

8. Calibration

The calibration of the indicator is fully digital. The calibration results are stored in permanent memory for use each time the instrument is powered up.

Note: Some of the digital setup steps can affect calibration. The BUILD and OPTION settings MUST be configured before calibration is attempted.

To perform a calibration, when in Full Setup select the CAL Group using the <GRP> key.

The calibration program will automatically prevent the instrument from being calibrated into an application outside of its specification. If an attempt is made to calibrate outside of the permitted range, an error message will display and the calibration will be abandoned. Refer to Error Messages page 39.

The instrument has a wide-range ADC. The non-trade calibration range of the instrument extends well beyond the Trade approved range.

Note: It should not be assumed that just because the instrument has successfully calibrated a scale, that the scale is correct for trade use. Always check the scale build against the approval specification.

8.1. Performing a Digital Calibration with Test Weights

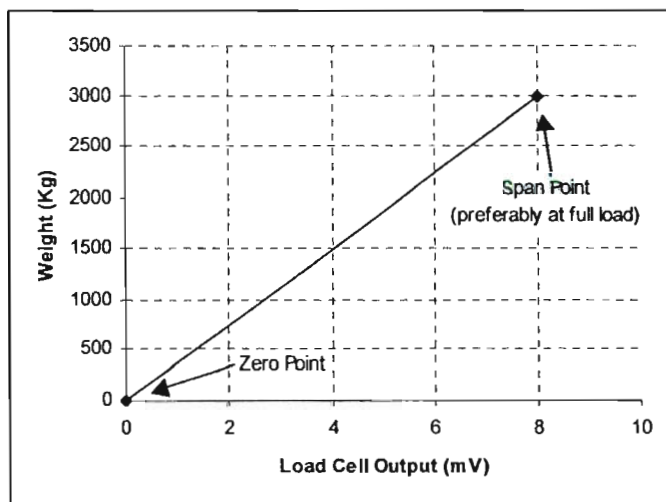


Figure 15: Chart - Zero and Span Points to Interpolate Weight from Load Cell

The Zero setting (CAL:ZERO) specifies a gross zero point for the scale. The Span setting (CAL:SPAN) specifies a second point (**preferably close to full scale**) used to convert the A/D readings into weighing units (e.g. kg). Select either of the Zero (CAL:ZERO) or Span (CAL:SPAN) calibration items. It is important that an initial Zero calibration is performed before any SPAN calibrations. The chart shown here demonstrates how the zero and span points are used to interpolate a weight reading from the load cell reading.

Note: Calibration points (Zero, Span and Linearization) must be spaced by at least 2% of Full scale from each other.

8.1.1. ZERO (Zero Calibration Routine)

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| <ul style="list-style-type: none">• Press the <SEL> key to start. The display will show the current weight. Remove all weight from the scale structure. |
| <ul style="list-style-type: none">• Press <SEL>, <EDT> or <OK> to execute a Zero Calibration. The display will show Z.in.P to indicate that zeroing is in progress. When the process is complete the display will return to weight to allow the zero to be checked. |
| <ul style="list-style-type: none">• Press the <ITM> key to leave the Zeroing routine or press <SEL>, <EDT> or <OK> to repeat the operation. |

8.1.2. SPAN (Span Calibration Routine)

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| <ul style="list-style-type: none">• Press <SEL> or <OK> to start. The display will show the current weight. |
| <ul style="list-style-type: none">• Add the calibration test mass to the scale. The minimum acceptable span calibration weight is 2% of the scale range. A weight this small may limit calibration accuracy. The closer the test weight is to full scale the better the accuracy. |
| <ul style="list-style-type: none">• Press <SEL> or <OK> to show the calibration weight value. Change this to the correct calibration weight using the <SEL> and <EDT> keys. |
| <ul style="list-style-type: none">• Press <ITM> or <OK> to trigger the Span Calibration routine. The display will show S.in P to indicate that spanning is in progress. When the process is complete the display will return to weight to allow the new weight reading to be checked. |
| <ul style="list-style-type: none">• When the Span Calibration is complete, press the <ITM> key to leave the Spanning routine or press <SEL>, <EDT> or <OK> to re-edit the calibration weight and repeat the operation. |

8.2. Performing a Calibration with Direct mV/V Entry

In applications where test weights are not easily available, it is possible to calibrate the instrument directly by entering the mV/V signal strength at Zero and full scale Span. The Direct Zero setting (CAL:DIR.ZER) specifies a gross zero point for the scale. The Direct Span setting (CAL:DIR.SPN) specifies the mV/V signal strength corresponding to an applied mass equal to the full scale reading. This calibration technique is not compatible with linearization. Clearly the accuracy of this type of calibration is limited to the accuracy of the direct mV/V data.

8.2.1. DIR.ZER (Direct Zero Calibration Entry)

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| <ul style="list-style-type: none">• Press the <OK> key to start. The display will show the current weight. |
| <ul style="list-style-type: none">• Press the <OK> key to enter the Direct Zero setting. Change the mV/V setting to the correct value for Zero using the <SEL> and <EDT> keys. |
| <ul style="list-style-type: none">• Press the <OK> key to store the new zero calibration. When the process is complete the display will return to weight to allow the new weight reading to be checked. |
| <ul style="list-style-type: none">• Press the <ITM> key to leave the Direct Zero routine or <OK> to repeat the operation. |

8.2.2. DIR.SPN (Direct Span Calibration Entry)

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| <ul style="list-style-type: none">• Press the <OK> key to start. The display will show the current weight. |
| <ul style="list-style-type: none">• Press the <OK> key to enter the Direct Span setting. Change the mV/V setting to the correct value for the full scale signal strength, using the <SEL> and <EDT> keys. |
| <ul style="list-style-type: none">• Press the <OK> key to store the new span calibration. When the process is complete the display will return to weight to allow the new weight reading to be checked. |
| <ul style="list-style-type: none">• Press the <ITM> key to leave the Direct Span routine or <OK> to repeat the operation. |

8.3. Using Linearization

This section provides instructions on the use of the linearization. Linearization is used to approximate the weight output to a non-linear scale. The chart below shows a non-linear characteristic for the load cell output. From the chart, it can be seen that the trace with no linearization applied is a poor approximation to the real characteristic. By applying one or more linearization points, more accurate weight readings can be achieved.

To perform a linearization, a calibration of the zero and full scale span points must have been performed. Both the zero and full scale calibration points are used in the linearization of the scale base. These two points are assumed to be accurately set and thus have no linearization error.

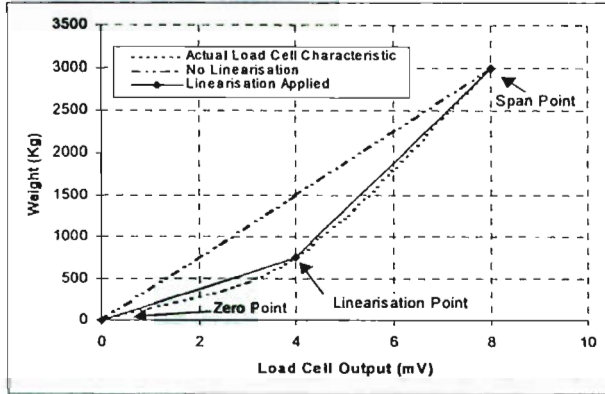


Figure 16: Chart - Non-Linear Characteristic for Load Cell Output

A maximum of five linearization points can be set independently between zero and full scale. Unused or unwanted points may also be cleared. The maximum correction that can be applied using a linearization point is $\pm 2\%$.

8.3.1. ED.LIN (Edit Linearization Points)

- Press the <SEL> key to step through the list of points. Each point is shown as **Ln.ppp** where **n** is the point number (1 to 5), and **ppp** is the approximate percentage of full scale where the linearization is applied. For example, **L1.050** indicates that linearization point one is active and was entered at about 50% of full scale. Unused linearization points are shown with a row of dashes (e.g. **L2.---**).
- Press <OK> to change the linearization point selected or press <ITM> to exit without making any changes.
- After pressing <OK>, the current weight reading is displayed. Add the calibration test mass to the scale. The closer the test mass is to the point of maximum error in linearity the more effective will be the correction. Press <OK> to enter a corrected weight value for this point or <ITM> to exit without making changes.
- Use the <SEL> and <EDT> keys to enter the correct value of the calibration weight being used.
- Press the <OK> key to trigger the linearization routine. The display will show **L.in P** to show that linearization is in progress. When the process is complete the display will show the weight to allow the new weight reading to be checked before returning to the menus. Press <ITM> to leave the routine or <OK> to repeat the operation.

8.3.2. CLR.LIN (Clear linearization)

- Press the <SEL> key to step through the list of points. Each point is shown as **Ln.ppp** where **n** is the point number (1 to 5), and **ppp** is the approximate percentage of full scale where the linearization is applied. For example, **L1.050** designates that linearization point one is active and was entered at about 50% of full scale. Unused linearization points are shown with a row of dashes (e.g. **L2.---**).
- Press <OK> to choose the linearization point to clear. The indicator will prompt to continue with **Cont. N**. Press <ITM> to switch between **Cont. N** (No) and **Cont. Y** (Yes). The <OK> key is used to accept your choice. When **Cont. Y** has been chosen the cleared linearization point then displays (e.g. **L1.---**).
- Press <ITM> to return to **CLR.LIN**.

Note: All linearization points are cleared by restoring the default calibration of the instrument. The zero and span settings are also cleared by this process.