Ramsey Model 60-12 Speed Sensor

Installation & Operation Manual

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Chapter 1 Introduction

Overview

The Thermo Scientific Model 60-12 Speed Sensor is designed and constructed for direct connection to a conveyor tail pulley, snugging roll, or large diameter return roller.

The speed sensor employs a brushless pulse generator producing a stream of pulses, each pulse representing a unit of belt travel. Frequency of the pulse stream is proportional to true belt speed.



Figure 1-1. Model 60-12 Speed Sensor

Application

The speed sensor is coupled to a rotating shaft which drives a generator inside the housing. The Model 60-12C Speed Sensor has a useable range between 20 and 200 RPM. The 60-12F is used for speeds from 3 to 30 RPM, and the 60-12G is used for speeds from 10 to 200 RPM. The 60-12 ENC Speed Sensor has a 500 pulse per revolution encoder inside, typically is used on slow RPM applications, and has a range of 0 to 200 RPM. The frequency of the speed sensor output signal is exactly proportional to shaft speed and provides the required speed input to a Thermo Scientific Integrator/Totalizer.

Unpacking and Inspection

The Model 60-12 Speed Sensor has been properly packaged and inspected prior to shipment. Before unpacking, be certain to check the package for external damage, as the carrier may often times be held responsible for shipping damage.

Storage

The Model 60-12 Speed Sensor can be safely stored indoors, with hole plugs installed, between -50 and +70 degrees C (-58 to +158 degrees F). The unit must be protected against moisture.

Chapter 2 Installation

Overview

The Models' 60-12C, F, G and ENC Speed Sensor must be attached to a pulley shaft which turns at true conveyor belt speed. Normally, the tail pulley shaft or a snubbing roll shaft satisfies this requirement. In installations where the tail pulley or snubbing roll shaft is not accessible, an additional pulley must be installed specifically for the speed sensor (see Section 2-4).

Coupling Installation

Two methods of coupling the speed sensor to the pulley shaft are shown in Figures 2-1 and Figures 2-2. Other methods may work as well, The most important requirement is that the speed sensor remains free floating and not rigidly coupled to the conveyor frame.



NOTE. Never mount speed sensor on a driven pulley.

Use the following procedures for coupling installation.

Method "A"

Locate the exact center of tail pulley or snubbing roll shaft. Figure 5-1 may be cut out and used as a centering guide. (Refer to Figure 2-1.)

1. Locate circle guide over tail pulley shaft and punch center. Drill a 1-3/4" deep hole using a 17/32" drill. (Drilling a smaller pilot hole is helpful in assuring correct centering.)

2. Tap this hole using a 5/8"-11 tap.

3. Clean out oil and dirt with an appropriate solvent and apply a thread lock retaining compound, such as "LOCKTITE thread locker 262".

4. Thread in supplied stub shaft coupling (part #037711) so that coupling collar bottoms out against tail pulley or snubbing shaft. See Figure 2-1.

5. Insert 60-12 speed sensor into coupling. Be sure to align shaft flat spot with set screws on coupling. Tighten all set screws securely.

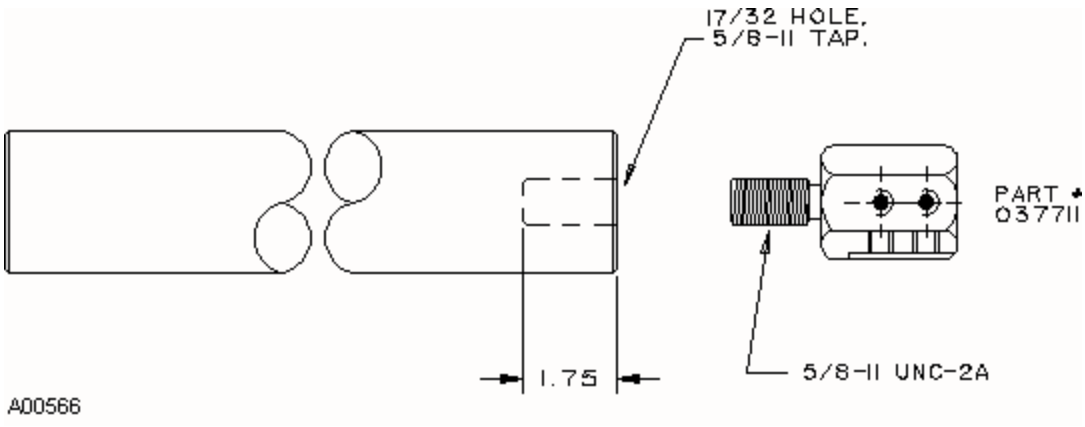


Figure 2-1. Method A Installation

Method "B"

If customer's tail pulley shaft has a 5/8" diameter stub shaft extending from it and is concentric with the centerline of the driving shaft, use part #002931 to couple 60-12 speed sensor to tail pulley shaft. (Refer to Figure 2-2.) This coupling is not supplied with the speed sensor but may be purchased separately from Thermo Fisher Scientific.

It would be advisable to provide two flat surfaces, 90º apart, on the stub shaft for a good set screw holding power.

NOTE. If possible, weld coupling to tail pulley shaft. Do not weld to any part of 60-12 speed sensor.

Align shaft flat spots with set screws on coupling. See Figure 2-2. Tighten all set screws securely.

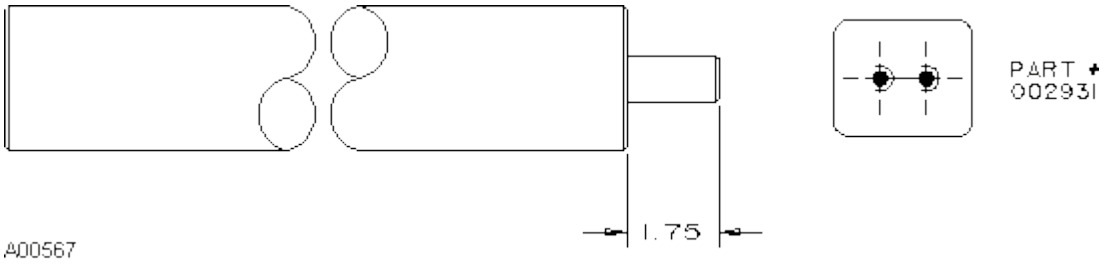


Figure 2-2. Method B Installation

Restraint Arm Installation

1. Attach restraint arm to speed sensor with two (supplied) 5/16" x 1-1/4" bolts. See Figure 2-3. The restraint arm should be mounted in a direction that will allow the sensor restraint arm to twist against the mechanical stop and in the direction of belt travel.

2. Weld or otherwise secure an appropriate mechanical stop such as a piece of scrap iron (or a bolt) to the conveyor frame. Rotate restraint arm to let it rest on the stop. See Figure 2-3. Make the mechanical stop large enough to accommodate some lateral movement of the restraint arm.

3. Fit one end of the supplied restraining spring through the hole in the end of the restraint arm. Attach the other end to the conveyor frame. Location should be such as to give a 1/2 inch spring stretch. Do not over-tighten spring as this may cause premature failure. See Figure 2-3.

4. Although not required, it is recommended that a rock or step shield be fabricated and installed around the speed sensor.

5. Do not connect power to the machine or turn on the unit until you have read and understood this entire chapter. The precautions and procedures presented in this chapter must be followed carefully to prevent equipment damage and protect the operator from possible injury.



NOTE. The purpose of this mounting arrangement is to allow the speed sensor to "float" and accommodate any slight misalignment of the coupling. Therefore, no resultant bearing stress is applied due to misalignment, nor will a slight "wobble" of the device result in electrical errors.

Alternate Sensor Location

In installations where the tail pulley or snubbing roll shaft is not accessible and additional pulley must be installed specifically for the speed sensor. When using an additional pulley for the speed sensor, the following requirements are essential:

1. Select the proper pulley diameter to provide a shaft RPM within the range of the speed sensor (at rated belt speed or over the range of belt speeds that are of concern).

2. Locate the pulley on the clean side of the return belt to minimize material build up on the pulley.

3. Install the unit in such a manner as to provide 15 to 30

degrees contact wrap on the pulley. Any slippage between belt and pulley will decrease the belt scale accuracy.

CAUTION. Unless the installation is consistent with the illustrations shown in Figure 2-1, Figure 2-2, Figure 2-3, and as described above, the warranty on the device is void

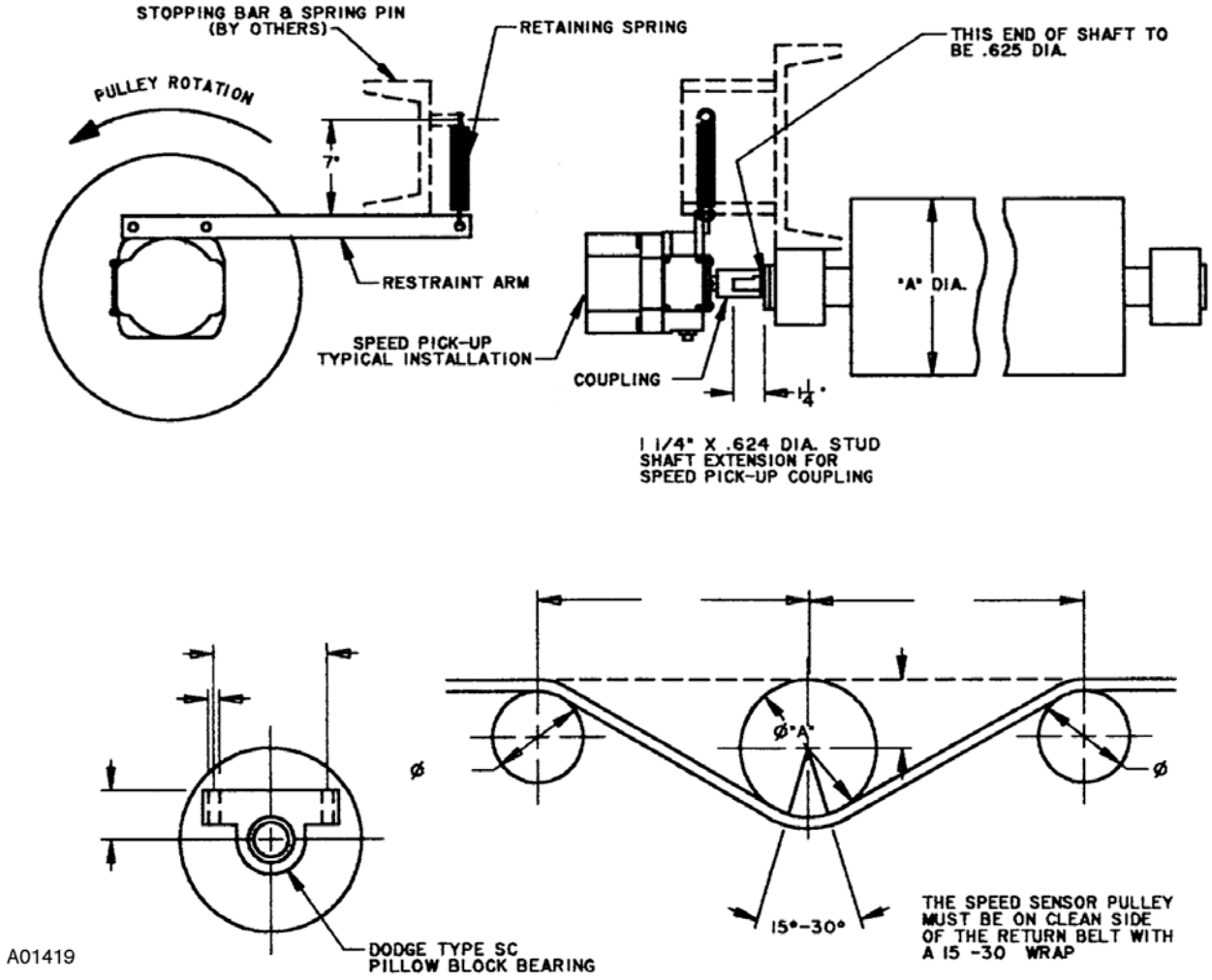


Figure 2-3. Mounting Illustration

1. Speed Sensor must not be mounted rigid. Use restraint arm and retaining spring. Mechanical stop and spring mount are by others.

2. Attach spring in location such as to give 1/2" spring stretch.

3. All wiring by others in accordance with system field wiring diagram and applicable codes.

Speed	Minimum "A"	Maximum "A"
100 FPM	2"	14"
200 FPM	4"	36"
300 FPM	6"	48"
400 FPM	8"	60"
500 FPM	10"	60"
600 FPM	12"	60"
700 FPM	14"	60"
800 FPM	16"	60"
900 FPM	18"	60"
1000 FPM	20"	60"

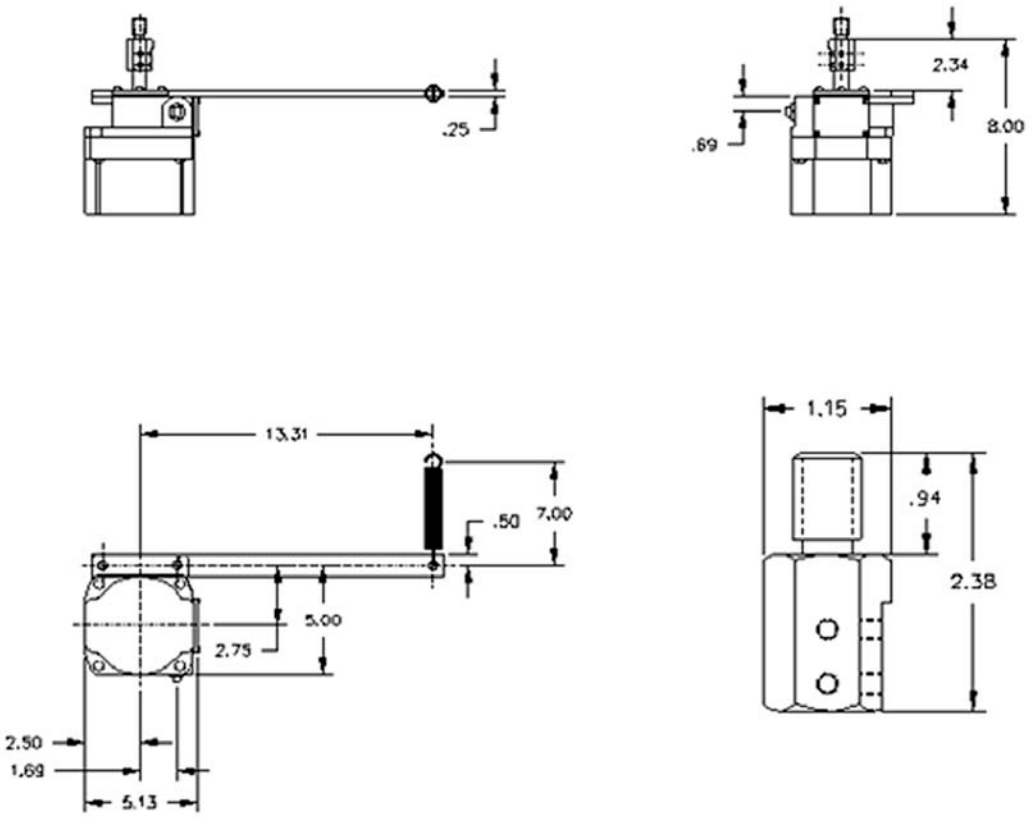


Figure 2-4. Outline and Mounting Dimensions

Notes:

1. Speed Sensor to be driven by conveyor tail pulley shaft or by special return roll.

2. Unit must be directly coupled to driving shaft. Do not drive with chains, belts, gears, etc.

3. Customer to provide tapped hole 1.75" deep.

4. Do not rigid mount speed sensor.

Electrical Wiring

Use the following procedures to make electrical connections:

1. Remove the terminal strip cover (Figure 1-1) and the dust plug from the threaded conduit aperture in the speed sensor housing.

2. Install 1/2 inch flexible conduit to the speed sensor housing.

3. For 60-12C speed sensor, use Beldon 8760 or equivalent, 2 conductor, 18 AWG, shielded, when total length between speed sensor and totalizer is 200 feet or less. Use Beldon 8780, 2 conductor, 16 AWG, shielded when total length is 201 to 3,000 feet.

   For 60-12F, G, or ENC models, use Beldon 8772 or equivalent, 3 conductor, 20 AWG, shielded. Maximum distance is 200 feet.

4. Do not put speed sensor cables in the same conduit as power wiring.

5. Connect one wire to each of terminals 15, 16, and 17 as shown in Figure 2-4. (No connection is needed to terminal 17 for 60-12C speed sensor.) Replace the terminal strip cover.

CAUTION. The three wires connecting the speed sensor to the integrator/totalizer must be shielded. Refer to system wiring diagram for proper shield termination.

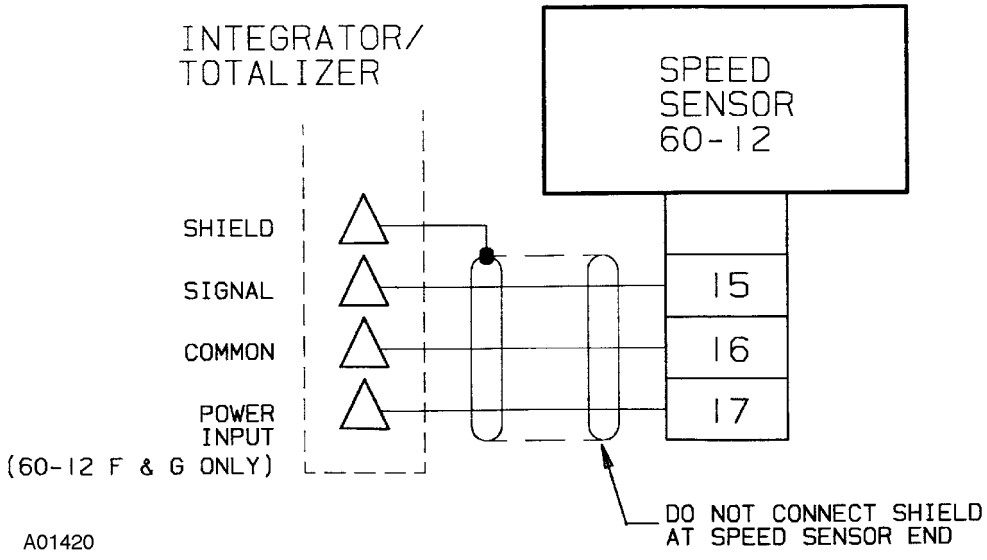


Figure 2-5. System Wiring

Chapter 3 Operation

Overview

The speed sensor element employs a brushless, pulse generator which produces a stream of pulses, each pulse representing a unit of belt travel. The frequency of the pulse stream is proportional to true belt speed. The pulse output signal is fed to the Integrator/Totalizer.

Model 60-12C

The Model 60-12C supplies the output of the generator directly to the totalizer for high speed operation (20-200 RPM).

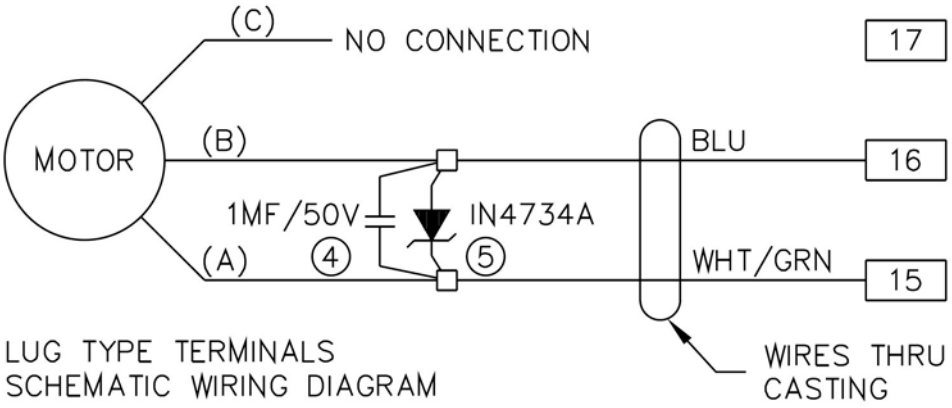


Figure 3-1. Schematic Model 60-12 Speed Sensor

Motor MFG	**Color**		
	A	**B**	**C**
Superior SS25	Red	White	Black
Oriental 2CSM	Red	White	Black
Source Eng. 57TYG002	Blue	White (2)	Red

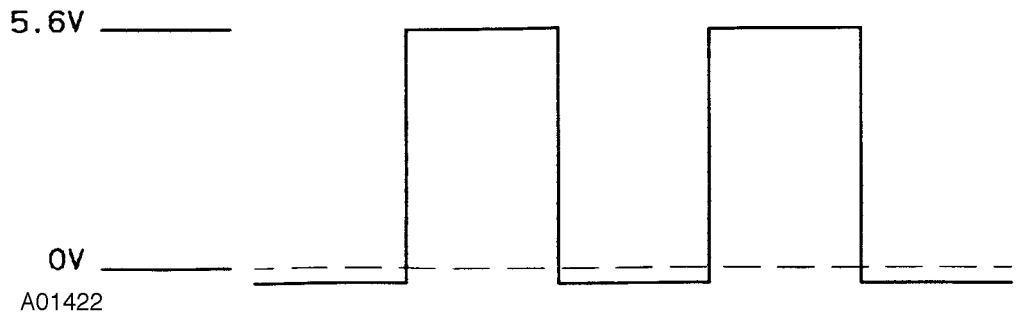


Figure 3-2. 60-12C Output Voltage

Model 60-12F

Speed sensor Model 60-12F is designed for use in low speed systems (3 to 30 RPM). The 60-12F outputs 200 pulses per revolution, and requires and external power source of 15 to 30 VDC to operate. It contains a two-phase servo generator. The rotor is a 50-slot permanent magnet that is rotated in the stators. This results in two AC signals that are out of phase with each other. The output frequency is determined by the follows: RPM x 3.33 = Hz. The output signal is approximately equal to the supplied voltage at terminal 17. Operation is as follows.

1. Referring to Figure 3-4, the two AC signals are applied to R-1 and R-5 while the common is connected to 2-2, pin 1.Z-2, pin 1 supplies a center reference voltage for Z-2 pins 9 and 13. As the voltage signal from the generator moves Z-2, pins 10 and 12 above and below the center reference voltage the outputs of Z-2, pins 8 and 14 switch from one state to the other. They are maintained in these states by the action of the two feedback resistors, R-4 and R-8.

2. The exclusive or gate that these two outputs feed into merely serves to combine them. The portion of Z-2 connected to pins 1 and 2 of Z-1 serves to provide some integration that will eliminate most signal jitter caused by vibration.

3. Due to the sensing of the signal level changes of the two phase generator, the output of this model is increased/ RPM x 3.333 = Hz, or 200 pulses per revolution.

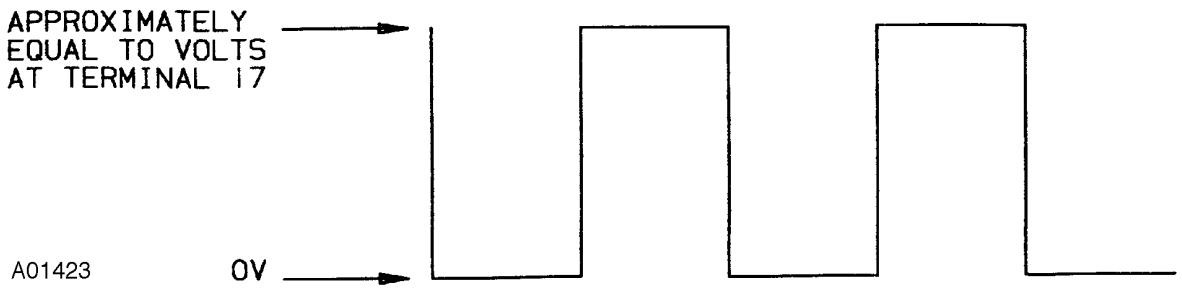


Figure 3-3. 60-12F, 60-12G, or 60-12 ENC Output Voltage Waveform

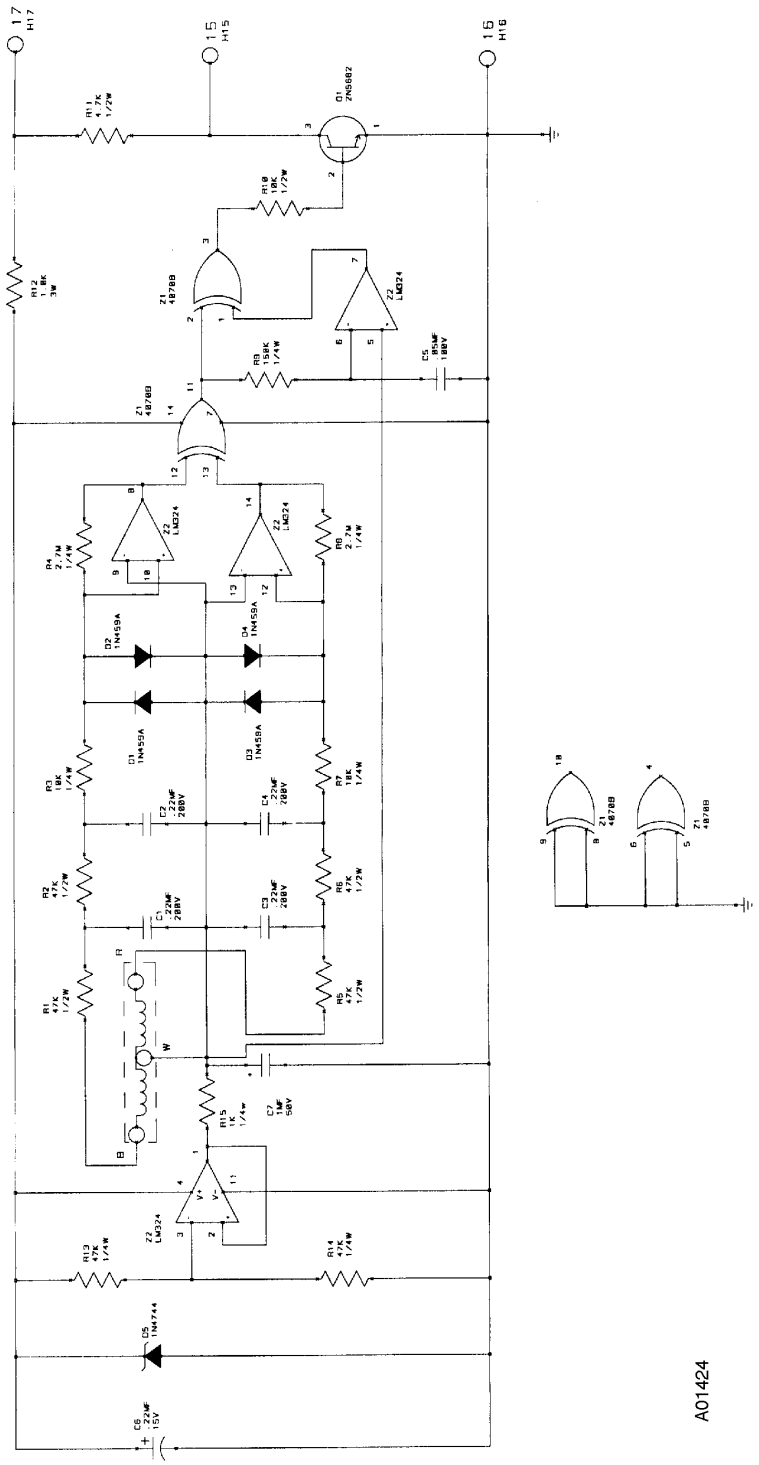


Figure 3-4. Schematic Model 60-12F Speed Sensor

Model 60-12G

The Model 60-12G is a modified 60-12F, in which C5 has been jumpered out. See Figure 3-4. The 60-12G puts out 100 pulses per revolution, and has an RPM range of 10 to 200 RPM. The output frequency is determined as follows: RPM x 1.666 = Hz. As with the 60-12F, the 60-12G puts out approximately the voltage supplied at terminal 17. See Figure 3-3. The 60-12G requires an external power source of 15 to 30 VDC to operate.

Model 60-12 ENC

The Model 60-12 ENC (500) has a 500 pulse per revolution encoder with an internal pull up resistor. The output is approximately the voltage supplied at Terminal 17. See Figure 3-3. The 60-12 ENC requires an external power source of 5 to 24 VDC at 60 mA to operate.

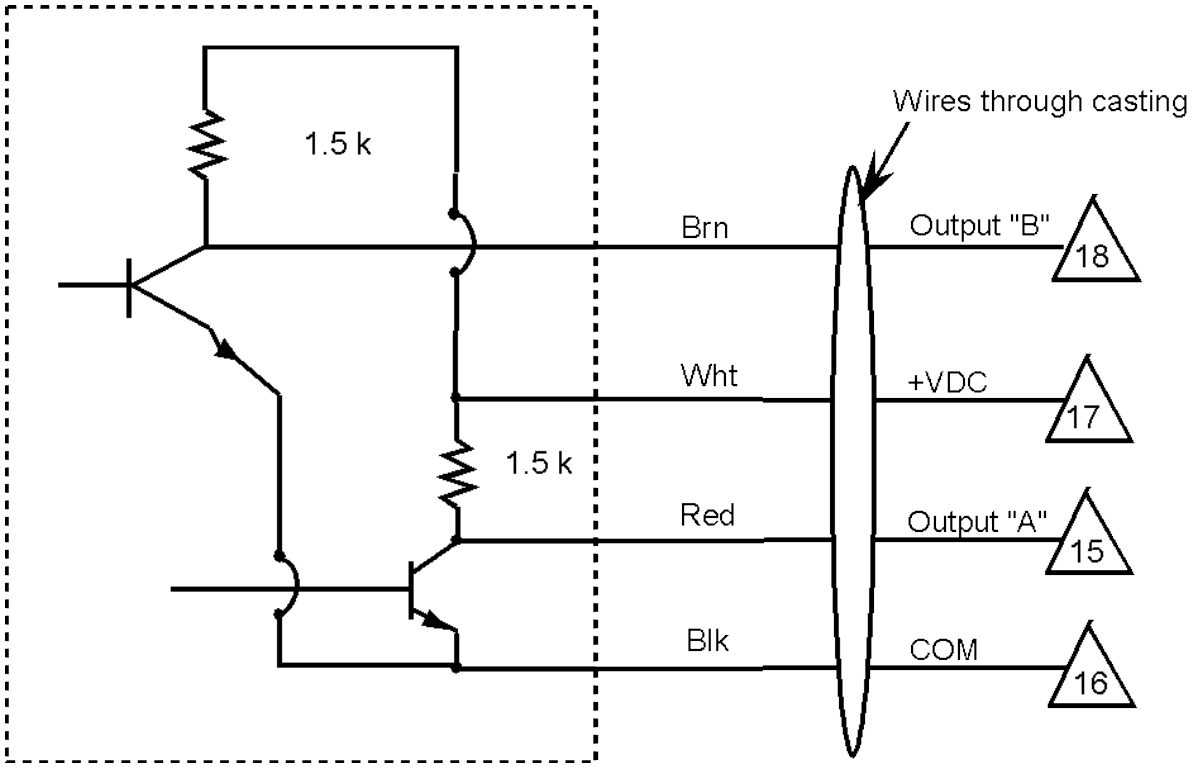


Figure 3-5. Schematic Model 60-12 ENC

Chapter 4 Maintenance

Overview

When performing scale calibration, it is a good practice to inspect the shaft coupling for tightness. Also verify that the restraint arm is free to move. If arm has worn a slot in the restraint stop and the restraint bar cannot float back and forth as well as against the spring, corrections should be made.

Calibration

No adjustment or calibration of the device is necessary. Operating Temperature range is -20º F to 130º F.

60-12C

1. Place AC voltmeter across field terminals 15 and 16 of 60-12C speed sensor.
2. With conveyor stopped, output should be 0.0 VAC.
3. Start conveyor belt; output should be approximately 3 VAC.
4. If no voltage is present, check the sensor with the wire from terminal 15 disconnected.
5. If no voltage is present while running, repair or replace the speed sensor.
6. If approximately 3 VAC is present, check field wiring.

60-12F or G

1. Place a DC voltmeter across field terminals 17(+) and 16(-) of 60-12F or G speed sensor.
2. Depending on Model of scale integrator, reading should be 20, 24 or 30 VDC.
3. If no voltage present, check at integrator terminals (see scale integrator manual).
4. If voltage is present, check field wiring. If no voltage present, repair or replace integrator.
5. Place AC voltmeter across field terminals 15 and 16 of 60-12F speed sensor.

6. With conveyor stopped, output should be 0.0 VAC.

7. Start conveyor belt; output should be approximately 3 VAC.

8. If no voltage is present, check the sensor with the wire from terminal 15 disconnected.

9. If no voltage is present while running, repair or replace the speed sensor.

10. If approximately 3 VAC is present, check field wiring.

60-12 ENC

1. Place a DC voltmeter across field terminals 17 (+) and 16 (-) of 60-12 ENC speed sensor.

2. Depending on Model of scale integrator, reading should be 20, 24 or 30 VDC.

3. If no voltage present, check at integrator terminals (see scale integrator manual).

4. If voltage is present, check field wiring. If no voltage present, repair or replace integrator.

5. Check output of speed sensor using an oscilloscope or frequency meter. Place meter across terminals 15 (+) and 16 (-) of speed sensor (channel "A") or terminal 18 (+) and 16 (-) of speed sensor (channel "B").

6. With conveyor stopped, there should be no pulse output.

7. With conveyor running, output frequency should increase with an increase of belt speed. Amplitude of pulse should be equal to voltage input (see step 2).

8. If no output, repair or replace speed sensor.

Chapter 5 Service, Repair & Replacement Parts

This chapter provides information about service, repair, and replacement parts for your Model 60-12 Speed Sensor. It includes the telephone numbers for various departments at Thermo Fisher Scientific. The procedure for ordering replacement parts, a Return Material Authorization form on page 3, and the parts list for the 60-12 Speed Sensor is included in this chapter.

Service and Repair Information

The maintenance information in this manual is designed to meet your service needs. If you should encounter a problem that requires technical assistance, you may call Thermo Fisher Scientific Product Service at 1-800-445-3503.

Thermo Fisher Scientific also provides on-site service technicians to assist customers with installation, setup, initial calibration, customer training, maintenance, and repair. Contact the Thermo Fisher Scientific Field Service department at the number given below for current rates and scheduling.

Thermo Fisher Scientific has repair centers located at our plant in Minneapolis, Minnesota. Products that need system checkout or repair can be returned to the plant with the Return Material Authorization (RMA) form. Contact our Repair and Return department 1-800-445-3503 to get a RMA form and number.



NOTE. Have your machine model number and serial number available when you call.

PHONE	1-800-445-3503
FAX	(763) 783-2525
Technical Assistance	1-800-445-3503
Field Service	1-800-445-3503
Return Material Authorization & Repair	1-800-445-3503

Parts Ordering Information

For the fastest service when ordering parts, telephone or FAX the Thermo Fisher Scientific Parts Department at the numbers given below. Your regional field service representative can also assist you with parts orders, but this may delay shipment of your parts.

The recommended procedure for ordering parts is:

1. Determine the broken or faulty part.
2. Locate the part in the Parts List.
3. Find the part number(s) for the item(s) you need.
4. Before you contact Thermo Fisher Scientific for your parts, make sure you have the following information:
    - Machine model and serial number
    - Purchase Order number
    - Date Required
    - Preferred shipping method
    - Part number(s), description, and quantity needed.

5. Telephone or FAX:

Thermo Fisher Scientific
Customer Service Department
501 90th Ave NW
Minneapolis, MN 55433
FAX: (763) 783-2525
Phone: 1-800-445-3503
Return Material Authorization
and Repair: 1-800-445-3503

Phone/Fax Contacts for Thermo Fisher Scientific Offices

Australia
+61 (0) 8 8208-8200
+61 (0) 8 8234-3772 fax
service.auadl@thermofisher.com

Brazil
+55-11-2367-2192
+55-11-2367-2192 fax

Canada
(See United States)

Chile
+56 2 378 5080
+56 2 370 1082 fax
ventas.Bulk.LA@thermofisher.com

China
+86 10-8419-3588
+86 10-8419-3580 fax

Germany
+49 (0) 208-824930
+49 (0) 208-852310 fax
service.oberhausen@thermofisher.com
sales.oberhausen@thermofisher.com

India
+91-22-4157-8800
+91-22-4157-8801 fax
sales.process.in@thermofisher.com

Italy
+39 02-950590.1 main
+39 02-950590.55 sales
+39 02-953200.15 fax
sales.mi.ramsey.it@thermofisher.com

Mexico
+52 53 125 556
+52 53 125 557 fax
email.mxnau.sales@thermofisher.com

South Africa
+27 (0) 11-822-4120
+27 (0) 11-822-3982 fax
sales@thermo.co.za

Spain
+34 91-484-5965
+34 91-484-3597 fax
commercial.pid.esmad@thermofisher.com

United States & Canada
+1 (800) 445-3503
+1 (763) 783-2525 fax
service.bulk.us@thermofisher.com
parts.bulk.us@thermofisher.com
sales.bulk.us@thermofisher.com