INSTRUCTION MANUAL FOR CLEVELAND-KIDDER STATIONARY SHAFT TRANSDUCERS

MODELS: EC, ECM, SC, SCM & SC-EP

A800-7438

Cleveland Motion Controls
An IMC Company

REVISION
GA

REVISION HISTORY

Rev	ECO	Author	Date	Description of Change
GA	CLE2565	DJM/CAD	07/22/03	Updated for EP, converted to MSWord

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B) DUE TO MISAPPLICATION, MODIFICATION, DISASSEMBLY, ABUSE, MISUSE, IMPROPER INSTALLATION, UNAUTHORIZED REPAIR, IMPROPER MAINTENANCE OR ABNORMAL CONDITIONS OF TEMPERATURE, DIRT OR CORROSIVE MATTER; OR

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1 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 areas

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 ROLL BALANCE

The sensing roll must be dynamically balanced when the roll speed is 300 RPM or greater. The sensing roll must not be driven or have any force applied to it other than by the web. Excessive vibrations can damage the transducers.

1.2.3 CRITICAL ROLL SPEED

Even with a balanced roll, a vibration can be set up in a stationary shaft. If this vibration (in cycles per minute) occurs at the harmonic frequency of the shaft, the transducers can be damaged. To determine the critical roll speed, use the following formula: (all dimensions are in inches)

$$\text{Critical roll speed in RPM} = \frac{4.8 \times 106 \times \text{Shaft O.D.}}{(\text{Shaft Length})^2}$$

To assure that this problem is avoided, the critical roll speed should at least be 20% above the roll speed attained at maximum web speed.

1.2.4 OVERLOADING

Repetitive overloading above the maximum working force or severe overloading should be avoided because it will damage the transducers.

1.3 SPECIFICATIONS

Gage Resistance	-120 ohms per leg 240 ohms, EP versions
Gage Factor	-100 nominal
Excitation Voltage	-5.6 VDC or VRMS max for non-EP versions, 10 VDC or VRMS max for EP versions
Output Signal at Rated MWF	-250 mV nominal per Transducer (1/2 bridge) 500 mV nominal per Transducer (EP versions) 500 mV nominal per Transducer pair (full bridge)
Output Impedance	-Approximately 850 ohms (910 ohms, EP versions) per Transducer (1/2 bridge) or 1700 ohms (1820 ohms, EP versions) per pair (full bridge) at 25°C
Required Input Impedance of Tension Amplifier	-5K ohms per Transducer (1/2 bridge) 10K ohms per pair (full bridge)
Maximum Voltage, Gage to Beam or Base (Ground)	-50 VDC
Operating Temperature Range	-0°F to +200°F

1.4 DESCRIPTION

The Cleveland-Kidder Tensi-Master tension transducers* for stationary shafts are available in three sizes, 1, 2 and 3 and in four different mounting configurations, S, FL, PB, and BR. (*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. For dimensions of the transducer with the mounting kits installed, see Figure 2.

The SC-1T, SC-2T, SC-3T, SCM-1T and SCM-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, as shown in Figure 1.

The flange mounting kit can be clamped onto the groove near the edge at the end of the type SC-1T, SC-2T, SC-3T, SCM-1T and SCM-2T cartridge. The cartridge can then be mounted to the machine frame by the flange with four mounting bolts for the type "FL" mounting, as shown in Figure 1.

The type EC-1T, EC-2T, EC-3T, ECM-1T and ECM-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, as shown in Figure 1.

The type EC-1T, EC-2T, EC-3T, ECM-1T and ECM-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, as shown in Figure 1.

For mounting dimensions see Figure 2.

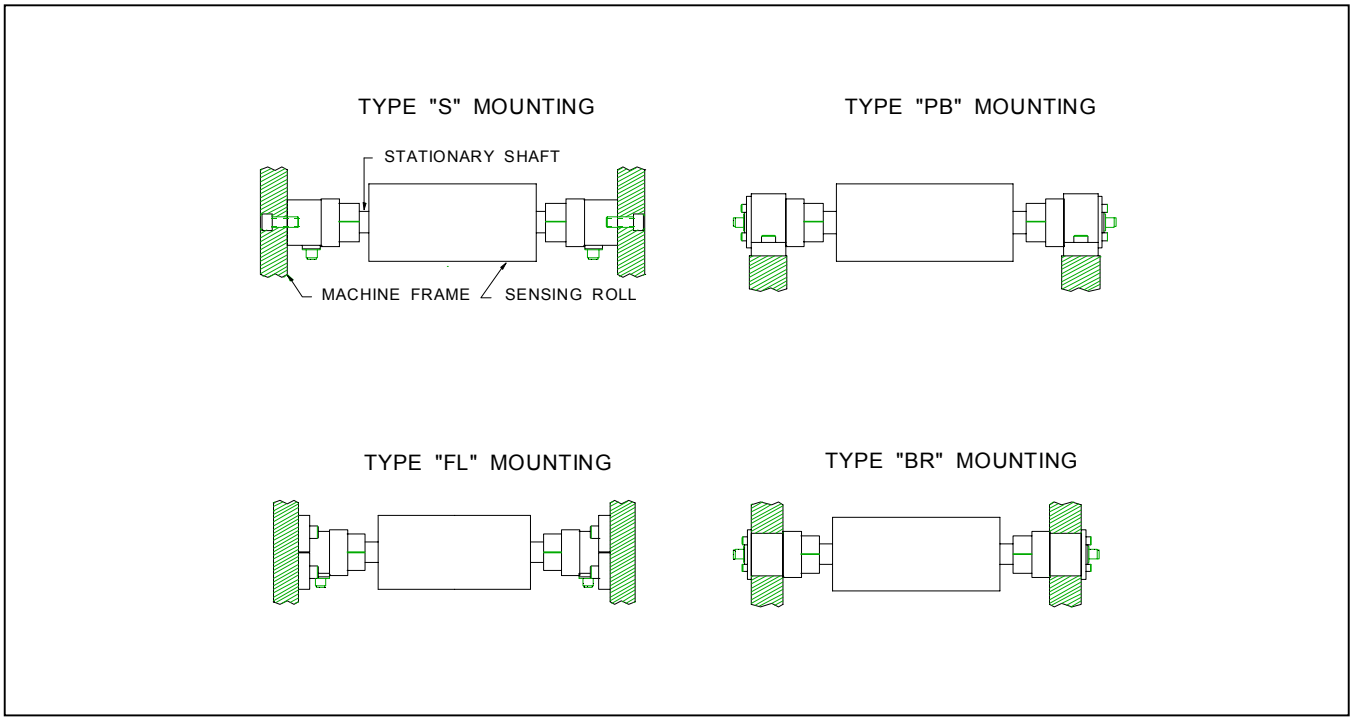
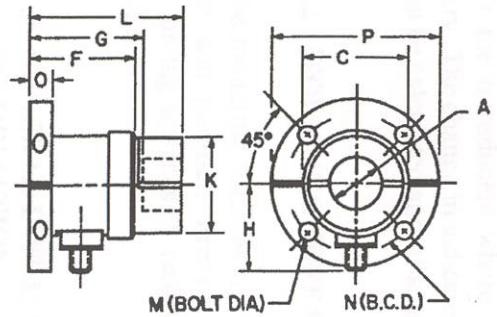
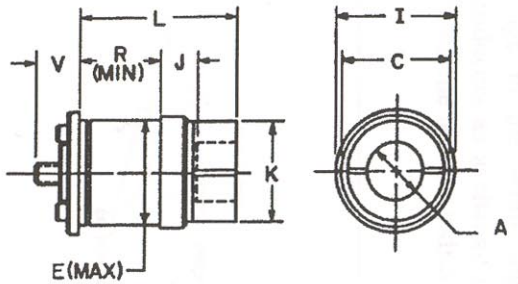


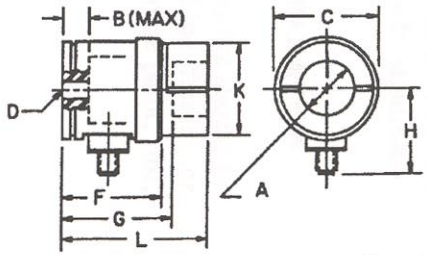
Figure 1



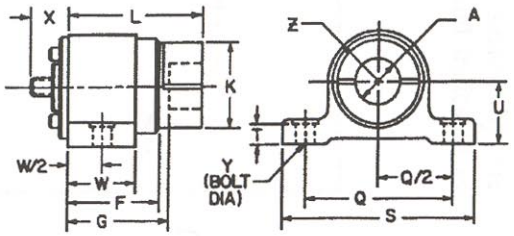
TYPE SC & SCM CARTRIDGE WITH FL MOUNTING KIT



TYPE EC & ECM CARTRIDGE WITH BR MOUNTING KIT



TYPE SC & SCM CARTRIDGE



TYPE EC & ECM CARTRIDGE WITH PILLOW BLOCK MOUNTING KIT

DIMENSIONS 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	1.250	0.55	2.50	1/2-13	2.375	2.44	2.60	2.10	2.75	0.87	2.25	3.63	3/8	3.25	0.50	4.00	4.00	1.74	5.38	0.58	1.63	1.02	1.75	1.02	1/2	1.50
2T	1.250	0.60	2.75	5/8-11	2.625	2.85	2.98	2.23	3.00	1.11	2.25	4.04	1/2	3.50	0.62	4.50	5.00	1.87	6.12	0.68	1.94	1.02	1.88	1.02	1/2	1.70
3T	1.938	0.60	2.75	5/8-11	2.625	2.85	3.48	2.23	3.00	1.61	2.95	4.54	1/2	3.50	0.62	4.50	5.00	1.87	6.12	0.68	1.94	1.02	1.88	1.02	1/2	1.70
DIMENSIONS IN MILLIMETERS ALLOW 64mm 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
M-1T	30.00	14.0	63.5	M12-1.75	60.32	62.0	66.0	53.3	69.9	22.1	57.2	92.2	M-10	82.55	12.7	101.6	101.6	44.2	136.7	14.7	41.3	25.9	44.5	25.9	M-12	38.1
M-2T	30.00	15.2	69.9	M16-2	66.67	72.4	75.7	56.6	76.2	28.2	57.2	102.6	M-12	88.90	15.9	114.3	127.0	47.5	155.4	17.3	49.2	25.9	47.6	25.9	M-12	43.2

OUTLINE DIMENSIONS

* INCHES
* MILLIMETER

Bushings are available for smaller shaft diameters.
Maximum shaft diameter 30.00 MM.

Figure 2

2 INSTALLATION

2.1 SELECTION OF MOUNTING LOCATION

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

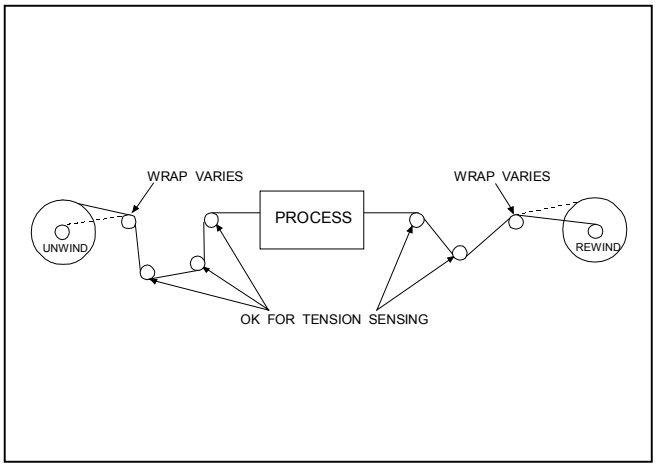


Figure 3

In some cases, it may be impossible to find a location for the transducers where 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 MOUNTING SURFACE PREPARATION

The mounting surfaces for the transducers should be flat and parallel. Prepare the machine frames or mounting surfaces by removing any loose paint, rust, scale, etc.

2.3 GENERAL INSTALLATION INFORMATION

The transducers must be mounted so that the applied web force is approximately perpendicular to the solid half of the shaft supporting socket. See Figure 4 and the instructions on page 8 for your particular transducer type and orientation.

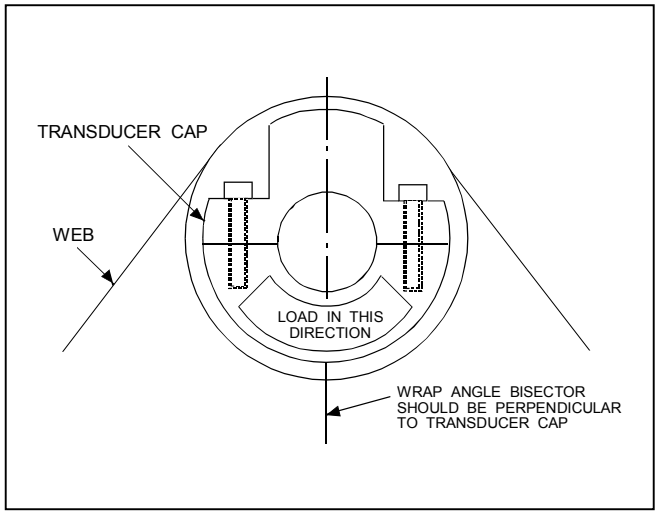


Figure 4

2.4 INSTALLATION PRECAUTIONS

To insure proper installation and operation of the system, the following steps should be performed in sequence. Failure to do so could seriously damage the transducers and void the warranty.

PRECAUTION:

Always install, orient and firmly bolt down the transducers BEFORE installing the tension sensing roll. When disassembling and installation, DO NOT remove the transducer an the tension sensing roll as an assembly - remove the roll first, before loosening the transducer mounting bolts.

DO NOT rotate transducers (for orientation) with the tension sensing roll installed. Damage may result.

2.5 TYPE S

Before tightening the mounting bolt, rotate the transducer until the cable connector is pointing in the direction of the web force. The cable connector should be the bisector of the web wrap angle.

The mounting bolts must not bottom out in the transducer. Measure to check that there is clearance between the mounting bolt and the bottom of the transducer mounting hole. The depth of the mounting hole for Type SC-1T is 0.55", for Type SC-2T and SC-3T is 0.60", for Type SCM-1T is 14 mm and for Type SCM-2T is 15 mm.

2.6 TYPE PB AND BR

After mounting, loosen - DO NOT REMOVE - the four socket head cap screws holding the lockplate on the back of the transducer. The transducer can now be rotated until the web force is perpendicular to the solid half of shaft socket. Firmly tighten cap screws.

2.7 TYPE FL

The mounting holes should be drilled so that the cable connector is in line with the resultant web force and will not interfere with the four transducer mounting bolts. The cable connector should bisect the web wrap angle. If present mounting holes are to be used, or if for some reason new holes cannot be drilled, the split flange can be rotated relative to the transducer body.

In order to rotate the split flange, remove the transducer from the machine frame. Loosen the two bolts clamping the split flange to the transducer body. Rotate the split flange to the desired position and then retighten the two clamping bolts. If the cable connector is not lined up with the web force, there will be some loss in sensitivity.

2.8 SENSING ROLL INSTALLATION

After positioning the transducers, SECURELY tighten the mounting bolts. Check to see that the transducers are parallel and in line. The transducers are designed to accommodate some frame to frame misalignment. Misalignments should be less than 1 degree.

Remove the transducer shaft caps by removing the (4) cap screws on each transducer.

Mount the tension sensing roll assembly in the transducers. Clearance between the end of the shaft and the transducer body should be from 1/16" to 1/64" (1.6mm to .4mm). If shaft bushings are required, use split bushings of the correct length, do not overhang the transducer I.D. and O.D. DO NOT use solid bushings. The lengthwise split in the bushing should be directly in line with the gap between the transducer cap and the transducer head. Securely fasten the transducer caps as shown in Figure 5.

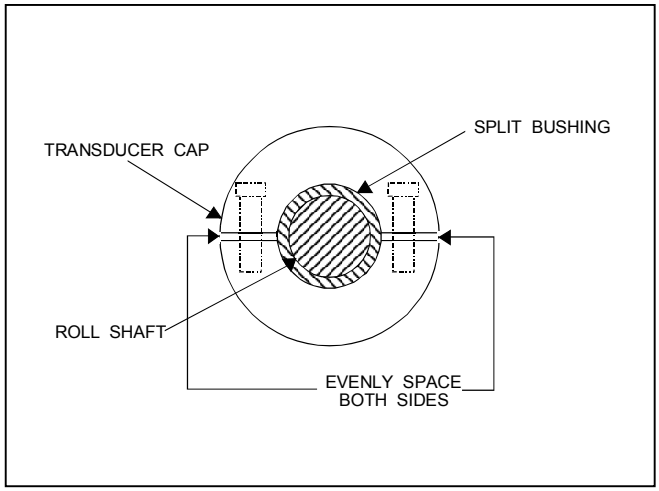


Figure 5

3 ELECTRICAL CONNECTIONS

Refer to the installation wiring diagrams supplied with the Cleveland-Kidder tension indicator or controller for making the transducer connections. Make certain that the cables do not interfere with the web path and that they are away from gearing or other moving parts.

Figure 6 is for reference only for use with a full bridge transducer configuration. Many of the Cleveland-Kidder indicators and controllers use only half bridge transducer inputs and then sum the two transducer signals internally. See the applicable installation wiring diagrams for the tension indicator or controller.

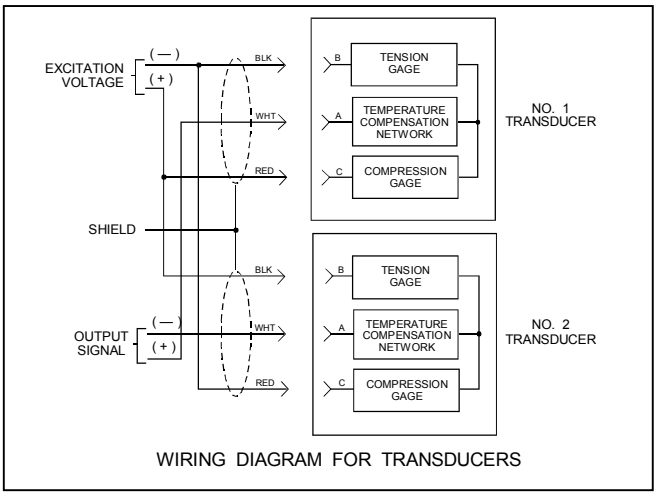


Figure 6

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 (±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 TEMPERATURE COMPENSATION

The 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 10K Ohms when a pair of transducers connected as a full bridge is used. If only one transducer is used, the tension amplifier impedance should be 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.

5 TROUBLESHOOTING

5.1 EXCESSIVE OUTPUT SIGNAL WITH NO LOAD

There may be a high degree of misalignment of the transducers causing a severe pre-load.

or

The sensing guide roll assembly may be excessively heavy. The sensing guide roll should not weigh more than ½ the maximum working force of the transducers in most cases.

5.2 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 web wrap angle.

5.3 OUTPUT SIGNAL FAILS TO INCREASE WITH ADDED LOAD

The transducers are overloaded and are hitting their stops. Replace the transducers with ones having a higher maximum working force or reduce the load. This may be accomplished by reducing the web wrap angle and/or using a lighter sensing roll.

5.4 WRONG POLARITY OF OUTPUT SIGNAL

Transducers may have been incorrectly oriented. Rotate them 180 degrees. If rotation is impossible, interchange the transducer leads as instructed in the tension indicator or controller manual.

5.5 OUTPUT SIGNAL NOT LINEAR, ZERO SHIFTS DURING OPERATION

Check transducer and tension roll mounting. All mounting bolts must be tight. Check that there is no dirt or foreign matter interfering with the transducer mounting.

5.6 NO OUTPUT SIGNAL

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

5.7 VERY HIGH OUTPUT WITH NO LOAD

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

TRANSDUCERS GAGE RESISTANCE CHECK

Measurement	Non-EP Resistance	EP Resistance
Pin C to Pin B	240 ohms ±36 ohms	480 ohms ±72 ohms
Pin A to Pin B	700 to 1100 ohms	800 to 1240 ohms
Pin A to Pin C	Equal to Pin A to Pin B ±5 ohms	Equal to Pin A to Pin B ±5 ohms

6 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) 642-2199

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 units.