

**Model 61-12C (FM)
or 61-12 C/CSA
Speed Sensor
Operating and Service Manual**

REC 3449 Rev M P/N 013984

Revision History

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About This Manual

This manual provides information you need to install, operate, and maintain a Model 61-12 C (FM) or Model 61-12 C/CSA Speed Sensor.

Read this manual before working with the product. For personal and system safety and for the best product performance, make sure you thoroughly understand the contents before using this machine.

Who Should Use this Guide?

This *Model 61-12 C (FM) Speed Sensor* manual is a learning resource and reference for anyone concerned with installing, operating or maintaining the speed sensor.

Organization of this Guide

This Guide is organized into five chapters and two appendices.

Chapter 1: Introduction to the Model 61-12C (FM) Speed Sensor – gives you an overview of the device’s capabilities, describes its functions, and lists its technical specifications.

Chapter 2: Installing the Model 61-12 C (FM) Speed Sensor– provides information about the installation of the speed sensor.

Chapter 3: Model 61-12C (FM) Speed Sensor Operations- provides information about setting up, testing, and operating the speed sensor.

Chapter 4: Maintaining and Troubleshooting the 61-12 C (FM) Speed Sensor – provides information about maintenance and troubleshooting. It includes procedures for determining and correcting operational problems.

Chapter 5: Service Repair and Replacement Parts - tells you how to contact Thermo Fisher Scientific and how to order parts.

Documentation Conventions

The following conventions are used in this manual to help easily identify certain types of information.

Bold is used the first time a new term is introduced.

Italic is used to for emphasis and terms that have already been introduced.

Blue is used for references to other sections of the guide and serve as links in documents.

SMALL CAPS are used in the names of setup, calibration, menu displays, and variables.

BOLD CAPITALS are used for the names of keys.



NOTE. Provides information of special importance to the reader. ▲



HINT. This symbol indicates a hint that may be of value but not necessary for operation. ▲

Safety Messages

Instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations.

There are two levels of safety messages: warnings and cautions. The distinction between the two is as follows:



CAUTION. Failure to observe could result in death or serious injury. ▲



WARNING. Failure to observe could result in death or serious injury. ▲

General Precautions

Do not install, operate, or perform any maintenance procedures until you have read the safety precautions presented.



WARNING. Failure to follow safe installation and servicing procedures could result in death or serious injury. ▲

- Make sure only personnel trained by a Thermo Fisher Scientific representative perform installation and maintenance procedures in accordance with the instructions in this manual.
- Allow only qualified electricians trained by a Thermo Fisher Scientific representative to open and work in the electronics cabinet and terminal boxes.
- Covers over the electronics and moving parts must always remain in place during normal operation. Remove only for maintenance with the machines power OFF. Replace all covers before resuming operation.
- During maintenance, a safety tag (not supplied by Thermo Fisher Scientific) is to be displayed over the ON/OFF switch area instructing others not to operate the unit (ANSI:B157.1)



CAUTION. High voltage that may be present on leads could cause electrical shock. ▲

- The main isolator switch must be **OFF** when checking input AC electrical connections, removing or inserting any electrical item, or attaching voltmeters to the system.
- Allow a minimum of 5 minutes between turning the mains isolator to the **OFF** position and opening the access panel of the machine.
- Use extreme caution when testing in, on, or around the electronics cabinet, high voltages in excess of 115 V or 230 V are present in these areas.



WARNING. Do not make changes to this equipment of any kind without prior consultation with Thermo Fisher Scientific. ▲

Inspection

Inspect the packages for external damage before opening. After unpacking, inspect the unit for damage and compare parts to those and the shipping invoice.

Chapter 1

Introduction

Overview

The Model 61-12 C (FM) Speed Sensor is designed and constructed for direct connection to a conveyor tail pulley, snubbing 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.

The Model 61-12 C (FM) is Factory Mutual (FM) approved for Class I, Division II, Groups D and Class II, Divisions I and II, Groups E, F, G.

Figure 1-1. Model 61-12C Speed Sensor



Introduction

Unpacking and Inspection

Application

The speed sensor is coupled to a rotating shaft which drives a generator inside the housing. The Model 61-12 C Speed Sensor has a usable range between 20 and 200 RPM. The frequency of the speed sensor output signal is exactly proportional to shaft speed and provides the required speed input to a Integrator/Totalizer.

Unpacking and Inspection

The Model 61-12 C 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 61-12 C 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 Model 61-12 C 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.

Coupling Installation

Two methods of coupling the speed sensor to the pulley shaft are shown in Figure 2-1 and Figure 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. ▲

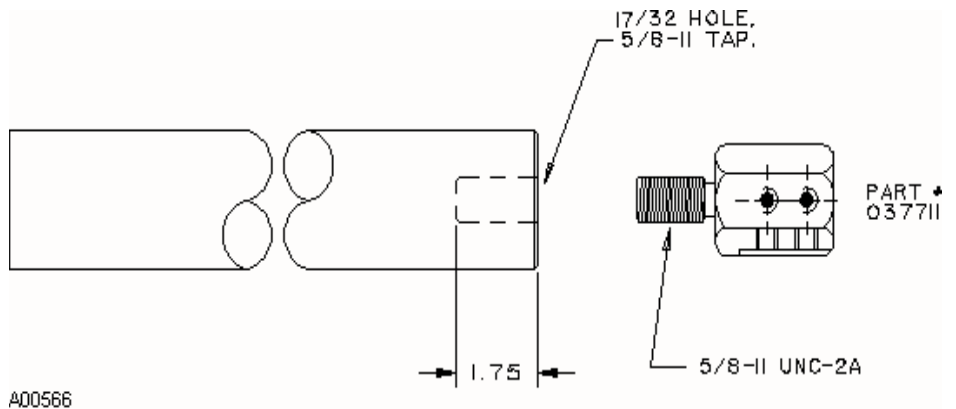
Use the following procedures for coupling installation:

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 "LOCTITE 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 61-12 C 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 61-12 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.

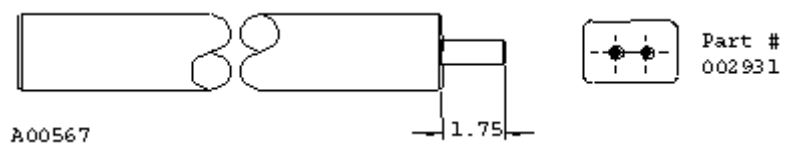
It would be advisable to provide two flat surfaces, 90° apart, on the stub shaft for a good set screw holding power.



Note. If possible, weld coupling to tail pulley shaft. Do not weld to any part of 61-12 C 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.



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, an 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.

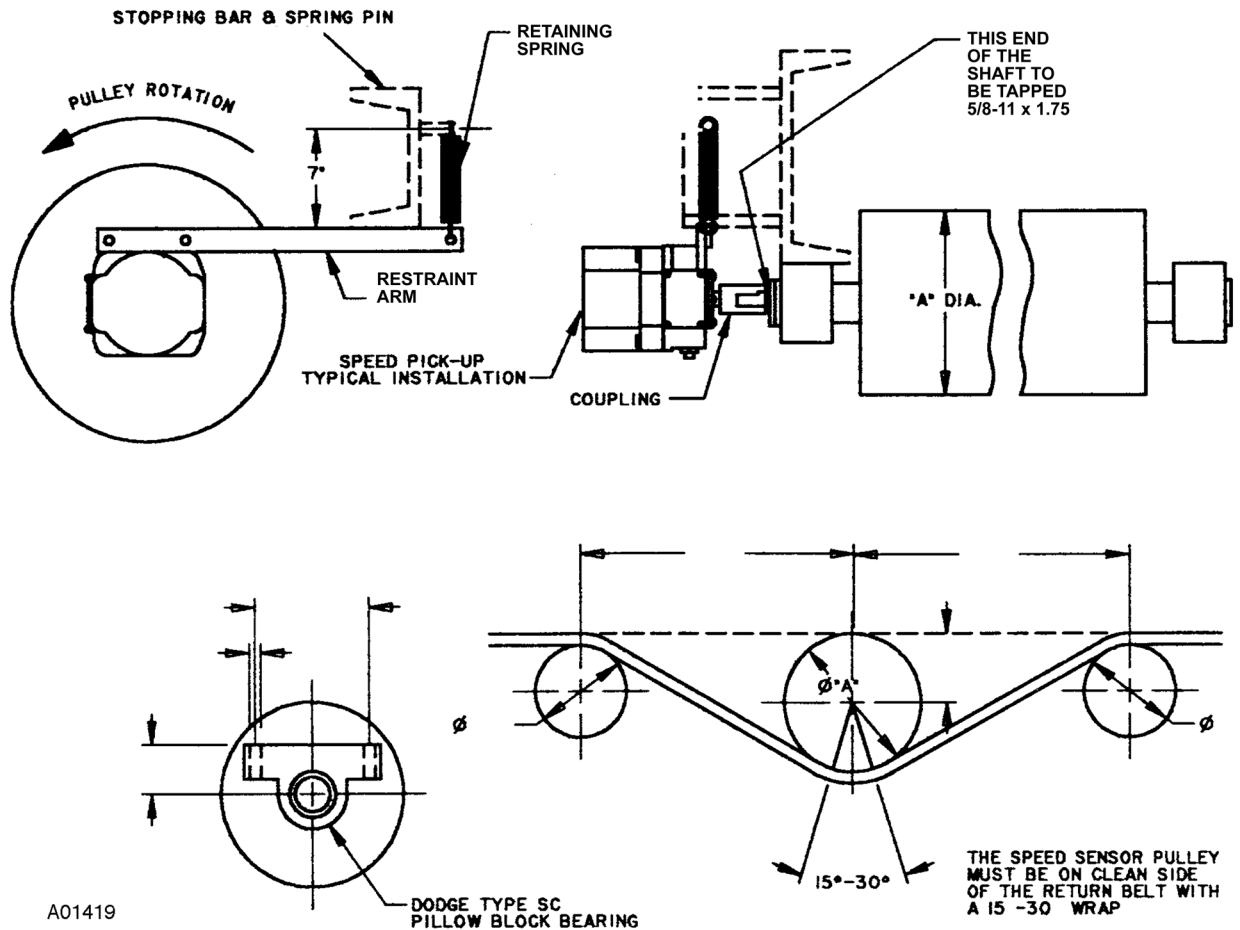
Installation

Alternate Sensor Location



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

Figure 2-3. Mounting Illustration



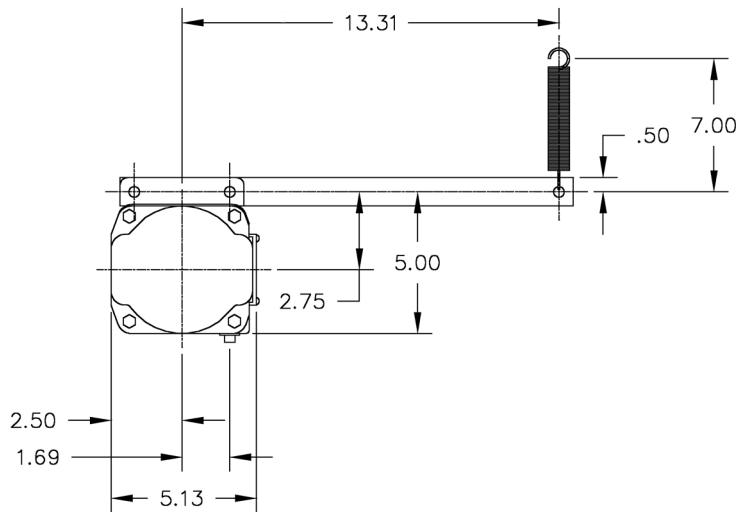
A01419

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.

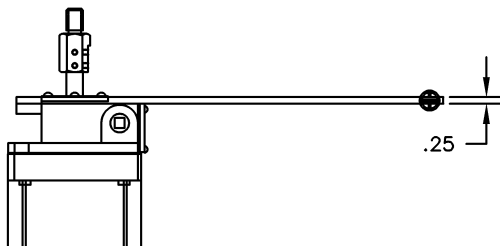
Installation

Alternate Sensor Location

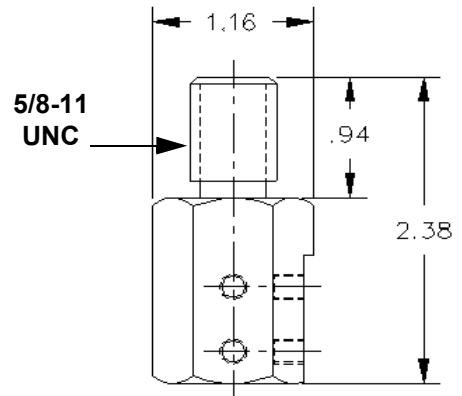
Speed	Minimum "A"	Maximum "A"
100 FPM	2"	14"
200 FPM	4"	36"
300 FPM	6"	48"
400 FPM	8"	60"
500 FPM	10"	60"
600 FPM	12"	60"
700 FPM	14"	60"
800 FPM	16"	60"
900 FPM	18"	60"
1000 FPM	20"	60"



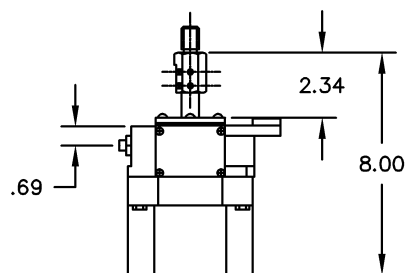
A0041a



A0041b



A0041d



A0041c

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 5/8-11 tapped hole 1.75" deep.
4. Do not rigid mount speed sensor.

Electrical Wiring

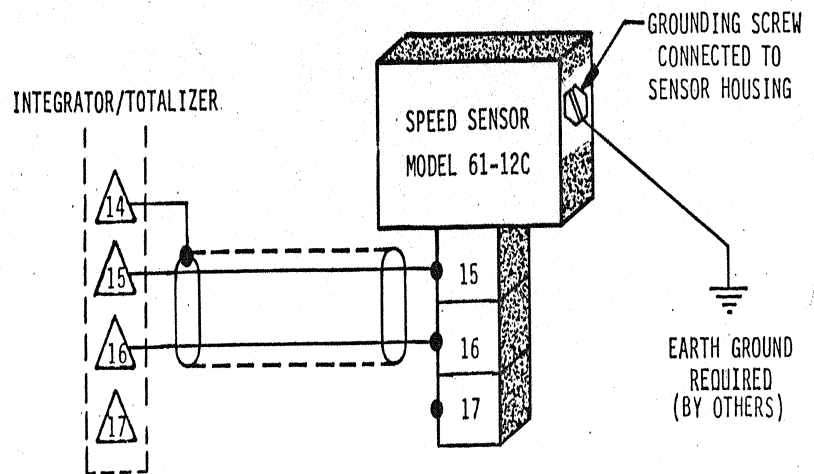


WARNING. This device is rated for use in areas described as: Class I, Division 2, Group D, and Class II, Divisions 1 and 2, Groups E, F, and G as defined by the National Electrical Code (NEC). ▲



WARNING. All wiring must be made in accordance with field wiring diagram, Figure 2-5, and the National Electrical Code. ▲

Figure 2-4. Field Wiring Model 61-12 C Speed Sensor



CAUTION. Two wires connecting the speed sensor to the integrator/totalizer must be shielded. Refer to filed wiring diagram in Figure 2-4 for proper shield termination. ▲



CAUTION. The speed sensor must be connected to a solid earth ground. A ground terminal screw (green) is connected to the housing by Thermo Fisher Scientific. Earth ground wire to be provided by others. See Figure 2-4. ▲

Notes:

1. Shielded cable, Belden #8762 (2 conductor) or equivalent.
2. Connect shield at integrator/totalizer end only. Make no connection at speed sensor end.

Chapter 3

Operation

Overview

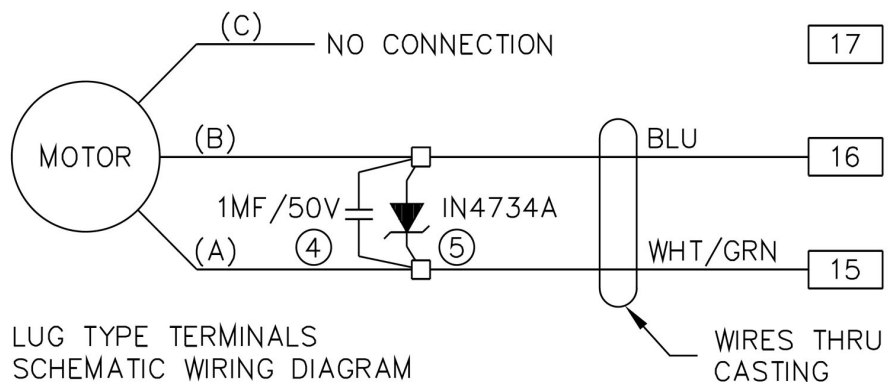
The speed sensor element employs a brushless, pulse generator which produces a stream of pulses, each pulse representing a unit of belt travel. The frequency of the pulse stream is proportional to true belt speed. The pulse output signal is fed to the Integrator/ Totalizer.

Model 61-12 C

The Model 61-12 C supplies the output of the generator directly to the totalizer for high speed operation (20-200 RPM).

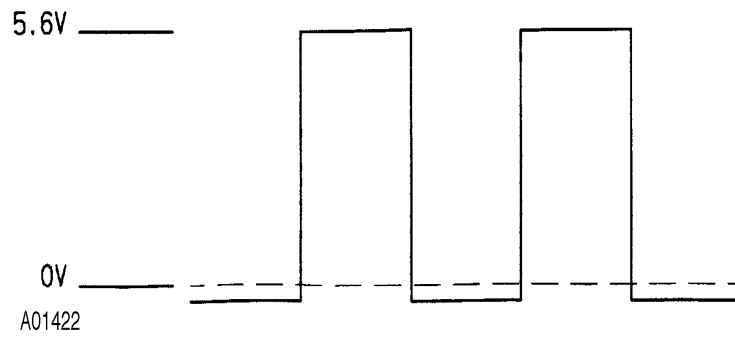
The rotor consists of a 50-slot permanent magnet that is rotated in the stator. The 61-12 C puts out 50 pulses per revolution; the output frequency is therefore the product of RPM x .8333. The output signal is a +5.6 volt pulse. The 61-12 C does not require an external power source to operate.

Figure 3-1. Method B Installation



Motor MFG	Color		
	A	B	C
Superior SS25	Red	White	Black
Oriental C8115-925	Red	White	Black
Source Eng. 57TYG002	Blue	White (2)	Red

Figure 3-2. 61-12C Output Voltage Waveform



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 -20°F to 130°F.