BA165
Electronic Balance 6000g x 0.1g

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User Guide
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1. INTRODUCTION

- The ADG series of precision electronic balances offers a range of capacities from 3000 grams to 10 kilograms.

- The balances are very simple to use and are applicable for general weighing. The user can also use the parts counting and weighing functions for special applications.

- The balances have an internal rechargeable battery.

- Special functions are available for parts counting, check-weighing, displaying weight in Newtons and displaying holding a maximum weight.

- The standard RS-232 interface allows the weight to be sent to a computer or printer and allows control of the balance using commands from a PC.

2. LOCATING THE BALANCE

- Place the balance on a stable surface.

- The ambient temperature of the balance should be kept as constant as possible. Do not place the balance where it may be subjected to draughts or heater. It is advisable not to place the balance near windows, air conditioning vents or radiators.

- The balance should be placed in a location where it is not likely to be damaged by accidentally dropping heavy weights or moisture on to the balance. The weighing area should be kept clean.

- Protect the balance from vibration, temperature and dust.

3. TECHNICAL DATA

SPECIFICATIONS			
	ADG 3000 L	**ADG 6000 L**	**ADG 10 L**
Maximum weighing capacity (Max)	3000g	6000g	10000g
Tare range	- 3000g	-6000g	-10000g
Interval d=	0.1g	0.1g	0.2g
Verification scale interval e=	1g	1 g	1g
Operating temperature	+5ºC / 35ºC		
Internal Battery	12VDC, approximately 20 hours operation		
Power supply	14VDC, 100mA minimum Supplied from external power supply 230VAC or 115VAC 50/60Hz.		
Pan Size (mm)	160 x 160 mm 6.3 x 6.3 inches		
Net weight	2.6 Kg / 5.7 lb.		
Standard features	RS-232 Interface, Bi-directional		
Special functions	Parts Counting, Check-weighing to Low and High Limits		

4. INSTALLATION

- Unpack the balance carefully.
- Place the rubber bumpers for the pan support on the pins then lay the pan on the supports. The spring under the permanent pan support will help eliminate static electricity that may accumulate on some samples.
- Turn the adjustable feet until the balance is level (check the bubble level on the rear of the balance).
- Insert the power supply connector in the plug on the rear of balance. Plug the power supply into the mains supply.
- Press the **[On/Off]** key to activate the balance.
- Wait until the balance auto-test is finished and a stable zero is displayed.

5. INDICATORS & KEY FUNCTIONS

INDICATORS

ZERO	On, when balance is at zero
STAB	On, when the display is stable
BAT-LO	Indicates a low battery condition
PCS	Indicates when the balance is in parts counting mode
g	Indicates when the balance is in grams weighing mode
	Three bars on the left of the display are used for check-weighing to show if weight is below the low limit, above the high limit or between the limits.

KEYS

KEY	Primary Function	Secondary Function
[Tare]	Re-zeroes the display to eliminate weight of containers	Selects the active digit when setting parameters. Return to normal weighing after parts counting, check-weighing or percent weighing
[→0←]	Sets new zero point	
[Func]	Enters the Function Menu	Selects or accepts a parameter
[Print]	Sends data to the RS-232 interface	Changes value of a parameter
[On/Off]	Switches the power to on and off	

6. INTERNAL BATTERY

The ADG balance includes a 12 Volt lead acid internal battery as standard. This battery will allow approximately 20 hours of operation from a full charge. The balance can be charged overnight using the external power supply. If the display shows "**BAT-LO**" the battery should be charged.

Only the power module supplied with the balance should be used for charging the battery. Incorrect power supplies could damage the battery or circuit boards and may cause the battery to leak acid.

7. OPERATION

7.1 POWER

- Press the **[On/Off]** key to turn the balance on.
- All LCD segments will be on for few seconds and then the display will show "**tESt**".
- After some time it will show zero weight. The stable (*STAB*) and Zero (*ZERO*) indicator will be on.

7.2 WEIGHING

- If necessary press the **[Tare]** key to zero the display. Place the object to be weighed on the pan and read the weight after the stability indicator (*STAB*) is displayed.

- The Zero function only operates within a narrow range (±4% of the capacity of the scale) around the original zero point. If the zero value is too large the error message "**VAL 4**" will be shown. In this case use the **[Tare]** key to zero the display.

- When you use a container you can set the display to zero so that only the net weight of any items added to the container is shown. Place the container on the pan and press **[Tare]**.

- When items are put into the container, the display will only show the weight of the items, which is the net weight.

- This may be repeated as many times as necessary to add more items to the container. Each time only the weight of the new addition will be shown.

- Make sure that the weight of the container and contents do not exceed the maximum capacity of the balance. Display will show "**Full-2**" if the capacity is exceeded. It will show "**Full-1**" if more weight is added above the "**Full-2**" point.

8. FUNCTION MENU

The function menu has a number of functions that allow the user to configure the balance as required. The user can select functions to calibrate the balance, select last digit suppression, select parts counting, set RS-232 parameters and enable the check-weighing function.

- Press the **[Func]** key to select the function. Then follow the instructions for the function selected.

- Not all functions may be available on all balances. Refer to your dealer or Adam Equipment for further details.

The following functions are available. For details on how each function is used refer to the respective sections.

“AUE”	Set the display averaging
“FIL”	Set the digital filtering
“bod”	Set the baud rate- adjustable from 300 to 9600 baud
“PIECE”	Enter parts counting function
“StEPS”	Enable check-weighing function and set the low and high limits
“cALibr”	Enter calibration mode
“rEPL”	Auto or manual print
“StAb”	Print instantaneously or only when stable
“Aut”	Enable the auto zero function
“tI”	Enable the automatic power-off function
“toP”	Set the balance to hold the maximum value function
“nE”	Display Newtons function
“SuPP”	A measure of the power supply voltage

PROCEDURE

- To enable or disable a function, press **[Func]**.
- Press **[Print]** to view the current setting.
- Pressing **[Print]** again will change the setting to the next value.
- Pressing **[Func]** again will return to normal weighing.
- To scroll through other functions, keep pressing the **[Func]** key when the scale is in the weighing mode.
- Press **[Print]** to enter the desired function or press **[Func]** to go to the next function.

8.1 AVE = Display Averaging Rate

- Select the required averaging rate for the display update.
- Press the **[Func]** key until "**AVE**" is displayed.
- Press **[Print]** to view the current setting.
- Press **[Print]** again to select the desired value.
- Press the **[Func]** key to return to weighing.

"**AVE 1**" = Fastest display rate for applications such as filling.
"**AVE 5**" = Slowest display rate for applications such as animal weighing or unstable environment.

8.2 FIL = Digital Filtering Selection

- Select the required level of digital filtering.
- Press the **[Func]** key until "**FIL**" is displayed.
- Press **[Print]** to view the current setting.
- Press **[Print]** again to select the desired value.
- Press the **[Func]** key to return to weighing.

"**FIL 1**" = Lowest level for normal use.
"**FIL 4**" = Highest level for uses in unstable environment

8.3 bOd = Baud Rate Selection

- Select the required baud rate for the RS-232 communications. Default rate is 4800*.

- Press the **[Func]** key until "**bOd**" is displayed.

- Press **[Print]** to select the desired value.

bOd 1	= 300 Baud	**bOd 2**	= 600 Baud
bOd 3	= 1200 Baud	**bOd 4**	= 2400 Baud
bOd 5*	= 4800 Baud	**bOd 6**	= 9600 Baud

- Press the **[Func]** key to return to weighing.

8.4 PIECE = Parts Counting Function

Parts counting function is used to display the number of items placed on the balance after a sample of the items is used to calibrate the balance.

- Place a container on the pan and press **[Tare]** to zero the display. Place a quantity of items to be counted in the container. The number of items is the sample size.

- To enter parts counting mode, press **[Func]** until "**PIECE**" is displayed.

- Press **[Print]** to enter parts counting mode. The sample size is displayed.

- To select a different sample size use, press the **[Tare]** key to select a digit and the **[Print]** to increment the value. The sample size can be set in the range of 1 to 10,000.

- When the desired sample size is shown, press **[Func]**.

- The display will show "**LoAd**". If the sample is not already on the pan, place it now.

- Press the **[Func]** key. The display will show "**contr**" followed by the number of items in the sample in "*pcs"*. If more items are added or removed from the balance, the display will show the new quantity.

- To return to weighing, press **[Func]** to select "**PIECE**" then press **[Tare]**.

To achieve the best accuracy while counting:

- The best accuracy is obtained with larger sample sizes.
- It is possible to use a smaller sample size to determine a larger sample accurately.
- If the sample items are not uniform the results may be inaccurate.
- For best accuracy it is desirable to have the unit weight of the items counted to be at least 0.1g.
- Care should be taken to check that the capacity of the balance is not exceeded. The display will show "**FULL-2**" if the capacity is exceeded.

To exit a weighing function such as "PIECES":

- Press the **[Func]** key until "**PIECES**" or any other weighing function is displayed and then press **[Tare].**
- The diplay will show .**StEPS = LOW-OK-HIGH**
- The check-weighing function will show a symbol on the left side of the display to indicate if the current weight displayed is:
  - "**HIGH**" above a high setpoint
  - "**OK**" between the set points
  - "**LOW**" below a low setpoint
- To enable the checkweighing function and set the value of the setpoints press the **[Func]** key until "**StEPS**" is displayed.
- Press **[Print]** to enter the function. The display will then show all zeros and the left most digit will be flashing. "**LOW**" symbol will be on.
- Use the **[Tare]** key to advance the flashing digit and the **[Print]** key to increment the digit for setting the low setpoint.
- When the value is correct press the **[Func]** key to go to the high setpoint. The "**HIGH**" symbol will be on.
- Set the high setpoint and press **[Func]** to return to weighing.

- The display will indicate when the weight on the scale is below the low setpoint, between or above the high setpoint.
- To disable the function press **[Func]** until either "**PIECE**" or "**StEPS**" is displayed and then press **[Tare]**.

8.5 cALibr = Calibration Procedure

- Zero the balance with no weight on the pan.
- Press **[Func]** until "**cALibr**" is displayed.
- Press **[Print]** to begin calibration.
- "**no CAL**" will be displayed initially. Then it will show "**LoAd**" followed by displaying the mass to be used as calibration weight. Place the desired mass on the centre of the pan.
- Press the **[Print]** key.
- "**CAL**" will be displayed initially. When "**unLoAd**" is displayed remove the calibration weight.
- The balance will return to normal weighing. Verify calibration by placing the weight back on the balance.

  Note: The only permissible calibration weight is the value shown on the display immediately after "LoAd".

8.6 rEPL = Results Printed Automatically or Manually

This parameter controls the operation of the RS-232 interface. The balance can be configured to either print automatically when the balance becomes stable or only when the **[Print]** key is pressed.

- To set the parameter press the **[Func]** key to show "**rEPL**".
- Press **[Print]** to see the parameter.
- Press **[Print]** to select either **rEPL**= 0 or **rEPL** = 1.
  rEPL = 0 Manual output when **[Print]** key is pressed.
  rEPL = 1 Automatically print when the results are stable.
- Press the **[Func]** key to return to weighing.

8.7 StAb = Print when stable or instantaneous

When the balance is set to manual print, i.e. **rEPL** = 0, it can be set to print either immediately after **[Print]** is pressed or only after the balance is stable after **[Print]** is pressed. The function can also be enabled from the RS-232 interface. See Section 7 on Communications with a Computer or Printer.

- To set the parameter press the **[Func]** key to show "**StAb**".
- Press **[Print]** to see the parameter.
- Press **[Print]** to select either **StAb**= 0 or **StAb** = 1.
  StAb=0, Sends results only when balance is stable.
  StAb=1, Sends results immediately after **[Print]** is pressed.

  NOTE: If **StAb** = 0 then **rEPL** should also be set to **rEPL** = 0.
- Press the **[Func]** key to return to weighing.

8.8 Aut = Autozero Function

The balance has an autozero function to automatically rezero the balance. This function will reset the zero of the balance if the zero should drift from the initial zero condition.

The autozero function is normally enabled to ensure a stable zero condition. However some operations may be affected by the autozero function. Examples are filling applications where the material flows very slowly and evaporation, where the user tares the balance with the sample on the pan and is looking for the amount of material that might evaporate. In these conditions the autozero may be disabled.

When the Autozero is disabled the ZERO indicator will not be on.

- To set the parameter press the **[Func]** key to show "**Aut**".
- Press **[Print]** to see the parameter.
- Press **[Print]** to select either **Aut** = 0 or **Aut** = 1.
  Aut = 0 Auto-zero function is enabled.
  Aut = 1 Auto-zero function is disabled.
- Press the **[Func]** key to return to weighing.

8.9 tI = Automatic Power Switch Off

The ADG balance includes an internal rechargeable battery. The typical operation time using only the battery is 20 hours. The balance includes the TIME function to turn the power off after 5 minutes if the balance is not being used. This function can be disabled if the balance is powered from the main power supply or if the disruption of the power might affect the weighing procedure.

- To set the parameter press the **[Func]** key to show "**tI**".
- Press **[Print]** to see the parameter.
- Press **[Print]** to select either **tI** = 0 or **tI** = 1.
  tI = 0 Automatic switch off is enabled.
  tI = 1 Automatic switch off is disabled.
- Press the **[Func]** key to return to weighing.

8.10 toP = Hold Maximum Value

When a weight is placed on the pan the display will hold the highest reading until the operator presses the **[Tare]** key to reset the display to zero. This function can be used at the same time as any of the weighing functions i.e. Parts Counting, Percent, Newtons etc. When the function is enabled the display will show a dash above the left digit.

- To set the parameter press the **[Func]** key to show "**toP**".
- Press **[Print]** to see the current parameter.
- Press **[Print]** to select **toP** = 0 or **toP** = 1.
  toP = 0 will disable the hold function and
  toP = 1 will enable the same.
- Press the **[Func]** key to return to weighing.

To exit this function press the **[Func]** key until **PIECES** or any other weighing function is displayed and then press **[Tare]**.

8.11 nE = Newton Unit of Weight

The balance can display the unknown weight in Newtons. When Newtons are selected the "kg" legend on the display will be turned off and an arrow will be turned on under the second digit.

- To set the parameter press the **[Func]** key to show "nE".
- Press **[Print]** to see the current parameter.
- Press **[Print]** to select nE = 0 or nE = 1.
  nE = 0 will weigh in kilograms and
  nE = 1 will weigh in Newtons.

To exit this function press the **[Func]** key until PIECES or any other weighing function is displayed and then press **[Tare]**.

8.12 SuPP = Display the battery Voltage

The balance can display the voltage from the internal battery.

- To set the parameter press the **[Func]** key to show "SuPP".
- Press **[Print]** to see the voltage. A fully charged battery will show above 12 Volts. If it shows less than 11 Volts the battery should be charged.
- Press **[Func]** to return to weighing.

9. COMMUNICATION WITH A COMPUTER OR PRINTER

Press the **[Print]** key to transmit weighing data (value and unit of mass) to a computer or printer through the RS-232C interface.

9.1 RS-232 Communication

The ADG balances can be connected to a printer for printing the results of the weighing or to a computer to either display or control the balance, through the RS-232 interface. The commands can tare the balance, request the weight be printed and enable the continuous output function.

A) PARAMETER

The interface parameters are:

300 - 9600 Baud as selected, default 4800 baud 8 data bit No parity 1 stop bit

B) CONNECTION

Output Connector: 9 pin D-Subminiature plug Pin 2, Data to the balance Pin 3, Data from the balance Pin 5, Signal Ground Handshaking is not implemented.

It will be necessary to connect pin 7 to pin 8 on the mating connector to enable the RS-232 interface. Do not connect these pins to the handshaking pins on the interfaced device.

C) OUTPUT FORMAT

The balance will output the weight with the units of measure in one line. The output is initiated when the **[Print]** key is pressed or a command is received over the RS-232 interface.

D) INPUT COMMANDS FORMAT

The balance can be controlled with the following commands. The commands must be sent in upper case letters, i.e. “T” not “t”. The balance will send the message ES if it does not understand a command that is sent to it.

T<cr><lf>	The uppercase T will tare the balance. This is the same as pressing the **[Tare]** key.
SI<cr><lf>	The SI command will cause the weight to be transmitted over the RS-232 interface. This is same as pressing **[Print].**
S0<cr><lf>	Sending S0 command will set the balance to output only when the balance is stable, equivalent to “**StAb 0**”.
S1<cr><lf>	Sending S1 command will set the balance to output irrespective of balance being stable or not, same as “**StAb 1**”.
Z<cr><1f>	Same as pressing the **[Zero]** key.

NOTE: Continuous output is not recommended when a printer is connected as often the printers cannot keep up with the number of values sent from the RS-232 interface. The RS-232 will output about 3 lines per second at the fastest baud rate (9600 baud).

10. ERROR MESSAGES

The balance will show messages on the display during normal operation and also to signify errors or incomplete operations. The following messages are in addition to the functional messages.

- LH -	When the initial weight on the pan is too large for the balance to operate correctly. Remove all weight from the pan when turning on the balance. If the message is still shown after applying power, the weighing mechanism might be damaged.
nuLL	When the initial weight on the pan is too small for the balance to operate correctly. Make sure the pan is correctly installed before turning on the balance. If the message is still shown after applying power, the weighing mechanism might be damaged.
WAIT	Displayed when the balance is waiting for an action to be completed or during the turn on time for the weighing mechanism to become stable. If the message does not disappear in a few seconds, check that the balance is located in a stable environment and the pan is installed correctly.
FULL2	This message is shown when the weight on the pan exceeds the capacity of the balance.
FULL 1	Shown when the weight on the pan exceeds the maximum value that the balance can measure above the capacity. If **FULL 1** or **FULL2** are shown when the pan is empty the weighing mechanism may be damaged or the electronics may need to be reset or replaced.
CAL ER	Displayed when the wrong weight is used during calibration. Repeat the calibration using the correct weight as shown on the display. If the message is still shown, the electronics or weighing mechanism may be damaged.

CE

Manufacturer's Declaration of Conformity

This product has been manufactured in accordance with the harmonised European standards, following the provisions of the below stated directives:

Electro Magnetic Compatibility Directive 89/336/EEC

Low Voltage Directive 73/23/EEC

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FCC COMPLIANCE

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

Shielded interconnect cables must be employed with this equipment to insure compliance with the pertinent RF emission limits governing this device.

Changes or modifications not expressly approved by Adam Equipment could void the user's authority to operate the equipment.

ADAM EQUIPMENT is an ISO 9001:2000 certified global organisation with more than 30 years experience in the production and sale of electronic weighing equipments. Products are sold through a world wide distributor network -supported from our company locations in the UK, USA and SOUTH AFRICA. The company and their distributors offer a full range of Technical Services such as on site and workshop repair, preventative maintenance and calibration facilities.

ADAM's products are predominantly designed for the Laboratory, Educational, Medical and Industrial Segments. The product range can be classified as follows:

- Analytical and Precision Laboratory Balances
- Top Loading Balances for Educational establishments
- Counting Scales for Industrial and Warehouse applications
- Digital Weighing/Check-weighing Scales
- High performance Platform Scales with extensive software features including parts counting, percent weighing etc.
- Digital Electronic Scales for Medical use
- Retail Scales for price computing

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