Precision Industry Electronic Balance Owner's Manual

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Introduction

Thank you for purchasing a D&T precision industry balance. The fine workmanship and durable construction should provide years of reliable service. While your balance is easy to operate, it is advisable to read this guide carefully before use. It is designed to help you perform and related operations quickly and accurately.

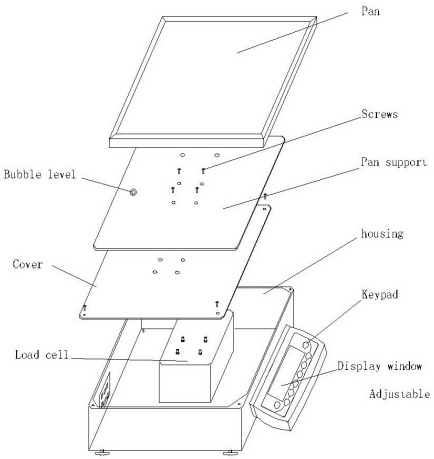
This manual is divided into five major sections. Section one, “understanding your balance”, explains the features and specifications, the various keys, displays, and messages you will enCOUNTer while using your balance. Section two, “installing your balance”, explains where to put your balance, how to level it and install the pan, and how to get start. Section three, “using your balance”, provides the detailed instructions necessary to perform various operations. Section four, “setup” explains how to setup your balance when you first use your balance, include setting the print function, baud rate, backlight, checking limiES, restoring the factory default setups and enabling uniES of measure. Following section five are appendices which include RS232 information, accessory information, troubleshooting, and a warranty.

Typographical conventions used in this manual include the following:

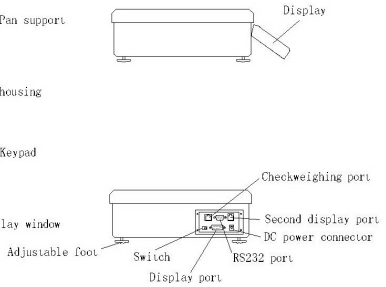
1. BOLD UPPER CASE CHARACTERS indicate specific keys on the balance keyboard.
2. “Quotation marks” enclose messages seen on the balance display.

Section one
Understanding Your Balance

1. Overview of the balance



Front view of balance



Rear view of balance

2. ES serial balance specification

Model	Capacity	Readability	Repeatability	Linearity	Weighing Pan Dimensions
ES-8K	8Kg	0.1g	±0.1g	±0.2g	275×327mm
ES-10K	10Kg	0.1g	±0.1g	±0.2g	275×327mm
ES-15K	15Kg	0.1g	±0.1g	±0.2g	275×327mm
ES-20K	20Kg	0.1g	±0.1g	±0.2g	275×327mm
ES-25K	25Kg	0.1g	±0.1g	±0.2g	275×327mm
ES-30K	30Kg	0.1g	±0.1g	±0.2g	275×327mm
ES-50K	50Kg	0.5g	±0.5g	±1g	275×327mm
ES-60K	60Kg	0.5g	±0.5g	±1g	275×327mm

3. Features of ES serial electronic balance:

* High Accuracy

* Signals LOW TARGET HIGH
* Standard RS232 Communication Port
* Independent Console
* Multiple Weighing UniES
* Automatic Calibration
* Large LCD displayer
* Accessorial displayer
*counter percent weighing
*stainless large pan,
*over-weighing protect
*monitor height angel adjustable

Key Board Function

CAL InstrucES the balance to accept calibration data

TARE Assigns the pan and whatever is currently being weighed a value of zero.

POWER To turn the display off, To turn the display on press this key again.

UNIES ConverES weighing uniES (for example, change from grams to ounces).

PRINT Sends to a printer or other peripheral device the information on the display.

PERCT InstrucES the balance to display percent weight

COUNT Determines a stable reference point and displays the preprogrammed Sample sizes (10,25,50,100,500,1000 pieces).

MANU InstrucES the balance to enter the MENU sys

LCD Indicator

Ok Reading shown is stable.

G Reading shown is given in grams.

Oz Reading shown is given in ounces.

Ct Reading shown is given in caraES.

Dwt Reading shown is given in pennyweight

% Reading shown is given in as a percent weight.

PCS Reading shown is given in as a counting

is securely fastened to both the balance and the peripheral. Next, reset the balance's baud rate and parity to match the external device and make certain the data formaES are identical. If data transmission or reception is still not possible, check that the cable is the correct type. (It may be necessary to cross the receive and transmit lines of interface. That is, the receive line of the balance must connect to the transmit line of the external device. Likewise, the transmit line of the balance must connect to the receive line of the external device. Special cable can be purchased for this purpose from a computer dealer) see appendix for detailed information.

If the problem still persisES, contact your dealer or Dertork Co., Ltd.

Blank display

Check the cable connection at the balance from power supply. Also, check to make sure the AC mains is providing power to the power supply and that the connection to the mains is intact. If the display remains off, check the cable connection at the balance from the display. And unplug the balance's power source, and then plug the unit in again. If the problem still persisES, contact your dealer or dertork Co., Ltd.

Standard Warranty

D&T instrument Co., Ltd warranES the balances it manufactures to be free from defecES in material and workmanship. Upon return, transportation charges prepaid, to an authorized service center within one year of the date of purchase, dertork or iES authorized agent will repair or replace. At iES option, any balance which it determines to contain defective material or workmanship and will return said balance to purchase, transportation prepaid. Dertork will not be obligated, however, to repair or replace balances which have been repaired by unauthorized parties, abused, improperly installed, altered, or otherwise misused or damaged, even if by accident, in any way. Dertork will not be responsible for any dismantling, reassembly or reinstallation charges.

Nothing in this warranty shall be construed as a warranty for merchantability or fitness for any special use or purchase, and this warranty is in lien of all other warranties, expressed or any special, indirect, incidental or consequential damages claimed in connection with the balances' performance or availability.

Shielded cables must be used with this unit to ensure compliance with the class a FCC limiES.

Computers which require handshaking need a connection between two pins on the computer's connector named DTR and DSR (data terminal ready and data set ready). CES may also need to jumpier to RES at your computer interface (clear to send and request to send).the maximum recommended cable length is 15 meters. The cable can be longer if it has ＜2500 pf capacitance . The load impedance of the device connected should be between 3000 and 7000 ohms with no more than 2500 pf shunt capacitance.

Routine Maintenance

Daily maintenance

1. Remove the weighing pan and thoroughly clean (top, bottom and edges) to remove any dirty which may have accumulated.
2. Note: do not use water, paint thinner or mild solvent is recommended.

Monthly maintenance

1. calibration the balance
2. For safety reasons, check that the AC mains cable has not visible signs of damage.

Troubleshooting

If the balance will no longer follow your instructions, unplug it from iES power source, then plug the unit in again. If any unusual messages appear during warm up, or if the balance does not return to normal operation, contact your dealer or Tianjin dertork co., ltd.

If the balance display "------"for an extended period of time, or the displayed readings is unstable, too much vibration or draft may be percent. Relocated the balance away from the source of vibration or shield the balance from the draft. If it is continues, service may be required.

If the balance displays "nocal" during calibration, check to make sure you are using the correct calibration weight. (this calibration procedure can only correct for ±1% span shift).

If you are experiencing difficulty in calibrating or printing, check the set up of the balance. restore the factory default setups.

If the RS232 interface does not function correctly, first make certain the RS232 cable

Display Message

-------	The balance is developing a stable reading
Unable	the balance is unable to perform your requested operation. press the TARE key and select another operation.
HHHHHH	the weight on the pan exceeds the capacity of the balance.
LLLLLL	the pan is not properly seated or has been removed.

Section two
Installing Your Balance

1. **locating your balance**

   The rugged design of your ES balance ensures that it will be able to operate well in the typical factory or office environment. Nonetheless, you should always treat your balance as you would any other piece of precision equipment, locating it on a clean dry surface, protected from draft and vibration.

2. **level your balance**

   Your balance has four adjustable feet; the bubble level is located in the center underneath the weighing pan. Adjust the four feet until the bubble is centered in the circle.

3. **installing the weighing pan**

   Next, place the pan over the pan support.

4. **connecting the display**

   Attach the cord coming out of the display to the weighing base port. If you would like to mount the display to the base, refer to the step below.

   1. Line up the display with the two spring loaded screw washers on the base.
   2. Press the display onto the base in order to engage the screw heads and slide the display to the left.
   3. Press down on the display to secure it into place.

   To remove the display, reverse the procedure listed above.

   1. Lift up the display until it reaches iES upper limit.
   2. Movеit down slightly as you slide it to the right.
   3. Once in iES farthest right position, the display can be wiggled off.

   If you would like to mount your display to the attached pole, refer to the step below.

1. Line up the clip hole on the back of display with the hole of pole.
2. Mount the screw through the hole, and tight the adjustable nut.
3. Adjust the display angel to comfort you can read the data easily.

5. Power the balance.

To power up your balance, insert the appropriate end of AC adaptor into an electrical outlet. Now insert the connector end into the back of the balance. The balance draws very little current from an outlet, and should always remain plugged in. the display may be turned off by pressing down the power key. This keeps your balance always ready to use with no "warm up" time.

6. Display test

When your balance is first power on, it displays the model such as ES030. and then it automatically runs through a display test lasting about thirty seconds, showing all possible message which might be displayed. And then setting iESelf to zero. The balance is then ready to be used. For best accuracy allow the balance to warm up for 25 minutes prior to using or calibrating.

Section three
Using Your Balance
Basic Weighing

To weigh a sample on your balance, use the following procedure:

1. Press the **TARE** key to zero the display.
2. Place the object to be weighed on the pan.
3. Wait for the "ok" indicator, and then read the weight from the display.

Weighing with a Container

To weigh objecES or liquids without including the weight of the container, use the following procedure:

1. Place the empty container on the pan. Press the **TARE** key, the balance will display "------"and return to zero.
2. Wait for the "ok" indicator, place or pour objecES or liquids into the container.
3. Wait for the "ok" indicator, the net weight will be displayed.

Converting Weighing UniES

Your balance is capable of weighing in any of the uniES listed in the "LCD INDICATORS" portion of this manual. To convert from one unit to another, simply press the **UNIES** key. Each time you press the key, the display converES to the unit

The first six digiES represent the number field. A sign (±)always precedes the number and a decimal point is always transmitted. Numbers less than six digiES long are preceded by spaces.(messages, when transmitted, are sent in the number field.)

Note: the position of the decimal point will depend on the readability and uniES the balance is displaying. The sign will be adjacent to the leading digit.

"H" and "I" are spaces.

"J" is the unit character. It describes the uniES of the number being transmitted. Your balance will transmit G for grams, O for ounces, C for caraES.

"K" is stable character. This character corresponds to the "ok" indicator on the display. A (space) means the reading is not stable. "S" means the reading is stable.

The immediate print output is always transmitted with a carriage return and line feed. If the balance is set to a specific number of line feeds, these will be transmitted with a carriage return.

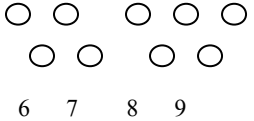
The RS232 Interface Hardware

Although Dertork balance can communicate with almost any RS232 device, the build-in interface does not include the complete protocol. Only the transmit and receive lines of the standard interface are used. This should not present any interfacing problems in most applications.

The data format is 1 start bit
8 data biES include parity
1 stop bit
10 biES per frame (framing errors ignored)

Note: the balance will transmit using the parity selected. However it does not check the parity it receives. Use an RS232 cable to connect the external device to the balance, or construct one following the instructions below.

Connect a high quality, shielded cable with a DB9S (D-subminiature 9 pin female connector) using the following printout:



pin	description
2	TXD- scale transmiES data
3	RXD-scale receives data
5	RRD- signal ground

Note: "handshake" signals, such as "clear to send" (CES) are not used. The peripheral must have a minimum buffer (15 characters)

9. After set high and low limiES, the balance will display “SET HI”, press the **TARE** key until display “enable”.

10. Press **COUNT** Key and the balance will return to check weighing mode.

Note: if you would return to normal weighing mode, select the disable and press the **COUNT** Key, the balance
will return to normal weighing mode.

If youwould view the weighing limiES, perform the follow procedure:

1. press the **MENU** key, the display will read “print”
2. press the **TARE** key repeatedly until the display reads “INSPCT”
3. Press the **COUNT** Key, the display reads the high limit weigh.
4. Press the **TARE** key, the display reads “set hi”. Press the **TARE** key, the display reads “set lo”. Then press the **COUNT** Key, the display will reads the low limit weighing.

Note: 1. to escape anytime during this procedure, press the **TARE** key until “ESC” is display and press the **COUNT** Key.

2. If you would clear the setups, repeatedly press the **TARE** key when you enter the check weighing mode until the display reads “clear”, and then press the **COUNT** Key. All of you set the data will be cleared.

3. If you finish the high limit and low limiES setups, all of the data will be stored in memory.

Appendix
Communication with a Computer

The balance keyboard functions can be accessed via the RS232 interface. The following commands are available:

U: =uniES key T: =TARE key C: =calib key

P: = print key %: = perct key #: = immediate print

Receiving data using the immediate print symbol

When a balance is connected to a computer, it is suggested that immediate print (#) be used. In response to this command the balance will transmit whatever number or message appears on the balance display. The string format output is shown below:

A B C D E F G H I J K L M

next in line on the balance. Continue pressing the key until the unit you wish to use is displayed. The order of uniES is as follows: GRAMS-OUNCES-CARAES-DWT.

Note: if a weighing unit has been disabled, it will not be displayed. Refer to section four “Enabling uniES of measure”.

Counter Mode

To count a number of like objecES on the balance, use the following procedure:

1. Place a container on the balance, press the **TARE** key.
2. press the **COUNT** key, each time the key is pressed requested sample size will increase(i.e.,10,25,50,100,500 PCS)
3. Place the requested number of pieces in the container, press the **UNIES** key.
4. Fill the container to the desired number of pieces.
5. Remove the pieces from the container and press the **TARE** key to return to the weight display.

Percent Deviation

To calculate the amount by which a weight varies from a reference, follow this procedure:

1. Press **TARE** key.
2. Place the reference weight on the pan.
3. Press the **PERCT** key. After acquiring a stable reading, the display will read “100.0”,or “100.00” depending on the amount of weight applied and the % LCD will be lit.
4. Press the **TARE** key, after acquiring a stable reading, the display will read “0.00” or “0.0” depending on the amount of weight applied. This display now shows percent deviation.
5. Remove the reference weight.
6. Place the weight to be measured on the pan.
7. Wait for the “ok” LCD to light, read the display, the display indicates percent deviation from the reference.
8. Remove the weight.
9. Repeat step 6-8 as many times as desired.
10. Press uniES to return to weighing.

Note: to display a % of a reference weight, skip step 4.

Check Weighing

If you want to judge objecES are in the range of your specific requirement, just need setup the limiES of the objecES.

1. Setup the objecES' limiES and start check weighing mode.(refer to setup section)
2. Press **TARE** key
3. Place the objecES to be measured on the pan.
4. After acquiring a stable reading, the display will indicates "LOW" or "HIGH" or "OK".
5. "OK" means the objecES weight is in the range of your specific requirement. "LOW" means the objecES weight is lower than your specific requirement. "HIGH" means the objecES weight is higher than your specific requirement.

Print Out Information

Your balance is designed to print out the displayed weight when connected to an optional serial printer. To print using the thermal receipt/label printer, follow the instructions below:

1. Connect the printer's AC adaptor to the proper electrical outlet.
2. Make sure the printer is turned on (as indicated by the printer's green light). If the printer is not on, press the power button.
3. Load the appropriate paper or label stock into the printer.
4. Connect the printer to the balance's RS232 connector using the cable provided.
5. Perform the necessary weighing procedures on the balance.
6. Press the **PRINT** key on the controller.

NOTE: if use label stock, the form feed command must be programmed in user setups (see appendix). When using a printer, set the baud rate and parity of your balance to match the printer (see appendix, user setup to select the print mode, baud rate and parity).

Repetitive Printing

It is sometimes desirable to measure weight at fixed intervals of times. One use of this procedure is evaporation studies. To print out weight at fixed intervals, refer to SETTING THE PRINT FUNCTION: User setups once. Once the time interval has been selected proceed as follow:

1. press the **MENU** key, the display will read "PRINT"
2. Press the **TARE** key repeatedly until the display reads "backlight".
3. Press the **COUNT** Key, the display will be read "1 nin" (after 1 minute will be off when there is no any operation).
4. repeatedly press the **TARE** key until you select the desired time ,(1,2,3,5,10,30,60) and then press the **COUNT** key. The balance will return to normal weighing mode.

   Note: to escape anytime during this procedure, press the **TARE** key until "ESC" is display and presses the **COUNT** Key.

Checking Setups

The check weighing function can be programmed to turn certain weighing limiES on or off. If you want to judge objecES are in the range of your specific requirement, just need setup the limiES of the objecES. To enable or disable certain limiES of measure, perform the following procedure

1. press the **MENU** key, the display will read "PRINT"
2. press the **TARE** key repeatedly until the display reads "INSPCT"
3. press the **COUNT** key , the display will be read "SET HI".(high limit weight)
4. Press the **COUNT** Key, the display will be read "0.000" which is initial in factory.
5. Press the **COUNT** Key, the display will be read "set dp", repeatedly press the **TARE** key until you select the desired point location. And then press the **COUNT** Key, the display will read "0.0".
6. Press the **COUNT** Key or **TARE** key, each press **COUNT** Key and release this key increases the display by one **COUNT**. Pressing and holding continuously scrolls the displayed readings. Press the **TARE** key will decrease the display by one **COUNT**. Pressing and holding continuously scrolls the displays readings until it match the targeted weight high limiES.
7. Press the **MENU** key, the targeted weight high limiES will flash. When you need to modify the display readings, press the **TARE** key for modifies the targeted number. When you reach the correct readings press the **COUNT** Key and the display will say "SET HI".
8. Press the **TARE** key to select the "set lo" (setup the low limiES). Same as above.

complete procedure (which ends with dwt) the change will not take effect.

Frmware Version

The operating software in your balance has a reference number. To display this number, follow the procedure below.

1. press the **MENU** key, the display will read “PRINT”
2. Press the **TARE** key three times, to display the “ver” for reference number.
   Note: to escape anytime during this procedure, press the **TARE** key until “ESC” is display and presses the **COUNT** Key.
3. Press the **COUNT** Key to display the software reference number, and then press the **TARE** key to return to the normal weighing mode.

Restoring the Factory Default Setups

The many features in this section allow the user to customize the balance to suit a particular application. However, in doing this it is possible to inadvertently set up the balance in such a way that it dose not operate as expected. To reset the factory defaulES so that the :**COUNT** key will select display response rate, print key will print a stale reading, 2400 baud , no parity, all uniES enabled. Perform the following steps:

1. press the **MENU** key, the display will read “PRINT”
2. Press the **TARE** key repeatedly until the display reads “initia” for factory defaulES.
   Note: to escape anytime during this procedure, press the **TARE** key until “ESC” is display and presses the **COUNT** Key.
3. Press the **COUNT** Key to restore the original factory defaulES. The balance will display “BUSY” and then return to the normal weighing mode.
   Note: restore the factory defaulES will return your balance to the entire factory spas and temperature calibration settings. You must recalibrate (span) your balance after restoring the factory defaulES. If you are experiencing a temperature included offset, you should also run the temperature compensation procedure.

Backlight Setups

The backlight function can be programmed to turn off after a certain interval seconds when there is no any operation. To enable or disable backlight, perform the following procedure.

1. Press the **PRINT** key to begin the repetitive printing procedure.
2. Press the **PRINT** key again to stop the procedure.

Interface with Computer

Your balance has a RS232 serial port and is designed to interface with computer equipment. If your balance is connected to a computer, follow the instructions in appendix.

Section four
User Setups

Your balance has a setup mode that can be used by the operator to optimize the balance’s performance. To enter the menu presses the **MENU** key. To view the current menu options, press the **TARE** key repeatedly. To select the displayed option, press the **COUNT** Key.

Calibration

o perform a span calibration, use the following procedure:

1. Press the **TARE** key to zero the balance.
2. Press the **CALIB** key and the balance will display iES full scale capacity calibration point. To calibrate the balance at full scale go to step 3. To calibrate at one half of the full capacity, go to step 4.
3. Place the calibration weight on the pan and press the **CALIB** key. The display will read “ ACAL” and then display the value of the weight on the pan. The balance is now in the normal weighing mode. Once the weight is removed from the pan, the display will return to zero.
   To restore the factory calibration, press the **TARE** key twice in step 3 to display “USPAN” the press the **COUNT** Key, to escape, press the **TARE** key three times in step 3 to display “ESC” then press the **COUNT** Key.
4. Press the **TARE** key and the balance will display the capacity which is half of full scale. Go to step 3 to finish the calibration procedure.

Note: if the test weight varies by ±1% from the factory calibration, the span calibration will not be accepted and “NOCAL” will be displayed.

Setting the Print Function

The **PRINT** key can be setup to send readings to a printer or computer under different parameters via the RS232 port. The selectable print function is: stable print which will only print once a stable reading is attained. Instant print which will print

immediately after the print key is pressed (note: the reading may not be stable) and interval print which may be programmed to print at predetermined time intervals. The number of line feeds also is set for label printing. The print function is separate from the line feed setup, i.e., set the print function first then re-enter the print MENU to program the number of line feeds.

To set the print key function, use the following procedure:

1. Press the **MENU** key, the display will read "PRINT". Note: to escape anytime during this procedure, press the TARE key until "ESC" is displayed, and then presses the **COUNT** Key.
2. Press the **COUNT** Key to enter the print menu. The display will read "STABLE" for stable print.
   a. for stable print
      Press the **COUNT** Key to select the stable print mode. The balance will return to the normal weighing mode.
   b. for instant print
      Press the **TARE** key once to display "INSTAN" for instant and then press the **COUNT** Key. The balance will return to the normal weighing mode.
   c. for interval print
      Press the **TARE** key twice to display "INTER" for interval print and then press the **COUNT** Key, proceed to step 5.
   d. For line feed.
      Press the **TARE** key three times to display "LINEFD" for line feed and then press the **COUNT** Key. Proceed to step 6.
3. To view the predetermined print intervals (in seconds) press the **TARE** key repeatedly. When the desired time interval is displayed, press the **COUNT** Key. (Select zero for continuous printing.)The balance will then return to the normal weighing mode. Pressing the **PRINT** key will print the displayed weight after each selected time interval (e.g., 90 seconds). To interrupt the interval printing presses the **PRINT** key again. To reactivate, press the **PRINT** key.
   Note: print intervals can vary up to ±0.2 seconds depending on weight variations.
4. To view the preset number of line feeds available (0~18) press the **TARE** key repeatedly. When the desired number of line feeds is displayed, press the

COUNT Key. The balance will then return to the normal weighing mode.

Setting the Baud Rate

The balance is capable of interfacing with a wide variety of computer devices. To set the baud rate (the rate at which the scale communications with a computer or printer) and parity, use the following procedure:

1. press the **MENU** key, the display will read "print"
2. Press the **TARE** key, the display will read "baud".
   Note: to escape anytime during this procedure, press the **TARE** key until "ESC" is display and presses the **COUNT** Key.
3. Press the **COUNT** Key to enter the baud rate menu. The display will read 300. To view the other baud rates press the **TARE** key repeatedly.
4. When the desired baud rate is displayed, press the **COUNT** Key to select it. The display will then read "parity".
5. Press the **COUNT** Key to enter the party menu. The display will read "NONE" for no parity. To view the parity menu press the **TARE** key.
6. When the desired parity (none, odd, even) is displayed, press the **COUNT** Key. The balance will then return to the normal weighing mode.

Enabling UniES of Measure

The uniES function can be programmed to turn certain weighing uniES on or off. To enable or disable certain uniES of measure, perform the following procedure.

1. press the **MENU** key, the display will read "PRINT"
2. Press the **TARE** key twice, to display the "UNIES" for the uniES menu.
   Note: to escape anytime during this procedure, press the **TARE** key until "ESC" is display and presses the **COUNT** Key.
3. Press the **COUNT** Key to enter the uniES menu and the display will read "enable".
4. Press the **COUNT** Key. The first selection display is "g yes" which represenES grams enabled. To enable grams press the **COUNT** Key. To disable grams, press the **TARE** key to display "g no", and then press the **COUNT** Key. These yes/no selections are also displayed for ounces (oz), caraES (ct) and dwt.

Note: to enable or disable any unit of measure, the procedure outlined above must be completed for each unit. If you make a change and escape before finishing the