

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

REC 3449 Rev M P/N 013984

ThermoFisher
S C I E N T I F I C

Revision History

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Thermo Fisher Scientific Warranty

The seller agrees, represents, and warrants that the equipment delivered hereunder shall be free from defects in material and workmanship. Such warranty shall not apply to accessories, parts, or material purchased by the seller unless they are manufactured pursuant to seller's design, but shall apply to the workmanship incorporated in the installation of such items in the complete equipment. To the extent purchased parts or accessories are covered by the manufacturer's warranty, seller shall extend such warranty to buyer.

Seller's obligation under said warranty is conditioned upon the return of the defective equipment, transportation charges prepaid, to the seller's factory in Minneapolis, Minnesota, and the submission of reasonable proof to seller prior to return of the equipment that the defect is due to a matter embraced within seller's warranty hereunder. Any such defect in material and workmanship shall be presented to seller as soon as such alleged errors or defects are discovered by purchaser and seller is given opportunity to investigate and correct alleged errors or defects and in all cases, buyer must have notified seller thereof within one (1) year after delivery, or one (1) year after installation if the installation was accomplished by the seller.

Said warranty shall not apply if the equipment shall not have been operated and maintained in accordance with seller's written instructions applicable to such equipment, or if such equipment shall have been repaired or altered or modified without seller's approval; provided, however, that the foregoing limitation of warranty insofar as it relates to repairs, alterations, or modifications, shall not be applicable to routine preventive and corrective maintenance which normally occur in the operation of the equipment.

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Purchaser agrees to underwrite the cost of any labor required for replacement; including time, travel, and living expenses of a Thermo Fisher Scientific Field Service Engineer at the closest factory base.

Thermo Fisher Scientific

501 90th Ave NW

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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.

Appendix A: Engineering Drawings

Appendix B: Factory Mutual Report

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.

About this Manual

About this Manual

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. ▲

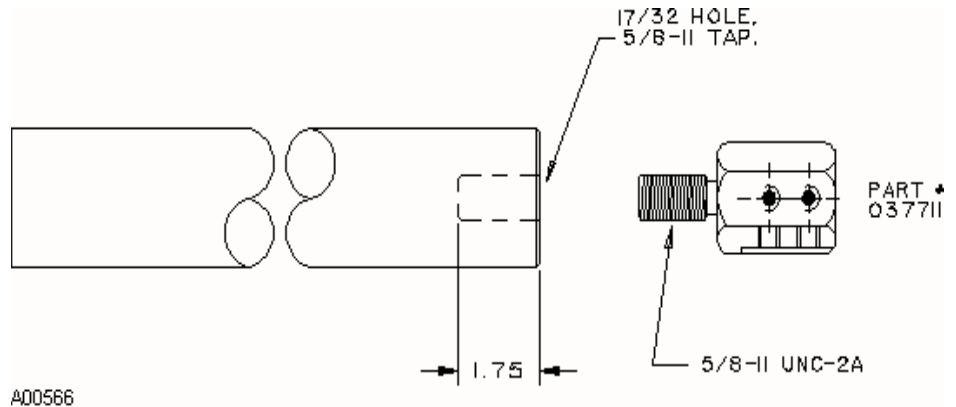
Use the following procedures for coupling installation:

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 "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 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.

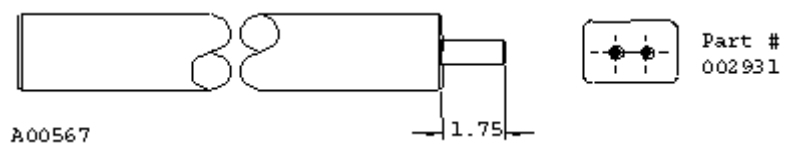
It would be advisable to provide two flat surfaces, 90° apart, on the stub shaft for a good set screw holding power.



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.

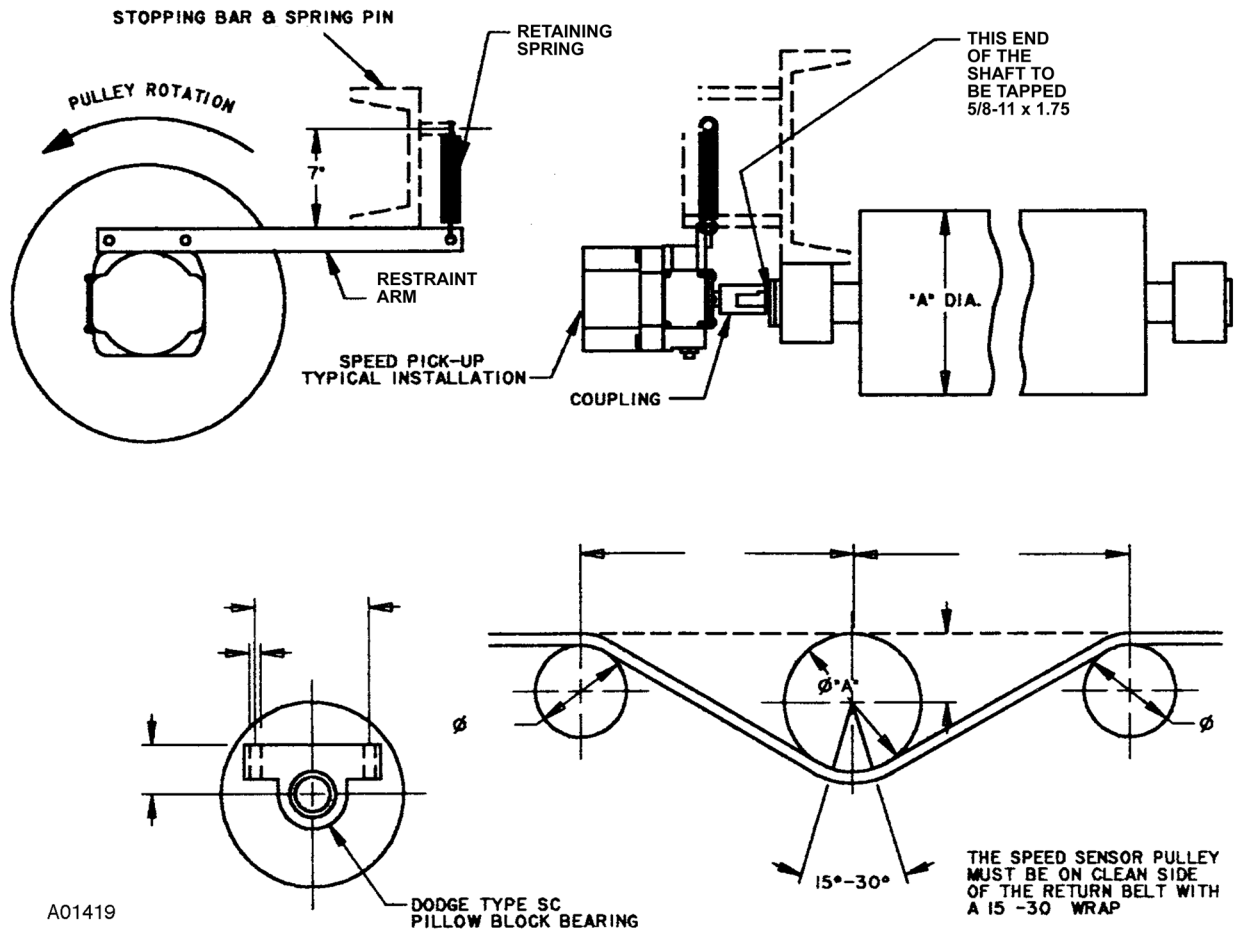
Installation

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

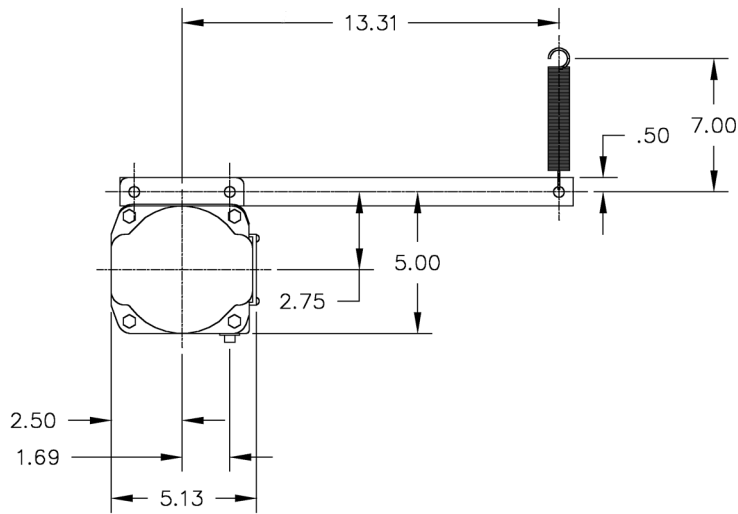


1. Speed Sensor must not be mounted rigid. Use restraint arm and retaining spring. Mechanical stop and spring mount are by others.
2. Attach spring in location such as to give 1/2" spring stretch.
3. All wiring by others in accordance with system field wiring diagram and applicable codes.

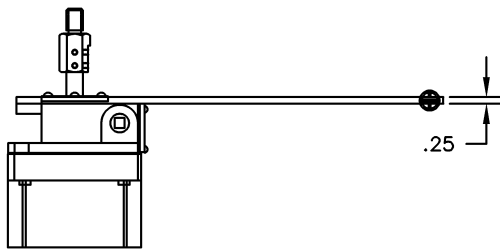
Installation

Alternate Sensor Location

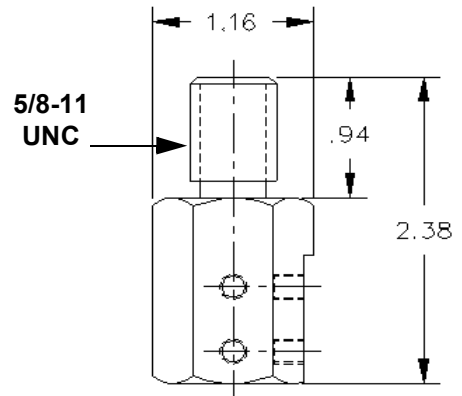
Speed	Minimum "A"	Maximum "A"
100 FPM	2"	14"
200 FPM	4"	36"
300 FPM	6"	48"
400 FPM	8"	60"
500 FPM	10"	60"
600 FPM	12"	60"
700 FPM	14"	60"
800 FPM	16"	60"
900 FPM	18"	60"
1000 FPM	20"	60"



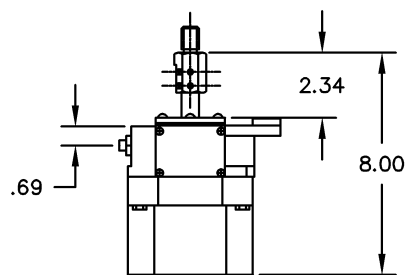
A0041a



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

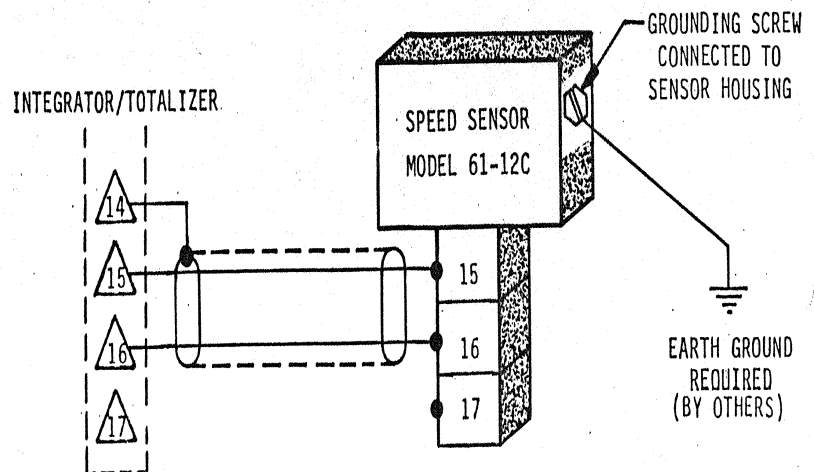


WARNING. This device is rated for use in areas described as: Class I, Division 2, Group D, and Class II, Divisions 1 and 2, Groups E, F, and G as defined by the National Electrical Code (NEC). ▲



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.

Installation
Electrical Wiring

Chapter 3

Operation

Overview

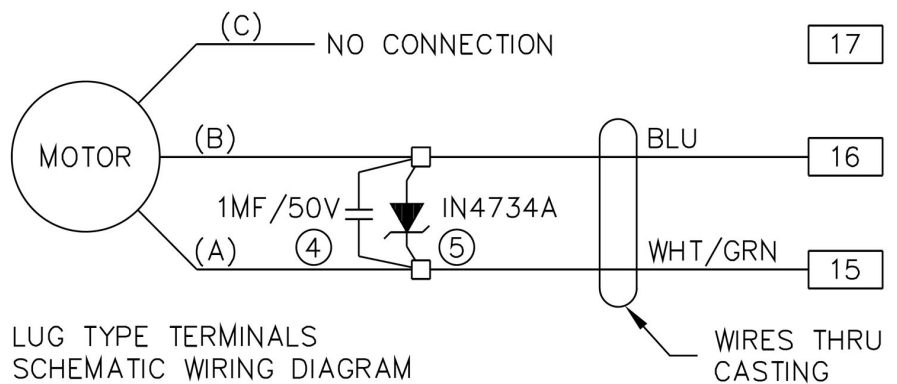
The speed sensor element employs a brushless, pulse generator which produces a stream of pulses, each pulse representing a unit of belt travel. The frequency of the pulse stream is proportional to true belt speed. The pulse output signal is fed to the Integrator/ Totalizer.

Model 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).

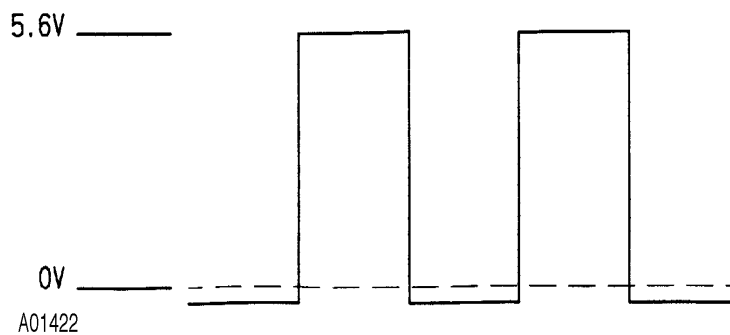
The rotor consists of a 50-slot permanent magnet that is rotated in the stator. The 61-12 C puts out 50 pulses per revolution; the output frequency is therefore the product of RPM x .8333. The output signal is a +5.6 volt pulse. The 61-12 C does not require an external power source to operate.

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.

Chapter 5

Service, Repair, and Replacement Parts

This chapter provides information about service, repair, and replacement parts for your *Thermo Scientific* product. It includes the telephone numbers for various departments at Thermo Fisher Scientific, the procedure for ordering replacement parts, a *Return Material Authorization (RMA) Form*, and the appropriate parts lists.

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

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

A *Thermo Fisher Scientific* repair center is located at the 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 at (800) 445-3503 to get a number to use on the form.

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

Main Switchboard	(763) 783-2500
FAX	(763) 783-2525
Service	(800) 445-3503
RMA and Repair	(800) 445-3503

24 x 7 phone support

Or any local *Thermo Fisher Scientific* office.

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.

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.

Telephone or FAX:

Thermo Fisher Scientific

Customer Service Department

501 90th Ave NW

Minneapolis, MN 55433

FAX: (763) 783-2525

Phone: (763) 783-2500

Return Material Authorization and Repair: (800) 445-3503

ThermoFisher SCIENTIFIC

501 90th Avenue N.W.
Minneapolis, MN 55433
11/27/2008

1-800-445-3503
Fax: 763.783.2525
www.thermo.com

Dear Customer,

Thank you for using our in-house repair service. To expedite your repair, control costs, and ensure that safety requirements are met please follow these simple steps.

1. Send in a copy of this completed form with a copy of your PO to the fax or email listed above. An RMA will not be issued without a hard copy PO on file.
2. Once an RMA has been issued, you will be sent a shipping label noting your RMA number and the address to ship the parts back to. The assigned RMA number is valid for 30 days from the date of issuance. If your part(s) is not received within 30 days, your PO will be cancelled and a new RMA will be required. All parts for repair MUST reference a valid RMA number or the part will be returned at your cost.
3. Please do not ship partial shipments. Your return must be complete. Any parts received separately will require a separate RMA and PO. Return only those products which are authorized by the RMA. Additional products that are sent without approval may be returned to you.
4. If a product is determined to be a "no defect found" then an evaluation fee of \$250.00 per part (\$500.00 per full system) sent in will be charged.
- 5.

Thank you for giving Thermo Fisher Scientific the opportunity to satisfy your service needs. You can contact me by sending an e-mail to _____ or by calling 1-800-445-3503.

Return Material Authorization (RMA) Form

Note: Thermo Fisher Scientific safety policy requires a decontamination form for any package being received into our building. Please complete the following paperwork and send it to the fax or email noted above. Failure to do so will cause delays. If the unit is not decontaminated as required, there will be a \$300.00 minimum charge.

CONTACT INFORMATION

Contact Name: _____
Phone Number: _____
Fax Number: _____
Email: _____

SHIPPING INFORMATION

Company Name: _____
Address: _____
City: _____ State: _____ Zip: _____

BILLING INFORMATION (If different from above):

Company Name: _____
Address: _____
City: _____ State: _____ Zip: _____
A/P Contact Name: _____
Phone Number: _____
Fax Number: _____
Email: _____

TAX EXEMPT: Yes No

PAYMENT INFORMATION (Choose One):

Credit Card (If you wish to pay via credit card, please call 800-227-8891, opt.2. In order to protect our customers from accidental data compromise, Thermo Fisher Scientific dba Thermo Ramsey Inc does not accept credit card numbers via email or fax.)

Purchase Order (If you wish to pay via PO, please send an official hard copy PO with this form)
PO Number: _____

Warranty (All warranties need to be pre-approved by our tech support representatives prior to an RMA being issued. If this box is checked then a tech support rep will be contacting you shortly)

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501 90th Avenue N.W.
Minneapolis, MN 55433
11/27/2008

1-800-445-3503
Fax: 763.783.2525
www.thermo.com

PRODUCT INFORMATION:

Part number: _____

Part Description: _____

Problem description:

Part number: _____

Part Description: _____

Problem description:

Part number: _____

Part Description: _____

Problem description:

Part number: _____

Part Description: _____

Problem description:

Part number: _____

Part Description: _____

Problem description:

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11/27/2008

1-800-445-3503
Fax: 763.783.2525
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DECONTAMINATION FORM

Please complete all areas of the Decontamination Declaration below.

- **Orders without a Decontamination Declaration will not be processed and the instrument will be returned to the sender via collect freight.**
- **Please send this form with a hard copy of your PO to the above email or fax number to obtain an RMA number for shipping. Retain a copy for your records.**

Please provide a specific description of your system's use:
Describe type of product run on your equipment:

Please describe all cleaning and/or decontamination performed:

Check all that apply:

- Out of Box Failure Non-Hazardous Materials only **Hazardous Material** (See Below)

Hazardous Materials:

<input type="checkbox"/> Carcinogen	<input type="checkbox"/> Bacteria	<input type="checkbox"/> Fungus	<input type="checkbox"/> Pathogen	<input type="checkbox"/> Toxic Substance
<input type="checkbox"/> Radioactive	<input type="checkbox"/> Virus	<input type="checkbox"/> Corrosive Chem. Hazard	<input type="checkbox"/> Flammable Chem. Hazard	<input type="checkbox"/> Reactive Chem. Hazard
<input type="checkbox"/> Animal/ Plant/ Mineral (Explain)		<input type="checkbox"/> Other (Explain)		
<hr/> <hr/>				

To the best of my knowledge, this equipment is free of harmful or hazardous chemical, biological or radioactive contamination. I understand that if the equipment is found to be contaminated, regardless of the signature on this document, the equipment will be returned at my company's expense.

Signature: _____ Title: _____ Date: _____

Thermo Fisher Scientific Offices

Here is a list of Thermo Fisher Scientific offices worldwide.

Australia

+61 (0) 8 8208 8200
+61 (0) 8 8234 3772 (fax)

Canada

+1 (905) 888-8808
+1 (905) 888-8828 (fax)

Chile

+56 (0) 2 378 8050
+56 (0) 2 370 1082 (fax)

China

+86 (0) 21 6865 4588
+86 (0) 21 6445 7830 (fax)

Germany

+49 (0) 208-824930
+49 (0) 208-852310 (fax)

India

+91 (20)-6626-7000
+91 (20)-6626-7001 (fax)

Italy

+39 02-959514-1
+39 02-953200-15 (fax)

Netherlands

+31 (0) 76-579-5555
+31 (0) 76-571-4958 (fax)

South Africa

+27 (0) 11-609-3101
+27 (0) 11-609-3110 (fax)

Spain

+34 (0) 91-484-5965
+34 (0) 91-484-3597 (fax)

United Kingdom

+44 (0) 1788-820300

+44 (0) 1788-820301 (fax)

United States

+1 (800) 445-3503

+1 (763) 783-2525 (fax)

+1 (763) 783-2500 (direct)

Disposal of Hazardous Waste

Disposal of lithium batteries and soldered printed circuit boards must be in accordance with your local Hazardous Waste Policy.

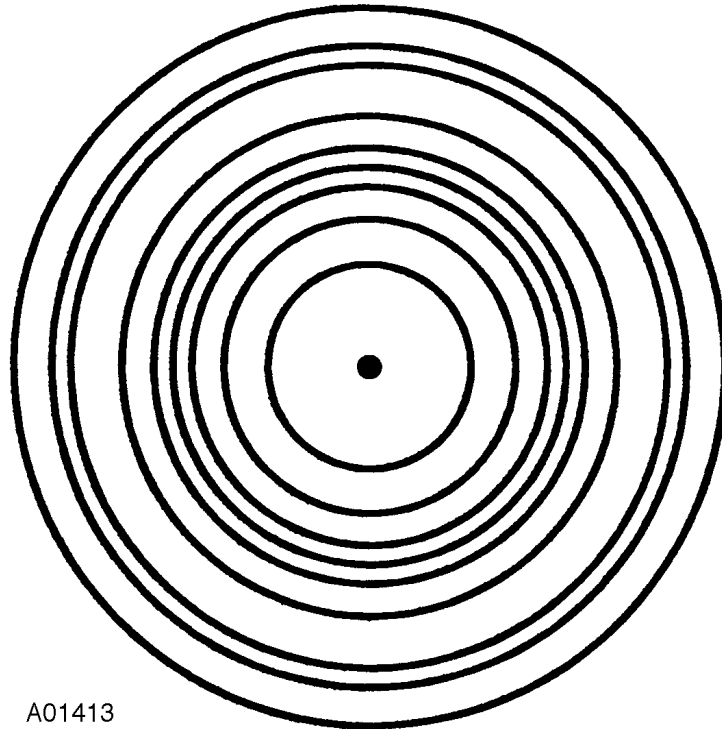
As an alternative, a product supplied by Thermo Fisher Scientific may be returned, freight pre-paid, for disposal. Contact the Repair Department for a Return Material Authorization Number, before shipping any product for disposal.

Parts List

This list provides part numbers and descriptions of the replaceable parts for the Model 61-12C Speed Sensor.

ITEM DESCRIPTION	PART NO.
Speed Sensor, Model 61-12C/FM	005995
Speed Sensor Accessories:	
Diode, Zener IN4734A, 5.6-V	001303
Capacitor, Tant 1-mf, 50-V	001173
Clamp Bar (Restraint Arm)	002920
Coupling Shaft, 6.25 Bore	002931
Spring, Extension for Clamp Bar	001988
Motor Support	040736
Motor, Step, AC	001522
Coupling, shaft, threaded	037711

Figure 5-1. Centering Template for Speed Sensor



A01413

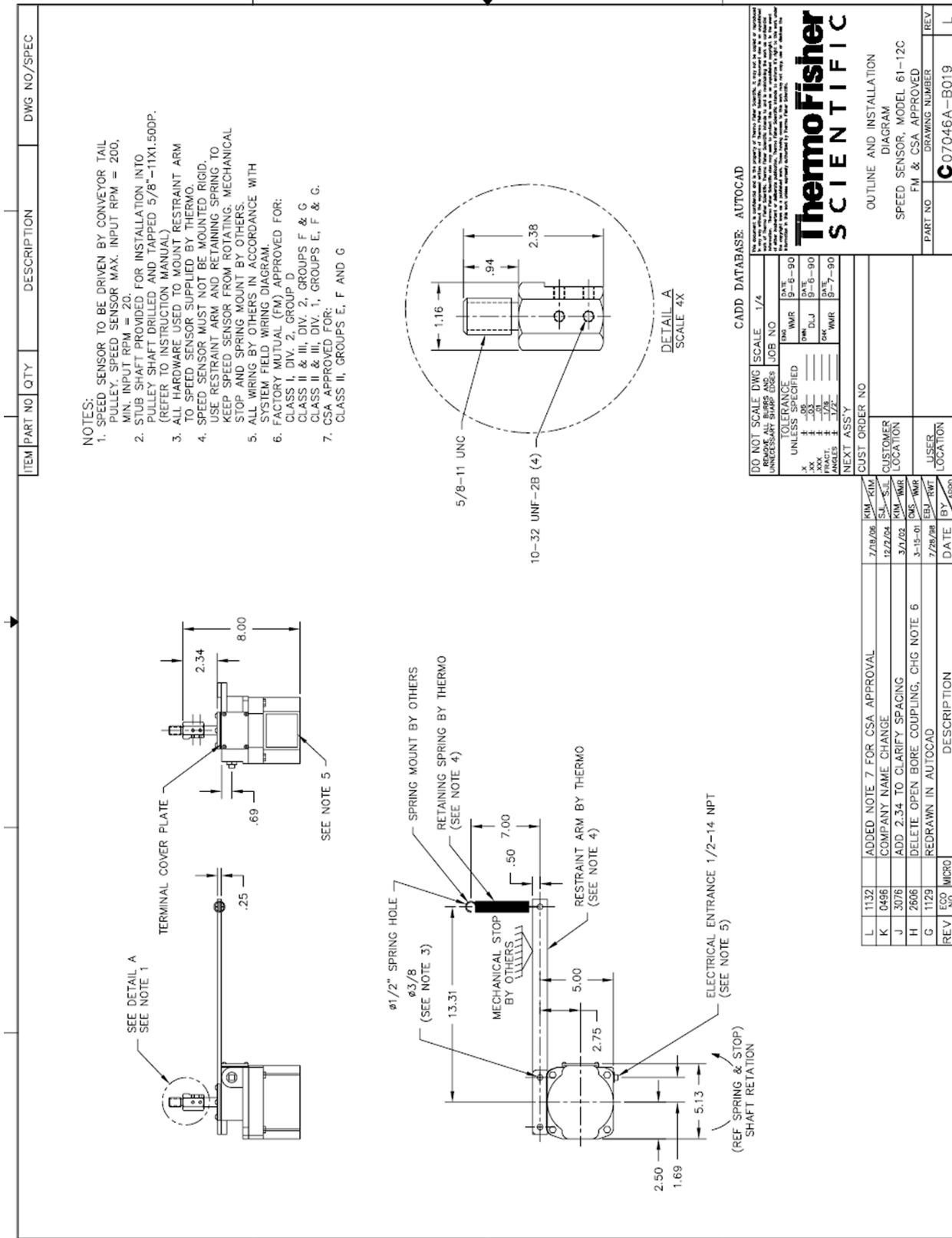
Service, Repair, and Replacement Parts
Parts List

Appendix A

Engineering Drawings

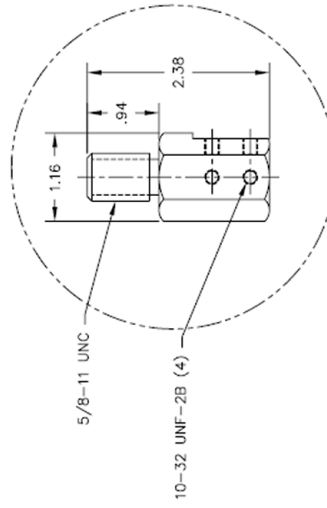
This appendix contains engineering drawings for your Model 61-12 C Speed Sensor. The following drawing is included.

- Outline and Installation Diagram, Speed Sensor Model 61-12 C (FM Approved) - C07046A-B019



ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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- NOTES:**
1. SPEED SENSOR TO BE DRIVEN BY CONVEYOR TAIL PULLEY. SPEED SENSOR MAX. INPUT RPM = 200, MIN. INPUT RPM = 20.
 2. SUB SHAFT DRILLED AND TAPPED 5/8"-11X1.50DP. (REFER TO INSTRUCTION MANUAL)
 3. ALL HARDWARE USED TO MOUNT RESTRAINT ARM TO SPEED SENSOR MUST NOT BE MOUNTED RIGID. USE RESTRAINT ARM AND RETAINING SPRING TO KEEP SPEED SENSOR FROM ROTATING. MECHANICAL STOP AND SPRING MOUNT BY OTHERS.
 4. ALL WIRING BY OTHERS IN ACCORDANCE WITH SYSTEM FIELD WIRING DIAGRAM.
 5. FACTORY MUTUAL (FM) APPROVED FOR: CLASS I, DIV. 2; GROUP D
 6. CSA APPROVED FOR: CLASS II & III, DIV. 2; GROUPS F & G
 7. CSA APPROVED FOR: CLASS II, GROUPS E, F AND G



DETAIL A
SCALE 4X

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG SCALE 1/4
REMOVE ALL DIMS AND JOB NO
UNLESS SPECIFIED

TOLERENCE	ISO	W/MR	DATE	8-6-90
X	UNLESS SPECIFIED	DM	DJL	8-6-90
XX	± .03	OK	W/MR	8-7-90
XXX	± .02	OK	W/MR	8-7-90
ANGLES	± 1/2°			

NEXT ASS'Y

CUST ORDER NO

CUSTOMER LOCATION

USER LOCATION

DATE BY

7/28/06 KIM-KIM
12/2/04 S.L.S.
3/02/02 KIM-WMR
3-15-01 DMS-WMR
7/28/06 ELL-RWF

ADDED NOTE 7 FOR CSA APPROVAL
COMPANY NAME CHANGE
ADD 2.34 TO CLARIFY SPACING
DELETE OPEN BORE COUPLING, CHG NOTE 6
REDRAWN IN AUTOCAD

ECO MICRO
NO DESCRIPTION

OUTLINE AND INSTALLATION DIAGRAM
SPEED SENSOR, MODEL 61-12C
FM & CSA APPROVED

PART NO **C07046A-B019** REV L

Derived from 2 3 4 5 6

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Appendix B

Factory Mutual Report

Overview This appendix contains Factory Mutual Report 3007635 on the 61-12C Speed Sensor.

FACTORY MUTUAL RESEARCH
Project I.D.3007635

**RE-EXAMINATION
MODEL 61-12C, SPEED SENSOR
FOR USE IN
HAZARDOUS (CLASSIFIED) LOCATIONS**

March 8, 2001

from

**THERMO FISHER SCIENTIFIC
501-90TH AVE. N.W.
MINNEAPOLIS, MN. 55433**

I INTRODUCTION

- 1.1 Thermo Ramsey requested Factory Mutual Research to perform an evaluation to determine if the apparatus listed in Section 1.5 can be considered as suitable for service as Nonincendive Class I, Division 2, Groups D; Suitable for Class II, III, Division 2, Group F & G; and Class II, III, Division 1, Group E, F, & G; indoor use. The subject equipment was examined to the applicable requirements of the standards listed in section 1.4
- 1.2 This report supercedes Factory Mutual Research Approval Report J.I. 0K0H2.AE and any subsequent revision reports.
- 1.3 This Report may be freely reproduced only in its entirety and without modification.
- 1.4 Standards

Title	Class Number	Date
Nonincendive Electrical Equipment for Use in Class I and Class II, Division 2, and Class III, Division 1 and 2 Hazardous (Classified) Locations	3611	October 1999
Electrical Equipment for Use in Hazardous (Classified) Locations, General Requirements	3600	November 1998
Electrical and Electronic Test, Measuring and Process Control Equipment	3810 Including Supplement #1	March 1989 July 1995

1.5 Listing

The product will appear in the Approval Guide as follows:

61 - 12C. Speed Sensor.

NI/ I/ 2/ D/ T6 Ta = 54°C; S/ II, III/ 2/F, G/T6 Ta = 54°C; S/ II, III/ 1/E, F, G/T6 Ta = 54°C

FACTORY MUTUAL RESEARCH
Project ID.3007635

II DESCRIPTION

The model 61-12C Speed Sensor is designed for direct connection to a conveyor tail pulley, snubbing roll, or large diameter return roller. The speed sensor employs a brush-less pulse generator which produces a stream of pulses, each pulse represents a unit of belt travel. The frequency of the pulse stream is proportional to the belt speed. The belt speed is translated into a 6V, 20mA, square wave output signal, the unit does not require any external power supply.

III EXAMINATIONS AND TESTS

3.1 General – A representative sample of the model 61-12C Speed Sensor was examined and tested by Factory Mutual Research to determine the acceptability of the apparatus for use in the specified hazardous locations. The examination included circuit analysis, temperature evaluation, as well as, a review of the manufacturer's documentation, and the physical construction of the equipment. Where it was relevant, test data and analysis from Factory Mutual Research report J.I. 0K0H2.AE and 23726, for Thermo Fisher Sc. was used to support conformance to the requirements in lieu of additional testing. Data from additional reports, which were used as part of this approval is listed in the pertinent sections of this report. All of the results were satisfactory and are summarized in the following sections.

3.2 Nonincendive Examination – Nonincendive equipment acceptability is based on the inability of the equipment to release sufficient electrical or thermal energy under normal operating conditions to cause ignition of the specific hazardous atmospheres. Hot spot temperatures were also evaluated.

The following results verify that the product listed in section 1.5 is a suitable use in Class I, II, III, Division 2, Groups D, F, and G hazardous (classified) locations.

3.2.1 Make / Break Evaluation – The unit does not use any normally intermittent making and breaking components, which could produce ignition capable energy due to arcing.

3.2.2 Capacitance Assessment – The units do not have any capacitive circuits, which discharge under normal operating conditions. No additional testing was required.

3.2.3 Inductance Assessment – The units do not have any inductive circuits, which are interrupted under normal operating conditions. No additional testing was required.

3.2.4 Temperature Test – There is no appreciable increase in the temperature of any of the components, under normal operating conditions, which could raise the temperature of the outside enclosure in excess of 85°C. At an operating ambient temperature of 54°C this yields a temperature code of T6 for the unit for Division 2 operation. The temperature code is not required to be marked on the label of the product.

3.2.5 Enclosure Evaluation – This portion of the evaluation verifies that the enclosure of the product listed in section 1.5 is permitted for use to provide the following types of protection methods: Class II, and III, Division 2, Groups F and G for indoor use.

The field mount housing for the Model 61-12C is the exact same housing as was approved under 23726 and J.I. 0K0H2.AE, therefore, the results obtain during the Dust-Ignitionproof examination of this housing apply. No other testing was required.

FACTORY MUTUAL RESEARCH
Project ID.3007635

- 3.3 Protection Against Electrical Shock, Fire, and Injury – Electrical equipment acceptability is based on the ability of the equipment to minimize the risk of electrical shock, fire, and personal injury.
- 3.3.1 Accessible Parts – The model 61-12C Speed Sensor does not have any accessible parts which are at HAZARDOUS LIVE voltage levels during normal or single fault conditions. No additional testing was required.
- 3.3.2 Protection Against Fire – The voltage supplied by the unit is less than 42.4 V DC and the current is less than 8A. This means that the circuit for the model 61-12C Speed Sensor is considered a limited circuit, thus reducing the risk of any fire hazard. Under normal operation or single fault failure, no hazardous condition exists. No additional testing was required.

IV MARKING

The following information appears on the apparatus identified in Section 1.5 and meets Standard requirements:

- Manufacturer's name and manufacturing location.
- Type number and date code
- Maximum input
- The Factory Mutual Research mark of Approval
- Hazardous Location Rating

V REMARKS

- 5.1 Installations shall comply with the relevant requirements of the latest edition of the National Electrical Code (ANSI/NFPA 70).
- 5.2 Tampering and replacement with non-factory components may adversely affect the safe use of the system.

VI FACILITIES AND PROCEDURES AUDIT

The manufacturing site in Minneapolis, Minnesota is subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.

VII MANUFACTURERS RESPONSIBILITIES

- 7.1 Documentation considered critical to this Approval is on file at Factory Mutual Research and listed in the Documentation File, Section VIII of this report. No changes of any nature shall be implemented unless notice of the proposed change has been given and written authorization obtained from Factory Mutual Research. The Approved Product Revision Report, Form 797, shall be forwarded to Factory Mutual Research as notice of proposed changes.

FACTORY MUTUAL RESEARCH
Project ID.3007635

VIII DOCUMENTATION

Concerning the model 61-12C Speed Sensor , the documentation listed below are applicable to this Approval and are considered to be controlled documents, on file under Project ID.3007635 at Factory Mutual Research.

Drawing No.	Issue	Description
D04780D-0001	FH	FINAL ASSEMBLY SPEED SENSOR
D06196A-0002	N	ASS'Y AND ALTERATION SPEED SENSOR
B06196A-0004	H	ANODIZING FILM SPEED SENSOR

IX CONCLUSION

The apparatus described in 1.5 meets Factory Mutual Research requirements. Approval is effective when the Approval Agreement is signed and received by Factory Mutual Research.

RE-EXAMINATION AND TESTING BY: Aaron Coleman

PROJECT DATA RECORD: ID. 3007635

ORIGINAL TEST DATA: 0K0H2.AE

ATTACHMENTS:
B06196A-0004 H ANODIZING FILM SPEED SENSOR

REPORT BY:

REPORT REVIEWED BY:



Aaron Coleman
Approvals Engineer
Electrical Section



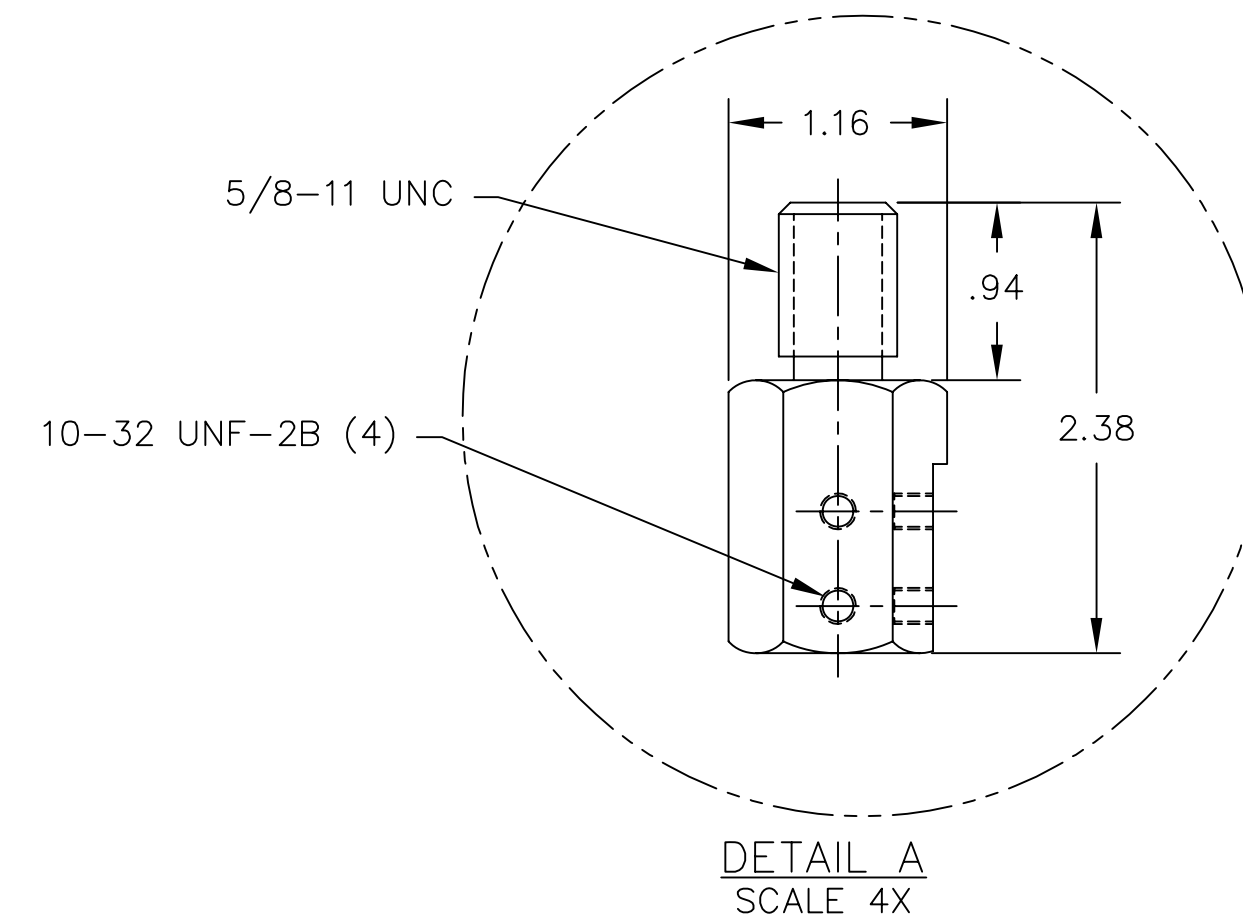
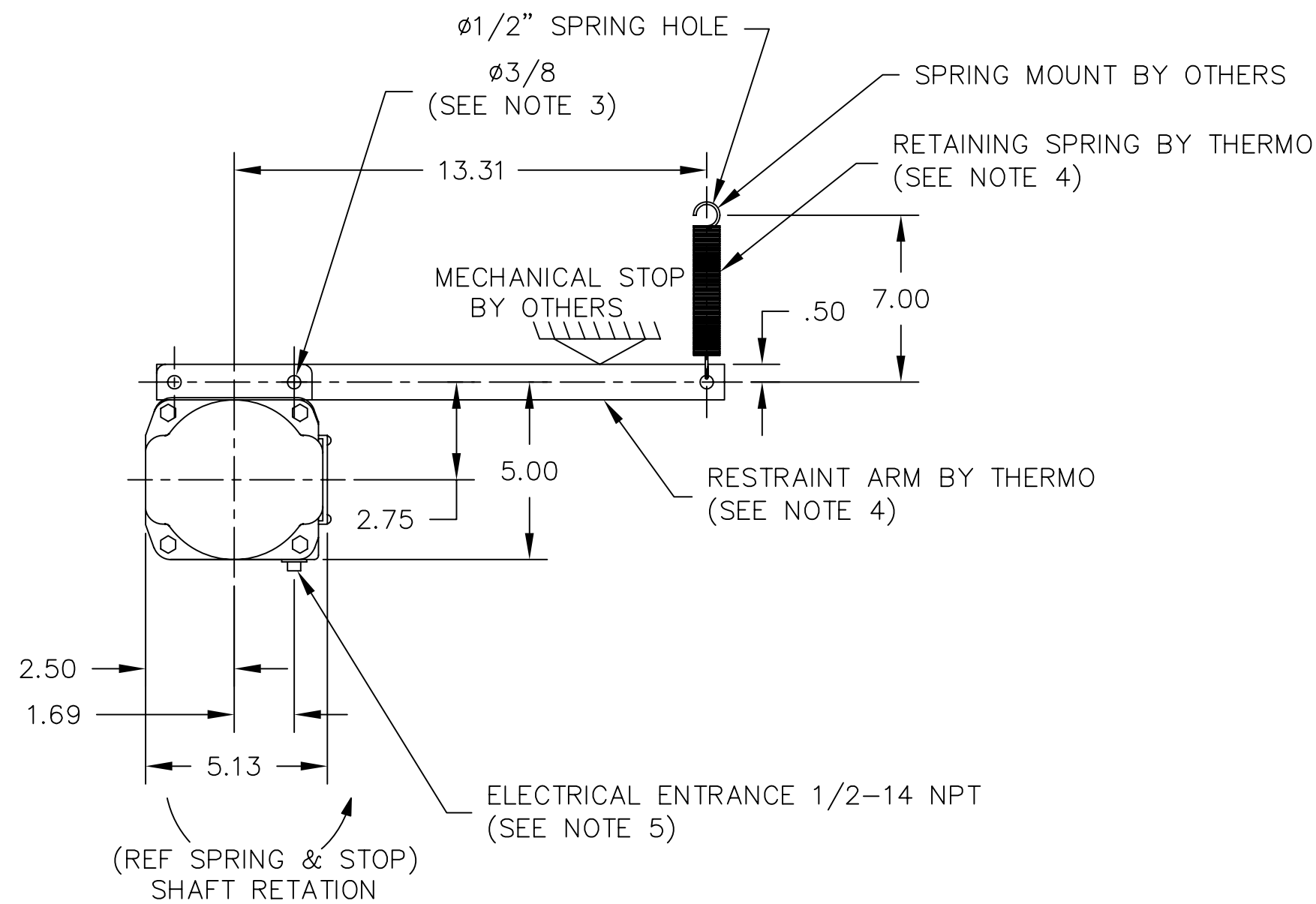
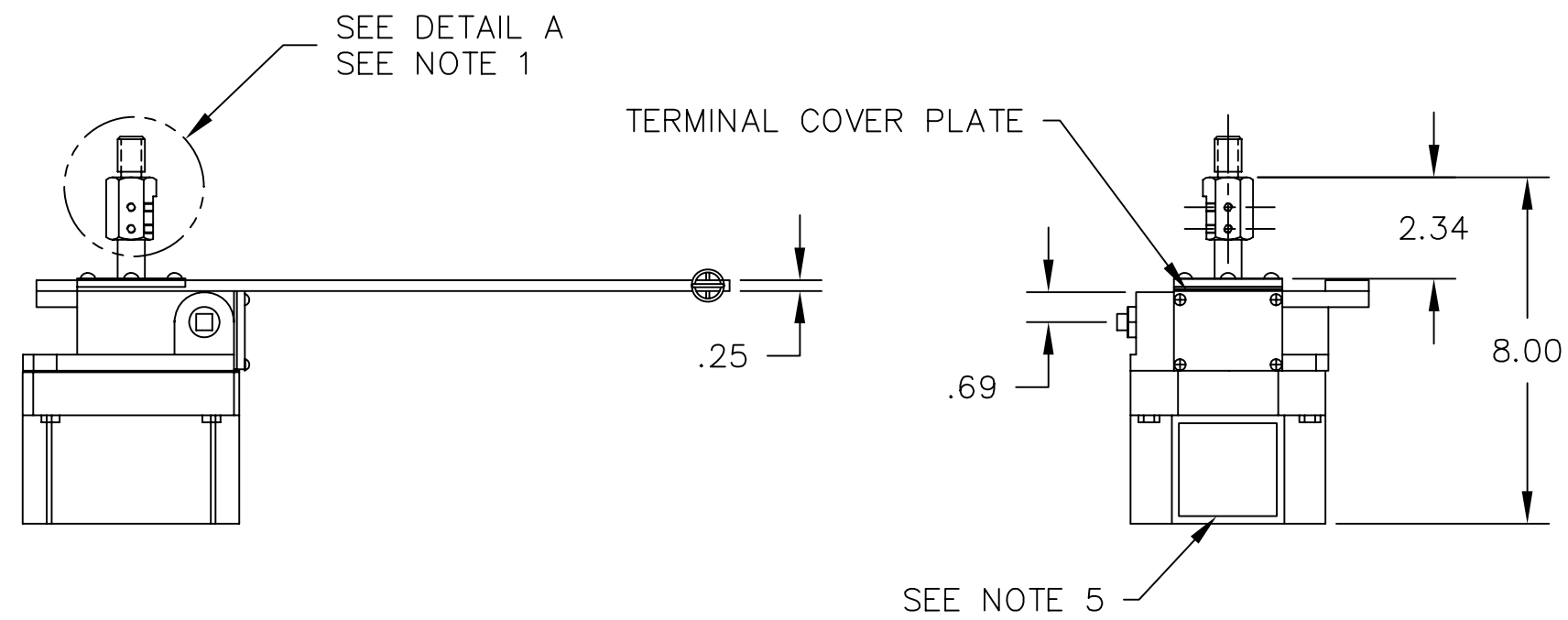
Nicholas P. Ludlam
Senior Engineer
Electrical Section

Factory Mutual Report
Overview

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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NOTES:

1. SPEED SENSOR TO BE DRIVEN BY CONVEYOR TAIL PULLEY. SPEED SENSOR MAX. INPUT RPM = 200, MIN. INPUT RPM = 20.
2. STUB SHAFT PROVIDED FOR INSTALLATION INTO PULLEY SHAFT DRILLED AND TAPPED 5/8"-11X1.50DP. (REFER TO INSTRUCTION MANUAL)
3. ALL HARDWARE USED TO MOUNT RESTRAINT ARM TO SPEED SENSOR SUPPLIED BY THERMO.
4. SPEED SENSOR MUST NOT BE MOUNTED RIGID. USE RESTRAINT ARM AND RETAINING SPRING TO KEEP SPEED SENSOR FROM ROTATING. MECHANICAL STOP AND SPRING MOUNT BY OTHERS.
5. ALL WIRING BY OTHERS IN ACCORDANCE WITH SYSTEM FIELD WIRING DIAGRAM.
6. FACTORY MUTUAL (FM) APPROVED FOR:
CLASS I, DIV. 2, GROUP D
CLASS II & III, DIV. 2, GROUPS F & G
CLASS II & III, DIV. 1, GROUPS E, F & G.
7. CSA APPROVED FOR:
CLASS II, GROUPS E, F AND G



CADD DATABASE: AUTOCAD

DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES	SCALE 1/4 JOB NO	ENG WMR DATE 9-6-90 DWN DLJ DATE 9-6-90 CHK WMR DATE 9-7-90
TOLERANCE UNLESS SPECIFIED .X ± .06 .XX ± .03 .XXX ± .01 FRACT. ± 1/16 ANGLES ± 1/2°		

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REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
L	1132		ADDED NOTE 7 FOR CSA APPROVAL	7/18/06	KIM	KIM
K	0496		COMPANY NAME CHANGE	12/2/04	SJL	SJL
J	3076		ADD 2.34 TO CLARIFY SPACING	3/1/02	KIM	WMR
H	2606		DELETE OPEN BORE COUPLING, CHG NOTE 6	3-15-01	CMS	WMR
G	1129		REDRAWN IN AUTOCAD	7/28/98	EBJ	RWT

NEXT ASS'Y	CUST ORDER NO
CUSTOMER LOCATION	
USER LOCATION	

OUTLINE AND INSTALLATION DIAGRAM SPEED SENSOR, MODEL 61-12C FM & CSA APPROVED		
PART NO	DRAWING NUMBER	REV
	C07046A-B019	L