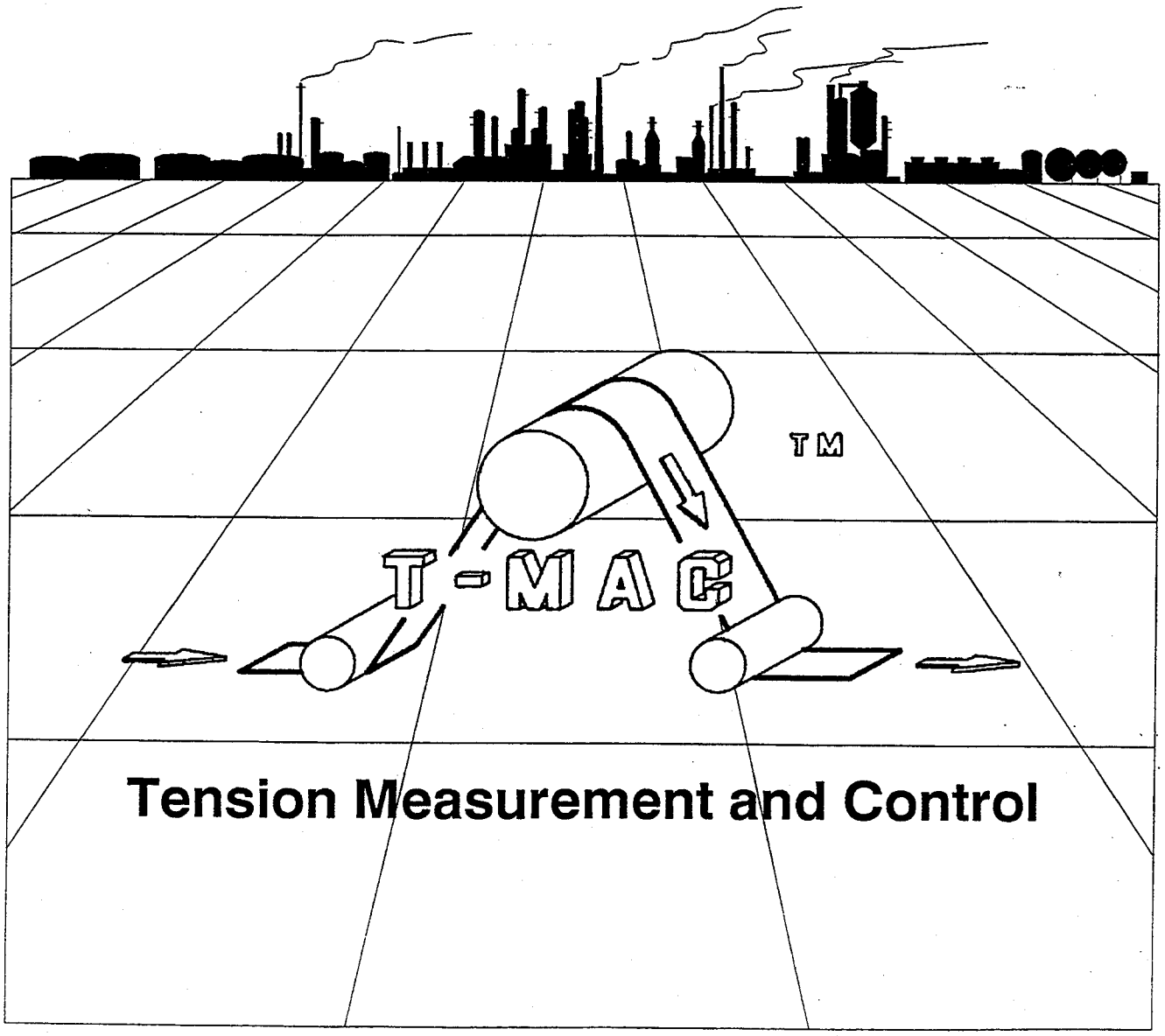
BLH NOBEL

A VPG Brand

Low Tension Transducer - LTT - Installation Instructions



NOTICE

BLH Nobel makes no representation or warranties of any kind whatsover with respects to the contents hereof and specifically disclaims any implied warranties or merchantability or fitness for any particular purpose. BLH Nobel shall not be held liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this publication or its contents.

BLH Nobel reserves the right to revise this manual at any time and to make changes in the contents hereof without obligation to notify any person of such revision or changes.

IS-LTT Table of Contents

Model LTT Tension Measurement Unit

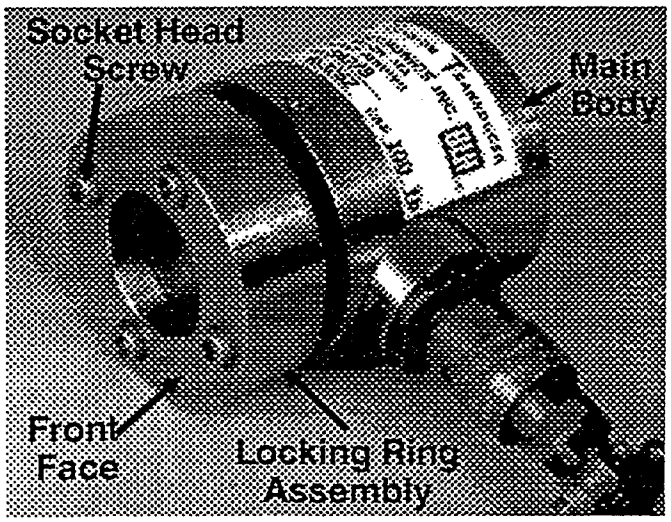


Figure 1. LTT, Low Tension Transducer

Model LTT Tension Measurement Unit

Installation Instructions

Introduction

BLH Electronics has combined load cell and roller bearing technology to produce a web tension transducer superior to any currently available (Figure 1). The model LTT Tension Measurement Unit (TMU) supports one end of a roll shaft (live or dead) and mounts to any surface perpendicular to the roll axis. Each Model LTT TMU is completely assembled and ready to install. **Do not take the LTT apart or adjust any screws other than those referred to in these instructions. Doing so will void the warranty and may cause unnecessary damage.** Eight pieces of 0.005 in. thick shim stock can be supplied with each LTT as an option. These may be used during installation to adjust positioning of the LTT. A bolt for attaching the LTT to the machine frame must be supplied by the user. All LTT capacities have a single $^{1}/_{2}$-20UNF-2B x $^{3}/_{8}$ bolt hole for mounting purposes.

Preparation for Installation

Read these instructions thoroughly before beginning installation. The following should be readily available at the installation site:

1). Allen wrench for locking ring assembly socket head screws ($^{9}/_{64}$ for LTT-20, 100, $^{5}/_{32}$ for LTT-500)
2). Mounting bolts corresponding to the number of LTT units to be installed. Reference outline drawing 464130-3 for bolt hole dimensions.
3). Wrench to fit the mounting bolts.
4). Equipment to lift the roller (if it is heavy) during installation.
5). Inclinometer and protractor to measure the angles of the web path and to adjust the working position of the LTT.

The web entry and exit angles, α and β (see Figure 4), should have been determined when the load cells were sized. Use values from 'T-MAC Web Tension Application Information Sheet', TD-067 supplement 'A', if angles have not changed. If angle information is not available, use an inclinometer to measure the web entry and exit angles (±1°) before dismantling the tension measurement roll.

Mechanical Installation

Two LTT's - One on Each End of the Roll:

Before beginning installation, measure the length of the roll and the distance between support points. LTT transducers have an internal spring wave washer to allow for thermal expansion of the roll and to provide a means of removing roll end play during system assembly. Ideal-

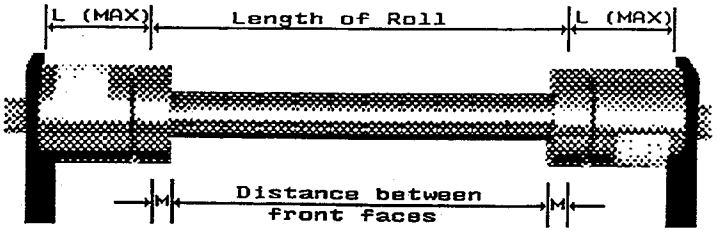


Figure 2. Two LTTs Mounted with Shaft

ly, once installation is complete, there will be no play along the axis of the roll and most of the expansion travel (see outline drawing 464130-3, dimension "E") will remain to accommodate thermal expansion. To accomplish this ideal condition, shim stock (optional with each LTT) should be used. Therefore, the distance between support points should be the length of the roll plus twice dimension "L (MAX)" (see outline drawing 464130-3 and Figure 2) plus about 0.040 in.

Roll mounting holes on each end of the machine frame should be at equal elevations. The LTT mounting location should be flat, and must be a rigid, strong support.

For retrofit installations, remove the roll that is to be fitted with LTT TMUs. You will need to make a vertical plumb line on the machine frame, at each end, that coincides with the center line of the roll. This will be used later to orient the LTT. It may be easier to make the plumb line while the roll is removed.

Loosen the four socket head screws on the front face of the LTT (see Figure 1). Insert one roll shaft into the opening on the front face of the LTT. To avoid introducing excessive end loads and twisting loads to the sensitive portion of the transducer, hold the unit as shown in Figure 3. Hold the main body of the transducer in the palm, and grip the locking ring assembly with the

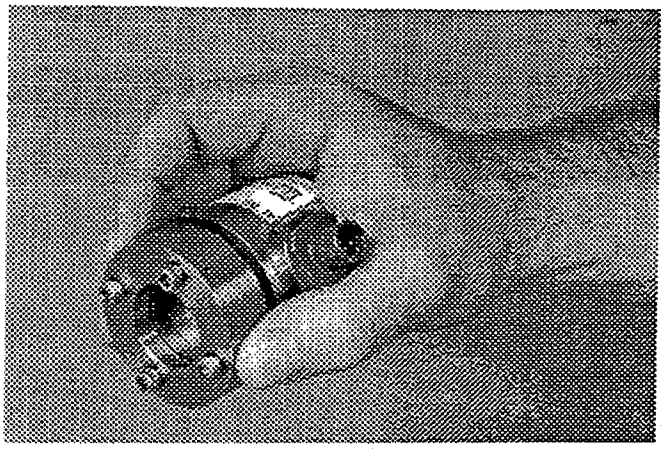
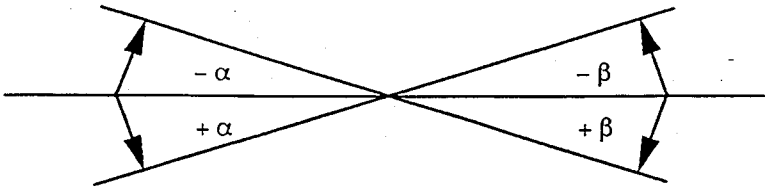


Figure 3. Correct Hold for LTT Unit

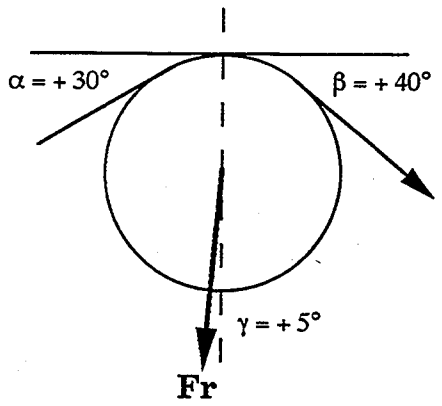
Reference Information



γ = Angle from Vertical
\+ = Clockwise
\- = Counterclockwise

$$\gamma = -\frac{(\alpha)+(\beta)}{2}$$

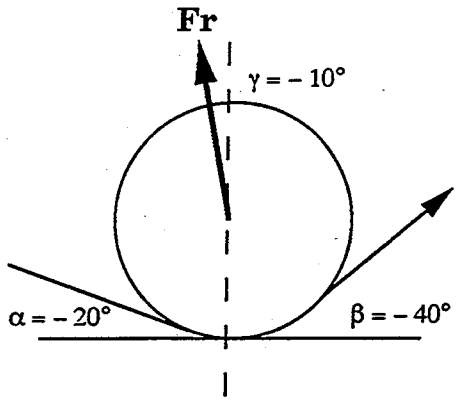
Example #1



$$\gamma = -\frac{(30°)+(40°)}{2} = +5°$$

γ = + 5° (Clockwise from Vertical)

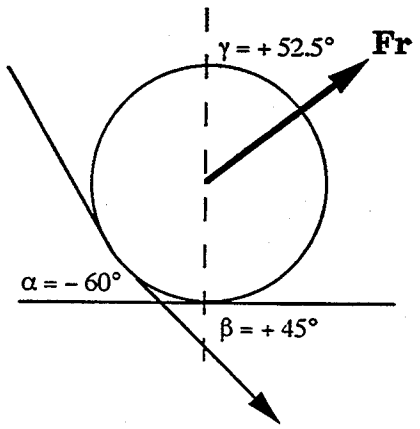
Example #2



$$\gamma = -\frac{(-20°)+(-40°)}{2} = -10°$$

γ = - 10° (Counter clockwise from Vertical)

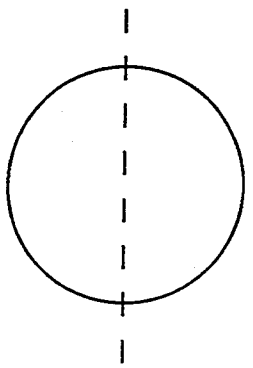
Example #3



$$\gamma = -\frac{(-60°)+(45°)}{2} = +52.5°$$

γ = + 52.5° (Clockwise from Vertical)

Your Application



$$\gamma = -\frac{(\quad°)+(\quad°)}{2} =$$

γ =

Figure 4.

thumb and two fingers, as shown. The locking ring assembly should take the force of shaft insertion - this force should not be transmitted to the main body of the LTT. In general, handle the LTT in a way that will prevent the locking ring assembly from hanging loose from the main body during all phases of installation. Push firmly on the shaft to make sure that it is seated all the way in. Tighten the four socket head screws evenly, in several steps, using a diametrically opposite sequence (like tightening lug nuts on a car). Use approximately 20 lb_f-in of torque on 20 and 100 pound capacity LTTs and 30 lb_f-in of torque on 500 pound capacity LTTs. Repeat this procedure on the other end of the shaft.

After both LTT's are secured to the roll, measure the distance between the two front faces (see Figure 2). The distance should be equal to the length of the roll minus twice dimension "M" for the capacity LTT being installed (see outline drawing 464130-3). If the distance is substantially greater than this value (more than 0.03 in.), the roll shaft has not been inserted far enough into the LTTs. Loosen the socket head screws, one end at a time, and push the shaft until it is seated all the way in.

Once the LTTs have been properly mounted onto the roll, lift the roll into place and bolt each transducer to the machine frame. Remember to handle the assembly carefully so that excess forces are not transmitted from the locking ring assembly to the main body of either LTT. Tighten bolts hand tight. There should be no play between the locking ring assembly and the main body of either LTT, and there should be a slight axial pressure against the wave washer in each LTT (see outline drawing 464130-3). Install shims until these conditions are met. Because the locking ring assembly can move in relation to the main body of the LTT, it is difficult to make an exact measurement. Typically, dimension 'D' (outline drawing 464130-3) should be slightly less than 'D (MAX)' to maximize the amount of expansion travel available for thermal movement.

If you have not already done so, make a vertical plumb line on the machine frame, at each end, that coincides with the center line of the roll. This plumb line will be used as a reference to position the LTT rotationally, so that the force measurement direction coincides with the direction of the resultant web tension force. The resultant web tension force will bisect the angle created as the web enters and exits the roll. Figure 4 illustrates some examples, where Fr is the resultant web tension force. Use the blank roll to draw in your web path and calculate the angle from vertical to the direction of Fr.

The "F" inscribed on the LTT orients the direction of force measurement. If the force, F_r, were in a perfectly vertical downward direction, the "F" on the LTT would be on top (at 12:00) - see Figure 5A. If Fr was determined to be clockwise 40 degrees from vertical in a downward direction, the "F" on the LTT would be positioned clockwise 40 degrees from vertical - see Figure 5B. The LTT should always be oriented such that the resultant web tension force, F_r, is aligned with the "F" inscription on the LTT. F_r should pull in a direction across the load cell away from the "F" inscription. Using

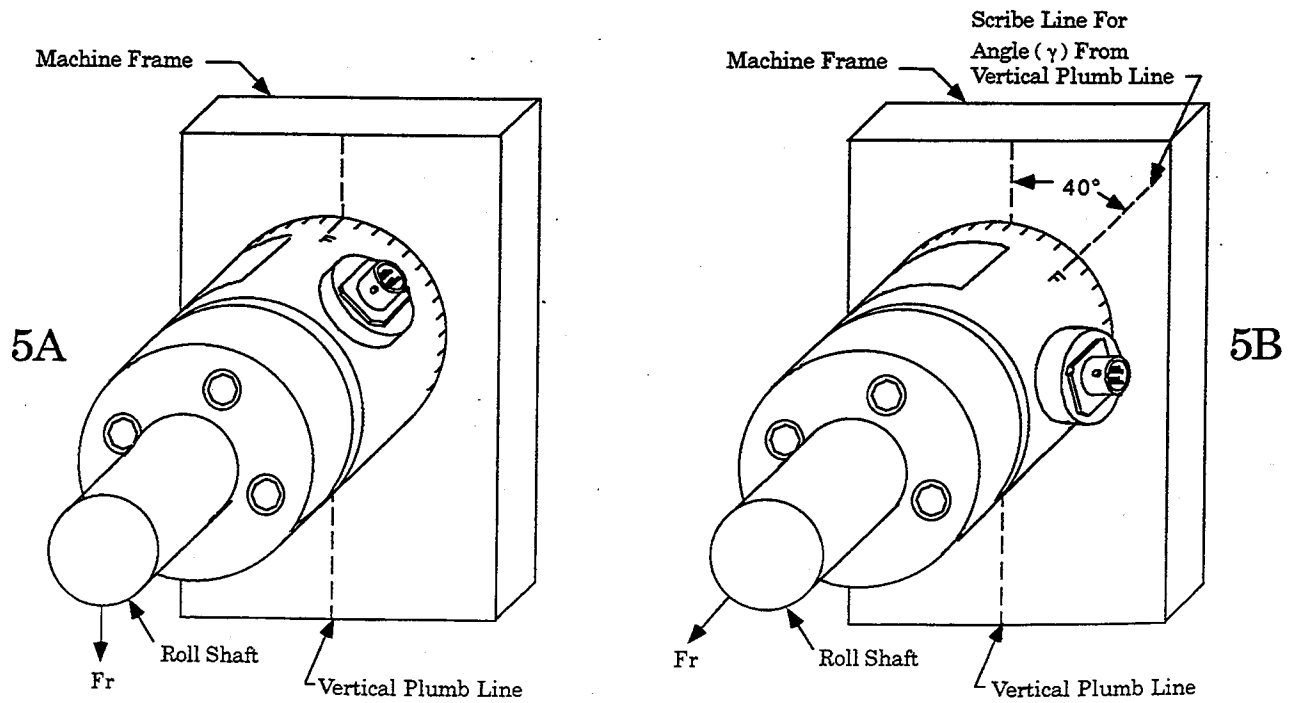


Figure 5. LTT Position Relative to Force Angle

a protractor, measure the angle (γ) from the vertical plumb line and mark it. The LTT will be rotated to this mark. As an alternative, use the 10° index marks around the circumference of the LTT unit to align the force measurement direction with F_r.

Hand rotate (do not use a wrench) each LTT unit until they are oriented in the proper direction. IMPORTANT: Make sure that both LTTs (one at each end of the roll) are oriented in the same direction!

Once both LTTs have been aligned properly to measure the resultant web tension force, F_r, tighten the mounting bolts with a wrench. Use approximately 500 lbf-in of torque on 20/100 pound LTTs, and 1000 lbf-in on 500 pound units.

One LTT - Standard Bearing on Other End of Roll

For installations where less accuracy is required or web tension force is perfectly equal between the two ends of the roll, a single LTT TMU can be used. Attach the LTT to one end of the roll and leave the standard bearing intact on the other end. The bearing and supporting hardware must be sized so that the elevation of the roll will be the same at both ends. When using only one LTT per roll, be certain that the web tension force does not shift toward one end of the roll (i.e. web does not track evenly, or tension profile across the web is not uniform). If the tension force does shift, the output of the LTT will change, causing non-repeatable readings.

Electrical Installation

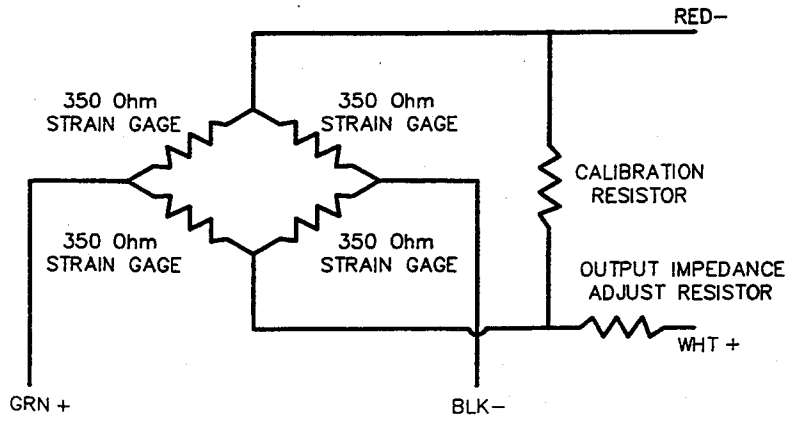
Each Model LTT TMU is supplied with a Cannon connector and mating half. The connector pin assignments are shown in Table 1. A partial schematic of the LTT is shown in Figure 6.

Table 1

+ EXCITATION	C (Green/Red)
- EXCITATION	B (Black)
+ SIGNAL OUTPUT	D (White/Green)
- SIGNAL OUTPUT	A (Red/White)

Cable is not supplied standard with the Model LTT, but can be purchased as necessary. Use four conductor shielded cable consisting of two twisted pairs of 20 A.W.G. wire (one pair excitation, one pair signal output) to connect the LTT to a J-Box or directly to a T-MAC instrument (see Figure 7). The color code shown (Table 1) is for BLH four-conductor shielded cable (P/N 461979).

Recommended excitation voltage is 10 Vdc. Maximum excitation voltage is 15 Vdc. A regulated, precision power supply (supplied in all BLH Electronics T-MAC instrumentation) must be used. Since signal output levels are very low (2 mV/V full scale typical), small power supply changes will greatly affect the output. If the distance between LTT and power supply is greater than 50 ft., a Model 304 Cable Extension Box or Model 308A Summing Junction Box (for two LTTs) is recommended. Use six conductor shielded cable, consisting of three twisted pairs of 20 A.W.G. wire (BLH P/N 207078), to connect the Model 304 or 308A to the T-MAC instrument. Note that the two extra lines are used for sensing the excitation voltage and regulating the power supply accordingly.



INPUT — BLK TO GRN — RESISTANCE 350 ± 3 Ohms AT 70° F

OUTPUT — WHT TO RED — RESISTANCE 350 ± 3 Ohms AT 70° F

LOAD BEAM	CHANGE IN OPEN CIRCUIT OUTPUT VOLTAGE FOR RATED CAPACITY	OUTPUT VOLTAGE AT ZERO LOAD
WEB TENSION TRANSDUCER	2.000 ±.005 mV/V	NOT OVER 0.1 mV/V

GENERAL NOTES

1. RECOMMEND INPUT 10 VOLTS AC OR DC. MAX INPUT 15 AC OR DC.
2. POLARITY IS SHOWN FOR FORCE IN DIRECTION AS SHOWN ON OUTLINE DWGS 463282-3 & 464130-3.

Figure 6. LTT Schematic (partial)

Typical System Block Diagrams

Some sample system block diagrams are shown in Figure 7. For further information on T-MAC instrumentation, including calibration, reference the appropriate instrument installation/operating manual.

NOTE: Diagrams shown are representative. If different configurations or cable lengths are desired, please contact a BLH application engineer.

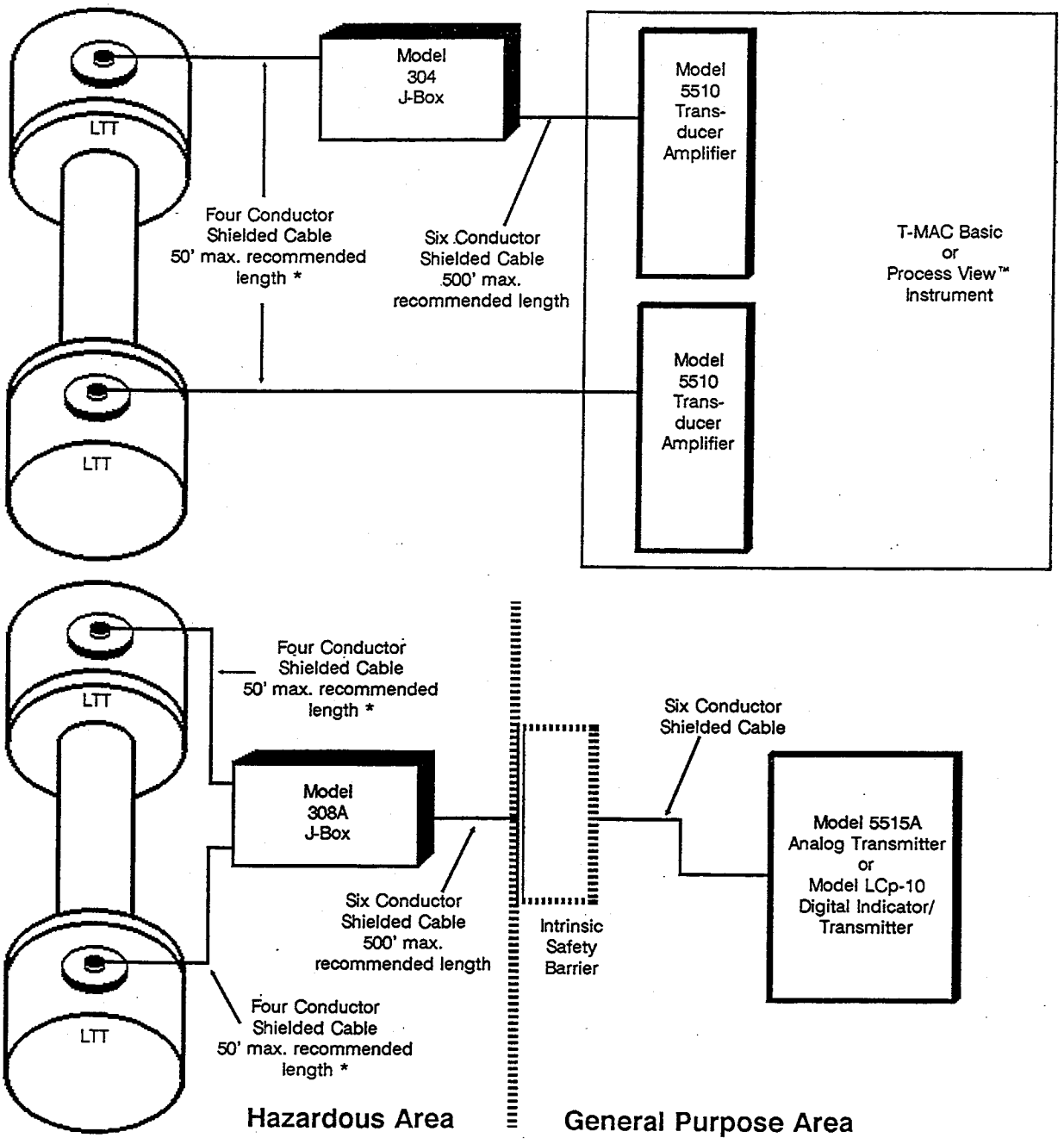


Figure 7. Typical Installations

* NOTE: This length should be kept as short as is practical and should be equal for each LTT in the system

Troubleshooting

1) OUTPUT SIGNAL FAILS TO INCREASE WITH ADDED LOAD.

The transducers are hitting their overload stops. If overload screws have been tampered with, return to the factory for resetting. If the transducers are actually being overloaded under normal operating conditions, replace with higher capacity transducers or reduce the tension force. Reducing the tension force can be accomplished by decreasing the web wrap angle and/or using a lighter roll. Consult BLH Applications Engineering for assistance in calculating Fr, the resultant web tension force, based on various wrap angles and roll weights.

2) OUTPUT SIGNAL NOT LINEAR; ZERO SHIFTS DURING OPERATION.

Check LTT and roll mounting. All mounting bolts must be tight. Check that there is no foreign matter interfering with the LTT mounting or with deflection of the locking ring assembly in relation to the main body.

3) NO OUTPUT SIGNAL.

Check to see that all connections have been made complete. Check for places where the connecting cable might be crimped or cut.

4) VERY HIGH OUTPUT WITH NO LOAD OR ONLY DEAD WEIGHT OF ROLL APPLIED TO LTT(s).

Check cables and connectors for good connections and check continuity of cables with an Ohm meter. Check for proper wiring to LTTs. Check LTT input resistance (across pins B and C) and output resistance (across pins D and A). Both should be 350 ohms +/- 3 ohms. If no load is applied, the output across pins D and A should be 0 mV/V +/- 0.1 mV/V. With an excitation voltage of 10V, this would mean +/- 1 mV. To check the no load condition, the LTT must be removed from the machine and held by the main body such that the locking ring assembly hangs vertically loose from the main body. If the LTT is turned sideways, the locking ring assembly will apply a slight load to the transducer element and the no load output conditions will not apply.

For service assistance, please obtain information from the LTT nameplate and information that was used for sizing, if available (wrap angle, tension force, weight of roll). Call:

BLH Electronics
75 Shawmut Rd.
Canton, MA 02021
(617) 821-2000
Ask for Field Service or
Applications Engineering

MAIN OFFICE
75 Shawmut Road
Canton, MA 02021
Tel: (781) 821-2000
Fax: (781) 828-1451
http://www.blh.com

BLH Electronics, Inc.
ISO 9001 Registered
U.S.A. Facility

CANADA
41 Horner Ave, Unit 5
Toronto, Ontario M8Z 4X4
Tel: (416) 251-2554
Fax: (416) 251-2690
Toll Free: (800) 567-6098

BLH NOBEL

A VPG Brand

blhnobel.com