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Industrial & Instrumentation Connector (IEEE 1394-1995 Mating Interface and IEEE 1394b-2002 Amendment) Revision 1.1

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1394 Trade Association Board of Directors

Abstract

This document provides additional dimensional and performance requirements for Industrial and Instrumentation Connector utilizing the IEEE Std 1394-1995 and IEEE Std 1394b-2002 mating interfaces. All other criteria are documented in IEEE Std 1394-1995, IEEE Std 1394a-2000, IEEE Std 1394b-2002 and IEEE1394-2008.

Keywords

Bus, Industrial, High speed serial bus, Interconnect connectors and cable assembly

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Annexes

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The source documents are:

- IEEE Std 1394-1995, Standard for a High Performance Serial Bus

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Foreword (This foreword is not part of 1394 Trade Association Specification 2005001)

This specification defines an Industrial and Instrumentation connector for applications where the functionality described in IEEE Std 1394-1995 is required with added mechanical enhancements for harsher environments

There is one annex, Annex A, in this specification, which is normative and part of this specification.

This specification was accepted by the Board of Directors of the 1394 Trade Association. Board of Director's acceptance of this specification does not necessarily imply that all board members voted for acceptance. At the time it accepted this specification, the 1394 Trade Association. Board of Directors had the following members:

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Richard Mourn, Vice-Chair
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1394 TA 2005001 Revision 1.1

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Revision history

Revision 1.0 (June 26, 2006) Initial release.

Revision 1.1 (June 1, 2010) Additional latching drawings in Annex A (1394b)

Industrial & Instrumentation Connector (IEEE 1394-1995 Mating Interface and IEEE 1394b-2002 Amendment)

1 Scope and Sequence

1.1 Scope

This specification describes an Industrial and Instrumentation connector for applications where the functionality described in IEEE Std 1394-1995 is required with added mechanical enhancements for harsher environments.

An industrial connector does not have the same design criteria as an external box to box application. The physical interconnection of the plug to the socket requires an external shroud to provide support and guidance to the internal IEEE Std 1394-1995 core connector. Industrial devices are optimized for strength and durability in a factory or test environment. The Industrial Connectors require increased latching of the mated pairs and enhanced strain relief around the terminated cable. These features will improve the mechanical reliability of the interconnection system.

1.2 Purpose

Although there is a need for improved mechanical performance, the electrical signal integrity identified with IEEE Std 1394-1995 needs to be satisfied. All of the performance parameters identified in both IEEE Std 1394-1995 and the amendment IEEE Std 1394a-2000 will be met with the new interconnection system.

Annex A will update this industrial latching interconnect specification to include the 9 pin connectors and cables found in IEEE 1394-2008 for higher performance devices up to S1600.

2 Normative references

2.1 Reference scope

The specifications and standards named in this section contain provisions, which, through reference in this text, constitute provisions of this 1394 Trade Association Specification. At the time of publication, the editions indicated were valid. All specifications and standards are subject to revision; parties to agreements based on this 1394 Trade Association Specification are encouraged to investigate the possibility of applying the most recent editions of the specifications and standards indicated below.

2.2 Approved references

The following approved specifications and standards may be obtained from the organizations that control them.

IEEE Std 1394-1995, Standard for a High Performance Serial Bus

IEEE Std 1394a-2000, Standard for a High Performance Serial Bus—Amendment 1

IEEE Std 1394b-2002, Standard for a High Performance Serial Bus—Amendment 2

Throughout this document, the term “IEEE 1394" shall be understood to refer to IEEE Std 1394-1995 as amended by IEEE Std 1394a-2000, IEEE Std 1394b-2002 and IEEE 1394-2008.

2.3 Reference acquisition

The references cited may be obtained from the organizations that control them:

1394 Trade Association, 315 Lincoln, Suite E, Mukilteo, WA 98275 USA; (425) 514-8454 / (425) 710-9971(FAX); http://www.1394ta.org/

American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036, USA; (212) 642-4900 / (212) 398-0023 (FAX); http://www.ansi.org/

Institute of Electrical and Electronic Engineers (IEEE), 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331, USA; (732) 981-0060 / (732) 981-1721 (FAX); http://www.ieee.org/

In addition, many of the documents controlled by the above organizations may also be ordered through a third party:

Global Engineering Documents, 15 Inverness Way, Englewood, CO 80112-5776; (800) 624-3974 / (303) 792-2192; http://www.global.ihs.com/

3 Definitions and notation

3.1 Definitions

3.1.1 Conformance

Several keywords are used to differentiate levels of requirements and optionally, as follows:

3.1.1.1 expected: A keyword used to describe the behavior of the hardware or software in the design models assumed by this specification. Other hardware and software design models may also be implemented.

3.1.1.2 ignored: A keyword that describes bits, bytes, quadlets, octlets or fields whose values are not checked by the recipient.

3.1.1.3 may: A keyword that indicates flexibility of choice with no implied preference.

3.1.1.4 reserved: A keyword used to describe objects (bits, bytes, quadlets, octlets and fields) or the code values assigned to these objects in cases where either the object or the code value is set aside for future standardization. Usage and interpretation may be specified by future extensions to this or other specifications. A reserved object shall be zeroed or, upon development of a future specification, set to a value specified by such a specification. The recipient of a reserved object shall ignore its value. The recipient of an object defined by this specification as other than reserved shall inspect its value and reject reserved code values.

3.1.1.5 shall: A keyword that indicates a mandatory requirement. Designers are required to implement all such mandatory requirements to assure interoperability with other products conforming to this specification.

3.1.1.6 should: A keyword that denotes flexibility of choice with a strongly preferred alternative. Equivalent to the phrase “is recommended.”

3.1.2 Glossary

The following terms are used in this specification:

3.1.2.1 Industrial Connector: an interconnection scheme that will require a greater level of mechanical retention than is currently provided by the IEEE Std 1394-1995 connector system.

3.1.3 Abbreviations

The following are abbreviations that are used in this specification:

IIC-1394-1995 Industrial and Instrumentation Connector with IEEE Std 1394-1995 Interface

3.2 Notation

3.2.1 Numeric values

Decimal and hexadecimal are used within this specification. By editorial convention, decimal numbers are most frequently used to represent quantities or counts. Addresses are uniformly represented by hexadecimal numbers. Hexadecimal numbers are also used when the value represented has an underlying structure that is more apparent in a hexadecimal format than in a decimal format.

Decimal numbers are represented by Arabic numerals without subscripts or by their English names. Hexadecimal numbers are represented by digits from the character set 0 – 9 and A – F followed by the subscript 16. When the

subscript is unnecessary to disambiguate the base of the number it may be omitted. For the sake of legibility hexadecimal numbers are separated into groups of four digits separated by spaces.
As an example, 42 and $2A_{16}$ both represent the same numeric value.

4 General

All dimensions, tolerances and descriptions of features that affect the intermatability of the standardized shielded connector plugs and sockets are specified within IEEE Std 1394-1995.

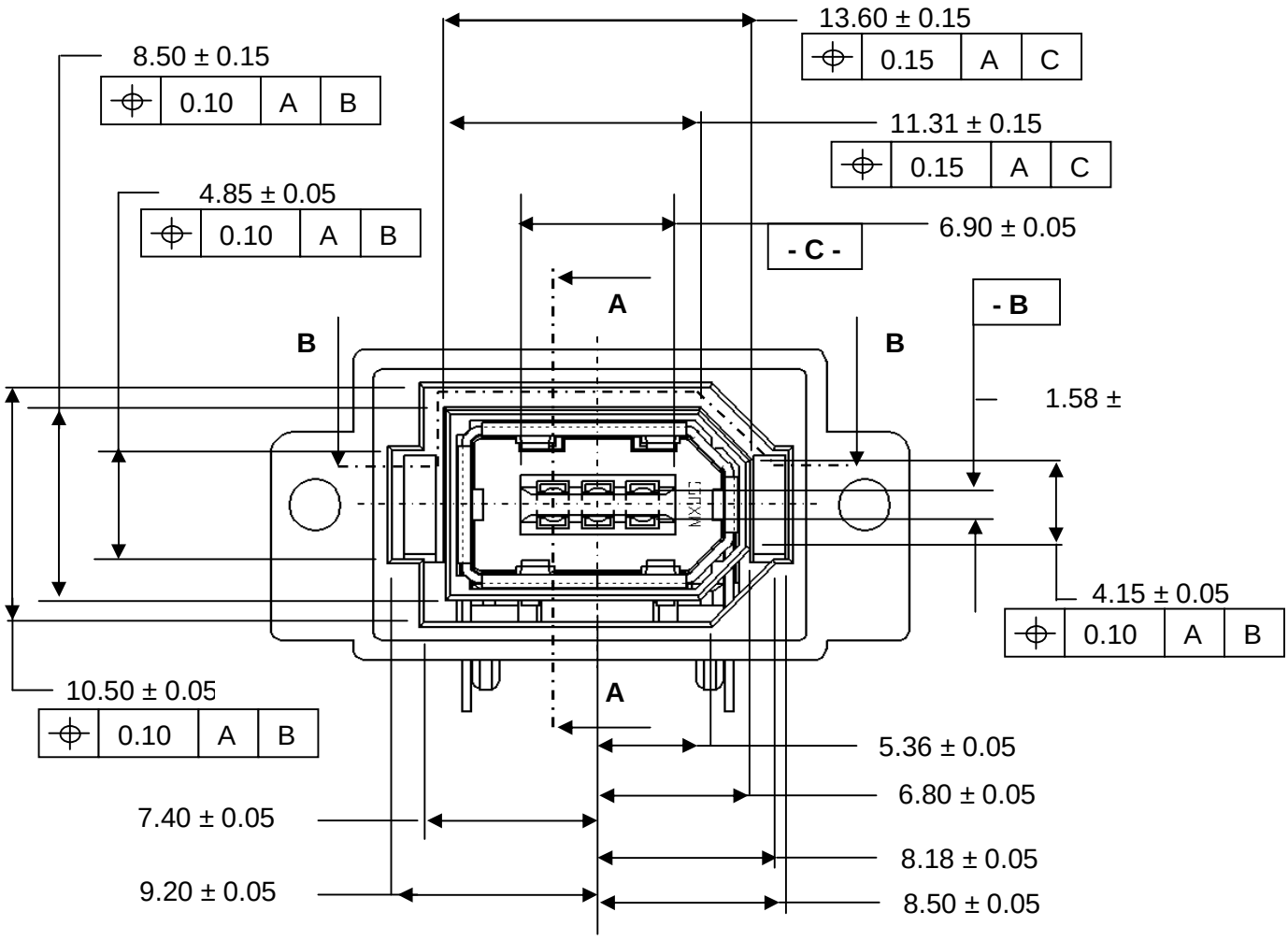
All cables and cable assemblies shall meet assembly criteria, test performance groups A to G and signal propagation performance found in IEEE Std 1394-1995 and IEEE Std 1394a-2000. The signal propagation test procedures described in IEEE Std 1394-1995 Annex K along with additions from the electrical test of IEEE Std 1394a-2000 shall be used in the evaluation.

Connector features that are not directly controlled within this clause shall be indirectly controlled by performance requirements in IEEE Std 1394-1995 and clause 3.

In addition, all additional tests required for 1394b connectors covered by IEEE 1394-2008 will be required for ANNEX A “The Latching 1394b interface”. Dimensional exceptions are found in Annex A for the overmold and PCB socket spacing.

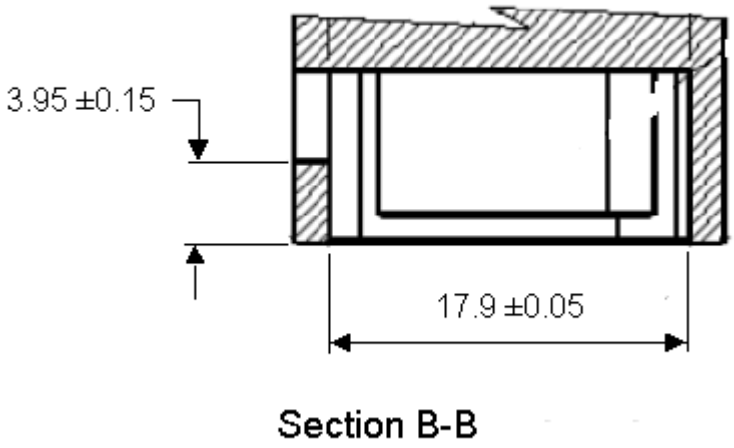
5 Connectors

This clause specifies all dimensions, tolerances and descriptions of features that affect the intermatability of the industrial latching plugs and sockets. The features of the industrial plugs and sockets that do not affect intermatability are not specified and may vary at the option of the manufacturer.

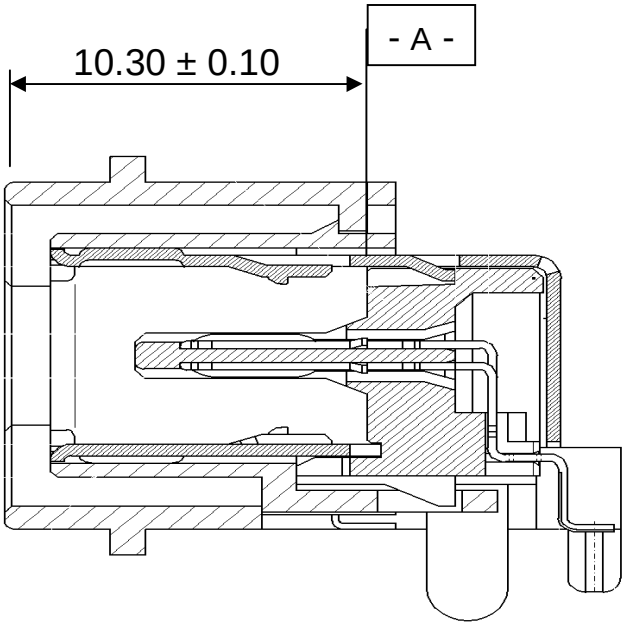


NOTES—
1. See IEEE Standard 1394-1995 Figure 4-4 Socket Shell Datum Features
2. Dimensions in mm
3. Unless otherwise specified, tolerances: linear ✎ 0.10 and angular ✎2°
4. Interpret all dimensions per ANSI-Y-14.5M-1994
5. Material composition is option of the manufacturer

Figure 5 – 1 Industrial Connector Socket



Section B-B

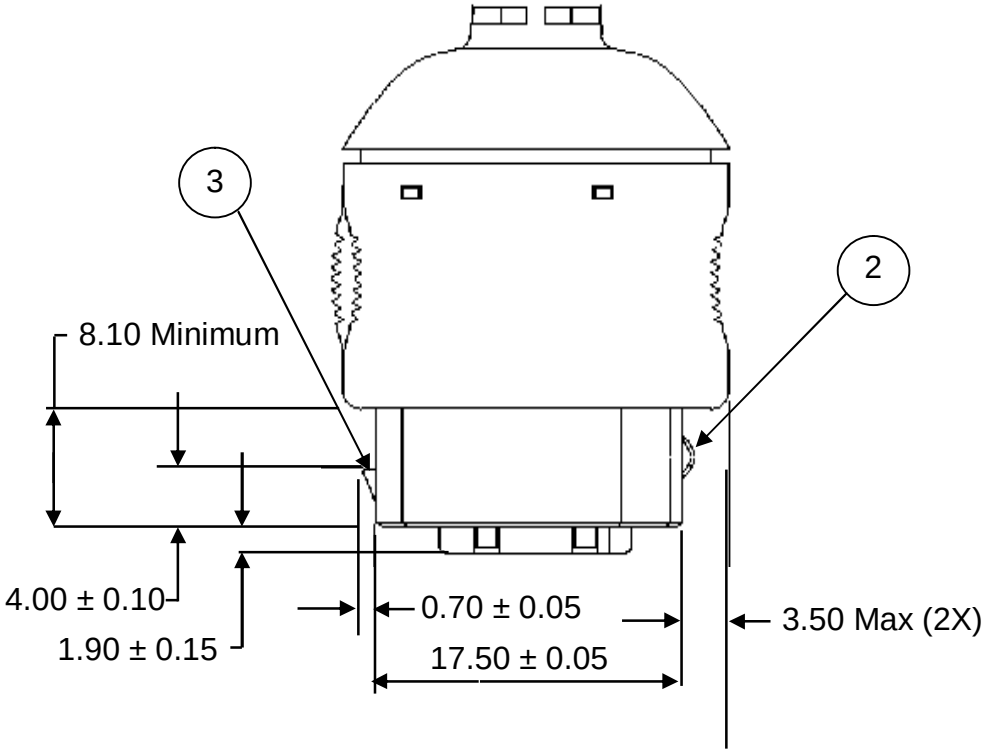


Section A -A

NOTES—

1. See IEEE Std 1394-1995 Figure 4-4 Socket Shell Datum definitions
2. Dimensions in mm
3. Unless otherwise specified, tolerances: linear ± 0.10 and angular ± 2º
4. Interpret all dimensions and tolerances per ANSI-Y-14.5M-1994
5. Material composition is the option of the manufacturer

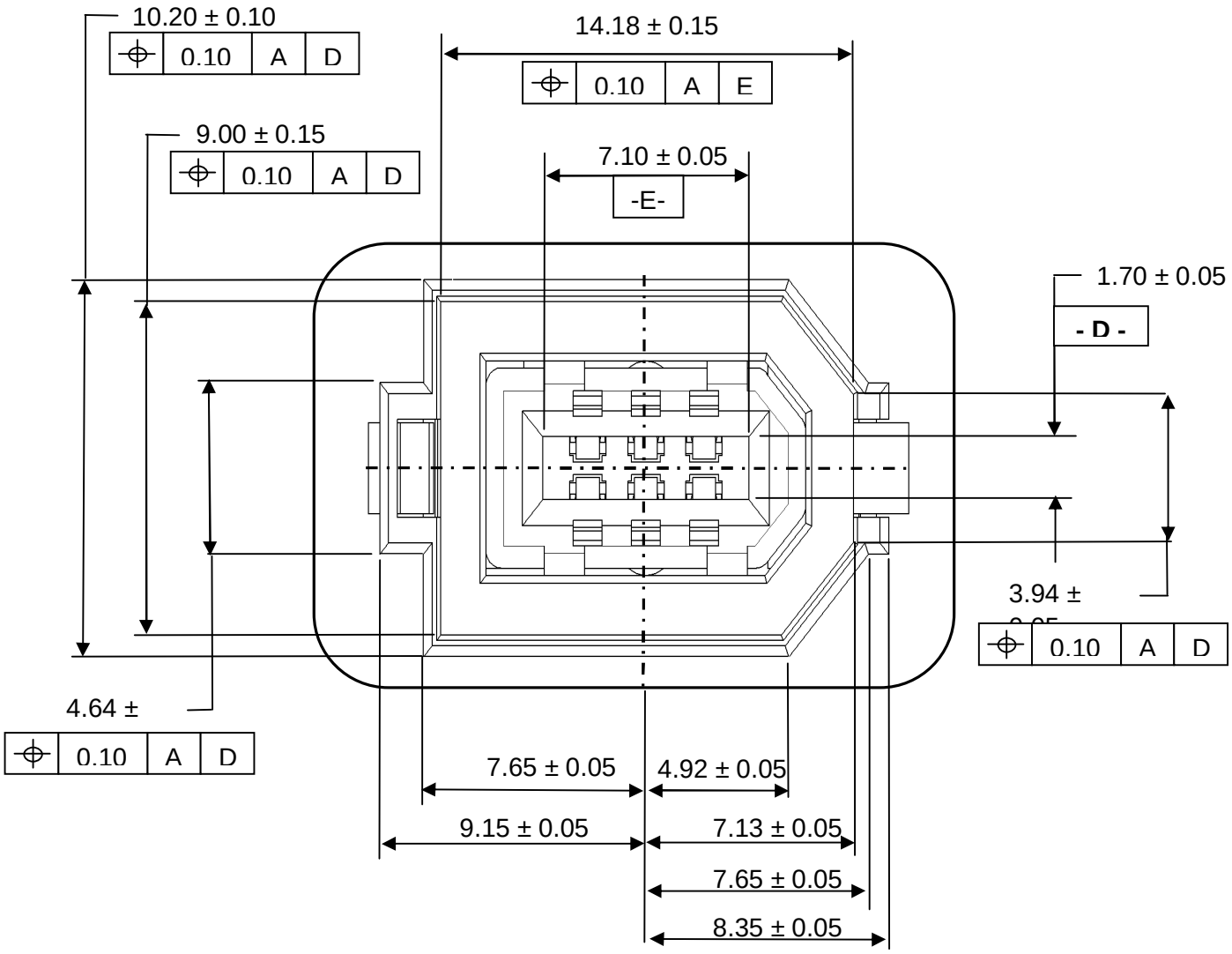
Figure 5 – 2 Industrial Connector Socket Body Section A-A and Section B-B



NOTES—

1. See IEEE Standard 1394-1995 Plug Body Datum definitions
2. Leaf Spring is optional
3. Locking latch
4. Inner shell on the plug shall be isolated from outer shell and shall float mechanically and electrically
5. Dimensions in mm
6. Unless otherwise specified, tolerances: linear ± 0.10 and angular ± 2º
7. Interpret all dimensions and tolerances per ANSI-Y-14.5M-1994
8. Material composition is the option of the manufacturer

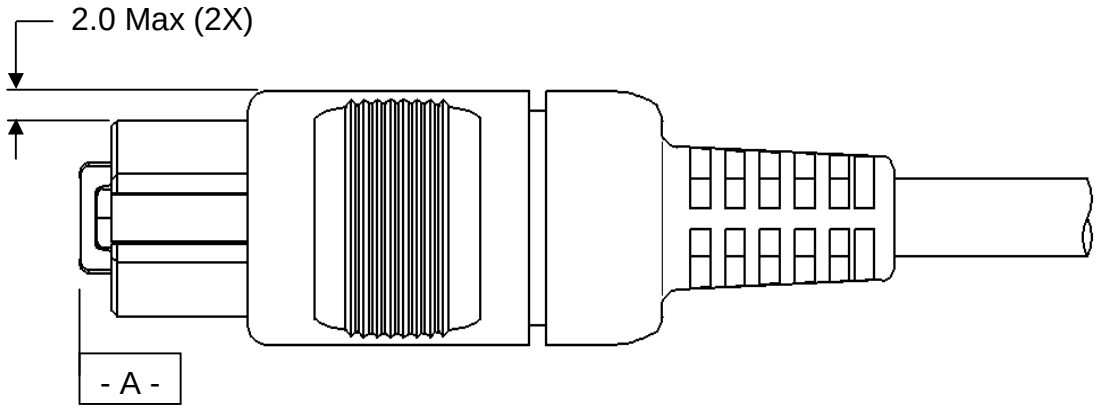
Figure 5 – 3 Industrial Connector plug body



NOTES—

1. See IEEE Standard 1394-1995 Plug Body Datum definitions
2. Dimensions in mm
3. Unless otherwise specified, tolerances: linear ✐ 0.10 and angular ✐2°
4. Interpret all dimensions and tolerances per ANSI-Y-14.5M-1994

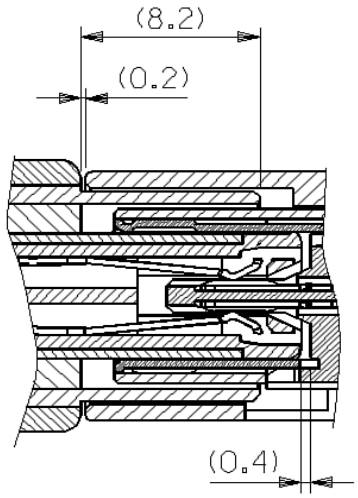
Figure 5 – 4 Industrial Connector plug body



NOTES—

1. See IEEE Std 1394-1995 Figure 4-2 Plug Body Datum definitions
2. Dimensions in mm
3. Unless otherwise specified, tolerances: linear ± 0.10 and angular ± 2º
4. Interpret all dimensions and tolerances per ANSI-Y-14.5M-1994

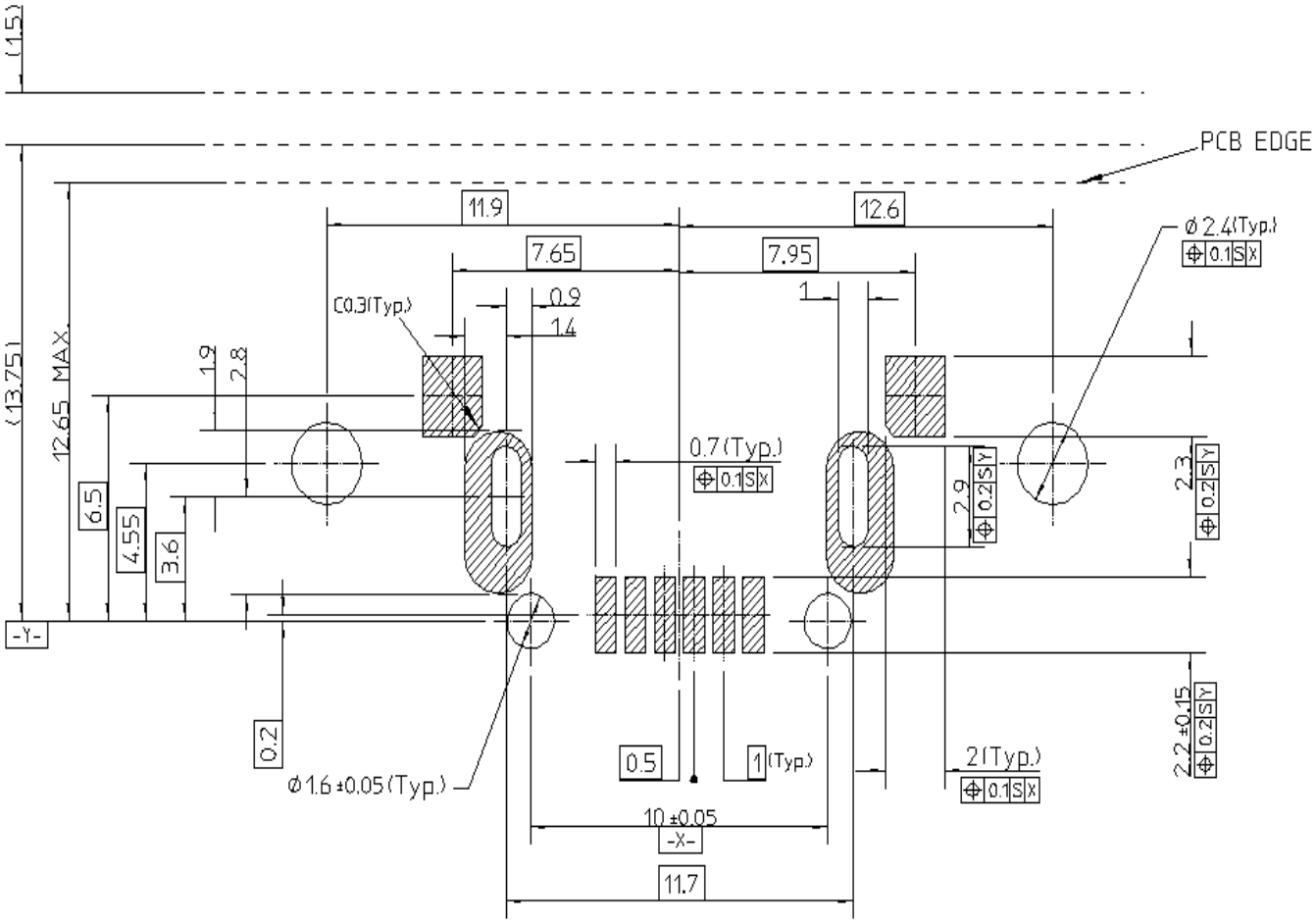
Figure 5 – 5 Industrial Connector plug body



NOTES—

1. Dimensions in mm
2. Unless otherwise specified, tolerances: linear ± 0.10 and angular ± 2º
3. Interpret all dimensions and tolerances per ANSI-Y-14.5M-1994

Figure 5 – 6 Industrial Connector plug and socket mated



NOTES—

1. Dimensions in mm
2. Unless otherwise specified, tolerances: linear ± 0.10 and angular ± 2º
3. Interpret all dimensions and tolerances per ANSI-Y-14.5M-1994
4. Datum -S- Bottom of the printed circuit board
5. Phantom of the socket body with a minimum socket mounting interval of 30 mm

Figure 5 – 7 Industrial Connector PC Board footprint (Informative)

6 Performance Group

Phase	Test			Measurements to be performed		Requirements
	Title	ID No.	Severity or conditions	Title	ID No.	Performance level
A1	Crimp strength	ANIS/EIA 364-08	Apply load at a rate of 25 mm/min			147 N Minimum
A2	Plug to socket latch strength		Apply 196 N load for one minute on plug housing	Continuity and Visual	ANSI/EIA 364-46-84	No discontinuity of contacts or shield greater than 1 µs

Table 6–1 Performance Group A

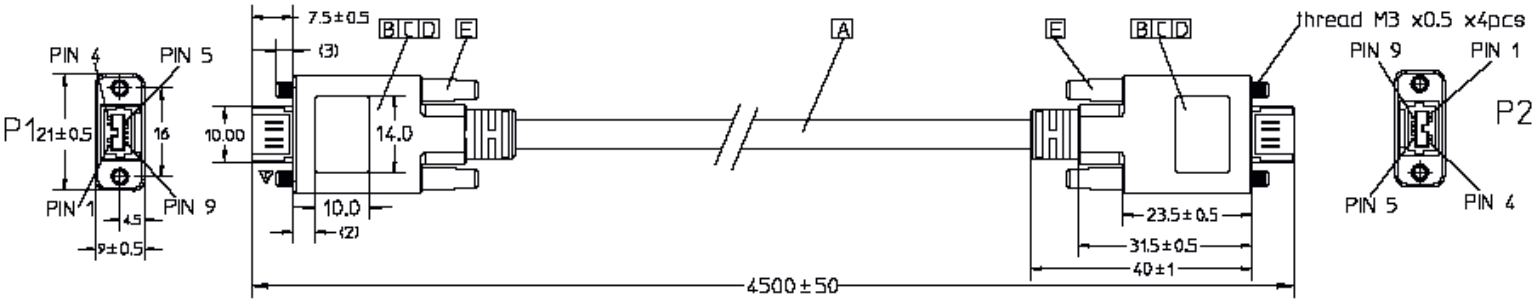
Annex A (normative)

1394b Latching Interconnect System

The 1394b Industrial Latching interface uses the standard IEEE 1394-2008 socket and a modified overmolded 1394b Beta plug to include threaded thumbscrews that will attach directly to the device panel or threaded standoffs on the device panel. The dimensions needed to manufacture the latching cable plug and minimum spacing on the PCB of the sockets are given as the reference. These definitions should ensure intermateability and interoperability. All other dimensions are found in the standard IEEE 1394-2008..

This annex specifies all dimensions, tolerances and descriptions of features that affect the intermatability of the 1394b industrial latching plugs and sockets. The features of the 1394b industrial plugs and sockets that do not affect intermatability are not specified and may vary at the option of the manufacturer.

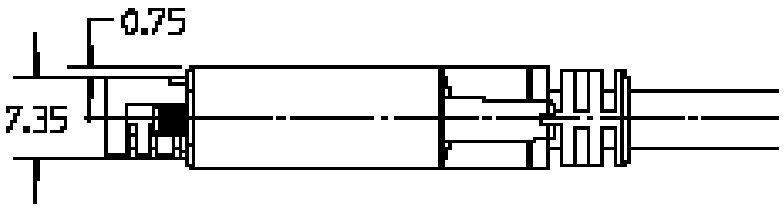
A.1 Annex figures



Annex Figure – 1 Overmodled Cable Plug Detail and Pinout

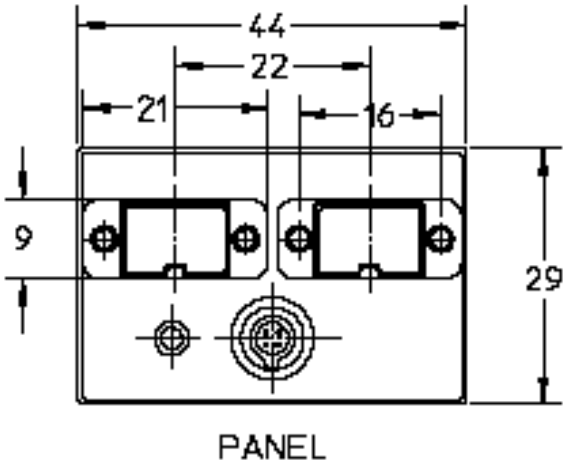
Note: 1- Cable length shown as reference only

A.2 Annex figures



Annex Figure - 2 Reference Latching Cable Plug- Side View

A.3 The figure A-3 PCB Socket Spacing



Annex Figure -3 Reference PCB Socket Panel

Note: 1- The standard 1394b Beta socket is to be used with this dimensional layout

Bibliography

[B1] IEEE Std 1212-2001, Standard for a Control and Status Registers (CSR) Architecture for microcomputer buses

[B2] IEEE Std 1394-1995, Standard for a High Performance Serial Bus

[B3] IEEE Std 1394a-2000, Standard for a High Performance Serial Bus—Amendment 1

[B4] IEEE Std 1394b-2002, Standard for a High Performance Serial Bus—Amendment 2

ISO/I