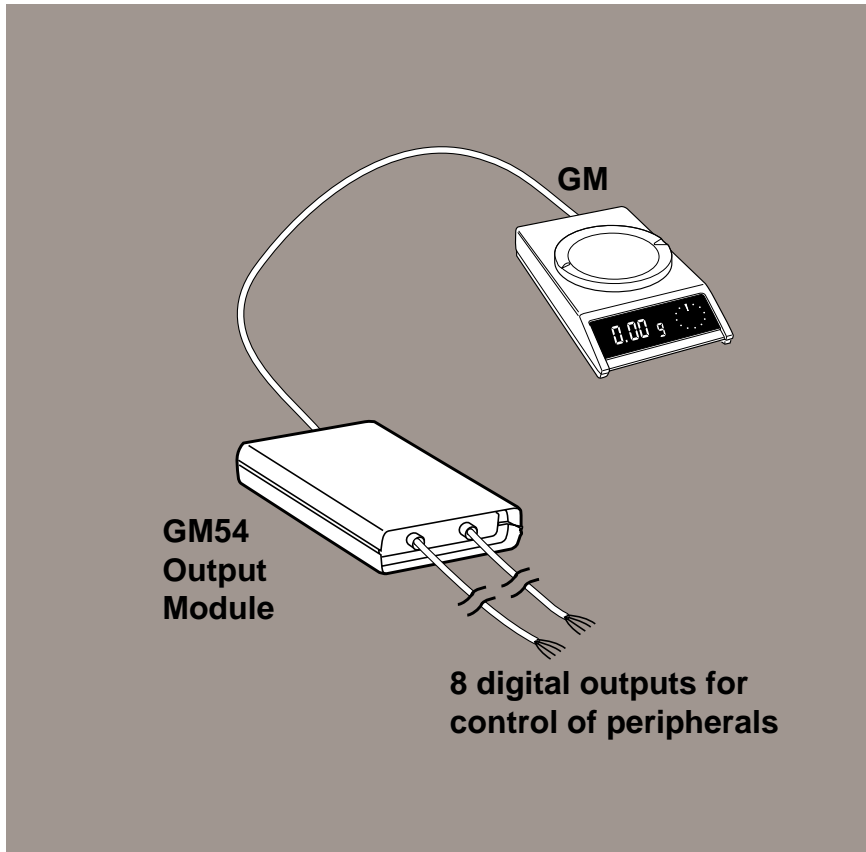
The CL249 and CL250 Interface Converters are needed when

- distances between 15 m and 1000 m have to be covered. The RS232C interface is not suitable for such distances. Or if
- CL peripheral units (e.g. CL310) have to be attached to an RS232C interface, e.g. for the attachment of a CL310 Multiplexer to the RS232C interface of a computer.

You will find further details regarding the METTLER TOLEDO CL interface converters in section 4, "CL devices".

To set up the cable connections, the CL extension cables (see section 4, "Cables and connectors") are available.

Control of peripherals by the balance or scale



- Result-dependent control of motors, pumps, valves, signal lamps, relays etc.,
- control of motors, pumps, etc. by a computer.

Application Pacs such as ProPac-M, FlowPac-M, SQC12 StatPac-M, SQC32 or SQC52 send result-dependent signals via the GM interface to the **GM54 Output Module**.

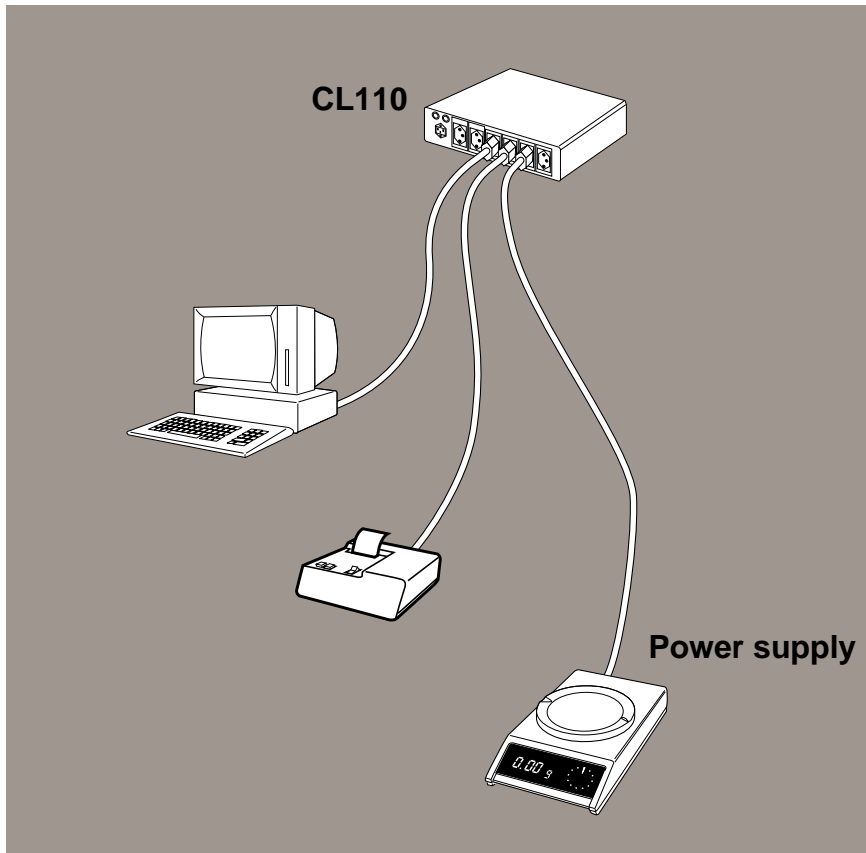
There these signals are converted to switching commands for the attached devices, such as pumps, motors or signal lamps.

In addition, the outputs of the GM54 Output Module can be controlled by a computer via the serial interface.

Peripherals can thus be controlled

- as a function of the weighing results or
- by the balance via the serial interface of a computer.

You will find further details regarding GM54 in section 4.

Protection of the system against electrical power line disturbances

- Protection of electronic instruments against power line disturbances,
- central on/off switching of the weighing system.

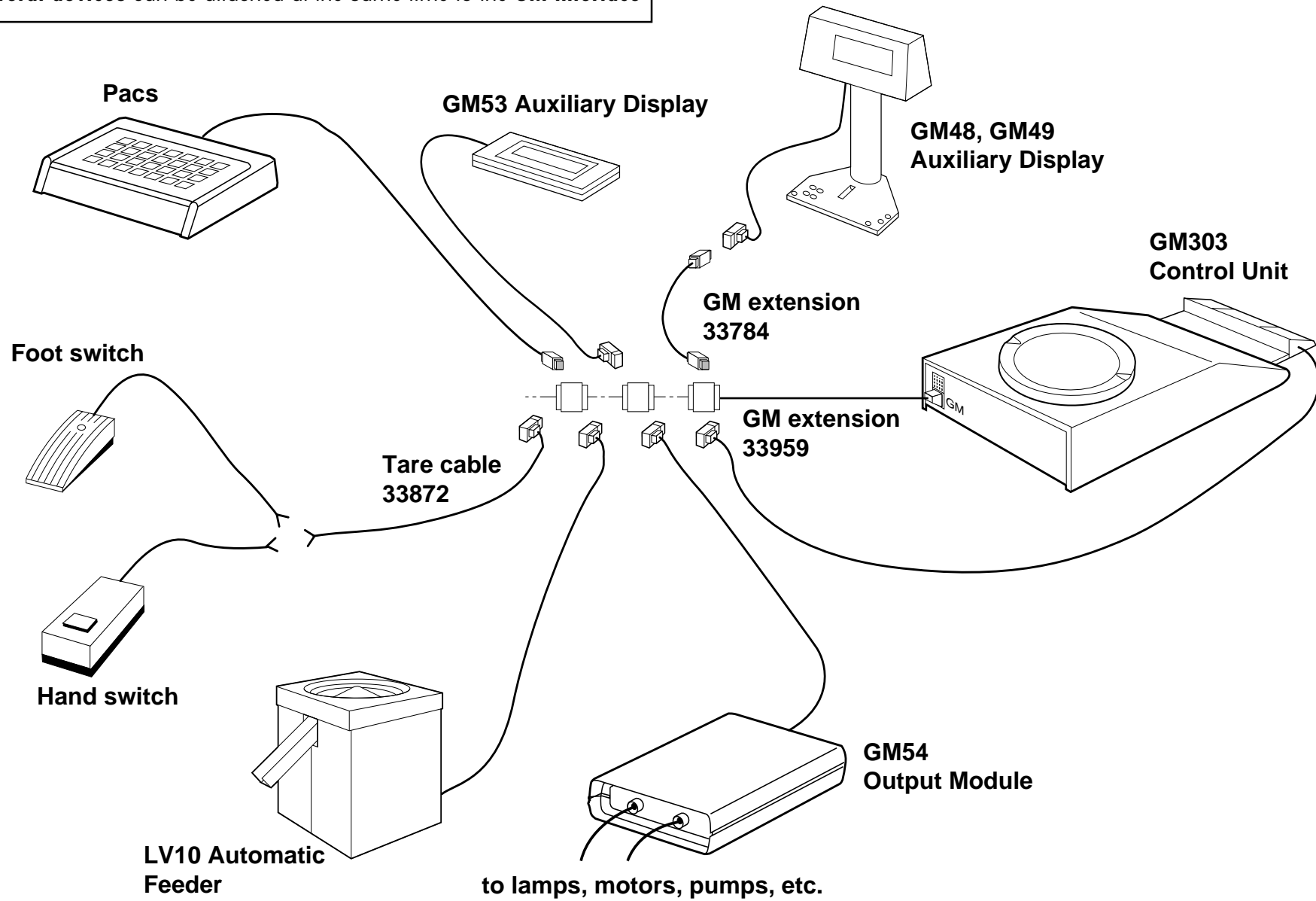
The **CL111** Power Line Filter offers excellent protection against power line disturbances of a moderate to high level. It can be used for loads up to 2 A power consumption.

For protection against extremely high disturbance levels, use of the **CL110** Power Line Filter, which can provide up to 3.15 A current, is advisable.

In addition, it is also possible to switch the attached units on and off centrally.

You will find further details regarding the METTLER TOLEDO power line filter in section 4, "CL devices".

Several devices can be attached at the same time to the GM interface



3. Application Pacs and software

The Application Pacs are supplied in two forms:

- as a separate entry keypad with cable for AM and PM balances,
- as an application terminal together with the display for SM scales.

For high-capacity PM and SM scales or for AM and PM balances with the GM303 Control Unit, the following software cassettes are available for simple applications:

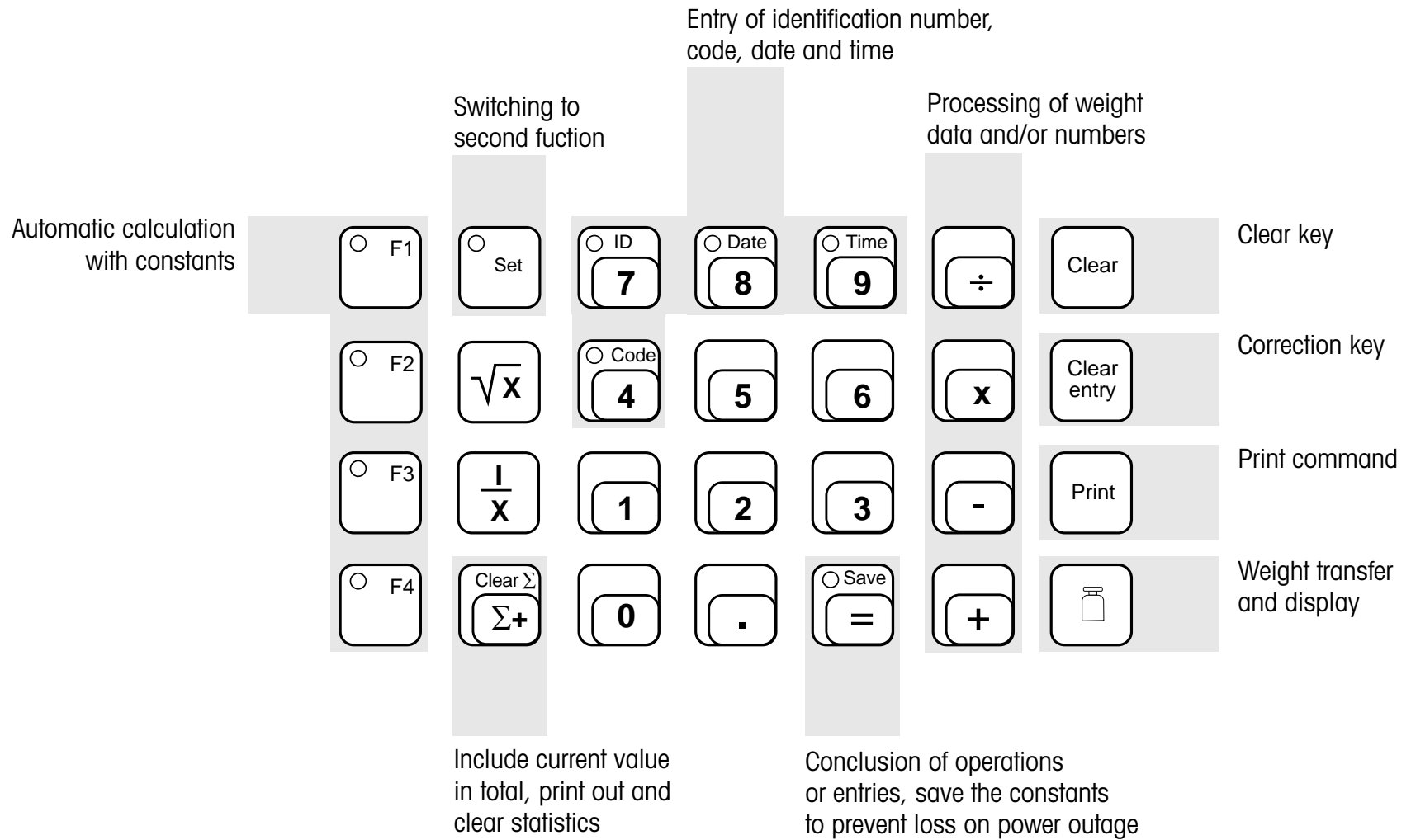
- CountEasy-M
- NetEasy-M
- StatEasy-M

Further details can be found in section 4, "GM devices".

• CalcPac-M	Page 3.2
– for direct calculations with weight data	
• CountPac-M	3.4
– a match for any piece counting operation	
• DataPac-M	3.6
– allows dialog with the computer	
• FlowPac-M	3.8
– for mass flow measurement and control	
• F03220	3.10
– the powerful formulation program for your MS-DOS computer	
• GoldPac-M	3.12
– for simple price calculation and unit switching in the gold and precious stone trades	
• LabPac-M	3.14
– the lab aid in differential weighing and formula weighing	
• LabWare "Density determination"	3.16
– the program for convenient density determination	
• LabWare "Moisture determination"	3.18
– the program for the simple determination of moisture content and dry weight	
• PharmaPac-M	3.20
– simplifies the production, control and packaging of pharmaceutical products	
• ProPac-M	3.22
– supports the checking and packaging of your products	
• SQC12 StatPac-M (for one article)	3.24
– controls fill quantities and pharmaceutical products where tolerances have statutory limits	
• SQC33 (for up to 300 articles)	3.26
– the statistics program for MS-DOS computers	
• XPac-M	3.28
– programmable for your special requirements	

CalcPac-M

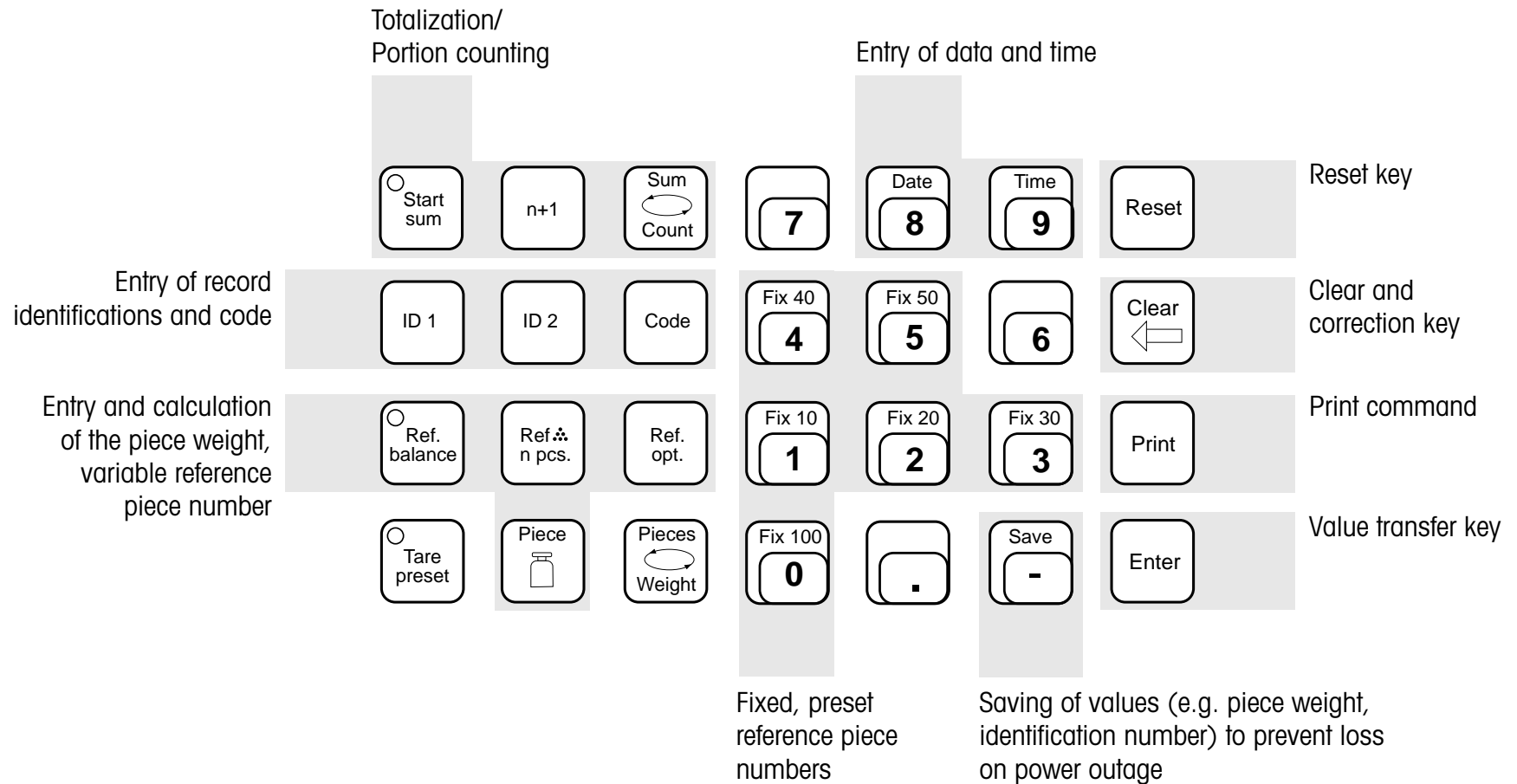
– for direct calculations with weight data



- Operations**
 - +, -, x, ÷, 1/x, \sqrt{x} , 2x, +/-, x^2
 - for calculations involving weight data and numbers or numbers alone
 - dynamic processing of the current display with a multiplication constant (also possible without entry keypad)
- Totalization/statistics**
 - addition or subtraction of individual weight values to or from the current total ($\Sigma+$, $\Sigma-$)
 - number of individual weighings n
 - mean value \bar{x}
 - standard deviation s
- Constants**
 - 4 constants incl. mathematical operators storable
 - 3 constants can be saved to prevent unintentional change
- Display formats**
 - fixed decimal point, 0...6 places
 - exponential format
 - fixed decimal point of the scale
- Result recording**
 - printout of values and results with date, time, code and identification number
 - complete record of totals
- Standard equipment**
 - terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions
- Peripherals**
 - GM units
 - GA44 Printer

CountPac-M

– a match for any piece counting operation



Piece counting

- with fixed, preset reference piece number Fix 10...Fix 100
- with any selectable reference piece number Ref. n pcs.
- entry of a known piece weight, display of this value on the balance or scale display
- reference optimization, i.e. recalculation of the piece weight from the current values
- second balance possible as reference balance, this allows a resolution up to 100x higher
- tare preset
- switching between piece count and weight
- counting out of a full container

Totalization/portion counting

- division of large quantities into portions
- item counter
- switching between current piece count and total

Statistics

- Weight statistics of parts being counted, with
- number of samples
 - mean value \bar{x}
 - standard deviation s

Result recording

- printout of values and results with date, time, code and two identification numbers

Standard equipment

- terminal (entry keypad) with cable
- plug-in program cassette
- operating instructions

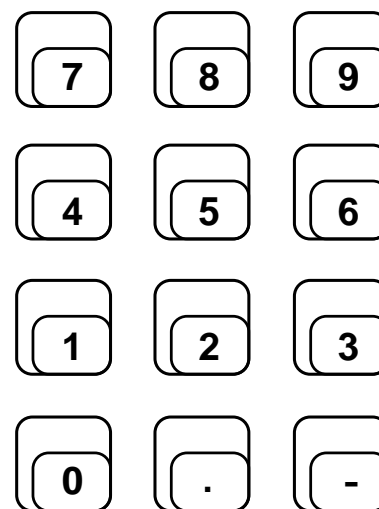
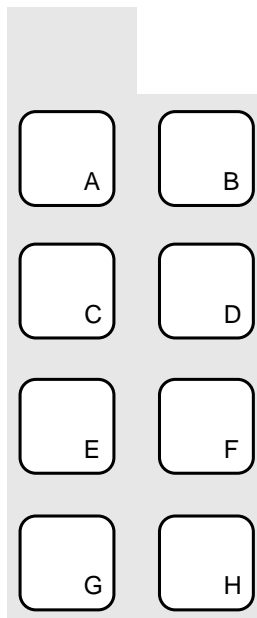
Peripherals

- GA44 Printer
- high resolution balance as reference balance, e.g. an AE, AM or AT balance
- connection cables for reference balances

DataPac-M

– allows dialog with the computer

Function keys



Clearing of
wrong entries



Termination of entry
Transfer of weighing results
Print key

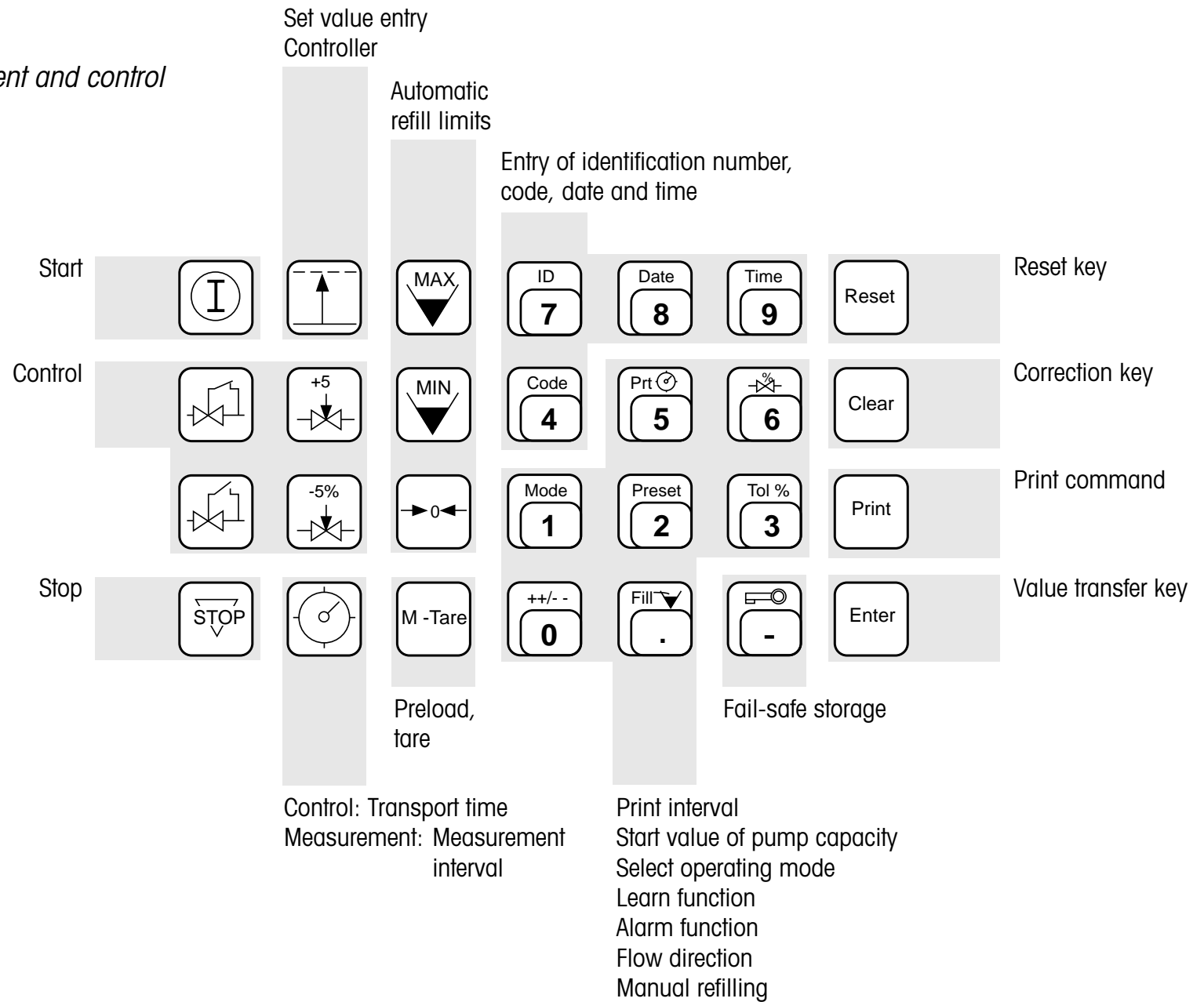
- Functions**
- entry and transfer of identifications
 - entry and transfer of (target) weight values and numbers
 - start of functional sequences in the program of the master computer
 - control of functional sequences, e.g. through Yes/No decisions

- Standard equipment**
- terminal (entry keypad) with cable
 - operating instructions with description of the interface and the commands to control the scale

- Peripherals**
- GA44 Printer
 - GM54 Output Module
 - LV10 Automatic Feeder
 - devices with RS/CL interface
 - connection cables for various computer systems

FlowPac-M

– for mass flow measurement and control



- Control**
 - mass flow control through pumps with frequency or analog signal control
 - mass flow control with electromagnetic valve for gases and liquids
 - continuous computer-controlled mass mixing

- Measurement**
 - measurement and recording of mass flows (weight decrease or increase per unit time) for the calibration or certification of pumps, valves or measuring instruments
 - determination of the efficiency of mass metering devices and filters

- Standard equipment**
 - terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions

- Peripherals**
 - GA44 Printer for recording the control or measurement process
 - GM54 Output Module for control operation
 - GA37 D/A Converter for pumps with analog signal control
 - GM48, GM49 Auxiliary Displays
 - connection cables for various computer systems

F03220

– the powerful formulation program for your MS-DOS computer

```

=====
                        METTLER F03220 FORMULATION SYSTEM
***** Color Corporation *****

Formula Name : Plaster                      Formula Code : Super-P
Formula No.  :      3                      Batch ID    : Smith
Batch Quantity: 2500.00 g                 Tare       :      332.10 g

*****
No.      Component Name      Component Code      Nominal      Actual
-----
12      Marble powder      Batch 56           783.30 g     785.20 g
11      Marble chips      Batch 78/9        366.70 g     365.90 g
4       Adhesive A        Batch 67-78       29.20 g      29.10 g
8       Color yellow      Ye-58.9          120.80 g     119.20 g
3       Additive 3        CD 45            151.70 g     153.20 g
2       Additive 2        YKL 67           498.30 g     493.60 g
16      Water              1050.00 g        1050.00 g

-----
Net      :      3000.00 g     2996.20 g
Difference to Nominal:      -0.1 %
Gross:      3328.50 g

Weighed by: . . . . . Date: 01.02.1990 Time: 11:48
=====

```

Formula weighing

2 different weighing methods:

- weighing the components of a formulation into a vessel or
- weighing of each component into its own vessel (up to 10 batches possible)
- mass unit for formulation and tolerance separately definable
- 3 scales with different resolution attachable
- up to 20 components per formulation,
up to 100 formulations and
up to 200 components can be stored and managed
- automatic totalization of the consumption of every single component
- result record of weighing data

Definition

- new entries or changes (mutations) to formulation data
- printout of formulation data in DIN A4 format
- storage or copying of formulation data to external storage devices
- clearing of the totalized consumption of the individual components

Configuration

Setting of general parameters, e.g.

- printout with or without formulation name, formulation code or component name
- password protection of the components and formulation data
- dialog languages English, German and French selectable in the installation
- label printout

Standard equipment

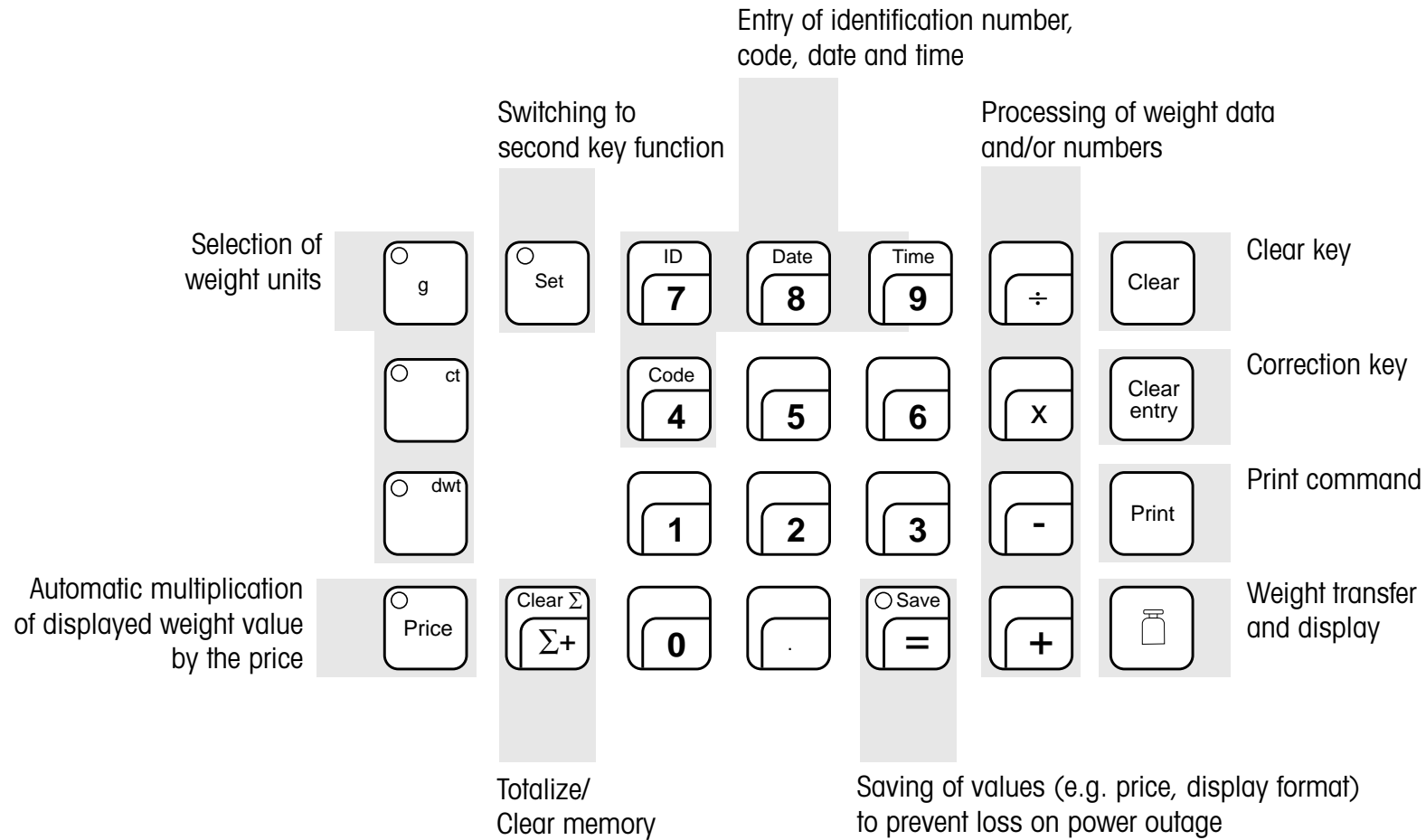
- FO3220-1: Software on 3.5" diskettes
FO3220-2: Software on 5.25" diskettes
- installation information
- operating instructions as text file on diskette

Accessories

- connection cable between scale and MS-DOS computer
- LV3 Vibrospatula

GoldPac-M

– for simple price calculation and unit switching in the gold and precious stone trades



- Operations**
 - +, -, x, ÷, totalization of individual weights, automatic price calculation
 - automatic calculations involving weight data and numbers or numbers alone

- Display format**
 - fixed decimal point, 0...6 places
 - exponential format
 - fixed decimal point of the scale

- Units**
 - direct choice between g, ct, dwt
 - additional units programmable

- Constants**
 - price per weight unit programmable

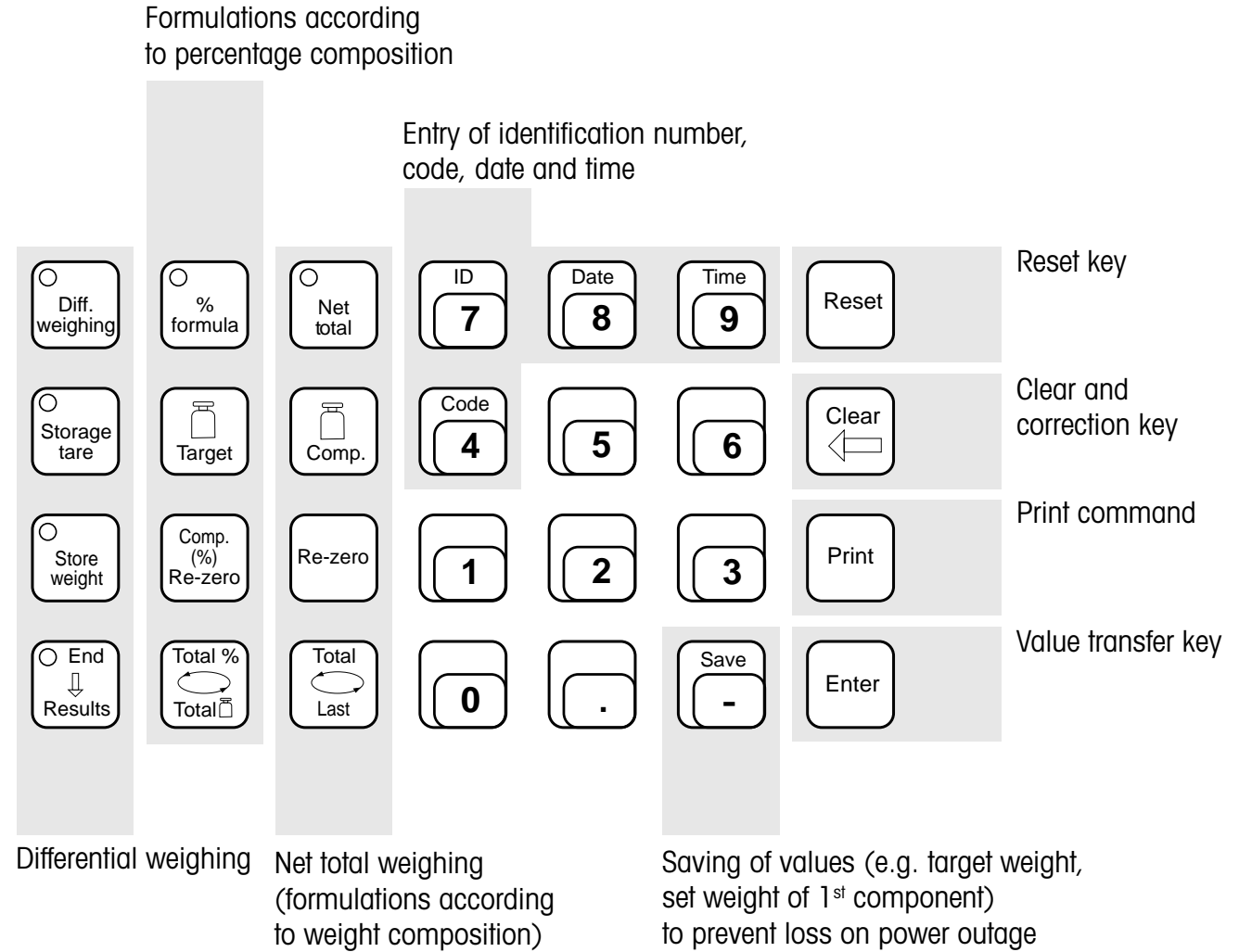
- Result recording**
 - printout of values and results with date, time, code and identification number
 - printout on totalization

- Standard equipment**
 - terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions

- Peripherals**
 - GM48, GM49 Auxiliary Displays
 - GA44 Printer

LabPac-M

– the lab aid in differential weighing and formula weighing



- Differential weighing**
 - storage of up to 20 tare weights and initial weights
 - automatic weight transfer in backweighing in the same order
 - result as difference in weight units or in % of the initial weight
 - result as absolute value in weight units or in % of the initial weight
 - batching of all samples after new treatment repeatable any number of times
 - scale available for other weighings during sample processing

- % formula**
 - entry of the formulation target weight in the selected weight unit and entry of the components in % of the target weight or
 - automatic calculation of the formulation target weight after entry of the 1st component in % and its initial weight
 - weighing-in of all components from zero with help of the DeltaTrac display
 - recall of the formulation target weight, filling of mixtures to target weight
 - recall of current net total in weight units or in % of the target weight

- Net total**
 - weighing in of any number of components each from zero with the help of the DeltaTrac display
 - net total (total of the component weights) recallable at any time
 - filling with top-up components (e.g. liquid) from net total up to formulation weight (additive weighing)
 - DeltaTrac display as weighing-in aid after entry of the target weight
 - totalization of individual weights (without target weight entry)

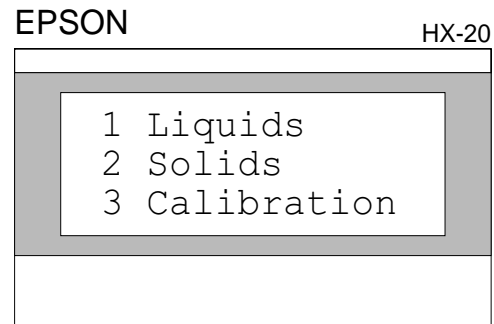
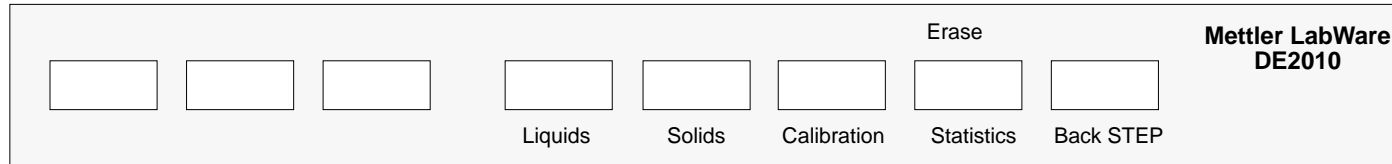
- Result recording**
 - printout of values and results with date, time, code and identification number

- Standard equipment**
 - terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions

- Peripherals**
 - GA44 Printer
 - LV3 Vibrospatula
 - GM48, GM49 Auxiliary Displays

LabWare "Density determination" 59730

– the program for convenient density determination



```

=====
Density determinat.
07.05.90          17:58
-----
Article  : Metal
Code     : porous
-----
Porous solids

L.density  0.9982 g/ml
Sample    119.86 g
Buoyancy  37.87 g
Density   3.159 g/ml

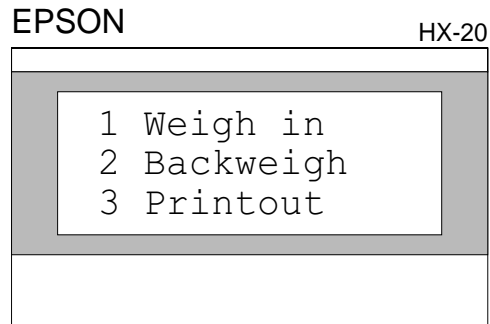
=====
*** Mettler LabWare ***

```

- Computer**
 - EPSON HX-20 with memory expansion and cassette tape drive
- Density determination liquids**
 - by the buoyancy method with the aid of a displacement body
 - by use of a pycnometer
- Density determination solids**
 - by the buoyancy method for normal or porous solids
 - by use of a pycnometer
- Statistics**
 - variable sample size
 - mean value \bar{x}
 - standard deviation s
- Result recording**
 - printout of values and results with date, time, article and code by HX-20
- Standard equipment**
 - microcassette with program
 - keypad template in English, German and French for the function keys of the HX-20
 - cable for connection of an AM, AT or PM balance to the HX-20
 - cable for connection of an AE balance to the HX-20
 - in-use cover for the HX-20
 - holder for large paper rolls
 - operating instructions
 - short-form operating instructions
- Accessories**
 - Density Determination Kit 33360
 - Displacement body 10 ml 210260

LabWare "Moisture determination" 59728

– the program for the simple determination of moisture content and dry weight



```

=====
Determine
dry content
08.05.90          15:28
-----
Article   : Butter
Batch    : 12/AS
-----
Pan No           3045
Init wg         20.670 g
Residue        15.910 g
Difference      -4.689 g
Calculation 1   -22.69 %
  
```

*** Mettler LabWare ***

```

=====
Determine
dry content
08.05.90          10:25
-----
Printout
from   08.05.90  16:18
to     08.05.90  17:23
  
```

```

Calculation 1
-----
Article   : Butter
Batch    : 12/AS

1.  -22.69%  2. -23.26%
3.  -20.30%  4. -18.05%
Mean value          -21.07%
-----
  
```

```

Article   : Butter
Batch    : 15/bb

1.  -21.47%  2. -21.78%
Mean value          -21.62%
-----
  
```

*** Mettler LabWare ***

- Computer**
 - EPSON HX-20 with memory expansion and cassette tape drive

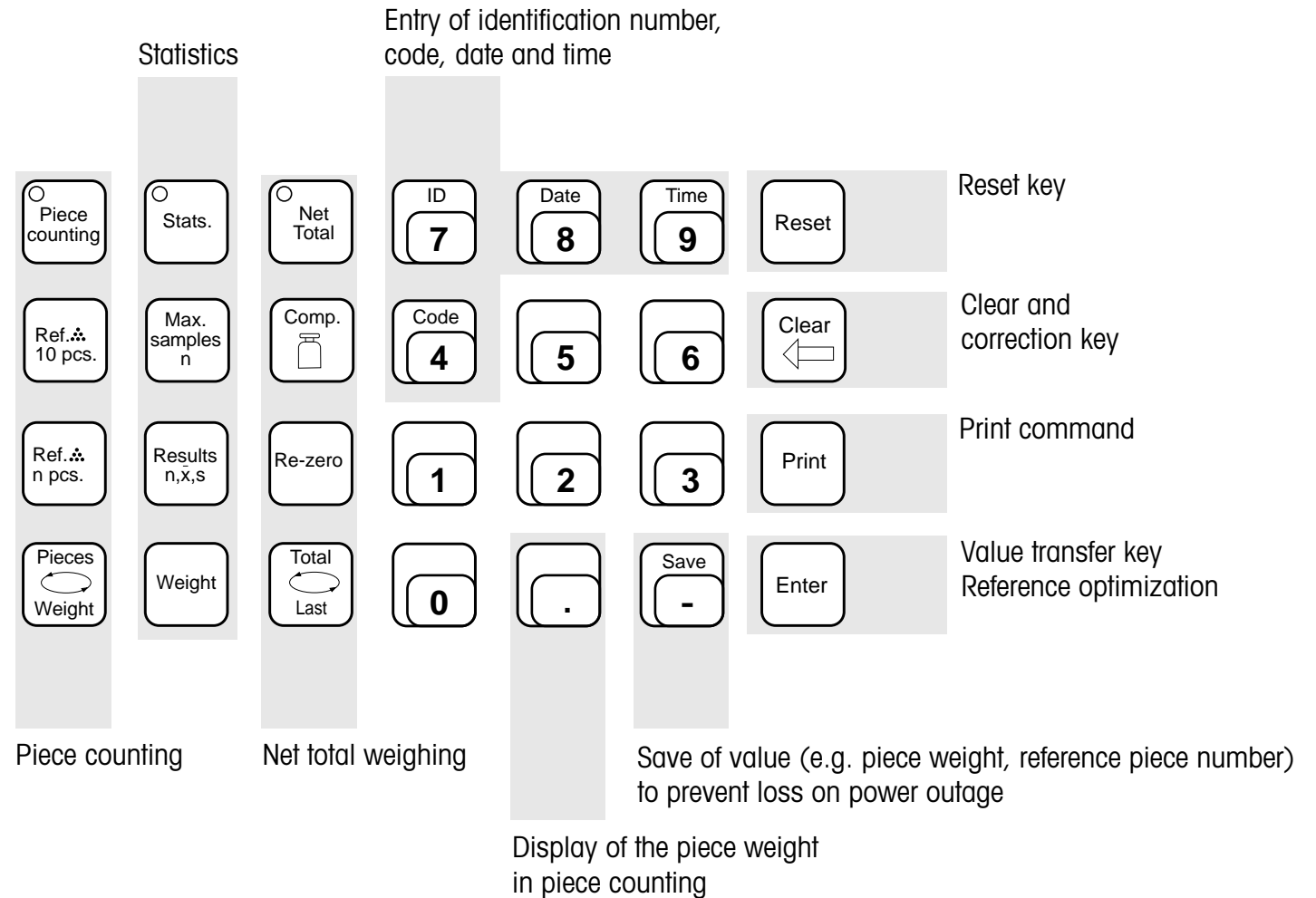
- Calculation**
 - moisture content (difference between residue and initial weight in percent of initial weight, initial weight = 100 %)
 - dry weight (residue in percent of initial weight, initial weight = 100 %)
 - wet weight (initial weight in percent of residue, residue = 100 %)
 - dry weight (difference between residue and initial weight in percent of residue, residue = 100 %)
 - summary of batches
 - mean value in multiple weighings
 - evaluation of up to 300 samples

- Result recording**
 - record of initial weights with article name, batch, pan number, tare and initial weight
 - backweighing record with article, batch, pan number, initial weight, residue, difference and result in accordance with the selected method of calculation

- Standard equipment**
 - microcassette with program
 - keypad template in English, German and French for the function keys of the HX-20
 - cable for connection of an AM, AT or PM balance to the HX-20
 - cable for connection of an AE balance to the HX-20
 - in-use cover for the HX-20
 - holder for large paper rolls
 - operating instructions

PharmaPac-M

– simplifies the production, control and packaging of pharmaceutical products



- Piece counting**
 - counting and determination of unknown piece numbers
 - with fixed, preset reference piece number Ref. 10 pcs.
 - with any selectable reference piece number Ref. n pcs.
 - reference optimization, i.e. recalculation of the piece weight from the current values
 - piece weight recallable at a keystroke
 - switching between piece count and weight

- Statistics**
 - mean value \bar{x}
 - standard deviation s
 - number of weighing samples selectable
 - individual weighing or additive weighing (weighed parts remain on the scale)
 - automatic plausibility check ($\pm 50\%$ of the current mean value)
 - statistical evaluation of animal weighings

- Net total**
 - weighing-in of any number of components each from zero with the aid of the DeltaTrac display
 - net total (total of the component weights) recallable at any time
 - filling with top-up components (e.g. liquid) from net total up to formulation weight (additive weighing)
 - DeltaTrac display as weighing-in aid after entry of the target weight
 - totalization of individual weight values (without target weight entry)

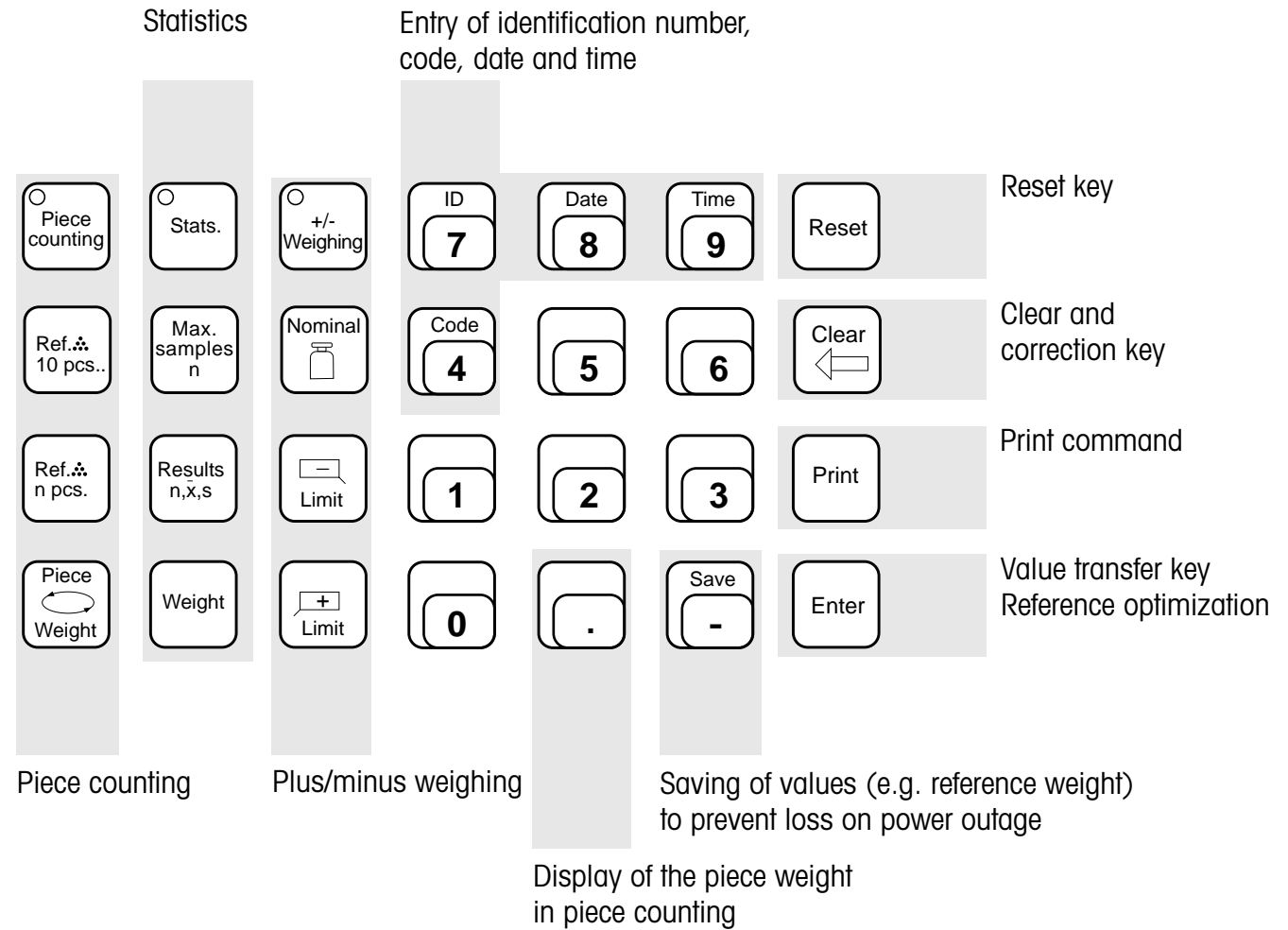
- Result recording**
 - printout of values and results with date, time, code and identification number

- Standard equipment**
 - terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions

- Peripherals**
 - GA44 Printer
 - LV3 Vibrospatula

ProPac-M

– supports the checking and packaging of your products



- Piece counting**
 - counting and determination of unknown piece numbers
 - with fixed, preset reference piece number Ref. 10 pcs.
 - with any selectable reference piece number Ref. n pcs.
 - reference optimization, i.e. recalculation of the piece weight from the current values
 - piece weight recallable at a keystroke
 - switching between piece count and weight

- Statistics**
 - mean value \bar{x}
 - standard deviation s
 - number of weighing samples selectable
 - individual weighing or additive weighing (weighed parts remain on the scale)
 - automatic plausibility check ($\pm 50\%$ of the current mean value)
 - statistical evaluation of animal weighings

- Plus/minus weighing**
 - weighing-in aid with the DeltaTrac display after entry of the target value
 - check on adherence to a target weight with selectable plus/minus tolerances
 - quality control of finished parts using the weight
 - automatic printout of the weight with selectable acceptance criteria
 - individual weighing or additive weighing (weighed parts or amounts remain on the scale)
 - control of outputs of the GM54 Output Module based on the weight situation in regard to tolerance limits

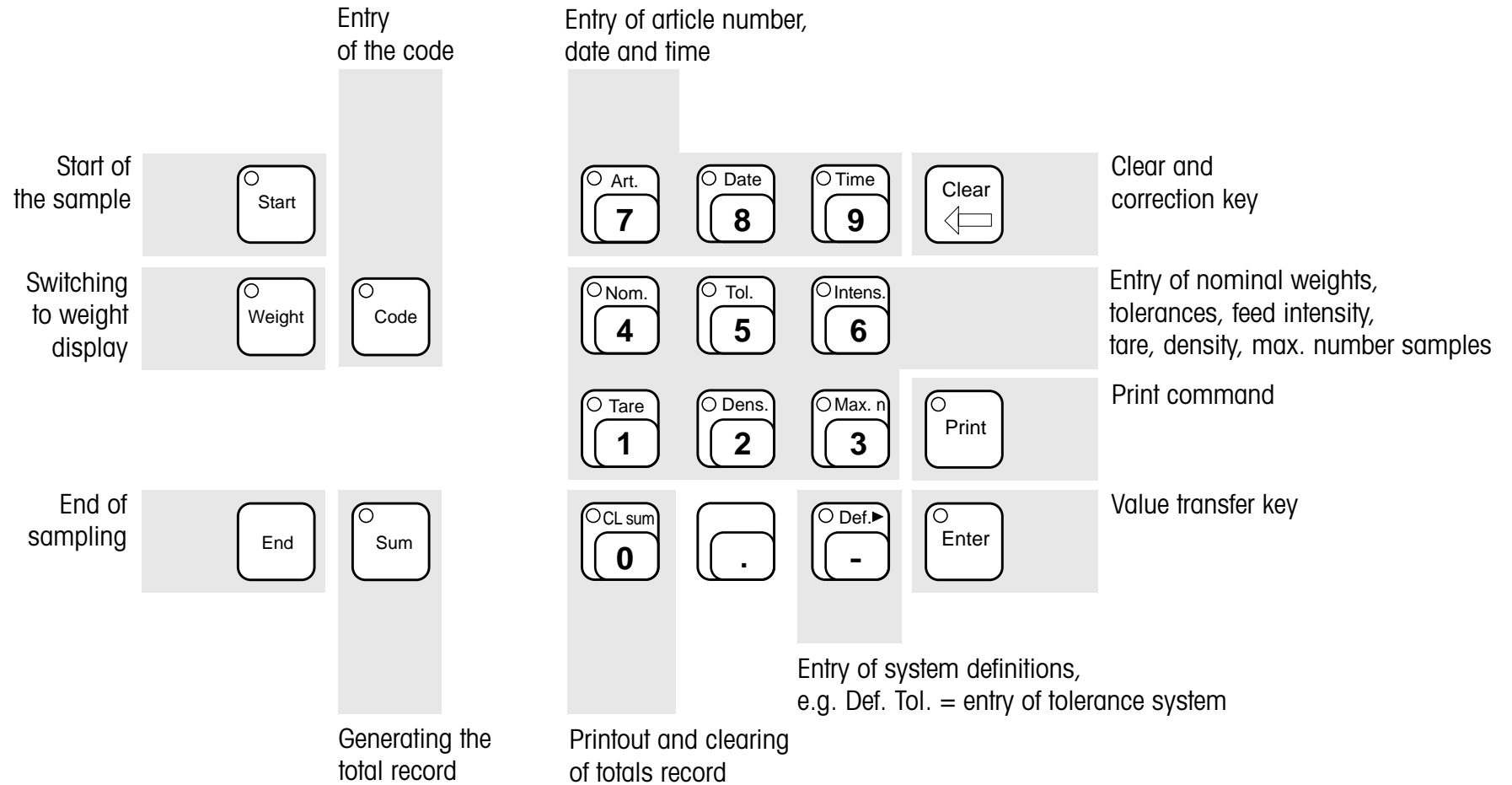
- Result recording**
 - printout of values and results with date, time, code and identification number

- Standard equipment**
 - terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions

- Peripherals**
 - GA44 Printer
 - GM54 Output Module
 - LV3 Vibrospatula

SQC12 StatPac-M (for one article)

– controls fill quantities and pharmaceutical products where tolerances have statutory limits



- System parameters**
- 7 different tolerance systems, e.g. EC, US, Japan and pharmacopeia
 - plausibility limits fixed or freely selectable (1...100 % of the nominal weight)
 - single or mean value tare
 - additive weighing (parts already weighed remain on the scale)
 - working with volume units through entry of the density for the filling control of liquids
 - nature of the result recording
 - printout of the system parameter values
- Evaluation**
- Record printout with
- individual values and special designation for violations of upper tolerance limits
 - sample size
 - mean value \bar{x}
 - standard deviation absolute and relative in % of the mean value
 - minimum and maximum as well as their difference
 - number of violations of lower tolerance limits
 - identification using date, time, code and article number
 - control of outputs of the GM54 Output Module based on weight situation in regard to tolerance limits
- Standard equipment**
- terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions
- Peripherals**
- GA44 Printer
 - GM54 Output Module
 - LV10 Automatic Feeder

SQC33 (for up to 300 articles)*– the statistics program for MS-DOS computers*

METTLER SQC33	Sampling (continuos)	19.05.1991 09:09
Call code : 1	Art.No. : 7610100021329	Art.name : Espresso
Nominal : 200.0 g		
Tare : 512.0 g	n:5	Avg. std. : 2.30 g
Batch name : SB		
	Sample	Weighing result
	1	201.0 g
	2	202.7 g
	3	223.8 g
	4	201.9 g
	5	202.6 g
		>T2+
Mean value :	206.4 g	103.20 %
Std.dev. :	9.75 g	4.88 %
Violations:	<T2-: 0	<T1-: 0
	>T1+: 1	>T2+: 1
Weighings :	5	Adjust. message: Scatter
Xmin:	201.0 g	Xmax: 223.8 g
		Range: 22.8 g

F5: Print 'off' F6: Individual 'on' F7: Abort F9: End

- Computer**
 - MS-DOS computer with attached A4 or A3 printer
 - acquisition and storage of production data of up to 300 articles for different sets of statistics
 - computer and weighing station can be separately installed from each other

- Parameters**
 - nominal weight (nominal fill quantity)
 - 9 different tolerance systems, e.g. EC, US, Japan, pharmacopeia or 2 free tolerances
 - plausibility limits - also asymmetrical - fixed or freely selectable
 - individual or mean value tare
 - additive weighing possible (parts already weighed remain on the scale)
 - 4 different volume units in the appropriate weight unit by entry of the density
 - variable sample size (max. 999, with individual tare 99, with pharmacopeia 150)
 - selectable feed rate of LV10 as well as automatic discharge at end of sample
 - adjustment message for control of the filling machine
 - password protection for important functions, e.g. changes to certain data
 - classification of the products with the aid of the GM54 Output Module

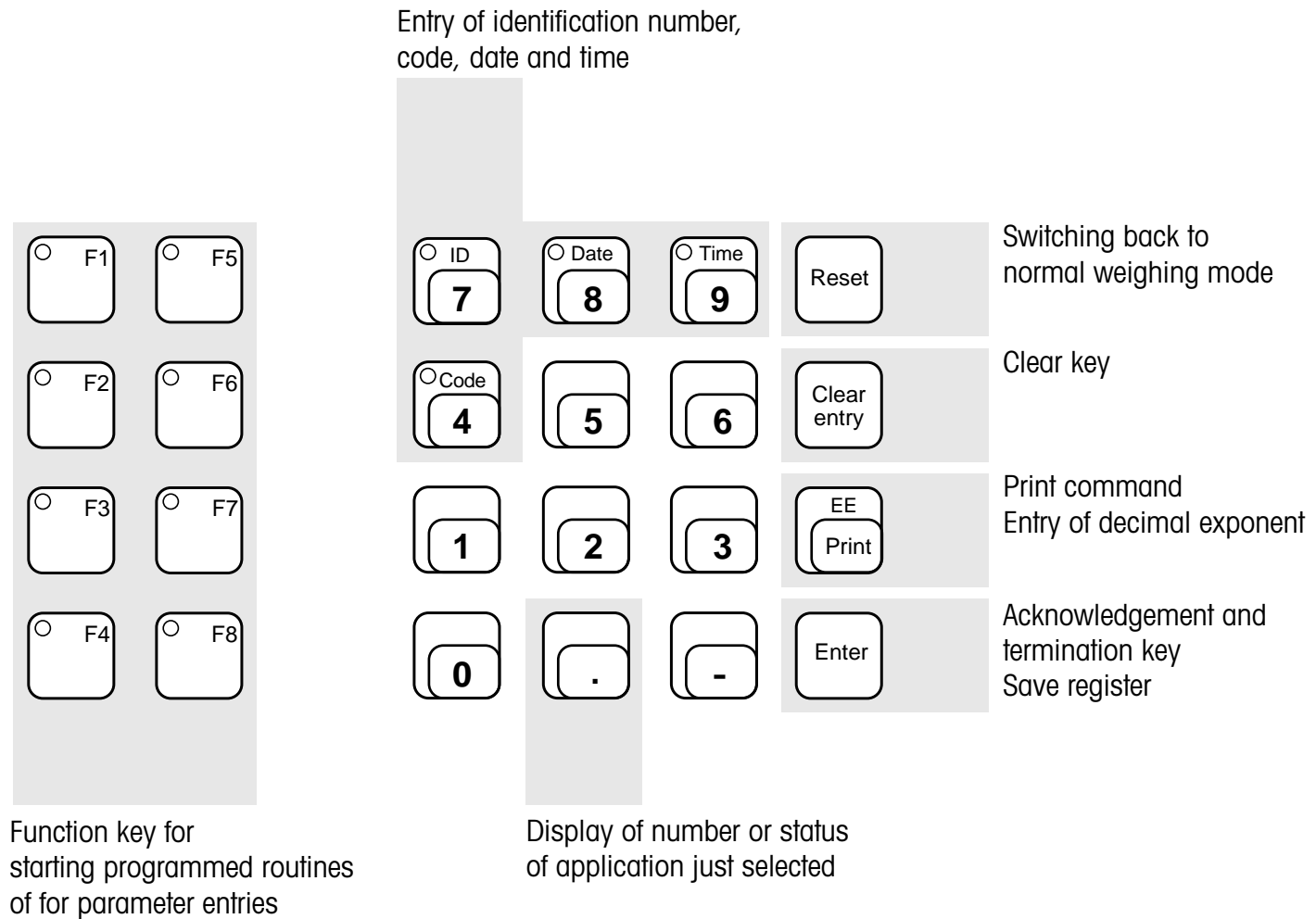
- Record/evaluation**
 - individual values, minimum, maximum and difference into sample record
 - sample size, number of weighings
 - mean value absolute and in % of the nominal weight
 - standard deviation absolute and in % of the mean value
 - number of tolerance violations absolute and in %
 - graphical representation of the results (histogram)
 - printout of an article catalog sorted in accordance with different features

- Standard equipment**
 - software on 3.5" diskettes
 - operating instructions on diskette

- Peripherals**
 - LV10 Automatic Feeder
 - GM54 Output Module
 - GA44 Printer (with GA50 Peripheral Controller)
 - Bar code reader at the weighing station (with GA50 Peripheral Controller)
 - connection cables for various computer systems

XPac-M

– programmable for your special requirements



- Capabilities**
 - 4 applications
 - 8 functions per application recallable via F1...F8
 - in operation without terminal, one function can be called up via control bar
 - 13 arithmetic registers (R0...R12), in addition X, Y and Z registers
 - fail-safe storage of contents of R1, R2 and R3
 - floating point arithmetic
 - automatic function for RESET, TARE and PRINT
 - comparator function with support of GM54 Output Module
 - program bootable from software cassette or via interface
 - data loadable from software cassette or via interface

- Result recording**
 - printout of values and results with date, time, code and identification number

- Standard equipment**
 - terminal (entry keypad) with cable
 - plug-in program cassette
 - operating instructions

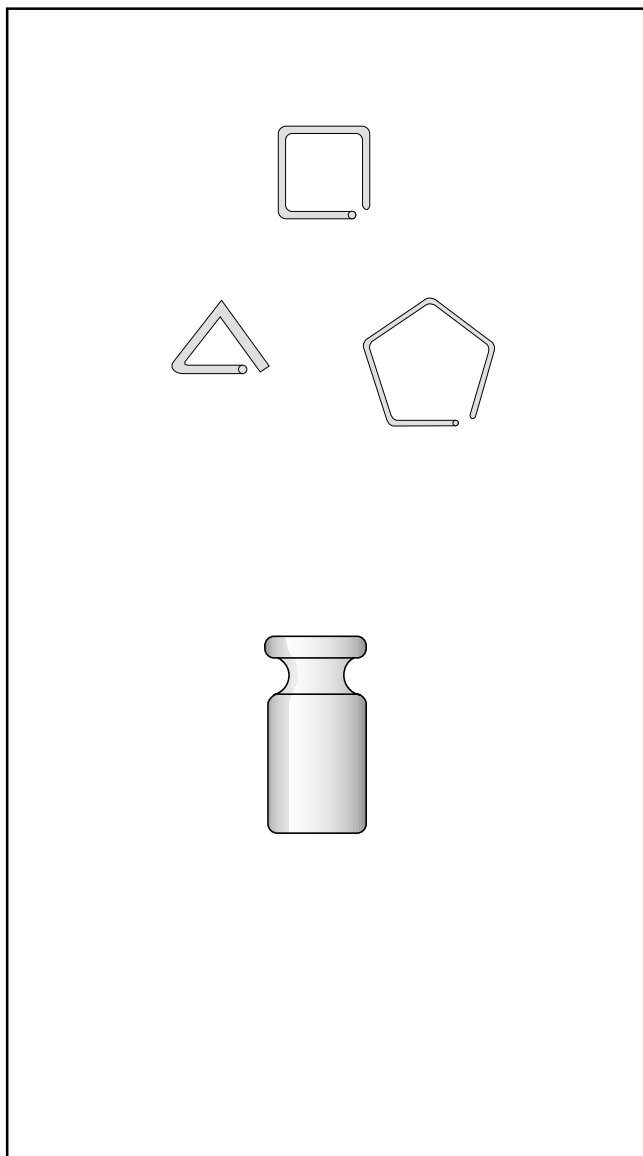
- Peripherals**
 - LV10 Automatic Feeder
 - GA44 Printer
 - GM54 Output Module
 - XPac compiler for program development (for MS-DOS computers)

- Sequence of program development**
 - development of program in XPac-specific language with the editor
 - translation of program with the XPac compiler
 - transfer of program to cassette

4. Accessories

	Page
• Calibration weights	4.2
• Weighing containers	4.3
• METTLER TOLEDO Optional accessories	
– Draft shield	4.5
– In-use covers, demo cases	4.6
– Density determination kit, displacement body, weighing tongs, triangular holder, anti-theft device	4.7
– Printer accessories, fuses, PM-SE Conversion Kit	4.8
• CL devices	
– CL240, CL241, CL249, CL250 Interface Converters	4.9
– CL310 5-Channel Line Selector, CL110, CL111 Power Line Filters	4.10
• GA devices	
– GA44 Thermal Printer	4.11
– GA37 D/A Converter, GA50 Peripheral Controller	4.12
• GM devices	
– GM303 Control Unit, hand switch, foot switch	4.13
– GM48, GM49, GM53 Auxiliary Displays, GM54 Output Module	4.14
• LP devices	
– LP16 and LJ16 Infrared Dryers, Thermometer Set	4.15
• LV devices	
– LV3 Vibrospatula, LV10 Automatic Feeder	4.16
• SM terminals and accessories	
– Base and application terminals	4.17
– SM-Stand, SM-WallMount Kit, PowerPac-SM, battery charger	4.18
• Cables and connectors	4.19

Calibration weights



Weight		Certification Class	Balance/Scale Type (standard version)	Order Number
1 x	50 g	E2	AM50 (included in standard equipment)	42055
1 x	100 g	E2	AM100 (included in standard equipment)	9834
1 x	100 g	F1	PM100, PM200, PM300, PM480	47900
1 x	200 g	F1	PM400	45935
1 x	500 g	F1	PM600	48307
1 x	1000 g	E2	PM1200	42056
1 x	1000 g	F1	PM2000, PM2500, PM3000, PM4800, SM3000	47905
1 x	2000 g	F1	PM4000, PM6000, PM6, PM30, PM34, SM6000	48312
2 x	2000 g	F1	PM6100, PM11, PM15, PM16, PM30, PM34, SM1520, SM15000	48317
1 x	5000 g	E2	PM5003	9839
1 x	5000 g	F1	for certified versions	42066
1 x	10000 g	E2	for certified versions	73512
1 x	2000 g	± 50 mg	PM6, PM15; 2 are needed	47699

Additional weights and standard weight sets on request

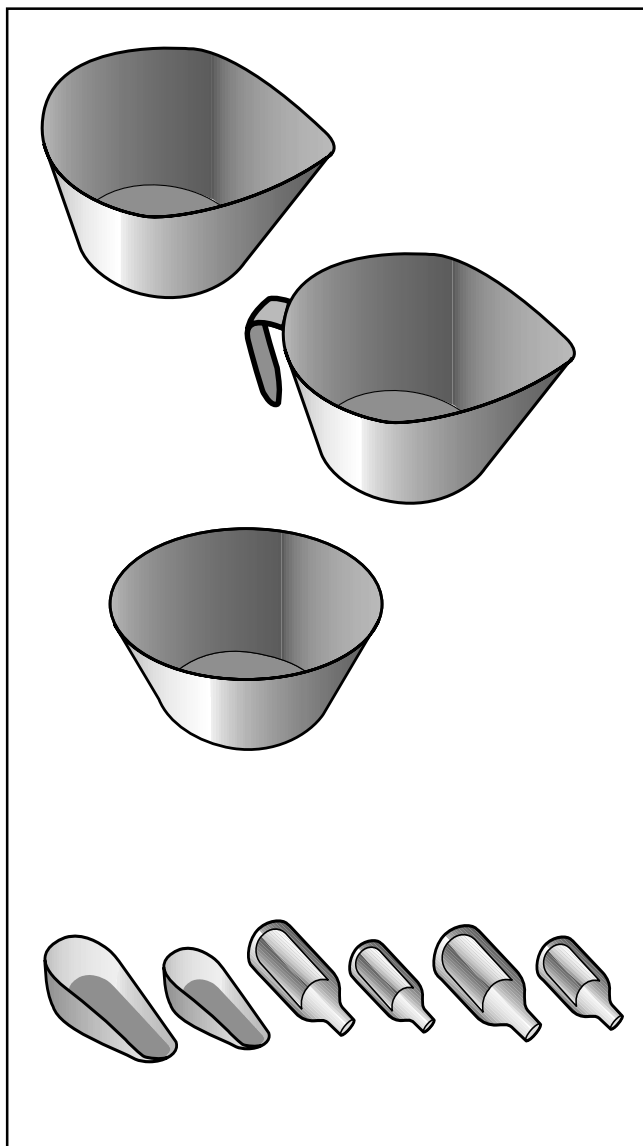
Tolerances according to OIML

Nominal value	Class E2	Class F1	Nominal value	Class E2	Class F1
50 g	±0.10 mg	±0.30 mg	1 kg	±1.5 mg	±5 mg
100 g	±0.15 mg	±0.5 mg	2 kg	±3.0 mg	±10 mg
200 g	±0.30 mg	±1.0 mg	5 kg	±7.5 mg	±25 mg
500 g	±0.75 mg	±2.5 mg	10 kg	±15 mg	±50 mg

Class E2 ≤ NIST Class S (NIST = National Institute of Standards and Technology, Washington, D.C.)

Class F1 ≈ NIST Class M

Weighing containers



Beakers, stainless steel

Content	Ø bottom	Ø top	Height	Tare	Order Number
1230 cm ³	176 mm	196 mm	140 mm	050 g	15020
1000 cm ³	180 mm	180 mm	173 mm	300 g	2889
2000 cm ³	130 mm	205 mm	188 mm	400 g	2550
5000 cm ³	130 mm	280 mm	145 mm	800 g	2559

Beaker, PVC

1500 cm ³	180 mm	150 mm	140 mm	270 g	11284
----------------------	--------	--------	--------	-------	-------

Animal weighing pan with conical top for PM balances of weighing range ≥ 400 g, stainless steel

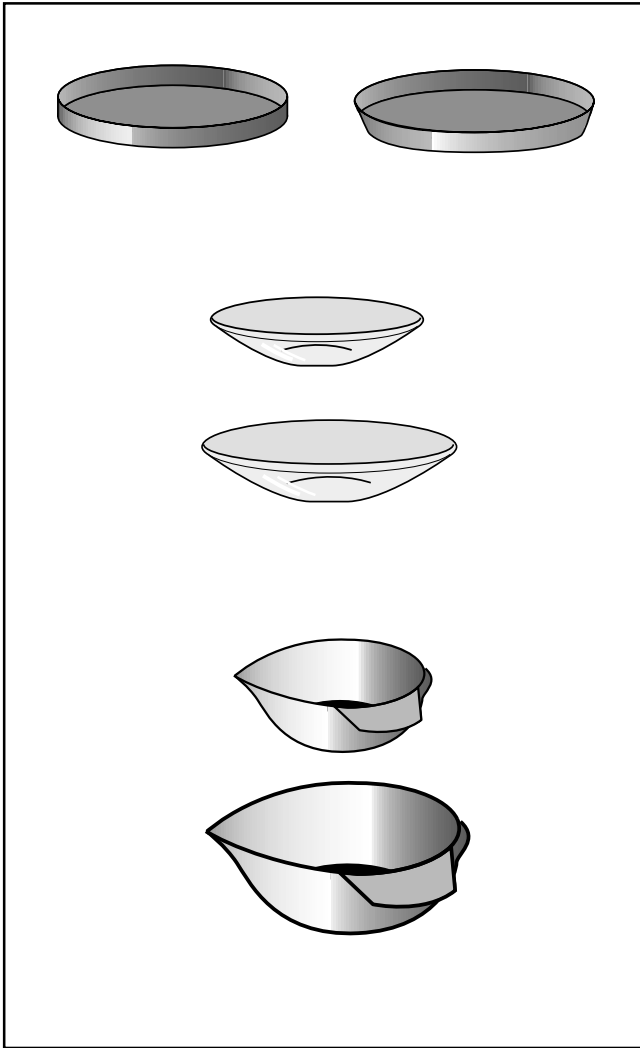
1000 cm ³	130 mm	220 mm	120 mm	< 290 g	47644
----------------------	--------	--------	--------	---------	-------

Weighing boats

Material	Ø	Length	Tare	Number	Order Number
Steel, stainless	-	078 mm	10 g \pm 1 mg	1	4507
Steel, stainless	-	107 mm	20 g \pm 1 mg	1	4508
Glass	20 mm	060 mm	16 g	5	23951
Glass	30 mm	080 mm	14 g	5	23952
PE	25 mm	065 mm	13 g	5	23953
PE	38 mm	100 mm	15 g	5	23954

Weighing containers

4.4



U-shaped weighing pans (specially for LP16 and LJ16 Infrared Dryers)

Material	Ø	Tare	Number	Order Number
Steel, stainless	96 mm	50 g	83	13954
Al, disposable	96 mm	03 g	80	13865

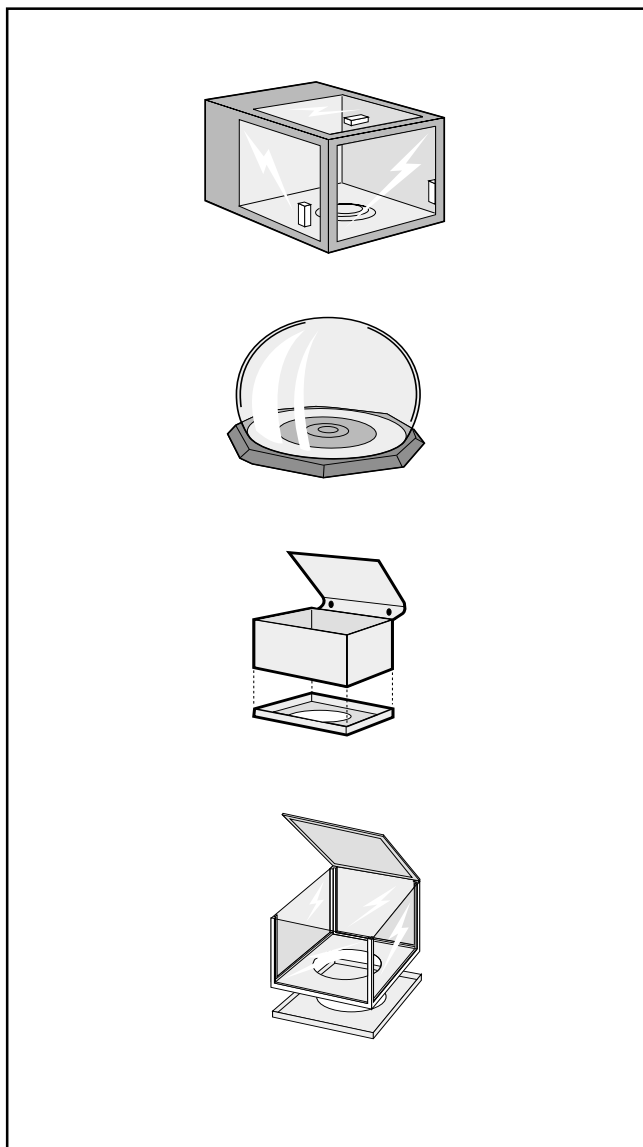
Glass dishes (watch glasses)

Material	Ø	Tare	Number	Order Number
Glass	50 mm	10 g ± 1 mg	81	4506
Glass	70 mm	20 g ± 1 mg	81	2013

Carat pans

Content	Material	Ø	Tare	Order Number
1300 ct	Steel, stainless	58 mm	15 g	43851
1000 ct	Steel, stainless	86 mm	35 g	1153
1000 ct	Al, black	86 mm	15 g	38730

METTLER TOLEDO Optional accessories



Draft shield

Order Number

Glass draft shield for balances with weighing pans up to Ø 150 mm

- shallow (effective height 150 mm, standard equipment for AM50)
- deep (effective height 235 mm, standard equipment for AM100, PM5003)

34300

33515

Spherical draft shield of glass for analytical balances and carat scales with weighing pan Ø 80 mm, weighing pan of spherical glass draft shield Ø 60 mm

33520

Plastic draft shield for weighing pans up to Ø 150 mm

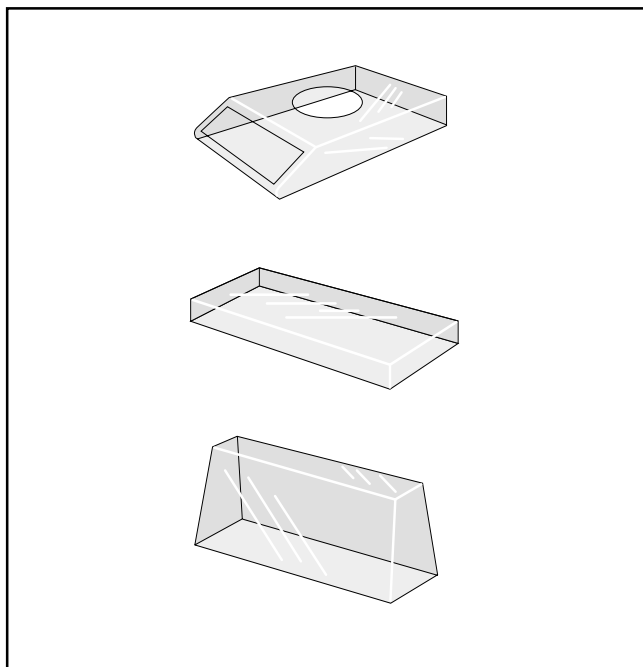
- 2 top units, effective height 50 mm and 80 mm

47910

All-purpose draft shield with detachable side panels of glass for PM balances with circular weighing pan, effective height with closed cover: 100 mm

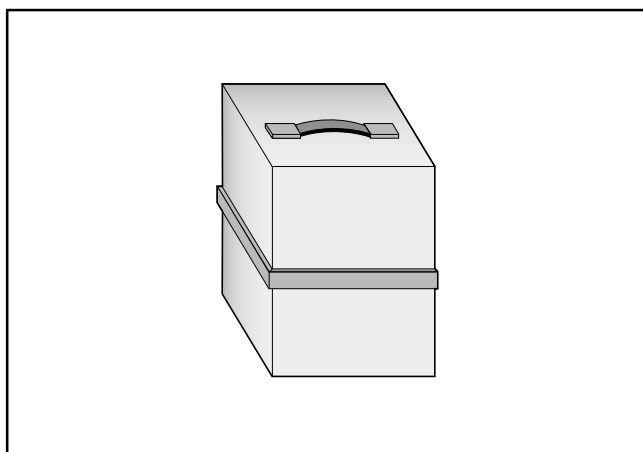
216100

(standard equipment for PM100, PM200, PM400, PM480, PM1200, PM2500)



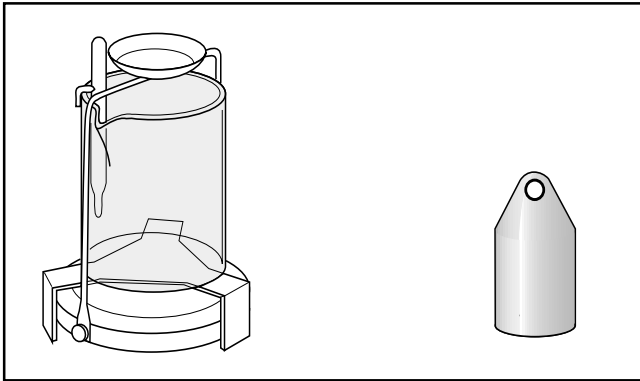
In-use covers

	Order Number
Molded in-use cover for AM/PM balances with weighing pan	5 34151
Retainer ring for 34151	41156
Molded in-use cover for PM3000, PM6000, PM6	5 34153
Molded in-use cover for PM11, PM15, PM16, PM30, PM30000, PM34	2 56629
Molded in-use cover for PM11-N, PM15-N, PM16-N, PM30-K, PM30000-K, PM34-K	min. 2 56883
Dust cover for AM/PM balances with shallow glass draft shield (34300)	33486
Molded in-use cover for SM weighing platforms	5 34216
In-use cover for SM base terminal SM-F or SM-L	5 34222
Molded in-use cover for GM48, GM49 Auxiliary Displays	1 45898
In-use cover for EPSON HX-20	59721



Demo cases

for AM balances with shallow glass draft shield (34300), LP16 with balance and LJ16	71589
for PM100...PM4800, PM6000, PM6100, PM6	71571
for PM11-N, PM15-N, PM16-N, PM30-K, PM30000-K, PM34-K	71498
for SM3000, SM6000, SM1520, SM15000	71579



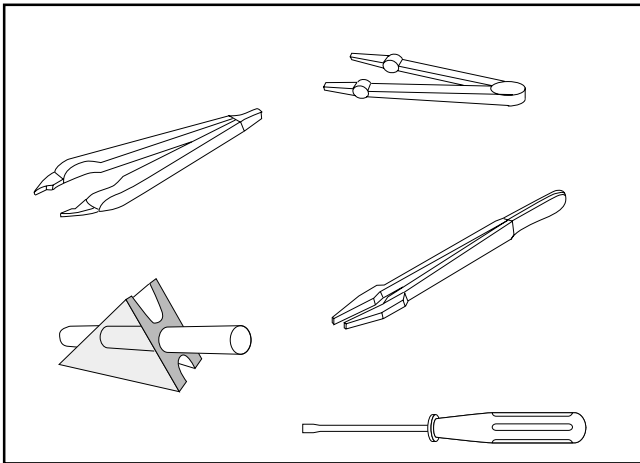
Density determination kit

for the density determination of solids and liquids on
PM balances with circular weighing pans of diameter 80 or 130 mm

Order Number

33360

For the density determination of liquids, the displacement body (10 ml)
210260 is also needed.



Weighing tongs

of plastic, with adjustable pitch, opening 65 mm, length 200 mm

210421

Tweezers for weights

of plastic, length 160 mm

6515

Straight tweezers

with fiber tip, length 210 mm

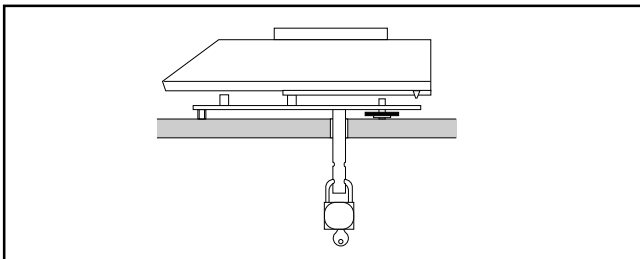
70209

Triangular holder, for test tubes, syringes and containers with round base

210435

Screwdriver

50279



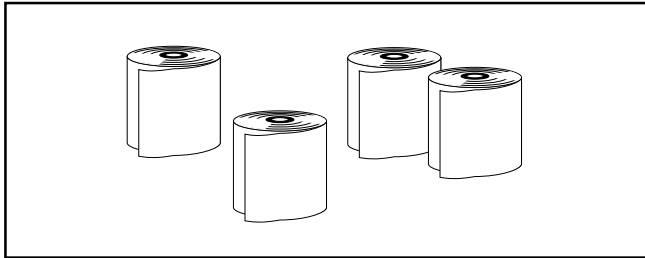
Anti-theft device

for AM balances and PM balances with weighing range up to 6.1 kg
(without padlock)

216147

bench top max. thickness 50 mm

bolt diameter 13.5 mm



Printer accessories

Order number

Paper for GA44 Printer (4 rolls)

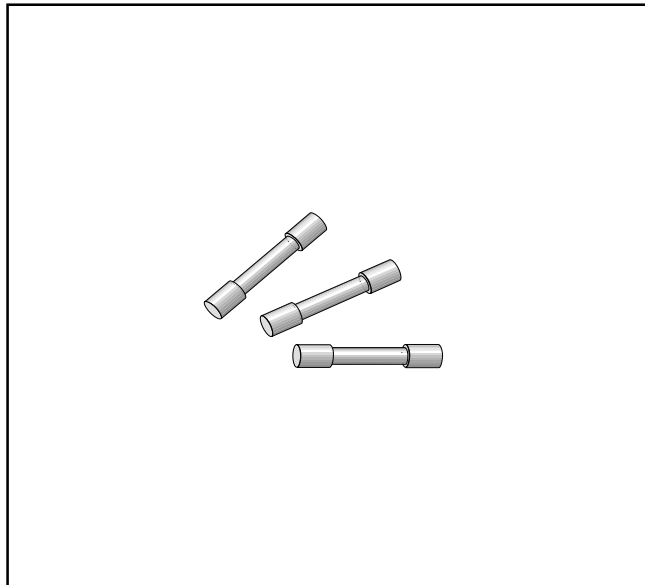
71328

Paper for GA24 Printer

65032

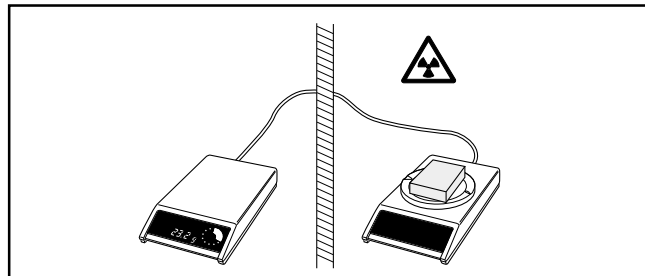
Ribbon for GA24 Printer

65031



Fuses

T 40 mA	for CL249	59344
T 63 mA (220 V)	for AM balances, PM100 ... PM6100	46328
T 80 mA	for CL241, CL249	20847
T 100 mA	for GA44, LP16, LJ16, CL241	16511
T 125 mA (110 V)	for AM balances, PM100 ... PM6100	26172
T 160 mA	for CL240, CL241	55144
T 200 mA	for GA44, LP16, LJ16, PM11-N ... PM34-K	20181
T 315 mA	for CL310	53407
T 2 A	for CL111	13873
T 3.15 A	for CL110, LP16, LJ16, with holder	54286
T 6.3 A	for CL110	28408



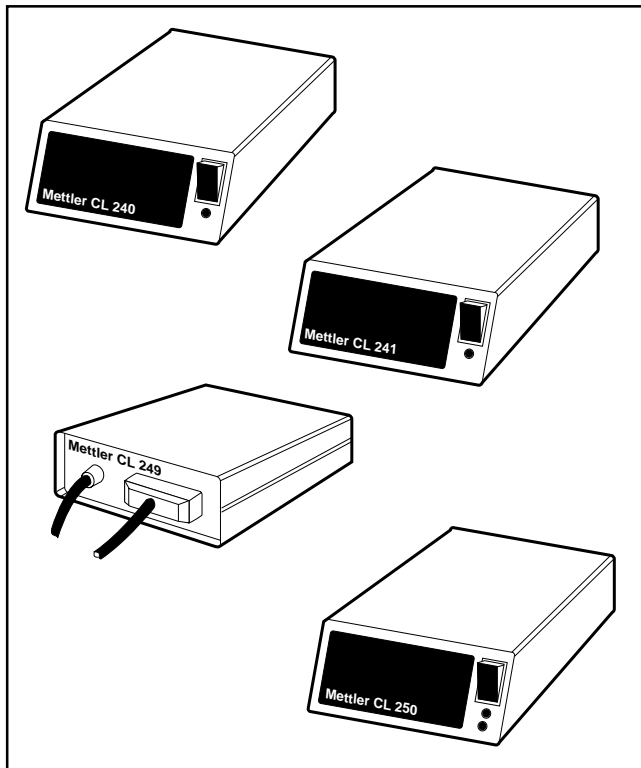
PM-SE Conversion kit

33925

For separation of the weighing cell from the electronics.

- distance up to 10 m
- for PM balances up to 6.1 kg
(not possible with PM1200, PM2500, PM5003, PM6100)

CL devices

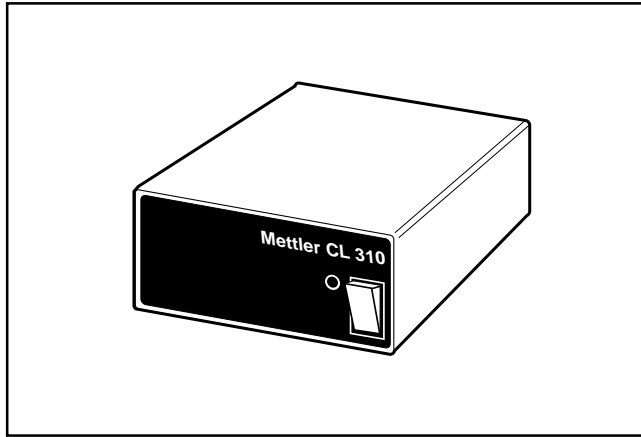


Interface converters

For the matching of the data transmission between the METTLER TOLEDO CL current loop data interface (20 mA) and BCD, IEEE488 and RS232C Interfaces.

- **CL240 BCD Interface:**
Serial-parallel converter (standard N200) for bidirectional transmission via shielded, galvanically separated wire connections.
- **CL241 IEEE488 Interface:**
Interface for IEC bus and HP-IB for bidirectional transmission with galvanic separation.
- **CL249 RS232C Interface:**
Interface for bidirectional transmission with galvanic separation.
- **CL250 RS232C Interface:**
Interface for bidirectional transmission with galvanic separation, selectable handshake protocol (RS232C side) and built-in data memory.

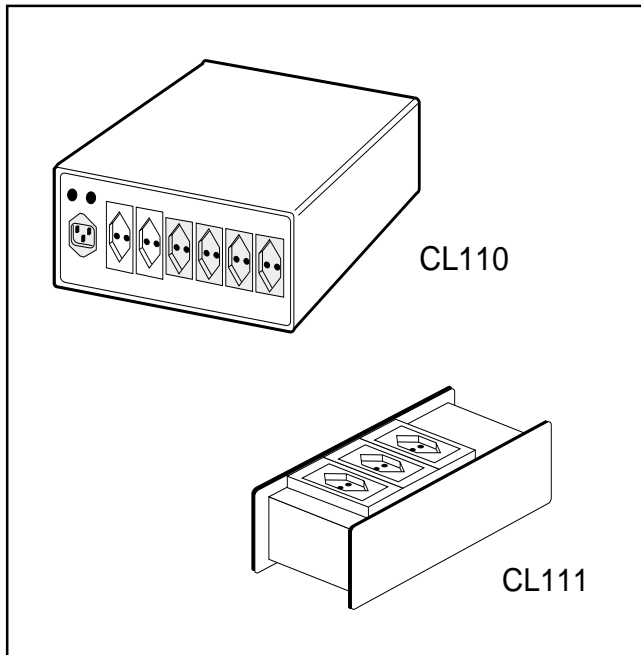
All METTLER TOLEDO Interface converters have a power supply connection with selectable voltage.



CL310 5-Channel Line Selector (Multiplexer)

For the attachment of several scales to a computer over a single line.

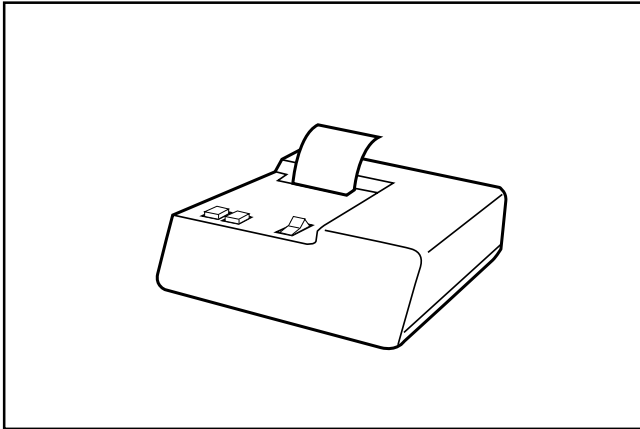
- 5 active channels (slaves) and one passive channel (master)
- all connections via the METTLER TOLEDO CL interface, distances up to 1000 m possible
- individual setting of interface parameters for every channel
- for system expansion, connectable in series
- power supply (voltage selectable)
- for the attachment to an RS232C Interface, an interface converter is needed, e.g. CL250



Power Line Filters

For the suppression of line disturbances and hence an increase in the functional reliability of electronic equipment.

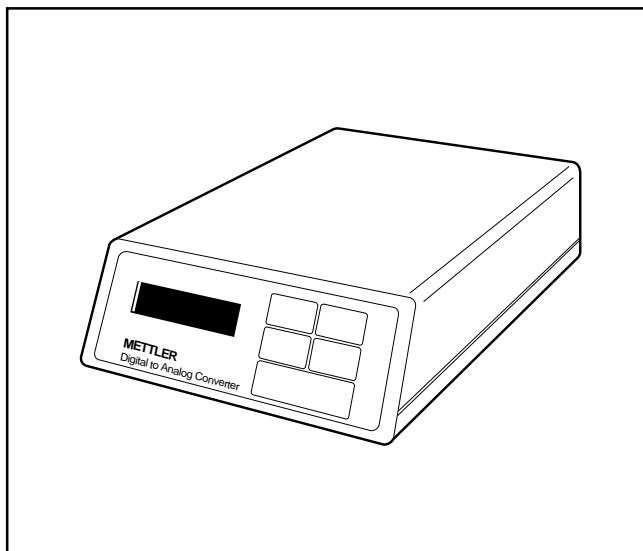
- **CL110:**
very high damping properties with 6 power outputs, 4 of which are filtered.
Load capacity: 3.15 A (filtered), 6.3 A (unfiltered).
On/off switching for all outputs together.
- **CL111:**
optimum suppression of common-mode interferences with 3 filtered outputs.
Load capacity: 2 A.



GA44 Printer

For the recording of results and balance settings.

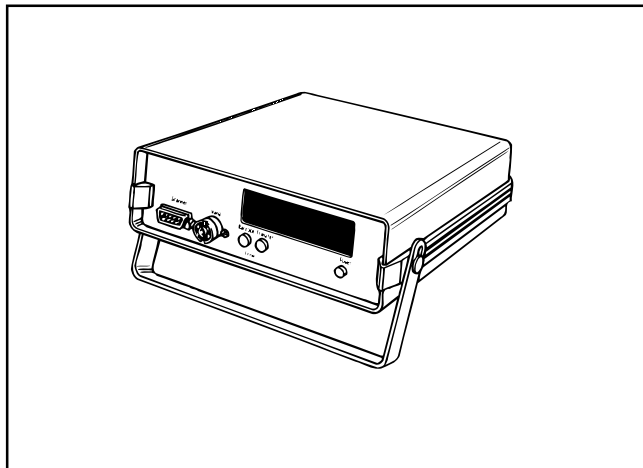
- alphanumeric thermal printer for connection to power supply
- 20 characters per line
- data transmission unidirectional with the METTLER TOLEDO CL interface
- PRT key to trigger the print command
- supplied with power cable, balance connection cable and 1.5 m extension
- additional extension cables in section "Cables and connectors"



GA37 D/A Converter

For the graphical representation of the weight profile as a function of time with the aid of an analog-controlled recorder (e.g. drying profile with the LP16 Dryer),
for the control of analog-controlled pumps in flow control with FlowPac-M,
for the continuous conversion of results and values from the RS232C serial interface of the balance or a computer into a corresponding analog voltage signal.

- RS232 input and output
- analog voltage output, analog current output
- 16-character, alphanumeric display
- power supply (selectable voltage)
- connection cable for Data I/O of the scale is enclosed

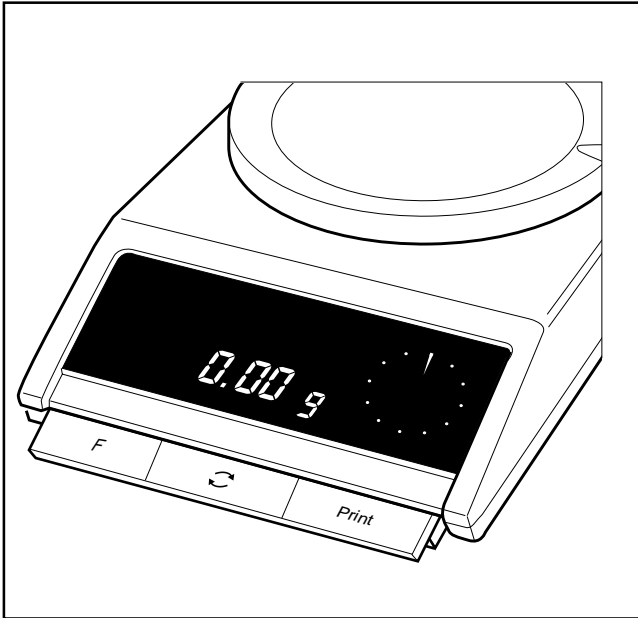


GA50 Peripheral Controller

For the processing and transmission of bar-coded information,
for the simultaneous attachment of a bar code reader or scanner, printer and computer,
for the control of the data flow between the balance and the peripherals.

- 3 connections (RS232C or METTLER TOLEDO CL interfaces), adjustable interface parameters
- active, 16-character, alphanumeric display
- bar code reader or scanner connection
- power supply (selectable voltage)
- various connection cables, see section "Cables and connectors"

GM devices



GM303 Control Unit

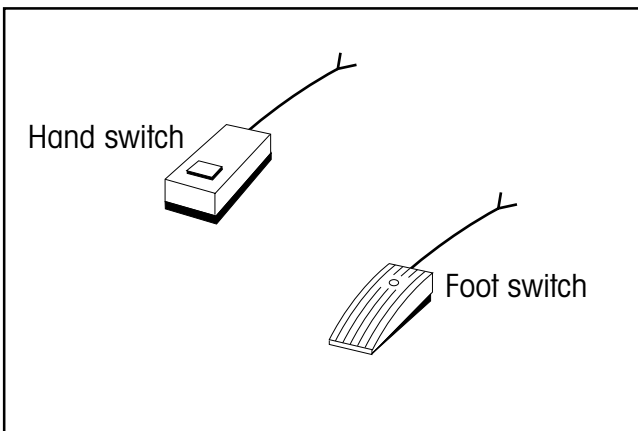
For simpler and faster operation of built-in applications with AM/PM balances up to 6.1 kg, for use with the following applications without separate keypad:

- net total (in combination with NetEasy-M)
- statistics (in combination with StatEasy-M)
- piece counting with variable reference (in combination with CountEasy-M)

- Operation as for SM and PM scales from 11 up to 32 kg
- Simple installation beneath control bar of scale
- Attachment via GM connection with a T-connector

Note

The NetEasy-M, StatEasy-M and CountEasy-M applications can also be used directly (without GM303) with SM scales and high-capacity PM scales.



Hand switch, foot switch

For remote triggering of the print or tare command.

Hand switch

42500

Foot switch

46278

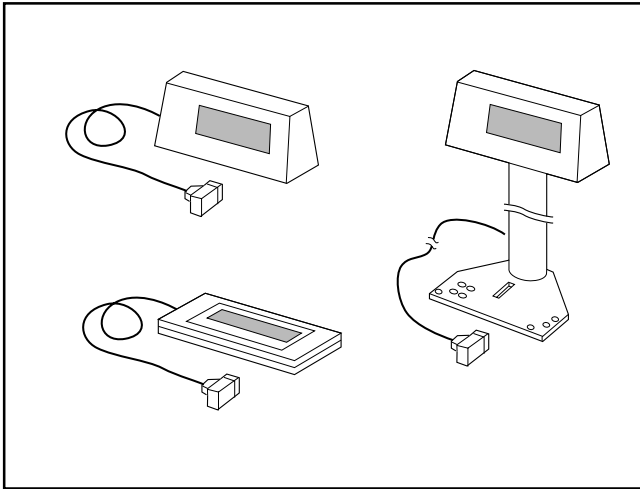
For attachment to the scale, an appropriate adapter cable is required:

Transfer adapter for triggering the print command

47473

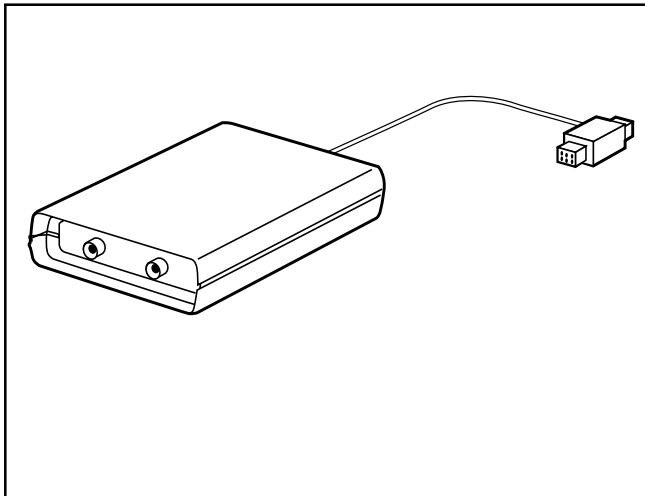
Tare adapter for triggering the tare command

33872



Auxiliary displays

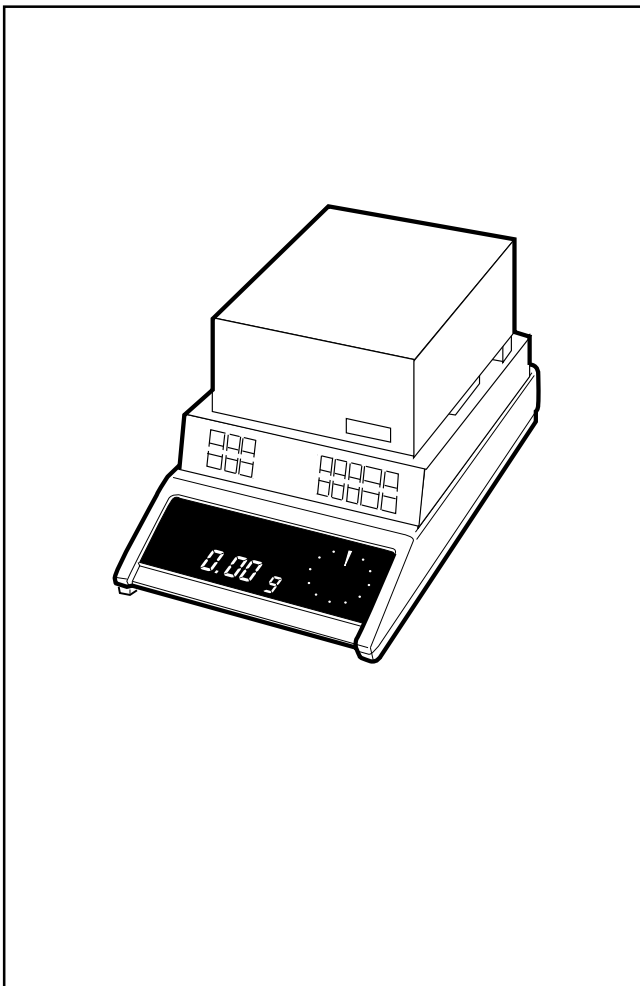
- Auxiliary display with bracket for fastening to wall:
 - GM48-1 with LCD (liquid crystal display)
 - GM49-1 with FD (active fluorescent display)
- Auxiliary display with stand for mounting on balance:
 - GM48-2 with LCD (liquid crystal display)
 - GM49-2 with FD (active fluorescent display)
- Auxiliary display for overhead projection, e.g. for instruction purposes:
 - GM53 with LCD (liquid crystal display)



GM54 Output Module

For the on/off switching of external loads, e.g. relays, valves, low-power motors, indicator lights.

- 8 independent passive digital outputs are controlled
 - directly through the balance software (FlowPac-M, ProPac-M, SQC12 StatPac-M, SQC33, SQC52), or
 - through appropriate commands via the serial interface (see operating instructions "Bidirectional data interface of the PM balances")
- galvanic separation between inputs and outputs
- connection/power supply of the inputs via the GM interface of the balance
- maximum switching voltage of output 36 VDC
- maximum current of load 100 mA



LP16 Infrared Dryer

For the rapid determination of moisture content and dry weight.

- suitable for all PM balances with circular weighing pan, particularly for PM balances with a readability of 1 mg
 - drying temperature adjustable between 50 °C...160 °C in 5° steps
 - drying over a fixed period between 1 and 240 minutes, or
 - drying up to a minimal weight decrease of the sample per time interval
 - evaluation in % or g, as dry weight, moisture content or as ATRO value
 - accuracy dependent on balance and amount of sample used
- power cable and connection cable to balance as well as 80 Al pans included in standard equipment
- data output via CL/RS232C Interface for the automatic recording of the settings, the drying procedure and the final results (e.g. with GA44 Printer or with a recorder via the GA37 D/A Converter)
- power consumption: max. 470 W

LJ 16 Infrared Dryer

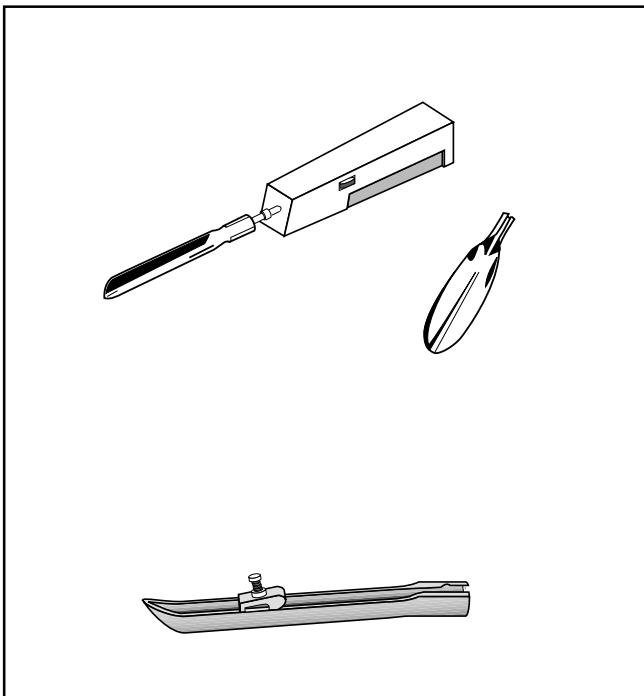
The simple compact instrument for routine work in the lab and in production.

Thermometer Set

13701

For checking the sample temperature.

LV devices

**LV3 Vibrospatula**

For the accurate weighing-in of powders and granules.

- continuously adjustable vibration intensity during weighing-in
- comfortable to hold
- stainless steel spoon
- 4-6 hours line-independent operation with built-in rechargeable battery
- simultaneous operation and charging possible
- battery charger included in standard equipment

Spare battery set

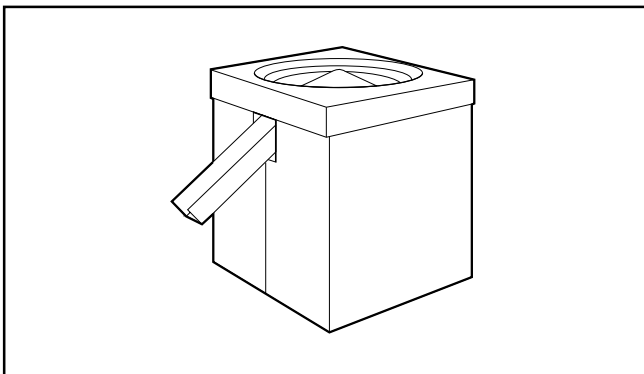
600018

Special spoon

9769

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

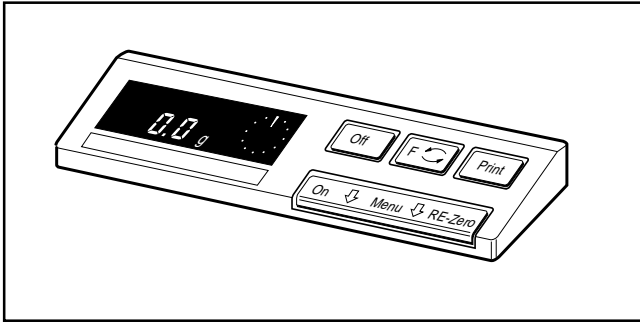
- flow rate adjustable

**LV10 Automatic Feeder**

For the automatic feed of small weighing samples (\emptyset 3 - 33 mm), e.g. of pharmaceutical products or small mechanical parts.

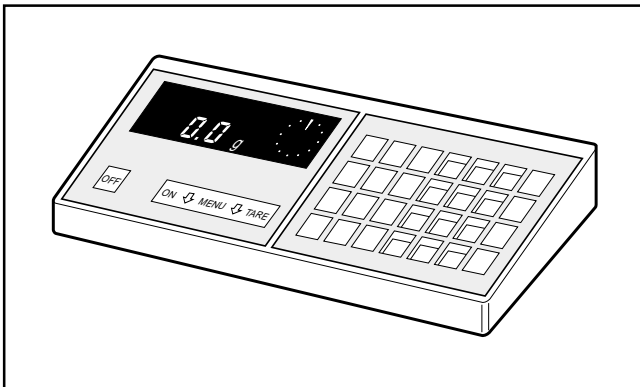
- choice of 4 vibration settings
- particularly suitable in connection with
 - DataPac-M,
 - SQC12 StatPac-M, SQC33, SQC52.

SM terminals and accessories



Base terminals

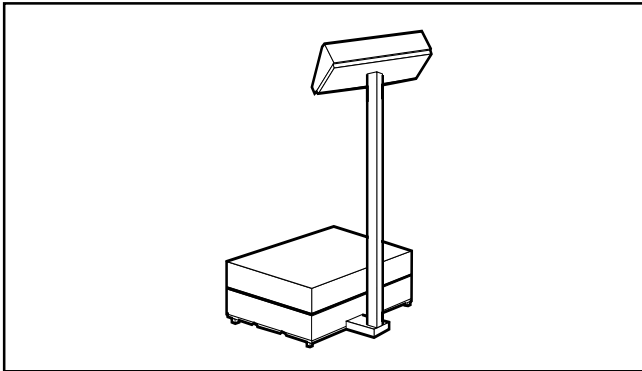
- SM-F Base Terminal
 - with fluorescent display
- SM-L Base Terminal
 - with liquid crystal display



Application terminals

Terminals with built-in Pac keypad for application-oriented use with ProPac-M, CountPac-M, DataPac-M, StatPac-M, XPac-M, LabPac-M, PharmaPac-M, CalcPac-M.

- SM-AF Application Terminal
 - with fluorescent display
- SM-AL Application Terminal
 - with liquid crystal display



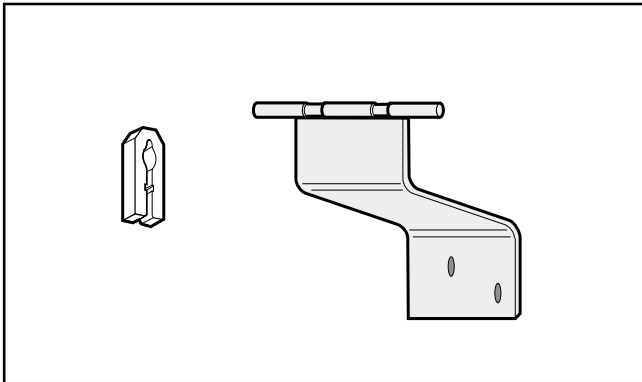
SM-Stand

34290

for stand mounting of the base or application terminal.

Standard equipment:

Stand complete with base, 2 shims, 2 screws



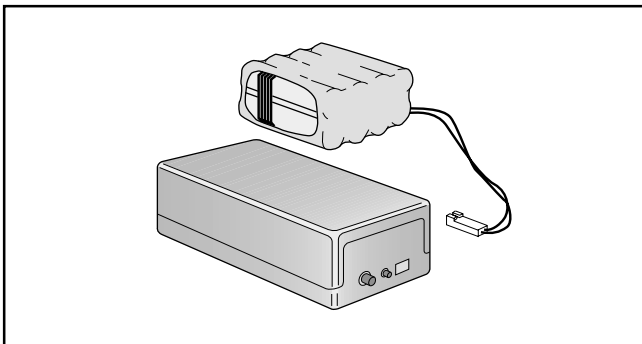
SM-WallMount Kit

34200

for wall mounting of the base or application terminal.

Standard equipment:

Wall fixture, 2 shims, 2 screws, extension cable (33784)



PowerPac-SM

Battery set for SM scales

34374

Battery charger

for PowerPac-SM

34480

Cables and connectors

Key

MM15p	15-pin MiniMettler connector, for Data I/O and GM connection, m = male, f = female	7pf/360 ° 2 x Ø 2 mm f	7-pin DIN connector, female, contacts arranged in a circle, screw cap 2 banana sockets, Ø 2 mm, hole spacing 8 mm
MMT15p	15-pin MiniMettler T-connector, male/female, for Data I/O and GM connection		
SubD25p	25-pin subminiature connector (RS connector), m = male, f = female		Transmission/RS handshake: u = unidirectional b = bidirectional T = unidirectional but transfer command
SubD9p	9-pin subminiature connector (RS connector), m = male, f = female		
5p/240 °	5-pin DIN connector, m = male, f = female, contacts arranged over 240 °		
7p/270 °	7-pin DIN connector, m = male, f = female, contacts arranged over 270 °	All cables are shielded	

Cables for serial data transmission (Data I/O connection of the balance)

Designation	Length/ No. cores	Connector 1	Connector 2	Transmission/ RS Handshake	Order Number	Remarks
-------------	----------------------	-------------	-------------	-------------------------------	--------------	---------

Operation of the Data I/O interface as an RS232C interface

RS232C for IBM/PC	1.5 m/ 4	MM15pm/Data	SubD25pf	b / u	33995	for all PCs with subD25pm connector
RS232C for IBM/AT	1.5 m/ 4	MM15pm/Data	SubD9pf	b / u	33783	for all PCs with subD9pm connector
RS232C for printer	1.5 m/ 4	MM15pm/Data	SubD25pm	b / u	33640	for all printers with subD25pf connector
RS232C for Macintosh	1.5 m/ 5	MM15pm/Data	miniDIN 8pm	b / b	210495	
RS232C for HX-20	1.5 m/ 5	MM15pm/Data	DIN 8pm	b / u	33955	standard with EPSON Kit 59719
RS232C for PX-4 (HX-40)	1.5 m/ 5	MM15pm/Data	miniDIN 8pm	b / u	33982	
RS232C for P-40 Printer	1.5 m/ 3	MM14pm/Data	DIN 6pm	u / u	33688	

Cables and connectors

4.20

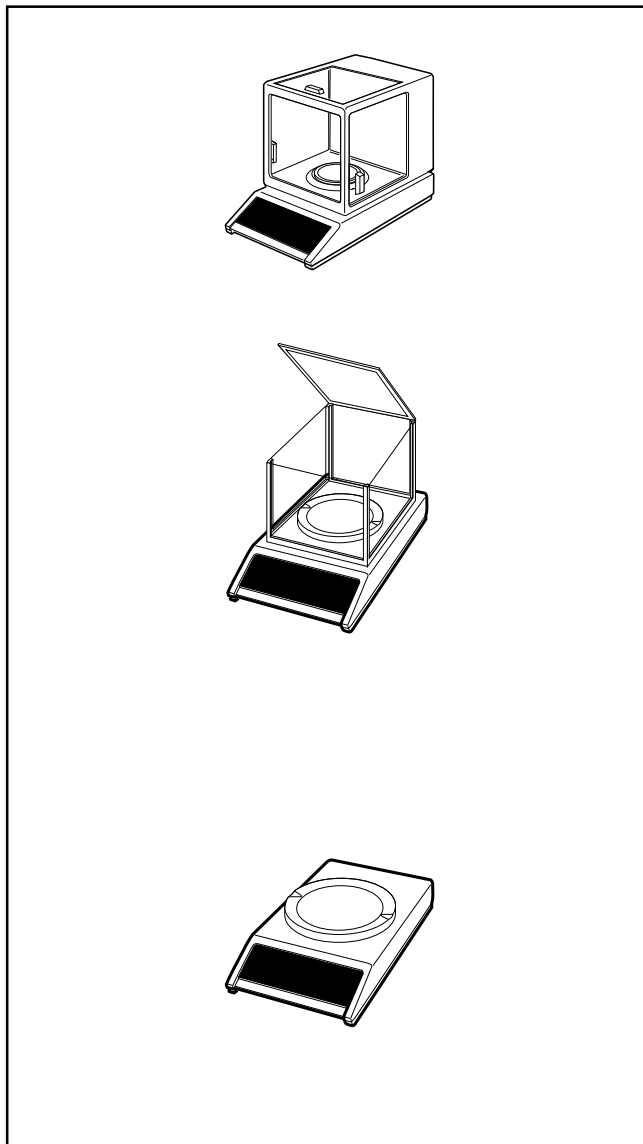
Designation	Length/ No. cores	Connector 1	Connector 2	Transmission/ RS Handshake	Order Number	Remarks
Operation of Data I/O interface as a METTLER TOLEDO CL interface						
CL cable for balance	1.5 m/ 4	MM15pm/Data	5pm/240°	b / -	47936	also suitable for GA50
CL extension	0.5 m/ 4	5pf/240°	5pm/240°	b / -	42554	
CL extension	1.0 m/ 4	5pf/240°	5pm/240°	b / -	42560	standard with CL310
CL extension	2.0 m/ 4	5pf/240°	5pm/240°	b / -	42555	standard with CL240, CL241
CL extension	5.0 m/ 4	5pf/240°	5pm/240°	b / -	42556	
CL extension	15.0 m/ 4	5pf/240°	5pm/240°	b / -	42557	
CL extension	30.0 m/ 4	5pf/240°	5pm/240°	b / -	42558	
GA44 cable for balance	1.5 m/ 4	MM15pm/Data	7pf/270°	T / -	47926	standard with GA44
GA44 extension	0.5 m/ 4	7pf/270°	7pm/270°	T / -	42559	
GA44 extension	1.5 m/ 4	7pf/270°	7pm/270°	T / -	42561	standard with GA44
GA44 extension	5.0 m/ 4	7pf/270°	7pm/270°	T / -	42562	
GA44 extension	15.0 m/ 4	7pf/270°	7pm/270°	T / -	42563	
LP16 data cable	0.3 m/ 4	MM15pm/Data	5pm/240°	b / -	13969	standard with LP16 and LJ16
Data cable for KD10	1.5 m/ 4	MM15pm/Data	7pf/360°	b / -	503752	
Additional cables for Data I/O						
Data I/O extension	2.0 m/15	MM15pm/Data	MM15pf/Data	b / b	216151	for the extension of all connections at the Data I/O output (CL and RS232C) of the AM/PM/SM balances and scales for DL18, DL21, DL25
Data I/O extension	15.0 m/15	MM15pm/Data	MM15pf/Data	b / b	216152	
Data I/O extension	10.0 m/15	MM15pm/Data	MM15pf/Data	b / b	216153	
Connection cable	1,5 m/15	MM15pm/Data	7pf/270°	b / b	23618	

Designation	Length/ No. cores	Connector 1	Connector 2	Transmission/ RS Handshake	Order Number	Remarks
Cables for the attachment of a reference balance for exact piece counting						
AE as ref. for PM/SM	1.5 m/ 2	SubD25pm	MMT15p/Data	u / -	33956	Data flow SubD25-pin to MMT15p
AM/PM as ref. for PM/SM	1.5 m/ 2	MM15pm/Data	MMT15p/Data	u / -	33868	Data flow MM15pm to MMT15p
AM/PM/SM as ref. for MMR2.7	m/ 4	MM15pm/Data	special/10pm	b / -	504123	set with cable and software (ID/NetPac-M) also for the attachment of AM/PM/SM balances and scales to an ID terminal
Cable extensions for the connections at the GM output						
GM extension	1.5 m/ 4	MM15pm/GM	MM15pf/GM	- / -	33784	
GM extension	1.5 m/ 4	MMT15p/GM	MM15pf/GM	- / -	33959	
Cables for hand and foot switches						
Transfer cable	0.3 m/ 2	MMT15p/Data	2x Ø 2mm f	- / -	47473	button for triggering the print command
Tare cable	0.3 m/ 2	MMT15p/GM	2x Ø 2mm f	- / -	33872	button for external taring
Loose cables and connectors						
Computer cable	14-pin, twisted pairs, shielded (min. 100 m)				88156	
CL connector	15-pin, female, 240° (5 pcs)				89005	
CL connector	15-pin, male, 240° (5 pcs)				89011	
MiniMettler	15-pin, male, Data I/O, for soldering				33930	
System connector for SM scales (for startup via the serial interface)					34490	

5. Technical data

	Page
• Overview of the AM/PM/SM balance and scale families	5.2
• Technical data for individual models	5.4
• General technical data	5.8
• Standard equipment	5.9
• Weighing ranges in secondary units	5.10
• Decimal places in secondary units	5.11
• Dimension diagrams	5.12

Overview of the AM/PM/SM balance and scale families



Analytical balances with readability 0.1 mg

AM50	Weighing capacity:	51 g
AM100	Weighing capacity:	110 g

Comparator with readability 1 mg

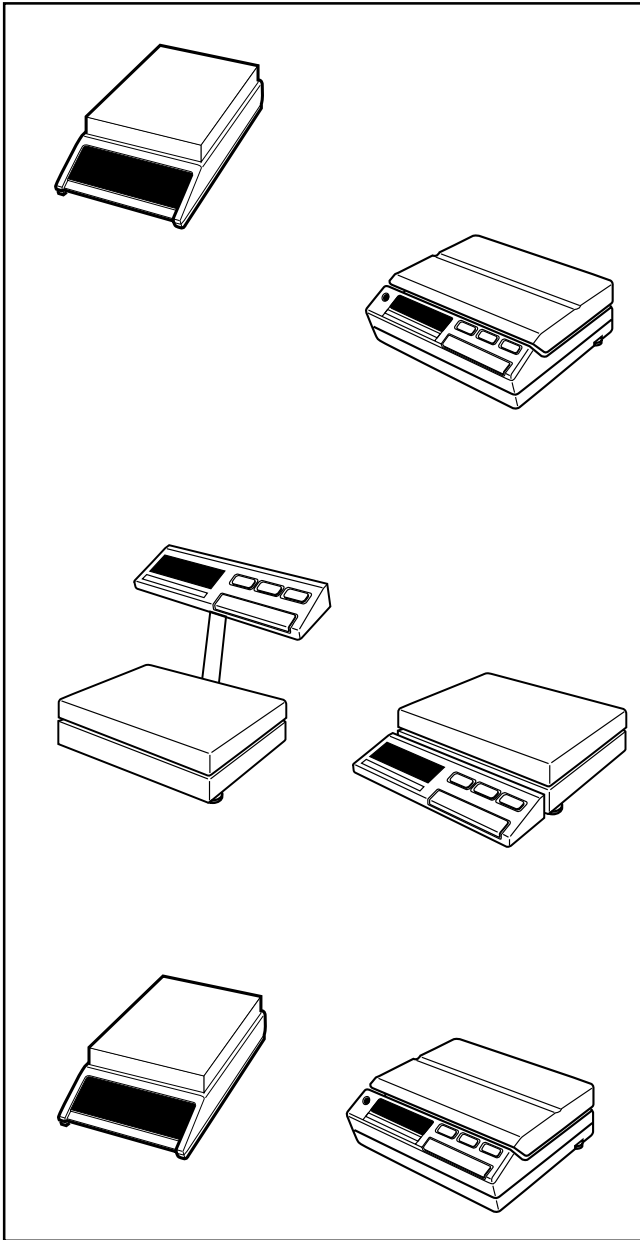
PM5003	Weighing capacity:	5100 g
--------	--------------------	--------

Precision balances with readability 1 mg (10 mg)

PM100	Weighing capacity:	110 g	
PM200	Weighing capacity:	210 g	
PM400	Weighing capacity:	410 g	
PM1200	Weighing capacity:	1200 g	
PM480 DeltaRange	Fine range:	80 g	(Coarse range: 410 g)
PM2500 DeltaRange	Fine range:	500 g	(Coarse range: 2100 g)

Precision balances or scales with readability 10 mg (0.1 g)

PM300	Weighing capacity:	310 g	
PM600	Weighing capacity:	610 g	
PM2000	Weighing capacity:	2100 g	
PM4000	Weighing capacity:	4100 g	
PM6100	Weighing capacity:	6100 g	
PM4800 DeltaRange	Fine range:	800 g	(Coarse range: 4100 g)



Precision scales with readability 0.1 g (1 g)

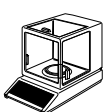

PM3000	Weighing capacity:	3.1 kg	
PM6000	Weighing capacity:	6.1 kg	
PM11-K, PM11-N	Weighing capacity:	11.0 kg	
PM16-K, PM16-N	Weighing capacity:	16.0 kg	
PM30000-K	Weighing capacity:	32.0 kg	
PM34-K DeltaRange	Fine range:	4.0 kg	(Coarse range: 32.0 kg)
PM34-N DeltaRange	Fine range:	4.0 kg	(Coarse range: 32.0 kg)

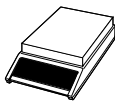
SM3000	Weighing capacity:	3.1 kg	
SM6000	Weighing capacity:	6.1 kg	
SM15000	Weighing capacity:	15.0 kg	
SM1520 DeltaRange	Fine range:	2.0 kg	(Coarse range: 15.0 kg)

SM scales are also available in an intrinsically-safe version. Ask your METTLER TOLEDO dealer.

Precision scales with readability 1 g

PM6	Weighing capacity:	6.1 kg
PM15-K, PM15-N	Weighing capacity:	16.0 kg
PM30-K, PM30-N	Weighing capacity:	32.0 kg

Technical data for individual models											
			AM50	AM100	PM100	PM200	PM400	PM1200	PM5003 Comparator	PM480 DeltaRange	PM2500 DeltaRange
Readability			0.1 mg	0.1 mg	0.001 g	0.001 g	0.001 g	0.001 g	0.001 g	0.01 g	0.01 g
- Fine range (recallable)			-	-	-	-	-	-	-	0.001 g	0.001 g
Weighing capacity			51 g	110 g	110 g	210 g	410 g	1200 g	5100 g	410 g	2100 g
- Fine range (recallable)			-	-	-	-	-	-	-	80 g	500 g
Taring range (by subtraction)			51 g	110 g	110 g	210 g	410 g	1200 g	5100 g	410 g	2100 g
Reproducibility (s)			0.1 mg	0.1 mg	0.5 mg	0.5 mg	0.001 g	0.001 g	0.0015 g	0.003 g	0.003 g
- Fine range			-	-	-	-	-	-	-	0.001 g	0.001 g
Linearity			± 0.2 mg	± 0.2 mg	± 0.002 g	± 0.002 g	± 0.002 g	± 0.002 g	± 0.01 g	± 0.005 g	± 0.005 g
- Fine range			-	-	-	-	-	-	-	± 0.002 g	± 0.002 g
Sensitivity drift / °C (10 ... 30 °C)			2 x 10 ⁻⁶	2 x 10 ⁻⁶	4 x 10 ⁻⁶	4 x 10 ⁻⁶	3 x 10 ⁻⁶	1.5 x 10 ⁻⁶	2 x 10 ⁻⁶	4 x 10 ⁻⁶	1.5 x 10 ⁻⁶
Stabilization time ¹⁾			2.5/4/6 s	2.5/4/6 s	1.5/2/3 s	1.5/2/3 s	1.5/2/3 s	2.5/4/6 s	9/12/15 s	1.5/2/3 s	2.5/4/6 s
Update speed			0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s
Display ²⁾			FD	FD	FD	FD	FD	LCD	LCD	FD	LCD
Result deviation											
in inclined position (1:1000)			0.5 mg	0.5 mg	0.005 g	0.005 g	0.005 g	0.005 g	0.02 g	0.005 g	0.005 g
Weighing pan			Ø 80 mm	Ø 80 mm	Ø 130 mm	Ø 130 mm	Ø 130 mm	Ø 130 mm	Ø 130 mm	Ø 130 mm	Ø 130 mm
Calibration weight ³⁾			50 g/E2	100 g/E2	100 g/F1	100 g/F1	200 g/F1	1000 g/E2	5000 g/E2	100 g/F1	1000 g/F1
Net weight			6.0 kg	6.6 kg	3.8 kg	3.8 kg	3.8kg	3.8 kg	6.6 kg	3.8 kg	3.8 kg
Balance housing (W x D x H) in mm			194 x 316 x 252	194 x 316 x 337	194 x 316 x 68	_____			194 x 316 x 337	194 x 316 x 68	_____
Power consumption			6 VA	_____							
Fusing			63 mA/220 V	_____							
			125 mA/110 V	_____							



	PM300	PM600	PM2000	PM4000	PM6100	PM4800	PM3000	PM6000	PM6	
Readability	0.01 g	0.01 g	0.01 g	0.01 g	0.01 g	0.1 g	0.1 g	0.1 g	1 g	
- Fine range (recallable)	-	-	-	-	-	0.01 g	-	-	-	
Weighing capacity	310 g	610 g	2100 g	4100 g	6100 g	4100 g	3100 g	6100 g	6100 g	
- Fine range (recallable)	-	-	-	-	-	800 g	-	-	-	
Taring range (by subtraction)	310 g	610 g	2100 g	4100 g	6100 g	4100 g	3100 g	6100 g	6100 g	
Reproducibility (s)	0.003 g	0.005 g	0.005 g	0.01 g	0.01 g	0.03 g	0.03 g	0.05 g	0.3 g	
- Fine range	-	-	-	-	-	0.01 g	-	-	-	
Linearity	± 0.01 g	± 0.01 g	± 0.02 g	± 0.02 g	± 0.02 g	± 0.05 g	± 0.1 g	± 0.1 g	± 1 g	
- Fine range	-	-	-	-	-	± 0.02 g	-	-	-	
Sensitivity drift / °C (10 ... 30 °C)	4 x 10 ⁻⁶	6 x 10 ⁻⁶	4 x 10 ⁻⁶	3 x 10 ⁻⁶	3 x 10 ⁻⁶	4 x 10 ⁻⁶	4 x 10 ⁻⁶	6 x 10 ⁻⁶	6 x 10 ⁻⁶	
Stabilization time ¹⁾	1/1.5/2.5 s	1.5/2/3 s	1.5/2/3 s	1.5/2/3 s	2.5/4/6 s	1.5/2/3 s	1/1.5/2.5 s	1/1.5/2.5 s	1/1.5/2.5 s	
Update speed	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	
Display ²⁾	FD	FD	FD	FD	FD	FD	FD	FD	FD	
Result deviation										
in inclined position (1:1000)	0.01 g	0.05 g	0.05 g	0.05 g	0.05 g	0.05 g	0.5 g	0.5 g	1 g	
Weighing pan	Ø 130 mm	Ø 150 mm	Ø 150 mm	Ø 170 mm	Ø 150 mm	Ø 170 mm	182 x 228	182 x 228	182 x 228	
Calibration weight Class F1 ³⁾	100 g	500 g	1000 g	2000 g	2 x 2000 g	1000 g	1000 g	2000 g	2000 g	
Net weight	3.8 kg	3.8 kg	3.8 kg	3.8 kg	3.8 kg	3.8 kg	4.2 kg	4.2 kg	4.2 kg	
Balance housing (W x D x H) in mm	194 x 316 x 68									
Power consumption	6 VA									
Fusing	63 mA/220 V									
	125 mA/110 V									

¹⁾ dependent on the setting of the vibration adapter 

²⁾ FD Fluorescent display, self-luminous

LCD Liquid crystal display, passive

³⁾ for noncertified version

Technical data for individual models


5.6



	PM11-K PM11-N	PM16-K PM16-N	PM30000-K	PM34-K DeltaRange PM34-N DeltaRange	PM15-K PM15-N	PM30-K PM30-N
Readability	0.1 g	0.1 g	0.1 g	1 g	1 g	1 g
- Fine range (recallable)	-	-	-	0.1 g	-	-
Weighing capacity	11000 g	16000 g	32000 g	32000 g	16000 g	32000 g
- Fine range (recallable)	-	-	-	4000 g	-	-
Taring range (by subtraction)	11000 g	16000 g	32000 g	32000 g	16000 g	32000 g
Reproducibility (s)	0.05 g	0.05 g	0.1 g	0.3 g	0.3 g	0.3 g
- Fine range	-	-	-	0.1 g	-	-
Linearity	± 0.2 g	± 0.2 g	± 0.2 g	± 0.5 g	± 0.5 g	± 0.5 g
- Fine range	-	-	-	± 0.2 g	-	-
Sensitivity drift / °C (10 ... 30 °C)	6 x 10 ⁻⁶	4 x 10 ⁻⁶	4 x 10 ⁻⁶	4 x 10 ⁻⁶	4 x 10 ⁻⁶	4 x 10 ⁻⁶
Stabilization time ¹⁾	1.5/2/3 s	1.5/2/3 s	1.5/2/3 s	1.5/2/3 s	1/1.5/2.5 s	1/1.5/2.5 s
Update speed	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s	0.13 s
Display ²⁾	FD	FD	FD	FD	FD	FD
Result deviation						
in inclined position (1:1000)	0.3 g	0.3 g	0.3 g	0.3 g	0.3 g	0.3 g
Weighing platform (W x L) in mm	245 x 350	245 x 350	245 x 350	245 x 350	245 x 350	245 x 350
Calibration weight with PM...-K	incorporated	incorporated	incorporated	incorporated	incorporated	incorporated
Calibration weight Class F1 ³⁾ for PM...-N	2 x 2000 g	2 x 2000 g	-	2 x 2000 g	2 x 2000 g	2 x 2000 g
Net weight	12.5 kg	12.5 kg	12.5 kg	12.5 kg	12.5 kg	12.5 kg
Scale housing (W x D x H) in mm	360 x 330 x 130					
Power consumption	8 VA					
Fusing	200 mA/220 V					
	125 mA/110 V					



	SM3000	SM6000	SM15000	SM1520 DeltaRange
Readability	0.1 g	0.1 g	0.1 g	1 g
- Fine range (recallable)	-	-	-	0.1 g
Weighing capacity	3100 g	6100 g	15000 g	15000 g
- Fine range (recallable)	-	-	-	2000 g
Taring range (by subtraction)	3100 g	6100 g	15000 g	15000 g
Reproducibility (s)	0.05 g	0.05 g	0.1 g	0.3 g
- Fine range	-	-	-	0.1 g
Linearity	± 0.1 g	± 0.1 g	± 0.2 g	± 1 g
- Fine range	-	-	-	± 0.2 g
Sensitivity drift / °C (10 ... 30 °C)	8 x 10 ⁻⁶	8 x 10 ⁻⁶	6 x 10 ⁻⁶	6 x 10 ⁻⁶
Stabilization time ¹⁾	1/1.5/2.5 s	1/1.5/2.5 s	1.5/2/3 s	1.5/2/3 s
Update speed	0.13 s	0.13 s	0.13 s	0.13 s
Display ²⁾	FD/LCD	FD/LCD	FD/LCD	FD/LCD
Result deviation				
in inclined position (1:1000)	0.5 g	0.5 g	0.5 g	1 g
Weighing platform (W x L) in mm	322 x 232	322 x 232	322 x 232	322 x 232
Calibration weight Class F1 ³⁾	1000 g	2000 g	2 x 2000 g	2 x 2000 g
Net weight	8 kg			
Scale housing (W x D x H) in mm ⁴⁾	328 x 350 x 85			
Power consumption	9 VA			



¹⁾ dependent on the setting of the vibration adapter 

²⁾ FD Fluorescent display, self-luminous: SM-F
LCD Liquid crystal display, passive: SM-L

³⁾ for noncertified version

⁴⁾ incl. base terminal

General technical data

Basic unit of balance/scale, selectable ¹⁾	g, kg, lb, oz, ozt, tl, GN, dwt, ct, C.M., k
Switchable 2 nd unit ¹⁾	g, kg, lb, oz, ozt, tl, GN, dwt, ct, C.M., k
Applications, selectable	piece counting, +/- or % weighing, animal weighing
Digital display	7 digits
DeltaTrac ²⁾	60 segments
Power supply AM and PM balances up to 6.1 kg	voltage selectable: 115/230 V, +15/-20 %, 50/60 Hz
Power supply high-capacity PM scales	100/115/200/230 V, +15/-20 %, 50/60 Hz
Power connection SM	voltage selectable: 115/230 V, ±15 %, 50/60 Hz supply via AC adapter: 11 VDC/0.1 A battery operation: duration 8 h; charge time 16 h
Vibration adapter 	choice of 3 settings, optical display
Weighing process adapter 	choice of 4 settings, optical display
Stability detector ^o	choice of 4 settings, optical display
Data interface	bidirectional RS232C/CL passive 20 mA
• Baud rate	110...9600 baud
• Parity	even, odd, mark, space
• Transmission	asynchronous 7-bit ASCII
• Plug-in connection	15-pin MiniMettler socket
• METTLER TOLEDO GM interface	15-pin MiniMettler for connection of peripherals
Admissible ambient conditions	
• Temperature	0 °C...40 °C
• Relative humidity	15 %...85 %
• Height below/above sea level	-300 m...+600 m
• Vibration	0.3 m/s ²
• Degree of protection (following IEC 529)	IP 54

SM scales are also available in an intrinsically-safe version. Ask your METTLER TOLEDO dealer.

¹⁾ see decimal places for secondary units

²⁾ dynamic graphic indicator and dispensing aid

Standard equipment

	AM50 AM100 PM5003 ³⁾	PM100 PM200 PM400 PM480 PM1200 ¹⁾ PM2500 ¹⁾	PM300 PM600 PM2000 PM4000 PM4800 PM6100 ¹⁾	PM3000 PM6000 PM6	PM11-N PM15-N PM16-N PM30-K PM34-K PM30000-K	SM1520 SM3000 SM6000 SM15000
Molded in-use cover	✓	✓	✓	✓	✓	-
Retainer ring for molded in-use cover	-	-	✓	-	-	-
Molded in-use cover for weighing platform	-	-	-	-	-	✓
In-use cover for terminal	-	-	-	-	-	✓
All-purpose draft shield	-	✓	-	-	-	-
Glass draft shield ²⁾	✓	-	-	-	-	-
Power cable (to national codes)	✓	✓	✓	✓	✓	AC adapter
Spare power fuse	✓	✓	✓	✓	✓	-
Screwdriver	✓	✓	✓	✓	✓	✓
Hanger	-	✓	✓	✓	41622	34592
Leveling screws and level	✓	✓	✓	✓	✓	✓
Data interface RS232C and CL	✓	✓	✓	✓	✓	✓
METTLER TOLEDO GM interface	✓	✓	✓	✓	✓	✓
Calibration weight (OIML E2)	✓	-	-	-	-	-

¹⁾ no hanger possible

²⁾ AM50: shallow

AM100: deep

PM5003: deep

³⁾ without calibration weight

Weighing ranges in secondary units

5.10

Weighing ranges in secondary units

		AM50	AM100 PM100	PM200	PM300	PM400 PM480	PM480 (fine)	PM600	PM1200	PM2000 PM2500	PM2500 (fine)	PM5003	PM3000
Range in	g	51	110	210	310	410	80	610	1200	2100	500	5100	3100
	lb	-	0.243	0.463	0.683	0.904	0.177	1.345	2.645	4.630	1.103	11.243	6.834
	oz	1.80	3.88	7.41	10.93	14.49	2.827	21.51	42.33	74.07	17.63	179.90	109.35
	ozt	1.640	3.536	6.752	9.97	13.18	2.573	19.61	38.58	67.51	16.07	163.97	99.67
	tl	1.360	2.938	5.609	8.28	10.95	2.137	16.29	32.05	56.09	13.35	136.17	82.80
	GN	787	1'697	3'240	4'784	6'327	1233	9'413	18'518	32'407	7'713	78'704	47'840
	dwt	32.80	70.73	135.0	199.3	263.6	51.44	392.2	771.6	1'350	321.5	3'279	1'993
	ct / k / C.M.	255	550	1'050	1'550	2'050	400	3'050	6'000	10'500	2'500	25'500	15'500

		PM4000 PM4800	PM4800 (fine)	PM6000 PM6100 PM6	PM11-N	PM15-N PM16-N	PM30-K PM34-K PM30000-K	PM34-K (fine)	SM3000	SM6000	SM15000 SM1520	SM1520 (fine)
Range in	g	4100	800	6100	11000	16000	32000	4000	3100	6100	15000	2000
	lb	9.039	1.764	13.45	24.25	35.27	70.54	8.818	6.834	13.45	33.01	4.41
	oz	144.6	28.27	215.1	388.0	564.4	1129	141.1	109.35	215.1	529.1	70.6
	ozt	131.8	25.73	196.1	353.6	514.4	1029	128.6	99.67	196.1	482.2	64.30
	tl	109.5	21.37	162.9	293.8	427.3	855	106.8	82.80	162.9	400.6	53.42
	GN	63'27	12'342	94'137	-	-	-	-	-	-	-	-
	dwt	2'636	514.4	3'922	7'073	10'288	20'576	2'572	1'993	3'922	9'645	1'285
	ct / k / C.M.	20'500	4'000	30'500	55'000	80'000	160'000	20'000	15'500	30'500	75'000	10'000

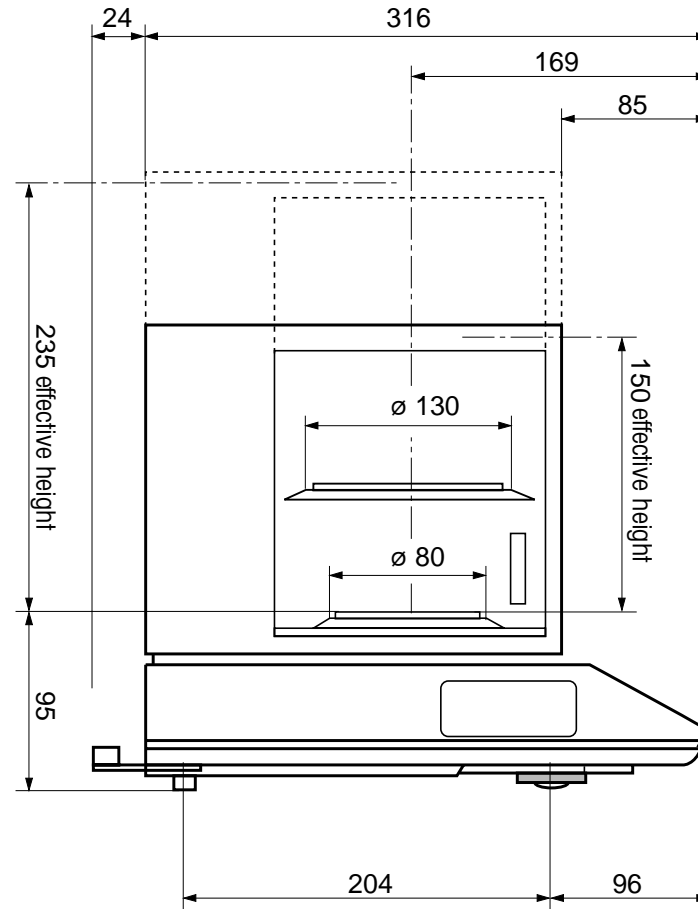
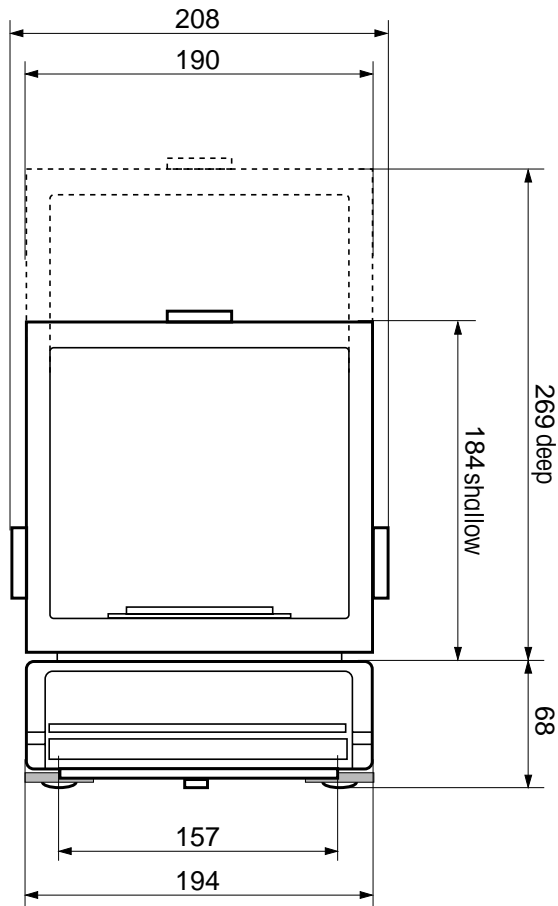
Decimal places in secondary units

	AM50 AM100	PM100 PM200 PM400 PM480 ¹⁾ PM1200 PM2500 ¹⁾ PM5003	PM300 PM600 PM2000 PM4000 PM4800 ¹⁾ PM6100	PM3000 PM6000 PM11-N PM16-N PM34-K ¹⁾ PM30000-K	PM6 PM15-N PM30-K	SM15000 SM1520 ¹⁾ SM3000 SM6000
g / dwt	0.0000	0.000	0.00	0.0	0.	0.0
kg	not settable	not settable	0.00000	0.0000	0.000	0.0000
lb	not settable	0.00000	0.0000	0.000	0.00	0.000
oz / ozt / tl	0.00000	0.0000	0.000	0.00	0.0	0.00
GN	0.00	0.0	0.	not settable	not settable	not settable
ct / k / C.M.	0.000	0.00	0.0	0.	not settable	0.

¹⁾ one decimal place less in coarse range

Dimension diagrams

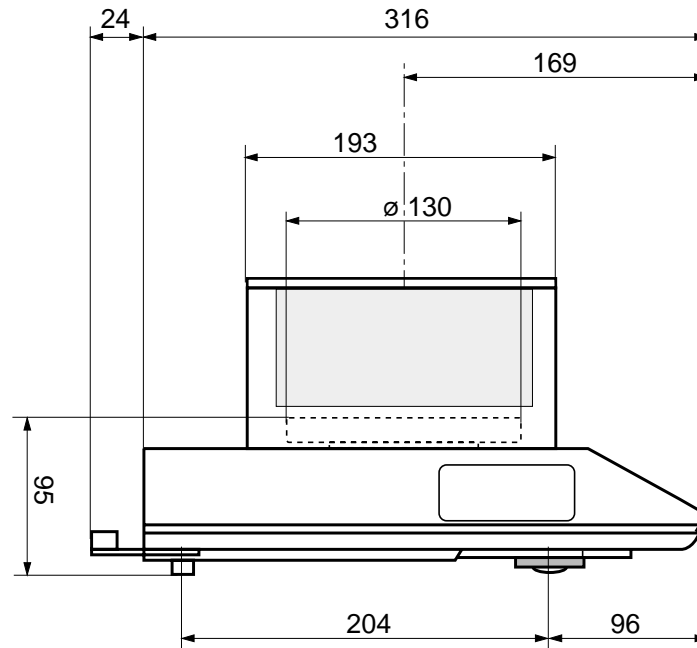
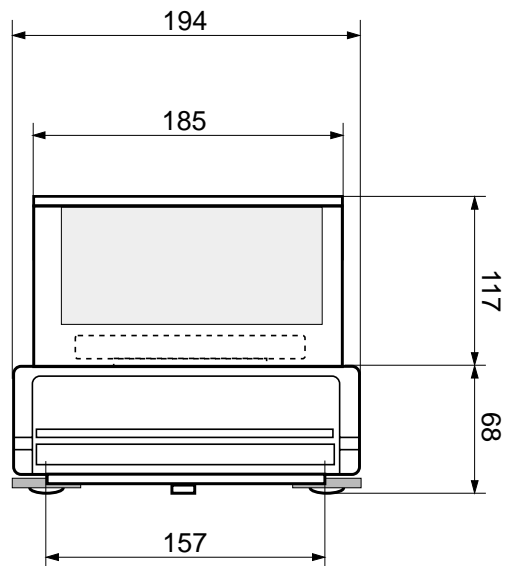
AM50, AM100, PM5003 with shallow or deep glass draft shield



PM5003

AM50, AM100

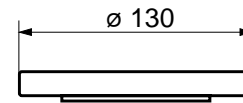
PM100, PM200, PM400, PM480, PM1200, PM2500



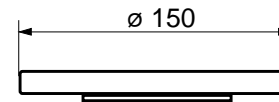
Dimension diagrams

5.14

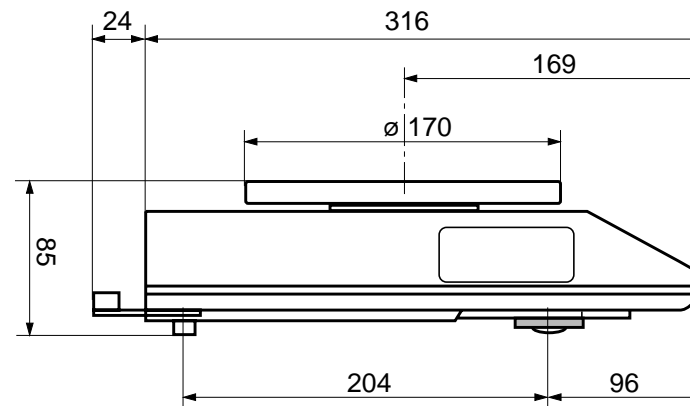
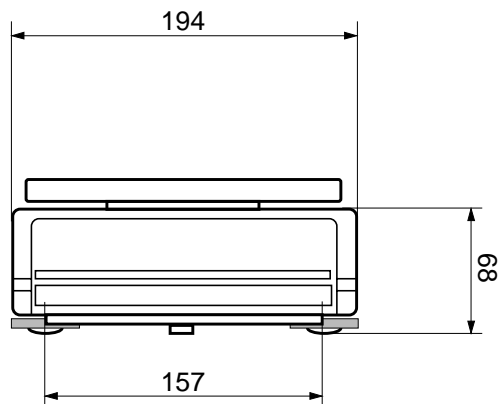
PM300, PM600, PM2000, PM4000, PM4800, PM6100



PM300

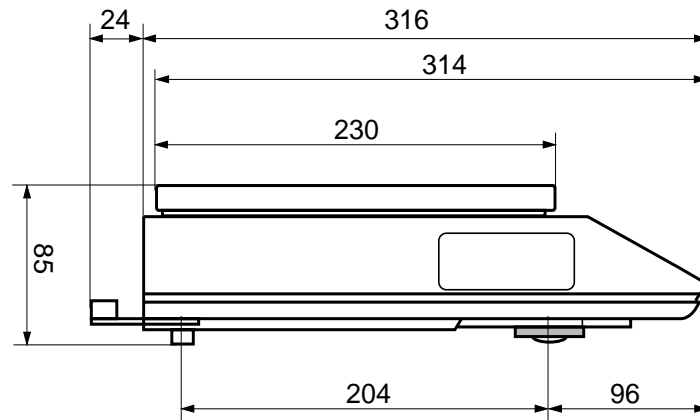
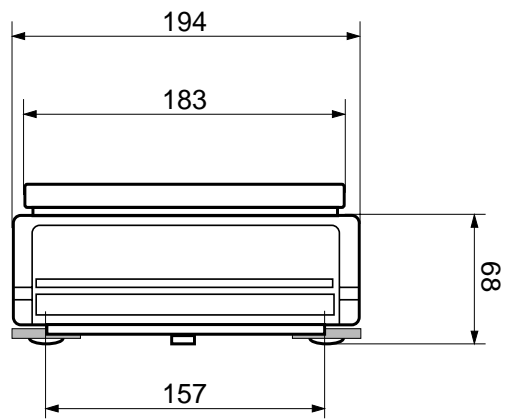


PM600, PM2000, PM6100



PM4000, PM4800

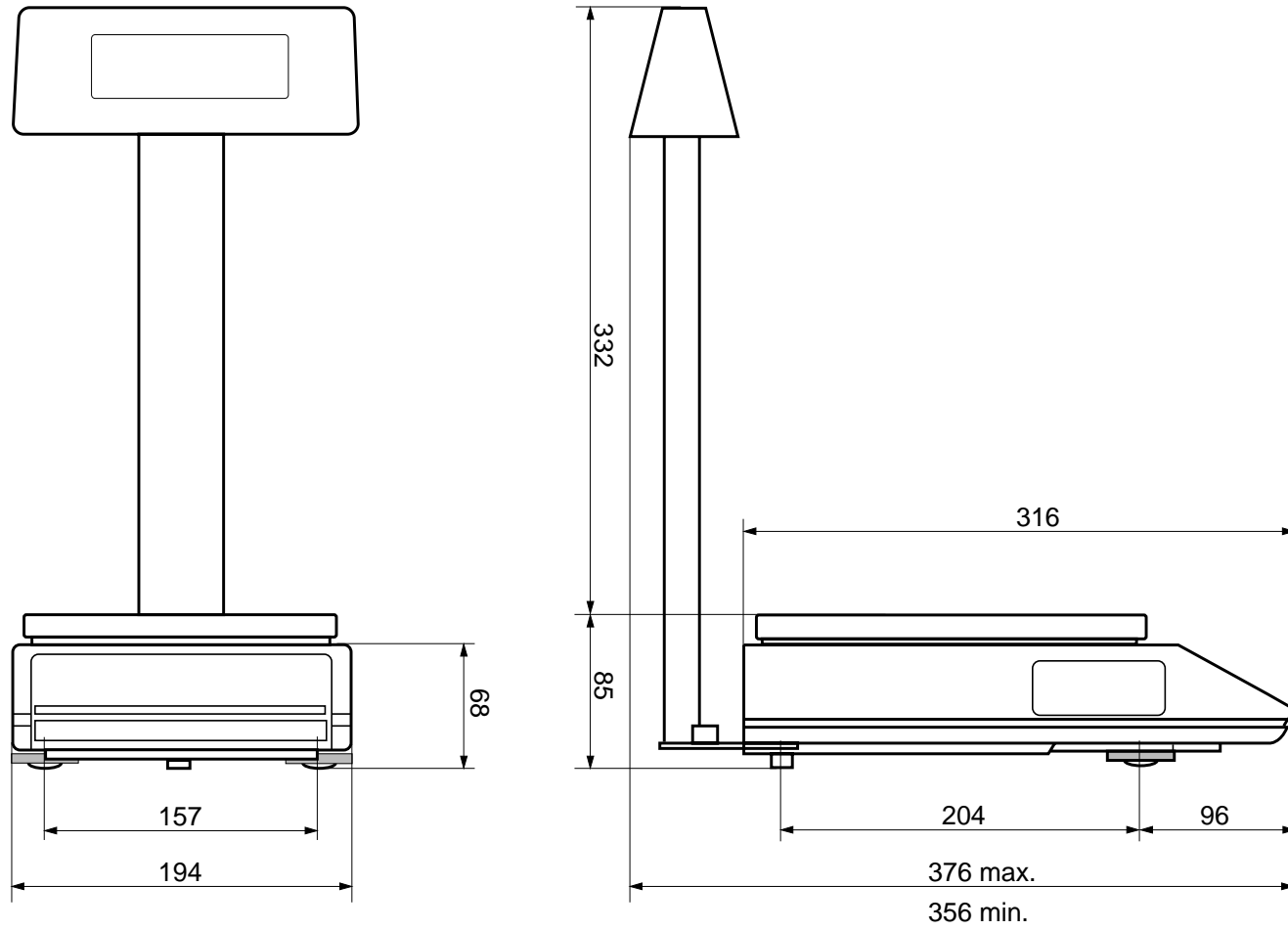
PM3000, PM6000, PM6



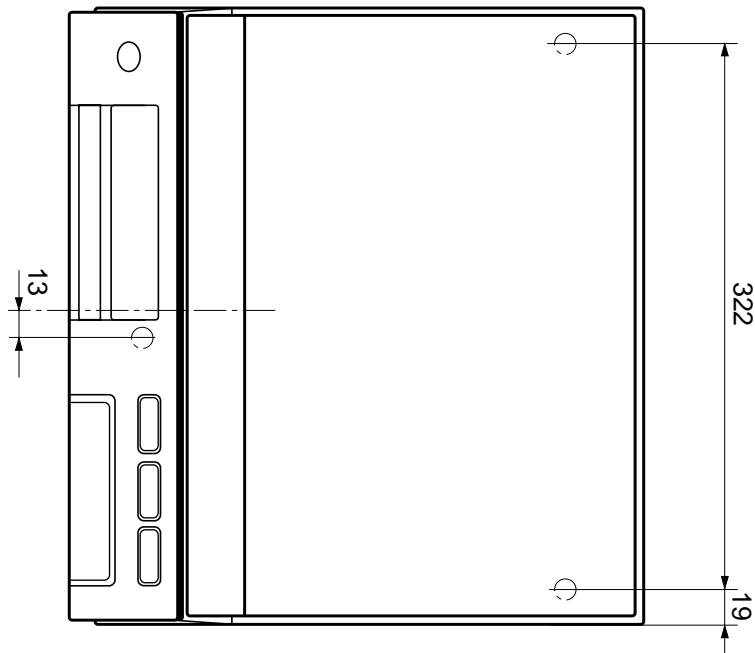
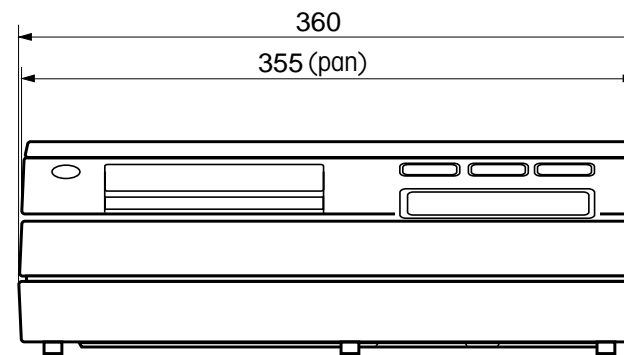
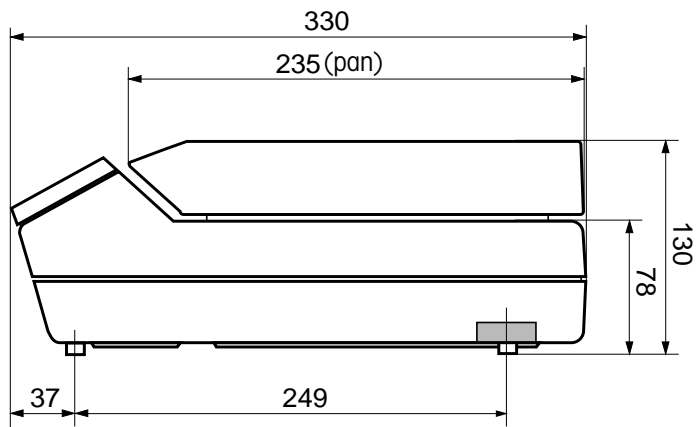
Dimension diagrams

5.16

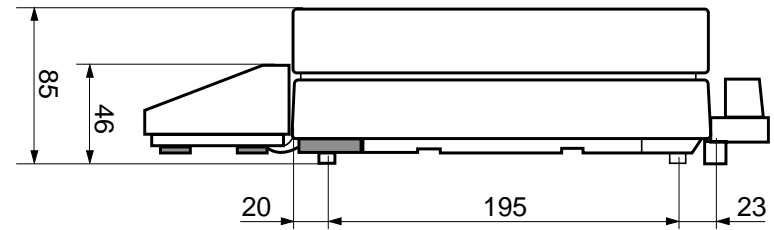
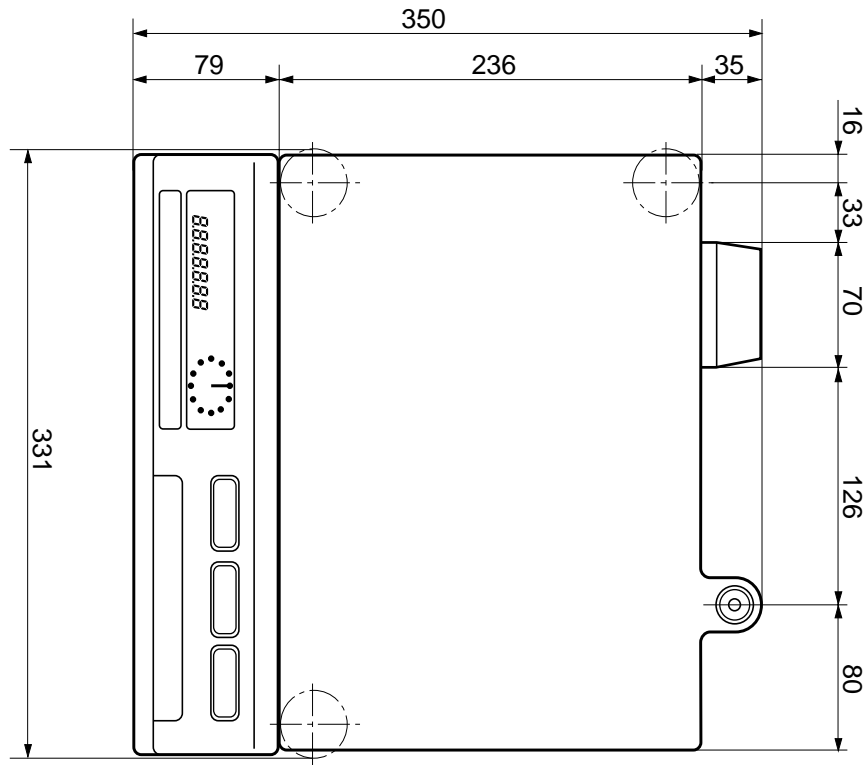
PM balances and scales up to 6.1 kg with auxiliary display and stand



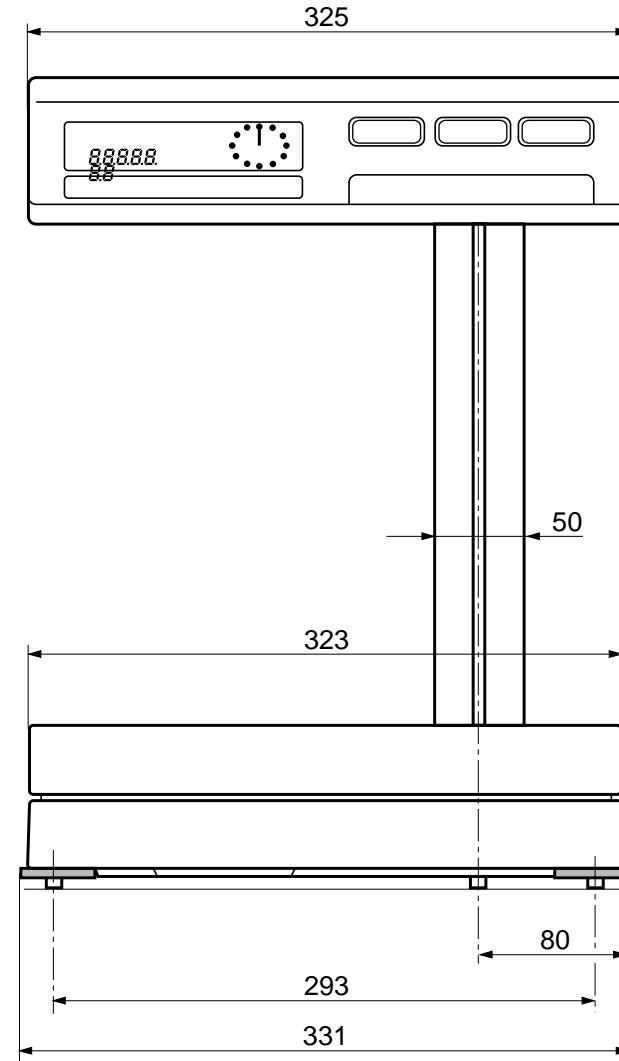
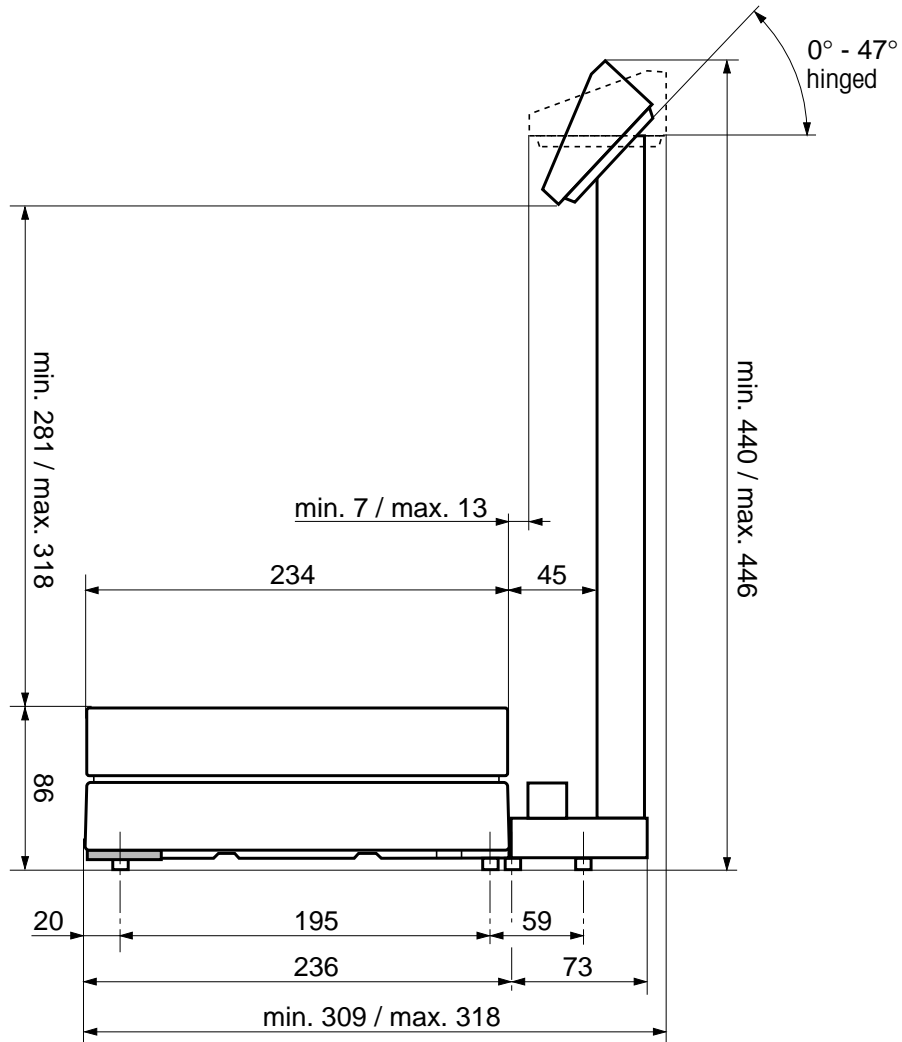
PM11-N, PM15-N, PM16-N, PM30-K, PM30000-K, PM34-K



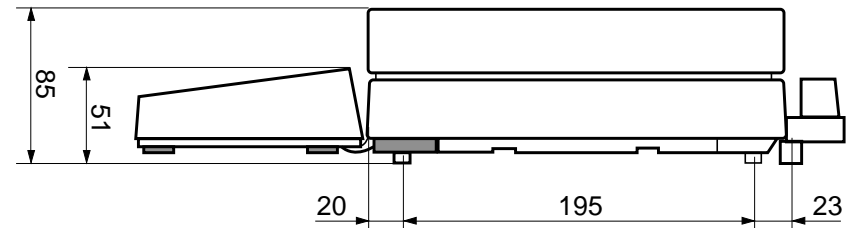
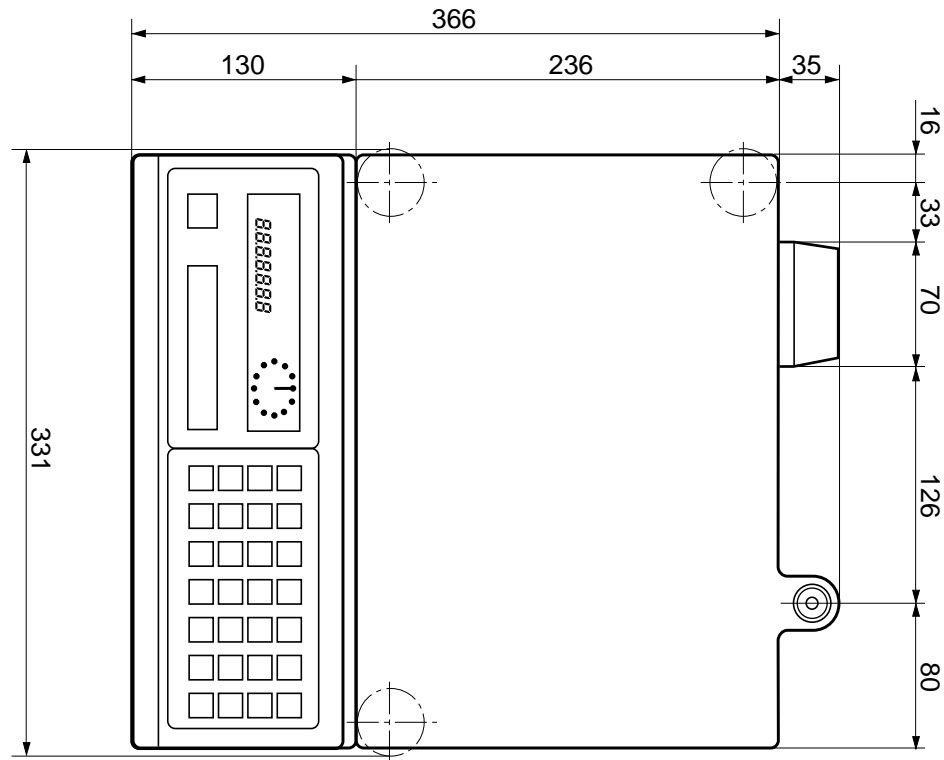
SM3000, SM6000, SM15000, SM1520 with base terminal



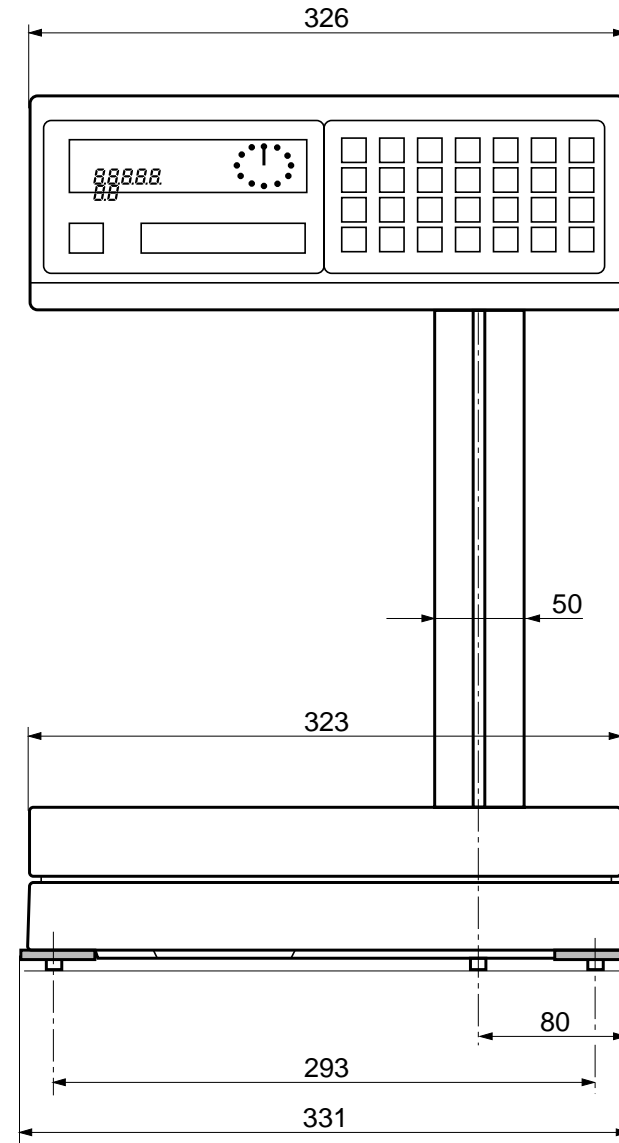
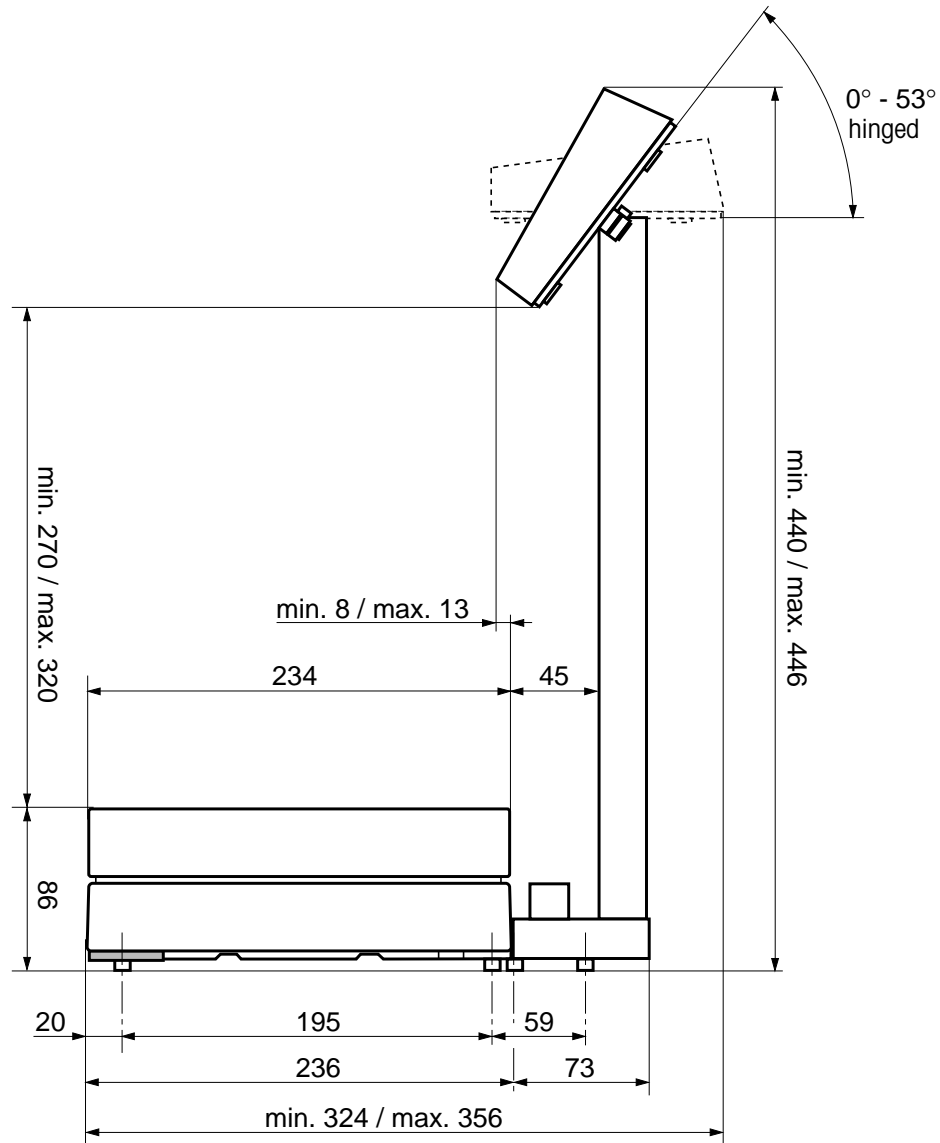
SM3000, SM6000, SM15000, SM1520 with base terminal and stand



SM3000, SM6000, SM15000, SM1520 with application terminal



SM3000, SM6000, SM15000, SM1520 with application terminal and stand



6. Documentation and literature references

For further information, you will find a list of METTLER TOLEDO publications on the following pages:

	Page
• Operating instructions	6.2
• Short-form operating instructions	6.3
• Technical documentation (Engineering support bulletins), Technical information bulletins	6.4
• Specification bulletins and brochures	6.5

Operating instructions

	Order No. German	Order No. English	Order No. French	Order No. Spanish	Order No. Italian	Order No. Japanese	Order No. Dutch	Order No. Arabic	Order No. Swedish
AM/PM balances (up to 6.1 kg)	702394	702395	702396	702397	702398	702399	703196	703197	704910
High-capacity PM scales	704683	704684	704685	704686	704687	704730	704731	-	704911
SM scales	703875	703876	703877	703878	703879	703880	703881	-	-
Bidirectional data interface	702177	702178	702179	701280	702204	-	-	-	-
PM-SE conversion kit	702565	702565	702565	702565	702565	-	-	-	-
CalcPac-M	702558	702559	702560	702561	702562	-	-	-	-
CountEasy-M	704712	704712	704712	704712	704712	-	-	-	-
CountPac-M	702169	702170	702171	702172	702221	-	-	-	-
DataPac-M	702177	702178	702179	702180	702204	-	-	-	-
FlowPac-M	704141	704142	704143	-	-	-	-	-	-
F03220 ¹⁾	704200	704200	704200	-	-	-	-	-	-
GoldPac-M	702553	702554	702555	702556	702557	-	-	-	-
LabPac-M	702157	702158	702159	702160	702231	703378	-	-	-
LabWare "Density determination"	702039	702039	702039	-	-	-	-	-	-
LabWare "Moisture determination"	702040	702040	702040	-	-	-	-	-	-
NetEasy-M	704713	704713	704713	704713	704713	-	-	-	-
PharmaPac-M	702165	702166	702167	702168	702233	-	-	-	-
ProPac-M	702161	702162	702163	702164	702232	-	-	-	-
SQC12 StatPac-M	702173	702174	702175	702176	702492	-	-	-	-
StatEasy-M	704714	704714	704714	704714	704714	-	-	-	-
XPac-M	703167	703167	703167	-	-	-	-	-	-

¹⁾ Installation information

	Order No. German	Order No. English	Order No. French	Order No. Spanish	Order No. Italian	Order No. Japanese
Density Determination Kit	702578	702578	702578	702578	702578	-
GA37	704210	704211	704212	-	-	-
GA44	701275	701275	701275	701275	-	-
GA50	703416	703417	703418	-	-	-
GM48	702129A	702129A	702129A	702129A	702129A	-
GM54	702131	702131	702131	702131	702131	-
GM303	704650	704650	704650	704650	704650	-
LJ16/LP16	704718	704719	704720	704721	704722	704723
LP16 Thermometer Set	703131	703131	703131	703131	703131	-
LV3 Vibrospatula	704647	704647	704647	-	-	-
LV10 Automatic Feeder	702181	702181	702181	702181	702181	-

Short-form operating instructions

	Order No. German	Order No. English	Order No. French	Order No. Spanish	Order No. Italian	Order No. Japanese	Order No. Dutch	Order No. Arabic
AM/PM balances (up to 6.1 kg)	702463	702464	702465	702466	702467	702468	703198	703199
PM...-K	704665	704666	704667	704668	704669	704670	704671	-
PM...-N	704688	704689	704690	704691	704692	704732	704733	-
SM scales	703882	703883	703884	703885	703886	703887	703888	-
DataPac-M	-	702446	-	-	-	-	-	-
GA37	704213	704214	704215	-	-	-	-	-
LabPac-M	704693	704694	704695	704696	704697	704698	704699	-
LabWare "Density determination"	702042	702042	702042	-	-	-	-	-

Documentation and literature references

Technical documentation (Engineering support bulletins)

	Order No. German	Order No. English	Order No. French	Order No. Spanish	Order No. Italian
Air buoyancy correction table	700613	700613	700613	-	-
Apple Macintosh Plus	703209	703210	703211	703212	703213
Cable installation	702785	702786	702787	702788	702789
Epson PX-4 (HX-40)	702790	702791	702792	702793	702794
IBM PC	702780	702781	702782	702783	702784
Lotus 1-2-3 and Measure	703191	703192	703193	-	-

Specification bulletins

	Order No. German	Order No. English	Order No. French	Order No. Spanish	Order No. Italian
GA50	720734	720735	720736	-	-
FO3220	720885	720886	720887	-	-
Interface converters	720687	720688	720689	720690	720691
LV10	720568	720569	720570	-	-
SQC33	721027	721028	721029	721030	721031
SQC52	720793	720794	720795	720796	720797
XPac-M	720588	720589	720590	720591	720592

Brochures

	Order No. German	Order No. English	Order No. French	Order No. Spanish	Order No. Italian	Order No. Japanese
Application – Technical data						
– Accessories AM/PM/SM	704700	704701	704702	-	704909	704703
DeltaTrac application brochure	720610	720611	720612	720613	720614	-
Dictionary of Weighing Terms	720113	720114	720115	720711	-	-
LP16 application brochure	721065	721066	721067	720608	721068	-
School experiments	720309	720310	720311	-	720814	-
SQC guide	720870	720871	720872	-	-	-
Weighing the Right Way	720905	720906	720907	720908	720909	720911
Weighing Therms	721158	721159	720115	720711	-	-
Fundamentals of Mass Determ.	721074	721118	-	-	-	-

Documentation and literature references

7. Index

Accessories	4.1ff.	Control of peripherals	2.9	Filter backweighing	1.4
Additive weighing	1.2	Control of the balance	2.4	Fine dispensing	1.8
Analytical balances AM	5.2	Control unit GM303	4.13	FlowPac-M	2.9, 3.8f.
Animal weighing	1.21	Conversion Kit PM-SE	1.22, 4.8	Foot switch	2.5 , 4.13
Animal weighing pan	4.3	CountEasy-M	3.1, 4.13	Formula weighing	1.7ff.
Anti-theft device	4.7	CountPac-M	1.16, 1.19, 3.4f.	Formulation program FO3220	1.10, 3.10f.
Attachment of a computer	2.4	D/A Converter GA37	4.12	Freely programmable applications	1.20
Attachment of a printer	2.2f.	Data interface	2.4 , 6.2	Fuses	4.8 , 5.9
Attachment of several balances or scales	2.6	Data transfer	2.1ff.	GA devices	2.2, 2.7, 4.11f.
Automatic feeder LV10	4.16	DataPac-M	2.7, 3.6f.	GM devices	2.9, 4.13ff.
Auxiliary displays GM48/49/53	4.14	Decimal places	5.11	GoldPac-M	1.15, 3.12f.
Backweighing	1.4f. , 1.16	DeltaRange	1.2, 1.17	Hand switch	2.5 , 4.13
Bar code identification	2.7	DeltaTrac	1.2, 1.8f. , 1.11, 5.8	Hanger	1.22, 5.9
Battery charger	4.18	Demo cases	4.6	In-use covers	4.6 , 5.9
Battery set	4.18	Density determination	1.3 , 1.22	Infrared dryers	1.6 , 4.15
Below-the-balance weighing	1.22	Density determination kit	1.3, 4.7	Interface	2.3ff. , 5.8f.
Cables	4.19ff.	Differential weighing	1.4ff.	Interface converters	2.8, 4.9
CalcPac-M	1.15f., 3.2f.	Dimension diagrams	5.12ff.	LabPac-M	1.2, 1.4, 1.9, 3.14f.
Calculating with weight data and constants	1.15	Dispensing	1.7ff.	LabWare	1.3, 1.5, 1.16, 3.16ff.
Calibration weights	4.2 , 5.4ff.	Displacement body	1.3, 4.7	Linearity	5.4ff.
CL devices	2.6, 2.8, 4.9ff.	Documentation	6.2ff.	LP devices	1.6, 4.15
Comparator	1.23 , 5.2	Draft shield	4.5 , 5.9	LV devices	4.16
Connection possibilities (overview)	2.11	Dynamic weighing	1.21	Mass flow control	3.8
Connectors	4.19ff.	Fill process control	1.12ff.	Mass flow measurement	3.8

Mixing	1.9	Reference optimization	1.18	Terminals	4.17f.
Moisture content and dry weight determination	1.4	Reference piece number	1.18	Thermometer set	1.6, 4.15
Multiplexer CL310	2.6, 4.10	Reference scale	1.16 , 2.11, 3.5	Totalization	1.2
Net total weighing	1.2	Reference weight	1.18	Triangular holder	4.7
NetEasy-M	3.1, 4.13	Reproducibility	5.4ff.	Tweezers	4.7
Operating instructions	6.2	Result deviation in inclined position	5.4ff.	Vibration adapter	5.8
Output Module GM54	1.11, 1.13, 2.9, 4.14	Result recording	2.2f.	Vibrospatula LV3	1.8, 1.10, 4.16
Percent formula weighing	1.9	Screw driver	4.7	Weighing boats	4.3
Peripheral Controller GA50	4.12	Sensitivity drift	5.4ff.	Weighing containers	4.3f.
Pharmakopeia	1.2, 1.13	Separation of weighing cell		Weighing in contaminated environment	1.22
PharmaPac-M	1.9, 1.16, 1.18, 3.20f.	from the electronics	1.22	Weighing of large weighing samples	1.22
Piece counting	1.2, 1.17ff.	SM stand	4.18	Weighing of magnetic weighing samples	1.22
Plus/minus tolerance check	1.11	Software cassettes	3.1, 4.13	Weighing pans	5.4f.
Plus/minus weighing	1.8, 1.11	SQC		Weighing process adapter	5.8
Power line filters CL110, CL111	2.10, 4.10	(Statistical Quality Control)	1.13f., 1.16, 3.24ff.	Weighing ranges	5.2ff.
PowerPac-SM	4.18	Stability detection	5.8	Weighing ranges in secondary units	5.10
Precision balances	5.2f.	Stabilization time	5.4ff.	Weighing to a target weight	1.7ff.
Precision scales	5.2f.	Standard deviation	1.15ff.	Weighing tongs	4.7
Price calculation from weight	1.15	StatEasy-M	3.1, 4.13	Weighing with extremely high accuracy	1.23
Printer	2.2ff., 4.11	Statistical evaluation	1.2, 1.16	Weight control	1.11ff.
Printer accessories	4.8	StatPac-M	1.16, 2.9, 3.24f.	XPac-M	1.20, 3.28f.
ProPac-M	1.11, 1.16, 1.18, 2.9, 3.22f.	System with several balances or scales	2.6		
Quality control	1.14, 1.16	Technical data	5.4ff.		

Printed on 100 % chlorine-free Paper, for the sake of our environment.

**To protect your METTLER TOLEDO product's future:
METTLER TOLEDO service assures the quality, measuring accuracy and preservation of
value of all METTLER TOLEDO products for years to come.
Please send for full details about our attractive terms of service.
Thank you.**



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

© Mettler-Toledo GmbH 1999 704701D Printed in Switzerland 9911/32.12

Mettler-Toledo GmbH, Laboratory & Weighing Technologies, CH-8606 Greifensee, Switzerland
Phone +41-1-944 22 11, Fax +41-1-944 30 60, Internet: <http://www.mt.com>