

TECHNICAL REFERENCE MANUAL

L-R-T Tension Indicator

TRIVIEW™ (Ti31)

DOC 801-2518



TriView™ Enclosure Version



TriView™ Panel Version

5 YEAR WARRANTY



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NEW!

TOUCHSCREEN DATA ENTRY

There are no mechanical switches or buttons on the TriView LRT tension indicator. Simply tap the screen to access controls. All controls are context driven buttons displayed on the touch-screen. The buttons are color coded: green to indicate availability for use, or gray to indicate some requirement is not yet met. The unit will also display the limiting reason in red.

QUIK-CAL™ PUSHBUTTON ZERO-SET AND CALIBRATION-SET

The TriView™ L-R-T tension indicators incorporates a labor-saving technology called Quik-Cal™, now with on screen instructions and buttons. Follow the on screen prompts and you will be done in a short time.

ZERO SET

The weight of the transducer roll produces an output that is not caused by web tension. This signal is compensated for in the Zero portion of the calibration process.

CAL SET

Following the calibration procedure will result in a highly accurate tension display and outputs. The procedure is detailed in Section 3.

Once complete the TriView™ L-R-T tension indicator will accurately display Total tension and either Left and Right tensions or Balance Left to Right below the Total.

ATTENTION!

Instructions for operation of the TriView Indicator are not included in this Technical Reference Manual.

They will be found in the **TriView LRT Operating Instructions, DOC 801-2462.**

TRIVIEW (Ti31) PRODUCT CODE

Example: Ti31-E-24-100-XRE

Ti31 - X - X - XXXX - OPTIONS

PACKAGING	POWER	METER SCALE	OPTIONS
E = Enclosure P = Panel Mount	24 AC	1 100 1000 5 125 1250 10 150 1500 15 200 2000 20 250 2500 25 300 3000 35 400 4000 50 500 5000 75 750	25CW = Calibration Weight is 25% DIFF = Displays difference between left & right side tensions TLS = Tension Limit Switch XRE = Extended Range ¹

NOTES: 1. XRE option requires transducers to have XR option.

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1.1 GENERAL DESCRIPTION

The Ti31 TriView™ L-R-T indicator is capable of displaying tension in either of two ways. The first displays left and right side tension in separate meters below a larger total tension meter. The second, the Difference option, displays a balance meter showing imbalance left or right of center, also below the same larger total tension meter.

Also available is the option to add a digital readout below each of the meters, producing a hybrid analog-digital display.

OUTPUTS

The Ti31 TriView™ L-R-T tension indicator is designed to provide an isolated tension Interface in one package between any type of DFE tension transducers and computers, tension recorders, or other devices for tension control and display purposes. Output from the Total channel is 0-10Vdc AND 4-20mA simultaneously. The reading is relative to the total tension across the web.

TLS Option

The TLS option can be used to detect tension above one operator selected value (TLS high) and below another operator selected value (TLS low). TLS high and low may be used independently or in combination.

1.2 FRONT VIEW

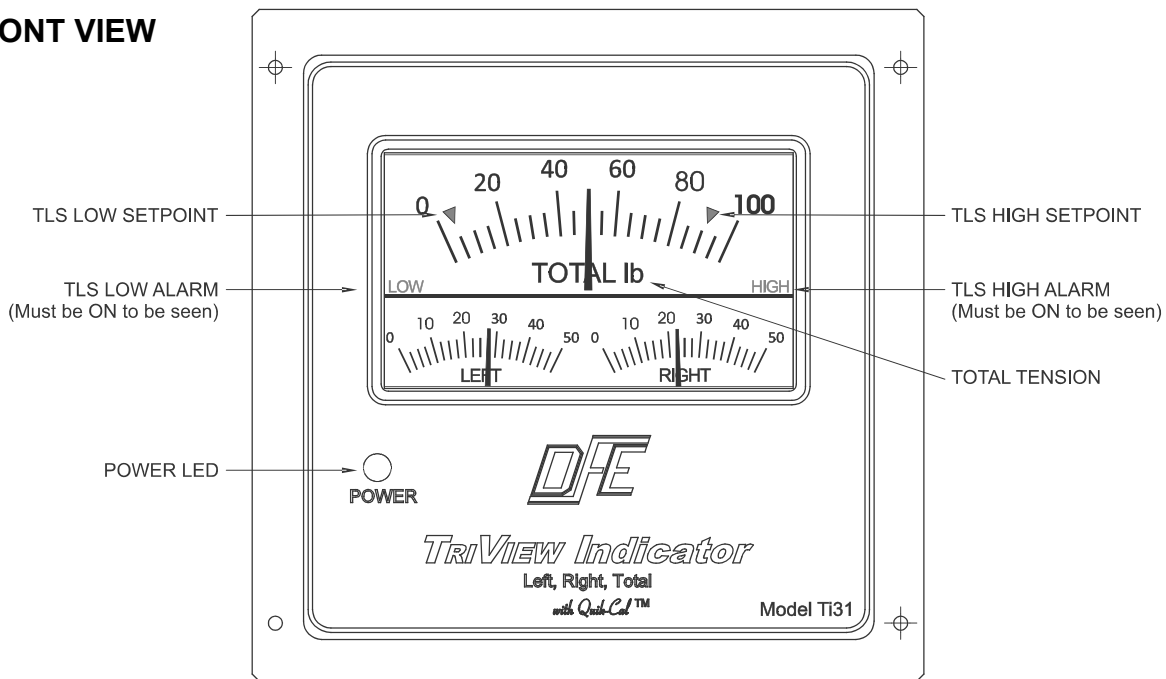


Figure 1 - FRONT VIEW OF TRI-VIEW

1.3 SPECIFICATIONS

Power Input:	Standard	.....	24VDC @ 250mA
	Optional:	.....	100-240 VAC 0.25-0.15A, 60/50Hz
Tension Signal Outputs:		.....	0 to +10 Volts DC @ 5 mA, Isolated
	(Total Only)	.....	4-20mA, Isolated and 0-10VDC @ 5 mA
Weight:	Panel:	.....	2.5 lbs. (1.2 KG)
	Enclosed:	.....	5.5 lbs. (2.5 KG)
Transducer Signal In:		.....	500 mV DC at rated load (per pair) maximum (Std)
		.....	1000mV DC at rated load (per pair) max (Extd Range)

1.3 SPECIFICATIONS continued...

Transducer Excitation:	5 Volts DC (10 Volts DC with XRE option)
Note: Type LT, RF, and VNW transducers are not designed for, and will not work with, the TriView™ L-R-T tension indicator.	
Zero (Tare) Range:	0-95% of transducer rating (Min.)
Calibration Range:	50:1 (Min.)
System Accuracy:	1% typical
Tension Display:	Digital Display, 5" Color TFT, Touchscreen shows Total on the Top and Left and Right side by side or Balance on the bottom.
Standard Meter Scales:	0–1, 5, 10, 15, 20, 25, 35, 50, 75, 100, 125, 150, 200, 250, 300, 400, 500, 750, 1000, 1250, 1500, 2000, 2500, 3000, 4000, 5000
Tension Limit Switch Relay	2 Individual Isolated Solid State Relays rated @ 250mA/24V Normally Open

1.4 ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe for use under the following conditions:

- Indoor use.
- Altitude up to 6500 ft (2000 meters).
- Temperature Range: 32° to 104° F (0° to 40° C)
- Maximum relative humidity 95% over the temperature range (non-condensing).
- Main supply voltage fluctuations not to exceed +/-10% of the nominal voltage.
- Main supply transient over-voltages according to over-voltage category II of IEC 60364-4-443.
- Pollution Degree 2 in accordance with EN61010-1:2010.

Terms used:

Overvoltage Category: Classification of parts of installation systems or circuits with standardized limits for transient overvoltages, dependent on the normal line voltage to earth.

Pollution: Any addition of foreign matter, solid, liquid or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity.

Pollution Degree 2: Normally only non-conductive POLLUTION occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

1.5 STANDARD FEATURES

- **Quik-Cal™** zero and calibration makes calibrating simple and fast.
- **Digital Display.** Full color 5" diagonal TFT screen with adjustable brightness.
- **Calibration** from center of roller or from both ends of roller.
- **5 Stored Setups** containing all Units, Range, Calibration, Cal%, and TLS.
- Calibration with **10% of Full Scale** weight.
- **0 to +10V Output AND 4 to 20mA Output**, proportional to total tension

1.5 OPTIONS (Customer Selectable)

- **25% Calibration Weight (25CW).** Select this option if the standard 10% calibration weight is too low a value for the application.
- **Difference Meter (DIFF).** Display differences between left side and right side tensions.
- **Extended Range (XRE).** 10 Vdc excitation for Extended Range transducers. Allows measurement of much lower tension than usual. Transducers must also have the XR option
- **Tension Limit Switch (TLS).** This detects a drop in tension below the TLS Low setting and/or a rise in tension above the TLS High setting where one or both are set to detect unacceptable tension levels. Both TLS Low and TLS High are adjustable and can operate an external relay when the tension passes the set value.

2.1 DIMENSIONS inches (mm)

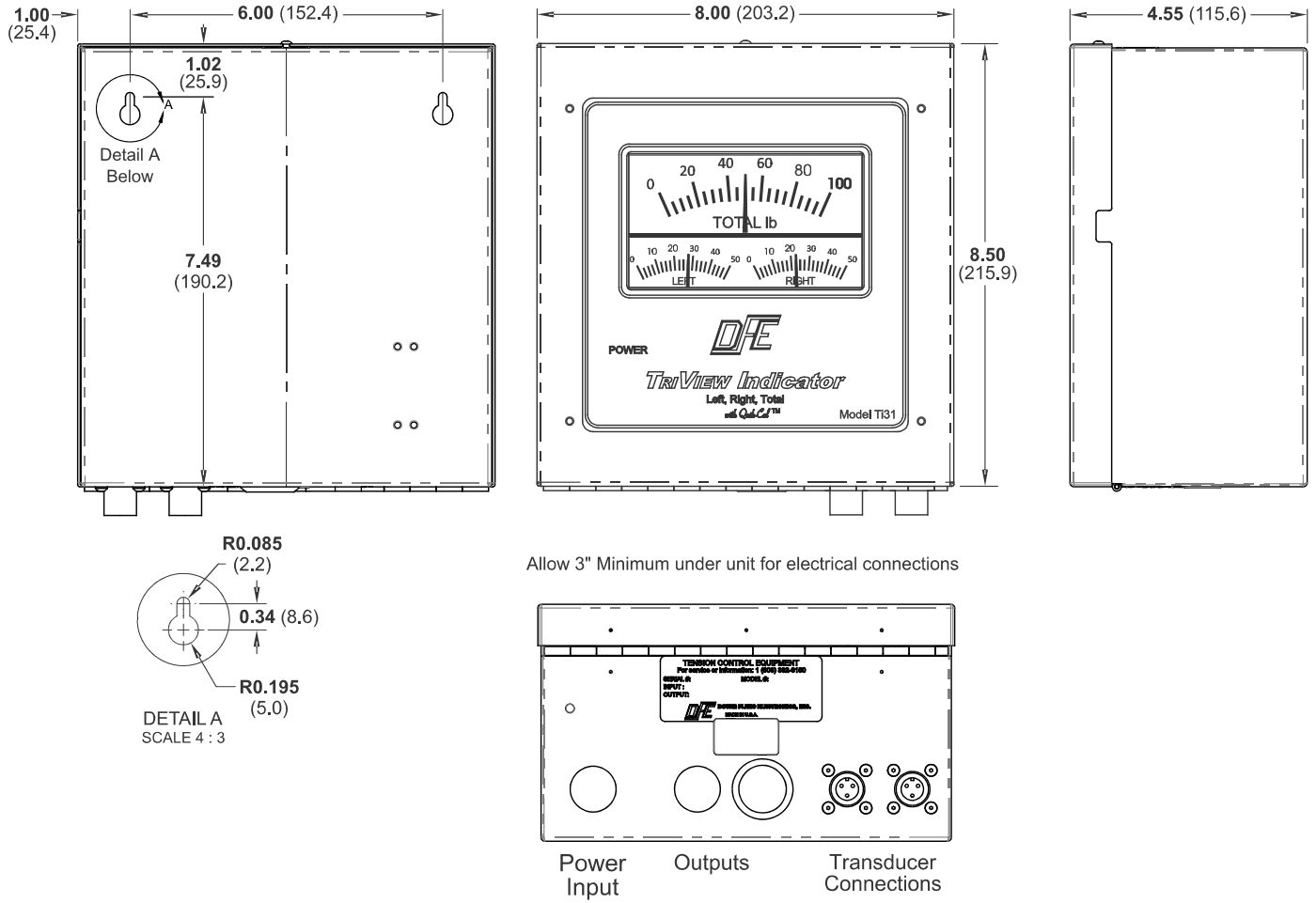


Figure 2 - DIMENSIONS OF ENCLOSURE VERSION

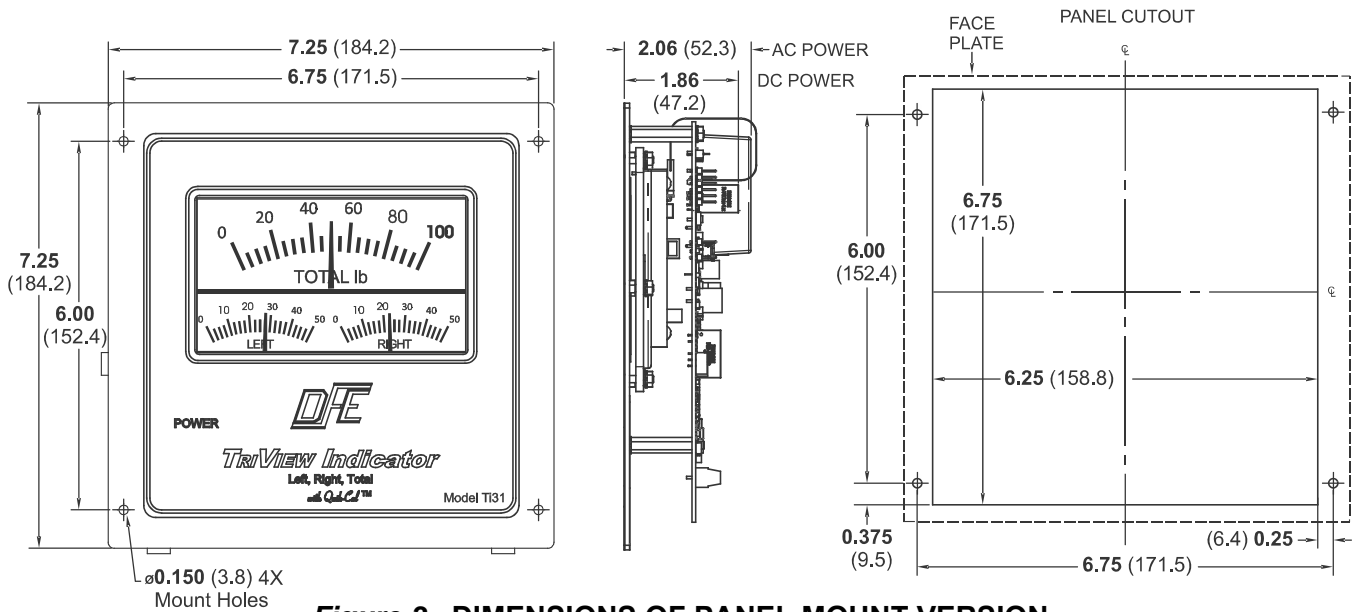


Figure 3 - DIMENSIONS OF PANEL MOUNT VERSION

2.2 SELECTION OF MOUNTING LOCATION

1. Enclosure Mount Versions

Select a mounting location on the machine frame or a wall that will provide convenient operator interaction and easy screen viewing. To ensure safety and proper operation, the TriView™ L-R-T indicator must be located away from dusty or wet environments. The unit should be mounted to a secure wall or surface that can support in excess of 5.5 lbs (2.5 Kg)

As the controller's front panel is hinged to the bottom of the enclosure, ensure that the mounting location will allow the front panel to swing open and down unobstructed. In addition, make sure there will be adequate room below the controller to allow for wire routing. (3 inches minimum)

2. Panel Mount Versions

The panel mount configuration should be installed in a cabinet or enclosure that can support in excess of 2.5 lbs (1.2 Kg) The controller should be positioned for convenient operator interaction and easy screen viewing. To ensure safety and proper operation, the TriView™ L-R-T indicator must be located away from dusty or wet environments. Ensure there is a minimum of 5" (12.7 cm) clearance behind the mounting panel to allow for physical fit of the controller with room for air circulation. In addition, ensure there will be adequate room below the indicator's mounting location to allow for wire routing to the input/output terminal blocks.

2.3 SAFETY AND EMC REQUIREMENTS

⚠ WARNING: If this equipment is not connected or operated in the manner specified, the operating safety of this unit, or of connected equipment, cannot be guaranteed.

⚠ WARNING: The isolated output is designed to prevent ground loops and noise. It is not intended or approved for safety isolation of hazardous voltages. Do not install unit where isolated circuit and chassis ground are more than 40V peak differential.

1. **AC Power Configuration**

For safety reasons, it is necessary to use appropriate wiring for your line voltage connections and for safety grounding. Make your ground connection between a reliable earth ground and the safety ground of your controller using a wire with a gauge of at least 16 AWG (or a cross-sectional area of at least 1mm²) and insulation rating of at least 600V.

Make your AC line voltage connections with wire gauge of at least 16 AWG (or a cross-sectional area of at least 1mm²) and insulation rating of at least 600V for each conductor.

2. **Both AC and DC Power Configurations**

Secure the power wiring to prevent inadvertent removal or strain on the input terminal. For enclosure mount AC units, this wiring should be secured at the power inlet of the enclosure.

3. **Circuit Breaker**

An external switch or circuit breaker is required for power disconnection of the TriView™ L-R-T indicator. It is recommended that this switch or circuit breaker be located near the equipment and be well labeled.

4. **Shielding**

For maximum EMC performance, a proper transducer installation, including shielded cables must be used. Cable shielding must be attached to a SHIELD connection on the terminal blocks, or to an appropriately grounded enclosure. Contact DFE for appropriate cable part numbers.

5. **Enclosure Mount Versions**

On enclosed units, gravity consistently holds the down-swinging door fully open, allowing overhead lighting to completely illuminate the internals of the indicator, and freeing the hands of the user for more important tasks than holding the door in place. Since the door swings downward, it is important to prevent the touchscreen from impacting or touching any obstructions below the indicator. As with any hinged enclosure, it is important to avoid leaning on the door which could over-stress the hinge.

⚠ WARNING: Always keep the enclosure closed with the access screw firmly tightened down during normal operation.

2.3 SAFETY AND EMC REQUIREMENTS *continued....*

5. Enclosure Mount Versions *continued...*

⚠ WARNING: Only qualified personnel may open the enclosure to access internal circuit boards and adjustments. When working with AC powered versions of the indicator, the AC power rails will be exposed with the door opened. Standard safety precautions should always be used when working around AC power rails. Unless the servicing requires power applied to the unit, power should always be shut off before opening the enclosure.

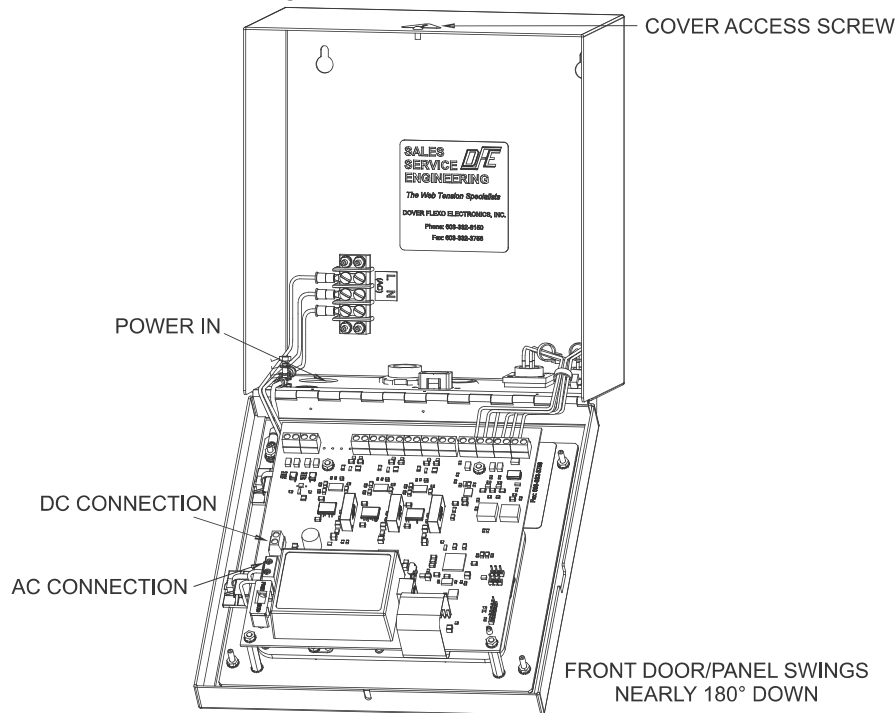


Figure 4 - ENCLOSURE VERSION SERVICE ACCESS

6. Electrostatic Discharge Protection

The indicator circuitry contains sensitive devices that are susceptible to damage from ESD (Electrostatic Discharge). The power inputs, I/O terminals, etc., have been designed to be protected from the high level of ESD present in typical industrial and web processing environments.

When accessing the circuit boards directly, however, unprotected devices are exposed to direct contact. Because of this, proper ESD precautions should be followed when servicing the indicator, such as wearing ground straps.

2.4 INSTALLATION INSTRUCTIONS

1. Panel Versions

For panel mount units, drill four clearance (0.150" / 3.8 mm) holes in a 6.75" (171.5 mm) horizontal by 6" (152.4 mm) vertical rectangle. Cut an opening centered in the holes measuring 6.25" (158.8 mm) across by 6.75" tall (171.5 mm) (see Section 2.1, Fig. 3 - Panel Version Dimensions). Mount your panel style indicator in the hole using four M3 (#4) nuts and screws.

2. Enclosure Versions

For enclosure mount units, drill and tap two M4 (#8) holes 6.00" (152.4 mm) apart horizontally and 7.49" (190.2 mm) up from the desired bottom of the enclosure to match the screw hole dimensions on the back surface of the TriView™ L-R-T enclosure (see Section 2.1, Fig. 3 - Enclosure Version Dimensions). The enclosure is fastened to the mounting surface you have chosen by two M4 (#8) screws, no washers. Install the screws on the mounting surface. Leave the screws loose about 6 turns. Position the keyholes in the back panel of the enclosure over the screws and slide it down until it locks in place. The cover must be open to tighten the mounting screws and secure the enclosure in place.

2.5 ELECTRICAL CONNECTIONS

1. AC POWER

Enclosed Units

Make AC wiring connections as follows:

1. The insulation rating of all line voltage wiring must be at least 600V.
2. Keep line voltage wiring physically separated from signal wiring at the terminal block and at any other point in the installation.
3. Keep all wiring to the indicator away from other devices emitting electromagnetic radiation.

⚠ WARNING: Maintain the washer and conductor stack order as found on the ground stud.

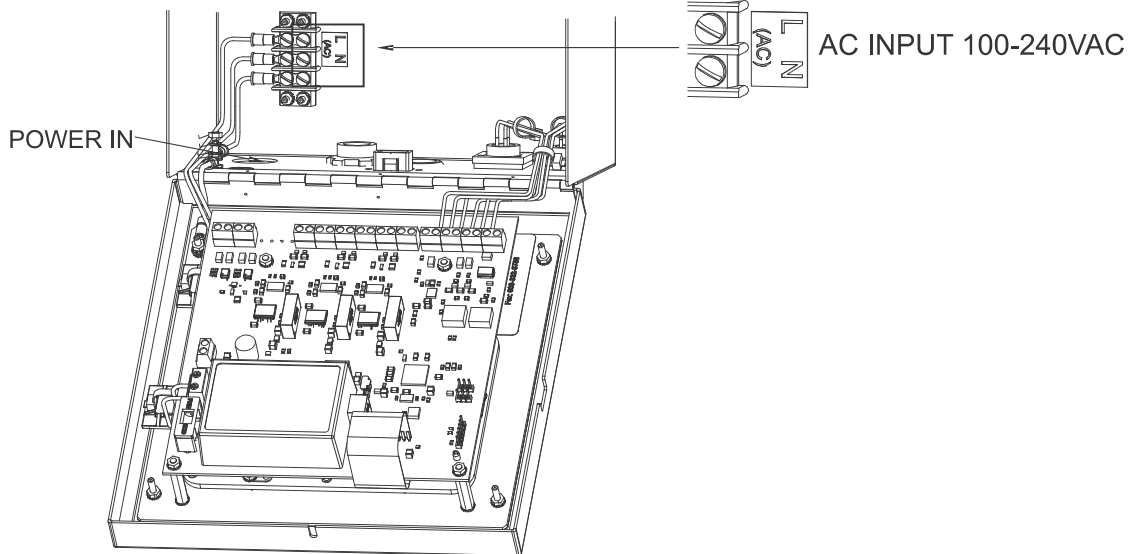


Figure 5a - AC POWER CONNECTION - ENCLOSED UNITS

⚠ WARNING: AC versions of the TriView™ L-R-T Indicator are designed for single phase AC operation only. To prevent product damage and potential hazard, do not connect them across three phase lines or to three phase circuits.

Panel Mount Units:

1. Connect your Line in to the terminal marked L
2. Connect Neutral to the terminal marked N
3. Connect **Protective Earth** to a mount hole for the panel per electrical code.

! Caution ! Ensure that you strain relieve the incoming power lines.

NOTE: Text on the PCB is oriented to read upright when the door of an enclosed unit is open downward. Consequently, the text will be inverted when the indicator is mounted in a panel.

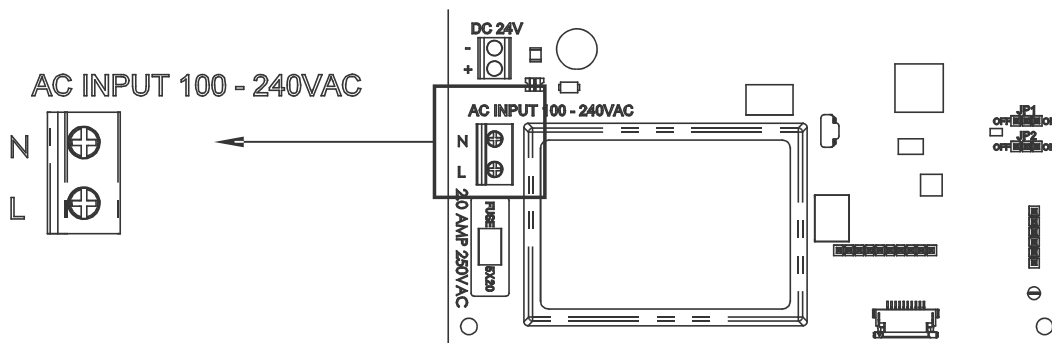


Figure 5b - AC POWER CONNECTION - PANEL MOUNT UNITS

2.5 ELECTRICAL CONNECTIONS *continued...*

2. DC POWER CONNECTION

1. Connect the wires to the terminals as marked for polarity.

⚠ WARNING: Do **NOT** connect to any power source other than +24VDC.

!CAUTION! The wiring should be strain relieved upstream of the terminals.

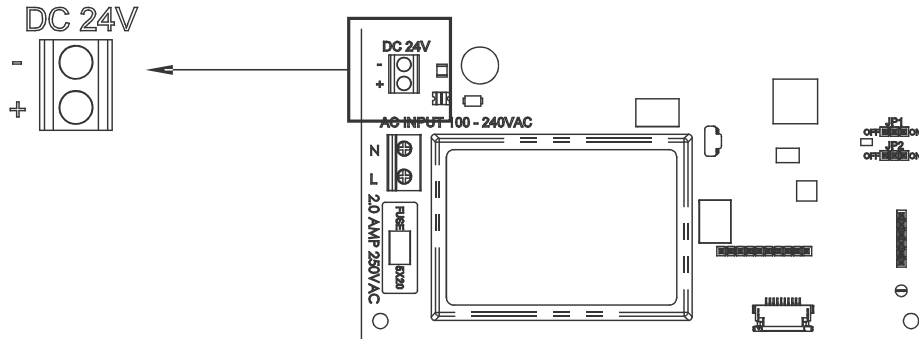


Figure 6 - DC POWER CONNECTION

3. INPUT / OUTPUT & TRANSDUCER CONNECTIONS

Connect all circuits desired for use. All connections can be in use at once. Terminal block is located at top of board.

1. Outputs

V = Pin1 is 0-10 VDC out, proportional to Total Tension. Pin 2 is Isolated Return.

I = Pin 1 is 4-20ma out, proportional to Total Tension. Pin 2 is Isolated Return.

Pin 1 is positive on all connections.

Out A is the Total Output channel, Out B is the Left channel, and Out C is the Right channel.

NOTE: 4-20mA requires a closed loop. Do not attempt to feed power from another source.

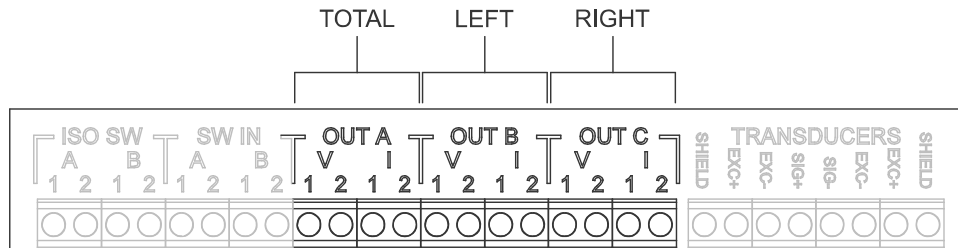


Figure 7 - OUTPUT CONNECTIONS

2. Tension Limit Switch (TLS - Optional)

TLS Low and TLS High are normally open limit switches which close when tension is outside acceptable limits. They can be used independently, in combination, or not at all.

NOTE: Neither the Low nor the Hi indications will display when tension is in range.

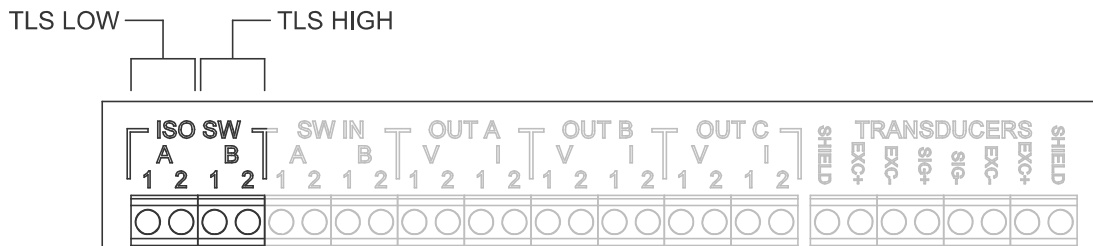


Figure 8 - TENSION LIMIT SWITCH CONNECTIONS

2.5 ELECTRICAL CONNECTIONS *continued...*

2. Tension Limit Switch *continued ...*

TLS Low and TLS High can also be used unconventionally in a normally closed arrangement to indicate when tension is within acceptable limits. This is done by setting TLS High at the minimum allowable tension, TLS Low at the maximum tension, and wiring the limit switches in series.

NOTE: Both the HI and Low Indications will display when TLS is in range.

3. Transducer Connections

To the electronics, connect the end(s) of the transducer cable(s) marked "G", denoting that the ground is connected at that end. Connect the opposite end of the cable(s) to the transducer(s). To panel-mounted electronics, connect the flying lead end of cable(s) as shown in Figure 9a or 9b. Note that the excitation polarity is reversed for the two half-bridges, enabling the electronics to indicate differential tension between Left and Right channels.

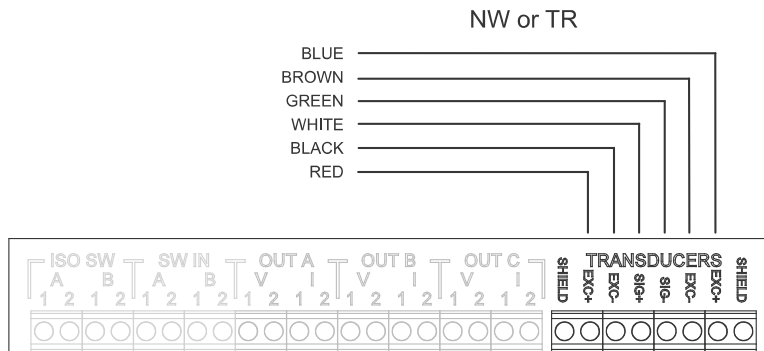


Figure 9a - CONNECTING ONE FULL BRIDGE TRANSDUCER

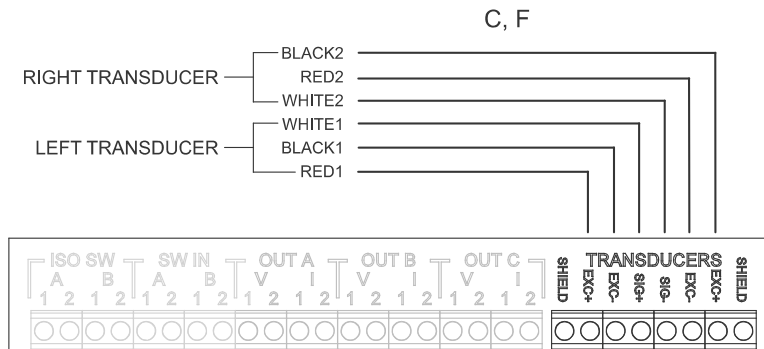


Figure 9b - CONNECTING TWO HALF BRIDGE TRANSDUCERS

3.1 PREPARING TO CALIBRATE

The TriView Indicator will arrive with factory presets and, once mounted and connected to power and to the transducer(s), it will be calibration-ready.

The only equipment needed to calibrate the indicator are a tape measure, an appropriately selected weight, and an inelastic (non-extensible) cord, rope or strap from which to hang the weight. The amount of weight required will be determined per Section 3.2.

In lieu of hanging a weight to calibrate, a spring scale may be used. While the tension indicated may be somewhat less accurate when calibrated with a spring scale, it will still be extremely consistent whether calibrated with a scale or with a weight.

3.2 CALIBRATE

Other than for initial startup with the QUICK START GUIDE, when the unit was first powered up, all calibrations of the TriView LRT must follow the steps outlined below:

Tap the display screen shown below (Figure 10) to temporarily float the control bar up from below the bottom of the screen.

Select the **Menu** button on the control bar (Figure 11) to bring up the **Main Menu**. A few seconds after the last touch, the control bar will time out and sink below the bottom of the screen again.



Figure 10 - DISPLAY SCREEN

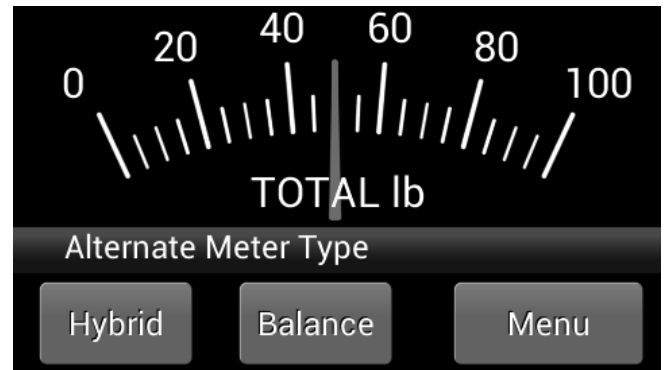


Figure 11 - DISPLAY with MENU BAR

Press **Setup** on the **Main Menu** screen (Figure 12) to bring up an access keypad for entering your access code (Figure 13). Permissions are required to create and edit setups.



Figure 12 - MAIN MENU

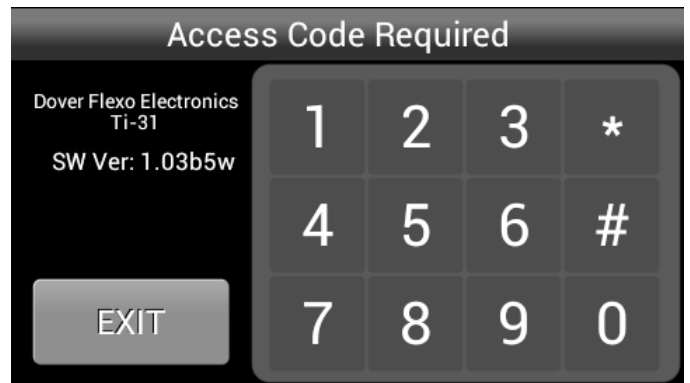


Figure 13 - ACCESS CODE SCREEN

Enter 6150 and the access code screen will give way to the **Setup Menu Options** screen (Figure 14). Select **Calibrate** to bring up the **Setup-Select Units** screen (Figure 15).

3.2 CALIBRATE *continued...*

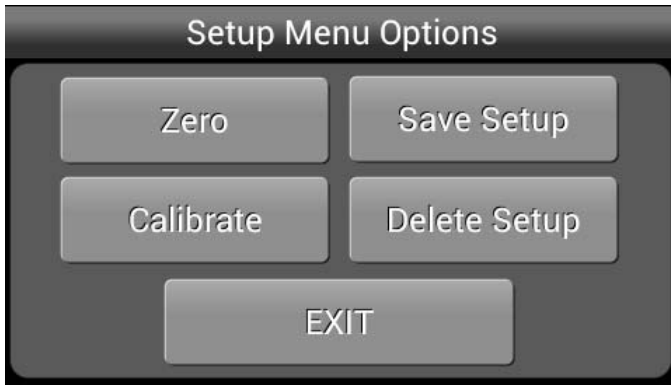


Figure 14 - SETUP MENU OPTIONS



Figure 15 - SETUP - SELECT UNITS

Choose your desired units (pounds, ounces, grams, kilograms or newtons) then press BACK to return to the prior screen or OK to accept and proceed to the **Setup-Select Range** screen (Figure 16). Swipe to find the desired range and press to select. Press BACK to return to the prior screen or OK to accept and proceed.

Select the calibration weight percentage on the **Setup-Calibration Weight %** screen (Figure 17). Selecting 10% allows use of lighter weights for higher tension applications, and 25% delivers better resolution. Locate appropriate weight(s) to use in the calibration step further on in this procedure. Press BACK to return to the prior screen or OK to accept and proceed.



Figure 16 - SETUP-SELECT RANGE

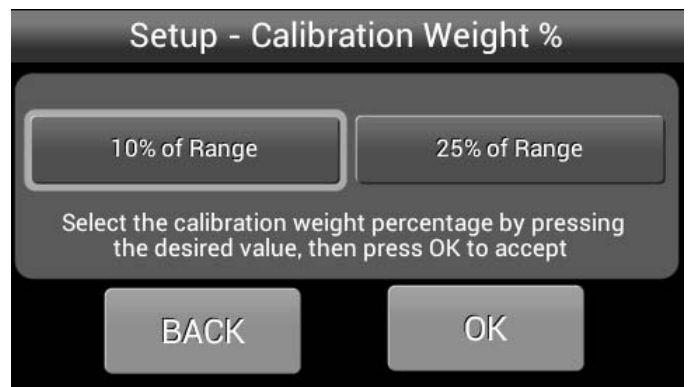


Figure 17 - CALIBRATION WEIGHT %

Select the transducer type on the **Setup-Select Transducer Type** screen (Figure 18). Choose Standard (5V) unless your Transducers are Marked "XR" (or 10V). Press BACK to return to the prior screen or OK to accept and proceed. Review settings for correctness on the **Setup-Review Settings** screen (Figure 19), then press BACK to return to the prior screen or OK to accept and proceed

⚠ WARNING: Using Extended Range with standard transducer(s) will damage the transducer(s).

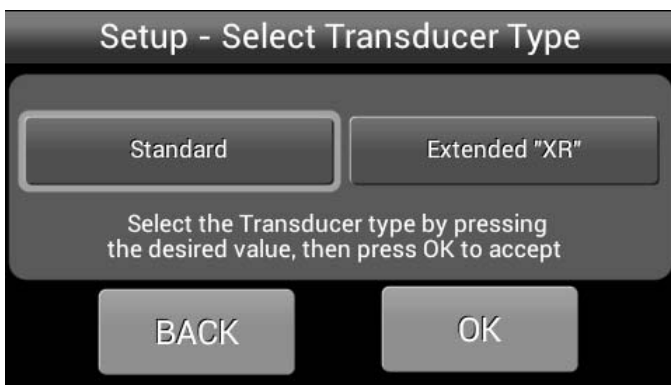


Figure 18 - SETUP-SELECT TRANSDUCER TYPE

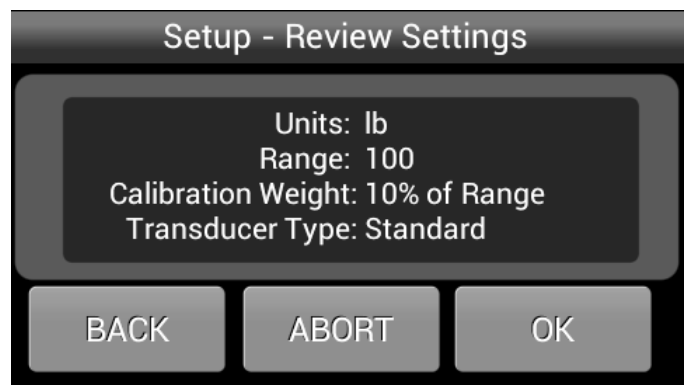


Figure 19 - SETUP-REVIEW SETTINGS

3.2 CALIBRATION *continued...*

Per the **Setup-Zero Tension** screen (Figure 20), check the transducer roll to make sure that nothing is hanging from, resting on, or leaning against it, including the calibration rope. Press OK when the roll is unloaded and ready to zero, or BACK to return to the prior screen.

The **Abort Calibration?** screen (Figure 21) presents the last opportunity to preserve existing calibration values. Press Continue to replace existing values, or Abort to keep them.

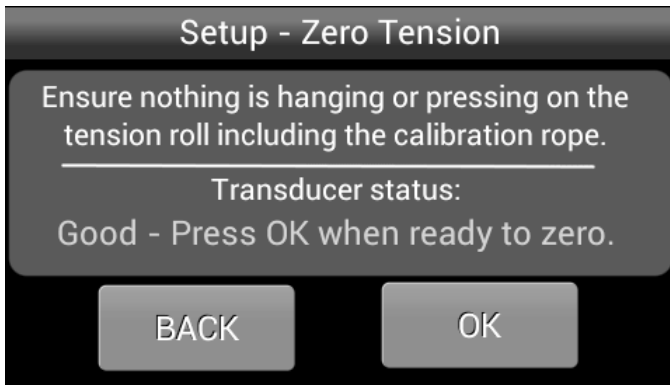


Figure 20 - SETUP-ZERO TENSION

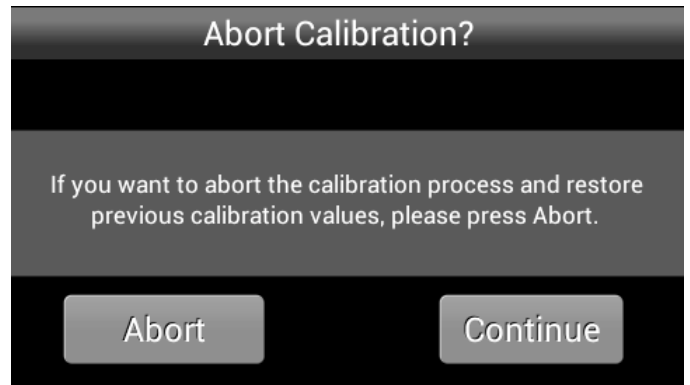


Figure 21 - ABORT CALIBRATION

After pressing OK, the **TriView** zeros out the roll weight and a progress bar moves across the screen, after which the message “Zero operation complete” comes up in green characters, as shown on the **Zero successful** screen (Figure 22). Press OK to accept or Re-Zero if something occurred which made the zero operation suspect.

The transducer roll may be calibrated either at the center, or at the ends, as shown in **Calibration Options** screen (Figure 23). Press either **Center** or **Ends** to identify where the calibration weight will be hung, or press BACK to return to the prior screen.



Figure 22 - SETUP ZERO SUCCESSFUL

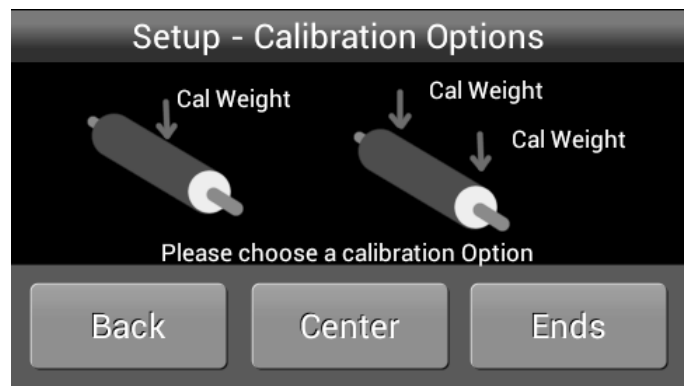


Figure 23 - CALIBRATION OPTIONS SCREENS

1. CENTER CALIBRATION

See the **Right Way / Wrong Way** illustration on Figure 24 for guidance, and for the calculated calibration weight. At the center of the web path (located with the tape measure), secure one end of the inelastic cord at least two rolls beyond the transducer roll, and thread it around the transducer roll and both adjacent idler rolls, following the exact same path as the web which will be measured. Be sure that the cord does not wrap around any driven rolls, drag bars or other obstacles that might affect tension.

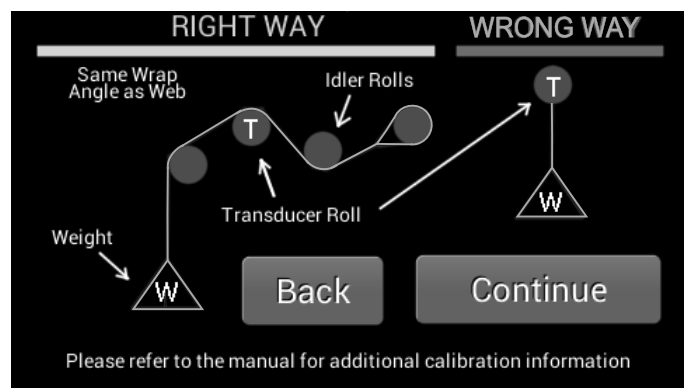


Figure 24 - WEB PATH SCREEN

3.2 CALIBRATION *continued...*

1. CENTER CALIBRATION *continued..*

Hang the total calibration weight on the free end of the cord and wait for it to stop swinging. It is important that the cord wrap around one idler roll on either side of the transducer roll, and that the weight be hanging freely, and not be touching anything. When these conditions are satisfied, press Continue to proceed.

Figure 25 shows the **Center Cal NOT Ready** screen. The Calibrate button is gray, accompanied by an error message in red characters. This error message appears if the transducers are not properly wired to the indicator, if the calibration weight is insufficient for the application, or if the weight is not properly loading the transducer roll. The Calibrate button will turn green and the red text will disappear when the conditions required for calibration have been met (Figure 26).



Figure 25 - CENTER CALIBRATION NOT READY

When ready, press the Calibrate button and the screen will indicate that the calibration was successful (Figure 27). Press BACK to return to the prior screen, **Re-Calibrate** if something occurred which made the calibration suspect, or OK, after which the indicator will very briefly flash a **Calibration Successful** screen, and then progress to the **Display Screen**.

2. END CALIBRATION

For convenient calibration of machines on which center calibration would be difficult, the TriView allows End Calibration of the transducer roll.

Per the following instructions, calibrate one end first, and then the other afterward:

See the Right Way / Wrong Way illustration on Figure 28 for guidance, and for the calculated calibration weight. **Note:** the calibration weight for End Calibration is one half the value that would be calculated for Center Calibration. At one side of the web path, secure one end of the inelastic cord at least two rolls beyond the transducer roll, and thread it around the transducer roll and both adjacent idler rolls, following the exact same path as the web which will be measured. Be sure that the cord does not wrap around any driven rolls, drag bars or other obstacles that might affect tension.

Hang the calibration weight on the free end of the cord and wait for it to stop swinging.



Figure 26 - CENTER CALIBRATION READY

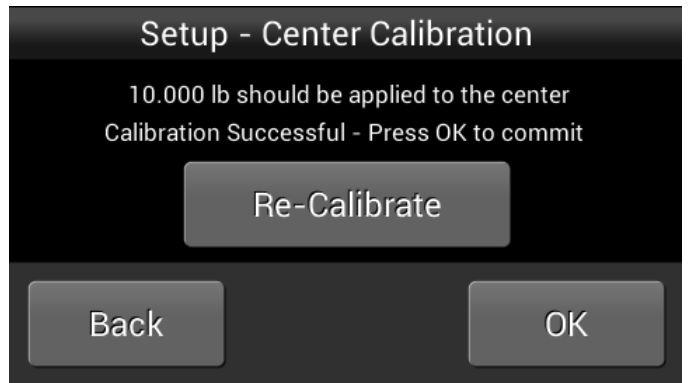


Figure 27 - CALIBRATION SUCCESSFUL

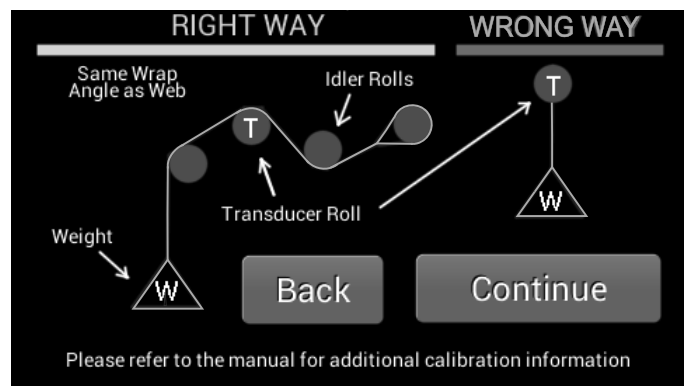


Figure 28 - WEB PATH SCREEN

3.2 CALIBRATION *continued...*

2. END CALIBRATION *continued..*

It is important that the cord wrap around one idler roll on either side of the transducer roll, and that the weight be hanging freely, and not be touching anything. When these conditions are satisfied, press Continue to proceed.

Figure 29 shows the **End Cal Not Ready** screen. At least one of the two calibration buttons (**Calibrate Left** and **Calibrate Right**) on the screen is gray, accompanied by an error message in red characters. This error message appears if the transducer(s) is not properly wired to the indicator, if the calibration weight is insufficient for the application, or if the weight is not properly loading the transducer roll.

The Calibrate button will turn green and the red text will disappear when the conditions required for calibration at that end have been met, as shown in Figure 30.

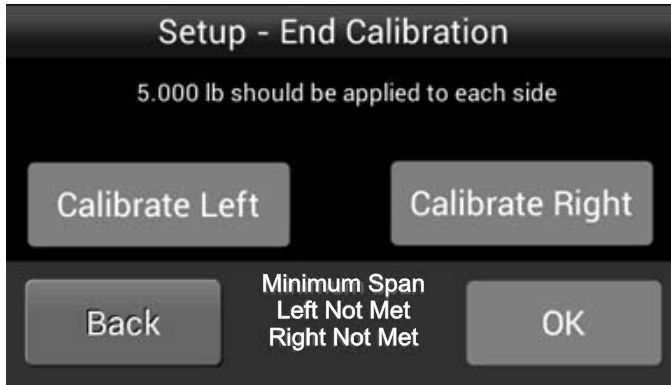


Figure 29 - END CALIBRATION NOT READY

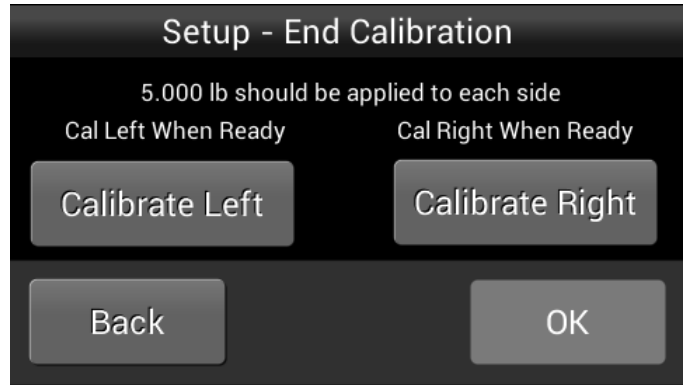


Figure 30 - END CALIBRATION READY

When ready, press the **Calibrate Left** or **Calibrate Right** button, as applicable, and the screen will indicate the end(s) at which the calibration was successful.

Only after both ends have been successfully calibrated per the above procedure will the End Calibration be complete (Figure 31).

Press BACK to return to the prior screen, **Re-Calibrate** if something occurred which made the calibration suspect, or OK, after which the indicator will very briefly flash a **Calibration Successful** screen, and then progress to the **Display Screen**.

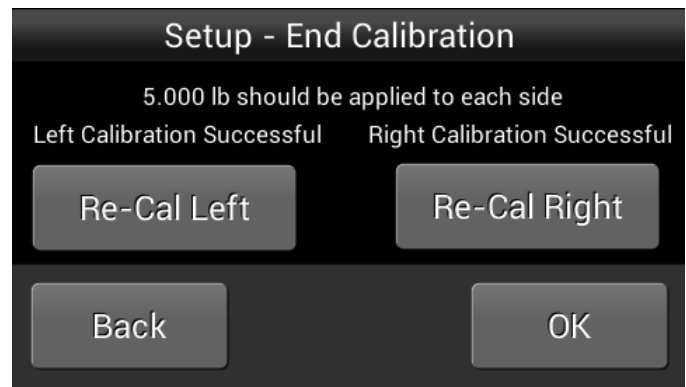


Figure 31 - END CAL SUCCESSFUL

3.3. ADJUSTING DISPLAY BRIGHTNESS AND DISPLAY DAMPING

Display Brightness and **Display Damping** can be operator-adjusted without an access code, and are covered in the **TriView LRT Operating Instructions**.

3.4. TENSION LIMIT SWITCH (TLS) SETTINGS

TLS settings can be operator-adjusted without an access code, and are covered in the **TriView LRT Operating Instructions**.

3.5 CREATING AND MANAGING SETUPS

An **Active Setup** is composed of all the most recently selected settings and is held in non-volatile memory, meaning that even if power to the indicator is lost, the settings will not be. The Active Setup is not recalled using the numbered setups (Setups 1-5), but will automatically come up again upon restart if the indicator is shut down while operating in that setup.

A **Saved Setup** is made up of a group of settings saved together in a numbered setup, and is also preserved in non-volatile memory. Only by saving a numbered setup after changing one or more settings in that numbered setup (overwriting), or by deleting the numbered setup, can saved settings be lost. The TriView Indicator is limited to saving 5 numbered setups.

1. To save an Active Setup as a Saved Setup,

tap the display screen and select the Menu button on the control bar. Select the Setup button on the Main Menu and enter the 6150 Access Code. Review the information on the Setup Information screen and press OK then select the Save Setup button on the Setup Menu Options screen (Figure 32).

Select a numbered Setup button (Figure 33) and OK to save the Setup.

The next screen will display the Setup Number and list the settings saved (Figure 34). Press OK on the New Setup Saved screen, press EXIT on the Setup Menu Options screen, and EXIT once more on the Main Menu to return to the display screen



Figure 32 - SETUP MENU - SAVE SETUP



Figure 33 - SELECT SETUP NUMBER

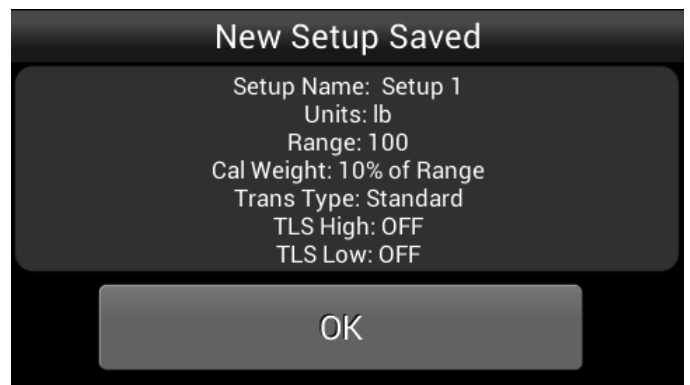


Figure 34 - NEW SETUP SAVED

2. To overwrite a Saved Setup, create the desired Active Setup and then save it as the numbered setup to be overwritten. Once any setting has changed and been accepted with the OK button, the older Setup cannot be retrieved.

3. To delete a Saved Setup, tap the display screen, select the Menu button on the control bar. Select the Setup button on the Main Menu and enter the 6150 Access Code. Review the information on the Setup Information screen and press OK, then select the Delete Setup button on the Setup Menu Options screen. Select a numbered Setup and OK on the **Select Setup to Delete** screen (Figure 35). After deletion, the screen will temporarily display a Setup Deleted message before reverting to the updated

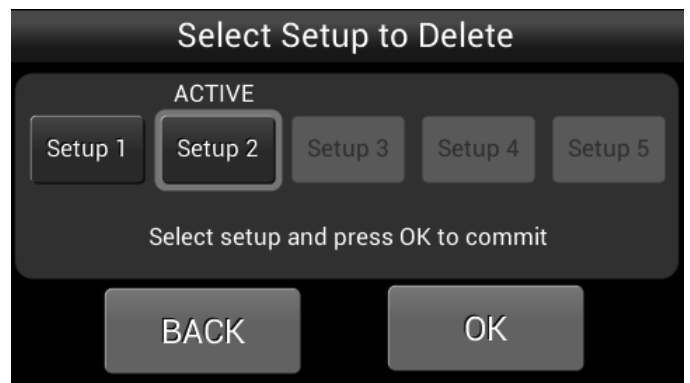


Figure 35 - DELETE SETUP SCREEN

3.5 CREATING AND MANAGING SETUPS *continued.*

3. To delete a Saved Setup *continued.*

Select Setup to Delete screen. Press the Back button to return to the Setup Menu Options screen, press EXIT to return to the Main Menu, and EXIT again to return to the display screen.

4. Recalling Stored Setups can be done by an operator without an access code, and is covered in the **TriView LRT Operating Instructions.**

3.6 DIAGNOSTICS

Diagnostics are operator-reviewable without an access code, and are covered in the **TriView LRT Operating Instructions.**

3.7 RE-ZERO

Occasionally, it may be necessary to re-zero the indicator without a complete re-calibration (after jarring the transducer roll, for example).

To get to the screen where the zero may be reset, tap the display screen and select the Menu button on the control bar. Select the Setup button on the Main Menu and enter the 6150 Access Code. Press OK on the **Setup Information** screen and select the Zero button on the **Setup Menu Options** screen to reach the **Setup – Zero Tension** screen (Figure 36)

Per the **Zero Tension** screen, check the transducer roll to make sure that nothing is hanging from, resting on, or leaning against it. Press OK when the roll is unloaded and ready to zero. Then press OK to re-zero, and a progress bar will travel across the screen, after which the **Setup-Zero successful** screen (Figure 37) will be displayed.



Figure 36 - ZERO TENSION SCREENS



Figure 37 - ZERO SUCCESSFUL SCREEN

4.1 CARE

Touchscreen displays can be damaged by impacts or excessive pressure. Ensure that the TriView™ LRT tension indicator is not handled or installed carelessly.

4.2 MAINTENANCE

The TriView™ LRT tension indicator requires no periodic maintenance. However, you may find it worthwhile to observe whether there is buildup of dust, debris or moisture on or near the unit after a period of time. If so, you may consider moving the unit or putting the unit in an enclosure more suited to your particular environment.

4.3 TROUBLESHOOTING

If the suggested remedy following each of the below listed symptoms fails to address the problem, please contact DFE Technical Support or Customer Service at 603-332-6150.

- **Touchscreen won't light up** (Operator should have already confirmed that the TriView LRT is connected to power) - If the issue persists, power may be disconnected, or thermal fuses may need more time to reset. Confirm that power is connected at the terminals (DC at TB15 or AC at TB16) and, if necessary, cycle power off and then back on after 60 seconds to reset the fuses.
- **Screen won't respond to touch** (Operator should already have tried using fingernail versus fingertip) - If the issue persists, registration of the display may not be correct, and re-registration of the touchscreen may be necessary.
- **Indicated tension looks incorrect** (Operator should have already examined diagnostics to confirm that the correct setup was recalled for the product being run) - Confirm that indicated tension looks incorrect and recalibrate, if necessary.

Access Code for setting up the TriView LRT Tension Indicator is **6150**

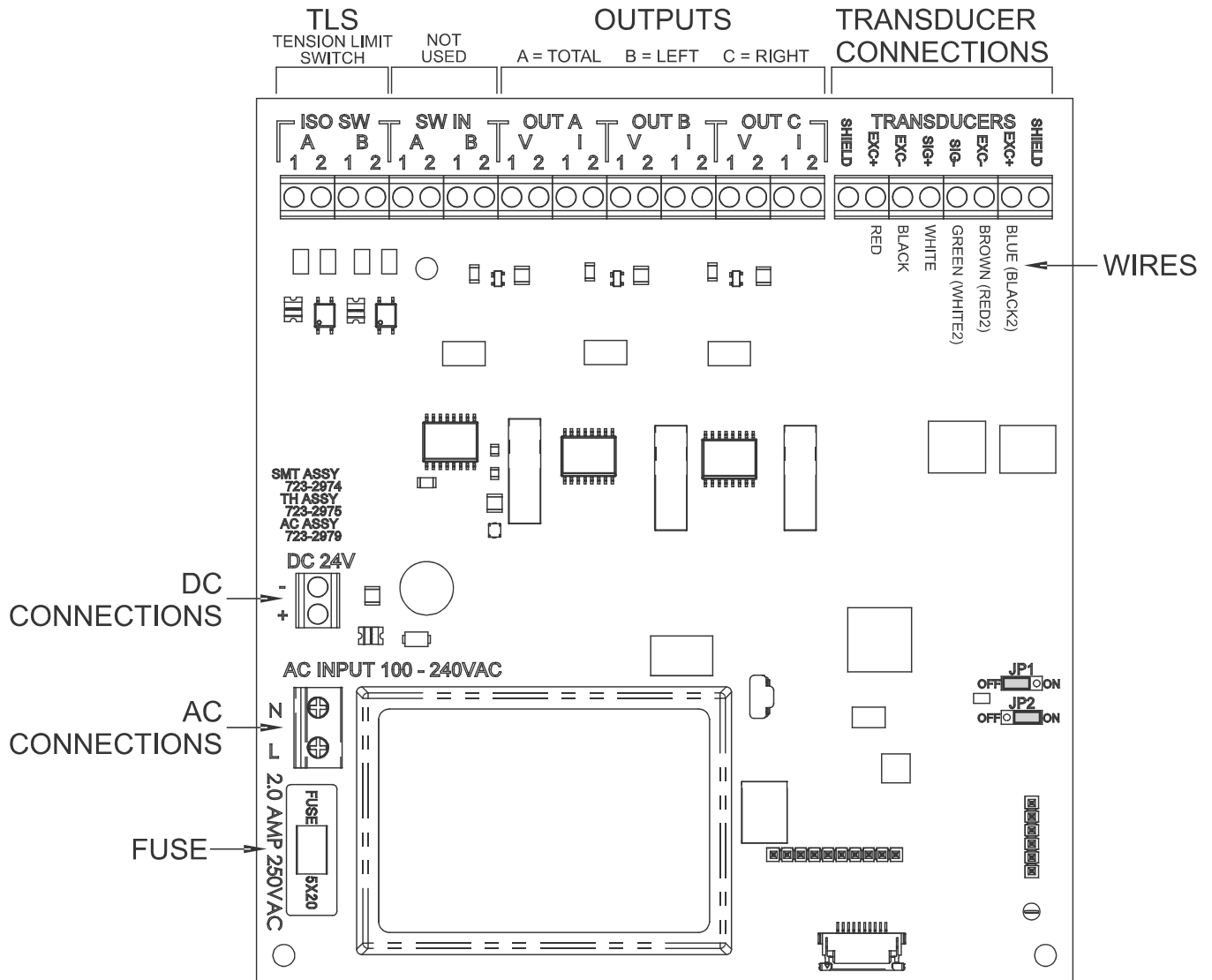
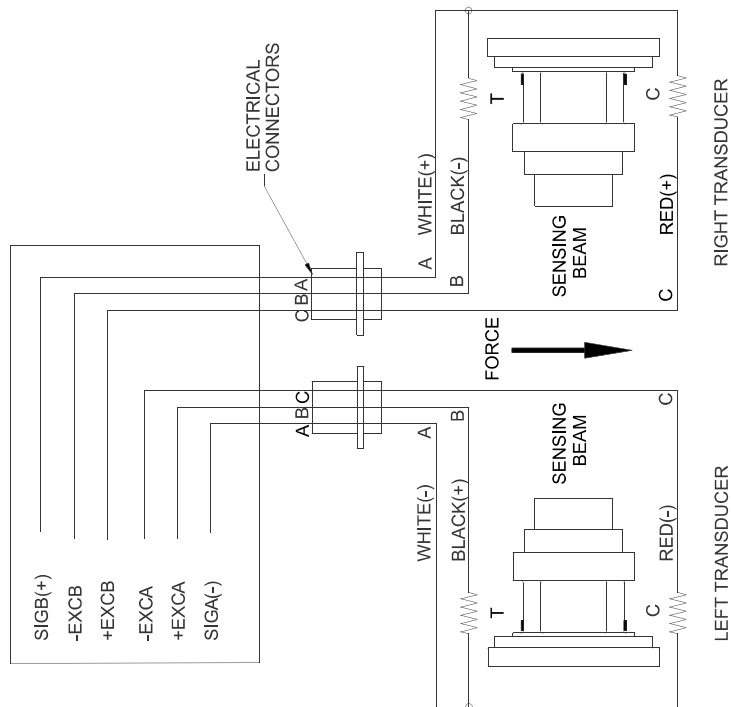


Figure 38 - CONTROL BOARD ELECTRICAL CONNECTIONS

Appendix B: Transducer Electrical Connections

MODELS C AND F TRANSDUCERS

THE TENSION (T) AND COMPRESSION (C) STRAIN GAGES ARE CONNECTED IN A BRIDGE CONFIGURATION. AS THE BEAMS BEND SLIGHTLY UNDER WEB TENSION, THE GAGE RESISTANCES CHANGE PRODUCING AN OUTPUT SIGNAL WHICH IS DIRECTLY PROPORTIONAL TO THE WEB TENSION.



TENSION ROLL (TR) AND NARROW WEB (NW) TRANSDUCERS

THE TENSION (T) AND COMPRESSION (C) STRAIN GAGES ARE CONNECTED IN A BRIDGE CONFIGURATION. AS THE BEAMS BEND SLIGHTLY UNDER WEB TENSION, THE GAGE RESISTANCES CHANGE PRODUCING AN OUTPUT SIGNAL WHICH IS DIRECTLY PROPORTIONAL TO THE WEB TENSION.

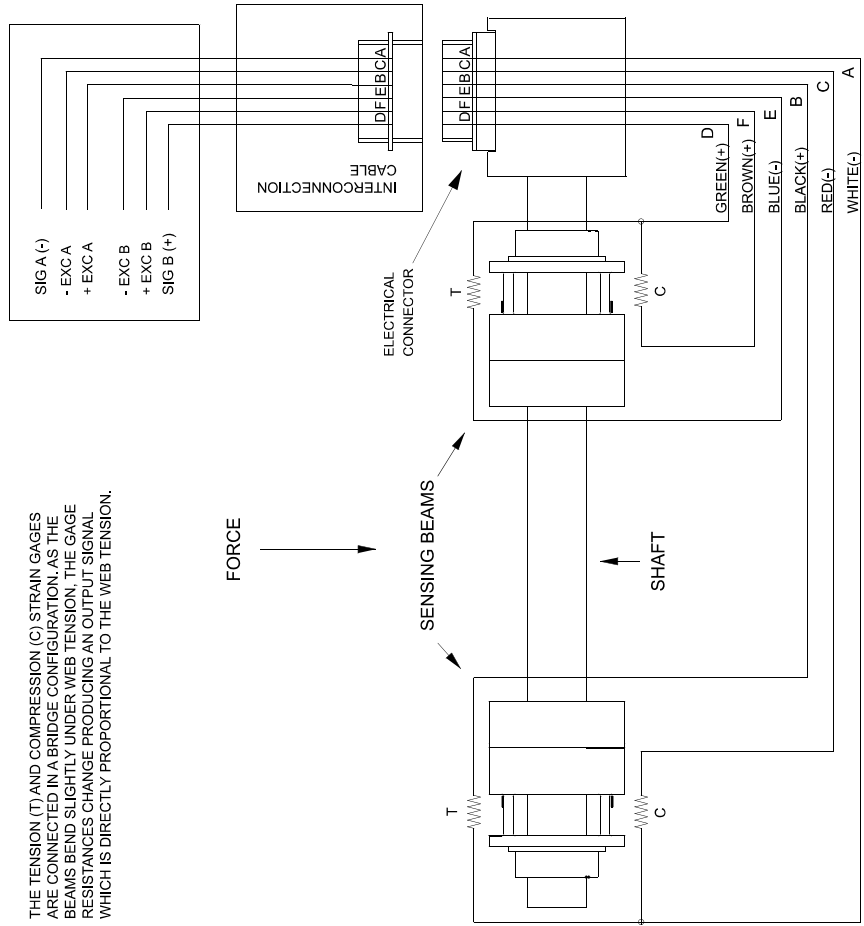


Figure 39 - MODELS C, F, TR, & NW TRANSDUCER WIRING

Appendix C: Typical Tensions for Various Materials

TYPICAL TENSIONS FOR WEB MATERIALS

ACETATE			0.5 lb. per mil per inch of width
FOIL	Aluminum		0.5 lb. per mil per inch of width
	Copper		0.5 lb. "
CELLOPHANE			0.75 lb. per mil per inch of width
NYLON			0.25 lb. per mil per inch of width
PAPER	15 lb *		0.4 lb. per inch of width
	20 lb		0.5 lb. "
	30 lb		0.75 lb. "
	40 lb		1.25 lb. "
	60 lb		2.0 lb. "
	80 lb		3.0 lb. "
	100 lb		4.0 lb. "
* based on 3000 sq. ft. ream			
PAPERBOARD	8pt		3.0 lb. per inch of width
	12pt		4.0 lb. "
	15pt		4.5 lb. "
	20pt		5.5 lb. "
	25pt		6.5 lb. "
	30pt		8.0 lb. "
POLYETHYLENE			0.12 lb. per mil per inch of width
POLYESTER (Mylar)			0.75 lb. per mil per inch of width
POLYPROPYLENE			0.25 lb. per mil per inch of width
POLYSTYRENE			1.0 lb. per mil per inch of width
RUBBER	<u>GAUGE</u>	<u>AT 25% STRETCH</u>	<u>AT 50% STRETCH</u>
	10 mil	1.75	3.68
	12 mil	1.10	2.03
	16.5 mil	4.09	8.17
	26 mil	2.47	4.97
SARAN			0.15 lb per mil per inch of width
STEEL	<u>GAUGE - INS</u>	<u>UNWIND-PSI</u>	<u>REWIND-PSI</u>
	0.001 -0.005	1000	4000
	0.006 -0.025	850	3500
	0.026 -0.040	750	3000
	0.041 -0.055	650	2600
	0.058 -0.070	550	2200
	0.071 -0.090	450	1800
	0.091 -0.120	450	1400
	0.121 -0.140	400	1200
	0.141 -0.165	400	1000
	0.166 -0.200	400	900
	0.201 -0.275	400	800
	0.276 -0.380	300	700
VINYL			0.05 lb. per mil per inch of width

*** For laminated webs, sum the tension for the individual webs and add 0.1 lb per inch of width.

TERMS AND CONDITIONS OF SALE AND SHIPMENT

1. THE COMPANY

Dover Flexo Electronics, Inc. is hereinafter referred to as the Company.

2. CONFLICTING OR MODIFYING TERMS

No modification of, additions to or conflicting provisions to these terms and conditions of sale and shipment, whether oral or written, incorporated into Buyer's order or other communications are binding upon the Company unless specifically agreed to by the Company in writing and signed by an officer of the Company. Failure of the Company to object to such additions, conflicts or modifications shall not be construed as a waiver of these terms and conditions nor an acceptance of any such provisions.

3. GOVERNING LAW

This contract shall be governed by and construed according to the laws of the state of New Hampshire, U.S.A. The parties agree that any and all legal proceedings pursuant to this contract shall take place under the jurisdiction of the courts of the State of New Hampshire in the judicial district of Strafford County.

4. PENALTY CLAUSES

Penalty clauses of any kind contained in orders, agreements or any other type of communication are not binding on the Company unless agreed to by an officer of the Company in writing.

5. WARRANTY

Dover Flexo Electronics, Inc. warrants, to the original Buyer, its' products to be free of defects in material and workmanship for five years from date of original shipment. Repairs on products are warranted for 90 days from date of shipment. During the warranty period the Company will repair or replace defective products free of charge if such products are returned with all shipping charges prepaid and if, upon examination, the product is shown to be defective. This warranty shall not apply to products damaged by abuse, neglect, accident, modification, alteration or mis-use. Normal wear is not warranted. All repairs and replacements under the provisions of this warranty shall be made at Dover Flexo Electronics or at an authorized repair facility. The Company shall not be liable for expenses incurred to repair or replace defective products at any other location or by unauthorized persons or agents. This warranty contains all of the obligations and warranties of the Company. There are no other warranties, either expressed or implied. No warranty is given regarding merchantability or suitability for any particular purpose. The Company shall not be liable in either equity or law for consequential damages, losses or expenses incurred by use of or inability to use its' products or for claims arising from same. No warranty is given for products of other manufacturers even though the Company may provide these products with its' own or by themselves. The provisions of this warranty can not be changed in any way by any agent or employee of the Company. Notice of defects must be received within the warranty period or the warranty is void. The warranty is void if the serial number tag is missing or not readable.

6. PAYMENTS

Standard terms of credit are net 30 days from date of shipment, providing satisfactory credit is established with the Company. Amounts past due are subject to a service charge of 1.5% per month or portion thereof or 18% per annum. The Company reserves the right to submit any unpaid late invoices to a third party for collection and Buyer shall pay all reasonable costs of such collection in addition to the invoice amount. All quoted prices and payments shall be in U.S. Dollars.

If the Company judges that the financial condition or payment practices of the Buyer does not justify shipment under the standard terms or the terms originally specified, the Company may require full or partial payment in advance or upon delivery. The Company reserves the right to make collection on any terms approved in writing by the Company's Finance Department. Each shipment shall be considered a separate and independent transaction and payment therefore shall be made accordingly. If the work covered by the purchase order is delayed by the Buyer, upon demand by Company payments shall be made on the purchase price based upon percentage of completion.

7. TAXES

Any tax, duty, custom, fee or any other charge of any nature whatsoever imposed by any governmental authority on or measured by any transaction between the Company and the Buyer shall be paid by the Buyer in addition to the prices quoted or invoiced.

8. RETURNS

Written authorization must be obtained from the Company's factory before returning any material for which the original Buyer expects credit, exchange, or repairs under the Warranty. Returned material (except exchanges or repairs under the Warranty) shall be subject to a minimum re-stocking charge of 15%. Non-standard material or other material provided specially to the Buyer's specification shall not be returnable for any reason. All material returned, for whatever reason, shall be sent with all freight charges prepaid by the Buyer.

9. SHIPPING METHOD AND CHARGES

All prices quoted are EXW the Company's factory. The Company shall select the freight carrier, method and routing. Shipping charges are prepaid and added to the invoice of Buyers with approved credit, however the Company reserves the right to ship freight-collect if it prefers. Shipping charges will include a charge for packaging. Company will pay standard ground freight charges for items being returned to Buyer which are repaired or replaced under the Warranty. Claims of items missing from a shipment must be received, in writing, within 30 days of original shipment

10. CANCELLATION, CHANGES, RESCHEDULING

Buyer shall reimburse Company for costs incurred for any item on order with the Company which is cancelled by the Buyer. Costs shall be determined by common and accepted accounting practices.

A one-time hold on any item ordered from the Company shall be allowed for a maximum of 30 days. After 30 days, or upon notice of a second hold, Company shall have the right to cancel the order and issue the appropriate cancellation charges which shall be paid by Buyer. Items held for the Buyer shall be at the risk and expense of the Buyer unless otherwise agreed upon in writing. Company reserves the right to dispose of cancelled material as it sees fit without any obligation to Buyer.

If Buyer makes, or causes to make, any change to an order the Company reserves the right to change the price accordingly.

11. PRICES

Prices published in price lists, catalogs or elsewhere are subject to change without notice and without obligation. Written quoted prices are valid for thirty days only.

12. EXPORT SHIPMENTS

Payment for shipments to countries other than the U.S.A. and Canada or to authorized distributors shall be secured by cash in advance or an irrevocable credit instrument approved by an officer of the Company. An additional charge will apply to any letter of credit. There will also be an extra charge for packaging and documentation.

13. CONDITION OF EQUIPMENT

Buyer shall keep products in good repair and shall be responsible for same until the full purchase price has been paid.

14. OWNERSHIP

Products sold are to remain the property of the Company until full payment of the purchase price is made.

rev.9 10/25/10

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optional	7		
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Standard Features	2		



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