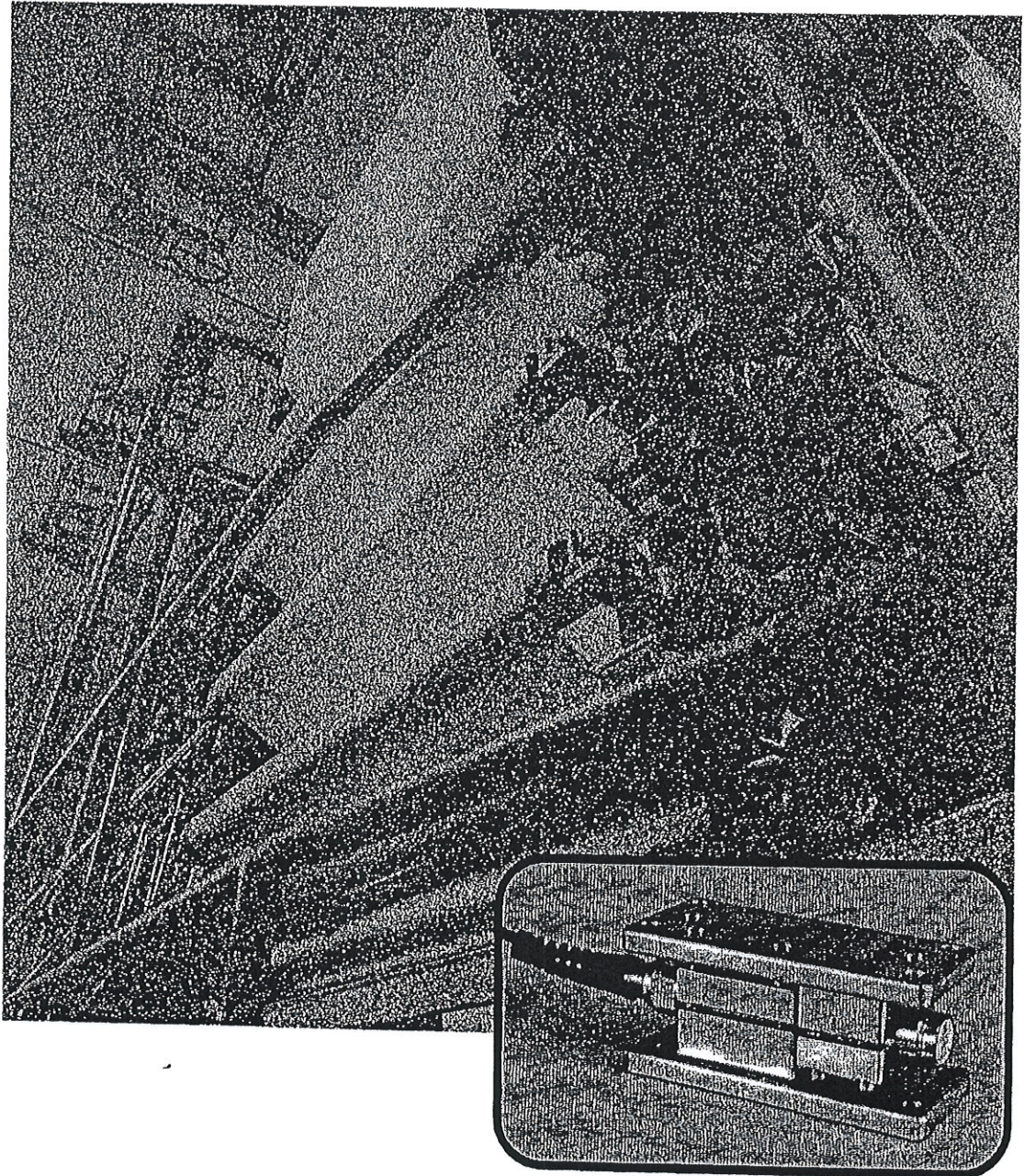


BLH NOBEL

A VPG Brand



HTK Web Tension Transducer Installation Instructions

NOTICE

BLH Nobel makes no representation or warranties of any kind whatsoever 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.

HTK Installation Instructions

Section I - General Information

- 1.1 INTRODUCTION 1
 - 1.1.1 Scope 1
- 1.2 DESCRIPTION 1
 - 1.2.1 HTK Modules 1
 - 1.2.2 Wrap Angle Considerations 1
- 1.3 WARRANTY POLICY 2
- 1.4 FIELD ENGINEERING 2
- 1.5 OUTLINE DIMENSIONS 3

Section II - Installation

- 2-1. GENERAL 1
- 2.2 MECHANICAL INSTALLATION 1
- 2.3 TRANSDUCER REPLACEMENT 2
- 2.4 ELECTRICAL CONNECTIONS 3
- 2.5 SYSTEM CONFIGURATIONS 3

Section III - Operation

- 3.1 TEMPERATURE CONSIDERATIONS 1
- 3.2 SEALING 1
- 3.3 LOAD CONSIDERATIONS 1

Section IV - Calibration

- 4.1 CALIBRATION 1
- 4.2 MAINTENANCE/TROUBLE SHOOTING 1

1.1 INTRODUCTION

1.1.1 Scope

This manual provides general information, installation, operating, and service information for BLH HTK Web Tension Measurement Modules (Figure 1-1).

1.2 DESCRIPTION

1.2.1 HTK Modules

BLH HTK Web Tension Measurement Modules are designed to mount directly below roller pillow block bearings on web tension based process equipment. Space required below the pillow block bearing is minimal, resulting in negligible line profile changes on retrofit installations. Each module includes an integral Top and Bottom adapter plate with hole mounting arrangements for typical installations found in the roofing, converting, printing, and plastic industries.

HTK transducer design strategically locates bonded strain gages to measure only applied shear stresses. The strain gages are wired in a Wheatstone Bridge circuit that, when provided with excitation voltage, produces changes in the electrical output proportional to the applied tension.

HTK Web Tension Measurement Modules offer the inherent advantage of all strain gage devices - excellent stability, accuracy, reliability, and infinite resolution. Mounting hardware components also are 100% stainless steel for use in harsh, industrial environments. Module sealing meets NEMA 4 and IP67 requirements. An integral cable conduit fitting and epoxy sealed strain gages ensure long-term reliability in wet or washdown locations.

They contain no moving parts or fluids, and are environmentally protected against dust and liquids. Modules are available with full-scale ranges from 225 - 1125 lb.

All transducer elements are machined from high strength stainless steel and are designed for uniform, repeatable stress distribution where the strain gages are bonded to the module. Gages are initially selected to match the thermal expansion co-efficient of the element material, matched for resistance, then wired to form a Wheatstone Bridge. The bridge is electrically compensated for precise temperature and modulus compensation over a broad range of operating temperatures.

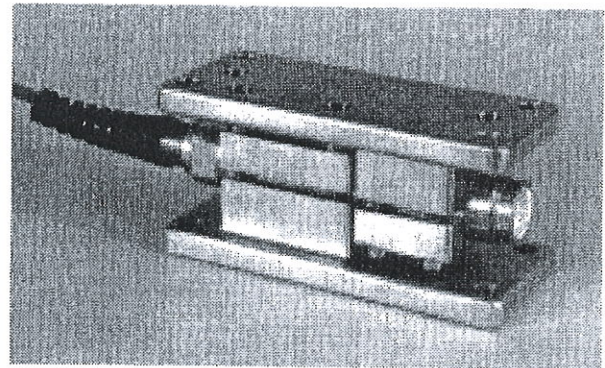


Figure 1-1. The HTK Web Tension Measurement Module

Small deflection, low mass design and absence of moving parts give HTK modules excellent high frequency response for dynamic web tension measurements.

1.2.2 Wrap Angle Considerations

HTK modules are designed for installations with equal and symmetrical entry and exit web wrap angles where the resultant force (F_R) is perpendicular to the primary axis of the HTK (Figure 1-2). For installations where entry and exit angles or symmetry differ, BLH offers HTU Tension Measurement Modules with transducers that measure both horizontal and vertical tension forces simultaneously.

Refer to table 1-1 (next page) for complete HTK specifications.

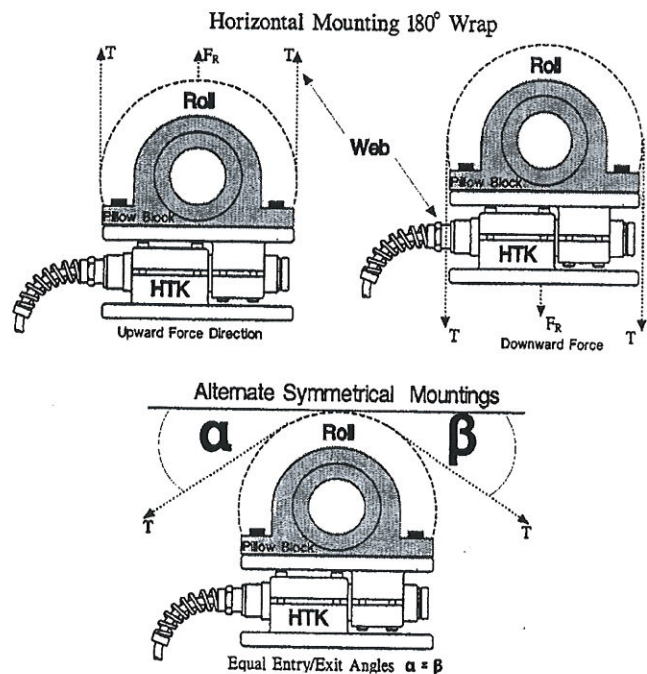


Figure 1-2. Symmetrical Wrap Angles

Table 1-1. Model HTK Performance Specifications

Performance		Electrical	
Available Capacities	1 kN - 5 kN (225 - 1125 lb)	Excitation Voltage	10 Vac-dc recommended 20 Vac-dc maximum
Rated Output (RO)	2.0394 mV/N +/-0.25%	Input Resistance	350 +/-3.0 ohms
Zero Balance - %RO	5.0	Output Resistance	350 +/-3.0 ohms
Error- Max. - %RO	0.05 (Combined error, best fit through zero)	Insulation Resistance	4 G-ohms minimum
Creep - %RO (5 Minutes)	+/-0.02	Connection-4-Cond. Cable	10m(32 ft. 10 in.)
Repeatability	0.01% Rated Capacity	Material	
Temperature		Beam	Stainless Steel (15-5PH)
Compensated Temp.	-10 to +50°C (+15 to +120°F)	Hardware	Stainless Steel (304)
Safe Temp.	-40 to +105°C (-40 to 220°F)	Moisture Protection	IEC IP67
Temperature Effects:		UnitWeight	12 pounds - all capacities
Zero Balance - %RO	0.0014/°C (0.0008/°F)	Deflection Under Load - mm (in.)	
Output - % Reading	0.0033/°C (0.0018/°F)	1 kN	0.101 (0.004)
Overload Rating - %Rated Capacity		2 kN	0.101 (0.004)
Safe Load	150	5 kN	0.152 (0.006)
Ultimate Load	300	Approvals	
Safe Sideload	100	FM (Factory Mutual)	3611 (Class I, II, III; Div. 1,2; Groups A-G)
Ultimate Sideload	200	CSA	C22.2 (Class I, II, III; Div. 1,2; Groups A-G)

NOTE: 1kN=approx. 225 lb

1.3 WARRANTY POLICY

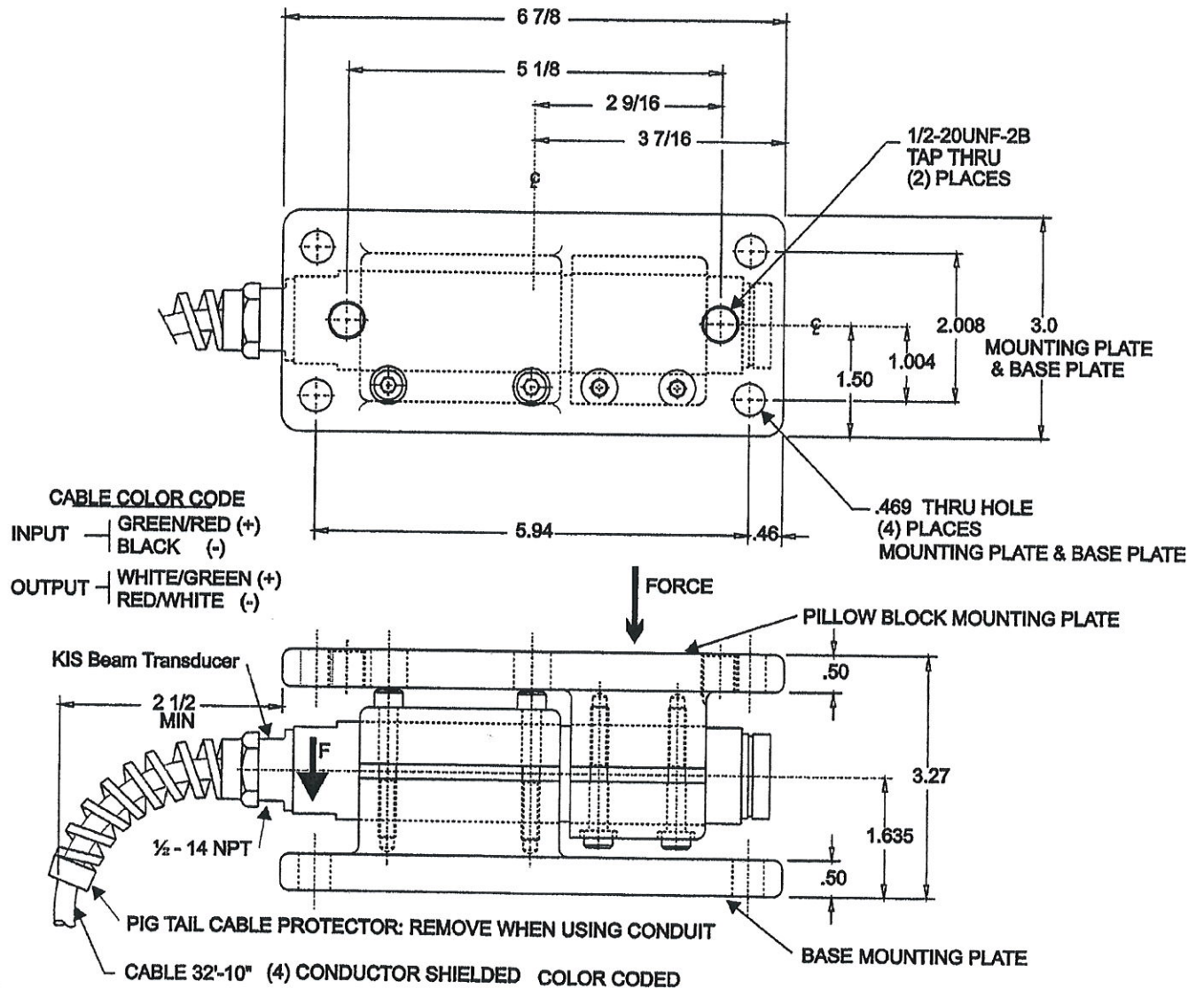
BLH warrants the products covered hereby to be free from defects in material and workmanship. BLH's liability under this guarantee shall be limited to repairing or furnishing parts to replace, f.o.b. point of manufacture, any parts which, within one (1) year from date of shipment of said product(s) from BLH's plant, fail because of defective workmanship or material performed or furnished by BLH. As a condition hereof, such defects must be brought to BLH's attention for verification when first discovered, and the material or parts alleged to be defective shall be returned to BLH if requested. BLH shall not be liable for transportation or installation charges, for expenses of Buyer for repairs or replacements or for any damages from delay or loss of use for other indirect or consequential damages of any kind. BLH may use improved designs of the parts to be replaced. This guarantee shall not apply to any material which shall have been repaired or altered outside of BLH's plant in any way, so as in BLH's judgment, to affect its strength, performance, or reliability, or to any defect due in any part to misuse, negligence, accident or any cause other than normal and reasonable use, nor shall it apply beyond their normal span of life to any materials whose normal span of life is shorter than the applicable period stated herein. In consideration of the forgoing guarantees, all implied warranties are waived by the Buyer, BLH does not guarantee quality of material or parts specified or furnished by Buyer, or by other parties designated by buyer, if not manufactured by BLH. If any modifications or repairs are made to this equipment without prior factory approval, the above warranty can become null and void.

1.4 FIELD ENGINEERING

Authorized BLH Field Service Engineers are available around the world to install HTK based web tension measurement systems and/or train factory personnel to do so. The Field Service Department at BLH is the most important tool to assure the best performance from your application. Field service phone numbers are listed below.

Factory: (Main Number) (781) 298-2200

1.5 HTK OUTLINE DIMENSIONS



RATED CAPACITY 1 KN, 2KN, 5KN (225 - 1125 LB)

Section II - Installation

2-1. GENERAL

This publication provides mechanical and electrical installation instructions for HTK Web Tension Measurement Modules (Figure 2-1). HTK Web Tension Measurement Modules are low profile tension transducer devices designed for simple mechanical installation beneath pillow block bearings. Each module contains a 15-5 PH stainless steel, double cantilever type transducer. Four bolts (customer supplied) secure the HTK base mounting plate to a prepared foundation, and two bolts (1/2-20UNF-2B customer supplied) attach the pillow block to the pillow block mounting plate. Customer supplied bolts should be grade 5 (English) or class 8.8 (metric) or stronger. Obtain torque specifications from the bolt manufacturer.

IMPORTANT: BLH strongly recommends that users read this section completely before installing modules. Each successive step depends upon satisfactory completion of all prior procedures. Failure to comply with recommended procedures may cause damage to equipment and injury to operating personnel.

2.2 MECHANICAL INSTALLATION

HTK installation instructions refer to specific parts of the HTK module. Use the HTK module diagram (Figure 2-1) to identify parts and part locations.

Step by Step Installation Instructions

(1) Positioning: HTK Web Tension Measurement Modules should be oriented so that resultant tension force (F_R) is applied perpendicular to the base of the module as shown in Figure 2-2.

(2) Base Mounting Plate Surface Preparation: The base of the tension module must be uniformly supported and level. BLH recommends a machined finish on the mounting surface. For a structural steel surface (pillow block mounting plate) using through bolts, the bolt spacing should be accurate to within 0.03 in. of the bolt pattern specified in the outline drawing dimensions. Grade 5 (English) or class 8.8 (metric) studs or bolts must be used. Do not weld the modules in place.

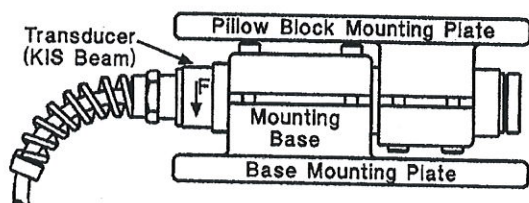


Figure 2-1. HTK Module Component Designations

(3) Pillow Block Mounting Plate (PBMP) Preparation: Two holes, pre-drilled in the adapter plate, are 1/2 20UNF-2B tapped for pillow block mounting (see Figure 1-3 outline dimensions). BLH recommends grade 5 (English) or grade 8.8 (metric) bolts of sufficient length to achieve full thread engagement (minimum) for all holes in the adapter plate. Torque specifications must be obtained from the bolt manufacturer. Do not weld the PBMP to the pillow block bearing.

NOTE: If existing pillow block mounting holes do not match the tapped holes in the PBMP, attach an additional plate to the PBMP using the existing 1/2-20UNF-2B holes. Use this additional plate (specifications per customer) for actual pillow block mounting.

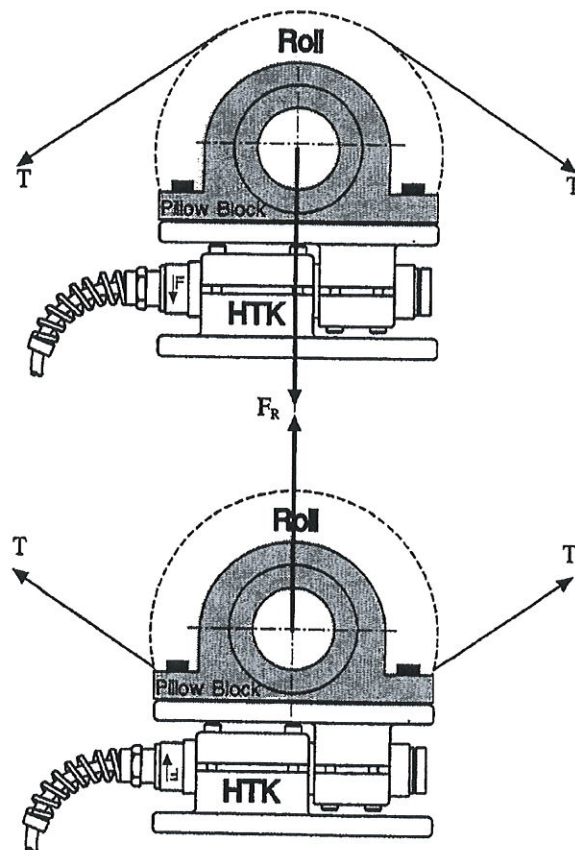


Figure 2-2. Tension Force Directions

(4) Mechanical Installation (Figure 2-3): Raise the pillow block/roll assembly and install the tension module in place on the HTK mounting surface (foundation). Before bolting down, be sure that the HTK mounting surface is uniformly supported and level. Lower the pillow block/roll assembly onto the module adapter plate and bolt in place. Avoid dropping the pillow block/roll assembly onto the module. Tighten all mounting bolts to the bolt manufacturer's recommended torque specification. Repeat for the opposite side of the roll. Following installation, do not perform arc welding on the equipment or any support structure electrically in contact with the tension modules.

NOTE: The HTK is not designed to sustain constant forces in the axial direction of the roll (transverse to the load beam). Therefore, one end of the roll must be supported with a pillow block that permits some axial growth as well as misalignment (Figure 2-4).

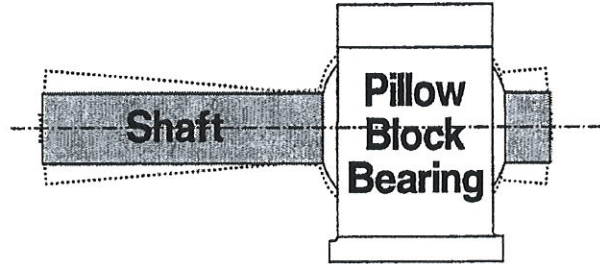


Figure 2-4. Allowance for Axial Growth/Misalignment

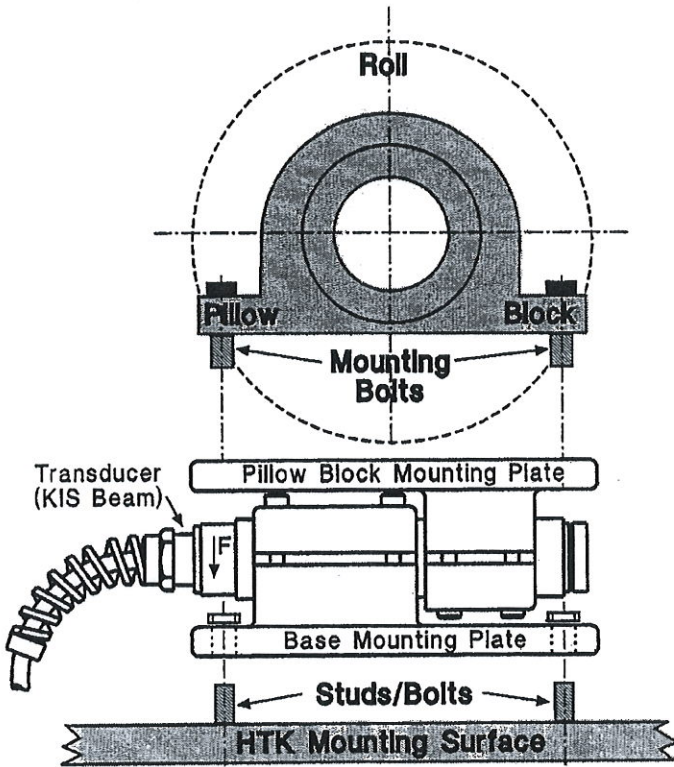


Figure 2-3. HTK Installation Diagram

2.3 TRANSDUCER REPLACEMENT

Should it become necessary to replace the HTK Module KIS Beam (paragraph 1.5), perform the following:

- a) Remove the Pillow Block Mounting Plate/Block Assembly (with KIS Beam).
- b) Loosen the mounting plate clamp block cap screws and slide the existing KIS Beam assembly out of the block. Note the location and position of the HTK Shim.

Place the mounting plate in front of you, length wise, so that the socket head cap screws, on this plate, are on your right side.

- c) Slide the replacement KIS Beam assembly into the opening on the left side of the mounting plate clamp block.
- d) Slide the HTK shim in between the KIS Beam and the clamp block. Align the edge of the KIS Beam housing to the left side of the plate clamping block. Position the beam so that the force arrow is aligned with the resultant force (up or down as shown in Figure 2-2).
- e) Align the shim so that it is centered on the clamping block. Remove each cap screw, apply Loctite #242 to the threads, reinstall screws and torque to a setting of 5 ft/lb.

- f) Mount the Pillow Block Mounting/Plate/Block Assembly to the Base Mounting Plate by sliding the cable end of the KIS Beam through the clamp block until the silicone sleeve is flush with the right side of the block. Align the corner thru holes (0.46 Diameter) in the pillow Block and Base mounting plates to within 0.030 inches. Torque the set screws on the cable end to 5 ft/lb.

No recalibration is required after replacement since the new beam outputs exactly match the old.

2.4 ELECTRICAL CONNECTIONS

The wiring color code is presented in paragraph 1.5 along with the HTK Web Tension Measurement Module dimensions. HTK Web Tension Measurement Modules are equipped with 1/2-14 NPT threaded fittings for conduit connection, if desired. The standard ten meter cable contains four conductors with integral shielding. Each conductor has tinned leads for easy connection to a BLH summing junction box or transmitter. Excess cable can be coiled up inside the summing unit or transmitter enclosure. If the cable length is cut, the rated output increases by approximately 0.003% per foot at 70°F. Refer to the junction box or transmitter wiring diagram (supplied with manual) for specific interconnection locations.

2.5 SYSTEM CONFIGURATIONS

Figure 2-5 presents two typical HTK based system configurations. HTK system complexity ranges from simple stand-alone readouts to full network and PLC/DCS interface capability.

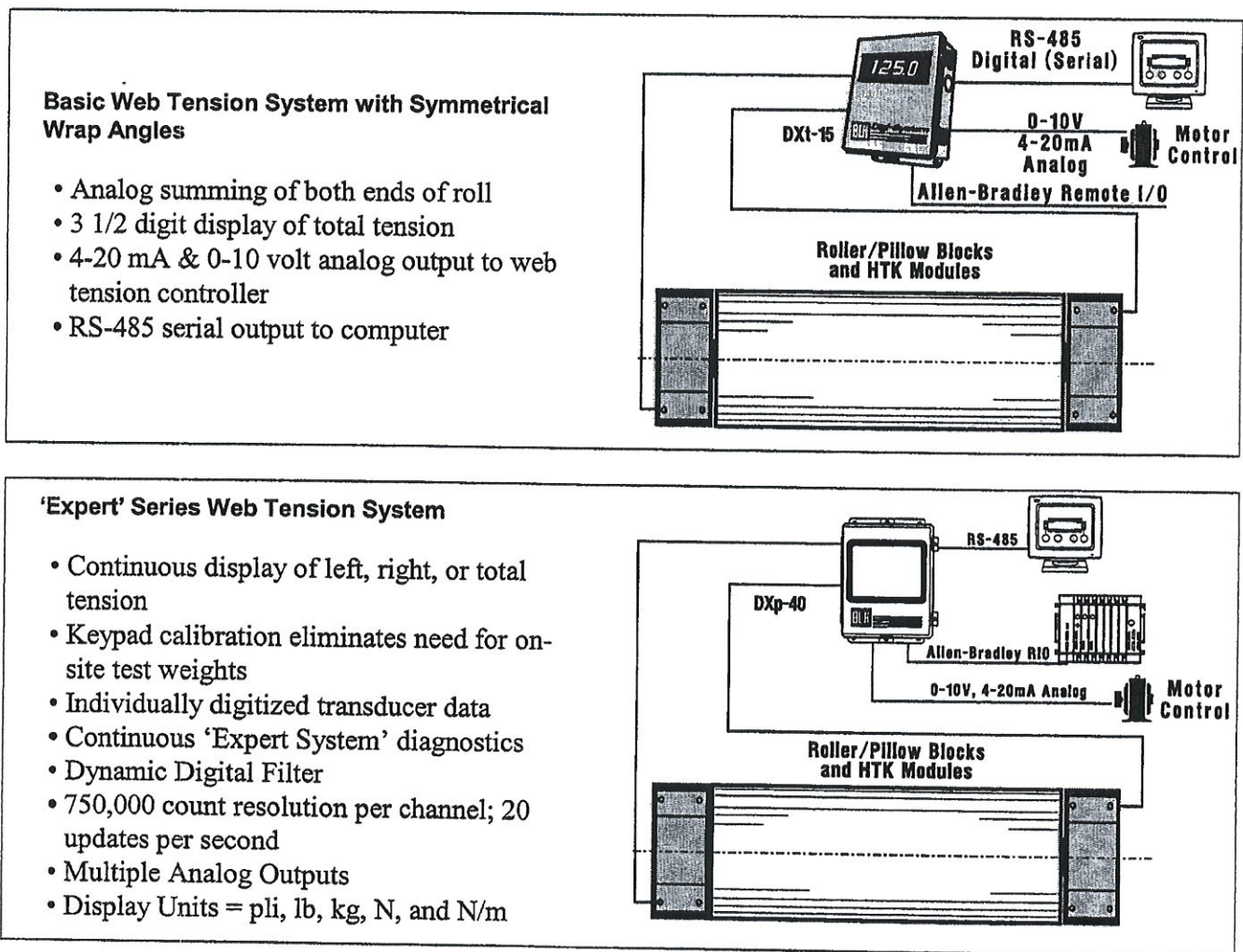


Figure 2-5. Typical System Configurations

3.1 TEMPERATURE CONSIDERATIONS

HTK modules perform best when operated within their compensated temperature range of +15 to +120 degrees Fahrenheit. Maximum operating temperature range without damage is -40 to +220 degrees Fahrenheit.

Should ambient temperatures at the HTK exceed the compensated temperature range, special precautions must be taken to ensure that actual module temperature is held within specified limits. These precautions are necessary whether or not the module is being operated.

3.2 SEALING

HTK modules are sealed to meet NEMA 4 and IP67 requirements. Type 4 enclosures are intended for indoor or outdoor use to provide a degree of protection against windblown dust and rain, and hose directed water.

3.3 LOAD CONSIDERATIONS

HTK modules can be periodically loaded up to 150% of rated capacity without producing a permanent shift in performance characteristics (beyond those specified).

CAUTION

A static overload in excess of the Overload Rating may permanently affect the accuracy and performance of the module. Peak vibratory loadings should be limited to 50% of rated capacity to preclude premature fatigue failure of the module.

Section IV - Calibration

4.1 CALIBRATION

HTK modules are carefully checked and calibrated at BLH before shipment. The accuracy of the instruments and standards used for calibration are traceable to the National Institute of Standards and Technology (NIST). A data and calibration sheet is furnished with each module supplied by BLH. The data included on this sheet can be used as a reference where independent calibration checks are performed.

Calibration can be accurately checked by applying the rated tension force to the module and then comparing the output with the original data on the calibration certificate. Calibration should be checked whenever the beam is thought to have been overloaded beyond its safe overload rating (150%). Note that the HTK performance cannot be changed through external adjustments, and any module displaying calibration error should be returned to BLH for service.

System calibration instructions are included in the digital indicator/transmitter operator's manual.

4.2 MAINTENANCE/TROUBLE SHOOTING

When it is necessary to determine if a HTK circuit is operative, the pillow block/roll assembly does not have to be lifted off the module in question. Simply read across the output leads (red & white) with a digital voltmeter with power applied to the module. The readings should be somewhat similar, normally in the 5-30 mV range. Any radical departure from these figures is usually indicative of a failure.

To determine the cause of incorrect operation of the measuring system, perform the following inspections:

- a. Check instrument power and fuses.
- b. Check to see that connections to the instrument are correct and tight.
- c. Check instrument performance independently following recommended procedure.
- d. Check continuity of interconnecting leads.
- e. Check junction box connections (where used).
- f. Check for proper excitation voltage.
- g. Check output of each module for comparable output levels.
- h. Insulation resistance checks: The HTK must be disconnected for leakage test (measured values should exceed 5000 M-ohms).
 - 1.) Ground to a lead of the interconnecting cable.
 - 2.) Module case to a lead of the cable.
 - 3.) Module case to the shield of the cable.
- j. Input/Output resistance check. Disconnect the module cable leads from the instrument or junction box. Measure the resistance between the input leads and between the output leads. Resistance should be as specified. OHMMETER USED SHOULD NOT APPLY MORE THAN 20 VOLTS TO THE BEAM BRIDGE.

Resistance readings other than those listed in the specifications indicate a failure within the unit. DO NOT attempt to repair; faulty modules require factory service. Contact a local sales office or BLH directly for RETURN AUTHORIZATION. Upon examination of the module at the factory, a full report on the condition with a quotation on repair cost and delivery will be submitted to the customer.

BLH NOBEL

A **VPG** Brand

blhnobel.com