STANDARD

ISA–37.5–1982 (R1995)

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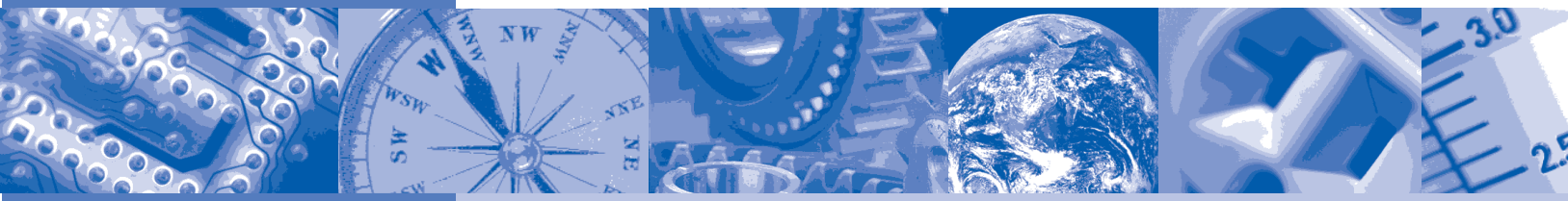

Specifications and Tests for Strain Gage Linear Accelerator Transducers

Reaffirmed 29 September 1995

ISA–The Instrumentation, Systems, and Automation Society

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ISA-37.5-1982 (R1995), Specifications and Tests for Strain Gage Linear Acceleration Transducers

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Preface

This preface, as well as all footnotes and annexes, is included for informational purposes and is not part of ISA-37.5-1982 (R1995).

This standard has been prepared as a part of the service of ISA, the international society for measurement and control, toward a goal of uniformity in the field of instrumentation. To be of real value, this document should not be static, but should be subject to periodic review. Toward this end, the Society welcomes all comments and criticisms, and asks that they be addressed to the Secretary, Standards and Practices Board; ISA; 67 Alexander Drive; P.O. Box 12277; Research Triangle Park, NC 27709; Telephone: (919) 549-8411; Fax: (919) 549-8288; E-mail: standards@isa.org.

The ISA Standards and Practices Department is aware of the growing need for attention to the metric system of units in general, and the International System of Units (SI) in particular, in the preparation of instrumentation standards, recommended practices, and technical reports. The Department is further aware of the benefits to USA users of ISA Standards of incorporating suitable references to the SI (and the metric system) in their business and professional dealings with other countries. Towards this end, this Department will endeavor to introduce SI-acceptable metric units in all new and revised standards to the greatest extent possible. *The Metric Practice Guide*, which has been published by the Institute of Electrical and Electronics Engineers as ANSI/IEEE Std. 268-1992, and future revisions, will be the reference guide for definitions, symbols, abbreviations, and conversion factors.

It is the policy of ISA to encourage and welcome the participation of all concerned individuals and interests in the development of ISA standards, recommended practices, and technical reports. Participation in the ISA standards-making process by an individual in no way constitutes endorsement by the employer of that individual, of ISA, or of any of the standards, recommended practices, and technical reports that ISA develops.

This standard is intended as a guide for technical personnel at user facilities as well as by manufacturers' technical and sales personnel whose duties include specifying, calibrating, testing or showing performance characteristics of strain-gage linear accelerometers. By basing users' specifications as well as technical advertising and reference literature on this standard, or by referencing portions thereof, as applicable, a clear understanding of the users' needs or of the transducers' performance capabilities, and of the methods used for evaluating or proving performance, will be provided. Adhering to the specification outline, terminology and procedures shown will not only result in simple, but also complete specifications; it will also reduce design time, procurement lead time, and labor, as well as material costs. Of major importance will be the reduction of qualification tests resulting from use of a commonly accepted test procedure and uniform data presentation.

The development of this Standard was initiated as the result of a survey conducted in December 1960. A total of 240 questionnaires was sent out to transducer users and manufacturers. A strong majority indicated in their replies a need for transducer standardization. As strain-gage acceleration transducers were one of the types shown to be most in need of standardization, a Subcommittee, 8A-RP37.5, was formed under the former Survey Committee on Transducers for Aerospace Testing, 8A-RP37. Subcommittee 8A-RP37.5 became Standards Committee SP37.5 when the scope of the committee's work was broadened to include the applications of these transducer types by all industries and sciences. To provide a coordinated document, this committee was composed of representatives from government, user, and manufacturer

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categories. This Standard was then processed over several mail-review and revision cycles until a consensus of reviewers was reached, and it was published as ISA Standard in 1971. It was approved as ANSI Standard MC 6.3-1975 in October 1975.

The assistance of those who aided in the preparation of this document by answering questionnaires, offering suggestions, and in other ways, is gratefully acknowledged.

The following individuals served as members of the 1975 SP37.5 committee:

NAME	COMPANY
L. L. Lathrop, Chairman (1965-71)	Sandia Laboratories
R. M. Canzoneri, Secretary	Bell and Howell
G. D. Goodrich	Statham Instruments, Inc.
J. S. Hilten, Chairman (1971-)	National Bureau of Standards
G. C. Machen—Deceased	U.S. Naval Missile Center
E. D. Pettler	Consultant
D. Shannon, Alternate	Bell and Howell

The following individuals served on the ISA Committee SP37, who reaffirmed ISA-S37.5 in 1995:

NAME	COMPANY
E. Icayan, Chairman	Westinghouse Hanford Co.
J. Weiss	Electric Power Research Inst.
P. Bliss	Consultant
M. Brigham	Washington Public Power Supply System
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M. Kopp	Validyne Corp.
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This standard was reaffirmed by the ISA Standards and Practices Board on September 29, 1995.

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C. Williams	Eastman Kodak Company
G. Wood	Graeme Wood Consulting
M. Zielinski	Fisher-Rosemount

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1 Scope

1.1 This Standard covers uni-directional and bi-directional strain-gage linear acceleration transducers.

1.2 Included among the specific types of strain-gage linear acceleration transducers for which this Standard is applicable, are the following:

Bonded, unbonded, deposited metallic, or semiconductor strain gages.

1.3 Terminology used is defined in either ISA-S37.1, *Electrical Transducer Nomenclature and Terminology* or in 4.3, Additional Terminology, of this Standard. An asterisk appears after those terms defined in ISA-S37.1; a double asterisk appears after those terms defined in this Standard.

2 Purpose

This Standard establishes the following for strain-gage linear acceleration transducers:

a) Uniform minimum specifications for design and performance characteristics

b) Uniform acceptance and qualification test methods, including calibration techniques

c) Uniform presentation of minimum test data

d) A drawing symbol for use in electrical schematics (see Note in Section 3)

3 Uniform drawings and symbols

3.1 Drawing symbol

The electrical diagram symbol for a linear strain-gage acceleration transducer is a square of dimensions 2x by 2x, with an added equilateral triangle, the base of which is the left side of the square. The triangle symbolizes the sensing element. The letter "a" in the triangle designates linear (rectilinear) acceleration.

NOTE — Angular acceleration is designed by the Greek letter alpha (α).

The strain gage bridge is symbolized by a small square, with diagonals x by x, centered in the large square. The diagonals of the small square are drawn perpendicular to the sides of the large square. Lines from each apex of the small square projected to the right side of the large square represent the electrical leads.

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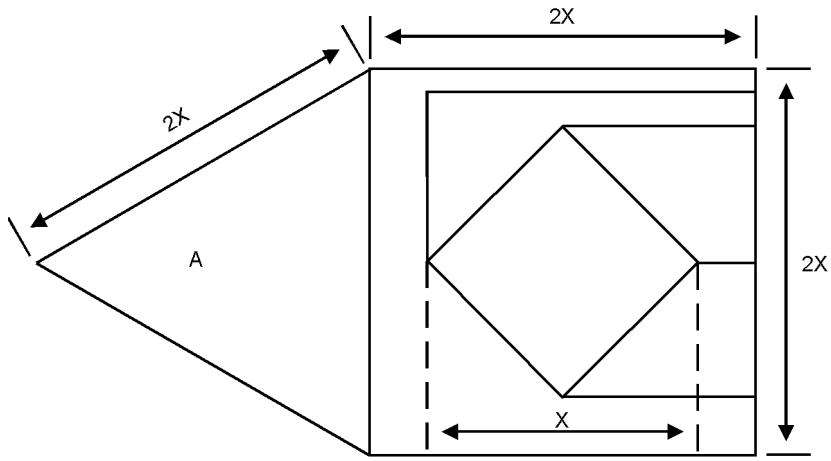

NOTE — This symbol is not ANSI approved at this time. It has been submitted to the ANSI Y32 Committee on Graphic Symbols for their consideration and approval.

3.2 Outline drawings

Orthogrographic projection outline drawings, with tolerances should include the following information:

a) The outline dimensions

b) The location and size of the mounting holes

c) The identification and location of the electrical connections; where a commercial connector is used, it and the mating connector should be identified

d) The location of the center of the seismic mass (using the following symbol,)

e) The direction and polarity of the sensitive axis (using the following symbol, $\xrightarrow{+}$, to indicate the direction in which the case must be accelerated to produce a positive electrical output) (see 4.1.1.3, Identification, and 4.1.3.6, Polarity of Electrical Output).

3.3 Electrical connections

Whether the electrical termination is by means of a connector or a cable, the pin designations or wire color code shall conform to the following transducer wiring standard promulgated by the Western Regional Strain Gage Committee, as approved September 18, 1957, and revised May 6, 1960.

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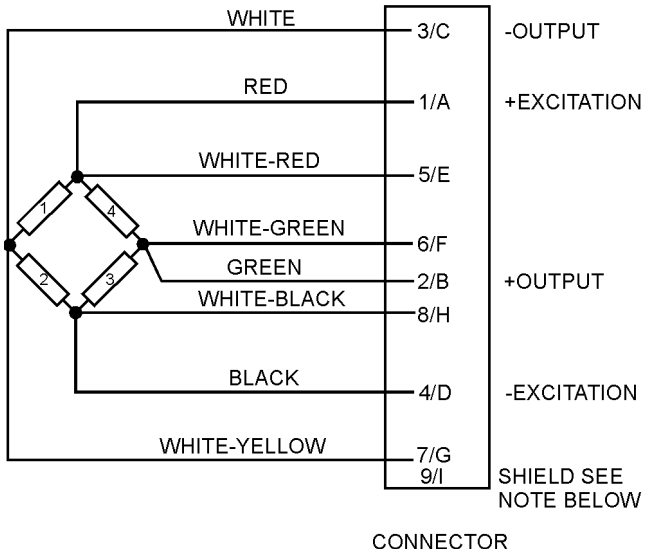

NOTES

1. The bridge elements shall be arranged so that functions producing positive electrical output will cause increasing resistance in arms 1 and 3 of the bridge.

2. For shielded transducers, pins 5, 7, and 9 shall be shield terminals for 4, 6, and 8 wire systems respectively.

4 Specification characteristics

4.1 Design characteristics

4.1.1 Basic mechanical design characteristics

4.1.1.1 Dimensions

Drawings giving dimensions (as well as other information) shall be provided as described in 3.2, Outline Drawings. Dimensions shall be given in millimeters (inches).

4.1.1.2 Mass

The mass of the transducer shall be given in grams (ounces).

4.1.1.3 Identification

The following characteristics shall be permanently inscribed on the outside of the transducer case or on a suitable nameplate permanently attached to the case:

a) Nomenclature of the transducer per ISA-S37.1, Electrical Transducer Nomenclature and Terminology (see 3, Nomenclature).

b) Name of the manufacturer

c) Model or part number

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