Instruction Manual for Connecting Sensors on Pillow Block Bearings Temperature Monitor, Alarm System, Embedded Thermocouple and Transmitter, Vibration Accelerometer, and Proximity Switch

Bearing Temperature Monitor-Alarm System

A. Connection to a PLC:
   – Use an AC input card 120 VAC
   – Cards available from Allen Bradley for SLC 500 are 1746-IA4, 1746-IA8 and 1746-IA16

B. If no PLC is used, the DODGE Light and Buzzer Alarm Module can be used (DODGE Part No. 063524). Connections are shown below.

DANGER: The user is responsible for conforming with the National Electrical Code and all other applicable local codes. Wiring practices, grounding, disconnects and overcurrent protection are of particular importance. Failure to observe these precautions could result in severe bodily injury or loss of life.

I. Bearing Temperature Alarm Monitor System:

1. A complete installation, Pillow Block with temperature switch, conduit, and alarm is shown in Figure 1. Items supplied by DODGE are the Pillow Block with temperature switch and the alarm monitor. Conduit, wires, and liquid tight fittings are supplied by the user.
2. A DODGE Pillow Block with temperature switch mounts on the shaft exactly like a standard pillow block.

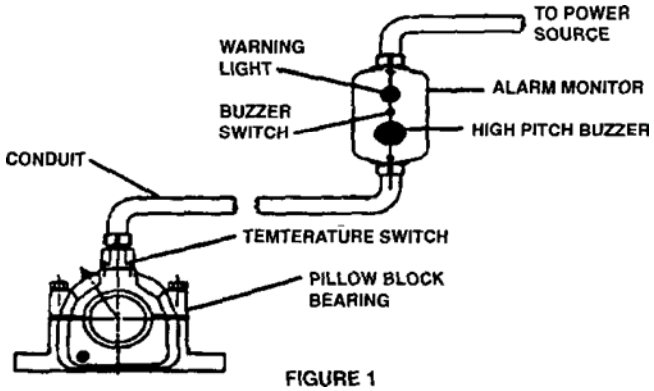


FIGURE 1

II. Alarm Monitor Installation:

1. Install the alarm monitor in a visible and close safe place using the four mounting holes on the back of the enclosure.
2. Remove the enclosure cover by removing the two screws on the front. (See Figure 2)
3. Install a conduit between the monitor and the bearing using $^1/_2$" liquid tight fittings.
4. Use 16 AWG wires installed in the conduit to connect the temperature switch to the alarm monitor.
5. Verify that AC power is disconnected and locked out or tagged at the power source. Bring AC power wires to the top of the alarm monitor and secure using $^1/_2$" liquid tight fitting.
6. At the bearing remove the temperature switch cover, connect the two leads of the temperature switch to the two wires installed in step 4 above using approved wire nut connectors and reinstall the cover.
7. Connect the end of one wire that is connected to the switch to one end of the fuse (6). Connect the second wire from the temperature switch to the joint (12).
8. Connect the black (hot) wire from the power source to the other end of the fuse (14). Connect the white (neutral) wire to lead (13). Connect the green (ground) wire to the ground screw (7) on the back of the monitor. Make sure the screw is tight and the wire is secure.
9. Replace the cover and secure with the two screws.

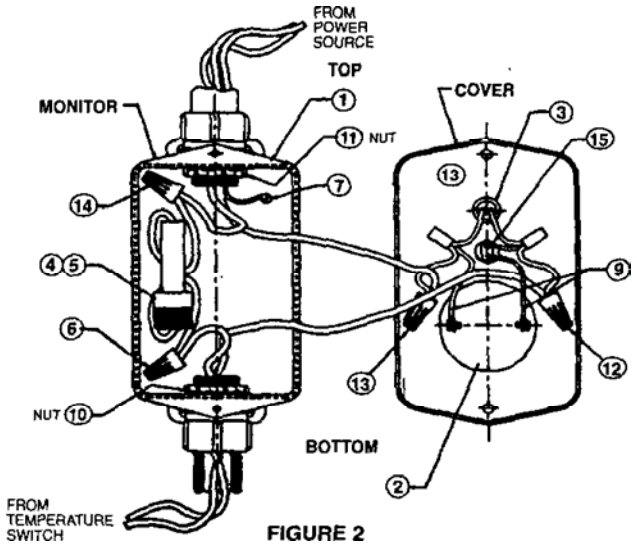


FIGURE 2

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Baldor Electric Company nor are the responsibility of Baldor Electric Company. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

World Headquarters
P.O. Box 2400, Fort Smith, AR 72902-2400 U.S.A., Ph: (1) 479.646.4711, Fax (1) 479.648.5792, International Fax (1) 479.648.5895
Dodge Product Support
6040 Ponders Court, Greenville, SC 29615-4617 U.S.A., Ph: (1) 864.297.4800, Fax: (1) 864.281.2433
www.baldor.com

MN3043 (Replaces 499807)
3043-0609
06/30/09

Pillow Block Assemblies with Embedded Thermocouple and Transmitter

A. Connection to a PLC:
   – The transmitter output can be connected directly to an analog input card with internal loop power supply.
   – Typical cards that can be used from Allen Bradley are 1771-NBSC and 1771-NB4S.

B. If a PLC is not available, the panel mounted temperature indicator available from DODGE can be used to power the transmitter and display the temperature. The indicator model is CT1010, Part No. 055221. The indicator has two settable alarm relays for warning and shut down. The connections are shown in the instruction manual supplied with the indicator.

I. Pillow block assemblies equipped with embedded thermocouple, transmitter and data acquisition system is shown in Figure 3.

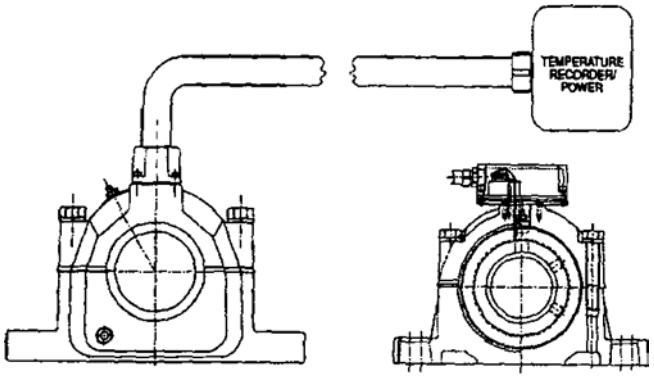


FIGURE 3

II. Connection of pillow block with loop driver or data acquisition system is shown in Figure 4 and Figure 5.

1. Take the top cover (1) off from the housing (2) by removing the four screws.
2. Install a $^1/_2$" liquid tight electrical fitting (3) on the cover (1) using the hole on the side.
3. Use a flex conduit (4) between the cover and the loop driver or your data acquisition system. Voltage supply required is 8.5 volts to 35 volts DC with no load.
4. Install the signal wires (two twisted copper wires) (5) inside the flex conduit.
5. Connect the ends of the two wires to the transmitter (6) terminals 1 and 2 and secure the screws.
6. Loop resistance: The maximum allowable resistance of the signal carrying load, including extension wires and load resistance, is given by this formula:

   $$R \text{ approximately} = \frac{(V \text{ supply} - 8.5V)}{.02 \text{ amps}}$$

   Example:
   If supply voltage is 24 VDC, the loop resistance must be less than 775 ohm (wires plus R1). Use 80% of the calculated value to protect against drop in voltage.
7. Replace the cover and tighten the four (4) screws.
8. Connect the other ends of the two wires (5) to your loop driver/power supply or your data acquisition system with built-in power supply.
9. Your system should now be able to read the temperature between 0 and 250ºF.
10. The output of the transmitter is 4–20 mA (milliamps).

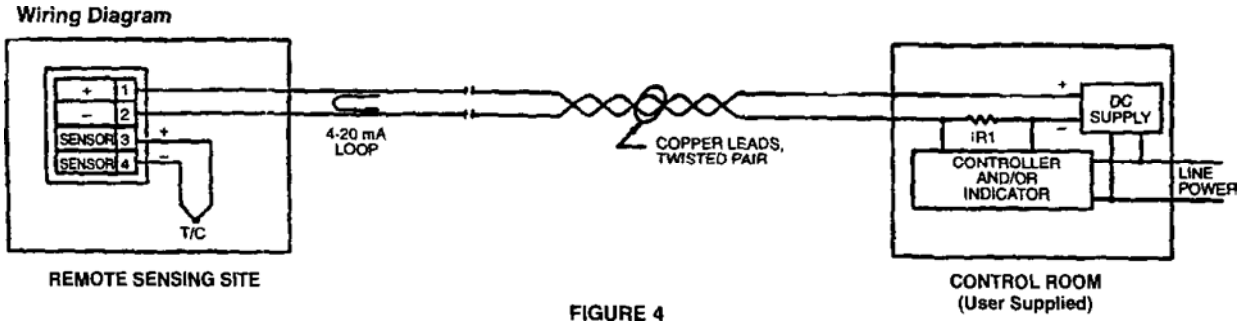


FIGURE 4

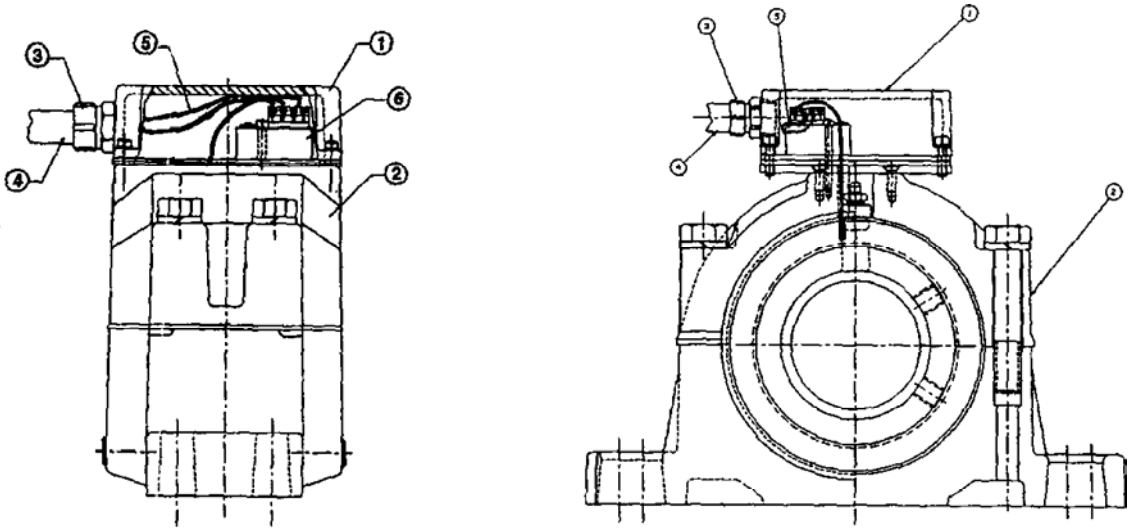


FIGURE 5

Pillow Block Assemblies with Accelerometer

A. Connection to a PLC:
   - In order to connect the accelerometer to a PLC, a vibration transmitter is needed to power the accelerometer and to transmit the signal in a suitable form.
   - The vibration transmitter produces 4 to 20 mA proportional to the vibration velocity and ±5 volts signal proportional to acceleration. The transmitter needs 20 to 30 DC voltage supply. The transmitter is available from DODGE, Part No. 055222.
   - The output of the transmitter can then be connected to Allen Bradley 1746-NI4 card.

B. Connection to a Data Acquisition System:
   - A data acquisition system is normally composed of a PC with analog input cards plus the required software.
   - In order to interface the accelerometer to the analog input card, the above transmitter can be used. A lower cost power conditioner module can also be used. The power conditioner module will produce plus or minus 5 volts when powered by a 24 volts DC power supply. The module is available from DODGE, Part No. 055223.
   - The output of the transmitter or module should then be connected to the input analog card in the PC. It is important that the vibration be sampled at 10,000 Hz.

1. Remove the top cover from the housing very carefully by removing the four screws. Note that the accelerometer is attached to the cover (1).
2. Install a $^1/_2$ inch liquid tight electrical fitting to the cover using the hole on the side.
3. Use a flex conduit (2) between the cover and the accelerometer power supply or the data acquisition system if the system has a built-in power supply.
4. Insert the accelerometer cable through the conduit and secure the nuts to the accelerometer and the power supply (3) and (4).
5. Use a DC power supply 18 to 28 volts with current capability of 2 to 20 mA. Attached is the specifications for the accelerometer and its power supply.

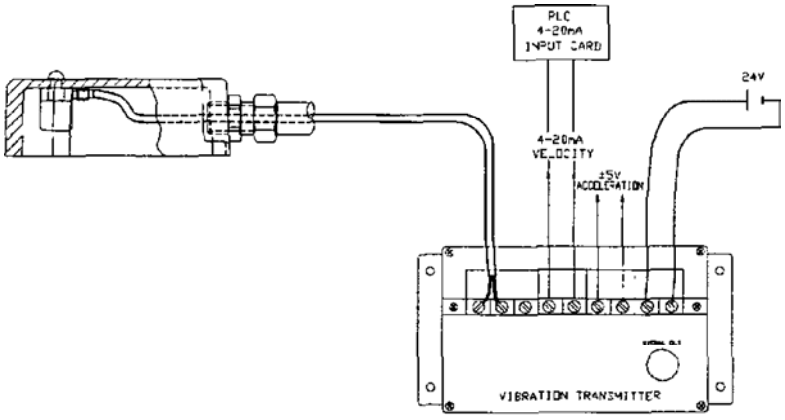


FIGURE 6

ACCELEROMETER CHARACTERISTICS

DYNAMICS	ENGLISH	S.I.
Sensitivity (±10%)[A]	100 mV/g	10,2 mV/m/s^2
Measurement Range	±50 g	±490 m/s^2
Resolution	0.0002 g	0,0019 m/s^2
Frequency Range: (±10%)[B]	66–300,000 cpm (1.1–5,000 Hz)	66–300 000 cpm (1,1–5 000 Hz)
(±3 dB)	30–600,000 cpm (0.5–10,000 Hz)	30–600 000 cpm (0,5–10 000 Hz)
Resonant Frequency[C]	1,080 kcpm (18 kHz)	1 080 kcpm (18 kHz)

Transverse Sensitivity		≤5%	≤5%
Amplitude Linearity(D)		±1%	±1%
ENVIRONMENTAL			
Shock Limit (peak)		5,000 g	49 050 m/s^2
Temperature Range		-65º to + 185ºF	-54º to +85ºC
Temperature Coefficient		-0.05%/ºF	-0,09%/ºC
Strain Sensitivity		0.001 g/με	0,01 m/s^2/με
ELECTRICAL			
Setting Time(E)		5 sec	5 sec
Excitation Voltage		18 to 28 volts	18 to 28 volts
Excitation Current		2 to 20 mA	2 to 20 mA
Output Impedance		<100 ohms	<100 ohms
Electrical Noise Broadband		200 μg	1 962 μm/s^2
Electrical Noise Spectrical:	10 Hz	4.0 μg/√Hz	39,2 (μm/s^2)/√Hz
	100 Hz	1.2 μg/√Hz	11,8 (μm/s^2)/√Hz
	1000 Hz	0.4 μg/√Hz	3,92 (μm/s^2)/√Hz
Output Bias		8 to 14 volts	8 to 14 volts
Full Scale Output Voltage		±5 volts	±5 volts
Discharge Time Constant		≥0.3 sec	≥0,3 sec
MECHANICAL		**ENGLISH**	**S.I.**
Size: Hex × Height		11/16 × 1.1 in	17.5 × 27.9 mm
Weight		1.2 oz	35 gm
Mounting Thread (female)(F)		1/4–28	Not Applicable
Mounting Torque		2 to 5 ft-lb	2,7 to 6,8 N-m
Sensing Element		Ceramic	Ceramic
Case Material		316L St. Stl.	316L St. Stl.
Sealing		Welded	Welded
Microdot 10–32		Microdot	Microdot
Connector Position		Side	Side

Supplied Accessories:
Single Point Calibration @ 100 Hz

Notes:
(A) Conversion Factor: 1 g = 9,81 m/s^2
(B) 1 Hz = 60 cpm (cycles per minute)
(C) Mounted Resonance (nominal)
(D) Zero Base Best Straight Line
(E) Within 1% of output bias
(F) 1/4–28 thread has no equivalent in S.I. system.

USAF, USN and TAF Pillow Blocks Fitted with a Proximity Switch

SPEED PICKUP:

A. Connection to a PLC:
   1. AC Proximity Probe:

      The AC proximity probe can be connected directly to a PLC using an AC input card such Allen Bradley 1746-IA4, 1746–IA8 or 1746-IA16. Other cards are also available for the PLC 5.

      Care must be given to the program timing to ensure that all the pulses are captured by the PLC. If the program is too long, DODGE offers a programmed Allen Bradley Micrologix PLC to provide the function of a zero speed switch.
   2. DC Proximity Probe:
      The DC proximity probe can be connected to a PLC using DC input cards such as Allen Bradley 1746-IV16 or 1746–IV8. Again care must be given to the program timing to ensure capturing all the pulses from the probe.

      If the program is too long to capture all the pulses, DODGE offers a programmed Allen Bradley Micrologix PLC to provide the function of a zero speed switch.

B. If a PLC is not available, DODGE offers a programmed Allen Bradley Micrologix PLC to function as a zero speed switch, Part No. 055224 (AC).

Note: When specifing the DODGE/AB Micrologix zero speed switch, please specify the customer preference for 24 volts DC output or 120 volts AC output.

A speed pickup provides a means of sensing speed variation up to 480 RPM (AC prox.) and up to 4200 RPM (DC prox.) by sensing the rotation of a specially equipped locknut with two raised surfaces.

USAF/USN PILLOW BLOCKS EQUIPPED WITH SPEED PICKUP:

For USAF/USN the speed sensor has been present at the factory. To indicate the setting a blue dye was used to mark where the proximity probe should be screwed into the housing. The probe was backed off and shipped loose to protect it during shipping and during the lowering of the shaft and the bearing. The proximity probe is made to be used only on the cast closed end housing and the non-expansion bearing of a tail pulley. For bore sizes up to 5", misalignment must not exceed ± $^1/_2$ degree. Misalignment for larger bore sizes should not exceed ± $^1/_4$ degree.

After lowering the shaft and the bearing into the lower half of the housing, screw the proximity probe into the housing up to the blue dye mark. Use the lock nut to secure the proximity probe in the housing. Use a tightening torque of 75 inch-lbs. for 12 mm AC switch, and 150 inch-lbs. for 18 mm Ac switch, and 25 inch-lbs. for DC switch also used with EZLINK. The enclosure provided can be used as the junction box for wiring the proximity switch to the out going cable. Follow all local and national electrical codes in wiring the proximity probe. Check the gap between the proximity probe and the raised portion of the shaft nut to make sure it is correct. For the 12 mm probe the gap is .1 inch, and for the 18 mm probe it is .12 inch. Note that for the 18 mm probes the probe is made to be flush with the inside of the housing.

After wiring the probe “The cable will have to be passed through the opening provided on the conduit box,” line up a gasket, the spacer, a gasket and the cover with the four screw holes on the casting. Use the four screws and the four lock washers to secure the conduit box, the gaskets and the spacer to the housing. Use a tightening torque on the 10–32 screws equal to 25 inch-lbs.

On some models a 90 degrees elbow is used as an enclosure. In this case, screw in the proximity probe until the blue dye portion is lined up with the housing. Secure the probe using the jam nut using the above tightening torque values. Place a silicon sealer on the bottom of the spacer and screw it to the probe. Tighten the spacer using the three screws and lock washers provided. Use a tightening torque 20–25 inch-lbs. Screw on the conduit elbow. The wiring elbow can be used as a junction box for the outgoing cable. Follow all local and national electrical codes in wiring the proximity switch

TYPE E, DI, AND TAF PILLOW BLOCKS EQUIPPED WITH SPEED PICKUP:

Mount the bearing to the shaft using the instruction manual that was provided with the bearing. Be sure to secure the

special proximity collar using the collar setscrews, making sure that the shaft does not protrude beyond the collar face. Mounting the bearing to the shaft can sometimes lead to slight runout of the collar face. Therefore, in order to assure that the collar (D) is perpendicular to the shaft, it is necessary to minimize the collar face runout to within .015".

1. Place proximity end cover (C) on housing mating surface using RTV on the endcover as a sealant and tighten mounting screws. Screw the proximity probe into the end cover (C) until it bottoms on the raised portion of the proximity collar.
2. Back the proximity probe $1^{1}/_{4}$ turn. This will provide the a 0.050" clearance gap between the proximity probe and the setscrew collar.
3. Tighten the jam nut on the proximity probe up flush against the endcover outer surface. Use 75 in-lb for jam nut torque on AC probes (871 TM-B2N12-A2) and 25 in-lb for jam nut torque on DC probes (871T-L2A12).

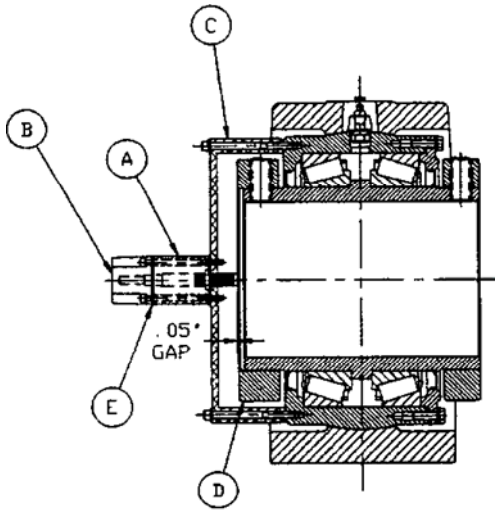


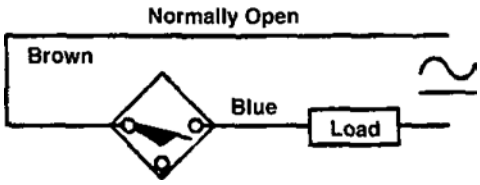
FIGURE 7

4. Mount the cover (B), spacer (A) and gaskets (E) on endcover with the 4 screws to a torque of 25 in-lbs.

The electrical enclosure (B) provided can be used as a junction box for writing the proximity probe to the outgoing cable. Follow all local and national electrical codes for wiring the probe.

With each revolution, the raised surfaces on the rotating locknut of the USAF/USN or the undercutt on the collar of the TAF pass the proximity switch which senses the presence/lack of metal and closes the switch. Each time the switch is closed an AC pulse is generated. A PLC can then be used to count the number of pulses and detect speed changes (see wiring diagram below).

Wiring Diagram



The switch is made for pillow blocks which are grounded via the mounting frame. An ungrounded block could lead to electrical shock.

Features:

2-Wire Operation
40–250 V AC/DC
Normally Open

Specifications:

Load Current 5–250 MA
Inrush Current ≤2A
Operating Voltage 40–250 V AC/DC
Operating Temp (-13ºF to 158ºF)
Shock & Vibration 5G, 30–120 Hz

EZLINK Installation:

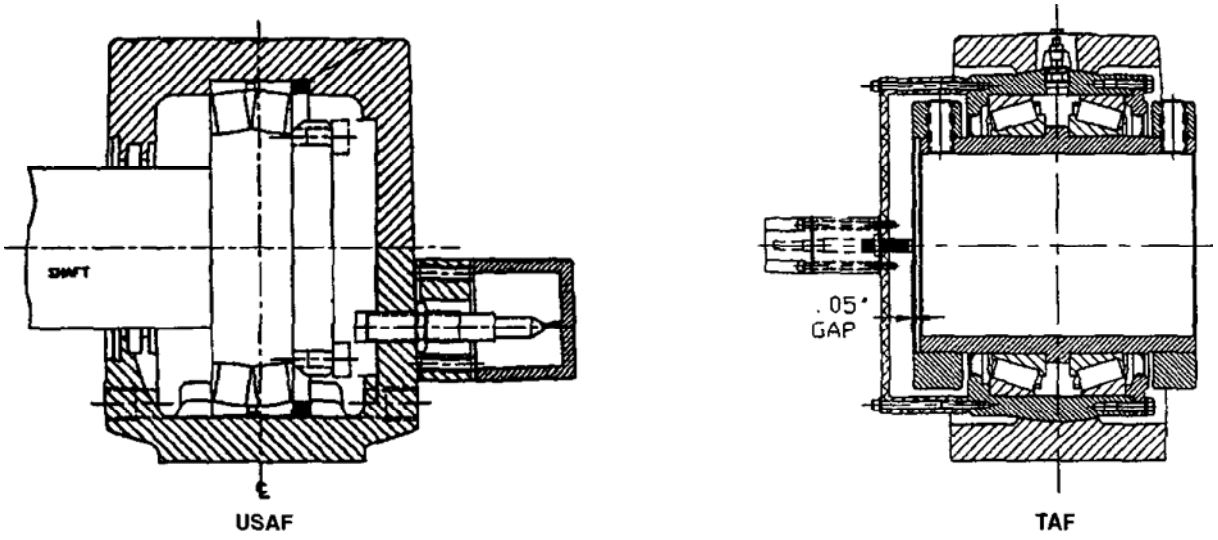
1. Blocks Equipped with Accelerometers and Thermocouples:

The installation in this case requires screwing a deviceNet drop cable from the main trunk to the EZLINK connector. To communicate to the node, follow the instruction manual provided with the configuration software disc.

2. Blocks Equipped as in 1 and with Speed Pickup:

Follow the instruction in the previous section for mounting the proximity probe. Use the three electrical wire connectors to couple the three pins connector to the proximity probe wires. Make sure that the wires with matched colors are connected together. Secure the cover of the conduit box.

Use the cable provided to connect the pins male connector on the proximity probe conduit box to the EZLINK bottom three pins female connector. Make sure that the pins are lined up with holes in the connector. Proceed as in 1 above.



USAF TAF

FIGURE 8