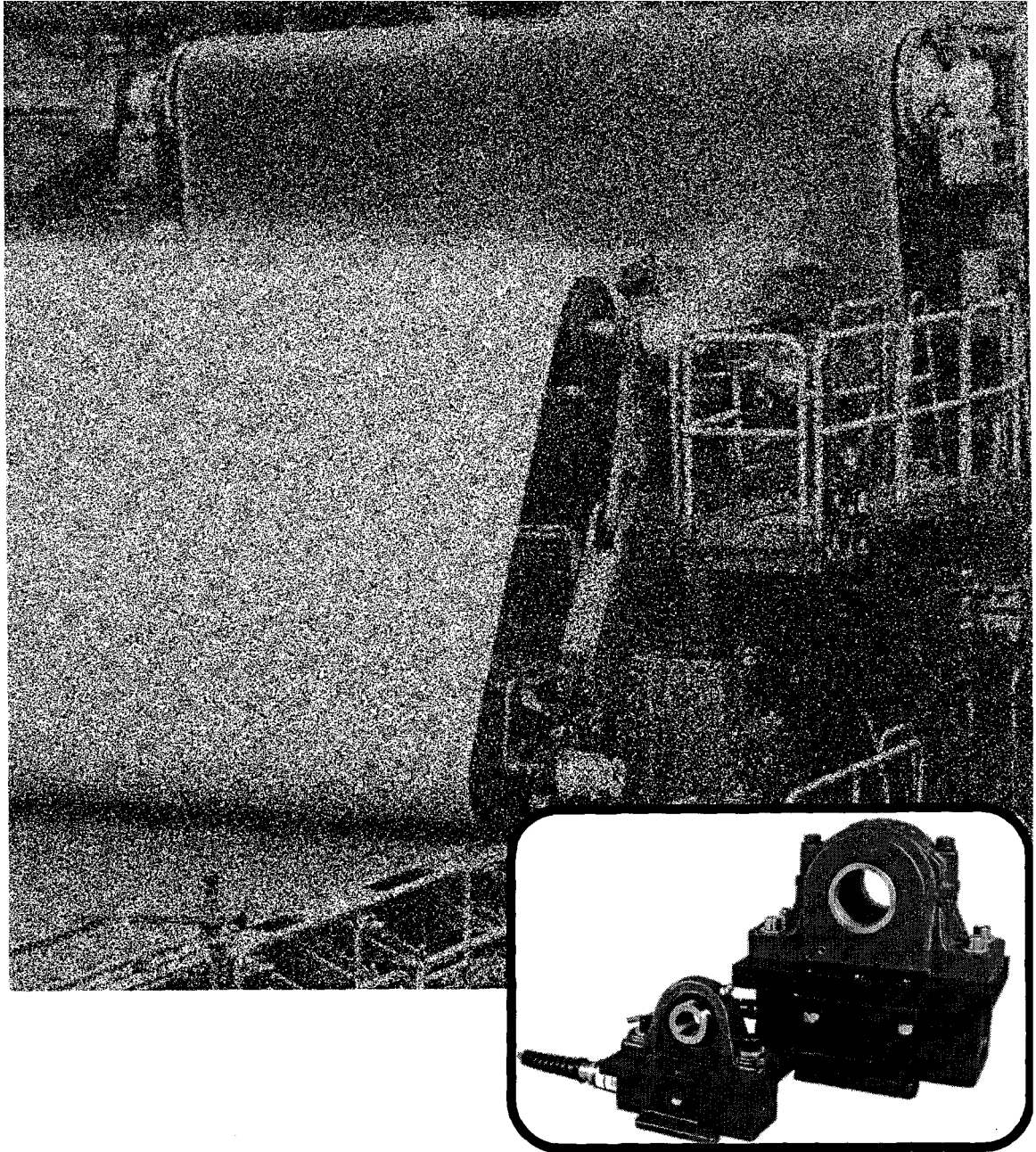


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HTZ Web Tension Transducer Installation Instructions

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SECTION I - General Information

1.1 INTRODUCTION

1.1.1 Scope

This manual provides general information, installation, operating, and service information for BLH HTZ-3 Web Tension Measurement Modules (Figure 1-1).

1.2 DESCRIPTION

1.2.1 HTZ-3 Modules

BLH HTZ-3 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 tension module includes an integral mounting pad to accept a pillow block adapter plate supplied as an option. The adapter plate design permits tension measurement in the upward or downward direction and offer provision for the installation of overload safety stops at each corner of the plate. Tension applications in the upward direction should always include safety stops.

HTZ-3 transducers contain bonded strain gages which are placed to measure applied shear stresses. The strain gages are wired in a Wheatstone bridge circuit that, when provided with an excitation voltage, produces changes in the electrical output proportional to the applied tension.

HTZ-3 Web Tension Measurement Modules offer the inherent advantage of all strain gage devices - excellent stability, accuracy, reliability, and infinite resolution. They contain no moving parts or fluids, and are environmentally protected against dust and liquids. The modules are available with full-scale ranges from 500 - 100,000 lb.

The 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 element. 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.

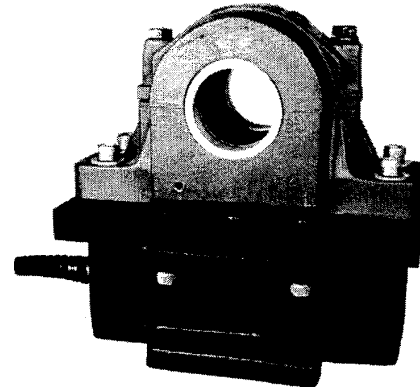


Figure 1-1. HTZ-3 Module With Pillow Block Bearing

Small deflection, low mass design and absence of moving parts give HTZ-3 modules excellent high frequency response for dynamic web tension measurements.

1.2.2 Wrap Angle Considerations

HTZ-3 modules are designed for installations with equal and symmetrical entry and exit web wrap angles (Figure 1-2). Angles may be oriented in either the up or down direction. For installations where entry and exit angles or symmetry differ, BLH offers HTA Tension Measurement Modules with transducers that rotate to the exact angle of maximum tension.

Refer to table 1-1 for complete HTZ-3 specifications.

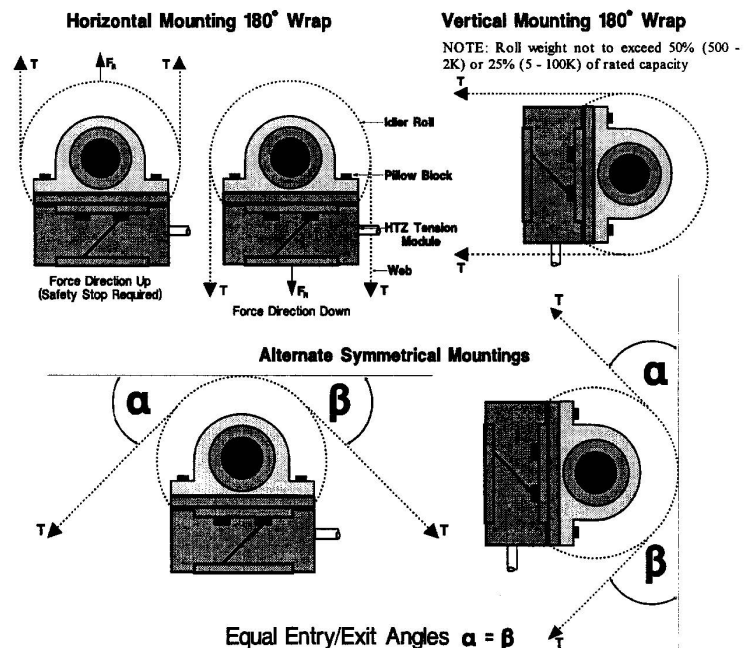


Figure 1-2. HTZ-3 Entry and Exit Angle Requirements

Table 1-1. HTZ-3 Specifications

Performance (% Rated Output):

Capacity	500 lb - 100,000 lb (8 ranges)
Rated Output (R.O.)	2.0 mV/V \pm 0.1%
Zero Balance	5% R.O.
Combined Error (best fit)	0.10% R.O.
Repeatability	0.01% R.O.
Creep (20 minutes)	0.03% R.O.

Temperature:

Operating Range	-40 to 220°F (-40 to 105°C)
Compensated Temp. Range	30 to 130°F (-1 to 54°C)
Temperature Effects:	
Zero Balance	0.0017% R.O./°F (0.003%/°C)
Output	0.0020% Reading /°F (0.0036%/°C)

Overload Rating:

Safe Load - %Rated Capacity	150
Ultimate Load - %Rated Capacity	300

FM Approval:

FM approved intrinsically safe for Class I, II, and III Div 1, Groups A-G when installed in accordance with BLH drawing # 468872-2

CL I Div 2 Gr A-D; CL III Div 2 Gr F, G when installed in accordance with BLH drawing #468873-2

Electrical:

Input Resistance	350 Ω \pm 3 Ω
Output Resistance	350 Ω \pm 3 Ω
Recommended Excitation	10 or 15 Vac/dc
Maximum Excitation	18 Vac/dc

Material:

Beam	15-5PH Stainless Steel
Brackets	Ductile Iron with Enamel Paint
Environmental Class	NEMA 4/IP65
Moisture Protection	IEC Recommendation 68-2-4... Test D, 100 Cycles

Deflection Under Load and Unit Weight:

Capacity (lb)	Deflection	Weight
500	0.012 in.	10 lb
1000	0.012 in.	10 lb
2000	0.013 in.	15 lb
5000	0.027 in.	15 lb
10000	0.023 in.	35 lb
20000	0.047 in.	50 lb

NOTE: Consult Web Tension Product Manager for 50 and 100K specifications and availability

NOTE: Specifications apply for upward and downward wrap angles

1.3 WARRANTY POLICY

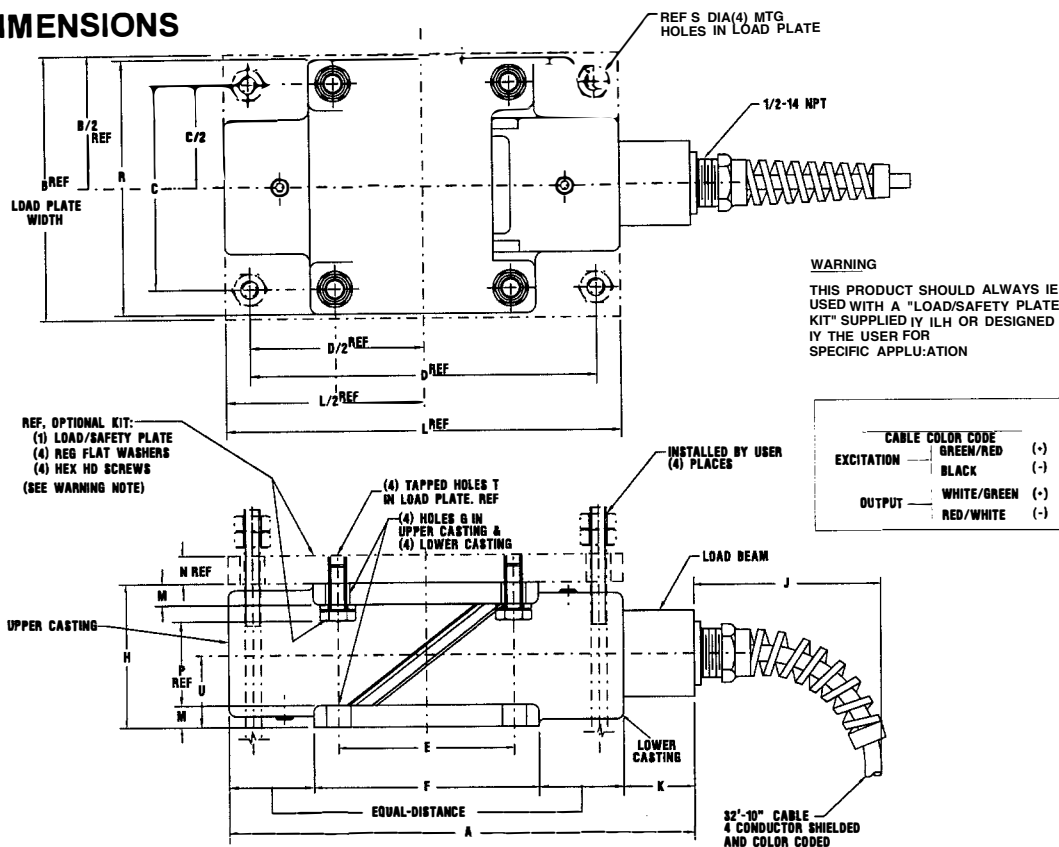
BLH will at its option, replace, or without replacement, render credit for any material which, if properly selected, stored and used by the buyer, shall prove defective within one year from the date of shipment. No claim shall be allowed by any party other than the Buyer, in no event shall BLH's liability for defective material exceed the purchase price thereof. BLH shall not be liable for labor, or for any special, consequential or incidental damages, or for any loss resulting from use of the material.

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1.4 FIELD ENGINEERING

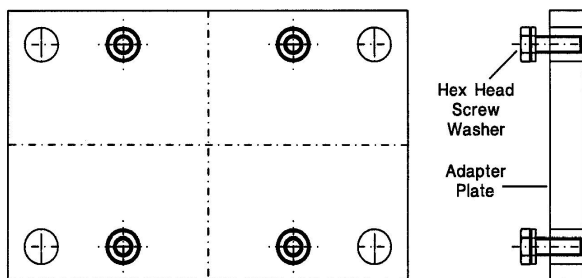
Authorized BLH Field Service Engineers are available around the world to install HTZ-3 weigh modules and/or train factory personnel to do so. The field service department at BLH is the most important tool to assure the best performance from your application. Field service phone numbers are listed below.

1.5 HTZ-3 DIMENSIONS



CAPACITY (lb)	A	B REF	C	D REF	E	F	G	H	J	K	L REF	M TYP	N REF	P REF	R	S REF	T REF	U
500 1,000	7.50	4	3.0	5.0	2.56	3.5	.32	2.00	3	1.50	6	.31	1/2	1.16	3.88	.50	1/4-20	1.00
2,000 5,000	8.25	4 1/2	3.62	6.0	3.12	4.0	.43	2.50		1.25	7	.38	5/8	1.43	4.5	.62	3/8-16	1.25
10,000	9.00	5 1/2	4.42	8.0	3.92	5.0	.43	3.34		9	.56	3/4	1.91	5.5	.75	3/8-16	1.67	
20,000	10.00	6 1/2	5.06	8 3/4	4.18	5.5	.50	3.88		FLUSH WITH +/- .12	10	.75	7/8	2.03	6.38	.88	7/16-14	1.94
50,000	12.00	8	6.00	10	5.00	6.5	.69	4.60		12	1.00	1 1/4	2.03	7.50	1.00	5/8-11	2.30	
100,000	15.75	10	8.12	11 3/4	6.12	8.0	.94	6.74		15.75	1.50	1 1/2	3.08	10.00	1.125	7/8-9	3.37	

Optional Load Plate - Reference Data



PART NO	CAPACITY (lbs)	LOAD PLATE ITEM 1	SCREW, HEX HD GRADE 8, ITEM 2	WASHER, FLAT ITEM 3	LGTH REF	WIDTH REF	THK REF	WEIGHT (lbs)
470054-2	500/1000	470022-3	1/4-20UNCX 3/4LG 149592-8	123428-8 SIZE 1/4	6	4	1/2	3.3
470055-2	2000/5000	470023-3	3/8-16UNCX 1LG 149593-8	123432-8 SIZE 3/8	7	4 1/2	5/8	5.5
470056-2	10,000	470024-3	3/8-16UNCX 1 1/4LG 149594-8	123432-8 SIZE 3/8	9	5 1/2	3/4	10.5
470057-2	20,000	470025-3	7/16-14UNCX 1 1/2LG 149595-8	149631-8 SIZE 7/16	10	6 1/2	7/8	16.1
470058-2	50,000	470026-3	5/8-11UNCX 1 3/4LG 149629-8	123436-8 SIZE 5/8	12	8	1 1/4	34
470059-2	100,000	470027-3	7/8-9UNCX 2 1/2LG 149630-8	123440-8	15 3/4	10	1 1/2	66.8

LOAD PL DATA - REF

Note: Overload safety screws are required for applications measuring force in the upward direction

SECTION II Installation

WARNING: BLH strongly recommends that the user read this section completely prior to starting installation as each successive step depends upon satisfactory completion of all prior procedures. Failure to comply with recommended procedures may cause severe damage to equipment and injury to operating personnel.

2-1. GENERAL

This publication provides mechanical and electrical installation instructions for HTZ-3 Web Tension Measurement Modules (Figure 2-1). HTZ-3 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 HTZ-3 module base to a prepared foundation, and four bolts (supplied with the optional BLH adapter plate) attach the pillow block adapter plate to the integral mounting pad. Customer supplied bolts should be grade 8 (english) or grade 8.8 (metric) or stronger. Obtain torque specifications from the bolt manufacturer.

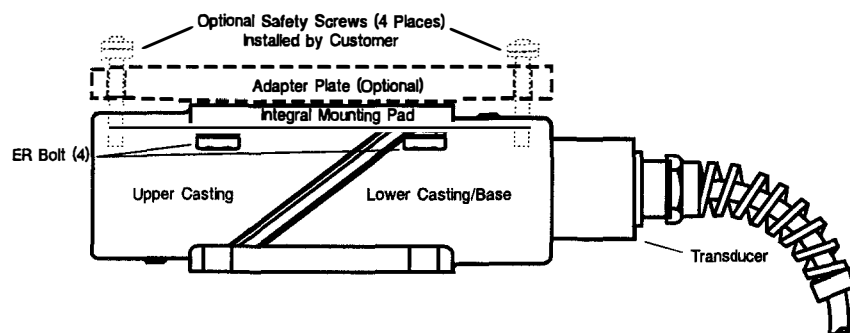


Figure 2-1. The HTZ-3 Web Tension Module

2.2 MECHANICAL INSTALLATION

HTZ-3 installation instructions refer to specific parts of the HTZ-3 module. Use the HTZ-3 module diagram (Figure 2-1) to identify parts and part locations.

Step by Step Installation Instructions

- (1) **Positioning:** HTZ-3 Web Tension Measurement Modules should be oriented so that resultant tension forces are applied toward the base or mounting pad of the module as shown in Figure 2-2.

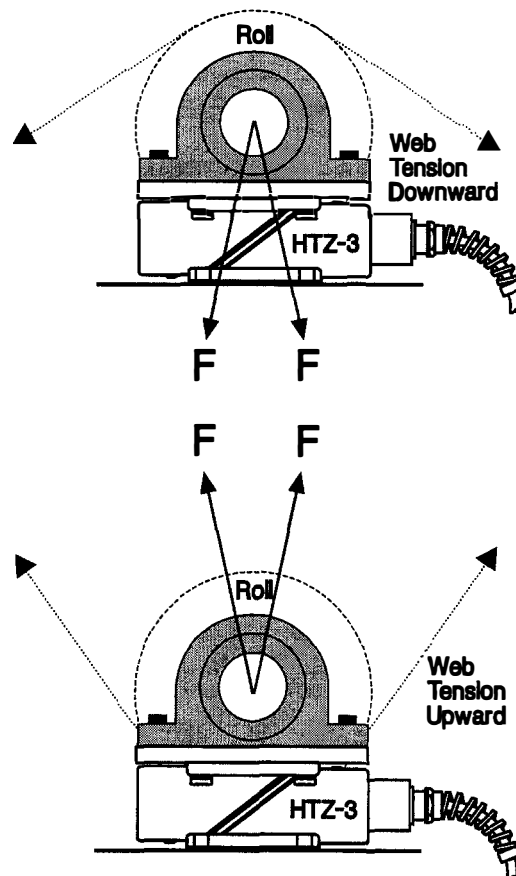


Figure 2-2. HTZ-3 Force Direction

Note: Overload safety screws are required for applications measuring force in the upward direction

(2) **Base Mounting Surface Preparation:** The base of the tension module must be uniformly supported and level. BLH recommends a machined finish on the foundation mounting surface. For a structural steel surface using through bolts, the bolt spacing should be accurate to within 0.05 in. of the bolt pattern specified in the outline drawing dimensions. Grade 5 (english) or grade 8.8 (metric) studs or bolts must be used. Do not weld the modules in place.

(3) **Adapter Plate Preparation:** Each optional HTZ-3 adapter plate is designed to customer supplied specifications. Pre-drilled holes in the plate are tapped according to customer bolt specifications. Torque specifications must be obtained from the bolt manufacturer. 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. Do not weld the adapter plate to the pillow block bearing.

(4) **Mechanical Installation** (Figure 2-3): Raise the pillow block/roll assembly and install the tension module in place on the HTZ-3 mounting surface (foundation). Before bolting down, be sure that the HTZ-3 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 modules. 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 HTZ-3 is not designed to sustain significant forces axial to the roll (transverse to the load beam). Therefore, one end of the roll must be supported with a pillow block that permits the shaft some amount of 'swing' (Figure 2-4).

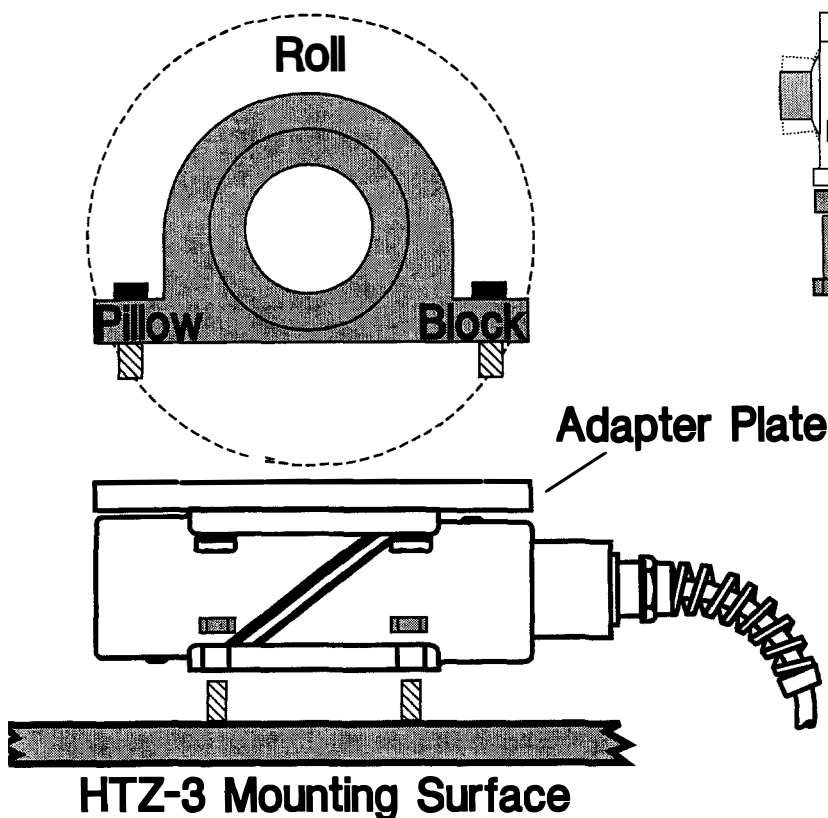


Figure 2-3. HTZ-3 Installation Arrangements

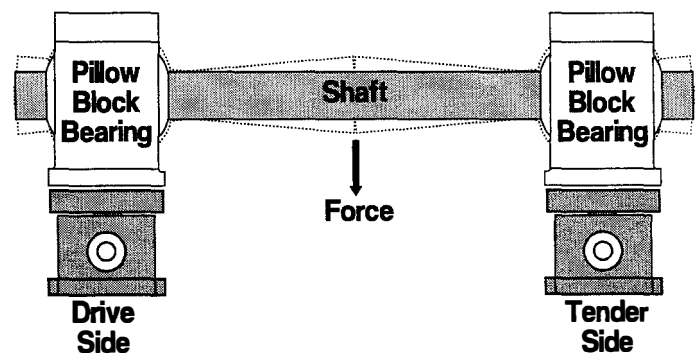


Figure 2-4. Transverse Force Allowance

2.3 ELECTRICAL CONNECTIONS

The wiring color code is presented in Section 1.5 HTZ-3 Web Tension Measurement Module Dimensions. HTZ-3 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 (typically supplied in manual) for specific interconnection locations.

Basic Tension System

Analog summing of both ends of roll

3 1/2 digit display of total tension

4-20 mA & 0-10 volt analog output to tension controller

RS-485 serial output to computer

Network Tension System

Continuous display of left, right, or total tension

Keypad calibration eliminates need for on-site test weights

Individually digitized transducer data

Continuous 'Expert' system diagnostics

Dynamic Digital Filter

750,000 count resolution per channel; 20 updates per second

2.4 SYSTEM CONFIGURATIONS

Figure 2-5 presents two typical HTZ-3 based system configurations. HTZ-3 system complexity ranges from simple stand-alone readouts to full network and PLC/DCS interface capability.

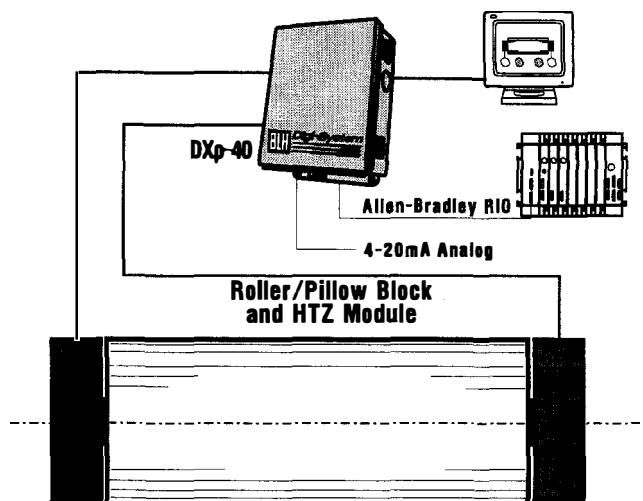
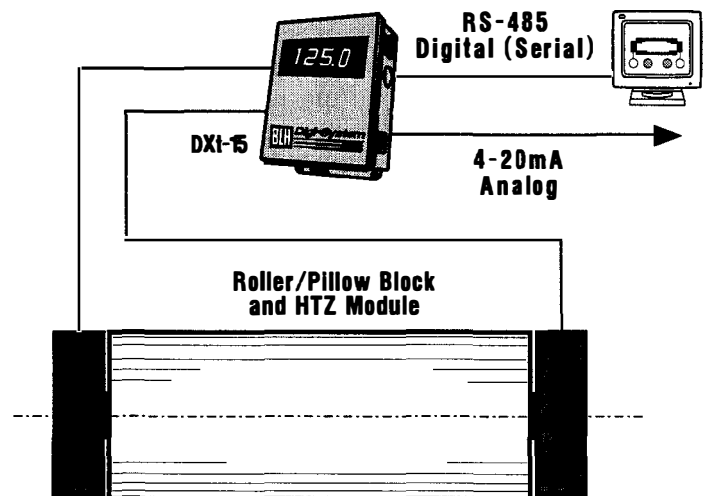


Figure 2-5. Typical Tension Measurement Systems

SECTION III – Operation

3.1 TEMPERATURE CONSIDERATIONS

HTZ modules perform best when operated within their compensated temperature range of + 30 to + 130 de-grees fahrenheit. Maximum operating temperature range without damage is -40 to + 220 degrees fahrenheit.

Should ambient temperatures at the HTZ 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

HTZ modules are sealed to meet NEMA 4 and IP65 requirements. Type 4 enclosures are intended for in-door or outdoor use to provide a degree of protection against windblown dust and rain, and hose directed water.

3.3 LOAD CONSIDERATIONS

HTZ modules can be periodically loaded up to 150% of rated load without adverse effects.

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 100% of rated capacity to preclude premature fatigue failure of the module.

SECTION IV - Maintenance

4.1 CALIBRATION

HTZ 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 HTZ 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 HTZ 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 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 HTZ 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.
 - i. 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.

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