# 7000XL Series

Digital Weight Indicator

# Technical Manual

MAN330 – Rev 5.3 Doran Scales, Inc. www.doranscales.com

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# Introduction

Thank you for purchasing a Doran Scales product. Please read this manual to ensure obtaining all the benefits that the indicator can provide. This manual is intended for revision 5.3 and greater scales. If required, Doran can upgrade the software in your scale to the current revision. Please contact the Doran Scales Technical Support Department at tech@doranscales.com for upgrade details.

## Unpacking Your Scale

Before unpacking your Doran scale, please read the instructions in this section. Your new scale is a durable industrial product, but it is also a sensitive weighing instrument. Normal care should be taken when handling and using this product. Improper handling or abuse can damage the scale and result in costly repairs that will not be covered by the warranty. If you notice any shipping damage, notify the shipper immediately. Please observe the following precautions to insure years of trouble-free service from your new scale.

- DO NOT drop the scale.
- DO NOT immerse the scale.
- DO NOT drop objects on the platform.
- DO NOT pick up the scale by the top of the weighing platform.
- Carefully remove the scale from the shipping carton.

| 7000XL Indicator Specifications | |
|---|---|
| NTEP Certificate | Class III – 10,000d; Cert. #99-129A4 |
| CWM Certificate | Class III – 10,000d; Cert. #AM-5347 |
| Enclosure | 304 Stainless Steel |
| Product Dimensions | 10” W x 6.75” H x 3.5” D |
| Environmental Protection | IP69K |
| Legal for Trade Temperature Range | 14 F to 104F (-10 C to +40 C) |
| Resolution Range | 200d to 50,000d |
| Analog Signal Sensitivity | 0.16 μV/e minimum, 0.5 μV/e typical |
| System Linearity | 0.01% full scale |
| Analog Signal Range | -0.5mV/V to 5 mV/V with 4 and 6 wire input |
| Excitation Voltage | 5 VDC |
| Number of Load Cells | Up to 8 350 Ohm |
| Scale Inputs | One |
| Calibration Range | Calibrate between 100% and 2% of capacity |
| Power Input | 100 – 240VAC 50/60Hz |
| Battery Option | Internal Rechargeable Sealed Lead Acid Battery<br>6VDC, 60 hours of continuous use, 1000 recharge cycles |
| Display | 0.8" high, 6 digit LED |
| Displayed Units | lb, kg, oz, g, lb:oz |
| Capacity Range | 1 to 999,000 lb |
| Serial Interface | Two Bi-directional RS-232 ports standard |
| Optional Communication Options | Ethernet<br>Wi-Fi – 802.11b/g<br>Bluetooth – 4.0, Class 3, SPP Protocol<br>USB – 2.0, CDC Protocol<br>4-20 mA – Active current loop |
| Controls | ZERO, UNITS and PRINT |
| Digital IO | Two remote switch inputs<br>Eight outputs – 4.7 or 12 VDC configurable up to 800mA. current-sinking Darlington pair |

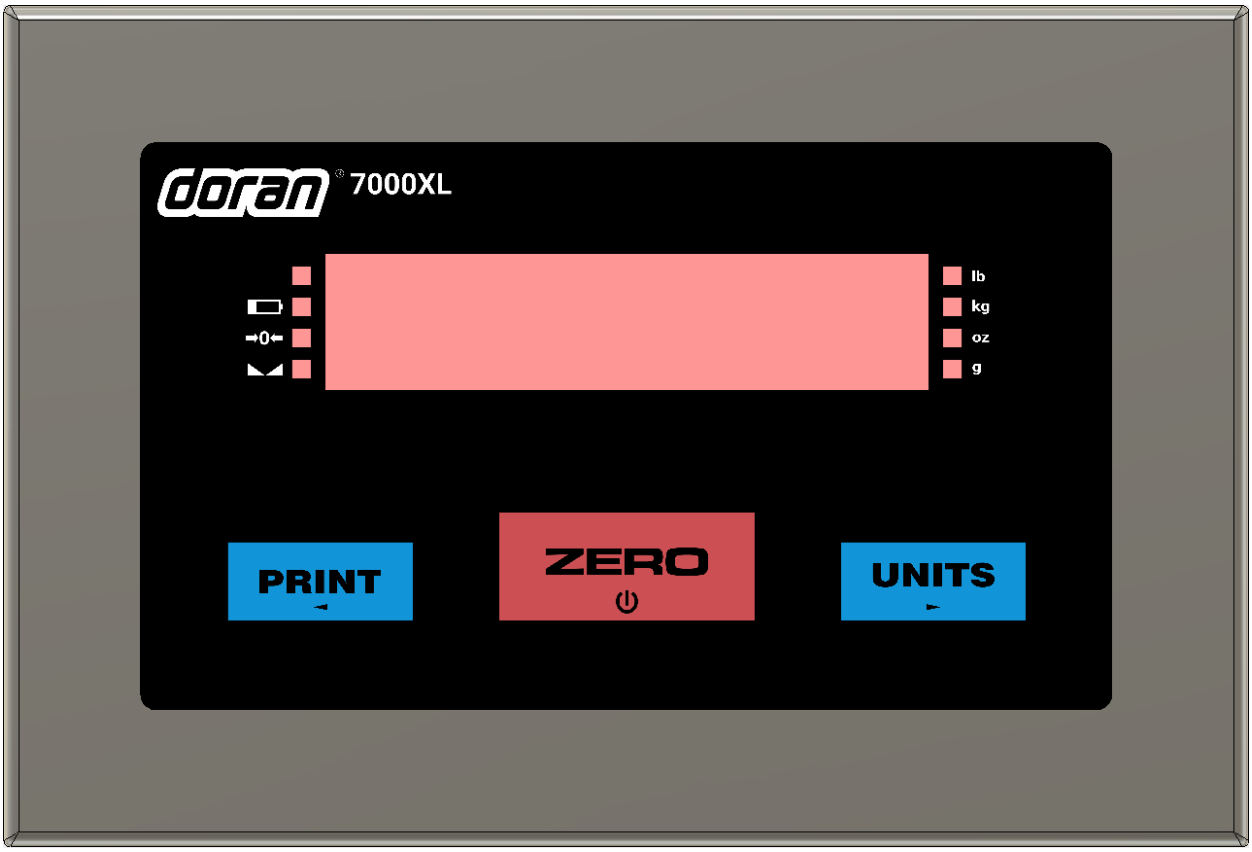


Fig. 1: Model 7000XL Front Panel Layout

The operational controls for the Model 7000XL consist of the ZERO, PRINT and UNITS buttons. A six digit LED display is used to display weight and operator messages during scale operation.

## Scale Annunciators

Unit of measure lb, oz, kg, g or lb:oz. The units annunciator to the right of the display will indicate the current unit of measure.

Battery option status indicator. When the annunciator illuminates, the battery charge is low and the scale should be plugged in to recharge the battery. While the scale is charging, the battery annunciator will flash. When the charging is complete, the annunciator will turn off.

→0← Center of zero. The annunciator will illuminate while the scale is displaying a zero weight.

Motion indicator. This symbol represents motion or instability of the weight. The annunciator will illuminate when motion is sensed on the platform. Changes in weight, vibration or air currents can cause the scale to go into motion.

## Power Up

Connect the cord to a compatible power source.

For indicators with battery option, press and hold ZERO.

## Basic Weighing Operation

1) Remove all items from the scale platform
2) Press the ZERO button to zero the scale
3) The weight display now reads zero
4) Place an item on the scale platform and wait for the motion annunciator to turn off, indicating an accurate, stable weight

## ZERO

ZERO is used to zero the scale. To zero the scale, wait until the scale is stable and press the ZERO button. The scale will not zero if the scale is in motion. The zero function will operate over the entire capacity of the scale.

The scale is equipped with a Zero on Demand parameter which zeros the scale upon the next stable reading after ZERO is pressed.

## UNITS

UNITS selects the current unit of measure. Press UNITS to change the current unit. The units annunciator to the right of the display will indicate the current unit or measure: lb, oz, kg, g or lb:oz.

Each unit can be enabled or disabled in the scale parameter setup. Lb:oz is disabled by default. Lb:oz not available for tolerance values and cannot be transmitted as data.

## PRINT

PRINT transmits data to a printer or other external devices. When the data is transmitted, the leftmost display digit will momentarily display an "r" to confirm data transmission.

There are many parameters that customize the control of manual and automatic transmission of data. Data can be transmitted via standard RS232, Ethernet, WiFi, Bluetooth or USB. Contact Doran Tech Support at tech@doranscales.com for support.

# Battery Operation

The 7000XL can be optionally configured with a self-contained Rechargeable Sealed Lead-Acid battery and charging circuit, both internal. The scale is designed to run continuously for up to 60 hours with a single 350 ohm load cell. To maximize battery life, leave the auto-off timer enabled which will automatically power down the scale after a period of non-use.

## Power Off

1) Manual - Press and hold the ZERO push button until the display turns off. The scale will not turn off if plugged in but will instead display "rEL Pb".
2) Automatic - At the end of the Unit On Timer (tdY) scale parameter setting. The scale will not turn off if plugged in.

## Low Battery Indication

The battery annunciator indicates that the battery is in need of recharging. Once it turns on, there will be approximately one hour of battery life remaining before the scale turns off. Multiple load cells, USB, Bluetooth, Ethernet, 4-20mA and WiFi communications will reduce battery life.

## Recharging Battery

To charge the battery, plug the line cord into a wall outlet. While the scale is charging, the battery annunciator will flash. The charging circuit will fully charge the battery in approximately eight hours. When the charging is complete, the annunciator will turn off. The scale can be used while recharging the battery.

Leaving the scale plugged in will ensure a fully charged battery and will not affect the life of the battery. The battery is able to support up to 1000 recharges. This is an estimate as many factors can affect battery life, including severe temperature changes and charging before the scale displays low battery.

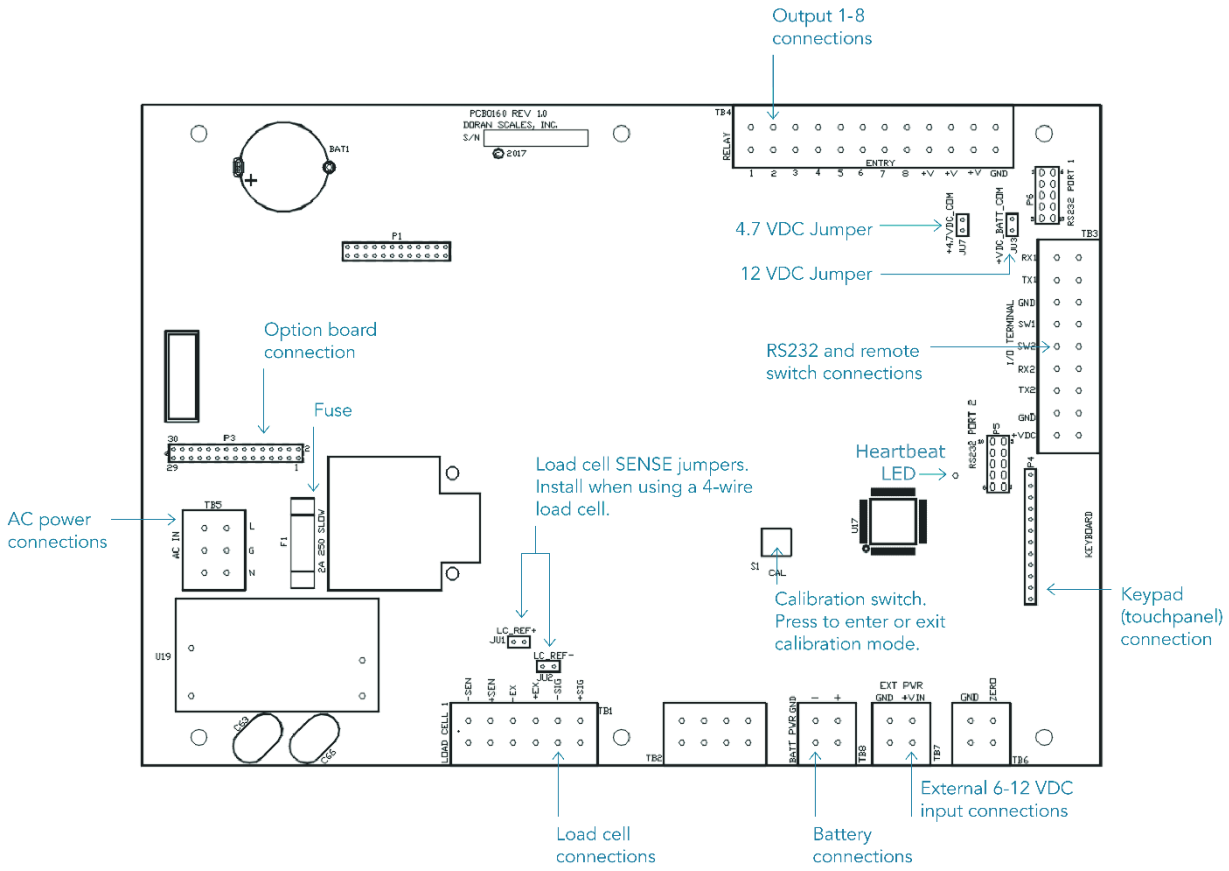



Fig. 2: Motherboard Layout

## Removing and Replacing the Rear Panel

Before you remove the rear panel, remove AC power. Power down the scale if the optional battery power is present. Removing the rear panel requires a 5/16" nut driver.

To replace the rear panel and achieve a tight seal, each screw requires a rubber bonded washer and the gasket needs to be in place. Tighten screws to 20 in-lb to achieve proper sealing. Tighten all watertight glands until the cable exiting the watertight can no longer slide through the watertight – this is usually finger tight plus a quarter turn with a wrench for a seal.

## Heartbeat LED

Between the keypad connection and the microprocessor exists a green heartbeat LED. When this LED is blinking, it indicates that the microprocessor has successfully loaded software and is receiving power.

## Load Cell Connection

Load cell connections are made through terminal block TB1. The power cord connects to terminal block TB5 adjacent to the transformer.

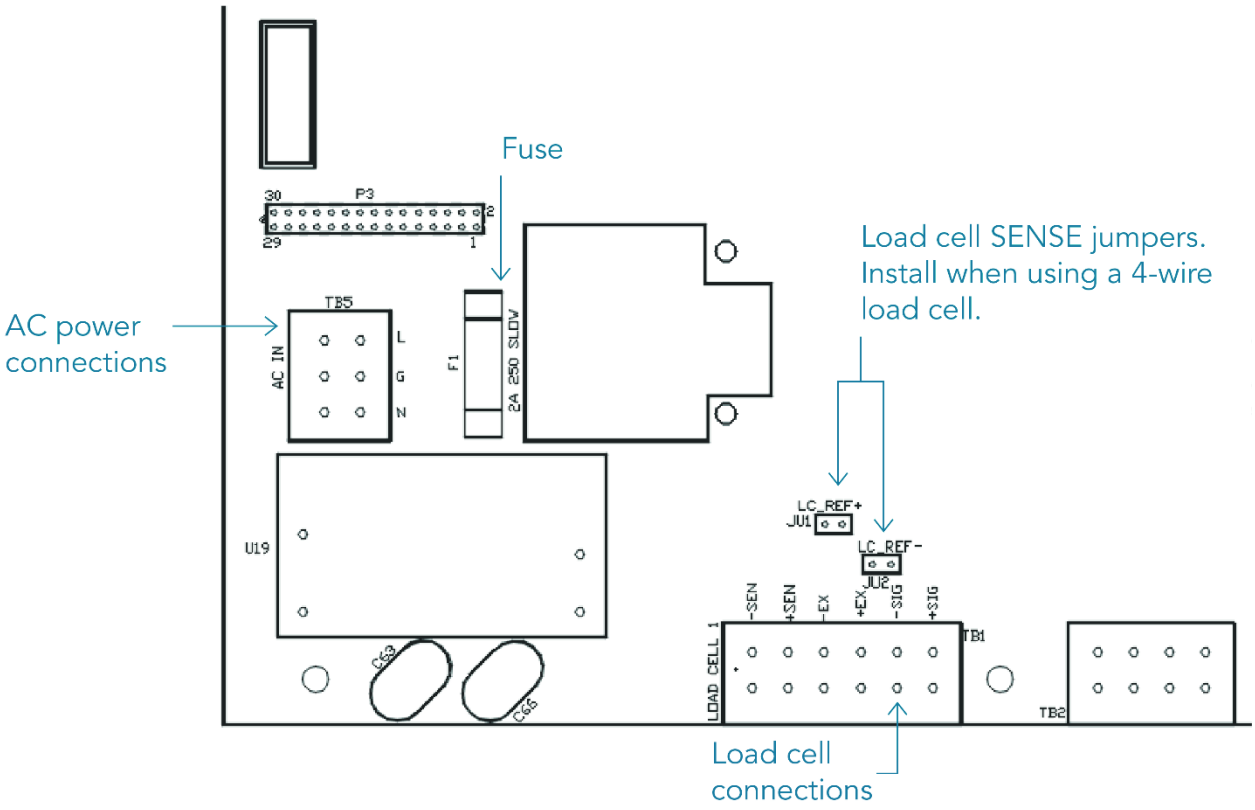



Fig. 3: Load Cell and Power (lower left of board)

| | 4 wire load cell | 6 wire load cell |
|---|---|---|
| **J1 Jumper** | In | Out |
| **J2 Jumper** | In | Out |

| Load Cell Input (TB1) | | |
|---|---|---|
| | **Description** | **Load Cell Color Code** |
| + SIG | + Signal | Red |
| - SIG | - Signal | White |
| + EX | + Excitation | Green |
| - EX | - Excitation | Black |
| + SEN | + Sense Signal | Blue |
| - SEN | - Sense Signal | Brown |

## Power Connection and Fuse

Power input is located at terminal block TB5, next to the fuse and black transformer.

| Neutral | Ground | Line (Hot) |
|---|---|---|
| N | G | L |

Make sure power is off before replacing the fuse. The scale's fuse (F1) is located next to the power terminal (J1).

The scale has a filtered power supply to reduce the effects of normal line noise, but it cannot limit severe fluctuations. Be sure the AC power is not excessively noisy. If problems occur, noise producing devices may have to be suppressed to minimize their effect.

## RS232 and Remote Switch Connection

The Remote Switch and Serial Communications are located in the TB3 terminal block. Option cables are passed through watertight glands mounted on the rear cover of the indicator.

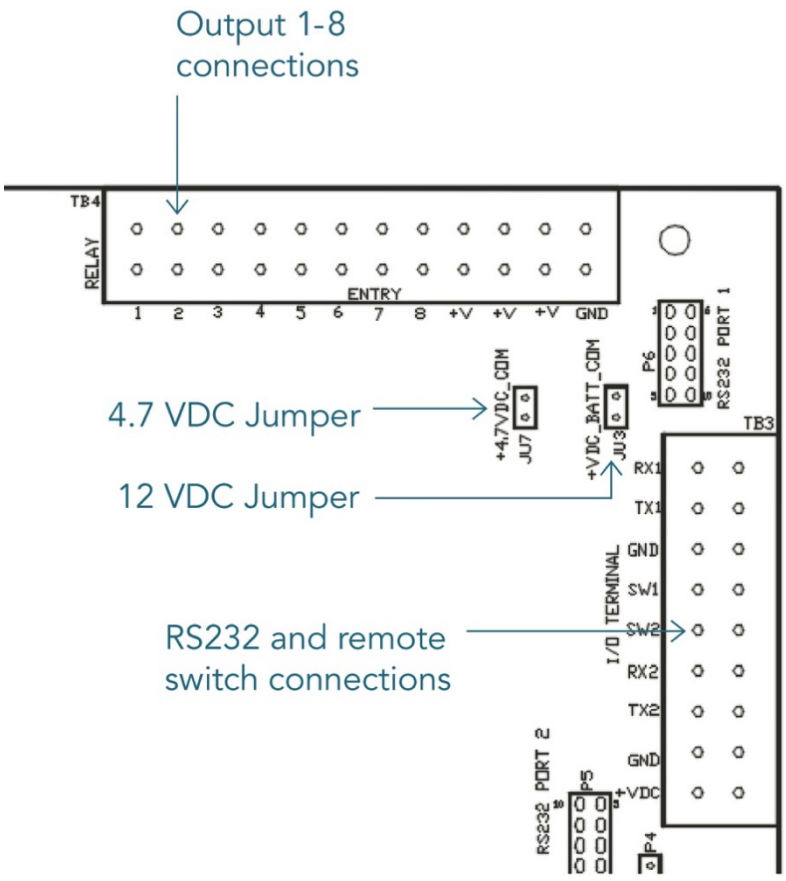
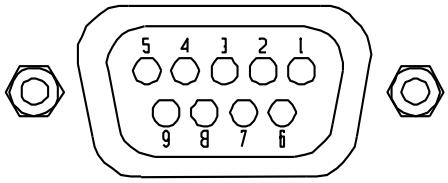
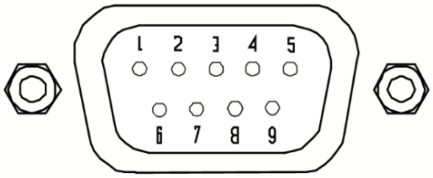


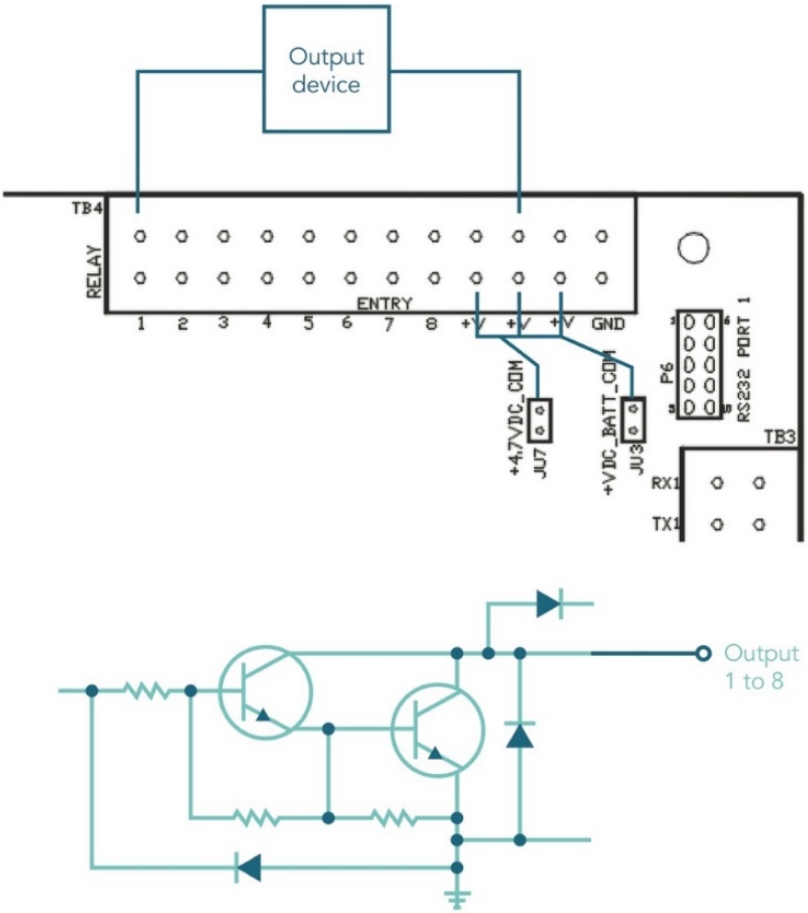

Fig. 4: Output Serial and Remote Switch Connection (upper right of board)

| TB3 RS232 and Remote Switch Connections | |
|---|---|
| | **Description** |
| RX1 | RS232 Port 1 Receive (RXD) |
| TX1 | RS232 Port 1 Transmit (TXD) |
| GND | Common Ground |
| SW1 | Remote Switch 1 Input |
| SW2 | Remote Switch 2 Input |
| RX2 | RS232 Port 2 Receive (RXD) |
| TX2 | RS232 Port 2 Transmit (TXD) |
| GND | Remote Switch Common |
| VDC | 4.7Vdc |

| **RS232 Output**<br>**DB9 Female Connector Wiring** | | **RS232 Output**<br>**DB9 Male Pin Wiring** |
|---|---|---|
| |  |  |
| | **Female Description** | **Male Description** |
| 2 | (TXD) Transmitted Data | (RXD) Received Data |
| 3 | (RXD) Received Data | (TXD) Transmitted Data |
| 5 | (GND) Ground | (GND) Ground |

## Output Connections

Each output point consists of a current-sinking Darlington pair with a transient – suppression diode connected to +V. Jumpers JU7 and JU3 control whether +V is board-supplied 4.7 VDC or 12 VDC. One or the other jumper needs to be installed for output operation, but never both. The maximum current sinkable through a single output is 500mA. If using board-suppled voltage, the maximum total current available is 800 mA.



# Calibration Guide

## Entering Calibration and Parameter Setup Mode

### Front Panel Access

1. Press and hold ZERO and UNITS simultaneously until the audit counters are displayed.
2. Ent Cd is displayed
3. Press ZERO 5 times, so that 5 is displayed,
4. Press UNITS

### Internal Calibration Button

The calibration push button is located near the center of the board and labeled CAL. Press this button to enter calibration and setup.

## Exit Calibration and Parameter Setup Mode

### Front Panel Access

1. Press UNITS until the display reads 9. donE.
2. Press the ZERO button
3. The display reads donE n
4. Press the ZERO button
5. The display reads donE Y
6. Press UNITS to return to the run mode
7. Display reads SAVEd to confirm changes are saved to memory

### Internal Calibration Button

The calibration push button is located near the center of the board and labeled CAL. Press this button to exit calibration and save settings.

## Set Scale Capacity

The Capacity selection is displayed after entering the Calibration and Setup mode.

1. 1 CAL is displayed
2. Press ZERO
3. The display will alternate between CAP AJ and the currently selected capacity
4. Press ZERO to change the capacity
5. The units annunciator will flash indicating the unit of measure for the capacity. Press ZERO to change the unit of measure if required.
6. Press PRINT
7. The right most digit will flash. Press ZERO to change this number from 0 to 9.
8. Press PRINT to move to the next digit to the left.
9. Repeat until all digits have been set to the desired scale capacity.
10. Once the digits have been set, the display will return to alternately displaying CAP AJ and the new capacity value.

**Set Scale Count By**

After the capacity has been entered, count by (resolution) will automatically be set for a legal for trade 5000 division level.

1. After calibration, press UNITS.
2. The display will alternate between CnE bY and the current count by
3. Press ZERO to select the desired count by
4. To exit and save changes, press UNITS until donE n is displayed.
5. Press ZERO
6. donE Y will be displayed
7. Press UNITS to return to the run mode

**Calibration**

After count by has been set, calibration is required

1. Press UNITS until CAL 0 appears on the display
2. Remove all weight from the scale platform
3. Press ZERO and wait for the display to count down to 0
4. The display will alternate between CAL FS and the scale capacity
5. Place the calibration weight on the scale platform (2% of capacity to full capacity)
6. If calibrating at scale capacity, press ZERO to begin calibration and move to step 12. If not calibrating at the scale capacity, continue to step 7.
7. Press PRINT
8. The right most digit will flash. Press ZERO to change this number from 0 to 9.
9. Press PRINT to move to the next digit to the left
10. Repeat until all digits have been set to the desired calibration weight
11. Press PRINT and the calibration process will begin and the display will count down to zero.
12. The display will momentarily display donE, followed by SAvEd and return to the normal weighing mode
13. Verify scale calibration

**NOTE:** Calibration at 2% of capacity has been provided as a convenience to customers with scales in inaccessible locations. Scales calibrated at 2% will not be as accurate at full capacity compared to scales calibrated at full capacity. It is the responsibility of the installer to ensure that scale accuracy is achieved after any calibration.

| **Calibration Messages** | |
|---|---|
| **Code** | **Solution** |
| r9 Err | The calibration zero is out of range. Press ZERO to clear error. Refer to the Scale Calibration Error Troubleshooting section. |
| Er nEG | The calibration span is in a negative range. Check polarity of load cell connection and repeat calibration. |
| SPAn E | The calibration span is out of range. Press ZERO to clear this error. Refer to the Scale Calibration Error Troubleshooting section. |
| Er unst | The scale is sensing an unstable weight. Remove any vibration or air currents to continue calibration. |

**Scale Calibration Troubleshooting**

The allowable load cell signal input range is 0.30 mV/V to 5.0 mV/V.

1. Calculate scale divisions by dividing the scale capacity by the count by. Example: For a 50 x 0.01 lb scale, divide 50 by 0.01 for a result of 5000d
2. Enter the calibration and parameter setup mode.
3. Press PRINT until the configuration menu 4 CnFG is displayed.
4. Press ZERO to enter the configuration menu.
5. Press UNITS until the scale counts are displayed.
6. Remove all items from the platform and record the zero load scale counts reading.
7. Place full capacity on the platform and record the scale counts.
8. Subtract the zero load counts from the full load counts to calculate the span.
9. The span number, from step #7, must be higher than the scale divisions found in step #1.

The maximum span, at full load is 750,000. If the span is higher, the span calibration will not be accepted.

If the span counts are too low or too high, check the load cell connections. If the connections are correct, replace the load cell.

# Scale Parameter Setup

## Entering Calibration and Parameter Setup Mode

### Front Panel Access

1. Press and hold ZERO and UNITS simultaneously until the audit counters are displayed.
2. ENt CAL is displayed
3. Press ZERO 5 times, so that 5 is displayed,
4. Press UNITS

### Internal Calibration Button

The calibration push button is located near the center of the board and labeled CAL. Press this button to enter calibration and setup.

## Exit Calibration and Parameter Setup Mode

### Front Panel Access

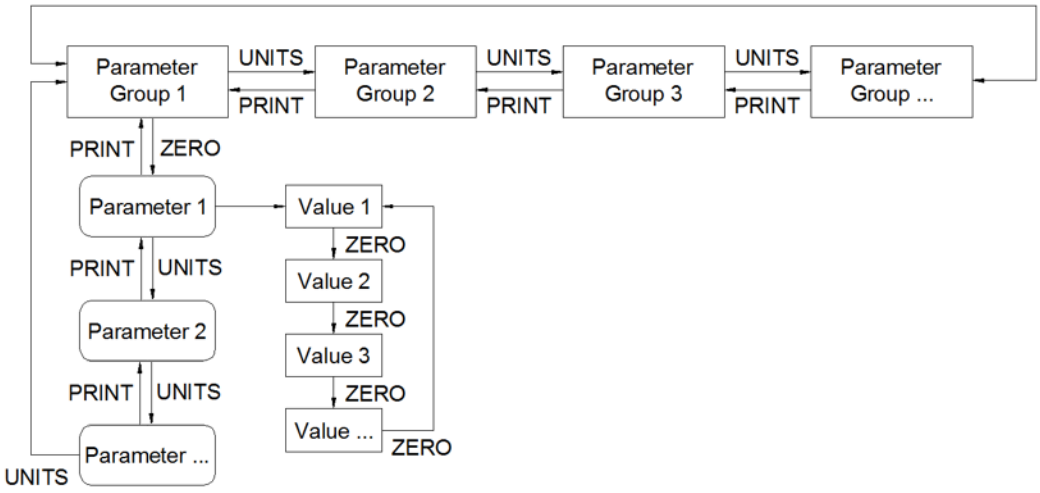
1. Press UNITS until the display reads 9. donE.
2. Press the ZERO button
3. The display reads donE n
4. Press the ZERO button
5. The display reads donE Y
6. Press UNITS to return to the run mode
7. Display reads SAVEd to confirm changes are saved to memory

### Internal Calibration Button

The calibration push button is located near the center of the board and labeled CAL. Press this button to exit calibration and save settings.

## Navigating Parameter Menu

Press UNITS and PRINT to navigate to the desired top level parameter group. Enter the group by pressing ZERO. Once within a group, press UNITS to advance, PRINT to back up and ZERO to change the currently displayed parameter setting.



## Parameter Groups

The scale parameters are divided up into eight parameter groups. Each group contains related parameters. Below is a brief list describing each parameter group.

| | |
|---|---|
| 1 CAL | Capacity and Calibration |
| 2 CnFG | General Settings |
| 3 SEr1 | Serial port #1 |
| 4 SEr2 | Serial port #2 |
| 5 Eth | Ethernet |
| 6 wwFi | Wireless Ethernet |
| 7 bt | Bluetooth |
| 8 USb | USB |
| 99 don | Exit |

## Legal for Trade Restrictions

When the Legal for Trade mode is enabled, it automatically disables some menus and parameter options. This is done to comply with NTEP and CWM requirements. The menus and parameter sections are shown on the following pages. Menus and parameters not available when in the Legal for Trade mode are marked by an asterisk.

## Audit Counters

When entering calibration mode, the Parameter audit counter and the Calibration audit counter will momentarily be displayed. The Parameter audit counter increments when legal for trade values are changed. The Calibration audit counter increments when the scale is calibrated.

## Software Part Number and Revision Level

During the front panel access procedure, the scale will display the software number and revision. The software number is Sw 191 followed by the software revision level rEv 0.0 or higher.

Please have the software number 191 and the revision level available when contacting our technical support department.

## Capacity and Calibration - 1CAL

| CAP AJ | **Capacity Adjustment** |
|---|---|
| 1 - 999000 | 1 lb / kg to 999,000 lb / kg<br><br>Refer to calibration guide for more detail |

| CntbY | **Count By Setup Menu**<br>Also known as resolution or division |
|---|---|
| 0.00002<br>5000 | Selection limited by scale capacity<br><br>Capacity/resolution (scale divisions) maximum value is 50,000d and minimum value is 200d |

| CAL | **Calibration Mode** |
|---|---|
| 0 | **Calibration Zero**<br>Press ZERO to perform calibration of the scale zero<br>Successful calibration is indicated by "CAL F5" |
| XXXXXX | Only appears after a successful zero calibration<br><br>Enter calibration weight through keypad and decimal point if required. |

| AvG | **Display Filter Setting**<br>Determines speed of digital filtering |
|---|---|
| 1 | Fastest display updates, most sensitive setting |
| 2 | **Default Setting** |
| 4 | |
| 8 | |
| 16 | |
| 32 | |
| 64 | Slowest display updates, least sensitive setting |

| | |
|---|---|
| AZt* | **Automatic Zero Tracking Range**<br>Weight within the specified number of divisions are automatically zeroed |
| oFF | Zero tracking is off, no automatic zeroing |
| 0.5 | **Zero tracking to within 0.5 division** |
| 1* | Zero tracking to within 1 division |
| 3* | Zero tracking to within 3 divisions |
| 5* | Zero tracking to within 5 divisions |
| 10* | Zero tracking to within 10 divisions |
| 20* | Zero tracking to within 20 divisions |

| | |
|---|---|
| nn.A.* | **Motion aperture***<br>Determines the number of divisions that consecutive readings must change before the scale is considered to be in motion |
| 0.5* | 0.5 divisions |
| 1 | **1 division** |
| 2* | 2 divisions |
| 3* | 3 divisions |
| 5* | 5 divisions |
| 10* | 10 divisions |

| | |
|---|---|
| nn.d* | **Motion Delay***<br>Length of a motion indication display. |
| 1 - 9 | Length of a motion indication display, in 100ms intervals. Default is **3**. (Locked to 3 in Legal for Trade mode) |

| | |
|---|---|
| SUO* | **Start Up Zero**<br>Controls the zero point when the scale is turned on |
| on | **Zeros on the first stable reading on power up** |
| CLO | Loads the calibration zero point |
| PbO* | Loads the last pushbutton zero |

* Parameters not available in Legal for Trade mode

| | |
|---|---|
| Zod | **Zero on Demand**<br>Enables or disable zero latching |
| on | If ZERO is pressed, it is saved until the scale becomes stable. |
| oFF | **If the scale is in motion, the zero request is discarded.** |

| | |
|---|---|
| Pod | **Print on Demand**<br>Enables or disables print latching |
| on | If PRINT is pressed, the print request is saved until the scale becomes stable. |
| oFF | **If the scale is in motion, the print request is discarded.** |
| nnt | Print when requested, whether the scale is in motion or not |

| | |
|---|---|
| oP | **Operating Mode** |
| Std | **Standard operation** |
| 44 | NTEP legal-for-trade. Restricts parameters to keep them within NTEP limits. |
| 445 | CWM legal-for-trade. Restricts parameters to keep them within CWM limits. |

| | |
|---|---|
| donE | **Exit Calibration and Setup** |
| y | Saves and exits setup when PRINT or UNITS is pressed. |
| n | **Remains in setup** |

## General Settings - 2 CnFG

| | | |
|---|---|---|
| CSL | **Unit Enable and Disable**<br>Determines which unit selections will be active | |
| no | **Do not enter Convert selection menu** | |
| YES | Enter Convert selection menu | |
| | Lb | **pounds menu** |
| | on | **lb is active** |
| | oFF | lb is non active |
| | kg | **kilograms menu** |
| | on | **kg is active** |
| | oFF | kg is non active |
| | oz | **ounces menu** |
| | on | **oz is active** |
| | oFF | oz is non active |
| | gr | **grams menu** |
| | on | **g is active** |
| | oFF | g is non active |
| | Lo | **pound:ounce menu** |
| | on | lb:oz is active |
| | oFF | **lb:oz is non active** |

**NOTE:** oz units are disabled for capacities greater than 60,000 lb
grams units are disabled for capacities greater than 2000 lb
lb:oz are only available for capacities between 10 and 1000 lb

| | |
|---|---|
| Units | **Start Up Units Select Mode**<br>Configures selection of startup units |
| | The unit annunciator, to the right of the display, indicates the active unit on power up. Press ZERO to change the selection. |

| | | | |
|---|---|---|---|
| P.b. | **Push Button Enable and Disable**<br>Determines which buttons are active or inactive | | |
| no | **Do not enter push button selection menu** | | |
| YES | Enter push button selection menu | | |
| | Pr | **PRINT button** | |
| | | on | **pb is active** |
| | | oFF | pb is non active |
| | Ut | **UNITS button** | |
| | | on | **pb is active** |
| | | oFF | pb is non active |
| | 2r | **ZERO button** | |
| | | on | **pb is active** |
| | | oFF | pb is non active |
| | r1, r2 | **REMOTE SWITCH 1 and 2 function** | |
| | | oFF | **Remote pb is non active** |
| | | 2r | ZERO |
| | | Pr | PRINT |
| | | Ut | UNITS |

| | |
|---|---|
| tdY | **Automatic off Timer**<br>Only visible when bAtt parameter is set to Y |
| on | Unit will remain on, On timer is off |
| 0.5 | 30 second On timer |
| 1 | **1 minute On timer** |
| 1.5 | 1.5 minute On timer |
| 2 | 2 minute On timer |
| 3 | 3 minute On timer |
| 5 | 5 minute On timer |
| 10 | 10 minute On timer |
| 30 | 30 minute On timer |
| 1hr | 1 hour On timer |
| 2hr | 2 hour On timer |
| 4hr | 4 hour On timer |
| 8hr | 8 hour On timer |

| | |
|---|---|
| tHS | **Threshold Level Entry**<br>Controls automatic printing features starting with A.P. |
| 0.1 - 9.9 | ±0.1% to ±9.9% of capacity<br><br>**Default setting is 1%** |

| dEFt | **Default**<br>Used to set parameters to factory default values |
|---|---|
| n | Do not default |
| y | Set parameters to default values |

| **Counts** | **Raw counts from the AD converter**<br>Used for troubleshooting during calibration |
|---|---|
| xxxxxx | -99999 to 999999 |

| brt | **Controls the brightness of all LEDs** |
|---|---|
| 1-15 | Can be set to a value of 1 to 15 with 15 being the brightest. Default value is **9**. Note: Decreasing brightness conserves battery life. |

| bAtt | **Enable or disable battery operation** |
|---|---|
| n | Battery option not installed |
| y | Battery option installed |

**Serial (RS232) Port 1 - 3 SEr 1**

| d.o.1 | **Data Output Mode Port 1** |
|---|---|
| t.o.d. | **Transmit on demand. Transmit when the PRINT button is pressed.** |
| A.P.1 | Auto Print 1. Transmit once only when scale becomes stable. |
| A.P.2 | Auto Print 2. Transmit once only when scale becomes stable. Scale must return to, or below, the threshold range. |
| A.P.4 | Auto Print 4. Transmit first stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| A.P.5 | Auto Print 5. Transmit the last stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| t1 | Transmits every 1 second. |
| t5 | Transmits every 5 seconds. |
| t60 | Transmits every 60 seconds. |
| C.P. | Continuous Print. Transmit when display is updated. Approximately every 1/10$^{th}$ of a second. |
| oFF | Port disabled |

**Note:** only one communication port can have a timed output mode (t1, t5, t60, or CP)

| For.1 | **Data Output Format Port 1** |
|---|---|
| **F0** | **Basic output format** |
| 2d | Basic Dual Print Format. Includes Kilogram weight. |
| SSP | Basic Output for label printer |
| F9 | Model 8000 emulation |
| Lb1 | User definable print string with default values |
| Lb2 | User definable print string with default values |
| Lb3 | User definable print string with default values |
| Lb4 | User definable print string |
| bo | WinSPC compatibility format |

| br.1 | **Baud Rate Port 1** |
|---|---|
| 12 | 1200 baud |
| 24 | 2400 baud |
| 48 | 4800 baud |
| **96** | **9600 baud** |
| 14.4 | 14,400 baud |
| 19.2 | 19,200 baud |
| 28.8 | 28,800 baud |
| 38.4 | 38,400 baud |

**Serial (RS232) Port 2 - 4 SEr2**

| d.o.2 | **Data Output Mode Port 2** |
|---|---|
| t.o.d. | **Transmit on demand. Transmit when the PRINT button is pressed.** |
| A.P.1 | Auto Print 1. Transmit once only when scale becomes stable. |
| A.P.2 | Auto Print 2. Transmit once only when scale becomes stable. Scale must return to, or below, the threshold range. |
| A.P.4 | Auto Print 4. Transmit first stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| A.P.5 | Auto Print 5. Transmit the last stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| t1 | Transmits every 1 second. |
| t5 | Transmits every 5 seconds. |
| t60 | Transmits every 60 seconds. |
| C.P. | Continuous Print. Transmit when display is updated. Approximately every 1/10$^{th}$ of a second. |
| oFF | Port disabled |

**Note:** only one communication port can have a timed output mode (t1, t5, t60, or CP)

| For.2 | **Data Output Format Port 2** |
|---|---|
| F0 | **Basic output format** |
| 2d | Basic Dual Print Format. Includes Kilogram weight. |
| SSP | Basic Output for label printer |
| F9 | Model 8000 emulation |
| Lb1 | User definable print string with default values |
| Lb2 | User definable print string with default values |
| Lb3 | User definable print string with default values |
| Lb4 | User definable print string |
| bo | WinSPC compatibility format |

| br.2 | **Baud Rate Port 2** |
|---|---|
| 12 | 1200 baud |
| 24 | 2400 baud |
| 48 | 4800 baud |
| **96** | **9600 baud** |
| 14.4 | 14,400 baud |
| 19.2 | 19,200 baud |
| 28.8 | 28,800 baud |
| 38.4 | 38,400 baud |

## Ethernet - S Eth

| d.o. E | **Data Output Mode Ethernet** |
|---|---|
| t.o.d. | Transmit on demand. Transmit when the PRINT button is pressed. |
| A.P. 1 | Auto Print 1. Transmit once only when scale becomes stable. |
| A.P.2 | Auto Print 2. Transmit once only when scale becomes stable. Scale must return to, or below, the threshold range. |
| A.P.4 | Auto Print 4. Transmit first stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| A.P.5 | Auto Print 5. Transmit the last stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| t 1 | Transmits every 1 second. |
| t5 | Transmits every 5 seconds. |
| t60 | Transmits every 60 seconds. |
| C.P. | Continuous Print. Transmit when display is updated. Approximately every 1/10th of a second. |
| C.P. UdP | Continuous Print. Transmit on selected UDP port when display is updated. Approximately every 1/10th of a second. |
| oFF | **Port disabled** |

**Note:** only one communication port can have a timed output mode (t1, t5, t60, or CP)

| For. E | **Data Output Format Ethernet** |
|---|---|
| F0 | **Basic output format** |
| 2d | Basic Dual Print Format. Includes Kilogram weight. |
| SSP | Basic Output for Label printer |
| F9 | Model 8000 emulation |
| Lb 1 | User definable print string with default values |
| Lb2 | User definable print string with default values |
| Lb3 | User definable print string with default values |
| Lb4 | User definable print string |
| bo | WinSPC compatibility format |

| iP.xxxx | **Static or DHCP IP Address Assignment** |
|---|---|
| iP.dhCP | **DHCP - address supplied by network server** |
| iP.StAt | Static - address assigned at indicator |

| IP Adr | **Static IP Address Assignment** |
|---|---|
| | Current IP address of the scale. Cannot be changed if the previous parameter is set to DHCP |

| SubnEt | **Subnet Mask** |
|---|---|
| | Current subnet setting. Cannot be changed if set for DHCP |

| GAtE | **IP Gateway** |
|---|---|
| | Current IP Gateway. Cannot be changed if set for DHCP |

| Port | **TCP Port Number** |
|---|---|
| xxxxx | Indicates the listening TCP port number of the scale |

| nnAc | **Ethernet MAC Address** |
|---|---|
| xxxxxx.xxxxxx | The unique Ethernet MAC address. Cannot be changed. |

| 4nnA | **4mA point adjustment** |
|---|---|
| 0-255 | Use this value to adjust the 4mA output, if that option is installed on your scale. Default is **127**. |

| 20nnA | **20mA point adjustment** |
|---|---|
| 0-255 | Use this value to adjust the 20mA output, if that option is installed on your scale. Default is **127**. |

| UdP IP | **UDP IP Address** |
|---|---|
| | Current IP address that the scale will use to send UDP packets. |

| U Port | **UDP Port Number** |
|---|---|
| xxxxx | Indicates the transmission UDP port number of the scale. |

**Wireless Ethernet - 6 uuF ,**

| d.o. UU | **Data Output Mode wifi** |
|---|---|
| t.o.d. | Transmit on demand. Transmit when the PRINT button is pressed. |
| A.P.1 | Auto Print 1. Transmit once only when scale becomes stable. |
| A.P.2 | Auto Print 2. Transmit once only when scale becomes stable. Scale must return to, or below, the threshold range. |
| A.P.4 | Auto Print 4. Transmit first stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| A.P.5 | Auto Print 5. Transmit the last stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| t1 | Transmits every 1 second. |
| t5 | Transmits every 5 seconds. |
| t60 | Transmits every 60 seconds. |
| C.P. | Continuous Print. Transmit when display is updated. Approximately every 1/10$^{th}$ of a second. |
| oFF | **Port disabled** |

**Note:** only one communication port can have a timed output mode (t1, t5, t60, or CP)

| For. UU | **Data Output Format wifi** |
|---|---|
| F0 | **Basic output format** |
| 2d | Basic Dual Print Format. Includes Kilogram weight. |
| SSP | Basic Output for label printer |
| F9 | Model 8000 emulation |
| Lb1 | User definable print string with default values |
| Lb2 | User definable print string with default values |
| Lb3 | User definable print string with default values |
| Lb4 | User definable print string |
| bo | WinSPC compatibility format |

| ,P.xxxx | **Static or DHCP IP Address Assignment** |
|---|---|
| ,P.dhCP | **DHCP - address supplied by network server** |
| ,P.StAt | Static - address assigned at indicator |

| .P Adr | **Static IP Address Assignment** |
|---|---|
| | Current IP address of the scale. Cannot be changed if the previous parameter is set to DHCP. |

| SubnEt | **Subnet Mask** |
|---|---|
| | Current subnet setting. Cannot be changed if set for DHCP |

| GAtE | **IP Gateway** |
|---|---|
| | Current IP Gateway. Cannot be changed if set for DHCP |

| Port | **TCP Port Number** |
|---|---|
| xxxxx | Indicates the listening TCP port number of the scale. |

| .dLE | **Idle Timeout** |
|---|---|
| 0 - 65536 | Number of seconds during which no data is transmitted or received before the connection is automatically closed. Default is **0** seconds.<br><br>Setting the timer to 0 prevents disconnecting. |

| .nAc | **Ethernet MAC Address** |
|---|---|
| xxxxxx.xxxxxx | The unique Ethernet MAC address. Cannot be changed. |

| CS | **Wifi Connection Status** |
|---|---|
| | 8 - The unit is not connected<br>88 - The unit is connecting.<br>888 - The unit is connected<br><br>There is no entry on this screen. This is a display that reports the wifi connection status. |

**Bluetooth - ᵀbt**

| d.o. bt | **Data Output Mode Bluetooth** |
|---|---|
| t.o.d. | Transmit on demand. Transmit when the PRINT button is pressed. |
| A.P.1 | Auto Print 1. Transmit once only when scale becomes stable. |
| A.P.2 | Auto Print 2. Transmit once only when scale becomes stable. Scale must return to, or below, the threshold range. |
| A.P.4 | Auto Print 4. Transmit first stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| A.P.5 | Auto Print 5. Transmit the last stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| t1 | Transmits every 1 second. |
| t5 | Transmits every 5 seconds. |
| t60 | Transmits every 60 seconds. |
| C.P. | Continuous Print. Transmit when display is updated. Approximately every 1/10$^{th}$ of a second. |
| oFF | **Port disabled** |

**Note:** only one communication port can have a timed output mode (t1, t5, t60, or CP)

| For. b | **Data Output Format Bluetooth** |
|---|---|
| F0 | **Basic output format** |
| 2d | Basic Dual Print Format. Includes Kilogram weight. |
| SSP | Basic Output for label printers |
| F9 | Model 8000 emulation |
| Lb1 | User definable print string with default values |
| Lb2 | User definable print string with default values |
| Lb3 | User definable print string with default values |
| Lb4 | User definable print string |
| bo | WinSPC compatibility format |

**USB - 8 USb**

| d.o. USb | **Data Output Mode USB** |
|---|---|
| t.o.d. | Transmit on demand. Transmit when the PRINT button is pressed. |
| A.P.1 | Auto Print 1. Transmit once only when scale becomes stable. |
| A.P.2 | Auto Print 2. Transmit once only when scale becomes stable. Scale must return to, or below, the threshold range. |
| A.P.4 | Auto Print 4. Transmit first stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| A.P.5 | Auto Print 5. Transmit the last stable weight outside of threshold. Transmission happens when weight returns to threshold range. |
| t1 | Transmits every 1 second. |
| t5 | Transmits every 5 seconds. |
| t60 | Transmits every 60 seconds. |
| C.P. | Continuous Print. Transmit when display is updated. Approximately every 1/10$^{th}$ of a second. |
| oFF | **Port disabled** |

**Note:** only one communication port can have a timed output mode (t1, t5, t60, or CP)

| For. USb | **Data Output Format USB** |
|---|---|
| F0 | **Basic output format** |
| 2d | Basic Dual Print Format. Includes Kilogram weight. |
| SSP | Basic Output for label printers |
| F9 | Model 8000 emulation |
| Lb1 | User definable print string with default values |
| Lb2 | User definable print string with default values |
| Lb3 | User definable print string with default values |
| Lb4 | User definable print string |
| bo | WinSPC compatibility format |

**Exit - 99 don**

| donE | **Exit and save changes** |
|---|---|
| n | Do not exit |
| y | Save changes and exit |

# Data Communications

To confirm data has been transmitted, the display will show a "r" in the leftmost digit.

**Transmit on Demand (tod)**
In this mode, scale data is transmitted whenever PRINT is pressed, a remote switch configured for a PRINT command is pressed, or a print request is received at the serial port. The scale must be stable and the scale value must be valid before the data is transmitted.

**Timer 1 (t 1)**
Transmits every 1 second.

**Timer 5 (t5)**
Transmits every 5 seconds.

**Timer 60 (t60)**
Transmits every 60 seconds.

**Continuous Data Transmission (CP)**
Data is transmitted each time the scale display updates, approximately every 0.1 seconds. Readings which occur when the scale is in motion are indicated out by the abbreviation "MOT." after the weight data.

**Auto Print 1 (AP 1)**
Auto Print 1 transmits the first stable scale reading each time the scale leaves motion.

**Auto Print 2 (AP2)**
Auto Print 2 transmits the first stable scale reading following the scale leaving motion that is above the adjustable threshold level. To adjust the threshold level as a % of capacity, see the Threshold Level parameter. In Auto Print 2, no further readings will be sent until the scale returns to weight reading that is below the adjustable threshold level.

**Auto Print 4 (AP4)**
Auto Print 4 transmits the first stable scale reading following the scale leaving motion that is above the adjustable threshold level. Transmission does not occur until the scale returns below the threshold value. To adjust the threshold level as a % of capacity, see the Threshold Level parameter.

**Auto Print 5 (AP5)**
Auto Print 5 transmits the last stable scale reading following the scale leaving motion that is above the adjustable threshold level. Transmission does not occur until the scale returns below the threshold value. To adjust the threshold level as a % of capacity, see the Threshold Level parameter.

**Data String Formatting**

Many predefined data formats are available with the 7000XL. This allows for flexibility when communicating with a database, printer, remote display or other devices.
The LB1-4 custom data strings provide the opportunity to define a custom print string up to 64 characters in length.

Note: Lb:oz unit is not supported in data strings.

| | **Print String** | **Description** |
|---|---|---|
| F0 | Standard Output Format<br><br><STX><p><xxxx.xx><SP><uu><SP><br><MOT><CR><LF><br><br>Sample Print String<br>±--10.05-lb<br><br>Sample Pounds – Ounces String<br>±27lb-12.2-oz<br><br><br><br><br>Note: "-" represents a space | **<STX>** Start of Text (02h)<br>**<p>** Weight Polarity<br>Negative weight "-", positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload "-------". Leading zeros are spaces (20h).<br>**<uu>** Displayed Units<br>"lb", "kg", "oz", "g"<br>**<MOT>** (Available only in Continuous print mode) Motion Status Appends "MOT" to the print string when printing while in motion<br>**<SP>** Line Space (20h)<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |
| F1 | Dual Unit lb and kg Print Output Format<br><br><STX><p><xxxx.xx><SP><uu><SP><br><MOT><CR><LF><br><(><p><xxxx.xx><SP><kg><SP><)><MO<br>T><CR><LF><br><br>Sample Print String<br>±--10.05-lb<br>±---4.56-kg<br><br><br><br><br>Note: "-" represents a space | **<STX>** Start of Text (02h)<br>**<p>** Weight Polarity<br>Negative weight "-", positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload "-------". Leading zeros are spaces (20h)<br>**<uu>** Displayed Units<br>"lb", "kg", "oz", "g"<br>**<MOT>** (Available only in Continuous print mode) Motion Status Appends "MOT" to the print string when printing while in motion<br>**<SP>** Line Space (20h)<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |

| | Print String | Description |
|---|---|---|
| SSP | Label Printer Output Format<br><br><FR”L1”><LF><?><LF><p><xxxx.xx><LF><uu><LF><"GS"><LF><MOT><LF><p><xxxx.xx><LF><kg><LF><P1,1><LF><br><br>Sample Print String<br>FR"L1"<br>?<br>±--10.05<br>lb<br>GS<br>MOT<br>±---4.56<br>kg<br>P1,1<br><br>Note: “-” represents a space | **<p>** Weight Polarity<br>Negative weight “-”, positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload “-------”. Leading zeros are spaces (20h)<br>**<uu>** Displayed Units<br>“lb”, “kg”, “oz”, “g”<br>**<MOT>** (Available only in Continuous print mode) Motion Status Appends “MOT” to the print string when printing while in motion<br>**<SP>** Line Space (20h)<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |
| F9 | Prints current weight, units, and “grs”.<br><br><STX><p><xxxx.xx><SP><uu><SP><grs><MOT><CR><LF><br><br>Sample Print String<br>±--10.05-lb-grs<br><br>Note: “-” represents a space | **<STX>** Start of Text (02h)<br>**<p>** Weight Polarity<br>Negative weight “-”, positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload “-------”. Leading zeros are spaces (20h)<br>**<uu>** Displayed Units<br>“lb”, “kg”, “oz”, “g”<br>**<MOT>** (Available only in Continuous print mode) Motion Status Appends “MOT” to the print string when printing while in motion<br>**<SP>** Line Space (20h)<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |

| | Print String | Description |
|---|---|---|
| Lb1 | Custom Data String 1 (\x\w \u \m\r\l)<br><br><STX><p><xxxx.xx><SP><uu><SP><br><MOT><CR><LF><br><br>Sample Print String<br>±--10.05-lb<br><br>Note: “-” represents a space | **<STX>** Start of Text (02h)<br>**<p>** Weight Polarity<br>Negative weight “-”, positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload “-------”. Leading zeros are spaces (20h)<br>**<uu>** Displayed Units<br>“lb”, “kg”, “oz”, “g”<br>**<MOT>** (Available only in Continuous print mode) Motion Status Appends “MOT” to the print string when printing while in motion<br>**<SP>** Line Space (20h)<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |
| Lb2 | Custom Data String 2 (\x\w \u \m\r\l)<br><br><STX><p><xxxx.xx><SP><uu><SP><br><MOT><CR><LF><br><br>Sample Print String<br>±--10.05-lb-ACCEPT<br><br>Note: “-” represents a space | **<STX>** Start of Text (02h)<br>**<p>** Weight Polarity<br>Negative weight “-”, positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload “-------”. Leading zeros are spaces (20h)<br>**<uu>** Displayed Units<br>“lb”, “kg”, “oz”, “g”<br>**<MOT>** (Available only in Continuous print mode) Motion Status Appends “MOT” to the print string when printing while in motion<br>**<SP>** Line Space (20h)<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |

| | Print String | Description |
|---|---|---|
| Lb3 | Custom Data String 3 (\xID:\i \w \u \m\r\l)<br><br><STX><"ID:"><br><SP><p><xxxx.xx><SP><uu><SP><MOT><CR><LF><br><br>Sample Print String<br>ID:00-±--10.05-lb<br><br><br><br><br><br><br>Note: "-" represents a space | **<p>** Weight Polarity<br>Negative weight "-", positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload "-------". Leading zeros are spaces (20h)<br>**<SP>** Line Space (20h)<br>**<uu>** Displayed Units<br>"lb", "kg", "oz", "g"<br>**<MOT>** (Available only in Continuous print mode , non-LFT) Motion Status Appends "MOT" to the print string when printing while in motion.<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |
| Lb4 | Custom Data String 4 | No default string. |
| b0 | Prints weight with polarity and units<br><br><p><xxxx.xx><SP><uu><SP><CR><LF><br><br>Sample Print String<br>±--10.05-lb<br><br><br><br><br>Note: "-" represents a space | **<p>** Weight Polarity<br>Negative weight "-", positive weight space (20h)<br>**<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload "-------". Leading zeros are spaces (20h).<br>**<SP>** Line Space (20h)<br>**<uu>** Displayed Units<br>"lb", "kg", "oz", "g"<br>**<CR>** Carriage Return (0dh)<br>**<LF>** Line Feed (0Ah) |

## Custom Data String Configuration

| Command | Length | Description |
|---|---|---|
| \BS | 4 | Battery Status. Low: “batt” OK: “BATT” |
| \d | 1-3 | Motion aperture (“0.5”, “1”, “2”, “3”, “5”, “10”) |
| \e | 4 | Threshold: 2 digits, decimal, and “%” |
| \hxx | 1 | HEX byte. “xx” can be 00 through FF |
| \l | 1 | Linefeed. ASCII 0x0A |
| \m | 0 or 3 | Motion status. “MOT” if in motion, no output if stable |
| \r | 1 | Carriage return. ASCII 0x0D |
| \u | 1-2 | Current unit. “lb”, “kg”, “g”, “oz”. Two characters except for grams which is one |
| \wx | 6-8 | Current weight, with weight format “x” (x = 1-5) |
| \x | 1 | Start of text character. ASCII 0x02 |
| \y | 1 | Current weight polarity. “-“ or a space |
| \y0 | 1 | Current weight polarity. “-“ or “0” |
| \Z | 0 | ZERO command |

| “x” Weight Formats | |
|---|---|
| 1 | 8 total characters. Polarity, 6 digits + decimal with leading spaces. |
| 2 | 8 total characters. Polarity, 6 digits + decimal with leading zeros. |
| 3 | 7 total characters. No polarity, 6 digits + decimal with leading spaces. |
| 4 | 7 total characters. No polarity, 6 digits + decimal with leading zeros. |
| 5 | 6 total characters. No polarity, 6 digits no decimal with leading zeros |

Plain text can be inserted into the data string. No control character or slash is necessary for plain text entry.

To download a custom data string, the string must be prefaced by a command to tell the indicator to expect a custom print string.

| | |
|---|---|
| ELx<string>↵ | Enter (Download) custom data string |
| RLx↵ | Read (Upload) custom data string |

x is the label buffer number (1 to 4)
↵ is carriage return or enter key in terminal program

The data string can have up to 62 control characters. For example, the following string is 8 characters in length “\w\u\r\l”. The custom string is terminated and download by pressing the enter. To program this string for Lb1 location in the scale’s memory, send the following string: EL1\w\u\r\l↵

Once programmed, set the Output Format For parameter to Lb1 to activate the print string.

**Indicator Commands**

All serial commands require a carriage return (0x0D) as a terminator. Commands can be entered on any communication option or serial port.

| | |
|---|---|
| W, w | Weight is transmitted out all enabled ports in the format selected for each port. |
| Wx, wx | Custom data string Lb1-4 can be requested to transmit out all ports. x = 1, 2, 3 or 4. |
| P, p | Weight data is sent out serial port 2 only |
| Px, px | Customer data string Lb1-4 can be requested to transmit out serial port 2 only. x = 1, 2, 3, or 4. |
| U, u | Causes the scale to switch to the next unit of measure. Same as if the UNITS button is pressed. |
| Ux, ux | Causes the scale to switch to the unit of measure specified by x. x = 1, 2, 3, or 4 where 1=lb, 2=kg, 3=g, 4=oz. |
| Z, z | Issues a ZERO command to the scale. Note: Scale will not zero if in motion or if an error is displayed. |
| MD | The scale will transmit its model number |
| RV | The scale will transmit its revision number |
| ELx<data> | Load the user data string, specified by x (1-4), with the data in <data>. <data> can be up to 64 bytes. The indicator responds with an '*' if the command is successful or '?' if unsuccessful. |
| RLx | Transmit the User data string stored in the location referenced by x. |
| SW1 | The indicator transmits the current wifi SSID. |
| SW2 | The indicator transmits the current wifi password. Only works if scale is in CAL menu. |
| SW3 | Force the wifi option board to reboot and attempt to reconnect. |
| SW4<data> | Send an SSID to the indicator. The scale will respond with a '*' if the operation was successful and a '?' if it was unsuccessful. |
| SW5<data> | Send a wifi password to the scale. The scale will respond with a '*' if the operation was successful and a '?' if it was unsuccessful. |

| | |
|---|---|
| SW6 | The scale will transmit its current wifi IP address |
| SW7 | The scale will transmit the current wifi IP port it is using. |
| SW8<data> | Enter transmit strength (strength 0-12, input in hexadecimal 0-C) |
| ipconfig | Returns IP address, subnet, gateway, port, SSID, and wifi password |
| SWB | Displays the received signal strength (RSSI) of a connected wifi board Note: Refer to the wifi troubleshooting section for more information. |
| SWC | Removes the wifi board from RSSI mode and return it to normal communications |
| ^Rxx.yy. | Request parameter setting in the format of calibration/setup menu group xx, sub-menu yy. For example:^R02.05<0x0D> will cause the scale to transmit its threshold value on the port that this command was received on. |
| ^Exx.yy. | This command will enter data to the scale in calibration/setup menu group xx, menu yy. Scale must be in CAL menu. |
| ^RFx | Report remote button function ‘x’ (x = 1 or 2) |
| ^EFx<data> | Enter remote button function ‘x’ (x = 1 or 2) |
| x1 | RS232 port 1 is echoed to RS232 port 2 |
| x2 | RS232 port 2 input is echoed to RS232 port 2 |
| x3 | Ethernet is echoed to port 2 |
| x4 | Wireless ethernet is echoed to port 2 |
| x5 | Scale displays raw counts |
| x6 | Wired ethernet is echoed to USB |
| x7 | Wireless ethernet is echoed to USB |
| xc | Clears all ‘x’ commands |
| xhbn | Enables ethernet “heartbeat” text. Every 30 seconds of ethernet inactivity, hex value 0xCE is output. |
| xhbf | Disables ethernet “heartbeat” text. |

For a complete protocol, please request this document from Doran Technical Support at tech@doranscales.com.

# 4-20mA Analog Output Option

## Introduction

The 4-20mA Analog Output Option is used to provide an analog output that is proportional to the weight on the scale platform. The option board provides an active power loop for the communications. Because of the inherent noise immunity present in a current loop, an isolated 4-20mA analog output is ideal for use in noisy environments. The 4-20mA analog output option can be used to send weight data to a process indicator, a simple on/off controller or to a programmable logic controller.

## Setup

The 4-20mA option is automatically calibrated for an output range of 4mA to 20mA, (i.e. 4mA equals zero weight and 20mA equals the scale's capacity). Attach the output cable from the 4-20mA option board to an appropriate controller or indicator. The white lead is connected to the + input of TB2 and the black lead is connected to the – input of TB2.

Calibrate your process indicator or controller according to the manufacturer's instructions. Remember that the option will output 4mA when the scale reads "zero" and 20mA when the scale reads full capacity.

## Operation

There is no effect on scale operation, when the 4-20mA Analog Output option is installed, except for battery units which will see a reduction in battery life of approximately 50%.

# Wired Ethernet Option

The Wired Ethernet Option (EXOPT302) connects your Excel Series scale to an Ethernet network. The Ethernet module is installed inside the indicator enclosure. The NEMA4X sealed RJ-45 Ethernet connector is bulkhead mounted to the rear panel of the indicator.

The Wired Ethernet Option auto senses 10/100Base–T networks. The Wired Ethernet Option is fully compliant with the 10/100Base-T Ethernet network standard, transferring data up to 100Mbps. Once the scale is connected you can collect data, remotely configure, or monitor the scale from any computer on the network.

## Specifications

**Hardware:** Bulkhead mount NEMA4X sealed RJ-45 connector

**Network Interface:** 10/100Base-T Ethernet protocol, Data rates up to 100Mbps
Universal IP address assignment
Static IP
DHCP
Operating Temp. 14° F to 104° F

**Options:** Washdown Safe RJ-45 Ethernet Connector Field Install Kit (EXOPT150)

# Wireless 802.11b/g Ethernet Option

The Wireless Ethernet Option (EXOPT303) connects your 7000XL scale to a wireless network. The Wireless Ethernet Option is fully compliant with the 802.11b/g wireless network standard. Wireless communications are protected by up to a 128-bit security encryption.

**Specifications**

**Hardware:** Bulkhead mount 2.4 GHz Dipole Antenna

**Network Interface:**
802.11b/g Ethernet Protocol
Universal IP address assignment
    Static IP
    DHCP
2.4 GHz Frequency
12 dBm Transmitting Power
Receiving Sensitivity
-83 dBm (Typ.)
Operating Temp. 14° F to 104° F

Wireless Security: WEP-128, WPA-PSK (TKIP), WPA2-PSK (AES)

Regulatory Approval: FCC ID: T9J-RN171

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio technician for help

# Troubleshooting Wifi

If WIFI is not functioning, try the following procedures:

**Confirm IP Configuration**

Enter the scale's calibration mode (as detailed on page 24) and navigate to parameter group 6 for WIFI. Press ZERO to enter the group, then use UNITS and PRINT to navigate within this group. Ensure that:

- d.o.ww is not set to oFF
- The ip address is properly set
- The subnet mask is properly set
- The ip gateway is properly set
- The port is properly set

**Confirm WIFI Connection**

Enter the scale's calibration mode (see Scale Parameter Setup) and navigate to parameter group 6 for WIFI. Press ZERO to enter the group, then use UNITS and PRINT to navigate within this group. Navigate to the final parameter "CS". If it reads:

8 – The unit is not connected
88 – The unit is connecting
888 – The unit is connected

If the scale is having trouble connecting, consider repositioning the scale and its antenna to strengthen the connection.

Once the scale is connected to Doran's terminal program Dimension, the exact signal strength can be found using the SWB remote command. See the below table for a guide to this signal strength:

| **Quality:** | **Wifi decibel value:** |
|---|---|
| Excellent | Greater than -60dB |
| Good | -60dB – -75dB |
| Poor | Less than -75dB |

# Bluetooth Option

Doran Scale's Bluetooth option is a Class 3, *Bluetooth* 4.0, configured for SPP. The Bluetooth option does not require any external antenna for communication. Once paired, the Bluetooth module will function as a wireless RS232 serial cable. Each Bluetooth module has an individual 12-digit address i.e. "34:81:F4:13:C8:CE".

## Computer Setup

To connect the scale's Bluetooth module with your computer; the computer will need to have a Bluetooth device installed. Some computers may or may not have a Bluetooth option. If there is no existing Bluetooth device, a Bluetooth USB dongle can be used. Follow the instructions included with the Bluetooth dongle software to setup the computer.

## Bluetooth USB Dongle

Since Bluetooth software drivers and hardware varies among manufacturers, it is recommended to use the USB Bluetooth dongle available from Doran. Support is not available if the customer is not using the Doran supplied USB dongle.

## Scale Setup

Please refer to the "7 bt" parameter group for configuring the scale to transmit data over Bluetooth.

## Pairing Devices (Scale)

The scale's Bluetooth module must be paired with your computer to communicate properly. Turn on the scale with the Bluetooth option installed. Be sure to have the scale near the computer to prevent any interference with communication while configuring the Bluetooth module. Wait 30 seconds after the scale is powered up to allow the scale's Bluetooth module to become available.

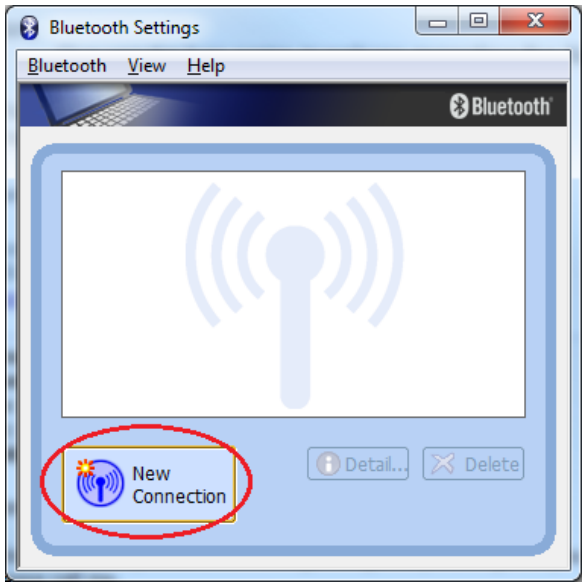
## Bluetooth Specifications

| Feature | Implementation |
|---|---|
| Bluetooth Transmission: | Class 3 |
| Fully Bluetooth: | Bluetooth SIG QDID: B021961 |
| Range: | Up to 10 meters |
| Frequency: | 2.402 – 2.480 GHz |
| Transmit Power: | +2dBm (typ.) |
| Receive Sensitivity: | -90dBm (Classic); -92dBm (LE) |
| Profile: | SPP Serial Port Profile |

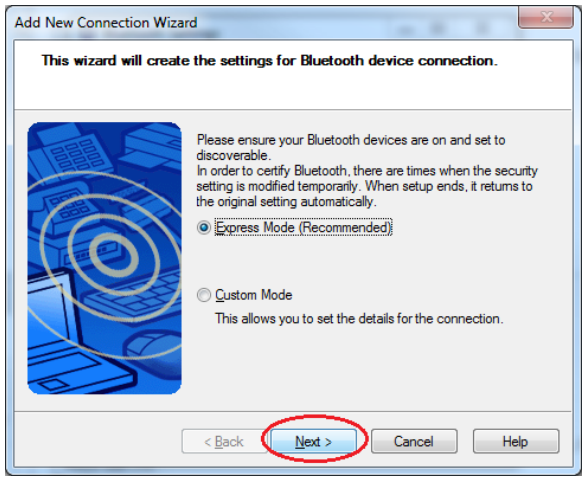
## Bluetooth Pairing Instructions

The following example connects the scale to a Toshiba Bluetooth Stack running on a Windows PC.

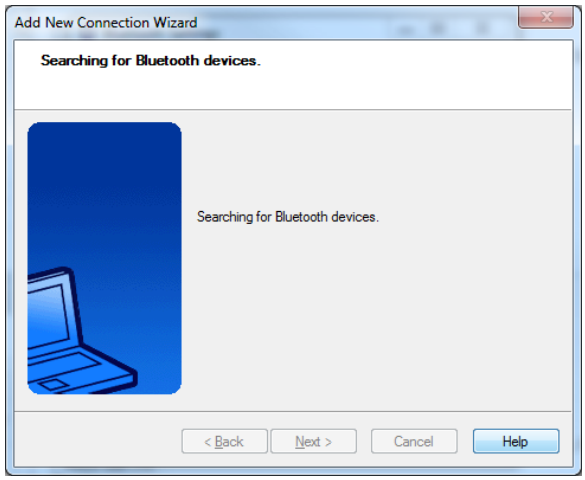
Click New Connection



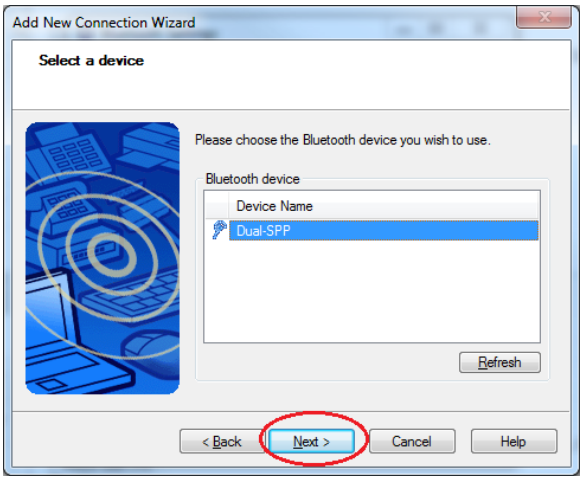

Click Next



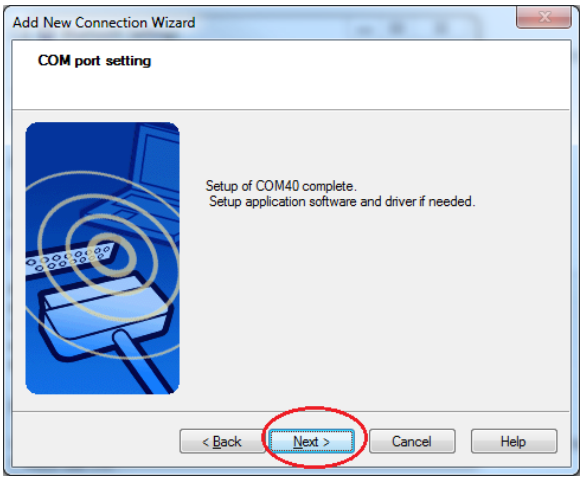

The driver will search for the scale.



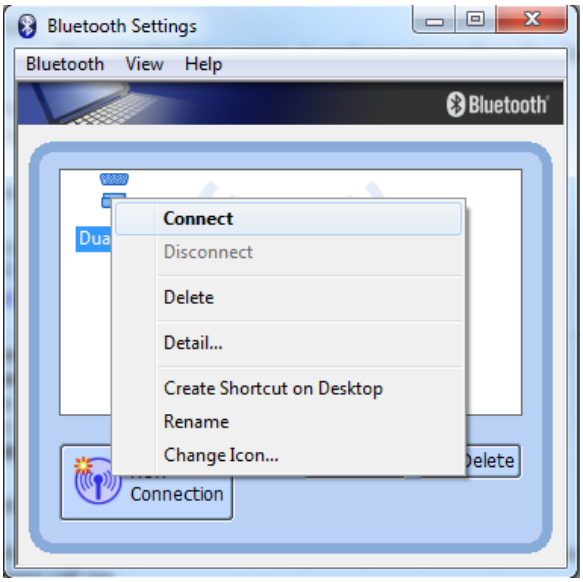
Select Dual-SPP and click Next



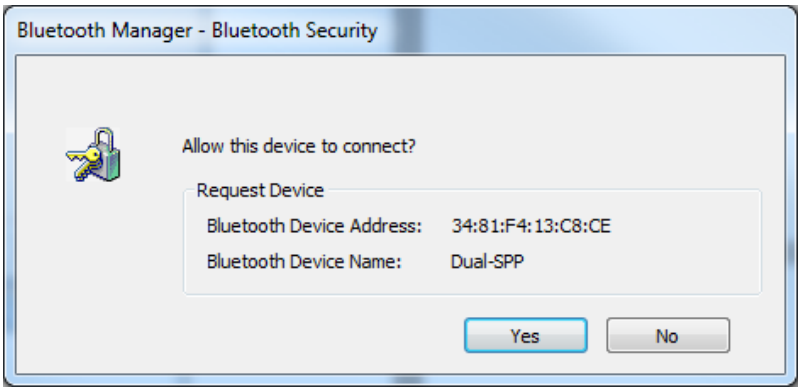

Click Next once to pair



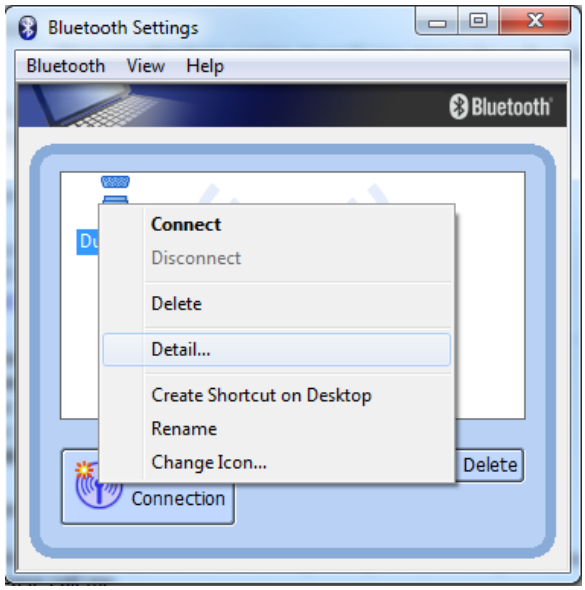

Right-click Dual-SPP and choose Connect



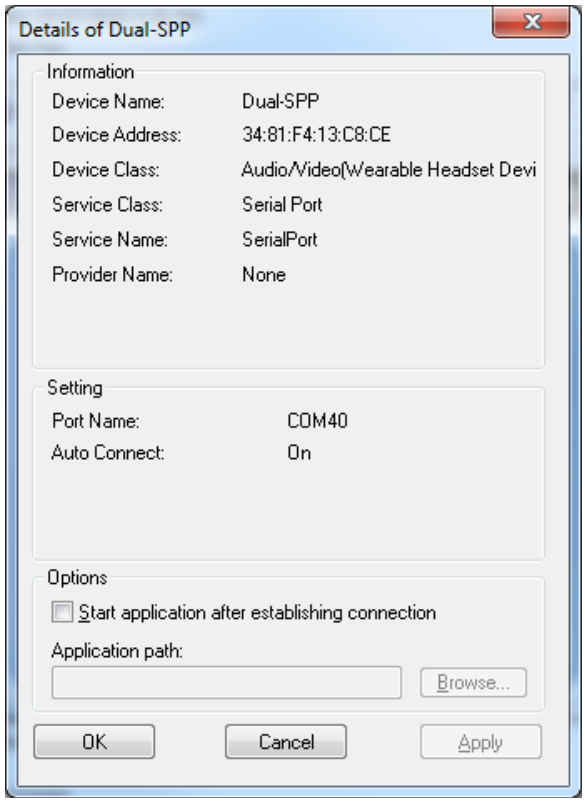
Click Yes to connect



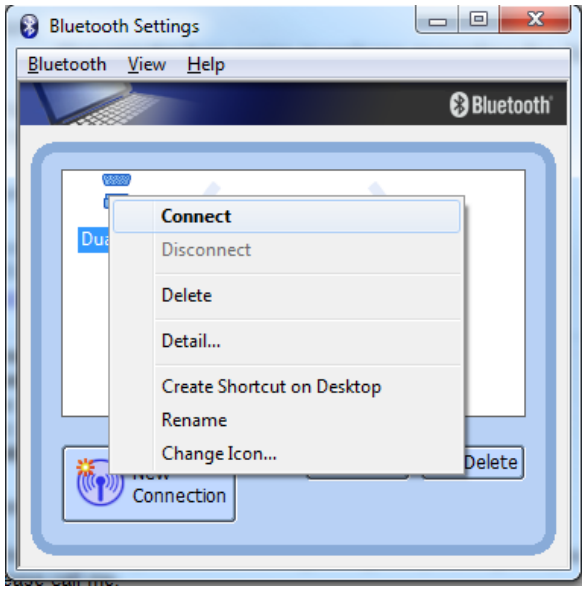

Right-click Dual-SPP and choose Detail…




The COM number will be displayed



Right-click Dual-SPP and choose Connect



## Troubleshooting

If any problem persists, contact Doran Tech Support at tech@doranscales.com

| Problem | What to Do or Check |
|---|---|
| Weight reading will not repeat or does not return to zero when weight is removed | Examine the weighing platform for any interferences. Be sure that nothing is inside the platform, under the load cell or the weigh bridge structure |
| Scale overloads before reaching full capacity | Make sure all four corner overload stops are properly set, if present. Take the platter off the scale, invert it and place it on the platform. With 1/2 of the scale's capacity in test weights concentrated over a corner of the platform, there should be approximately 1/32" of clearance between the stop and the bottom of the spider. Check all four corners then recalibrate the scale. |
| Scale will not indicate full capacity or go into overload | Make sure that there is nothing caught in the scale under or around the load cell or spider, which would interfere with their movement. If not, check the overload stops using the above procedure. |
| Scale will not zero when the ZERO button is pressed | Make sure that the scale is stable ( ◣◢ annunciator is off) when ZERO is pressed. If excessive motion is a problem, then it may be necessary to activate the Zero on Demand or change the Display Filter parameter. |
| Weight readings don't seem to be correct | Check the scale's accuracy with a test weight. Recalibrate if necessary. |
| Scale drifts off of zero | Check for air currents and/or vibration around the scale. If that is the cause, it may be necessary to set the AZT parameter to a wider setting to compensate |
| Scale reading is bouncing | Check for air currents and/or vibration around the scale. If that is the cause, it may be necessary to change the Display Filter parameter. |

**Scale Messages**

| Message | Meaning |
|---|---|
| rEL Pb | ZERO pressed and held past needed period |
| PASSon | Password enabled |
| Abort | Invalid value entry or screen timeout |
| Er mno | Calibration error: motion detected |
| Our Ld | The scale is reading an overload condition |
| Udr Ld | The scale is reading an underload condition |
| Ldn9 0 | “Loading Zero” - the scale is filling the average buffer value and does not yet have a valid weight reading |
| donE | Calibration completed |
| SAvEd | Exiting CAL mode or other data entry modes |
| Ent Cd | Prompt for code entry to get into CAL mode |
| Error | Improper value entered or improper action requested |

## Default to Factory Settings

To return the setup parameters to factory default, follow these steps.

1. Enter Calibration

   **Front Panel Access**

   1. Press and hold ZERO and UNITS simultaneously until the audit counters are displayed.
   2. ENt Cd is displayed
   3. Press ZERO 5 times, so that 5 is displayed,
   4. Press UNITS

   **Internal Calibration Button**

   The calibration push button is located near the center of the board and labeled CAL. Press this button to enter calibration and setup.

2. Press ZERO to enter the 2 CnF9 parameter group
3. Press UNITS to scroll to menu item dEFt n.
4. Press ZERO to change selection to dEFt Y.
5. Press UNITS to advance. The display will return to dEFt n.
6. Press ZERO to change selection to dEFt Y.
7. Press UNITS to advance.
8. The scale will then show SAVEd.
9. After the SAVEd message is displayed, the scale then performs its normal power up routine and enters the Calibration mode. At this time, all the parameters will have been reset to their factory default settings.

## Scale Default Settings

When reset to default settings, the CAL menu items and setpoints/outputs are reset. The scale will maintain the calibration settings previously used.

A reference for each CAL menu default value can be found the Scale Parameter Menu Setup, listed in bold.

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