

## INSTRUCTION MANUAL . . . TYPE CLT



### 1.0 GENERAL INFORMATION

#### 1.1 RECEIVING AND UNPACKING

Handle and unpack the equipment carefully. Immediately upon arrival, check the shipment against the packing list. Any damage should be reported immediately to the carrier and to the nearest CMC® representative.

Equipment which will not be installed immediately should be stored in a clean, dry location. Precautions should be taken to prevent moisture, dust and dirt from accumulating in storage and installation area.

#### 1.2 PRECAUTIONS

1.2.1 Shipping - It is recommended that the sensing roll be removed when the machine is shipped with the transducers mounted. The shock and vibration transmitted to the transducers by the sensing roll during transporting can damage them.

1.2.2 Handling - An impact such as dropping the transducer or a sharp blow to the transducer can damage it. The unit should be completely surrounded by a soft foam cushion when being transported.

1.2.3 Overloading - Repetitive overloading above the maximum working force, shock or severe overloading should be avoided because they can damage the unit.

1.2.4 Overvoltage - The excitation voltage should not exceed 10 VDC or AC (RMS). Excessive voltage can destroy the semiconductor strain gages.

The voltage between the gage and beam or base (ground) should not exceed a peak of 50 volts. Exceeding this voltage can cause an insulation breakdown between the gage and the beam.

### 1.3 SPECIFICATIONS

Gage Resistance - 220 ohms per leg nominal  
Gage Factor - 100 nominal  
Excitation Voltage - 5.6 VDC or VAC (RMS) nominal. ***Not*** to exceed 10 VDC or VAC (RMS)

Output Signal at Rated MWF - 20mV/V, 30mV/V (Alum, Steel)

Output Impedance - Size 1 Steel, Size 2 Steel  
- Approximately 850 ohms at 25EC

- Size 1 Aluminum  
- Approximately 120 ohms at 25EC

Required Input Impedance of Tension Amplifier - 5000 ohms

Insulation Breakdown Voltage Gage to Beam - 50 volts peak

Operating Temperature - 0°F to +150°F

## 1.4 DESCRIPTION

The Cantilever transducers were designed to measure tension in webs having widths of up to 30 inches. Sensing beams to which semiconductor strain gages are bonded form a half bridge circuit. With these high signal output gages a very small force on the roller is shown as a change in the tension output signal.

The cantilever transducer cartridge is not fitted with a sensing roll as standard. Provision is made to mount a sensing roll in the end of the cartridge. Several shaft diameters can be selected by choosing an appropriate adapter. The transducer is nearly insensitive to the location of the net web force along the length of the roll.

The Cantilever tension transducers\* are available in two sizes, 1 and 2 in four different mounting configurations, S, FL, PB, and BR. There are also "Metric" and "English" versions of each size. (\*U.S. patent # 4326424. Foreign patents upon request.)

The different configurations are made by adding mounting hardware modules to the transducer cartridges. In each of the sizes, the transducer cartridges are available with the connector mounted either on the side or the end.

The CLTSC-1T and CLTSC-2T cartridges have the connector located on the side. These cartridges can be mounted to the machine frame with a single bolt which goes through the machine frame for the type "S" mounting.

The flange mounting kit can be clamped onto the groove near the edge at the end of the type CLTSC-1T and CLTSC-2T cartridge. The cartridge can then be mounted to the machine frame by the flange with four mounting bolts for the type "FL" mounting.

The type CLTEC-1T and CLTEC-2T cartridges have the connector located on the end. The cartridge can be converted to a pillow block type transducer by adding the pillow block (PB) mounting kit. The cartridge is inserted into the pillow block base and then the lockplate is bolted to the end of the cartridge. The transducer is mounted to the machine frame with two bolts through the pillow block base for the type "PB" mounting.

The type CLTEC-1T and CLTEC-2T cartridges can also be mounted through the machine frame by using the type BR mounting kit. The cartridge is inserted through a hole in the machine frame and then the lockplate is bolted to the end of the cartridge for the type "BR" mounting.

## 2.0 INSTALLATION

### 2.1 SELECTION OF TRANSDUCER MOUNTING LOCATION

When selecting a transducer mounting location, keep in mind that the tension sensing roll must **NOT** be mounted where the web wrap can vary. Any change in wrap angle will be sensed by the transducers as a change in tension, and indicated as such on the indicator.

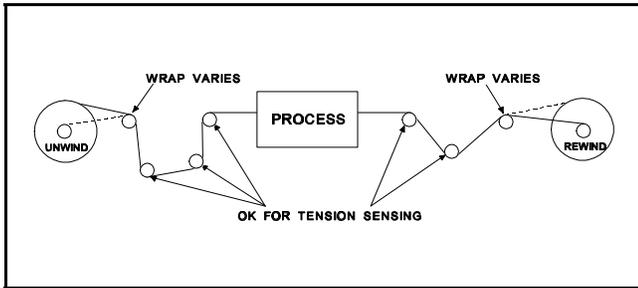


Figure 2

In some cases it may be impossible to find a location for the transducer when the wrap angle does not vary. The change in indicated tension which will result can be calculated, and if small may not be significant.

### 2.2 GENERAL INSTALLATION INFORMATION

Orient the base of the transducer so that the force applied by the web will be in line with the load line label and that the resulting force caused by the web will be opposite the load line as shown in Figure 3

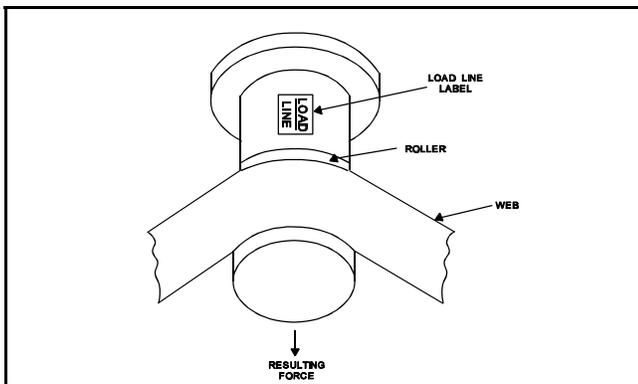
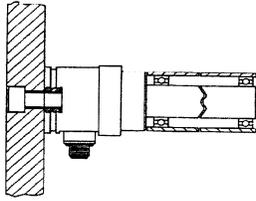
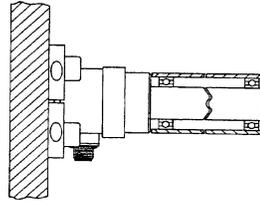


Figure 3

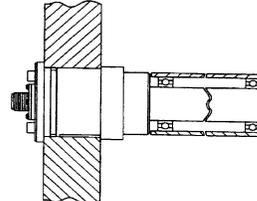
## 2.3 METHODS OF INSTALLATION - "ENGLISH" DIMENSION TRANSDUCERS



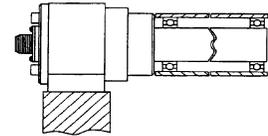
**Type "S"**  
Stud Mounted



**Type "FL"**  
Flange Mounted



**Type "BR"**  
Bearing Replacement

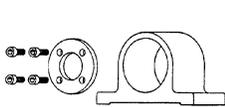


**Type "PB"**  
Pillow Block

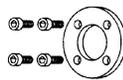
## 2.4 CLT CONFIGURATION GUIDE

These diagrams illustrate the various configurations provided by the CLT modular design.

Note: Cantilevered Transducers CLT are designed for use with cantilevered rolls only. See operating parameters.



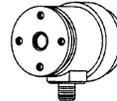
**Type PB Mounting Kit**  
PB Size 1 (MO-04494)  
PB Size 2 (MO-04499)



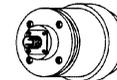
**Type BR Mounting Kit**  
BR Size 1 (MO-04495)  
BR Size 2 (MO-04500)



**Type FL Mounting Kit**  
FL Size 1 (MO-04493)  
FL Size 2 (MO-04498)



**Transducer Cartridge  
(Side Connector)**  
CLTSC-1T (ALUM-MO-12131-XY)  
CLTSC-1T (STEEL-MO-12133-XY)  
CLTSC-2T (STEEL-MO-12135-XY)



**Transducer Cartridge  
(End Connector)**  
CLTEC-1T (ALUM-MO-12132-XY)  
CLTEC-1T (STEEL-MO-12134-XY)  
CLTEC-2T (STEEL-MO-12136-XY)

Cartridges		MWF (lbs.)			
Type	1T ALUM	0.1	1	5	10
CLTSC	MO-12131	00	10	20	30
CLTEC	MO-12132	00	10	20	30
Type	1T STEEL	25	50	100	
CLTSC	MO-12133	00	10	20	
CLTEC	MO-12134	00	10	20	
Type	2T STEEL	100	250	500	
CLTSC	MO-12135	00	10	20	
CLTEC	MO-12136	00	10	20	

Shaft Adapters		Finished Bore Size						
Type	NO.	1/2"	5/8"	3/4"	1"	1.125"	1.25"	1.5"
1T ALUM	MO-12143	0	1	2	3	4	5	
1T STEEL	MO-12144	0	1	2	3	4	5	
2T STEEL	MO-12145			0	1	2	3	4

### Mounting Kits

Type	Size 1	Size 2
FL	MO-04493	MO-04498
BR	MO-04495	MO-04500
PB	MO-04494	MO-04499

### SELECTION PROCESS:

1. Select the Maximum Working Force (MWF) rating based upon your calculations from the equation on page 4.
2. Select the Transducer Cartridge type and size (SC refers to Side Connector, EC refers to End Connector).
3. Select the appropriate Shaft Adapter.
4. Select Kit for Type FL, BR, and PB installation.

## 2.5 TRANSDUCER RATINGS

## 2.6 SELECTING A CANTILEVERED TRANSDUCER CLT FOR YOUR APPLICATION:

1. Determine the MWF using the following equation:

$$\text{MWF} = 2T \times K \times \sin(A/2) \pm W \times \sin(B)^*$$

MWF = Maximum Working Force (lbs.)

T= Maximum Total Tension (lbs.)

K= Transient Tension Overload Factor (normally between 1.4 and 2)

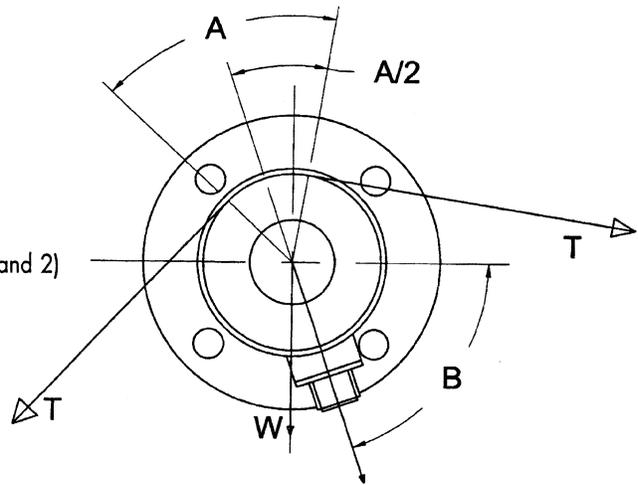
A= Wrap Angle

B= Angle of Tension Force

W= Weight of Cantilevered Roller

\*Use + if Angle B is below horizontal and - if above.

Do not use W for 0.1 or 1 lb. ratings.



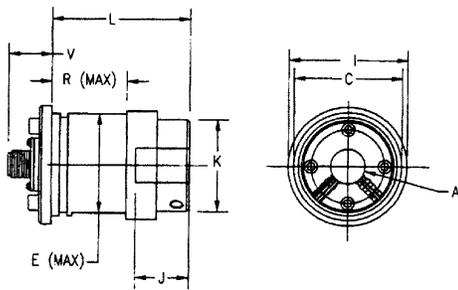
2. Determine the required web width.
3. Contact CMC application engineering to assist you in designing your roller and for selecting the appropriate transducer.

### Maximum Roll Width Examples for a given shaft diameter providing 0.01 inches or less of angular deflection:

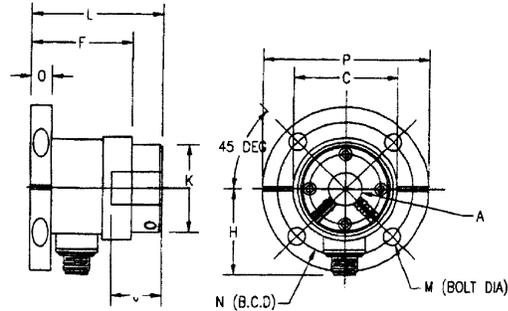
Transducer MWF (lb.)	Shaft Diameter (in.)	Recommended Maximum Limits		
		Roll Weight (lb.)	Roll Width (in.)*	Critical Speed (RPM)
0.1 (without W)	0.625	1.0	17	1800
1 (without W)	0.625	1.0	17	2000
5	1	5	23	2400
10	1.125	10	20	3500
25	1.25	15	19	3000
50	2	30	18	3200
100	2	40	14	3500
100	2	50	18	5000
250	2	60	11	5000
500	2	100	8	5000

\*Using the full load rating of the transducer. Longer roll or smaller deflection can be achieved.

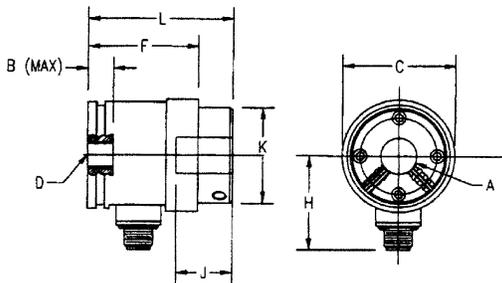
## 2.7 DIMENSIONAL DATA



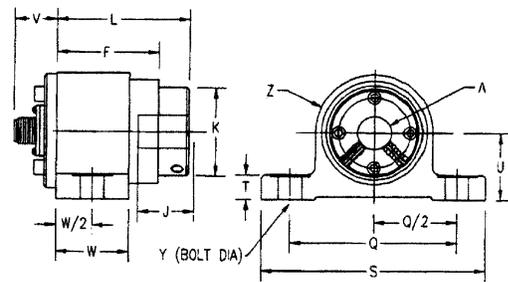
**Type CLTEC Cartridge  
with BR Mounting Kit**



**Type CLTSC Cartridge  
with FL Mounting Kit**



**Type CTSC Cartridge**



**Type CLTEC Cartridge  
with Pillow Block Mounting Kit**

Dimensions are in Inches, Allow 2.5 in Clearance for Connector

Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1T	-	0.55	2.50	1/2	2.375	2.44	-	2.10	2.75	1.10	2.125	3.10	3/8	3.25	0.50	4.00	4.00	1.74	5.38	0.58	1.63	1.02	1.75	-	1/2	1.50
2T	-	0.60	2.75	5/8	2.625	2.85	-	2.23	3.00	1.30	2.312	3.665	1/2	3.50	0.62	4.50	5.00	1.87	6.12	0.68	1.94	1.02	1.88	-	1/2	1.70

**Bore Diameters Available  
for Shaft Mounting (Refer  
To Shaft Adapters from the  
"How To Order" Section)**

<b>1T</b>	1/2	3/8	3/4	1	1.125	1.25
<b>2T</b>	3/4	1	1.125	1.25	1.5	-

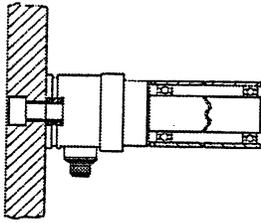
\*For demanding applications (large tensions and web widths)  
we recommend using a larger roller shaft and machining the end  
to fit one of the available fixtures.

Description	Weight (lb. Each)		
	Size		
	1T ALUM	1T STL	2T STL
Transducer Cartridge	1.7	2.5	3.6
With Type FL Mounting Kit	2.6	3.4	5.2
With Type BR Mounting Kit	2.0	2.8	4.1
With Type PB Mounting Kit	4.4	5.2	7.7

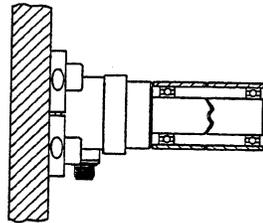
### CLT Transducer Specification Data

Gage Resistance	Each transducer contains half a bridge having a nominal resistance of 220 ohms per LEG
Gage Factor	100 nominal
Excitation Voltage	10 VDC or VAC (rms) maximum
Output Signal @ Rated MWF	40 to 450 mV nominal
Operating Temperature Range	0 degrees to 200 degrees F (Consult factory if operating temperature is greater than 150 degrees)
Sensitivity Change with Temperature	Less than 0.02% of rated output typical
Humidity	95% R.H.
Combined Non-linearity and Hysteresis	±0.5% maximum of rated output
Repeatability	±0.2% maximum of rated output
Non-destructive Overload Rating	150% of maximum working force (MWF)
Ultimate Overload Rating	300% of MWF typical 500% of MWF for ratings ≤ 25lbs.
"MS" Connectors	MS-3102A-10SL-3P (3 Pin Connector)
Input Impedance required: (Transducer Signal Amplifier if not CMC supplied)	5K ohms per transducer
Output Impedance	• 880 ohms (nominal) for MWF ratings ≥ 25 lbs. • 120 ohms (nominal) for MWF ratings ≤ 10 lbs.

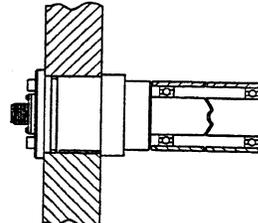
## 2.8 METHODS OF INSTALLATION - "METRIC" DIMENSION TRANSDUCERS



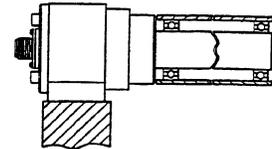
**Type "S"**  
Stud Mounted



**Type "FL"**  
Flange Mounted



**Type "BR"**  
Bearing Replacement



**Type "PB"**  
Pillow Block

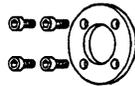
## 2.9 CLT CONFIGURATION GUIDE

These diagrams illustrate the various configurations provided by the CLT modular design.

Note: Cantilevered Transducers CLT are designed for use with cantilevered rolls only. See operating parameters.



**Type PB Mounting Kit**  
PB Size 1 (MO-04494)  
PB Size 2 (MO-04499)



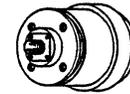
**Type BR Mounting Kit**  
BR Size 1 (MO-04495)  
BR Size 2 (MO-04500)



**Type FL Mounting Kit**  
FL Size 1 (MO-04493)  
FL Size 2 (MO-04498)



**Transducer Cartridge  
(Side Connector)**  
CLTSC-1T (ALUM-MO-12137-XY)  
CLTSC-1T (STEEL-MO-12139-XY)  
CLTSC-2T (STEEL-MO-12141-XY)



**Transducer Cartridge  
(End Connector)**  
CLTEC-1T (ALUM-MO-12138-XY)  
CLTEC-1T (STEEL-MO-12140-XY)  
CLTEC-2T (STEEL-MO-12142-XY)

## 2.10 TRANSDUCER RATINGS

Cartridges		MWF (N)			
Type	1T ALUM	0.5	5	20	45
CLTSC	MO-12137	00	10	20	30
CLTEC	MO-12138	00	10	20	30
Type	1T STEEL	100	200	450	
CLTSC	MO-12139	00	10	20	
CLTEC	MO-12140	00	10	20	
Type	2T STEEL	450	1000	2000	
CLTSC	MO-12141	00	10	20	
CLTEC	MO-12142	00	10	20	

Shaft Adapters		Finished Bore Size (mm)				
Type	NO.	17	20	25	30	35
1T ALUM	MO-12146	0	1	2	3	
1T STEEL	MO-12147	0	1	2	3	
2T STEEL	MO-12148			1	2	3

### Mounting Kits

Type	Size 1	Size 2
FL	MO-04493	MO-04498
BR	MO-04495	MO-04500
PB	MO-04494	MO-04499

### SELECTION PROCESS:

1. Select the Maximum Working Force (MWF) rating based upon your calculations from the equation on page 7.
2. Select the Transducer Cartridge type and size [SC refers to Side Connector, EC refers to End Connector].
3. Select the appropriate Shaft Adapter.
4. Select Kit for Type FL, BR, and PB installation.

## 2.11 SELECTING A CANTILEVERED TRANSDUCER CLT FOR YOUR APPLICATION

1. Determine the MWF using the following equation:

$$MWF = 2T \times K \times \sin(A/2) \pm W \times \sin(B)^*$$

MWF = Maximum Working Force (N)

T= Maximum Total Tension (N)

K= Transient Tension Overload Factor (normally between 1.4 and 2)

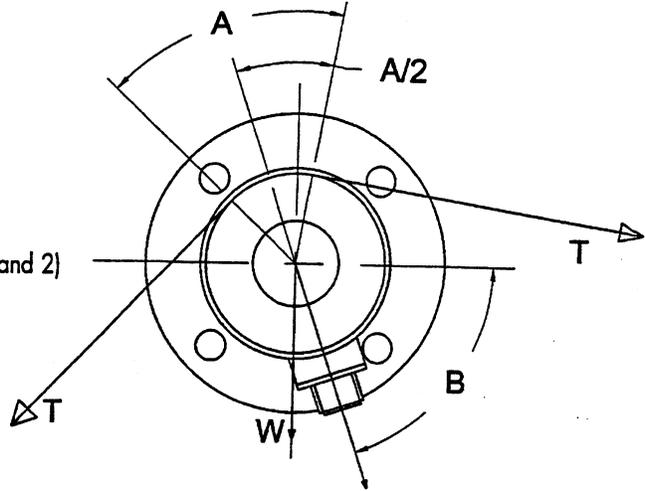
A= Wrap Angle

B= Angle of Tension Force

W= Weight of Cantilevered Roller (N)

\*Use + if Angle B is below horizontal and - if above.

Do not use W for 0.5 N or 5 N ratings.



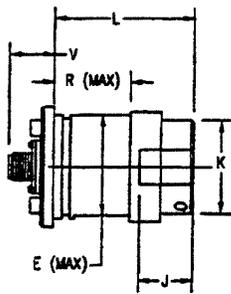
2. Determine the required web width.
3. Contact CMC application engineering to assist you in designing your roller and for selecting the appropriate transducer.

Maximum Roll Width Examples for a given shaft diameter providing 0.25 mm or less of angular deflection:

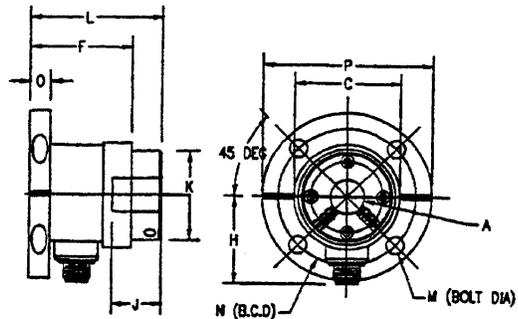
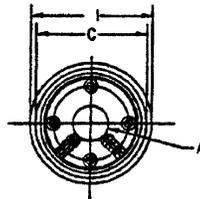
Transducer MWF (N)	Shaft Diameter (mm)	Recommended Maximum Limits		
		Roll Weight (N)	Roll Width (mm)*	Critical Speed (RPM)
0.5 (without W)	170	5	500	1800
5 (without W)	170	5	500	2000
20	25	20	560	2400
45	30	45	520	3500
100	30	65	405	3000
200	35	130	360	3200
450	50	180	360	3500
450	50	225	460	5000
1000	50	270	280	5000
2000	50	450	200	5000

\*Using the full load rating of the transducer. Longer roll or smaller deflection can be achieved.

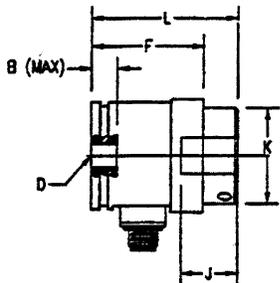
## 2.12 DIMENSIONAL DATA



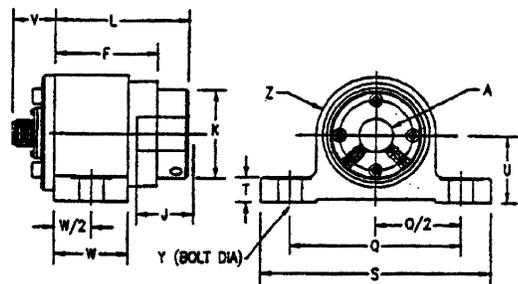
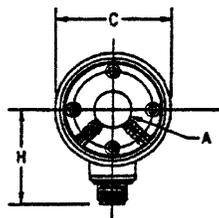
**Type CLTEC Cartridge  
with BR Mounting Kit**



**Type CLTSC Cartridge  
with FL Mounting Kit**



**Type CTSC Cartridge**



**Type CLTEC Cartridge  
with Pillow Block Mounting Kit**

Dimensions are in millimeters, Allow 64 mm Clearance for Connector

Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1T	-	14.0	63.5	12	60.3	62.0	-	53.3	69.5	27.9	54.0	78.7	9.5	82.6	12.7	101.6	101.6	44.2	136.6	14.7	41.4	25.9	44.5	-	12.7	38.1
2T	-	15.2	69.9	16	66.7	72.4	-	56.6	76.2	33.0	58.7	93.1	12.7	89.0	15.7	114.3	127.0	47.5	155.4	17.3	49.3	25.9	47.8	-	12.7	43.2

Bore Diameters Available  
For Shaft Mounting (Refer  
To Shaft Adapters from the  
"How To Order" Section)

	1T	17	20	25	30
2T	20	25	30	35	

\*For demanding applications (large tensions and web widths)  
we recommend using a larger roller shaft and machining the end  
to fit one of the available features.

Weight (Kg Each)			
Description	Size		
	1T ALUM	1T STL	2T STL
Transducer Cartridge	0.8	1.1	1.6
With Type FL Mounting Kit	1.2	1.5	2.4
With Type BR Mounting Kit	0.9	1.3	1.9
With Type PB Mounting Kit	2.0	2.4	3.5

### CLT Transducer Specification Data

Gage Resistance	Each transducer contains half a bridge having a nominal resistance of 220 ohms per LEG
Gage Factor	100 nominal
Excitation Voltage	10 VDC or VAC (rms) maximum
Output Signal @ Rated MWF	40 to 450 mV nominal
Operating Temperature Range	15 degrees to 100 degrees C (Consult factory if operating temperature is greater than 70 degrees C)
Sensitivity Change with Temperature	Less than 0.02% of rated output typical
Humidity	95% R.H.
Combined Non-linearity and Hysteresis	±0.5% maximum of rated output
Repeatability	±0.2% maximum of rated output
Non-destructive Overload Rating	150% of maximum working force (MWF)
Ultimate Overload Rating	300% of MWF typical 500% of MWF for ratings ≤ 100 N
"MS" Connectors	MS-3102A-10SL-3P (3 Pin Connector)
Input Impedance required: (Transducer Signal Amplifier if not CMC supplied)	5K ohms per transducer
Output Impedance	• 880 ohms (nominal) for MWF ratings ≥ 100 N • 120 ohms (nominal) for MWF ratings ≤ 45 N

### 3.0 ELECTRICAL CONNECTIONS

Refer the the installation wiring diagram supplied with the CLEVELAND-KIDDER tension indicator or controller for making the transducer connections. Make certain that the cable does not interfere with the web path and that it is away from gearing or other moving parts.

The following wiring diagrams are for reference only. Most of the CLEVELAND-KIDDER indicators and controllers will accept a half bridge input as shown in Figure 4 or in Figure 5. See the applicable installation wiring diagrams for the tension indicator or controller.

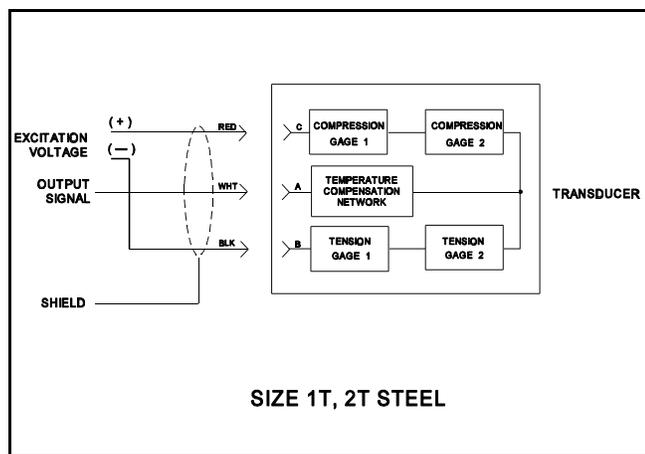


Figure 4

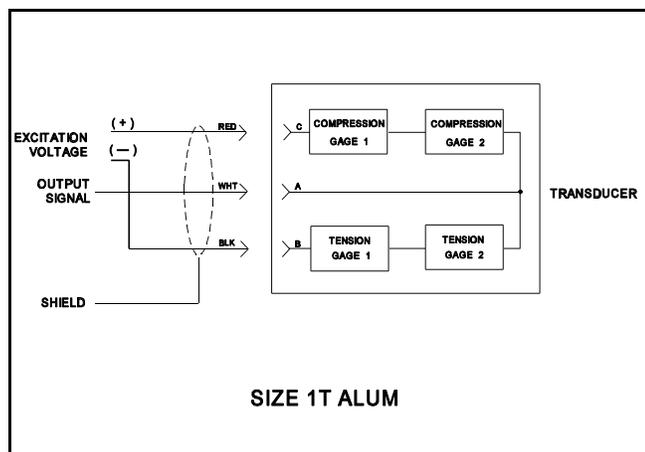


Figure 5

### 3.1 MATING CONNECTORS FOR TRANSDUCERS

USE	CMC P/N
Mating Straight Connector, Boot and Clamp Kit	MO-09854
Mating 90" Angle Connector, Boot and Clamp Kit	MO-09855

### 3.2 INTRINSICALLY SAFE TRANSDUCERS

These transducers are intrinsically safe only when they are part of a complete intrinsically safe system using the TIX-1 tension indicator or wired per CMC control drawings.

For transducers utilizing a 5.6 VDC ( $\pm 2.8$  VDC) excitation voltage refer to CMC Control Drawing A800-42273. For transducers utilizing a +5VDC excitation voltage refer to CMC Control Drawing A800-42281.

Barrier block assemblies and/or the individual barrier blocks may be purchased from CMC. Please contact CMC for part numbers and pricing.

### 4.0 TEMPERATURE COMPENSATION

The size 1T and 2T steel transducers are supplied with a temperature compensation network which is in series with the output signal lead. The compensation circuit is designed to be used with a tension amplifier which has an input impedance of 5K Ohms. If other than the input impedances given above are used, drift will occur in the tension amplifier output when the transducer temperature changes. Size 1T aluminum transducers use a beam material that does not require temperature compensation.

### 5.0 TROUBLESHOOTING

#### 5.1 LOW OUTPUT SIGNAL

The transducer may have too large a maximum working force for the application. Replace with a lower maximum working force transducer or increase the web wrap angle.

## 5.2 OUTPUT SIGNAL FAILS TO INCREASE WITH ADDED LOAD

The transducer is overloaded and is hitting the mechanical stop. Replace the transducer with one having a higher maximum working force or reduce the load. (This may be accomplished by reducing the web wrap angle.)

## 5.3 WRONG POLARITY OF OUTPUT SIGNAL

Transducer may have been incorrectly oriented. Make certain that the web force is being applied to the top side of the transducer which is identified by the load line label as shown in Figure 2 on page 3. If rotation is impossible, interchange the transducer leads as instructed in the tension indicator or controller manual.

## 5.4 NO OUTPUT SIGNAL

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

## 5.5 VERY HIGH OUTPUT WITH NO LOAD

Check cable and connector for good connections and check continuity of cable with an ohmmeter. Check for proper wiring to transducer. Check transducer gage resistance as given in the following chart at room temperature with no load applied.

### TRANSDUCER GAGE RESISTANCE CHECK

#### Size 1T, 2T Steel

<u>Measurement</u>	<u>Resistance</u>
Pin B to Pin C	440 ohms $\pm$ 72 ohms
Pin A to Pin B	700 to 1400 ohms
Pin A to Pin C	Equal to Pin A to Pin B $\pm$ 12 ohms

#### Size 1T (Aluminum)

<u>Measurement</u>	<u>Resistance</u>
Pin B to Pin C	440 ohms $\pm$ 72 ohms
Pin A to Pin B	220 ohms $\pm$ 36 ohms
Pin A to Pin C	Equal to Pin A

to Pin B  $\pm$ 12 ohms

## 6.0 SERVICE ASSISTANCE AND REPAIR

For additional service assistance, please obtain the Type, MWF, and Serial Number from the nameplate. Contact the Factory Service Department.

**Phone:** (216) 524-8800  
**Fax:** (216) 642-2100

Disassembly by improperly trained personnel may result in additional damage to these units. Should repairs be required or for warranty repairs, contact the Customer Service Department for a return authorization number before returning the unit.

## 7.0 WARRANTY AND LIMITATION OF LIABILITY

### CLEVELAND MOTION CONTROLS, INC.

#### LIMITED WARRANTY.

ALL GOODS ARE SOLD SUBJECT TO THE MUTUAL AGREEMENT THAT THEY ARE WARRANTED BY THE COMPANY TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR ONE YEAR FROM THE DATE OF SHIPMENT. THE COMPANY'S WARRANTY DOES NOT COVER, AND IT MAKES NO WARRANTY WITH RESPECT TO ANY DEFECT, FAILURE, DEFICIENCY OR ERROR WHICH IS:

- A) NOT REPORTED TO THE COMPANY WITHIN THE APPLICABLE WARRANTY PERIOD; OR
- B) DUE TO MISAPPLICATION, MODIFICATION, DISASSEMBLY, ABUSE, MISUSE, IMPROPER INSTALLATION, UNAUTHORIZED REPAIR, IMPROPER MAINTENANCE OR ABNORMAL CONDITIONS OF TEMPERATURE, DIRT OR CORROSIVE MATTER; OR
- C) DUE TO OPERATION, EITHER INTENTIONAL OR OTHERWISE, ABOVE RATED CAPACITIES OR IN AN OTHERWISE IMPROPER MANNER.

**THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES. THE PARTIES AGREE THAT THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARE EXCLUDED FROM THE SALE OF GOODS.**

#### LIMITATION OF REMEDY AND LIABILITY.

THE REMEDY PROVIDED HEREIN IS BUYER'S SOLE AND EXCLUSIVE REMEDY. **THE BUYER'S REMEDY AND THE COMPANY'S LIABILITY (WHETHER UNDER THE THEORIES OF BREACH OF WARRANTY, CONTRACT, TORT INCLUDING NEGLIGENCE OR STRICT LIABILITY OR ANY OTHER LEGAL THEORY) SHALL BE LIMITED EXCLUSIVELY AT THE COMPANY'S OPTION TO REPLACING OR REPAIRING WITHOUT CHARGE AT THE COMPANY'S FACTORY OR ELSEWHERE ANY MATERIAL OR WORKMANSHIP DEFECTS WHICH BECOME APPARENT WITHIN ONE YEAR FROM THE DATE ON WHICH THE GOODS WERE SHIPPED.** THE COMPANY SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF USE, INCOME OR PROFIT, OR LOSSES SUSTAINED AS A RESULT OF INJURY (INCLUDING DEATH) TO ANY PERSON OR DAMAGES TO PROPERTY. THE COMPANY SHALL HAVE NO LIABILITY FOR DAMAGES OF ANY KIND ARISING FROM THE INSTALLATION AND/OR USE OF THE GOODS BY ANYONE. BY THE ACCEPTANCE OF THE GOODS, THE BUYER SHALL ASSUME ALL LIABILITY FOR ANY DAMAGES WHICH MAY RESULT FROM USE OR MISUSE BY THE BUYER, ITS EMPLOYEES OR BY OTHERS.



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