



SP-150 Electronic Balance

USER MANUAL

October 2008

Arizona Instrument LLC
3375 N Delaware Street
Chandler, Arizona 85225
(602) 470-1414
(800) 528-7411
Fax (480) 804-0656
<http://www.azic.com>

email:

azi@azic.com - General
intl@azic.com - International
support@azic.com - Customer Support

AZI P/N: 700-0014-D

SP-150 Electronic Balance

Setup and Operation Manual

Thank you for choosing an SP-150 Electronic Balance from Arizona Instrument LLC. AZI is pleased to provide you with a balance designed and manufactured for years of reliable service and proudly made in the U.S.A.

Please read this manual completely before using your balance. This information will enable you to fully utilize your balance and should be located nearby to be used as a quick reference guide. The balance is intended to be used only in the manner outlined in this manual. Misuse of the balance may cause product failure.

PROPRIETARY RIGHTS NOTICE

The material in this manual contains valuable information developed by Arizona Instrument LLC for use with the Computrac[®] Vapor Pro[®] line of moisture analyzers. No part of this manual can be reproduced or transmitted in any form or by any means, electronic, mechanical, or otherwise. This includes photocopying and recording or in connection with any information storage or retrieval system without the express written permission of Arizona Instrument LLC.

ALL RIGHTS RESERVED

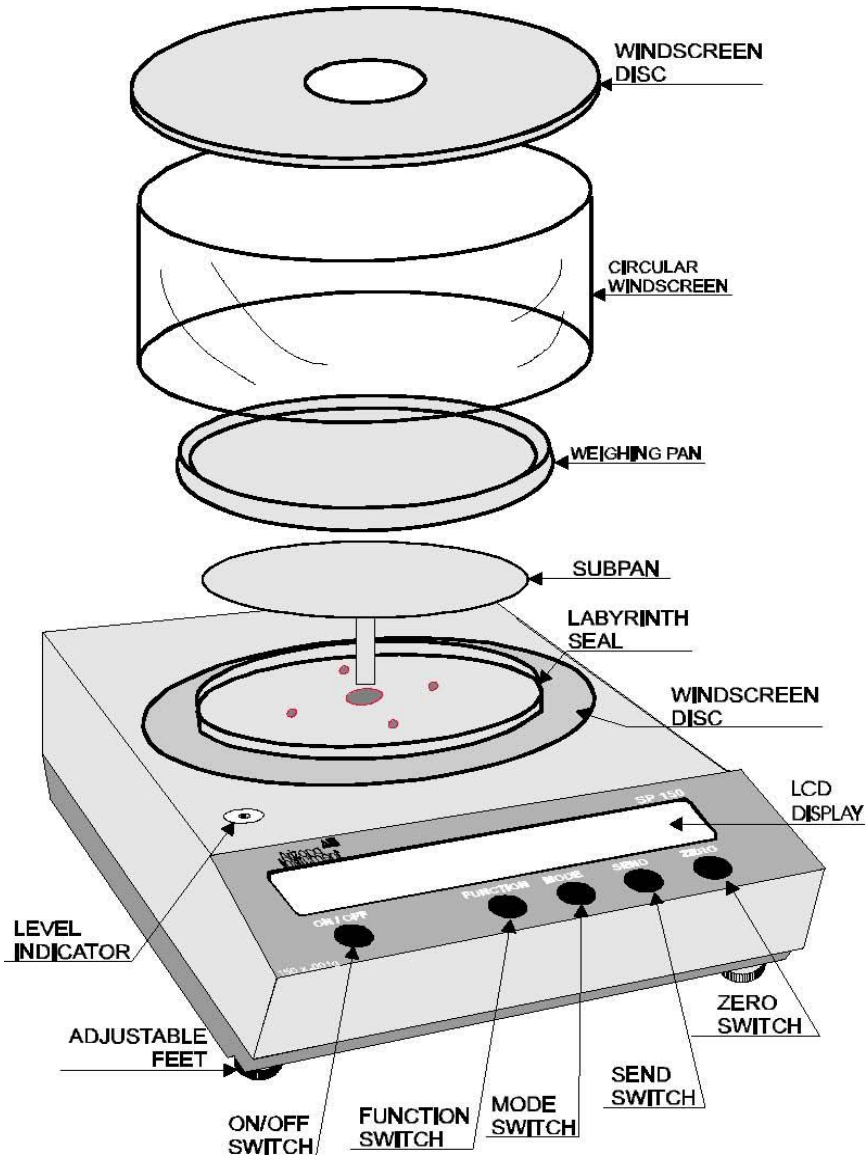
© Copyright 1999-2008 Arizona Instrument LLC

Table of Contents

SP-150 Electronic Balance	2
Unpacking and Setup	4
The On/Off Switch.....	6
Connecting the SP-150 to the Vapor Pro.....	7
The Zero Switch.....	8
The Mode Switch.....	8
The Send Switch	8
The Function Switch.....	8
CAL 1 [Auto-Calibration] - Using an external calibration weight.....	9
Capacity Tracker.....	10
Selectable Vibration Filters and Stability Indicator.....	10
SP-150 Rear Panel	11
RS-232 Interface Cable.....	11
RS-232 Front Panel Configuration	12
Troubleshooting Guide	14
Environmental Requirements.....	15
SP-150 Specifications	16
FCC Compliance.....	17
Limited Warranty	17
Extended Warranty	17
Returned Goods Policy	18
Appendix A - Front Panel Parts Counting.....	19
Appendix B - Weight Checking.....	20
TRADEMARK AND COPYRIGHT PROTECTION.....	21

Unpacking and Setup

The balance, weighing pans, remote power supply and windscreen are packed in a foam support to protect them from shock during shipping and handling. Save and reuse all packing material for future shipments. A null modem cable, a 100g weight and this user's manual are also packed with the balance.



Balance Full View

AZI SP-150 balances are equipped with a special clamping screw that locks the balance suspension during shipping. This screw must be loosened before the balance can be operated (see Figure 1).

- Locate the black knob, on the front center of the balance, underneath the display area.
 - Remove the paper tag.
 - Turn the knob, approximately one (1) turn counter clockwise, as shown in Figure 1, until it stops.

If the balance is shipped or moved long distances, the clamping screw should be re-tightened by turning the knob in the clockwise direction until resistance is felt, approximately one (1) turn.

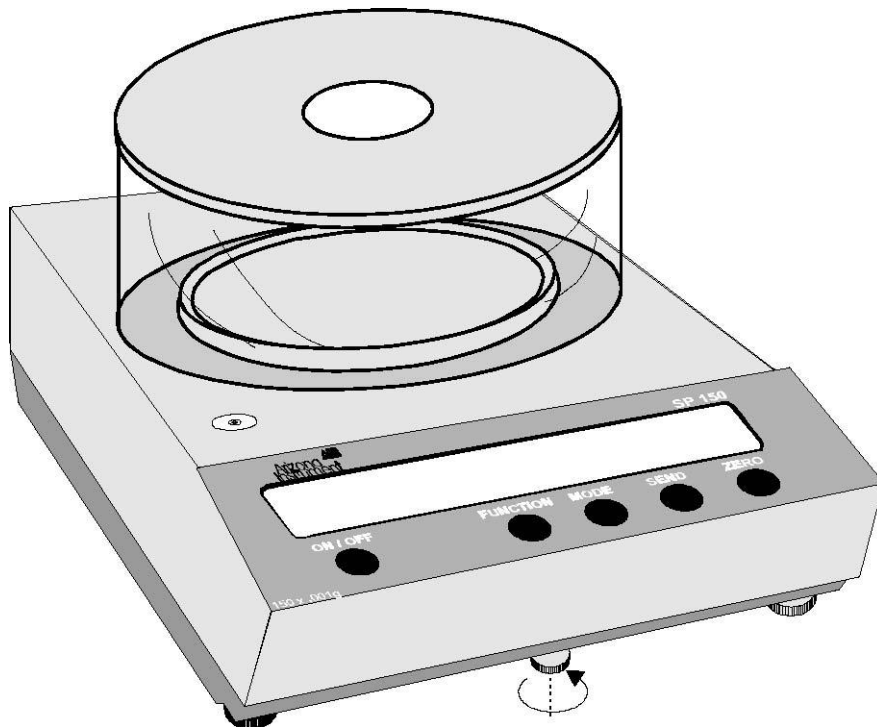


Figure 1 - Unlocking Clamping Screw

The environment in which your balance is used is very important. Air movement, temperature changes, vibrations, direct sunlight, etc. influence the performance of high precision balances. Therefore, place your balance on a solid, sturdy surface that is free of air currents and vibration. The surface should not be magnetic and should be located away from doors, windows, heaters, air conditioners and fans.

Level the balance by turning the front feet to center the bubble in the level Indicator.

Turn a foot clockwise to raise that side or counter-clockwise to lower that side of the balance.

Turn both feet together to raise or lower the front of the balance.

Before making any connections, verify that the power requirement shown on the remote power supply is compatible with the AC power outlet to which the balance will be connected. **First plug the round DIN connector into the rear panel receptacle. Then, plug the power supply into a grounded AC outlet. Do not alter or bypass the ground plug in any way. Doing so adversely affects the performance of the balance.**

NOTE: Your balance must be plugged in and switched on for at least one (1) hour, then calibrated, prior to use. Please see the calibration instructions on page 9.

The On/Off Switch

Press the ON/OFF switch and observe the turn on sequence shown below.

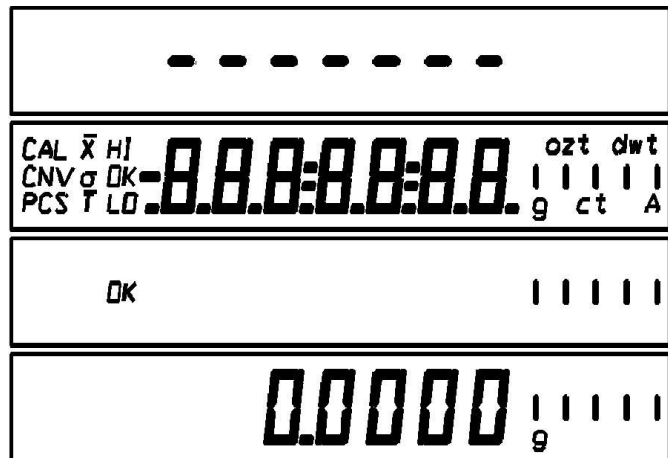


Figure 2 - Turn On Display Sequence

During this sequence the balance is doing an automatic systems check to verify it is functioning properly.

****NOTE:** The clamping screw must be unlocked before turning the balance on or the balance will not be able to complete the automatic systems check.

Connecting the SP-150 to the Vapor Pro

The balance is configured to interface directly with the Vapor Pro series of Moisture Analyzers. Weight readings at the balance can be transmitted directly to the Vapor Pro through the null modem cable connection.

To enable this communication between the balance and the Vapor Pro:

- Power to both units should be switched OFF.
- Connect the null modem cable (AZI P/N 200-0069) to the RS-232 connector at the rear of the balance. Connect the other end of the cable to the balance connector at the rear of the Vapor Pro.
- Switch the power to both units ON.
- On the Vapor Pro, press the **[Menu]** key. Use the **[Down]** key to highlight the SETUP MENU. Press the **[Selct]** key to access this menu. Highlight the EXT BALANCE SETUP option and press **[Selct]**. Highlight and select the SELECT BALANCE DRIVER option. Use the **[Edit]** key to select AZISP150 as the external balance. Press **[Quit]** and then **[Accpt]** key to program this option. Select the CHECK BALANCE COMM option to verify the cable is connected and that the Vapor Pro and the balance are communicating. Use the **[Esc]** key to return to the MAIN MENU.

If the Communication Check is not successful, the balance's communication settings need to be reset to their factory presets. Refer to **RS-232 Front Panel Configuration** on page 12 for instructions on resetting the balance to the required factory presets.

- From the MAIN MENU, select the MEMORY START MENU and then ADD/EDIT MEMORY START. Access the memory start to be edited using the **[Up]** or **[Down]** keys and the **[Selct]** key. At the SAMPLE WEIGHT ENTRY MODE option, select DIGITAL BALANCE.

When a test is run using that memory start parameter, the Vapor Pro will automatically check for data communication. The weight readings from the external balance will be displayed on the Vapor Pro display. Follow the display prompts to proceed through the weighing and testing sequence.

The Zero Switch

Pressing the ZERO switch at any time returns the display to zeros. When a weighing that has been zeroed out is removed from the pan, a negative reading is displayed. To return to zeros, press the ZERO switch.

The Mode Switch

Pressing the MODE switch starts the unit of weight cycle as follows: grams (g), carats (ct), pennyweights (dwt), troy ounces (ozt), and ounces (oz). Press the MODE switch a second time when the desired unit of measure appears. For Vapor Pro operation, verify that the balance is weighing in grams (g).

The Send Switch

The SEND button is not normally employed in everyday usage of the balance, although it is used in certain specific configuration procedures, as detailed later in this manual.

The Function Switch

Pressing the FUNCTION switch cycles the display through four functions as follows:

PCS - front panel parts counting

HI OK LO - check weighing

CAL 1 - auto-calibration

CAL 2 - factory set - **DO NOT USE**

CAL 2 is set at the factory and should never require further adjustment. The procedure for CAL1 begins on page 9. For the other two functions (PCS and HI OK LO), refer to the appendices beginning on page 19.

CAL 1 [Auto-Calibration] - Using an external calibration weight

Perform auto-calibration every time you move your balance. It is extremely important to use high quality weights and verify the balance has been warmed up for at least one (1) hour prior to calibration.

Procedure

Display Reading

Remove any containers or weights so that only the stainless steel pan is in place. Press the ZERO switch.

Zeros are displayed.

Press the FUNCTION switch.

Display cycles repeatedly through PCS, HI-OK-LO, CAL1, and CAL2.

Press the MODE switch when CAL 1 appears.

CAL 1 and a flashing 0 are displayed.

Wait 10 seconds then press the ZERO switch.

The display stops flashing. In approximately 10 seconds a weight value or two alternating weight values flash on the display.

Place the displayed weight or one of the alternating weights on the pan.

The display stops flashing and the selected weight are displayed.

Wait 10 seconds then press the ZERO switch.

The weight continues to be displayed while the calibration takes place (approximately 10 seconds). The display blanks, then displays "OK" and the calibration weight.

Remove the calibration weight.

The display returns to zeros and the normal weighing mode.

Capacity Tracker

The capacity tracker provides a graphic display of the used and unused portions of the weighing range. Each segment represents 5% of the balance's capacity and is illuminated as that portion of the capacity is used. The larger segments, representing $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and full load, flash as they are approached and then become solid again as they are exceeded.

Selectable Vibration Filters and Stability Indicator

All balances are equipped with three vibration filters and a stability indicator to adapt to varying weighing conditions. The balance is delivered set in the high (Fil HI) mode, which is the most aggressive mode. Less filtering (Fil nor or Fil Lo) can be selected for quieter conditions and faster response.

The stability indicator "OK" is illuminated when the balance has determined that all readings are within the filter parameters the user has selected. If the weight readings are outside the acceptable limit, the stability indicator will not light. The stability indicator can be disabled if desired.

To enter the vibration filter selection mode, proceed as follows:

Procedure

Turn balance OFF using the ON/OFF switch.

Hold the MODE switch down while turning balance on using the ON/OFF switch.

Press the SEND switch until the desired vibration filter is displayed. Then press the ZERO switch.

Press the SEND switch until the desired stability indicator setting is displayed and then press the ZERO switch.

Press the ON/OFF switch.

Press the ON/OFF switch.

Display Reading

Display blanks.

OK and the current filter, Fil Nor, balance Fil Lo or Fil HI is displayed.

OK SAVEd is displayed followed by the current stability indicator setting, Si on or Si oFF.

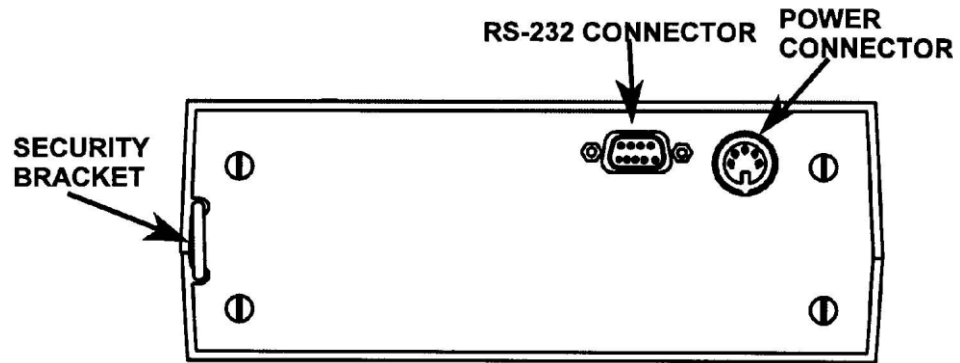
OK SAVEd is displayed followed by the vibration filter setting chosen in step 3.

The display blanks.

The balance returns to normal operation with the new vibration filter and stability indicator settings in place.

SP-150 Rear Panel

The rear panel of the SP-150 provides the power connector, an RS-232 connector, and a retractable security bracket. The security bracket may be extended to provide a convenient method of securing the balance.



SP-150 Rear Panel

RS-232 Interface Cable

Your balance is equipped with a bi-directional RS-232 compatible interface. The included Null Modem Cable (AZI P/N 200-0069) is a custom cable manufactured to the following diagram. Only this cable will provide the connections necessary for the SP-150 Balance to communicate with the Vapor Pro Moisture Analyzer.



SP-150's Null Modem Cable

RS-232 Front Panel Configuration

The RS-232 Configuration Mode allows changes to the baud rate, front panel control, software protocol, parity and auto send parameters. The balance is preconfigured at Arizona Instrument to communicate with a Vapor Pro.

Any changes to the recommended configuration will affect communication with the Vapor Pro.

It is not necessary to follow the entire configuration procedure if only one parameter is to be changed. Follow steps 1 and 2, and then use the MODE switch to cycle through the different parameters. When the parameter to be changed is displayed, toggle the setting using the SEND switch until the desired setting is displayed. Save the setting using the ZERO switch, and the balance will confirm by displaying "SAVED". Then, turn the balance off and then on again with the ON/OFF switch to return to normal operating mode.

To enter RS-232 configuration mode, proceed as follows:

Procedure	Display Reading
Turn balance off using the ON/OFF switch	Display blanks
Hold the SEND switch down while turning balance on using ON/OFF switch	The current baud rate is displayed
Press the SEND switch until br 9600 is displayed.	br 9600
Press the ZERO switch to save br 9600 as the BAUD RATE.	SAVED is displayed followed by br 9600 .
Press the MODE switch to move to the next parameter: LOCAL CONTROL	The current LOCAL CONTROL setting, LC on or LC off is displayed.
Press the SEND until LC off is displayed.	LC off
Press the ZERO switch to save LC off as the LOCAL CONTROL setting.	SAVED is displayed followed by LC off .
Press the MODE switch to move to the next parameter: SOFTWARE PROTOCOL	The current SOFTWARE PROTOCOL setting, Pr off or Pr on is displayed.
Press the SEND switch until Pr off is displayed.	Pr off
Press the ZERO switch to save Pr off as the SOFTWARE PROTOCOL setting.	SAVED is displayed followed by Pr off .
Press the MODE switch to move to the next parameter: PARITY	The current parity setting, PA EVEn, PA odd or PA none is displayed.
Press the SEND switch until PA none is displayed.	PA none

Press the ZERO switch to save PA none as the PARITY setting.	SAVEd is displayed followed by PA none .
Press the MODE switch to move to the next parameter: AUTO SEND	The current auto send setting, AS oFF or AS on is displayed.
Press the SEND switch until AS oFF is displayed.	AS oFF
Press the ZERO switch to save AS oFF as the AUTO SEND setting.	SAVEd is displayed followed by AS oFF .
Press the MODE switch to move to the next parameter: CONTINUOUS SEND.	The current continuous send setting, CS oFF or CS on is displayed.
Press the SEND switch until CS oFF is displayed.	CS oFF
Press the ZERO switch to save CS oFF as the CONTINUOUS SEND setting.	SAVEd is displayed followed by CS oFF .
Press the MODE switch to move to the next parameter: DISPLAY BLANKING.	The current display blanking setting, bL on or bL oFF is displayed.
Press the SEND switch until bL oFF is displayed.	bL oFF
Press the ZERO switch to save bL oFF as the DISPLAY BLANKING setting.	SAVEd is displayed followed by bL oFF .
Press the ON/OFF switch	The display blanks.
Press the ON/OFF switch	The balance is ready for use.

Changing any of these settings from the AZI factory presets is NOT recommended, and will affect communication with the Computrac Vapor Pro.

If any of the preset values are changed, use the above instructions to restore the balance's ability to communicate with the Vapor Pro by resetting the values to the preset AZI defaults listed.

Verify the balance's ability to communicate with the Vapor Pro as detailed in **Connecting the SP-150 to the Vapor Pro** on page 7 above.

<u>Settings Summary:</u>	
br	9600
LC	OFF
Pr	OFF
PA	NONE
AS	OFF
CS	OFF
bL	OFF

Troubleshooting Guide

NOTE: Many problems such as the balance remaining in the turn-on sequence, "weird" characters on the display or "garbage" on the display are caused by connecting the power supply to the balance incorrectly. The proper procedure is to connect the round DIN connector on the power supply cable to the balance then plug the power supply into the wall outlet.

<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>POSSIBLE SOLUTION</u>
The display is blank	Balance not turned on Power cable not plugged in No power from AC outlet	Press ON/OFF switch Plug in power cable Turn on circuit breaker or change AC outlets
OL appears on display	Maximum capacity exceeded	Reduce container weight Weigh sample in smaller increments
UL appears on display	Pan is not in place Balance is out of range Shipping clamp is on	Ensure pan is positioned properly Press ZERO switch Loosen clamp (see page 5)
Display is unstable	Drafts/air currents present Vibrations present	Install windscreen or relocate balance Isolate or relocate balance
Weight readings are incorrect	Balance is out of calibration Balance is not level Balance was not re-zeroed Unit of weight set incorrectly Sample touching windscreen	Re-calibrate balance Level balance Press ZERO before weighing Select proper weighing mode Reposition sample
Display stays in turn-on sequence	Sub-pan and/or weighing pan not in place Excessive draft or vibration Shipping clamp is engaged	Place pan(s) on balance Isolate or relocate balance Loosen clamp (see page 5)

Err 1 appears in display	Power supply connected to wall outlet before balance	Unplug power supply from wall then re-plug into wall
Err 2 appears in display	Calibration weight is incorrect	Use calibration weight that appears in display
Err 3 through 14 appears in display	Balance not warmed up Service is required	Plug in and turn on balance for 1 hour Call AZI Customer Service at 1-800-528-7411 or 602-470-1414

Environmental Requirements

This product is intended for indoor use at altitudes up to 2000 meters, Pollution Degree 1 or 2 in accordance with IEC 664 and transient overvoltages according to Installation Categories (Overvoltage Categories) I, II and III. For main supply, the minimum and normal category is II.

SP-150 Specifications

Weighing Mode	Single Range
Capacity	150 g
Readability	0.001 g
Tare Range	0-150 g
Repeatability (Standard Deviation)	0.001 g
Linearity	±0.0015 g
Stabilization Time	~ 3 seconds
Weighing Speed	Adaptive
Update Interval	200 ms
Data Interface	RS-232 bidirectional interface is standard. Baud rates are 300, 600, 1200, 2400, 4800, 9600 and 19,200
Pan Size	Circular 4.5 inch diameter
Operating Temperature	5 °C to 40 °C
Relative Humidity	80% for temperatures up to 31 °C decreasing linearly to 50% at 40 °C
Power Supply	115 Volts/60 Hz ± 10% 230 Volts/50 Hz or 60 Hz ±10%
Windscreen	Circular 6 inch diameter x 3.25 inches high
Housing (W x D x H)	7.5" x 11.25" x 3.25"
Weight	~ 9.5 lbs

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 their own expense.

Shielded interconnect cables and shielded power cords must be employed with this equipment to ensure compliance with the pertinent RF emission limits governing this device.

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

Limited Warranty

This Arizona Instrument Electronic Balance and its accessories are warranted against defects in materials and workmanship for one (1) year from the date of delivery. During the warranty period, Arizona Instrument will repair or, at its option, replace at no charge, components that prove to be defective. The equipment must be returned, shipping prepaid, to Arizona Instrument's product service facility. This limited warranty does not apply if the equipment is damaged by accident or misuse or as a result of service or modification by other than an Arizona Instrument LLC service facility. The foregoing warranty is in lieu of all other warranties expressed or implied including but not limited any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. Arizona Instrument LLC shall not be liable for any special, incidental or consequential damages whether in contract, tort or otherwise.

Extended Warranty

Extended warranty coverage can be purchased in a one, two or three year term at the time of balance purchase. Details are included on a separate information sheet accompanying the balance. Call Arizona Instrument at 1-800-528-7411 or 602-470-1414 for additional information.

Returned Goods Policy

Should it become necessary to return any item to Arizona Instrument for any reason, please contact our Customer Service Department at (800) 235-3360 or (602) 470-1414 to obtain a Return Materials Authorization (RMA) Number. When you call, please be ready to provide the serial number and a description of the problem. Frequently we can provide self-help information that will eliminate the need for returning the unit(s). You may also obtain an RMA Number by contacting Customer Service by e-mail at support@azic.com or through the AZI Home Page at <http://www.azic.com>.

If equipment return is required, please pack the item in the original box and packing materials. As an alternate, place equipment in a snug-fitting box, then pack that box in a larger box with at least four inches of packing material between the two boxes. Arizona Instrument does not assume responsibility for under-packed items.

Please include the RMA# and the name and phone number of the person we should contact regarding repair question(s).

Appendix A - Front Panel Parts Counting

Access to the counting function via the front panel is not available if bi-directional RS-232 communication is enabled, i.e. if the front panel local control is off, which is the default. Turning local control on in order to use the parts counting feature will disable communication with the Vapor Pro. Refer to **RS-232 Front Panel Configuration** on page 12 for more information on setting local control on or off.

Procedure

Press the FUNCTION switch.

Press the MODE switch while PCS appears on the display.

Place the container on the pan, wait 10 seconds, then press the ZERO switch.

Place 10 pieces in the container, wait 10 seconds, then press the ZERO switch.

If you need a larger sample, add pieces (the balance will count them) until the decimal part is near 0.7 or 0.3. Then press the ZERO switch.

When you are satisfied the sample is large enough, press the ZERO switch once again.

When you wish to count something else, press the MODE switch.

If you want to exit the counting mode, press the MODE switch again.

Display Reading

Display cycles repeatedly through PCS, HI-OK-LO, CAL1, and CAL2.

PCS and 0 flash. This is a prompt to zero the balance with the container you will be using to weigh the initial sample.

PCS and 10 flash. This is a prompt to place 10 pieces in the container and press zero.

PCS continues to flash and OK appears on the display while a stable weight is obtained. Then 10.000, or something very close to it appears on the display. The number of decimal places depends on the weight. PCS continues to flash. This prompts you that you may now increase the size of the sample if you wish. The decimal places are an aid. When adding more samples, if the decimal part approaches .5 you cannot be sure of the exact count.

The balance will round to the nearest whole number but still show the decimal places. This step may be repeated as many times as you wish.

The balance rounds to the nearest whole number, the decimal places disappear, and PCS lights steadily.

You are now back at step 2 with a flashing PCS and 0.

You are now in the weighing mode you used just before selecting pieces.

Appendix B - Weight Checking

The following procedure checks the weight of individual parts against user-programmed upper and lower weight limits.

Procedure

Press the FUNCTION switch.

Press the MODE switch when HI-OK-LO appears on the display.

Press the ZERO switch.

Place weight on pan that represents the upper limit of the acceptable weight span.

Press the ZERO switch.

Remove upper limit weight and place weight on the pan that represents the lower limit.

Press the ZERO switch.

Remove low limit weight.

Display Reading

Display cycles repeatedly through PCS, HI-OK-LO, CAL1, and CAL2

HI, LO and O flash.

HI flashes and zeros are displayed.

HI flashes and weight is displayed.

LO flashes and upper limit weight is displayed.

LO flashes and weight is displayed.

HI-OK-LO briefly appears then OK and the low limit weight are displayed.

LO appears and zeros are displayed.

The balance is now ready to check the weight of parts. The balance displays OK along with the weight of the part if the part is within the selected limits. If the part is too heavy, HI and the weight are displayed. If the part is too light, LO and the weight are displayed. The limits are stored until the balance is turned off. To exit weight checking, press the MODE switch and the balance will return to normal operation.

TRADEMARK AND COPYRIGHT PROTECTION

Computrac, Vapor Pro, Arizona Instrument, and the stylized AZI are all registered trademarks of Arizona Instrument LLC. Instrument firmware is copyright protected.

Copyright 1999-2008 Arizona Instrument LLC. All Rights Reserved.

Arizona Instrument LLC
SP-150 Electronic Balance User's Manual
Part Number: 700-0014, Revision D
October 2008

If you have any questions regarding the operation of this instrument, please call our toll free number (800) 528-7411 or (602) 470-1414. You may also send a fax to (480) 804-0656.

Arizona Instrument LLC
3375 N Delaware Street
Chandler, Arizona 85225 USA

<http://www.azic.com>

email:

azi@azic.com - General
intl@azic.com - International
support@azic.com - Customer Service