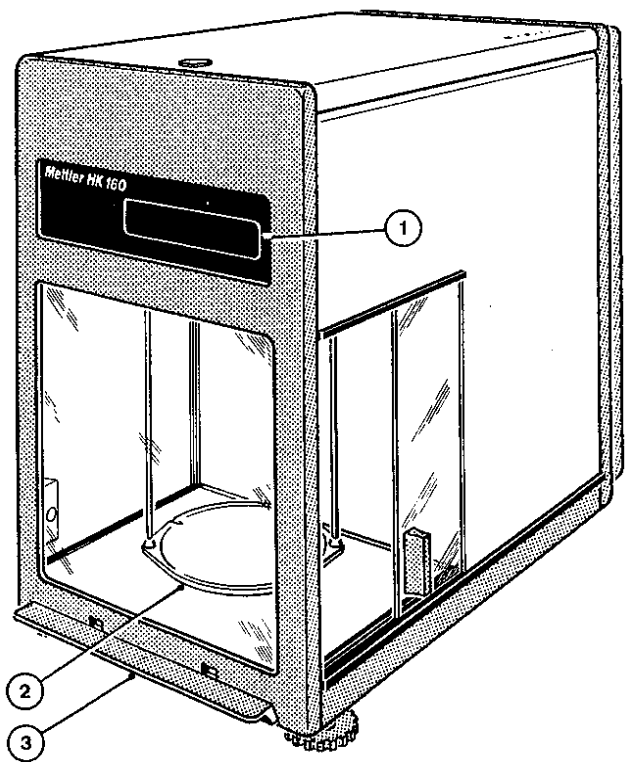
Operating Instructions
Bedienungsanleitung
Mode d'emploi
Instrucciones de manejo

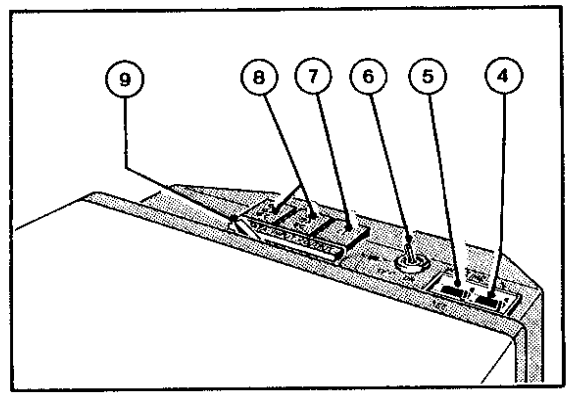
METTLER

HK160

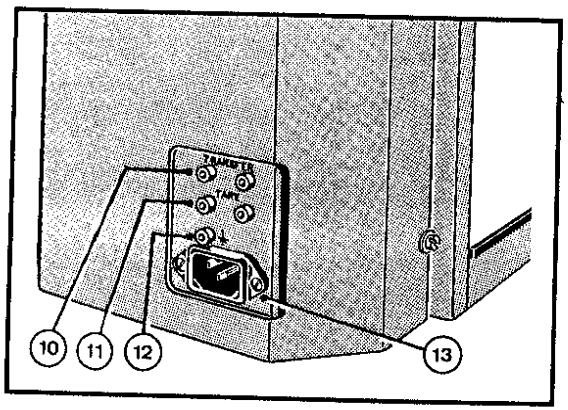
METTLER HK160

Electronic analytical balance
Readability 0.1 mg
Weighing range 0...160 g





Top of rear wall



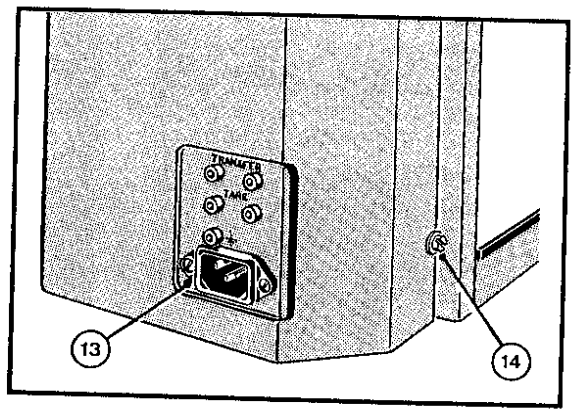
Bottom of rear wall

1 Display
2 Weighing pan
3 Control bar
4 Step switch for stability detector
5 Step switch for integration time
6 Switch for high-speed readout
7 Connector for CL instruments
8 Two connectors for GK40/41 Terminal and GA/GC peripheral
9 Lever for self-calibration
10 Connector for transfer instructions
11 Connector for remote taring
12 Grounding socket
13 Power cable receptacle

TABLE OF CONTENTS

PREPARATION: How to check and/or correct the voltage setting

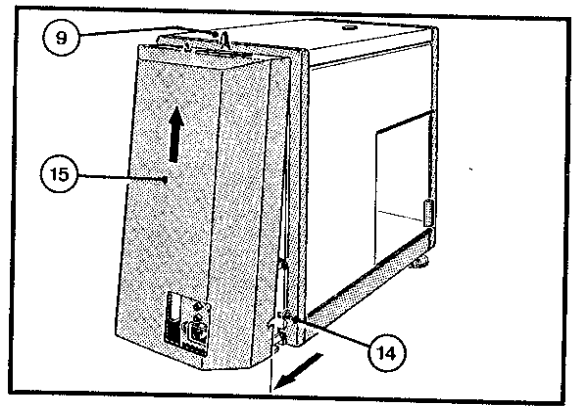
The setting of the balance voltage selector must correspond to the local power line voltage. Before placing the balance in operation, check selector setting to determine whether or not this is the case and adjust setting, if necessary.



Checking the voltage setting

A strip of yellow paper indicating the operating voltage is attached over power cable receptacle (13).

If the indicated voltage does not correspond to your local power supply voltage, or if the yellow sticker is missing, the rear wall of the balance housing must be opened, the setting of fuse holder (17) checked and, if necessary, corrected.

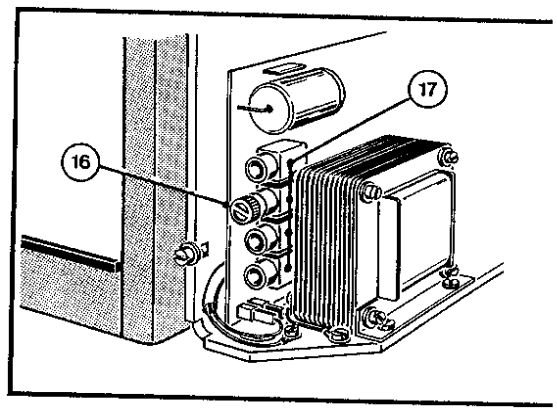


Opening rear wall of balance housing

First, make sure the power cable is not connected!

If weighing pan (2) is already installed, unhook and remove pan. Then:

- Loosen both screws (14).
- Set calibration lever (9) to vertical and hold in this position.
- Swing cover (15) to rear out of screws (14), slide up and remove.



Adjusting the voltage setting (rear wall of balance)

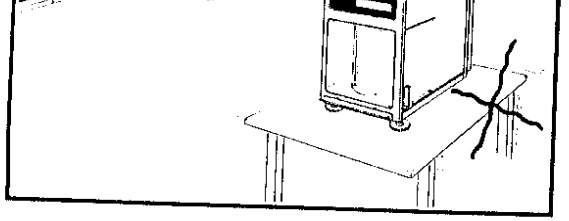
- Turn fuse cap (16) counter-clockwise and lift off.
- Insert fuse cap (16) with its fuse in that fuse holder (17) which is designated with your local power supply voltage.
- Gently press in fuse cap (16) and turn clockwise.
- Close rear wall of balance: With calibration lever (9) in vertical position, slide in cover (15) from top under screws (14), then tighten screws (14).

PREPARATION: How to set up the balance

Select a suitable location for your balance.

This will improve its performance.

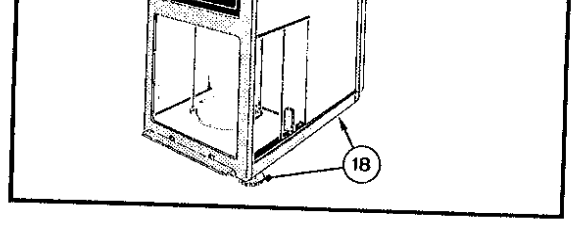
Level the balance and recheck it periodically.



Location

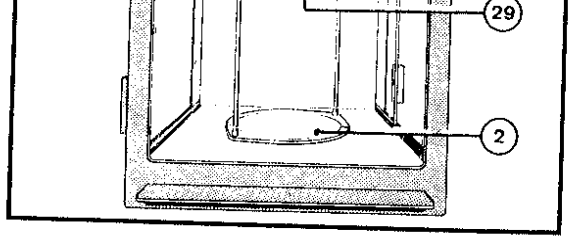
- Solid support
- Moderate temperature fluctuations.
- To the extent possible, avoid direct exposure to sunlight and drafts.
- Plug in power cable.

If it is not possible to secure a stable location, the HK balance is still capable of functioning correctly. To find out how this is done, turn to "Stability detector and integration time".



Leveling

- Adjust all three leveling screws (18) in such a manner that the air bubble of level indicator (19) is in center of circular marking.



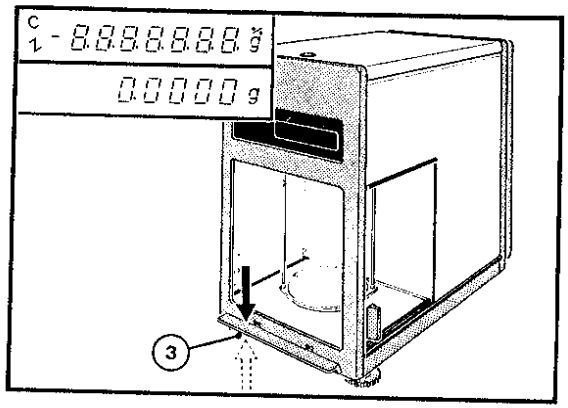
Hooking in the weighing pan

- Hook (29) can be turned to any desired position.
- Suspension of weighing pan (2) is designed in such a manner that oscillations are damped automatically.
- Always unhook weighing pan when transporting balance.

OPERATION: How to switch on and calibrate the balance

If your HK balance is being used several times in the course of a day, it is advisable to leave the balance switched on for the entire day. This way, your balance can reach a constant operating temperature and its accuracy will be improved. It is also recommended to switch on the balance some time before beginning weighing operations (warm-up time).

Before starting to work, the balance must be calibrated, i.e., set to accurate weight indication (repeat procedure about once a month). The procedure is automated.



Switching the balance on and off

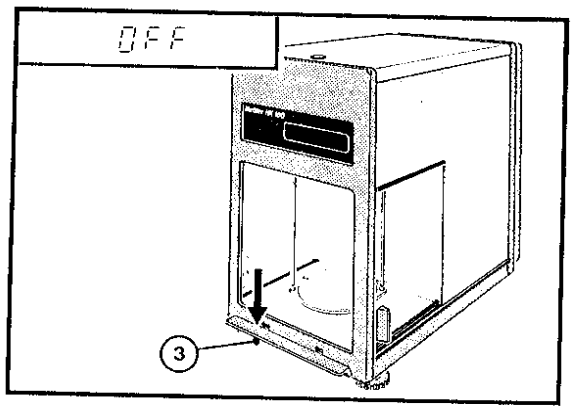
Switching on:
- Briefly press control bar (3).

For several seconds, the display will show: 8.8.8.8.8.8.8 g

This will give you an opportunity to make sure that the display functions properly.

After that, the display will indicate: 0.0000 g

Switching off:
- Briefly lift up control bar (3).



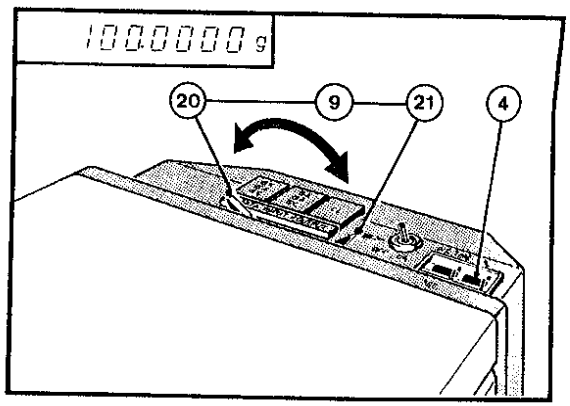
Balance displays OFF

If a power failure occurs during the operation, the indication OFF will show up on the display as soon as power is restored. In this case, the balance has to be switched on again:

- Briefly press control bar (3) twice.

Reminders for calibration

- Balance must be switched on for atleast 30 minutes.
- Recheck leveling
- Stability detector switch (4) must be set to 1...5
- Application key must be pulled out of terminal GK40/41, if connected.



Calibrating the balance

- Gently press control bar (3) (repeat if necessary): 0.0000 g.
- Wait for stability detector ∿ (22) to go out.
- Gently move calibration lever (9) to position (21). Display will indicate one after the other - CAL -; ------- and after 12 seconds: 100.0000 g.
- If balance is incorrectly operated, it will not be calibrated. Display: CAL Err. In this case, start again.

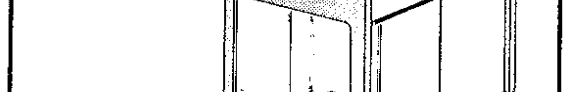
After balance indicates 100.0000 g:
- Reset calibration lever (9) to normal position (20).

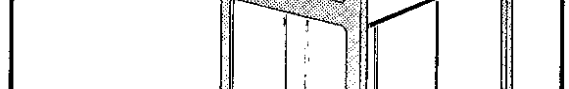
The balance is now ready for operation.

OPERATION: How to make a weight determination

Your balance is equipped with control signals which ensure the reliability of the results.
The red stability control signal ↯ indicates the presence of external disturbances (drafts, vibrations).
The yellow C serves to identify malfunctions; it indicates internal disturbances.
The section entitled "Stability Control and Integration Time" tells you how to achieve the best results.

To further increase the accuracy of its results, the balance automatically rounds off the last digit.





Control signals

- Stability control ↯ (22), red.
  Its sensitivity can be adjusted by means of switch (4). This signal lights up whenever the weighing system is not stable.

  > The results should only be read after the red signal is blanked out.

- Identification of malfunctions C (23), yellow. If this lamp stays on, see Section titled "What if...?" If this lamp only lights up briefly during weighing, this does not matter.

Making a weight determination

If balance was switched off or did not indicate exactly zero:
- Press control bar (3) and wait for balance to display zero.
- Place weighing object on pan.
- Wait for signal ↯ (22) to go out.
- Read indicated weight.

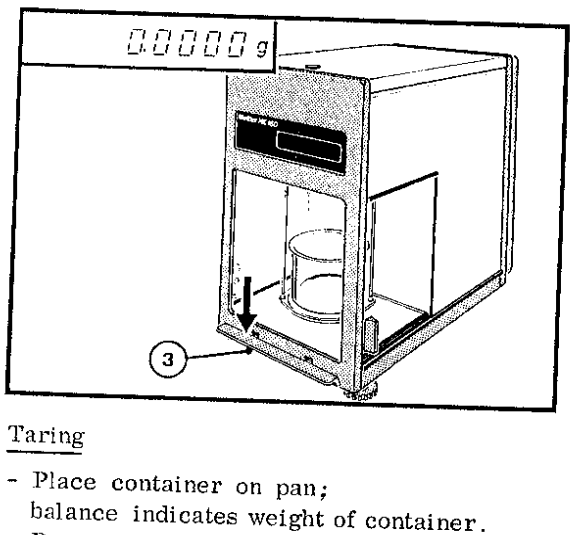
If the weighing range is exceeded, the display is blanked out except for the upper horizontal segments of the digits. This indicates: "Overload".

Accuracy of indicated results

Your balance always mesures with a greater accuracy than it displays.
The last digit of the readout is automatically rounded off.

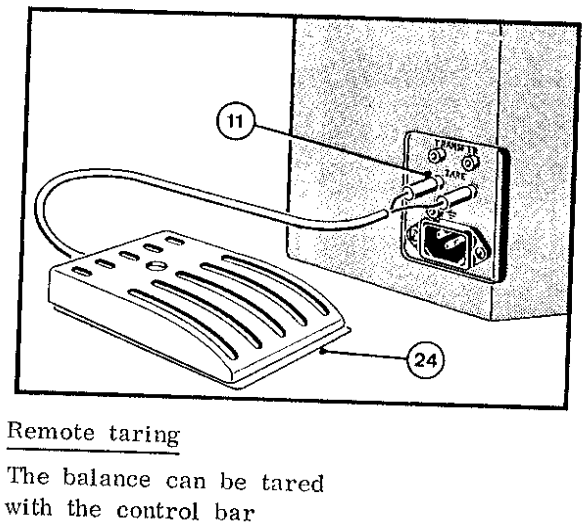
OPERATION: How to tare

Taring means that the display of the balance is reset to zero
after a container has been placed on the pan.
In this manner, the weight of the container is no longer taken into account when the weighing object is weighed in;
the balance only indicates the weight of the object.
However, both the container and the weighing object must not exceed the weighing range of the balance.



Taring

- Place container on pan;
  balance indicates weight of container.
- Press control bar (3), i.e.,
  tare balance.
  The balance now indicates zero.
  The overall weighing range of
  the balance less the weight of
  the container is now available
  for weighing in.



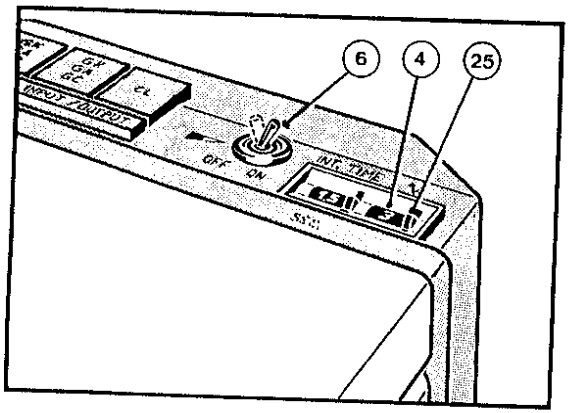
Remote taring

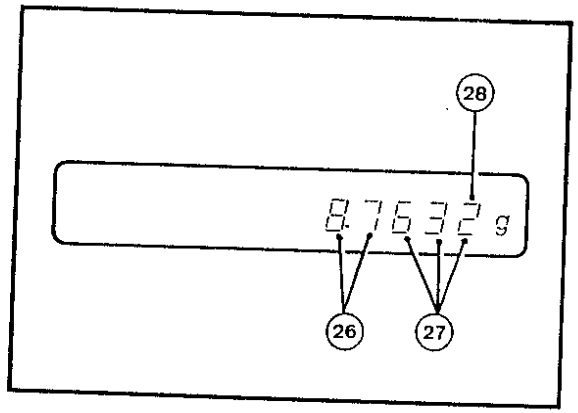
The balance can be tared
with the control bar
or with an external switch (24),
i.e., with a manual control button
or a foot pedal selected
from the available accessories.

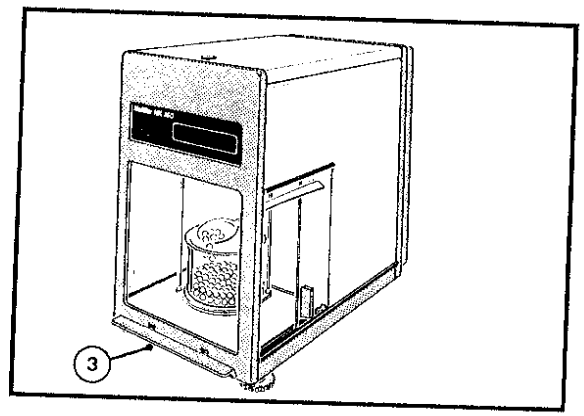
- Connect the manual control button
  or foot pedal to TARE sockets (11)
  located at the rear of the balance.

OPERATION: How to weigh in

Weighing in means filling a liquid or loose material into a container on the balance until a desired weight (target weight) is reached.
Your HK balance is equipped with a high-speed readout for rapid weighing in.
It provides a virtually instantaneous reading and accelerated digit succession.
The high-speed readout is switched on and off automatically by the stability detector.







High-speed readout

Function (switch (6) in ON position):
- During rapid initial filling of substance: accelerated reading and faster digit succession (changing weight can be followed more closely).
- During fine-dispensing to reach target weight: balance automatically switches back to normal digit succession speed (better reading of exact figures).

The change-over point can be selected on stability detector switch (4) (by setting cam (25)).
Steps 1...3: change-over occurs when material flow is light;
Steps 4...5: change-over occurs when material flow is heavy.

Reading

During rapid initial filling
to vicinity of target weight
observe only the two digits at left (26),
but during fine-dispensing
up to target weight
mainly the digits at right (27).

(While the high-speed readout is in operation, the last digit (28) is blanked out but reappears when flow of material is reduced to fine dispensing).

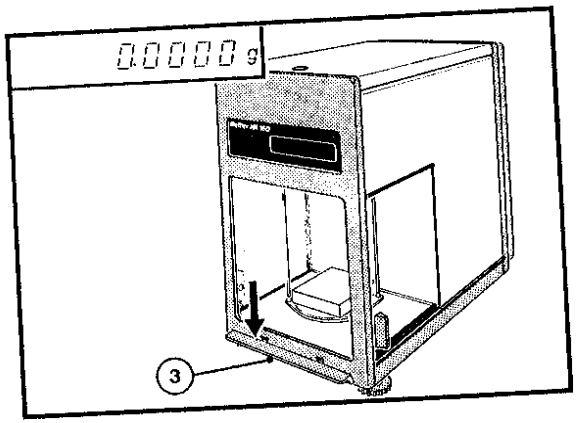
Weighing in

- Set switch (6) to ON.
- Place container on pan.
- Tare (3): zero reading.
- Fill in substance up to target weight.

If different substances are being weighed in for compounding, the balance can be tared after each substance so that the next substance can be started from zero.
This can be continued until the total weight of container and mixture exceeds the weighing range of the balance (160 g).

OPERATION: How to read deviations from a reference weight

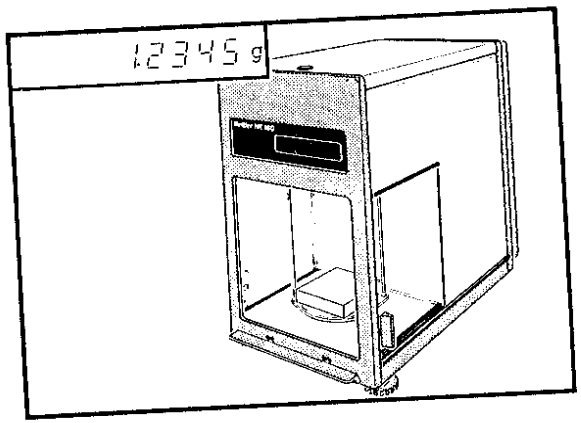
Your Mettler HK balance makes it possible
to directly read deviations from a reference weight.



Entering the reference weight in the balance

- Place reference weight on pan (weights or sample).
- Tare balance, i.e., press control bar (3). Balance display should now indicate zero.
- Remove reference weight.

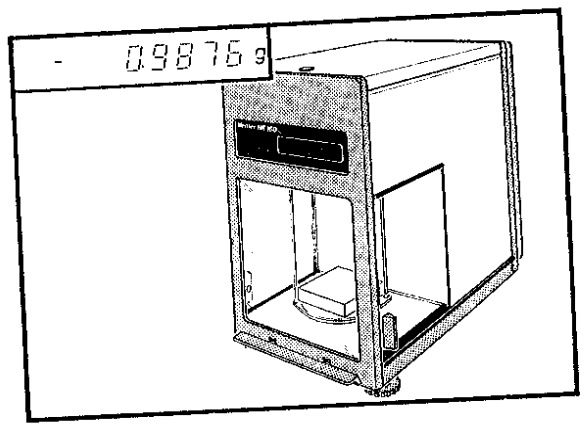
The reference weight is now indicated on the display with a negative sign in front, e.g. : -60.0000 g.



Plus deviations

- Place object to be checked on pan of balance.

If the object is heavier than the reference weight, the display indicates the plus deviation, i.e. :
-60.0000 g + 61.2345 g = 1.2345 g.



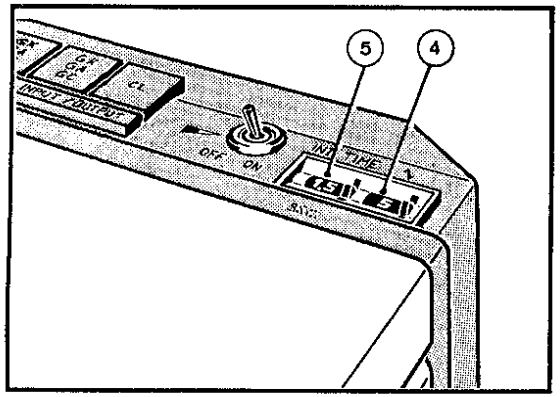
Minus deviations

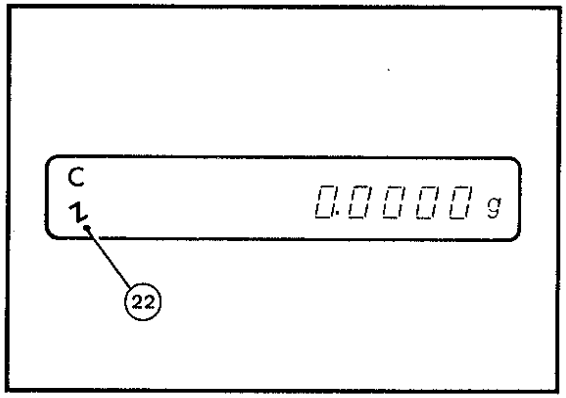
- Place object to be checked on pan of balance.

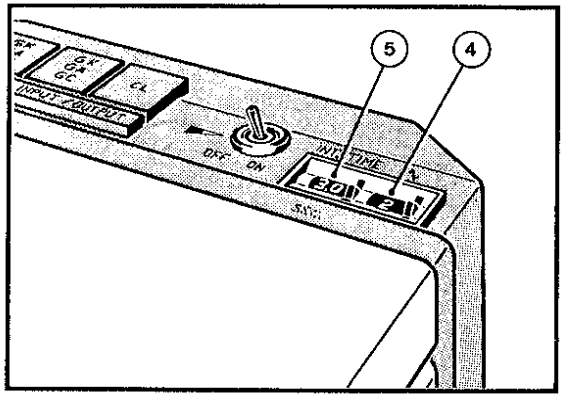
If the object is lighter than the reference weight, the display indicates the deviation with a negative sign in front, i.e. :
-60.0000 g + 59.0124 g = -0.9876 g.

OPERATION: How to set the stability detector and integration time selector

Technically, your HK balance is designed to provide accurate results even in slightly unstable weighing locations.
This is achieved with the help of the stability detector and the integration time selector.
Their effectiveness can be individually adjusted with switches (4) and (5). If signal (22) of stability detector (4) is still on, it indicates that the result is not ready for reading and/or for transfer via the data output (because of instability).
When signal (22) is blanked out, the balance is stable enough for the weighing data to be released.
Integration time (5) constantly averages out minor fluctuations so that the display essentially keeps indicating the accurate value.
The table below provides indications on how to find the most favorable setting under a given condition.







Highest weighing speed

Stab. Detector (4): Insensitive setting (e.g., 5)
Int. time (5): Setting should be short enough (e.g., 1.5 sec) so that stab. detector signal (22) goes out as soon as the result is sufficiently stabilized.

Normal setting (factory-set)

Stab. detector (4): Position 3

Int. time (5): 3.0 seconds

Highest weighing accuracy

Stab. detector (4): Most sensitive position (1...3) in which stability detector signal (22) is barely blanked out when balance is stable (several seconds after taring or changing of load).

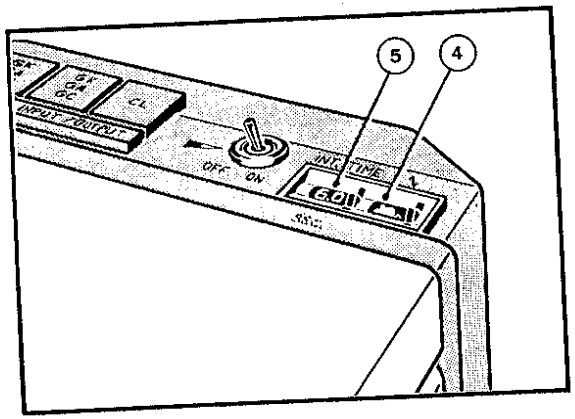
Int. time (5): Long enough (3...6 sec). for stab. detector signal (22) to be blanked out only after the result is completely stabilized.

Stab. detector in Position 1: Highest sensitivity
in Position 5: Lowest sensitivity
in OFF position: Stab detector switched off; data output is free.

INT. time in position 1.5 sec: Weakest damping of external disturbances
in position 6.0 sec: Strongest damping of external disturbances.

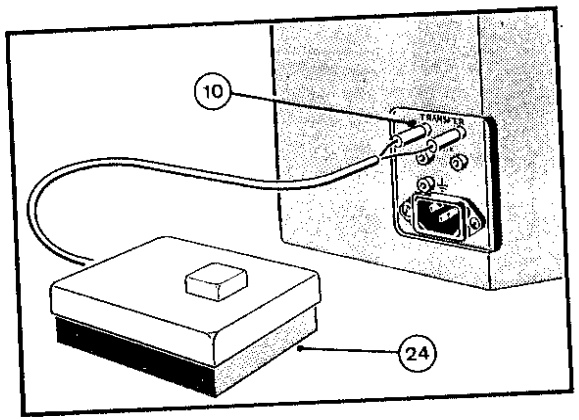
OPERATION: How to weigh unstable objects (special case)

A special setting of the stability detector switch (4) makes it possible to easily determine weight values even with unstable objects (e.g. animals) or in case of external disturbances such as drafts, while the sliding doors must be kept open (exception: weighing in).
The slight movements of the load do not, in this case, affect the accuracy or the reading of the displayed results to any substantial extent.
Even the result available at the data output is unmistakable and stable.

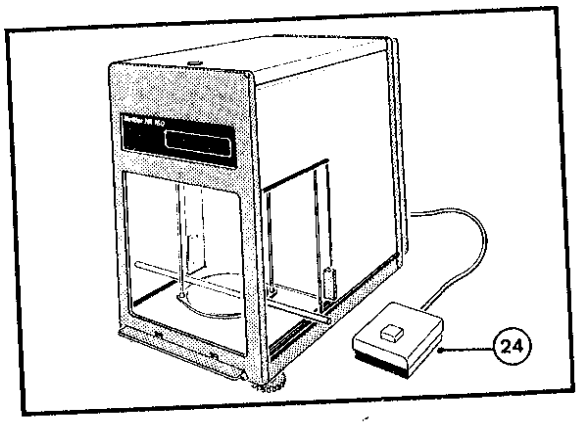


Setting

- Set stability detector (4) to the animal symbol (mouse) two steps above position 5.
- Set integration time (5) to 6 seconds (if the weighing object is not too unstable, 3 seconds might be sufficient).



- Connect manual control button or foot pedal (24) (accessories) to TRANSFER sockets (10).



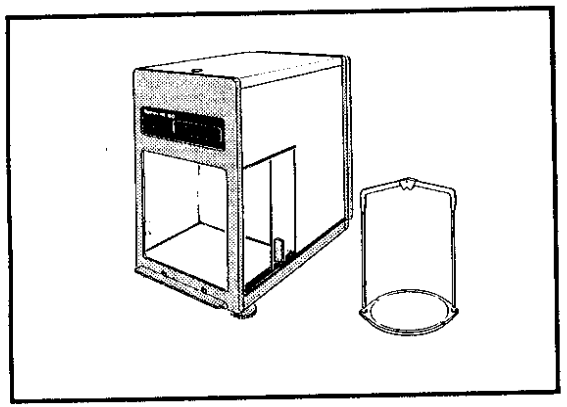
Weighing

- Place weighing object on pan.
- Let balance swing in (several seconds)
- Briefly press manual control or foot pedal (24), the display is blanked out for a short time depending on the selected INT time (5). After that the weight is displayed by the balance. It will be held unchanged for 6 or 3 seconds (depending on the INT time setting). At the same time, data transfer is released.
  Only then will the display change again.

CARE AND MAINTENANCE

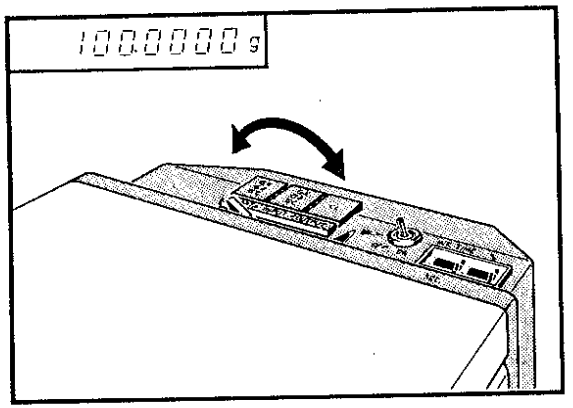
Your Mettler HK balance requires very little care and maintenance.
It should be cleaned and calibrated at regular intervals.

Occasionally the microfuse must be replaced if the balance cannot be switched on.



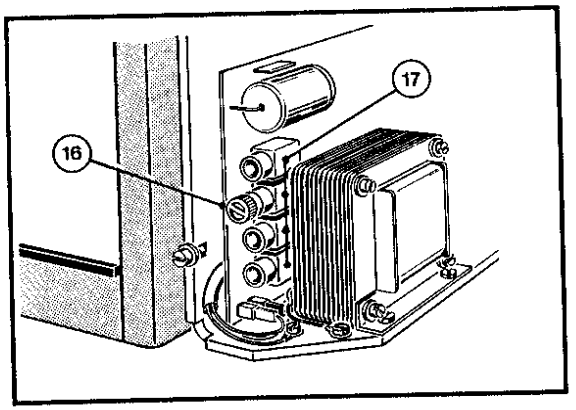
Cleaning

Clean weighing pan,
weighing chamber and
balance housing whenever
necessary with a wet rag,
mild soapy water and poilsh.
Avoid using strong solvents.



Calibration

If your balance is to deliver
accurate weighing results,
it must be properly calibrated.
Calibrate the balance at
regular intervals;
in case of constant operation,
at least once a month.
Observe warm-up time
of 30 minutes.



Replacing the microfuse

Use same procedure as for
voltage setting :

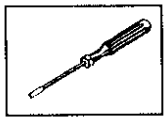
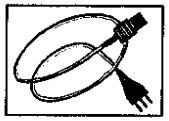
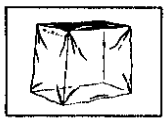
- Disconnect power cable.
- Open rear wall of balance housing.
- Turn fuse cap (16) counterclockwise and lift off.
- Replace fuse (0.4AT, see Accessories) and again insert fuse cap (16) with new fuse in appropriate fuse holder (17).
- Gently press in fuse cap (16) and turn clockwise.
- Close rear wall of balance housing.
- Plug in power cable.

WHAT IF... ?

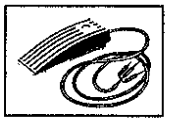
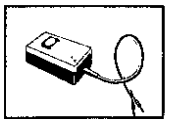
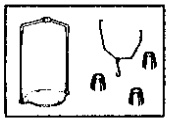
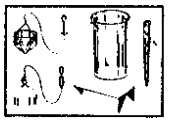
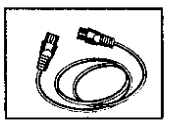
... the entire display fails to light up ?	- Balance is not switched on. - Power cable is not plugged in. - No power - A short power failure has occurred (turn balance off and then on again). - Microfuse is defective (replace 0.4AT fuse; see Accessories). If fuse blows again: - recheck operating voltage; if correct: - inform nearest Mettler Service.
... OFF is displayed ?	- Power cable was disconnected and again plugged in. - Power was temporarily off (press control bar twice).
... only the upper segments of the display light up ?	- Weighing range is exceeded (overload).
... only the lower segments of the display light up ?	- Weighing pan is not hooked on (underload).
... the weighing result is unstable ?	- There is a draft (are the sliding doors closed ?). - Weighing station is unstable. - Selected integration time is too short.
... the weighing result is obvioulsy wrong ?	- Balance was not tared. - Balance is not leveled. - Balance is not calibrated. - Selected voltage is wrong or power line voltage has dropped off.
... only part of the display lights up ? ... the result is retained without change ?	- A short malfunction has occurred (switch balance off and on again).
... balance displays meaningless symbols ?	- A short malfunction has occurred (switch balance off and on again). - Selected voltage is wrong or power line voltage has dropped off.
... the stability detector (↯ , red) does not go out ?	- Stability detector setting is too sensitive. - Weighing location is unfavorable.
... malfunction indicator (C, yellow) does not go out ?	- A short malfunction has occurred (switch balance off and on again). - Calibration has changed (recalibrate balance). If malfunction indicator does not go out after calibrating the balance, contact Mettler Service.

ACCESSORIES

Equipment supplied with balance

	Screwdriver	50 279
	Power cable Neutral	87 576
	Switzerland	87 920
	Germany	87 925
	USA	88 668
	Microfuses (set of 3, 0.4 AT)	51 367
	Dust cover	50 560

Optional equipment

	Foot pedal	46 278
	Manual control button	42 500
	GD hanger (for weighing below the balance)	40 385
	Specific gravity (density) determination kit	52 960
	Terminal	GK40 GK41
	Thermal Printer	GA40
	Remote Display	GC45
	D/A Converter	GC47
	Connection cable 0.5 m	42 559
	for GK40/GK41 1.5 m	42 561
	5 m	42 562
	GA40/GC45/GC47 15 m	42 563

TECHNICAL SPECIFICATIONS

Readability	0.1 mg
Weighing range	0...160 g
Taring range (by subtraction)	0...160 g
Stabilization time (typical)	~ 3 s
Integration time (externally adjustable)	1.5/3/6 s
Reproducibility (standard deviation)	±0.1 mg
Linearity relative to 10 g	±0.1 mg
Linearity relative to 160 g	±0.2 mg
Admissible ambient temperature during operation	10...40°C
Sensitivity drift (10...30°C)	$\pm 1.5 \times 10^{-6}$/°C
Result deviation when balance is inclined by 1:1000	< ±0.1 mg
Automatic stability detector - sensitivity adjustable	6 steps
Power supply	
- voltage selector, adjustable	110/130/220/240 V
- admissible voltage fluctuations	±10...-15 %
- frequency	50...60 Hz
- Power consumption	approx. 25 VA
Weighing pan of stainless steel	ø 115 mm
- width/height of pan bowl	115/175 mm
Weighing chamber (width x depth x height)	200 x 170 x 200 mm
Balance housing (width x depth x height)	230 x 470 x 410 mm
Net weight	15.6 kg
Data output 03 (for Mettler peripheral instruments)	standard
CL Data Interface (20 mA current loop)	standard