2200 Series

Process Control Digital Weight Indicator

Technical Manual

MAN346 – Rev E

Doran Scales, Inc.

www.doranscales.com

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Scale Setup

Thank you for purchasing a Doran Scales product. Please read this manual to ensure obtaining all the benefits that the indicator can provide. If any questions arise, please contact the Doran Scales Technical Support Department at 630-879-1288.

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

Specifications

NTEP Certificate	Class III – 10,000d; Cert. #06-101
CWM Certificate	Class III – 10,000d; Cert. #AM-5617
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 100,000d
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 2% and 100% of capacity
Power Input	100 – 240VAC 50/60Hz
Battery Option	Internal Rechargeable Sealed Lead Acid Battery 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
Communication Options	Ethernet Wi-Fi – 802.11b/g Bluetooth – 4.0, Class 3, SPP Protocol USB – 2.0, CDC Protocol 4-20 mA – Active current loop Audible Alarms Light Tower
Digital IO	Two remote switch inputs Eight outputs – 4.7 or 12 VDC configurable up to 800mA. current-sinking Darlington pair

Scale Controls and Operation

Fig. 1: Front Panel

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.

NET — Net weighing mode is indicated by the NET annunciator. The annunciator will illuminate when a net weight is displayed. When not illuminated, a gross weight is displayed.

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.

1 to 8 setpoint output status indicators. Below the weight display are annunciators that are illuminated when an output is active in weighing mode or the current setpoint or preact is being edited.

Powering On

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. If

ZERO

ZERO is used to zero the scale. To zero the scale, 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.

If the scale is displaying a net weight, pressing ZERO will return the scale to gross mode and display a zero weight. The stored tare will remain in memory.

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

TARE

Place the item you wish to tare on the scale platform and press TARE. The scale will display a net weight and the NET annunciator will illuminate.

Tare weights will remain in memory even if the indicator is turned off.

Keyboard TARE entry

Enter a weight and press TARE to save or press CLEAR to cancel tare entry. The scale will display a net weight and the NET annunciator will illuminate.

Display TARE value

To display the current tare value, press and hold TARE for three seconds. The display will briefly read tArE then flash the tare weight in the currently selected units. To exit press CLEAR.

Clear TARE value

Enter 0 and press TARE. This will remove the tare weight from memory.

GROSS NET selection

Press the GROSS NET button to switch between the gross and net weighing mode. Switching to the net mode is possible only when a tare is entered. Net mode is indicated when the NET annunciator is illuminated.

UNITS

UNITS selects the 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 is not available for checkweigh or setpoint values.

PRINT

PRINT transmits data to a printer or other external devices. When the data is transmitted, the left most 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 options. Contact Doran Tech Support at 630-879-1288 for support.

START

Start currently loaded batch program.

STOP

Pauses or stops currently loaded batch program. Press once to pause and a second time to stop operation.

Password Protected Values

To activate password protection, the PASS parameter must be configured with a numeric password. Once configured, password protection will be activated upon power up.

If password protection is activated, the display will show PASS when Setpoint, Preact, Tare, values are displayed. Password protection also inhibits deletion or creation of new product IDs. Enter the password and press ENTER, the display will then show PASS and then OFF. Protection is now disabled and values can be accessed and changed.

To reactivate password protection, press and hold ENTER for 2 seconds. The display will show PASSon.

Setpoint and Output Operation

The 2200 is equipped with eight outputs and eight setpoints. The output must be assigned by the Output Configuration (out) parameter to any of the eight setpoints, remote input, batch program control and threshold weight to activate. A setpoint is a target weight that triggers an output. The method of triggering the assigned output is controlled by the configuration of the Setpoint Operation (S.o.) parameter.

Enter SETPOINT Target Weight

Press SETPOINT. The last viewed or edited setpoint will be displayed. Press UNITS or PRINT to scroll through the eight available setpoints. The annunciators below the main display indicate the current setpoint.

Enter the setpoint weight using the numeric keypad. Press SETPOINT to accept the change and return to the weigh mode or press UNITS or PRINT to save and edit other setpoints. Press SETPOINT to exit this mode.

The display will read Abort to indicate no changes were made to the setpoint values or the display will read SAVEd to indicate the setpoint value is saved.

Display SETPOINT Target Weight

Press SETPOINT. The last viewed or edited setpoint will be displayed. Press UNITS or PRINT to scroll through the eight available setpoints. The annunciators below the main display indicate the current setpoint. Press SETPOINT to exit this mode.

Setpoint Learning Preacts

A preact works with setpoints to allow the user to enter setpoint target weights that are the final desired weight. The preact automatically adjusts the setpoint target weight required for material in transit variations or line pressure changes. The output assigned to the setpoint will then transition before the setpoint target weight is achieved.

Note: Preacts are always adjusting the weight through the learning process. If the process has not changed, it should not be necessary to change this value. If the process is not reliably in control, change Preact Adjustment % Configuration (PrE) parameter to dial in the learning process. Use the password protection feature if adjustment of the preact could cause a safety issue.

Output Transition = Setpoint target weight – preact weight

The preact value changes based upon the final weight using the following formula:

Preact = previous preact + Adjustment % x (final stable weight – setpoint target weight)

The Preact Adjustment % Configuration (PrE) parameter affects how the learning preact will react to changes. The default value is 50% when the learning preact is turned on. The final stable weight sample will be collected within 3.5 seconds of the output transition. If no stable weight can be achieved in this time, the preact will not be adjusted for that measurement. The overall change will be limited to a maximum of 63% of the setpoint value, regardless of the adjustment percentage.

For Example:
20 pounds of a material is desired and material in transit is observed and estimated at 0.5 lb.
Setpoint 1 is set to 20 lb
Preact 1 is set to 0.5 lb
Adjustment % is left at the default of 50%

After running the process, the final weight is observed to be 20.3 lb

Preact = 0.5 lb + 0.5 x (20.3 – 20)
Preact = 0.65 lb

Enter Setpoint Preact Weight

Press SETPOINT. The last viewed or edited setpoint will be displayed. Press ZERO to display the preact weight. Press UNITS or PRINT to scroll through the eight available preacts. The annunciators below the main display indicate the current setpoint.

Display SETPOINT Target Weight

Press SETPOINT. The last viewed or edited setpoint will be displayed. Press ZERO to display the preact weight. Press UNITS or PRINT to scroll through the eight available preacts. The annunciators below the main display indicate the current setpoint. Press SETPOINT to exit this mode.

Battery Operation

The 2200 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 "rELPb".
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.

Product ID

800 product IDs are available. Deploying a large library of IDs with multiple scales can be easy to manage with Doran's data management programs.

Product IDs save information that includes:

- Setpoint values
- Preact values
- Batch program assigned to product ID
- Unit of measure
- Accumulator and counter values
- Tare
- Two 40 alphanumeric character fields
- Motion Aperture (nn.A.)
- Threshold (tHS)
- Setpoint operation (S.o.)
- Output configuration (out)

Recall PRODUCT ID from Memory

When powered on, no product ID will be loaded. This is indicated when pressing PROD ID and the display reads OFF. Once a product ID is loaded, the unit of measure is locked in the unit of the product ID.

To select a stored product, press PROD ID, enter the ID number and press ENTER. The display will read SAVEd to indicate the fields associated with that Product ID number are active. After selecting a product, the scale will measure and display in the units saved for that product. The UNITS button will then be disabled. Selecting product 'OFF' will re-enable the UNITS button.

Another method to select a product is to press PROD ID, then use the UNITS or PRINT buttons to scroll through the available products. Press ENTER to select the displayed product. The display will read SAVEd to indicate the fields associated with that Product ID number are active.

Barcode Scan Recall PRODUCT ID from Memory

Press PROD ID to enter the Product ID recall mode. The display will show Id, followed by the current Product ID number. Using Doran's optional barcode scanner, scan the desired barcode. The display will confirm by showing the barcode value. To exit the ID edit mode, press PROD ID.

Display Current PRODUCT ID

Press PROD ID, the display will show Id followed by the currently active product.

Create New PRODUCT ID

Select the desired unit that will be used to checkweigh the new product. Enter a product ID up to 6 digits not currently in memory and press PROD ID. The display will momentarily show nEW then Id. Then return to weighing mode. All fields associated with the new Product ID number will be blank.

To enter and save values for all fields associated with the current Product ID, enter values for each field. When changing products, the display will read SAVEd to indicate the all fields associated with the new Product ID number are saved and will be recalled when that product is used again.

Delete PRODUCT ID from Memory

Enter the product ID to be deleted and press PROD ID. The display will show Prd id, followed by the Product ID number. Press and hold the CLEAR button for more than 2 seconds. The display will show CLr id and then donE. All fields associated with that Product ID number will be cleared. The previously used Product ID number will become active.

Batch Program Operation

A batch program uses a series of commands to operate a control process. Operating Mode (oP) must be set to batch operating mode for batch programs to run. Up to 100 programs can be stored at one time. Each program can contain up to 100 commands.

Load a Batch Program into Memory

If the unit is programmed with multiple batch programs, they are selected by recalling a Product ID that contains many parameters that affect the operation of the batch program. Reference the Product ID section for more information.

If only one batch program is stored in memory, a Product ID is not required but still can be used if desired.

If a single batch is use with no Product ID, the batch program is loaded when the indicator powers on.

Start a Batch Program

Pressing start begins the batch program.

Pause a Running Batch Program

Press STOP once to pause the batch program.

Press START to resume the batch program.

Stop a Running Batch Program

Press STOP twice to stop and reset the batch program to the first step.

Batch Commands

Command	Description
START	START button press required. Use to pause a batch that requires user interaction.
TARE	Performs a TARE operation
ZERO	Performs a ZERO operation
PRINT	Performs a PRINT operation
NET	Places the indicator in NET mode Note: Setpoint Weight Operation (Suu.) setting controls setpoint target weight and the net weight may not be the setpoint target weight.
GROSS	Places the indicator in GROSS mode Note: Setpoint Weight Operation (Suu.) setting controls setpoint target weight and the net weight may not be the setpoint target weight.
ACCUM	Performs a Accumulation operation
ACCUM / CLEAR	Clears Accumulator and counter values
Set Output X	Will activate output 1-8 where X is the output number. Only

	operates on outputs with Output Configuration (out) parameter set to bAt
Set Output All	Will activate all outputs. Only operates on outputs with Output Configuration (out) parameter set to bAt
Deactivate Output X	Will deactivate output 1-8 where X is the output number. Only operates on outputs with Output Configuration (out) parameter set to bAt
Deactivate Output All	Will deactivate all outputs. Only operates on outputs with Output Configuration (out) parameter set to bAt
Wait for Setpoint X	Waits for Setpoint 1-8 to transition states
Wait for Input 1	Pauses until Input 1 is active
Wait for Input 2	Pauses until Input 2 is active
Wait 001-999 seconds	Pauses for up to 999 seconds
Wait Until Stable	Halts further operations until a stable weight is achieved
Wait for Product ID	Pauses until a valid product ID is entered
Wait for Keypad Tare Entry	Operator enters a valid tare value and presses enter
Global Repeat	Repeats the operations infinitely
Global Repeat 01-99	Repeats operations up to 99 times
Start of local repeat	Repeats steps between this command a the local repeat command below
Local repeat 01-99	Performs a repeat of commands between is step and the Start of local repeat command up to 99 times
Start of Input Jump	Line jumped to based upon Input X active Jump command
If Input 1 Active Jump	Performs a line jump command if Input 1 is active
If Input 2 Active Jump	Performs a line jump command if Input 2 is active
End of Batch	Batch program ends

Tank Level Maintenance Operation

This operation maintains a level in a tank between two setpoint target weights. This allows the tank to be drained to a desired amount before being refilled to a maximum target weight. Setpoint 1 will be the low level of the tank. When the tank is drained to setpoint 1, the tank will begin filling and will stop at the setpoint 2 target weight.

To configure this operation:

1. Setpoint 2 must be configured to FILL in the Setpoint Operation (5.0.) parameter.
2. Assign setpoint 2 to an output in Output Operation (out) parameter
3. Configure setpoint 1 as the lowest level desired
4. Configure setpoint 2 as the highest level desired

Time and Date

Setting Time and Date

Press and hold decimal point / clock button until dAtE is displayed. The current date flashes on the display. To toggle between the current time and date, press the decimal point button. The display reads t imE when the time is displayed.

To change the date:

1. Press and hold decimal point / clock button until dAtE is displayed
2. The display flashes the current the date
3. The digit that being edited flashes on the display
4. Enter the date with leading zeros in the format MM.DD.YY
5. Press UNITS to advance to the next digit
6. Press UNITS until the display reads SAvEd to confirm the date changes are saved

To change the time:

1. Press and hold decimal point / clock button until dAtE is displayed
2. Press the decimal point button
3. The display reads t imE when the time in 24hour format is displayed
4. The digit that being edited flashes on the display
5. Enter the time with leading zeros in the format HH.MM.SS
6. Press UNITS to advance to the next digit
7. Press UNITS until the display reads SAvEd to confirm the time changes are saved

Press ENTER to return to the normal weighing mode.

Accumulator and Counter

Accumulator and Counter Operation

When a manual or automatic print function is executed, the accumulator has the currently displayed weight added to its' current value and the counter is incremented. To confirm an accumulation and counter operation, the left most display digit will momentarily display an o.

To accumulate automatically, select an auto print function in the parameter setup menu.

To accumulate manually, allow the scale to become stable and press PRINT.

The maximum value that can be shown for the accumulator and counter is 999,999. When the maximum value is reached, the accumulator and counter will rollover to a zero value. This feature can only be used in a non Legal For Trade application.

If using Product ID functions, the Accumulator and Counter values are stored with the associated product.

Display Accumulator and Counter Values

Press the ACCUM button to enter the accumulator and counter recall mode. The display will show Accumn followed by the accumulated weight in the units currently selected in the weigh mode. Then Counter will be displayed followed by the counter value.

Press ACCUM to exit the accumulator and counter recall mode without changing their values.

Clear Accumulator and Counter

Press the ACCUM button to enter the accumulator and counter recall mode. The display will show Accumn followed by the accumulated weight in the units currently selected in the weigh mode. Then Counter will be displayed followed by the counter value.

Press CLEAR to clear the accumulator and counter values. The display will show ClrAc and exit from the recall mode.

Changing the current display units will clear both the accumulator and counter values.

Accumulator and Counter Data String Output to Printer or Data Collection

Press ACCUM to enter the accumulator recall mode. Press PRINT to transmit the LB4 custom data string that contains the accumulator and counter values by default. Both the accumulator and counter values are cleared after transmission.

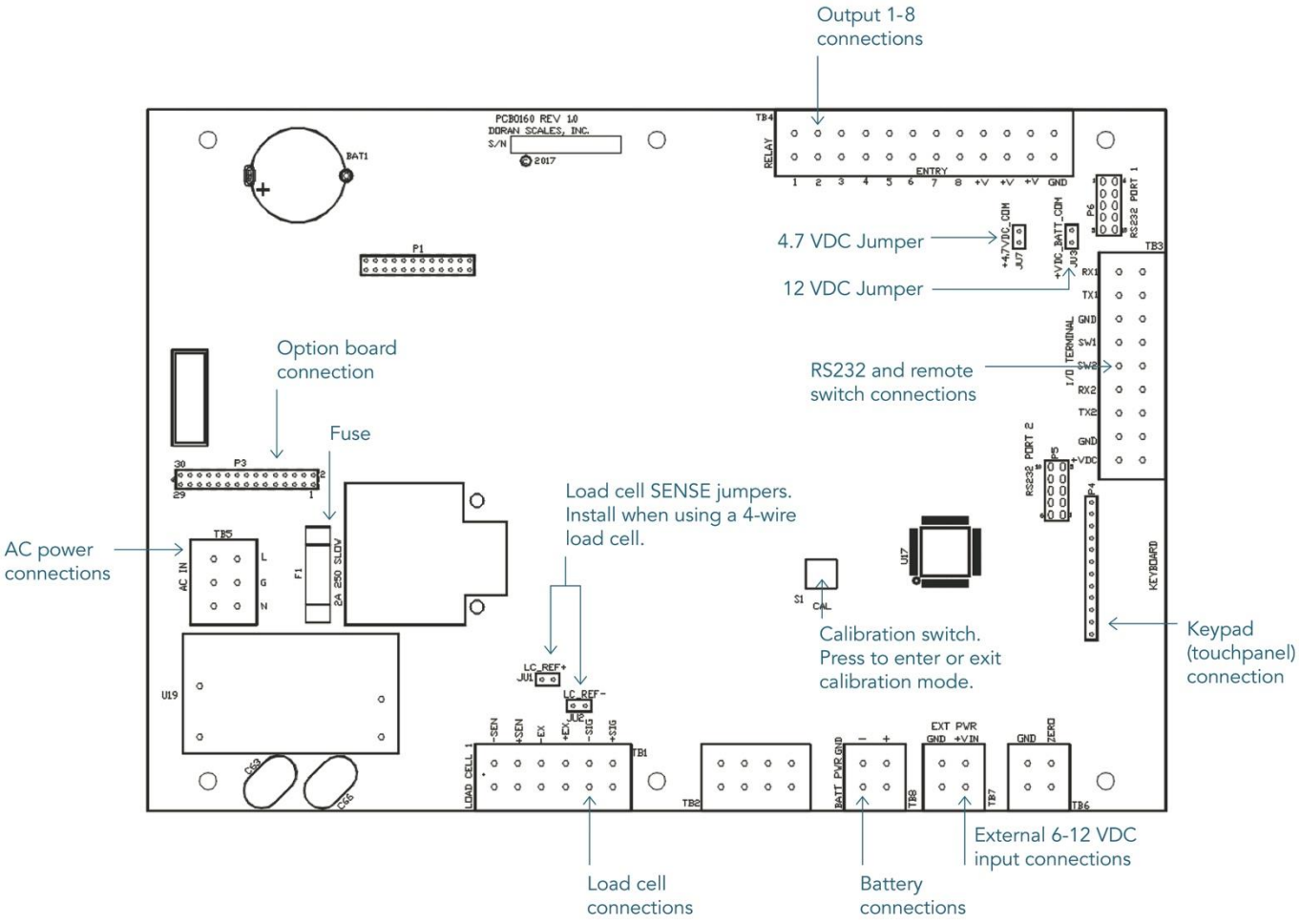


Fig. 2: Motherboard Layout

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 to seal.

Load Cell Connection

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

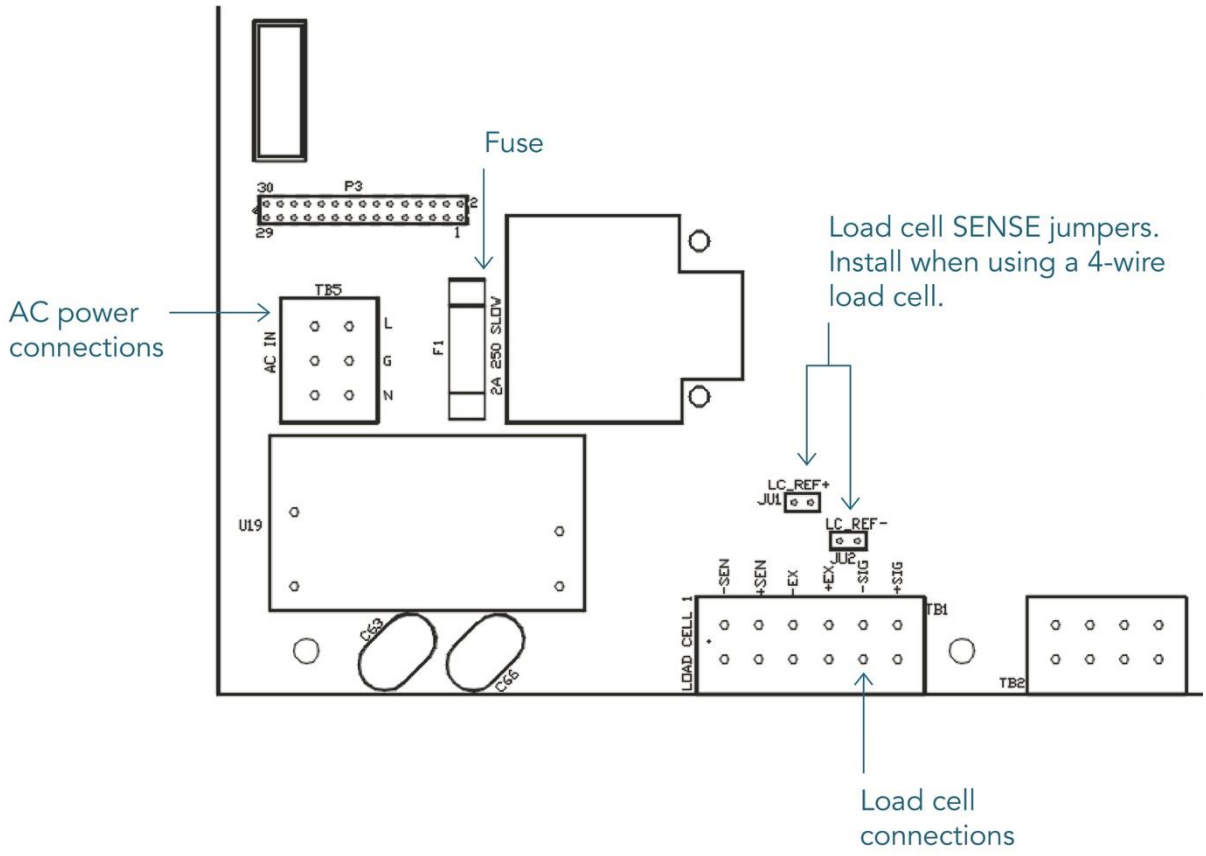


Fig. 3: Load Cell and Power (lower left of board)

	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.

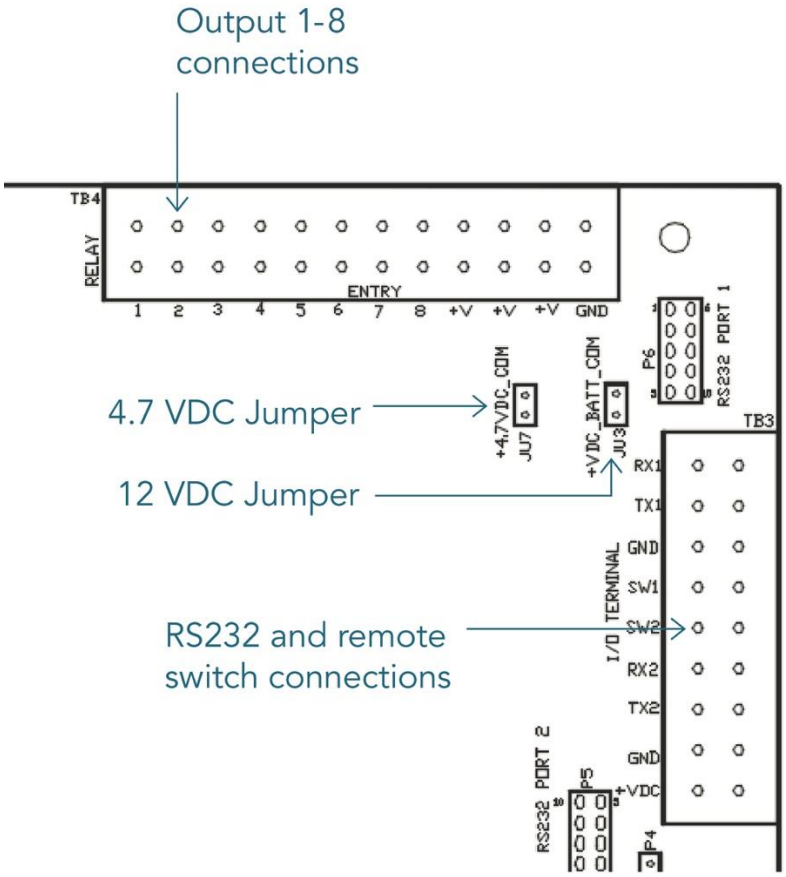
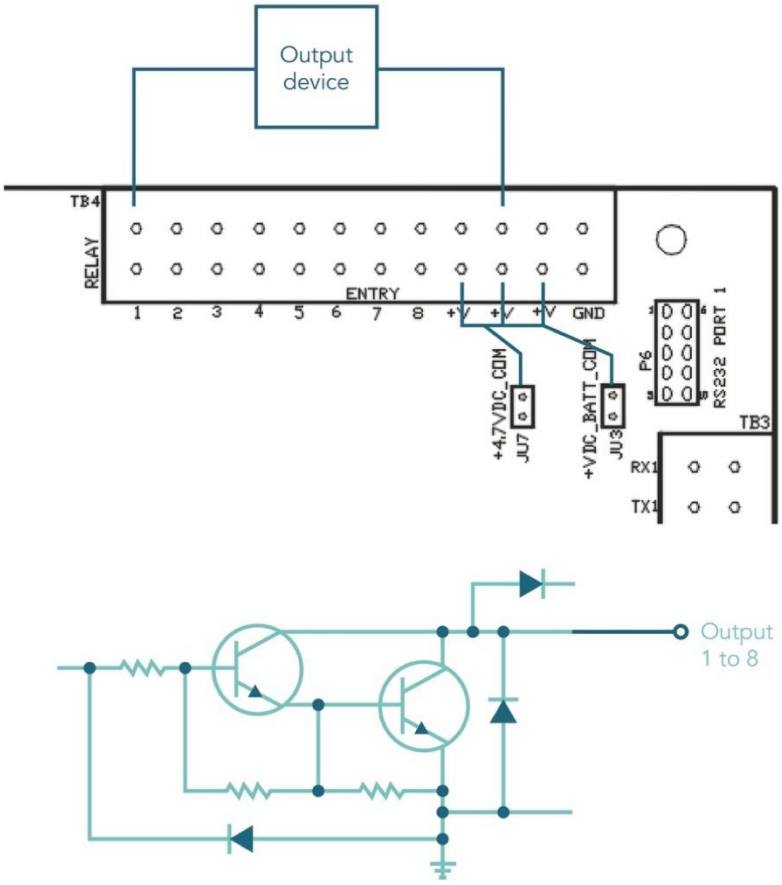


Fig. 4: Output Serial and Remote Switch Connection (upper right of board)

TB3 RS232 and Remote Switch Connections		
	Description	**Wire Color Code**
RX1	RS232 Port 1 Receive	White
TX1	RS232 Port 1 Transmit	Red
GND	Common Ground	Black
SW1	Remote Switch 1 Input	White
SW2	Remote Switch 2 Input	White
RX2	RS232 Port 2 Receive	White
TX2	RS232 Port 2 Transmit	Red
GND	Remote Switch Common	Black
VDC	4.7Vdc	

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 99. don.
2. Press the ZERO button
3. The display reads donEn
4. Press the ZERO button
5. The display reads donEY
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 CntbY and the current count by
3. Press ZERO to select the desired count by
4. To exit and save changes, press UNITS until donEn is displayed.
5. Press ZERO
6. donEY 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 CALO 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 CALFS 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 Error Codes

Code	Solution
r9Err	The calibration zero is out of range. Press ZERO to clear error. Refer to the Scale Calibration Error Troubleshooting section.
ErnEG	The calibration span is in a negative range. Check polarity of load cell connection and repeat calibration.
SPAnE	The calibration span is out of range. Press ZERO to clear this error. Refer to the Scale Calibration Error Troubleshooting section.
ErnnA	The scale is sensing an unstable weight. Remove any vibration or air currents to continue calibration.

Scale Calibration Error 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 CnF9 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 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

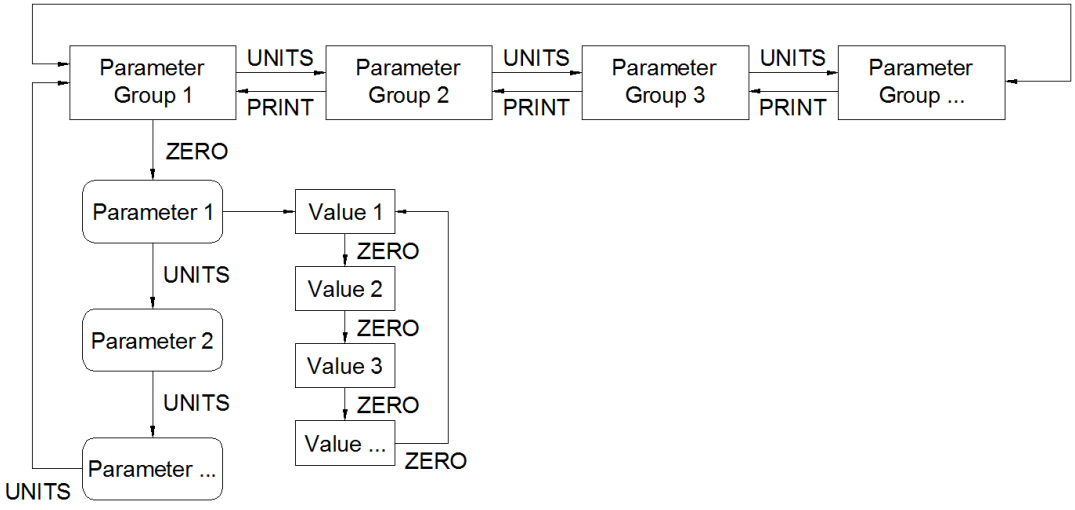
1. Press UNITS until the display reads 99. don.
2. Press the ZERO button
3. The display reads donEn
4. Press the ZERO button
5. The display reads donEY
6. Press UNITS to return to the run mode
7. Display reads SAVEd to confirm changes are saved to memory

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 to select 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 wwFn	Wireless Ethernet
7 bt	Bluetooth
8 USb	USB
9 OPEr	Output Operation
99 don	Exit Setup

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 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.

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

Capacity and Calibration - 1 CAL

CAP AJ	**Capacity Adjustment**
1 - 999000	1 lb / kg to 999,000 lb / kg Press ZERO to change flashing digit Press PRINT to select next digit

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

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

AvG	**Display Filter Setting** 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** 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** * 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*** Length of a motion indication display.
1 - 9	Length of a motion indication display, in 100ms intervals. Default is **3**.

SuO*	**Start Up Zero** 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

tAr	**Tare Input**
Pbn	**Tare Pushbutton as well as keypad entry**
Pb	Tare Pushbutton only
n	keypad only
oFF	No tare entry

Zod	**Zero on Demand** 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** 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.**

oP	**Operating Mode**
Std	**Standard operation**
NTEP	NTEP legal-for-trade. Restricts parameters to keep them within NTEP limits.
CWM	CWM legal-for-trade. Restricts parameters to keep them within CWM limits.
bAt	Batch program mode

bAt	**Batch Selection**
0-99	Select batch number that will be loaded into memory if no product ID is loaded.

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 Disable** 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** 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** Determines which buttons are active or inactive		
no	**Do not enter push button selection menu**		
YES	Enter push button selection menu		
	Pr	**PRINT button**	
		on1	**pb is active on port 1**
		on2	pb is active on port 2
		onb	pb is active on port 1 & port 2
		oFF	pb is non active
	Ut	**UNITS button**	
		on	**pb is active**
		oFF	pb is non active
	Zr	**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**
		Zr	ZERO
		Pr	PRINT
		Ut	UNITS
		Ac	ACCUM
		tr	TARE
		Gn	GROSS NET
	SS	**Start and Stop buttons**	
		on	**pb is active**
		oFF	pb is not active
	Gn	**GROSS NET button**	
		on	**pb is active**
		oFF	pb is not active
	Ac	**ACCUM button**	
		on	**pb is active**
		oFF	pb is not active (disables accumulator function)
	SP	**SETPOINT button**	
		on	**pb is active**
		oFF	pb is non active
	tr	**TARE button**	
		on	**pb is active**
		oFF	pb is non active
	id	**PRODUCT ID button**	
		on	**pb is active**
		oFF	pb is non active

tdY	**Automatic off Timer** Only visible when bAtt PArAmEtEr .S 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 minutes On timer
2	2 minutes On timer
3	3 minutes On timer
5	5 minutes On timer
10	10 minutes On timer
30	30 minutes 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** Controls automatic printing features starting with A.P.
0.1 - 9.9	±0.1% to ±9.9% of capacity **Default setting is 1%**

dEFt	**Default** 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** 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

PASS	**Enable or disable password**
n	Password inactive
y	Password active – press Units, enter numeric password and press enter. The password must be a minimum of 3 digits and no longer than 6 digits.

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.3	Auto Print 3. Transmit once when the scale stabilizes within the ACCEPT range. Weight must fall below the threshold value before transmitting again.
C.P.	Continuous Print. Transmit when display is updated.
oFF	Port disabled

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.3	Auto Print 3. Transmit once when the scale stabilizes within the ACCEPT range. Weight must fall below the threshold value before transmitting again.
C.P.	Continuous Print. Transmit when display is updated.
oFF	Port disabled

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

Wired 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.3	Auto Print 3. Transmit once when the scale stabilizes within the ACCEPT range. Weight must fall below the threshold value before transmitting again.
C.P.	Continuous Print. Transmit when display is updated.
C.P. UdP	Continuous Print. Transmit on selected UDP port when display is updated.
oFF	**Port disabled**

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
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

IPxxxx	**Static or DHCP IP Address Assignment**
IPdhCP	**DHCP - address supplied by network server**
IPStAt	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 Adr	**UDP IP Address**
	Current IP address that the scale will use to send UDP packets.

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

Wireless Ethernet - GuuF.

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.3	Auto Print 3. Transmit once when the scale stabilizes within the ACCEPT range. Weight must fall below the threshold value before transmitting again.
C.P.	Continuous Print. Transmit when display is updated.
oFF	**Port disabled**

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

IPxxxx	**Static or DHCP IP Address Assignment**
IPdhCP	**DHCP - address supplied by network server**
IPStAt	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.

IdLE	**Idle Timeout**
0 - 65536	Number of seconds during which no data is transmitted or received before the connection is automatically closed. Default is **30** seconds. Setting the timer to 0 prevents disconnecting.

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

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

Bluetooth - bt

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.3	Auto Print 3. Transmit once when the scale stabilizes within the ACCEPT range. Weight must fall below the threshold value before transmitting again.
C.P.	Continuous Print. Transmit when display is updated.
oFF	**Port disabled**

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 - 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.3	Auto Print 3. Transmit once when the scale stabilizes within the ACCEPT range. Weight must fall below the threshold value before transmitting again.
C.P.	Continuous Print. Transmit when display is updated.
oFF	**Port disabled**

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

Setpoints and Output Operation – 9 OPEr

S.o.	**Setpoint Operation**		
no	**Do not enter Setpoint Operation**		
YES	Enter menu		
	SP1-8	**Setpoint Mode**	
		oFF	**Setpoint off**
		HA	Active High (wt≥setpt$_x$)
		LA	Active Low (wt≤setpt$_x$)
		HS	Active High (wt≥setpt$_x$): only stable weights
		LS	Active Low (wt≤setpt$_x$): only stable weights
		HAL	Active High (wt≥setpt$_x$): Latching to Threshold Level
		LAL	Output Active Low (wt≤setpt$_x$): Latching to Threshold Level
		HSL	Output Active High (wt≥setpt$_x$): Latching to Threshold Level and stable weight
		LSL	Output Active Low (wt≤setpt$_x$): Latching to Threshold Level and stable weight
		bA_	Band, Active High, only one setpoint activates at a time. (wt≥setpt$_x$&wt< setpt$_{x+1}$) (not available on SP8)
		bS_	Band, Active High, only one setpoint activates at a time. (wt≥setpt$_x$&wt< setpt$_{x+1}$): only stable weights. (not available on SP8)
		bSL	Band, Active High, only one setpoint activates at a time. (wt≥setpt$_x$&wt< setpt$_{x+1}$): Latching to Threshold Level and stable weight. (not available on SP8)
		FIL	Tank fill operation. SP2 only. See tank fill section for details.

Suu.	**Setpoint Weight Operation** Weight that is used to evaluate the Setpoint logic
dSP	Currently displayed weight
nEt	Net weight
Gro S	Gross weight

PrE	**Preact Adjustment % Configuration**		
no	**Do not enter menu**		
YES	Enter menu		
	P1-8	**Preact Configuration**	
		XX	Enter preact adjustment % Range: 1 to 90 %

out	**Output Configuration**
no	**Do not enter Output selection menu**
YES	Enter menu
	o1-8 **Output Configuration**
	o1 oFF **Output is deactivated**
	o1 SP1 Setpoint 1 used for output logic
	o1 SP2 Setpoint 2 used for output logic
	o1 SP3 Setpoint 3 used for output logic
	o1 SP4 Setpoint 4 used for output logic
	o1 SP5 Setpoint 5 used for output logic
	o1 SP6 Setpoint 6 used for output logic
	o1 SP7 Setpoint 7 used for output logic
	o1 SP8 Setpoint 8 used for output logic
	o1 tHS Weight below threshold level used for output logic
	o1 in1 Remote Switch Input Logic 1 used for output logic
	o1 in2 Remote Switch Input Logic 2 used for output logic
	bAt State controlled by batch program commands

Exit - 99don

donE	**Exit and save changes**
n	Do not exit
Y	Save changes and exit

Data Communications

Data Communication Modes

The Scale Indicator offers four different communication modes. These modes dictate when data is transmitted. To confirm data has been transmitted, the display will show a "r" to confirm data transmission.

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.

Continuous Data Transmission (CP)

Data is transmitted each time the scale display updates. Readings which occur when the scale is in motion are indicated out by the abbreviation "MOT." after the weight data. The Digital Filter Setup parameter will control the number of data transmissions per second.

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 and 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 3 (AP3)

Auto Print 3 transmits the first stable scale reading following the scale leaving motion, within the ACCEPT band and above the adjustable threshold level. To adjust the Threshold level as a % of capacity, see the Threshold Level parameter. In Auto Print 3, no further readings will be sent until the scale returns to weight reading that is below the adjustable threshold level.

Data String Formatting

Many predefined data formats are available. 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 <STX><p><xxxx.xx><SP><uu><SP><MOT><CR><LF> Sample Print String ±--10.05-lb Note: "-" represents a space	**<STX>** Start of Text (02h) **<p>** Weight Polarity Negative weight "-", positive weight space (20h) **<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload "-------". Leading zeros are spaces (20h). **<uu>** Displayed Units "lb", "kg", "oz", "g" **<MOT>** (Available only in Continuous print mode) Motion Status Appends "MOT" to the print string when printing while in motion **<SP>** Line Space (20h) **<CR>** Carriage Return (0dh) **<LF>** Line Feed (0Ah)
2d	Dual Unit lb and kg Print Output Format <STX><p><xxxx.xx><SP><uu><SP><MOT><CR><LF> <(><p><xxxx.xx><SP><kg><SP><)><MOT><CR><LF> Sample Print String ±--10.05-lb ±---4.56-kg Note: "-" represents a space	**<STX>** Start of Text (02h) **<p>** Weight Polarity Negative weight "-", positive weight space (20h) **<xxxx.xx>** Weight Data fixed field of 6 digits plus decimal. In overload or underload "-------". Leading zeros are spaces (20h) **<uu>** Displayed Units "lb", "kg", "oz", "g" **<MOT>** (Available only in Continuous print mode) Motion Status Appends "MOT" to the print string when printing while in motion **<SP>** Line Space (20h) **<CR>** Carriage Return (0dh) **<LF>** Line Feed (0Ah)

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

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

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

Custom Data String Configuration

\I0	Current product ID, up to 20 characters
\w	Current weight: Polarity, 6 digits and decimal, leading spaces
\w0	Current weight: Polarity, 6 digits and decimal, leading zeroes
\wp	Current weight: No polarity, 6 digits and decimal, leading spaces
\wP	Current weight: No polarity, 6 digits and decimal, leading zeroes
\q	Current GROSS weight. Polarity, 6 digits and decimal point, leading spaces
\n	Current NET weight. Polarity, 6 digits and decimal point, leading spaces
\u	Current unit. lb, kg, g, oz. Two characters except for grams which is one.
\W	Current weighing mode. “GS” for GROSS and “NT” for NET
\m	Motion status. MOT or three spaces when stable.
\y	Current weight polarity. “-“ or “ “ (space)
\y0	Polarity of the currently displayed weight. ‘0’ or ‘-‘
\s	Check weigh status. 6 characters with spaces at end if not six characters. HIGH, OVER, ACCEPT, UNDER, LOW
\t	Current TARE. Polarity, 6 digits and decimal point, leading spaces
\R	Clears TARE and places scale in the GROSS MODE
\Z	ZERO command
\a	Accumulated Weight. 8 digits, with leading spaces, polarity and decimal point (if applicable.)
\A	Accumulated Weight. 8 digits, with leading zeros, polarity and decimal point. Positive polarity is represented as a “0”.
\c	Accumulation counter, 7 digits, leading spaces
\C	Accumulation Counter, 7 digits, leading zeroes
\B	Clears the Accumulator and Counter
\l	Linefeed. ASCII 0x0A
\r	Carriage return. ASCII 0x0D
\x	Start of text character. ASCII 0x02.
\hxx	HEX byte. xx can be 00 through FF.
\TM	24 hour time: HH:MM
\Tm	24 hour time with seconds: HH:MM:SS
\TC	12 hour time: HH:MM “AM” or “PM”
\Tc	12 hour time with seconds: HH:MM:SS “AM” or “PM”
\TP	“AM” or “PM”
\M	Month. “01” – “12”
\Y	Year. “”00” – “99”
\J	Day. “01” – “31”

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.

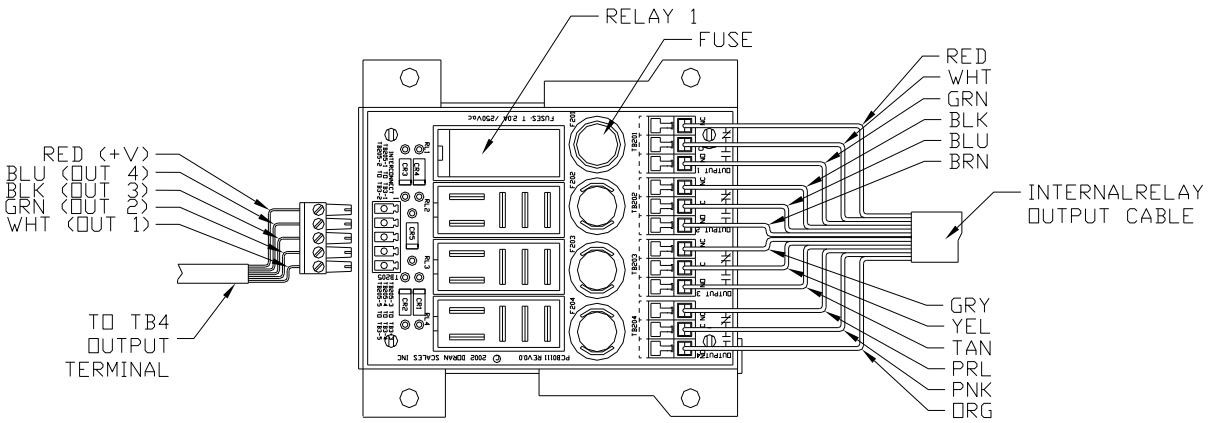
Remote Indicator Commands

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 communications port 2 only
Px, px	Customer data string Lb1-4 can be requested to transmit out communications 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.
T, t	Issues a TARE command to the scale. Note: Scale will not TARE if in motion or if an error is displayed.
G, g	Places the scale into gross weight mode.
N, n	Places the scale into net weight mode. Note: The indicator will not be able to enter the net mode if a tare is not present.
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.
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 held wifi IP address.
SW7	The scale will transmit the current wifi IP port it is using.
^R>	Force the scale to enter calibration/setup mode
^R<	Force the scale to exit calibration/setup mode
^Rxx.yy.	This command will request that the scale transmit the data in calibration/setup menu group xx, 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.
MD	The scale will transmit its model number

Internal Relay Option

The Internal Relay Option allows up to four relays to be mounted inside the indicator. Three types of relays are available for use with the Internal Relay Option – 6Vdc Electromechanical and Solid State (AC or DC). Specify style of relay at time of order.



Internal Relay Board

Internal Relay Setup:

A twelve conductor cable provides the relay output connections that exits the meter through a watertight. Leave this cable in place when configuring the outputs and refer to the output cable color code table. The Scale does not provide the AC or DC power to run external devices.

Each relay has a three-position output that provides a Common, Normally Open and Normally Closed terminal. The Normally Closed terminal is only available for use with a mechanical relay. Solid State relays can operate as Normally Closed through software configuration only. The following table shows the color codes and terminal connections for the included cable.

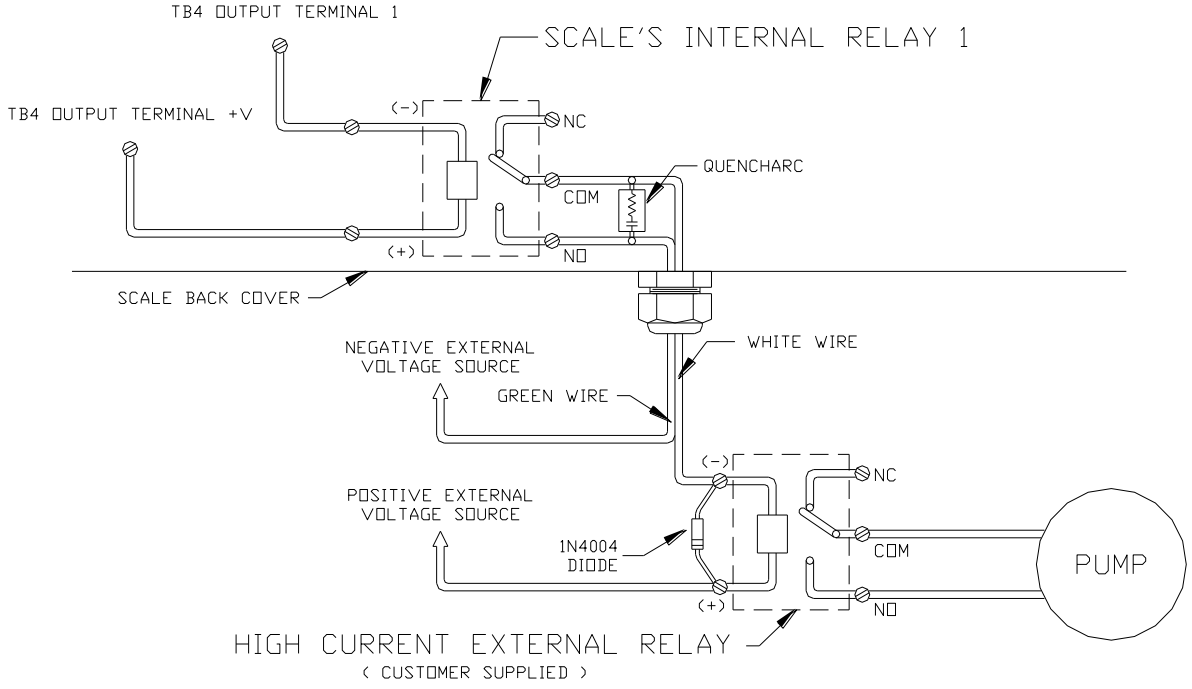
Relay Specifications:

6VDC Mechanical Relay, 10A 250VAC / 30VDC
AC Solid State Relay, 2A 100-240VAC
DC Solid State Relay, 2A 5-48VDC

Internal Relay Output Cable Color Code		
Channel	Terminal	Conductor Color
Relay 1 (OUTPUT 1)	TB201 – NC	Red
	TB201 – COM	White
	TB201 – NO	Green
Relay 2 (OUTPUT 2)	TB202 – NC	Black
	TB202 – COM	Blue
	TB202 – NO	Brown
Relay 3 (OUTPUT 3)	TB203 – NC	Grey
	TB203 – COM	Yellow
	TB203 – NO	Tan
Relay 4 (OUTPUT 4)	TB204 – NC	Purple (Pearl)
	TB204 – COM	Pink
	TB204 – NO	Orange

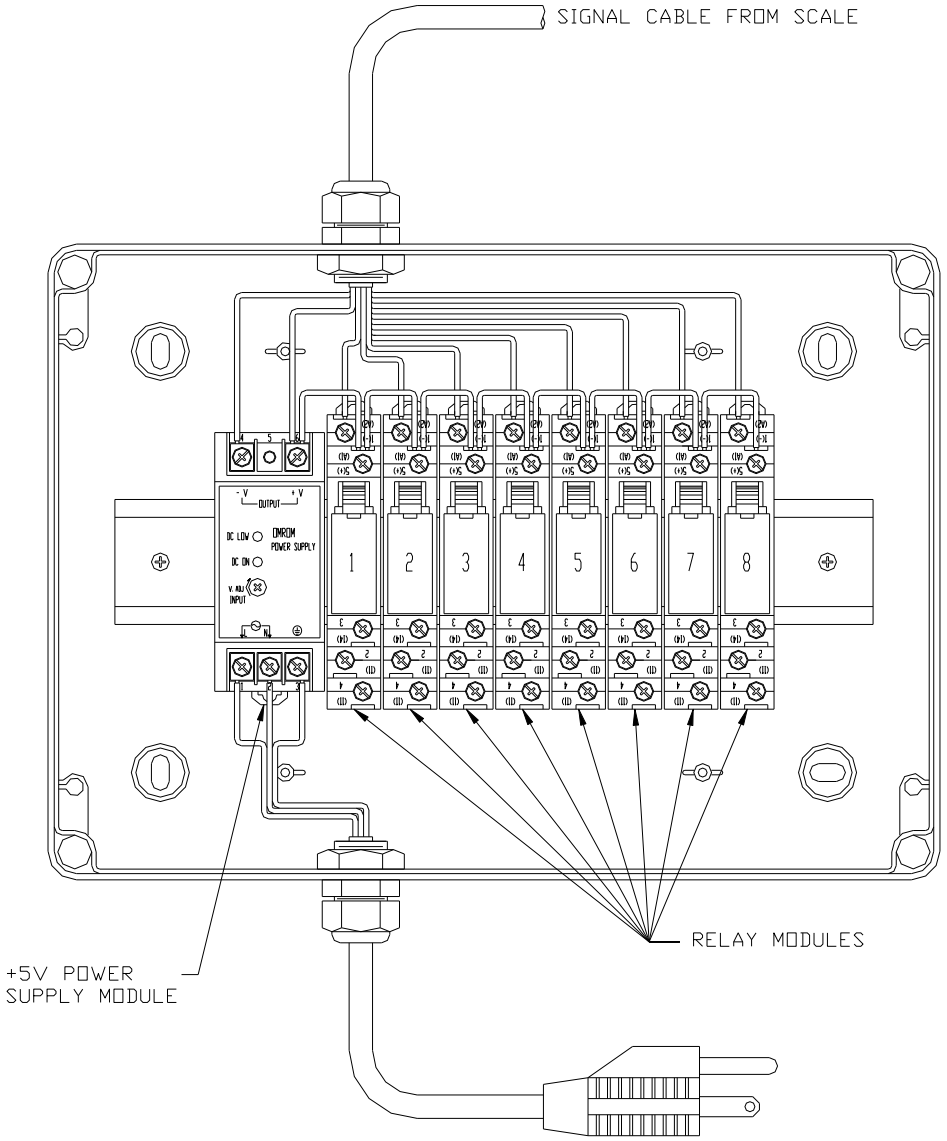
Step-up Relay Circuit

If the current load to be switched is greater than the maximum current limit of the internal relay, i.e. 10 Amps for mechanical relay or 2 Amps for Solid State Relay, a step-up relay circuit is required in order to switch to the higher current loads.



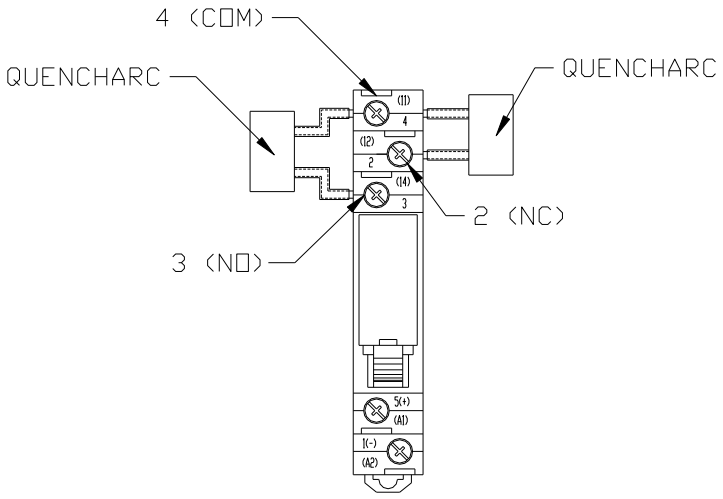
External Relay Box Option

The External Relay Box Option consists of up to eight DIN rail mounted relay modules. The Relay Box is a NEMA4X polystyrene enclosure with a clear cover and knock-out plugs with sizes of 7/8", 1-1/8", 1-1/2". Three types of relays are available for use with the External Relay Box Option – Electromechanical and Solid State (AC or DC). Shown below with optional a +6V Power Supply.



External Relay Setup:

The Relay module is offered with three types of relays, mechanical and solid state (AC or DC). The mechanical relay's output consists of terminal 4 - common (COM), terminal 3 - normally open (NO), and terminal 2 - normally closed (NC).



Scale Signal Cable Color Code		
Module	Terminal	Conductor Color
Relay 1	1(-) A2	Brown
Relay 2	1(-) A2	Red
Relay 3	1(-) A2	Orange
Relay 4	1(-) A2	Yellow
Relay 5	1(-) A2	Green
Relay 6	1(-) A2	Blue
Relay 7	1(-) A2	Purple
Relay 8	1(-) A2	Grey
Power Supply	Output +V	White
Power Supply	Output -V	Black

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. 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.

NOTE: If the scale is in an underload fault condition the 4-20mA output level is set to 3.5mA for underload. If in overload, please note that the output is limited to a maximum of 20mA. Output impedance range is zero to 600 ohms.

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 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

Wireless 802.11b/g Ethernet Option

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
12dBm Transmitting Power
Receiving Sensitivity
-83dBm(Typ.)
Operating Temp. 14° F to 104° F

Wireless Security: 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

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.

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.

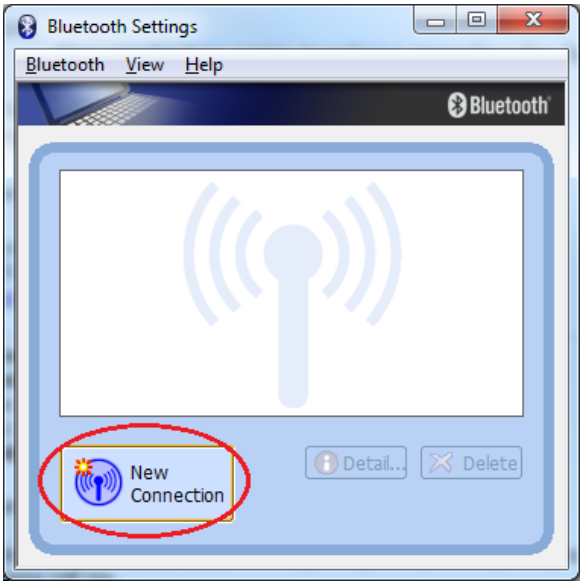
Bluetooth Specifications

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

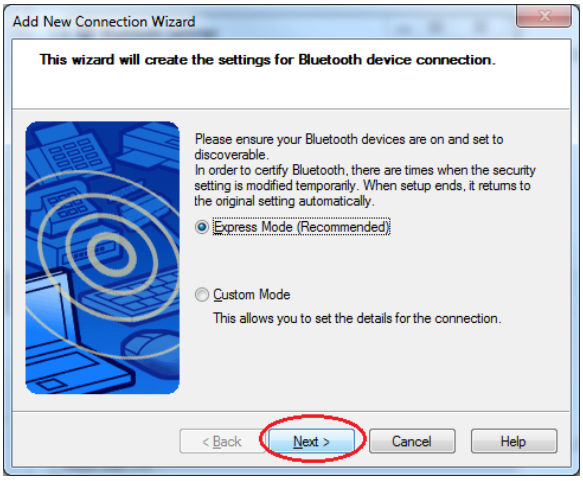
Bluetooth Pairing Instructions

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

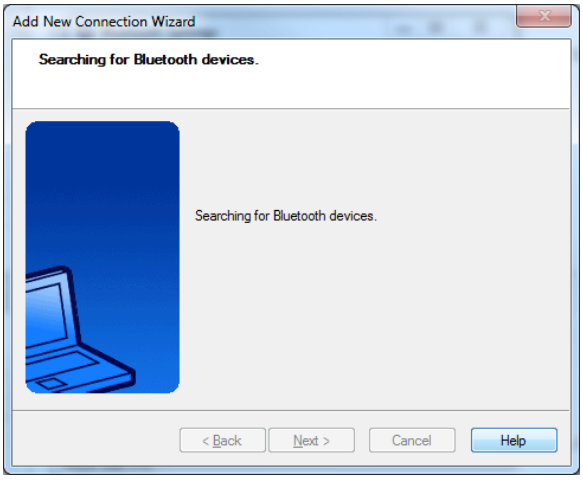
Click New Connection



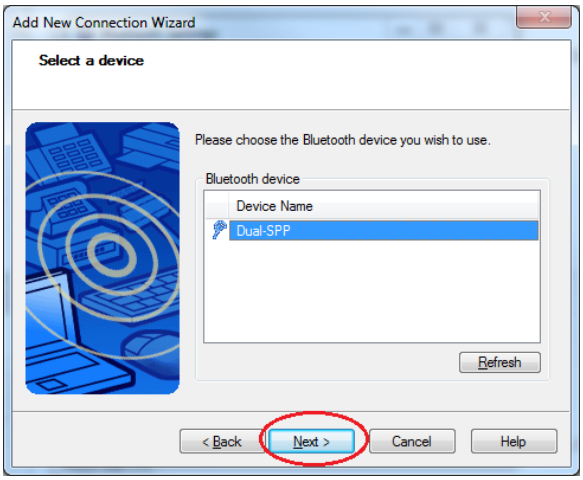
Click Next



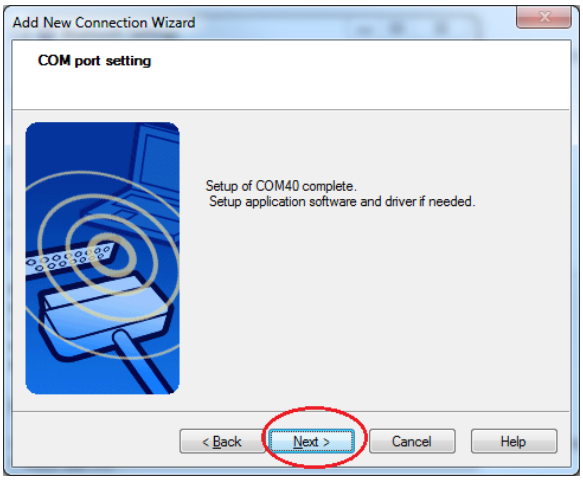
The driver will search for the scale.



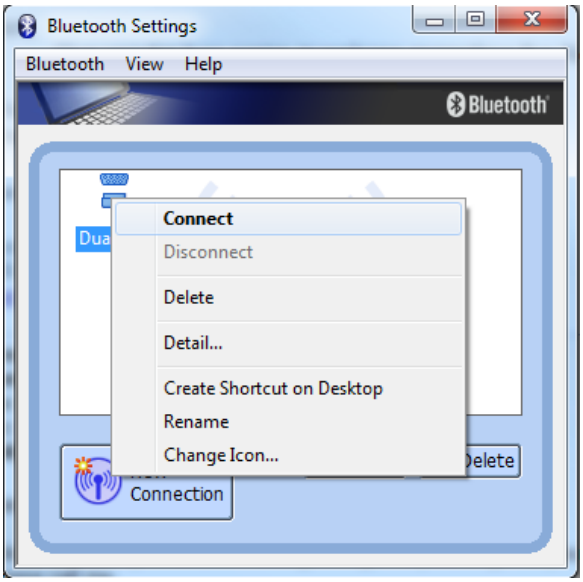
Select Dual-SPP and click Next



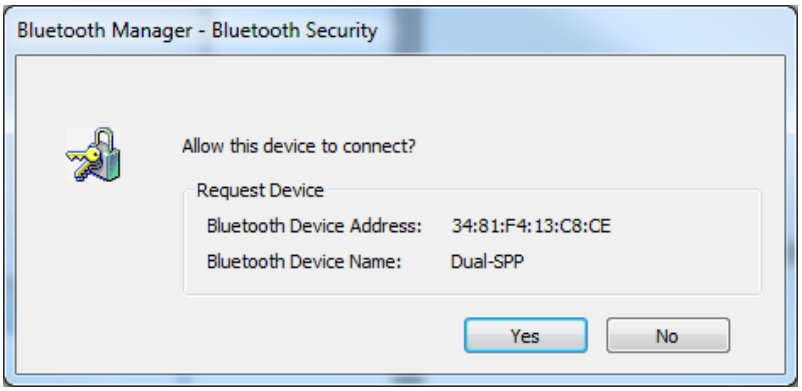
Click Next once to pair



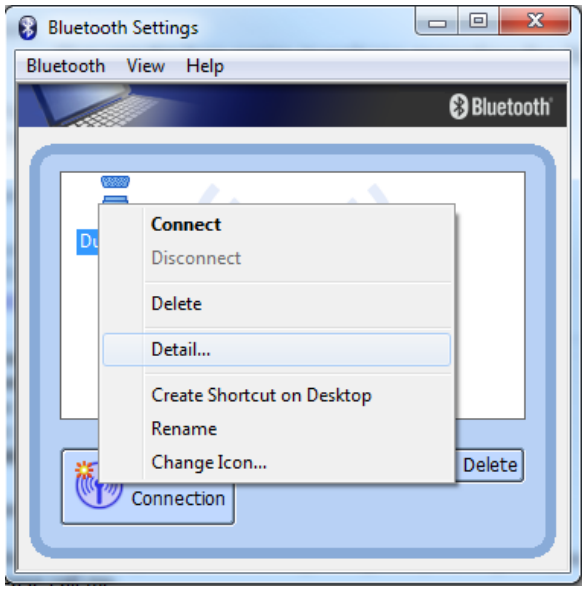
Right-click Dual-SPP and choose Connect



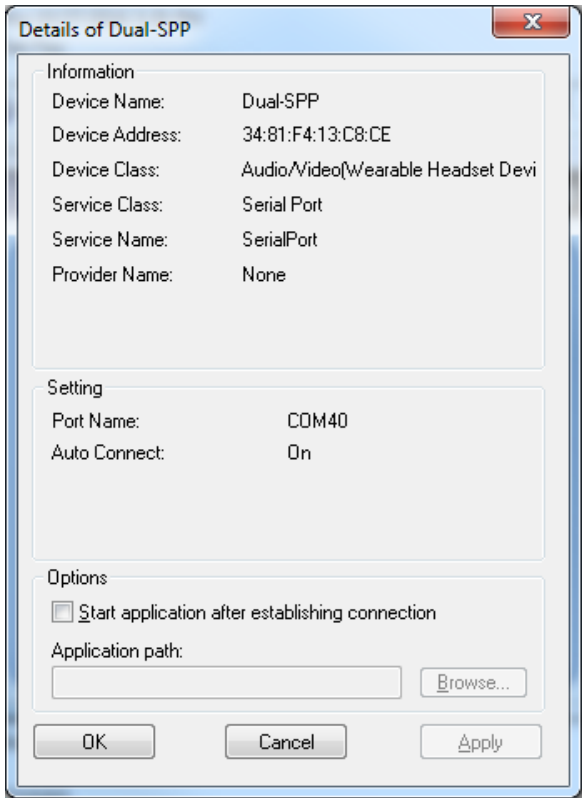
Click Yes to connect



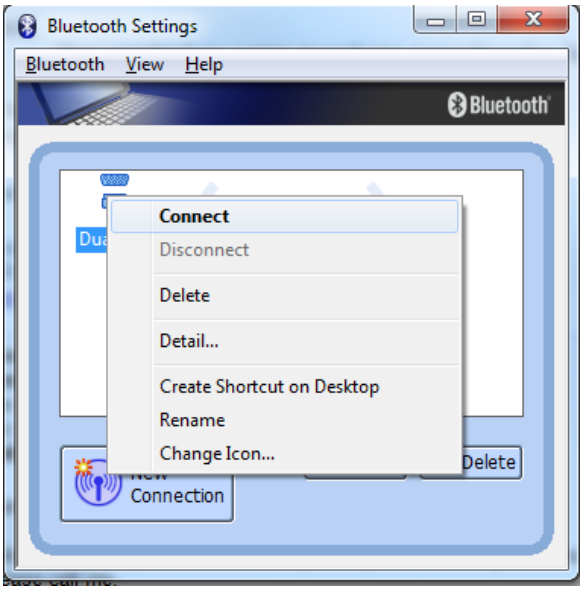
Right-click Dual-SPP and choose Detail…



The COM number will be displayed



Right-click Dual-SPP and choose Connect



Troubleshooting

If any problem persists, contact Doran Tech Support at 630-879-1288

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 Filterparameter.
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
"donE" Function complete	The scale has successfully completed the requested action.
"Abort" Aborted function	The requested action has been canceled prior to completion.
"SAVEd" Parameter value saved	The scale has successfully store and verified parameter value in nonvolatile memory.
"rELPb" Release push button	The scale has detected that a front panel button has been depressed for more than 3 seconds.

Error Messages

Message	What to Do or Check
OvrLd Scale overload	The scale is in overload. The load on the scale exceeds the capacity by more than 103%. Remove excess weight from scale.
UdrLd Scale underload	The scale is in underload. The load on the scale is less than the minimum scale capacity by more than -20%. Recalibrate scale or add additional dead load.
Ld90 Loading zero.	The scale is attempting to load power up zero. This message will remain until scale is stable.
SPAnE Calibration Range Error	Calibration zero is out of range, refer to Scale Calibration Error Troubleshooting section for additional information.
Errno Motion Calibration Error	Calibration weight readings are unstable. Too much vibration during the Calibration or load cell signal wires are not connected.

Default to Factory Settings

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

WARNING: Defaulting the scale will require recalibration.

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 1 CAL parameter group
3. Press UNITS to scroll to menu item dEFtn.
4. Press ZERO to change selection to dEFtY
5. Press UNITS.
6. The scale will then show InIt and SAVEd.
7. 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.

Doran Scales, Inc.
883 Enterprise Court
St. Charles, IL 60174

www.doranscales.com

630-879-1200