SAUER DANFOSS

MCX103A Non-Contact Rotary Position Sensor

Technical Information

E1™ COMPLIANT

Revisions

Revision History

Table of Revisions

Date	Page	Changed	Rev
07 Dec 2010	Cover	PLUS+1 Compliant logo	AB
28 Sep 2010		Replaces BLN-95-8991	AA

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Overview

Description

The MCX103A Non-Contact Rotary Position Sensor serves as either a command or feedback source. The sensor is a non-contacting proportional hall chip which is ideal for the rugged off-highway environment. The sensor's housing is aluminum, and the rotary hub is supported by dual sleeve bearings that resist side loading damage.

This sensor does not have a miscellaneous standby switch.

Features

- Non-contact sensor withstands high shock and vibration
- Low cost
- Input voltage adapted for microprocessor circuits
- Infinite resolution
- Long life
- Designed to withstand the mobile environment
  - – - 40° to 85° C operating range
  - – 95% relative humidity
  - – Meets off-highway vibration standards
  - – Protected against static discharge, EMI and RFI

Ordering Information

Part Number Quick Reference

Part number	Supply voltage	Total electrical rotation	Body style	Connector
MCX103A1051	5 to 8 Vdc	45°	Stud mount with flange	6 pin MS
MCX103A1069	5 to 8 Vdc	45°	Flange mount	6 pin MS
MCX103A1077	5 to 8 Vdc	30°	Stud mount with flange	6 pin MS
MCX103A1110*	8 Vdc	30°	Stud mount with flange	14 pin MS
MCX103A1131	5 to 8 Vdc	30°	Stud mount with flange	6 pin MS
MCX103A1149	5 Vdc	30°	Stud mount with flange	6 pin MS
MCX103A1157	5 Vdc	30°	Stud mount with flange, connector out end cap	6 pin MS

* Used with KGS Road Sentry System.

MCX103A1093, MCX103A1102, MCX103A1123 are obsolete.

Ordering Information (continued)

Surface Contacts

Part Number	Description
KG04003*	Right angle follower (nylon)
KG06601	Skate assembly
KG07002**	Steering follower (with nylon grid adapter)

To avoid possible electromagnetic and radio frequency interference (EMI/RFI) use only:
* KG04003 surface contact for grade
** KG07002 surface contact for steering

Service Part

Part Number	Description
K32299	Hub and hanger assembly

Related Product

Part Number	Description
KW01026 cable assembly	Braided (not foil) shield cable with a minimum of 75% shielding.
KW01009 cable assembly	Standard unshielded.

Cables are two to ten feet retractable, completely assembled with a six position straight socket terminal plug connected to each end, and on one end there is a cap and chain.

To ensure avoiding the harmful effects of EMI/RFI use KW01026 shield cable assembly. See *Wiring*, page 10.

Theory of Operation

The MCX103A Non-contact Rotary Position Sensor is powered by a regulated command source in the 5 to 8 Vdc range. Typically, a follower attachment that traces a string line or other reference surface provides input to the sensor. Changes in the reference move the follower, which in turn rotates a spring-loaded hub. The hub is attached to a shaft, mounted upon the shaft is a U-shaped magnet. A linear Hall effect chip, stationary between the two poles, outputs a voltage in proportion to the number of impinging magnetic flux linkages. As the poles rotate about the chip, the flux linkages decrease with the increasingly oblique angle. The sensor's voltage ranges nearly linearly from 3.8 to 1.2 V, normal (with 5 Vdc input).

Technical Data

Electrical

Input voltage	5 to 10 Vdc
Hall effect electromagnetic sensor	Life is not limited by the number of cycles.
Maximum current draw	20 mA
Output voltage at 5 Vdc	2.5 Vdc nominal at null
	1.2 ± .1 Vdc (full clockwise, 30° device)
	3.8 ± .1 Vdc (full counterclockwise, 30° device)
	1.2 ± .1 Vdc (full clockwise, 45° device)
	3.8 ± .1 Vdc (full counterclockwise, 45° device)
Linearity	Approximately ± 3% over the rated angle. Since the output is proportional to the sine of the input angle, greater linearity can be achieved by reducing the angle employed.
EMI/RFI*	20 V per meter between 14 Khz and 1 Ghz
	100 V per meter over the ranges: 24 to 51 Mhz 148 to 175 Mhz 445 to 517 Mhz 798 to 875 Mhz

* All EMI/RFI specifications subject to shielded cabling. See *Wiring*, page 10.

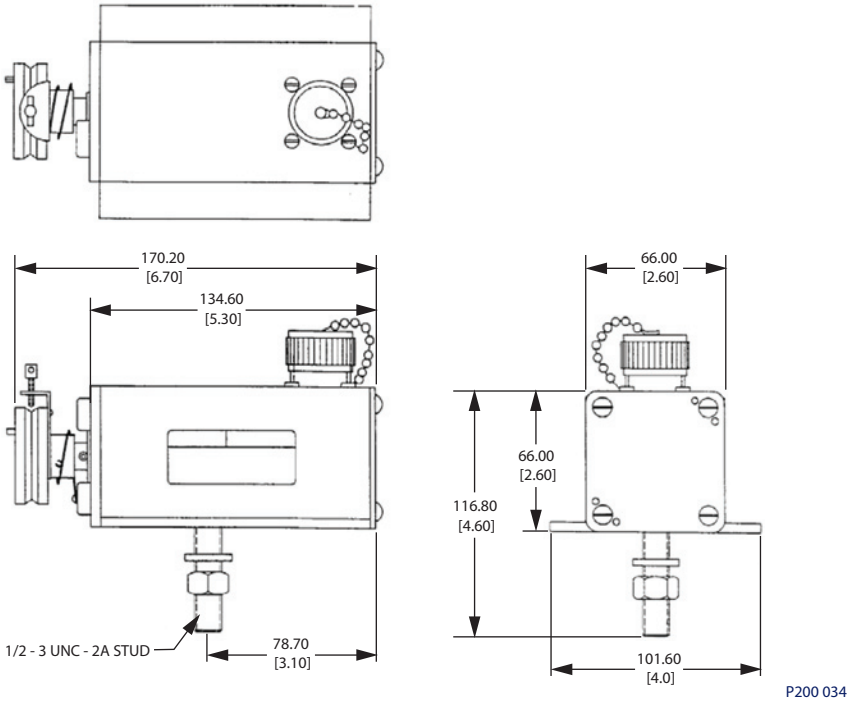
Environment

Operation temperature rating	- 40° to 85° C (- 40° to 185° F)
Storage temperature rating	- 55° to 125° C (- 67° to 257° F)
Temperature stability	Null shift of ± .028% per degree C from - 40° to 85° C
	Gain shift of ± .025% per degree C from - 40° to 85° C
Vibration (Two part vibration test designed for mobile equipment controls.)	Withstands cycling test performed on each of the three major axes: Cycling from 5 to 2000 Hz for a period of one hour (if four resonant points) to three hours (if no resonant point).
	Withstands resonant dwell for one million cycles for each of the four most severe resonant points on each of the three major axes.
Shock (Three shocks in both directions of the three mutually perpendicular axes for a total of 18 shocks.)	50 g per 11 ms
Humidity (Placed in a controlled atmosphere of 95% humidity at 38° C (100° F) for 10 days.)	Performs within specification limits.

Dimensions

MCX103A1051, MCX103A1077, and MCX103A1149

mm [in]



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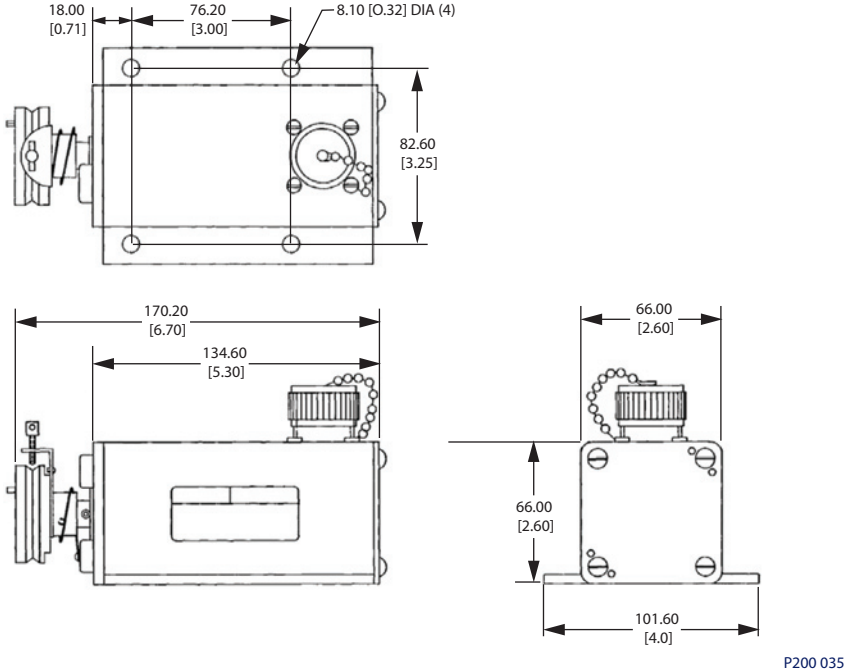
MCX103A1069

mm [in]



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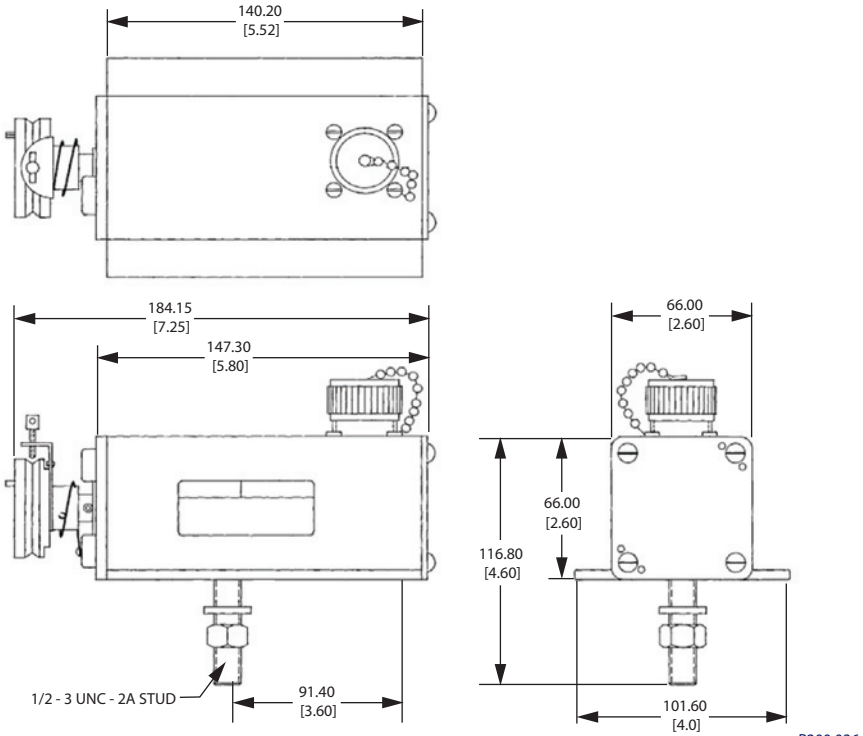
Dimensions (continued)

MCX103A1110

mm [in]



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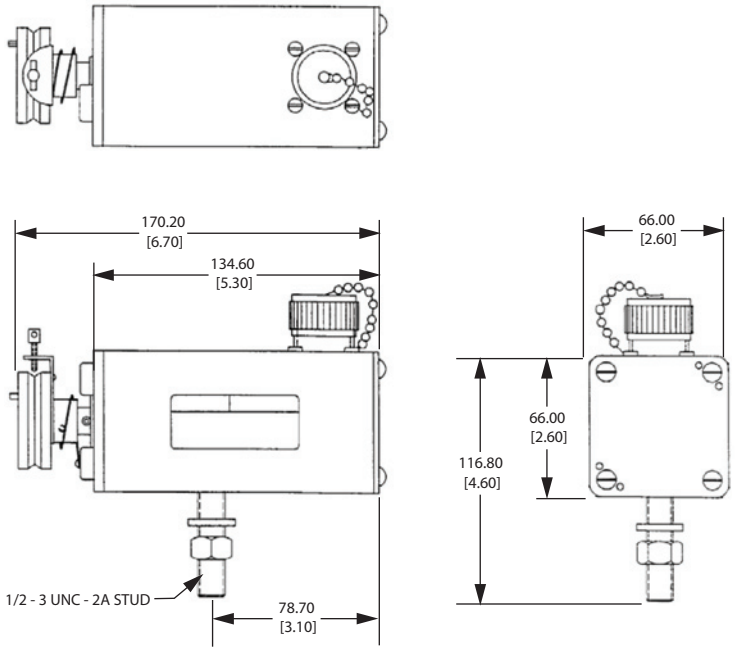
MCX103A1131

mm [in]



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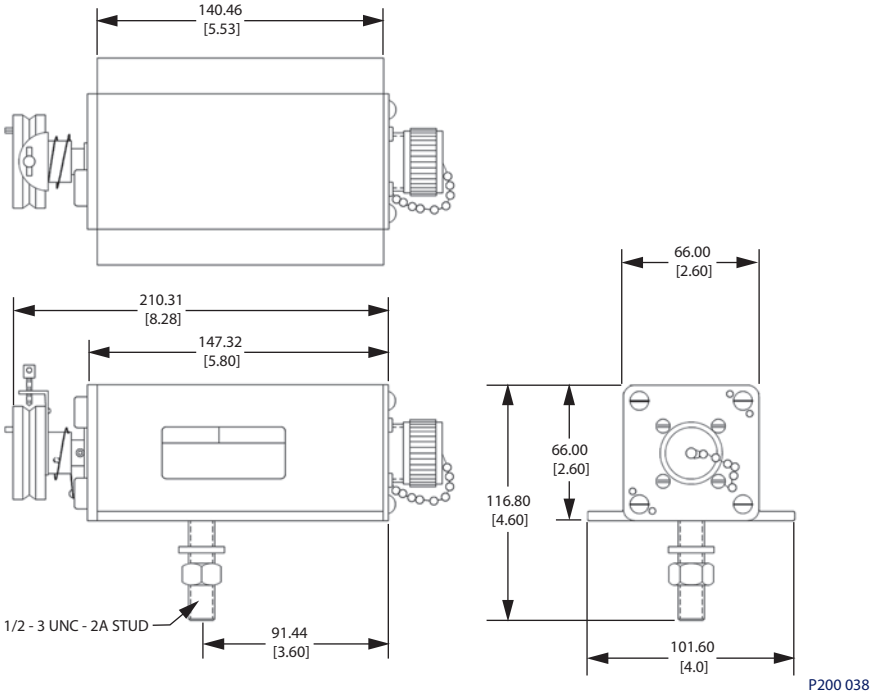
Dimensions (continued)

MCX103A1157

mm [in]



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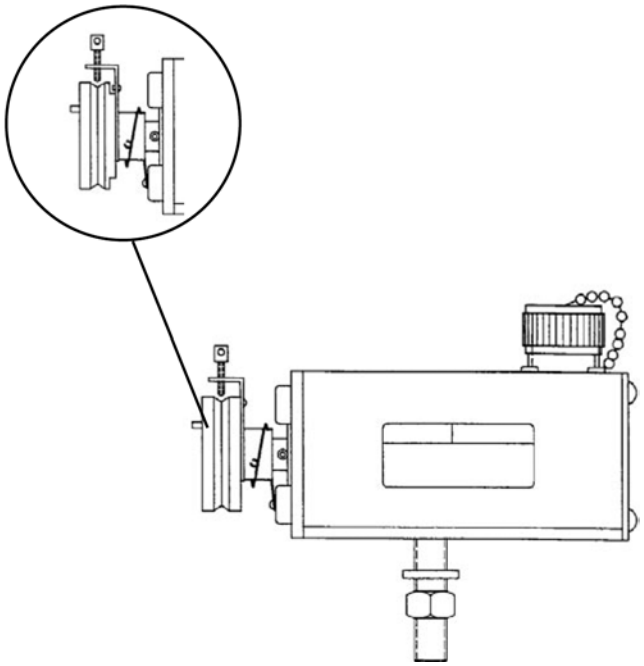
Service Part

Hub and Hanger Assembly

Service Part Number: K32299



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Installation

Mounting

The MCX103A may be ordered with either side flanges or mounting stud. See *Dimensions*, pages 7 to 9. The flanges use four 1/4 inch bolts. The stud mount has a 2 inch bolt extending from the case serving as a rotatable mount, allowing for proper leveling. It is important that the sensor be level in the plane of rotation around the pivot.

In applications controlling grade, an improper mounting will cause the follower attachment to move up or down on a level surface as the machine moves closer or farther from the string line. The mounting stud must be inserted through a vertical plate attached to an appropriate height-adjusting jack. The mounting stud is approximately 4.25 inches above the string line when trailing a grid at 45° below horizontal.

See *Ordering Information*, page 4 and *Sauer-Danfoss Surface Contacts*, page 5:

Wiring

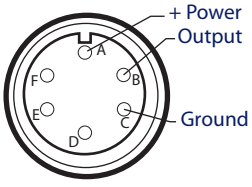
EMI/RFI will be present in varying degrees in any environment that has static electricity, power lines, radio equipment, solenoid switching, etc. To avoid the harmful effects of EMI/RFI, use KW01026 braided (not foil) shield cable with a minimum of 75% shielding. Terminate the shield at both ends to the connector shell with the length short as possible. See *Ordering Information*, *Related Product*, page 5.

Standard unshielded cables can be ordered from Sauer-Danfoss. KW01009, a two foot coiled cable extending to ten feet is available, which is completely assembled with mating MS connectors for ease of installation. See *Ordering Information*, *Related Product*, page 5.

All electrical connections are made to the sensor through a 6 or 14 pin MS connector, see below for connector diagrams.

Reverse power polarity may damage the sensor.

6 pin MS Mating Connector



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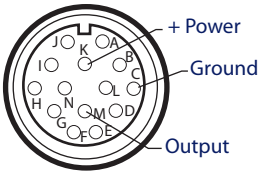
14 pin MS Mating Connector



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Notes

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