DENVER INSTRUMENT®

TP Series

Electronic Precision Balances/Elektronische Präzisionswaagen/Balances électroniques de précision/Balanzas electrónicas de precisión

Operating Instructions/Betriebsanleitung/ Mode d'emploi/Instrucciones de funcionamiento

Contents

Warnings and Safety Precautions

Safety

- To prevent damage to the equipment, please read these operating instructions carefully before using your balance.

⚠ Do not use this balance in a hazardous area/location.

⚠ Make absolutely sure to unplug the balance from AC power before you connect or disconnect a peripheral device.

⚠ Exposure to excessive electromagnetic disturbance can cause the readout value to change. Once the disturbance has ceased, the instrument can be used again in accordance with its intended use.

Setting up the Balance

⚠ Warning when using pre-wired RS-232 connecting cables: The pin assignments in RS-232 cables purchased from other manufacturers may be incompatible with DENVER balances. Be sure to check the pin assignment against the chart on page 21 before connecting the cable, and disconnect any lines that do not match.

– Connect only DENVER accessories and options, as these are optimally designed for use with your DENVER balance. Do not try to solve any problems on your own. The operator shall be responsible for any modifications to DENVER equipment and for any connections of cables or equipment not supplied by DENVER and must check and, if necessary, correct these modifications and connections. On request, DENVER will provide information on the minimum operating specifications (in accordance with the standards for defined immunity to interference).

– Do not open the balance housing. If the seal is broken, this will result in forfeiture of all claims under the manufacturer's warranty.

Getting Started

Storage and Shipping Conditions
– Do not expose the balance to extreme temperatures, blows, shocks, vibration or moisture.

Unpacking the Balance
● After unpacking the balance, check it immediately for any visible damage

○ If you see any sign of damage, proceed as directed in the chapter entitled “Care and Maintenance,” under the section on “Safety Inspection”

○ Save the box and all parts of the packaging until you have successfully installed your balance in case you need to return it. Before packing your balance, unplug all connected cables to prevent damage.

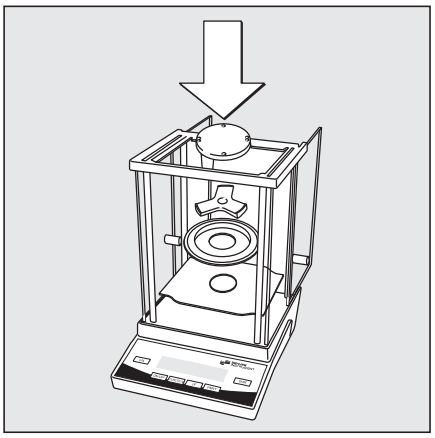
Equipment Supplied
– Balance
– Weighing pan
– Pan support (only on models with a round weighing pan)
– AC adapter, plug type

Additionally supplied with TP-214 models:
– Shield ring
– Shield plate
– Dust cover

Additionally supplied with TP-303, TP-303 I models:
– Glass draft shield with cover

Installation Instructions
When choosing a location to set up your balance, observe the following:
– Avoid placing the balance in close proximity to a heater or otherwise exposing the balance to heat or direct sunlight
– Protect the balance from drafts that come from open windows or doors
– Avoid exposing the balance to extreme vibrations during weighing
– Do not expose the balance to extreme moisture over long periods

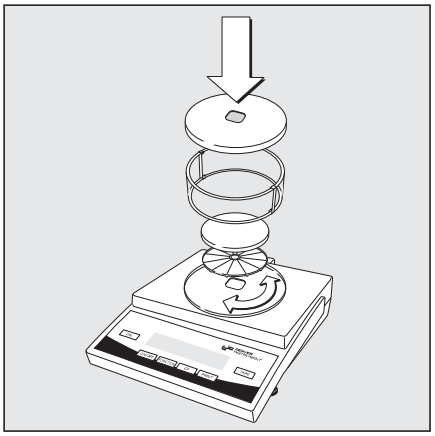
Conditioning the Balance
Moisture in the air can condense on the surfaces of a cold balance whenever it is brought into a substantially warmer place. If you transfer the balance to a warmer area, make sure to condition it for about 2 hours at room temperature, leaving it unplugged from AC power.



Setting up the Balance
Balances with an Analytical Draft Shield

- Place the components listed below inside the chamber in the order given:

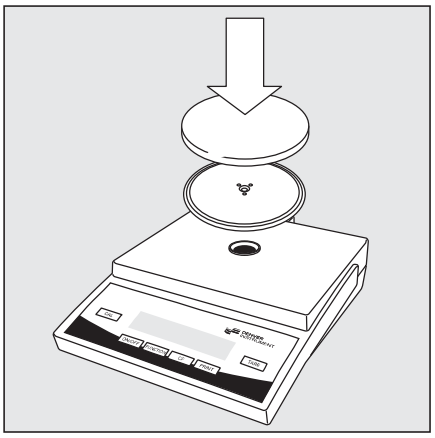
– Shield plate
– Shield ring
– Pan support
– Weighing pan



Balances with a Glass Draft Shield

- Place the components listed below inside the chamber in the order given:

– Draft shield base – place it on the balance so that the edge for fitting the glass draft shield faces upwards and turn it until it is firmly in place
– Pan support
– Weighing pan
– Glass draft shield
– Draft shield cover – place it on the balance so that the edge faces downwards



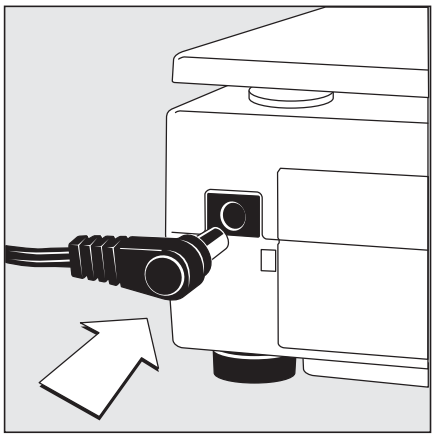
Balances with a Round Weighing Pan

- Place the components listed below inside the chamber in the order given:

– Pan support
– Weighing pan

Balances with a Rectangular Weighing Pan

- Place the weighing pan on the balance

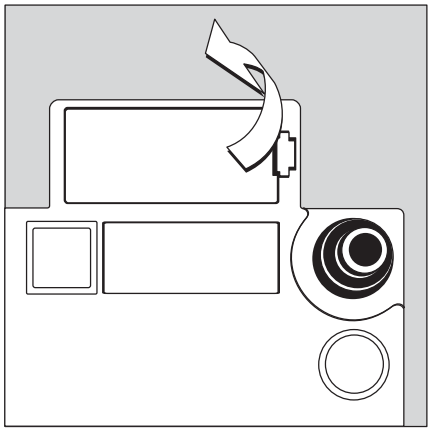


Connecting the Balance to AC Power/ Safety Precautions
Use only original Denver AC adapters

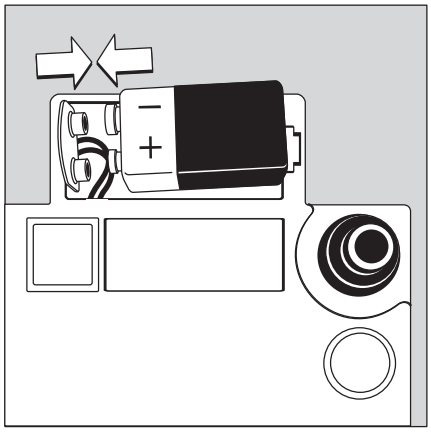
- Insert the right-angle plug into the jack
- The AC adapter rated to Class 2 can be plugged into any wall outlet without requiring any additional safety precautions

The ground is connected to the balance housing, which can be additionally grounded for operation.

Using a Non-Rechargeable/Rechargeable Battery:
for models TP-6101, TP-3101, TP-12

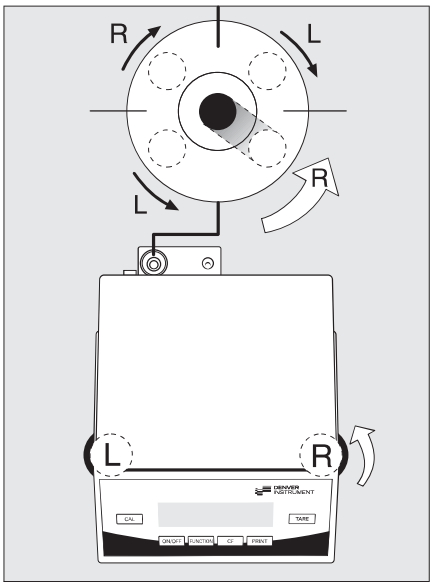


○ A non-rechargeable or rechargeable battery is not included with the equipment supplied
⚠ Use only a commercially available non-rechargeable or rechargeable 9-volt battery
⚠ When using a rechargeable battery, always use an external charger to recharge the battery
- Lay the balance/scale on its side
- Open the battery compartment: Lift the compartment cover



- Insert the 9-volt (rechargeable) battery in the compartment

○ Make sure to connect the positive and negative poles correctly
⚠ All used batteries are classified as waste that requires special handling (not “household” waste). Dispose of rechargeable batteries in accordance with the applicable special waste disposal regulations.
- Close the battery compartment: Press down on the cover until it clicks into place

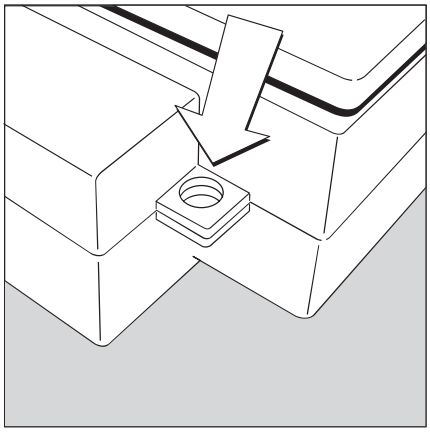


Leveling the Balance
Level the balance any time you set it up in a new location. Use only the 2 front feet of the balance for leveling.

TP-3002, TP-1502, TP-6101, TP-3101, TP-12:

- Turn the 2 rear feet until they are in position
- Turn the 2 front feet as shown here in the illustration until the air bubble is centered in the level indicator

> In most cases, this will require several adjustment steps



Anti-theft Locking Device
To protect against theft, use the mounting lug on the rear panel of the balance.

- Secure the balance at the place of installation, for example with a chain or a lock

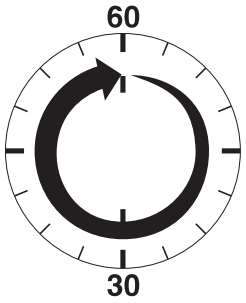
Basic Weighing Function

Preparation

- ● Turn on the balance: Press [ON/OFF]
- ● To change configurations: See the chapter entitled “Configuring the Balance”
- ○ To tare the balance: Press [TARE]

Additional Functions:

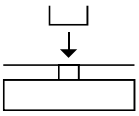
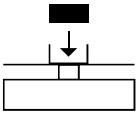
- ● To turn off the balance: Press [ON/OFF]



Warmup Time

- ○ To ensure accurate results, the balance must warm up for 60 minutes before operation. Only after this time will the balance have reached the required operating temperature.

Example
Basic weighing

Step	Key (or instruction)	Display/Printout
1. Turn on the balance	[ON/OFF]	
Self-test is performed		
2. Place container on balance (here: 52 g)		+ 52.0 g
3. Tare the balance	[TARE]	+ 0.0 g
4. Place sample in container on balance (here: 150.2 g)		+ 150.2 g

Calibration/Adjustment

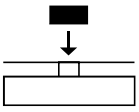
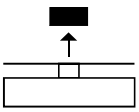
Available Features
Calibration/adjustment can only be performed when

– there is no load on the balance,
– the balance is tared,
– the internal signal is stable.

If these conditions are not met, an error message is displayed.
Otherwise, the weight required for calibration/adjustment is displayed.

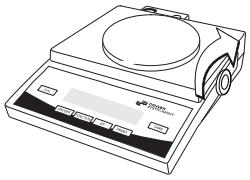
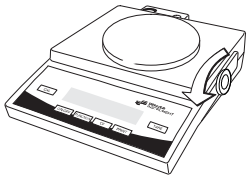
You can use any of the following weight units to calibrate/adjust:
g, kg*, lb (menu code 1.4.x)
You can block calibration/adjustment of the balance:
– Select menu code 1.5.3

External calibration/adjustment

Step	Key (or instruction)	Display/Printout
1. Tare the balance	[TARE]	0.0 g
2. Begin calibration Calibration weight is displayed without weight unit (here: 1000 g)	[CAL]	+ 1000.0
3. Place the indicated calibration weight on the balance		1000.0
After calibration, the calibration weight is displayed with wt. unit		+ 1000.0 g
4. Remove the calibration weight		0.0 g

* = not on models with a readability of 0.1 mg

Calibration/adjustment with internal weight: Model TP-303I
Menu setting 1 5 2 required.

Step	Key (or instruction)	Display/Printout
1. Calibrate/adjust the unloaded balance		
2. Tare the unloaded balance	[TARE]	0.0 g
3. Start calibration/adjustment	[CAL]	C
4. Move the selector for the motorized weight into the "calibration/adjustment" position		C
5. Calibration/adjustment is performed ("CC" flashes on the display)		CC
6. Remove weight: Return the selector to the initial position		CC
7. The internal weight is removed from the weighing system		0.0 g

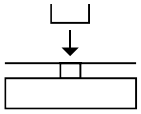
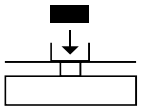
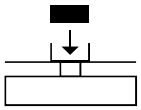
Net-Total Formulation/Second Tare Memory

With this application program you can weigh in components for formulation of a mixture.

Preparation

Configure the Net-Total Formulation/Second Tare Memory application in the operating menu: See “Configuring the Balance.” Menu code: 2.1.3

Example

Step	Key (or instruction)	Display/Printout
1. Place an empty container on the balance		+ 65.0 g
2. Tare the balance	[TARE]	+ 0.0 g
3. Add the first component		+ 120.5 g
4. Store the first component weight. If the print format is set to include data ID codes, the following is printed	[FUNCTION]	0.0 g_{NET} N1 + 120.5 g
5. Add the next component		+ 70.5 g
6. Store the 2nd component weight.	[FUNCTION]	0.0 g_{NET}
7. Add further components, if desired	As described for steps 5 and 6	
8. Display total weight and fill to desired final weight	[CF]	+ 191.0 g

Counting

Purpose
With the Counting program you can determine the number of parts that each have approximately equal weight.

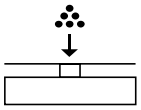
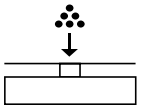
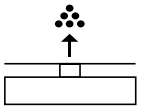
Preparation
- ● Configure the Counting application in the operating menu:
  See "Configuring the Balance"
  Menu code: 2. 1. 4

- ○ Reference sample quantity:
  Code 3. 3. 1 5 pcs
  Code 3. 3. 2 10 pcs (factory setting)
  Code 3. 3. 3 20 pcs
  Code 3. 3. 4 50 pcs
  Code 3. 3. 5 100 pcs

- ○ Storage parameter
  (display accuracy for counting)
  Code 3. 4. 1 Standard resolution (factory setting)
  Code 3. 4. 2 With 10 times higher resolution than standard

See also "Configuring the Balance"

Example
Determine an unknown piece count; weigh the preset reference sample quantity
Menu: Application program: Counting (menu code 2. 1. 4)
Reference sample quantity: 20 pcs (menu code 3. 3. 3)

Step	Key (or instruction)	Display/Printout
1. Tare the balance	[TARE]	0.0 g
2. Display the reference sample quantity (here: 20 pcs)	[FUNCTION] >2 sec.	rEF 20 (briefly)
3. Place the reference sample quantity (20 pcs) on the balance (here: 66 g)		+ 66.0 g
4. Start the application; if the print format is set to include data ID codes, the following piece weight is printed	[FUNCTION]	+ 20 pcs wRef + 3.300 g
5. Weigh uncounted parts (here: 174 pcs)		+ 174 pcs
6. Display weight	[FUNCTION]	+ 574.2 g
7. Display quantity	[FUNCTION]	+ 174 pcs
8. Unload the balance		0 pcs
9. Delete the reference value	[CF]	
10. Repeat the procedure starting from step 5, if desired.		

Weighing in Percent

Purpose
This application program allows you to obtain weight readouts in percent which are in proportion to a reference weight.

Preparation

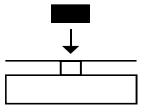
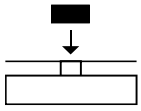
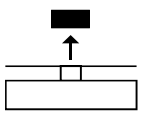
- ● Configure the Weighing in Percent application in the operating menu: See "Configuring the Balance." Menu code: 2. 1. 5

- ○ Reference percentage:
  Code 3. 3. 1 5 %
  Code 3. 3. 2 10 % (factory setting)
  Code 3. 3. 3 20 %
  Code 3. 3. 4 50 %
  Code 3. 3. 5 100 %

- ○ Storage parameter (display accuracy for counting)
  Code 3. 4. 1 Standard resolution: With stability (factory setting)
  Code 3. 4. 2 With 10 times higher stability than standard

See also "Configuring the Balance"

Example
Determine an unknown percentage: store the weight on the balance as a reference percentage
Menu: Application program: Weighing in Percent (menu code 2. 1. 5)
Menu: Reference percentage: 100 % (menu code 3. 3. 5)

Step	Key (or instruction)	Display/Printout
1. Tare the balance	[TARE]	0.0 g
2. Display the reference percentage:	[FUNCTION] >2 sec.	rEF 100
3. Place the reference weight for 100 % on the balance (here: 222.5 g)		+ 222.5 g
4. Start the application; if the print format is set to include data ID codes the following is printed	[FUNCTION]	+ 100.00 % Wxx% + 222.500 g
5. Place an unknown weight on the balance (here: 322.5 g)		+ 144.94 %
6. Display weight	[FUNCTION]	+ 322.5 g
7. Display percentage	[FUNCTION]	+ 144.94 %
8. Unload the balance		0.00 %
9. Delete the reference percentage	[CF]	
10. Repeat the procedure starting from step 5, if desired.		

Weigh Averaging

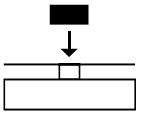
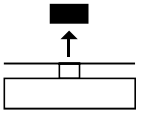
Purpose
Use this program to determine weights under unstable ambient conditions. In this program, the balance calculates the weight as the average value from a defined number of individual weighing operations, called “subweighs” in this manual.

Preparation
- Configure the Weigh Averaging application in the operating menu: See “Configuring the Balance.” Menu code: 2. 1. 12

○ Number of subweighs for weigh averaging:
- 3. 3. 1 5 subweighs
- 3. 3. 2 10 subweighs (factory setting)
- 3. 3. 3 20 subweighs
- 3. 3. 4 50 subweighs
- 3. 3. 5 100 subweighs

See also “Configuring the Balance”

Example
Determine the weight of a sample in extremely unstable ambient conditions by calculating the average of 10 subweighing operations.
Menu: Application program: Weigh Averaging (menu code 2. 1. 12)

Step	Key (or instruction)	Display/Printout
1. Tare the balance	[TARE]	0.0 g
2. Display the number of subweighs (here: 10)	[FUNCTION] >2 sec.	rEF 10 (briefly)
3. Place sample on the balance (weight readout fluctuates)		8888
4. Start measurement	[FUNCTION]	8888 10 9 8 ⋮ 1
After 10 subweighs		+ 275.5 g ⚠
If the print format is set to include data ID codes, the following is printed		Res + 275.5 g
5. Unload the balance		+ 275.5 g ⚠ (stable display)
6. Delete the result	[CF]	

7. Repeat the procedure starting from step 3, if desired.

Toggling between Weight Units

With this application program you can toggle the display of a weight value back and forth between two weight units.

Configure the “Toggle Weight Units” application in the operating menu:
See “Configuring the Balance.” Menu code 2.1.2

Menu code		Unit	Conversion factor	Abbr. on printout
1.7.1	3.1.1	Grams	1.00000000000	o
1.7.2 o	3.1.2 o	Grams	1	g
1.7.3	3.1.3	Kilograms[1])	0.00100000000	kg
1.7.4	3.1.4	Carats	5	ct
1.7.5	3.1.5	Pounds	0.00220462260	lb
1.7.6	3.1.6	Ounces	0.03527396200	oz
1.7.7	3.1.7	Troy ounces	0.03215074700	ozt
1.7.8	3.1.8	Hong Kong taels	0.02671725000	tlh
1.7.9	3.1.9	Singapore taels	0.02645544638	tls
1.7.10	3.1.10	Taiwanese taels	0.02666666000	tlt
1.7.11	3.1.11	Grains	15.43235835000	GN
1.7.12	3.1.12	Pennyweights	0.64301493100	dwt
1.7.13	3.1.13	Milligrams	1000	mg
1.7.14	3.1.14	Parts per pound	1.12876677120	/lb
1.7.15	3.1.15	Chinese taels	0.02645547175	tlc
1.7.16	3.1.16	Mommes	0.26670000000	mom
1.7.17	3.1.17	Austrian carats	5	K
1.7.18	3.1.18	Tola	0.08573333810	tol
1.7.19	3.1.19	Baht	0.06578947437	bat
1.7.20	3.1.20	Mesghal	0.21700000000	MS

o = Factory setting
[1]) = not for models with a readability of ≤ 0.1 mg

Function

- To toggle the display between the 1st and 2nd weight units:
  Press the [FUNCTION] key

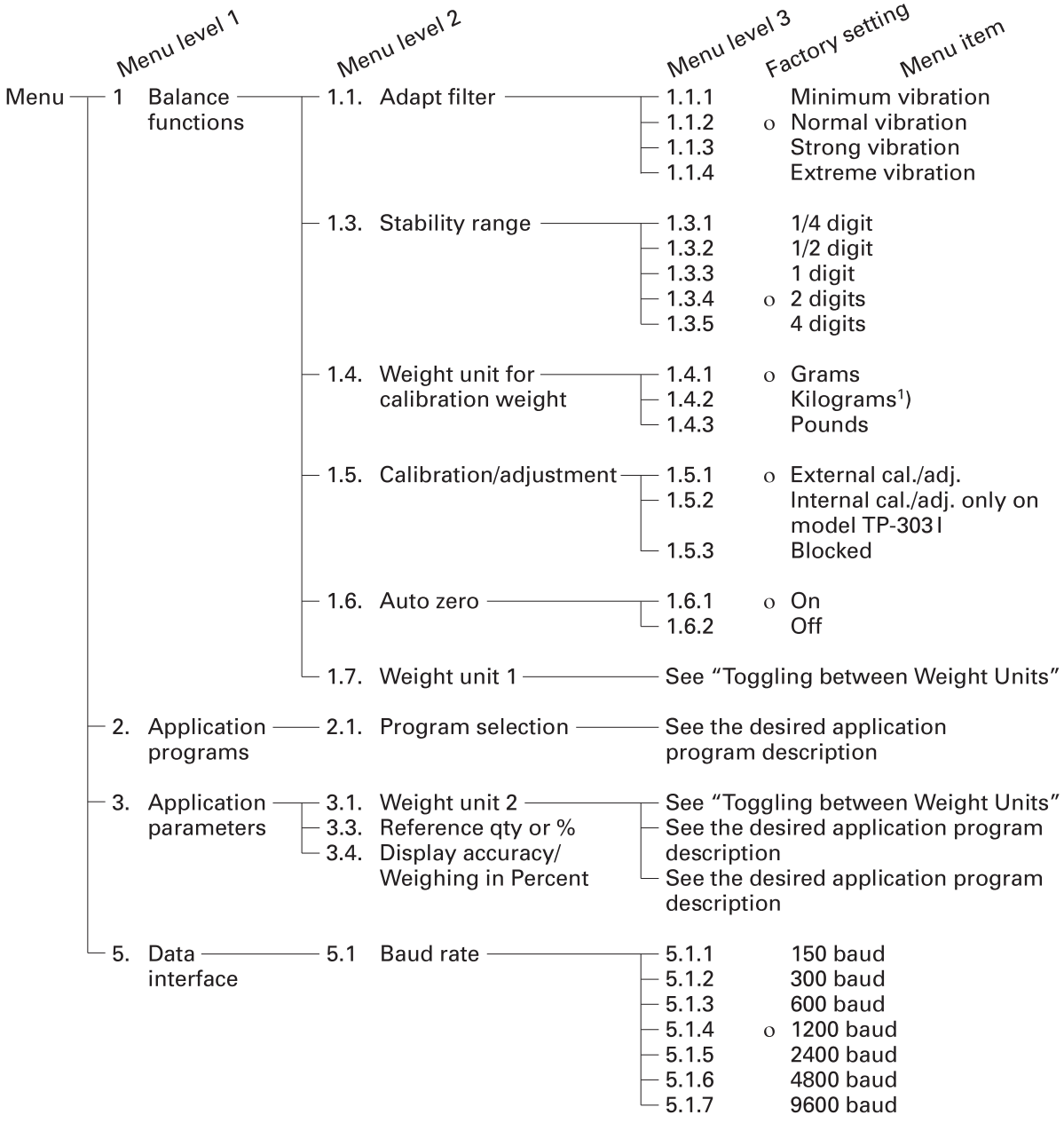
Setting the Parameters (Menu Codes)
You can configure your balance to meet individual requirements by selecting from the parameters available in the menu.

Example: Adapt the balance to unstable ambient conditions
Menu code 1. 1. 4

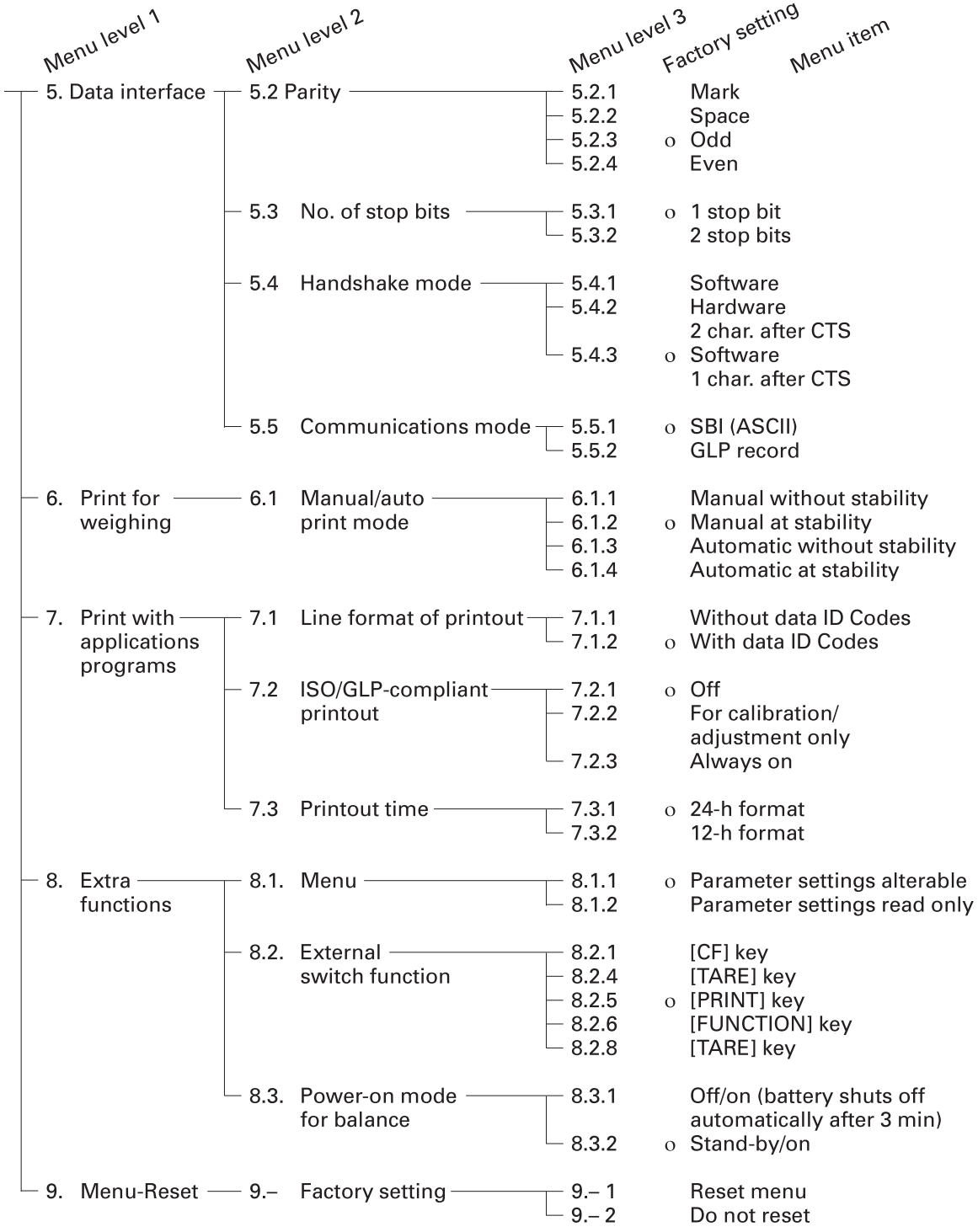
Step	Key (or instruction)	Display
1. Turn off the balance	[ON/OFF]	
2. Turn the balance back on; while all segments are displayed	[ON/OFF] [TARE] briefly	1.
○ To navigate within a menu level; the last menu option is	[TARE] repeatedly	2. ⋮
followed by the first option		9. 1.
3. Select the 2nd menu level	[PRINT]	1. 1.
4. Select the 3rd menu level	[PRINT]	1. 1. 2 o
5. In Menu Level 3: Select the desired option	[TARE] repeatedly	1. 1. 4
6. Confirm new setting; the “o” indicates the currently set option	[PRINT] >2 sec.	1. 1. 4 o
○ Select the next menu level (here: move from the 3rd to the 1st level)	[PRINT]	1.
○ Set other menu codes, if desired	[PRINT], [TARE]	
7. Store parameter settings and exit operating menu or	[TARE] >2 sec.	
○ Exit operating menu without storing changes	[ON/OFF]	
> Restart the application		0.0 g

Balance Operating Menu (Overview)

o Factory setting
√ User setting



[1]) = not for models with a readability of 0.1 mg


Menu level 1
Menu level 2
Menu level 3
Factory setting
Menu item
5. Data interface
5.2 Parity
5.2.1 Mark
5.2.2 Space
5.2.3 o Odd
5.2.4 Even
5.3 No. of stop bits
5.3.1 o 1 stop bit
5.3.2 2 stop bits
5.4 Handshake mode
5.4.1 Software
5.4.2 Hardware
2 char. after CTS
5.4.3 o Software
1 char. after CTS
5.5 Communications mode
5.5.1 o SBI (ASCII)
5.5.2 GLP record
6. Print for weighing
6.1 Manual/auto print mode
6.1.1 Manual without stability
6.1.2 o Manual at stability
6.1.3 Automatic without stability
6.1.4 Automatic at stability
7. Print with applications programs
7.1 Line format of printout
7.1.1 Without data ID Codes
7.1.2 o With data ID Codes
7.2 ISO/GLP-compliant printout
7.2.1 o Off
7.2.2 For calibration/ adjustment only
7.2.3 Always on
7.3 Printout time
7.3.1 o 24-h format
7.3.2 12-h format
8. Extra functions
8.1. Menu
8.1.1 o Parameter settings alterable
8.1.2 Parameter settings read only
8.2. External switch function
8.2.1 [CF] key
8.2.4 [TARE] key
8.2.5 o [PRINT] key
8.2.6 [FUNCTION] key
8.2.8 [TARE] key
8.3. Power-on mode for balance
8.3.1 Off/on (battery shuts off automatically after 3 min)
8.3.2 o Stand-by/on
9. Menu-Reset
9.– Factory setting
9.– 1 Reset menu
9.– 2 Do not reset

ISO/GLP-compliant Printout

Features
You can have the parameters pertaining to the ambient weighing conditions printed before (GLP header) and after (GLP footer) the values of a weighing series.
These parameters include:

GLP header:
– Date
– Time at beginning of measurement
– Balance manufacturer
– Balance model
– Balance serial number
– Software version number
– Identification number of the current sampling operation

GLP footer:
– Date
– Time at end of measurement
– Field for operator signature

⚠ The record can only be output to a Denver data printer 901042-1

Settings

● Set the following menu codes (see "Configuring the Balance"):

– GLP-compliant record: menu code 552

– ISO/GLP-compliant record after calibration/adjustment only: menu code 722 or ISO/GLP-compliant record always on: menu code 723

– Line format for printout: With data ID codes – 22 characters: menu code 712

– Printout date/time:
  – 24-h format: menu code 731
  – 12-h format: menu code 732

⚠ No ISO/GLP-compliant record is output if any of the following settings are configured: menu codes 613, 614 (automatic printout) and 711

Function Keys
Press [PRINT] to output header and first measured value.

> Header is output the first time [PRINT] is pressed

To output header and reference data automatically with an application program active: Press [FUNCTION]

End application program:
End application program and output GLP footer: Press [CF]

The ISO/GLP-compliant record can contain the following lines:

`--------------------`	Dotted line
`17-Jan-2006    10:15`	Date/time (beginning of measurement)
`  Denver Inst`	Balance manufacturer
`Mod.          TP-3002`	Balance model
`Ser. no.     10105355`	Balance serial number
`Ver. no.     00-19-41`	Software version
`ID`	ID
`--------------------`	Dotted line
`L ID`	Measurement series no.
`wRef  +     21.14 g`	Counting: Reference weight
`Qnt   +       235 pcs`	Counting result
`Qnt   +       567 pcs`	Counting result
`--------------------`	Dotted line
`17-Jan-2006    10:20`	Date/time (end of measurement)
`Name:`	Field for operator signature
	Blank line
`--------------------`	Dotted line

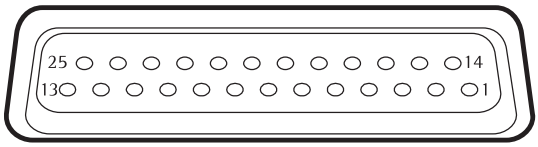
ISO/GLP-compliant printout for external calibration/adjustment

`--------------------`	Dotted line
`17-Jan-2006    10:30`	Date/time (beginning of measurement)
`  Denver Inst`	Balance manufacturer
`Mod.          TP-3002`	Balance model
`Ser. no.     10105355`	Balance serial number
`Ver. no.     00-19-41`	Software version
`ID`	ID
`--------------------`	Dotted line
`Cal. Extern`	Calibration/adjustment mode
`Set   +   2000.0 g`	Calibration weight
`--------------------`	Dotted line
`17-Jan-2006    10:32`	Date/time (end of measurement)
`Name:`	Field for operator signature
	Blank line
`--------------------`	Dotted line

Data Interface

Purpose
Your balance comes equipped with an interface port for connection to a computer or other peripheral device. You can use an on-line computer to change, start and/or monitor the functions of the balance and the application programs.

Female interface connector



Pin Assignment Chart, 25-pin female interface connector, RS-232:

Pin 1: Shield
Pin 2: Data output (TxD)
Pin 3: Data input (RxD)
Pin 4: Internal ground (GND)
Pin 5: Clear to send (CTS)
Pin 6: Not connected
Pin 7: Internal ground (GND)
Pin 8: Internal ground (GND)
Pin 9: Not connected
Pin 10: Not connected
Pin 11: Charging voltage for rechargeable battery pack +12 ... +20 V (I _ out 25mA)
Pin 12: Reset _ Out *)
Pin 13: +5 V output
Pin 14: Internal ground (GND)
Pin 15: Universal remote switch
Pin 16: Not connected
Pin 17: Not connected
Pin 18: Not connected
Pin 19: Not connected
Pin 20: Data terminal ready (DTR)
Pin 21: Internal ground (GND)
Pin 22: Not connected
Pin 23: Not connected
Pin 24: Not connected
Pin 25: +5 V output

For remote switch

*) = Hardware restart

Preparation
You can set these parameters for other devices in the Setup menu (see the chapter entitled “Configuring the Balance”). You will also find a detailed description of the available data interface commands in the file “Data Interface Descriptions for TP Models”, which you can order directly from Denver Instrument.

The many and versatile properties of these balances can be fully utilized for printing out records of the results when you connect your balance to a DENVER data printer. The recording capability for printouts makes it easy for you to work in compliance with ISO/GLP.

Error Codes

Error codes are shown on the main display for 2 seconds. The program then returns automatically to the previous mode (e.g., weighing).

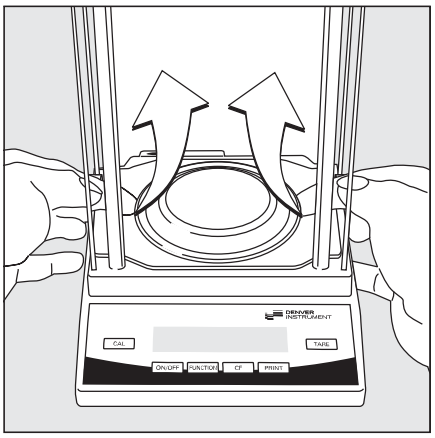
Display	Cause	Solution
No segments appear on the display	No AC power is available The AC adapter is not plugged in Battery or rechargeable battery pack is discharged	Check the AC power supply Plug in the AC adapter Replace the battery or recharge the battery pack using an external charger
H	The load exceeds the balance capacity	Unload the balance
L and E 54	The weighing pan is not in place Something is touching the weighing pan	Place the weighing pan on the balance Move that object that is touching the weighing pan
E 02	Calibration parameter not met, e.g.: – balance not zeroed – balance is loaded	Unload the balance Press [TARE] to tare the balance Calibrate only when zero is displayed
E 09	When gross value ≤ zero; no tare	Tare the balance
E 10	The [TARE] key is blocked when there is data in the second tare memory (net-total). Only 1 tare function can be used at a time	Press [CF] to clear the tare memory and release the tare key
E 11	Value input is not allowed for second tare memory	Press [TARE]
E 22	Weight is too light or there is no sample on the balance	Increase the weight on the balance
E 30	Interface port for printer output is blocked	Contact your local DENVER Service Center
Max. weighing capacity is less than indicated under “Specifications”	The balance was turned on without the weighing pan in place	Place the weighing pan on the balance and press [ON/OFF] to turn the balance back on
The weight readout is obviously wrong	The balance has not been calibrated/adjusted The balance was not tared before weighing	Calibrate/adjust the balance Tare the balance

If any other errors occur, contact your local DENVER Service Center!

Care and Maintenance

Service
Regular servicing by a trained DENVER dealer will extend the service life of your balance and ensure its continued weighing accuracy. DENVER can offer you service contracts, with your choice of regular maintenance intervals. The optimum maintenance interval depends on the operating conditions at the place of installation and on the individual tolerance requirements.

Repairs
Repair work must be performed by trained service technicians. Any attempt by untrained persons to perform repairs may lead to hazards for the user.



Cleaning
- Unplug the AC adapter from the wall outlet (mains supply). If you have an interface cable connected to the balance port, unplug it from the port,
- Clean the balance using a piece of cloth which has been wet with a mild detergent (soap)
- After cleaning, wipe down the balance with a soft, dry cloth.
  Removing and Cleaning the Weighing Pan:
- Lift up and remove the weighing pan together with the pan support by gripping them from under the shield ring. Make sure that you do not damage the weighing system in doing so.

⚠ Make sure that no liquid enters the balance housing.

⚠ Do not use any aggressive cleaning agents (solvents or similar agents).

Cleaning Stainless Steel Surfaces
Clean all stainless steel parts regularly. Remove the stainless steel weighing pan and thoroughly clean it separately. Use a damp cloth or sponge to clean any stainless steel parts on the balance. Only use commercially available household cleaning agent that is suitable for use on stainless steel. Clean stainless steel surfaces by wiping them down. Then rinse thoroughly, making sure to remove all residues. Afterwards, allow the balance to dry. If desired, you can apply oil to the cleaned surfaces as additional protection. Solvents are permitted for use only on stainless steel parts.

Safety Inspection
If there is any indication that safe operation of the balance with the AC adapter is no longer warranted:

- Turn off the power and disconnect the equipment from AC power immediately

> Lock the equipment in a secure place to ensure that it cannot be used for the time being

In such cases, notify your DENVER service center. Maintenance and repair work may only be performed by service technicians who are authorized by DENVER and who

– have access to the required maintenance manuals
– have attended the relevant service training courses

Instructions for Recycling

Information and Instructions on Disposal and Repairs
Packaging that is no longer required must be disposed of at the local waste disposal facility. The packaging is made of environmentally friendly materials that can be used as secondary raw materials.

The equipment, including accessories and batteries, does not belong in your regular household waste. The EU legislation requires its Member States to collect electrical and electronic equipment and disposed of it separately from other unsorted municipal waste with the aim of recycling it.
In Germany and many other countries, Denver Instrument takes care of the return and legally compliant disposal of its electrical and electronic equipment on its own. These products may not be placed with the household waste or brought to collection centers run by local public disposal operations – not even by small commercial operators.

For disposal in Germany and in the other Member States of the European Economic Area (EEA), please contact our service technicians on location or our Service Center:

Denver Instrument GmbH
Robert-Bosch-Breite 10
37079 Goettingen, Germany

In countries that are not members of the European Economic Area (EEA) or where no Denver affiliates, subsidiaries, dealers or distributors are located, please contact your local authorities or a commercial disposal operator.

Prior to disposal and/or scrapping of the equipment, any batteries should be removed and disposed of in local collection boxes.

Denver Instrument, its affiliates, subsidiaries, dealers and distributors will not take back equipment contaminated with hazardous materials (ABC contamination) – either for repair or disposal. Please refer to the accompanying leaflet/manual or visit our Internet website (www.denverinstrument.com) for comprehensive information that includes our service addresses to contact if you plan to send your equipment in for repairs or proper disposal.

Specifications

Model		TP-214
Weighing capacity	g	210
Readability	mg	0.1
Tare range (subtractive)	g	210
Repeatability	≤±mg	0.1
Linearity	≤±mg	0.2
Allowable ambient operating temperature		+10…+30°C (50°F to 86°F)
Sensitivity drift within +10…+30°C	≤±/K	$3 \cdot 10^{-6}$
Response time (average)	s	3
Adaptation to ambient conditions	By selection of 1 of 4 optimized filter levels	
Display update (depends on the filter level selected)	s	0.2–0.4
External calibration weight (of at least accuracy class…)	g lb	200 (E2) 0.4
Net weight, approx.	kg/lb	3.0/6.6
Pan size	mm inches	80 ∅ 3.3 ∅
Weighing chamber height	mm inches	200 7.9
Dimensions (W×D×H)	mm inches	189×251×299 7.4×9.9×11.8
AC power source/power requirements		AC adapter, 230 V or 115 V, +15%…–20%
Frequency		48–60 Hz
Power requirements, direct current	V	10 to 20
Power consumption (average)	W	1
Hours of operation with the rechargeable battery pack (see “Accessories”)	h	20

Model		TP-303, TP303I	TP-3002	TP-1502
Weighing capacity	g	310	3,100	1,500
Readability	g	0.001	0.01	0.01
Tare range (subtractive)	g	310	3,100	1,500
Repeatability	≤±g	0.001	0.01	0.015
Linearity	≤±g	0.002	0.02	0.03
Allowable ambient operating temperature		+10…+30 °C (50° to 86°F)		
Sensitivity drift within +10…+30 °C	≤±/K	$4 \cdot 10^{-6}$	$3 \cdot 10^{-6}$	$4 \cdot 10^{-6}$
Response time (average)	s	3	3	2,5
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels		
Display update (depends on the filter level selected)	s	0.2–0.8		
External calibration weight (of least accuracy class…)	g lb	200 (E2) 0.4	2000 (E2) 4	1000 (F2) 2
Net weight, approx.	kg	2.2	2.2	1.6
Pan size	mm	100 ∅	174×143	174×143
Dimensions (W×D×H)	mm	189×251×120	189×251×70	189×251×70
AC power source/ power requirements		AC adapter 230 V or 115 V, +15% to –20%		
Frequency		48–60 Hz		
AC power source/direct current	V	10–20		
Power consumption (average)	W	0.75		
Hours of operation with the rechargeable battery pack (see “Accessories”)	h	20	20	25

Model		TP-6101	TP-3101	TP-12
Weighing capacity	g	6,100	3,100	12,000
Readability	g	0.1	0.1	1
Tare range (subtractive)	g	6,100	3,100	12,000
Repeatability	≤±g	0.1	0.1	1
Linearity	≤±g	0.2	0.2	2
Operating temperature range		+10…+30°C (50°F to 86°F)		
Sensitivity drift within +10…+30 °C	≤±/K	$5 \cdot 10^{-6}$	$10 \cdot 10^{-6}$	$25 \cdot 10^{-6}$
Response time (average)	s	2	2	1.5
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels		
Display update (depends on the filter level selected)	s	0.2–0.8		
External calibration weight (of at least accuracy class)	kg lb	5 (F2) 10	1 (F2) 2	5 (M1) 10
Net weight, approx.	kg	1.6		
Pan size	mm	174×143		
Dimensions (B×T×H)	mm	189×251×70		
AC power source/, power requirements		AC adapter 230 V or 115 V, +15% to –20%		
Frequency		48–60 Hz		
AC power source/direct current	V	10–20		
Power consumption (average)	W	0.75		
Approx. hours of operation with – 9-volt battery, approx. – fully charged rechargeable battery	 h h	 11 2.5		
Hours of operation with the YRB08Z rechargeable battery pack	h	25		

CE Marking

The CE marking affixed to the equipment indicates that the equipment meets the requirements of the following Directive(s) issued by the Council of the European Union:

Council Directive 89/336/EEC "Electromagnetic compatibility (EMC)"

1. Electromagnetic Compatibility
1.1 Reference to 89/336/EEC:

Official Journal of the European Communities, No. 2001/C 105/03

EN 61326-1	Electrical equipment for measurement, control and laboratory use EMC requirements
Part 1:	General requirements Defined immunity to interference: Industrial areas, continuous non-monitored operation Limitation of emmissions: Residential areas, Class B

Important Note:
The operator shall be responsible for any modifications to Denver Instrument equipment and for any connections of cables or equipment not supplied by Denver Instrument and must check and, if necessary, correct these modifications and connections. On request, Denver Instrument will provide information on the minimum operating specifications (in accordance with the Standards listed above for defined immunity to interference).

73/23/EU	**"Electrical equipment designed for use within certain voltage limits"**

Applicable European Standards:

EN 60950	Safety of information technology equipment including electrical business equipment
EN 61010	Safety requirements for electrical equipment for measurement, control and laboratory use Part 1: General requirements

If you use electrical equipment in installations and under ambient conditions requiring higher safety standards, you must comply with the provisions as specified in the applicable regulations for installation in your country.