



ANSI/EIA-972-2018
Approved: March 8, 2018

EIA-972

EIA SPECIFICATION

Specification for M12 Power Circular Connectors

EIA-972

March 2018



Electronic Components Industry Association

NOTICE

EIA Engineering Specifications and Publications are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for his particular need. Existence of such Specifications and Publications shall not in any respect preclude any member or nonmember of ECIA from manufacturing or selling products not conforming to such Specifications and Publications, nor shall the existence of such Specifications and Publications preclude their voluntary use by those other than ECIA members, whether the standard is to be used either domestically or internationally.

Specifications and Publications are adopted by ECIA in accordance with the American National Standards Institute (ANSI) patent policy. By such action, ECIA does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the Specification or Publication.

This EIA specification is considered to have International Standardization implications, but the International Electrotechnical Commission activity has not progressed to the point where a valid comparison between the EIA standard and the IEC document can be made.

This Specification does not purport to address all safety problems associated with its use or all applicable regulatory requirements. It is the responsibility of the user of this Specification to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before its use.

NOTE – The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights.

By publication of this standard, no position is taken with respect to the validity of any such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, then details may be obtained from the standards developer

Neither the standards developer nor ANSI is responsible for identifying patents for which a license may be required by an American National Standard or for conducting inquiries into the legal validity or scope of those patents that are brought to their attention.

(From Standards Proposal No. 5240, formulated under the cognizance of the CE-2.0 Committee on EIA National Connector and Socket Standards.)

Published by

©Electronic Components Industry Association 2018
EIA Standards & Technology Department
2214 Rock Hill Road, Suite 265
Herndon, VA 20170

**PLEASE !
DON'T VIOLATE
THE
LAW!**

This document is copyrighted by the ECIA and may not be reproduced without permission.

Organizations may obtain permission to reproduce a limited number of copies through entering into a license agreement. For information, contact:

IHS Markit
15 Inverness Way East
Englewood, CO 80112-5704 or call
USA and Canada (1-877-413-5186), International (303-397-7956)

(This page left blank)

CONTENTS

Clause	Page
Foreword	v
1 General information	1
1.1 Scope	1
1.2 Recommended method of mounting	1
1.3 Ratings and characteristics	2
1.4 References	2
1.5 Marking	2
2 Technical information	3
2.1 Definitions	3
2.2 Survey of styles and variants for fixed (receptacle) connectors	3
2.3 Survey of styles and variants for free (plug) connectors	4
3 Dimensional information	4
3.1 General	4
3.2 Isometric view and common features for fixed (receptacle) connectors	5
3.2.1 Fixed connector (receptacle) male straight flange mount (DM).....	5
3.2.2 Fixed connector (receptacle) male straight M16x1.5 mounting threads (EM).....	5
3.2.3 Fixed connector (receptacle) male straight M20x1.5 mounting threads (FM).....	6
3.2.4 Fixed connector (receptacle) female straight M16x1.5 mounting threads (EF).....	6
3.2.5 Fixed connector (receptacle) female straight M20x1.5 mounting threads (FF).....	7
3.3 Isometric view and common features for free (plug) (EB) connectors	7
3.3.1 Free connector (plug) male straight, rewirable (JM)	7
3.3.2 Free connector (plug) male right angled version, rewirable (KM)	8
3.3.3 Free connector (plug) male straight version, non-rewirable (LM)	8
3.3.4 Free connector (plug) male right angled version, non-rewirable (MM)	9
3.3.5 Free connector (plug) female straight, rewirable (JF).....	9
3.3.6 Free connector (plug) female right angled version, rewirable (KF)	10
3.3.7 Free connector (plug) female straight version, non-rewirable (LF).....	10
3.3.8 Free connector (plug) female right angled version, non-rewirable (MF)	11

CONTENTS (continued)

Clause	Page
3.4 Interface dimensions	12
3.4.1 Pin front view E-coding.....	12
3.4.2 Socket front view E-coding	13
3.4.3 Contact position for E-coding.....	14
3.4.4 Pin front view F-coding	15
3.4.5 Socket front view F-coding.....	15
3.4.5 Contact position for F-coding	16
3.5 Mating information	16
4 Characteristics	17
4.1 Climatic category	17
4.1.1 Thermal shock	17
4.1.2 Humidity-temperature cycling	17
4.1.3 Temperature life	17
4.1.4 Mixed flowing gas	17
4.2 Electrical	17
4.2.1 Withstanding voltage	17
4.2.2 Current versus temperature rise	18
4.2.3 Contact resistance	19
4.2.4 Insulation resistance	19
4.3 Mechanical	19
4.3.1 Durability cycling	19
4.3.2 Mating and unmating force	19
4.3.3 Vibration	20
4.3.4 Physical shock	21
5 Test schedule	21
5.1 General	21
5.2 Test sequences	22
5.2.1 Minimum test sequences for product qualification	22

CONTENTS (continued)

Clause	Page
6 Quality assessment procedures	26
6.1 Qualification approval testing	26
6.2 Reinspection.....	26

Table

1 Ratings of connectors	2
2 Styles and variants for fixed (receptacle) connectors	3
3 Styles and variants for free (plug) connectors	4
4 Performance levels	17
5 Test group P - General examination	22
6 Test group AP	23
7 Test group BP	24
8 Test group CP	25
9 Qualification approval tests	26
10 Reinspection.....	26

Figure

1 Fixed connector, male contacts, mounting with thread M12 x 1, square flange 20mm, front mounting	5
2 Fixed connector, male contacts, mounting with thread M12 x 1, with wire ends, single hole mounting thread M16 x 1.5	5
3 Fixed connector, male contacts, mounting with thread M12 x 1, with wire ends, single hole mounting thread M20 x 1.5	6
4 Fixed connector, female contacts, mounting with thread M12 x 1, with wire ends, single hole mounting thread M16 x 1.5	6
5 Fixed connector, female contacts, mounting with thread M12 x 1, with wire ends, single hole mounting thread M20 x 1,5	7
6 Free connector, male contacts, straight version with locking nut.....	7
7 Free connector, male contacts, right angled version with locking nut.....	8
8 Free connector, male contacts, straight version with locking nut.....	8
9 Free connector, male contacts, right angled version with locking nut.....	9
10 Free connector, female contacts, straight version with locking nut.....	9
11 Free connector, female contacts, right angled version with locking nut	10
12 Free connector, female contacts, straight version with locking nut.....	10
13 Free connector, female contacts, right angled version with locking nut	11
14 Pin front view E-coding.....	12

CONTENTS (continued)

Figure		Page
15	Socket front view E-coding	13
16	Contact position for E-coding front view	14
17	Pin front view F-coding	15
18	Socket front view F-coding	15
19	Contact position for F-coding front view.....	16
20	Current capacity versus temperature for 4-way F-coding.....	18
21	Current capacity versus temperature for 5-way E-coding	18
22	Contact resistance measurement points typical	19
23	Vibration and physical shock test fixture straight typical.....	20
24	Vibration and physical shock test fixture free to free connector typical	21

Foreword

(This Foreword is informative only and is not part of this Specification.)

This specification contains the connector types specified for M12 x 1 power circular connectors, typically used for power supply and power applications in industrial premises. Utilization of this Specification is intended to eliminate misunderstandings or confusion between a manufacturer and user with respect to product performance and testing requirements for this as well as other possible applications.

Specification for M12 Power Circular Connectors

(From EIA Standards Proposal No. 5240, formulated under the cognizance of the EIA CE-2.0 Committee on National Connector and Socket Standards.)

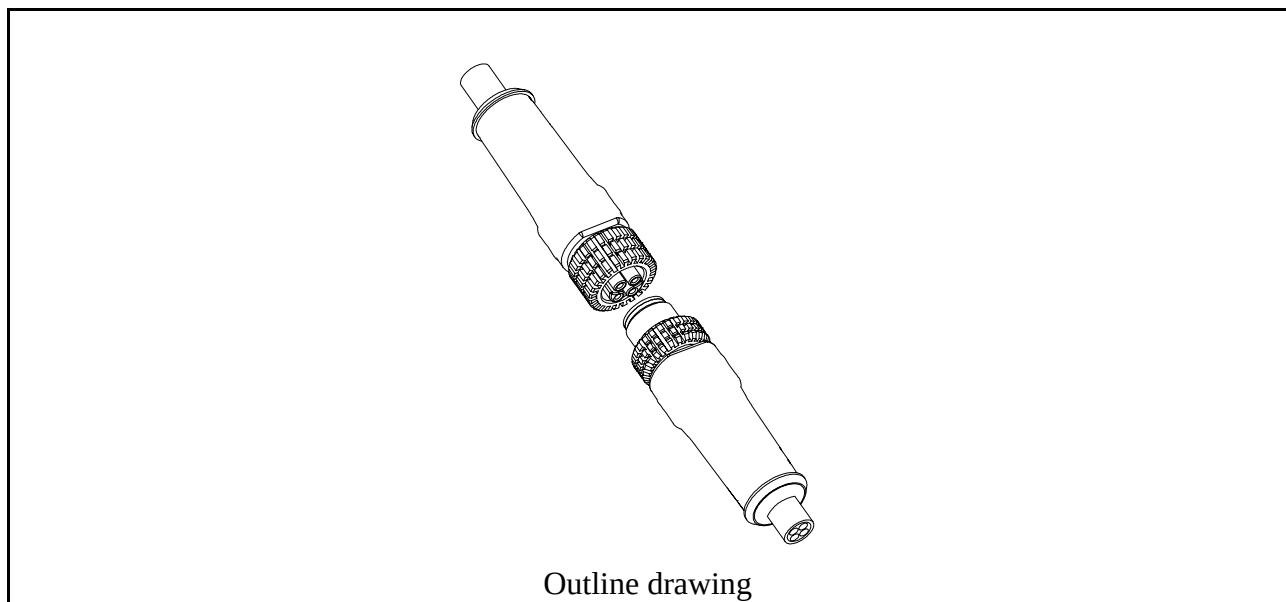
1 General information

1.1 Scope

This specification is applicable to M12 x 1 circular power connectors. The fixed connector (receptacle) and the free cable connector (plug) are suitable for rewirable and non-rewirable connectors having the following characteristics:

- M12 x 1 threaded coupling interface
- Circular interface
- 2 to 5 positions
- Mated connector NOT to be disconnected under load

All dimensions in this document apply to the unmated finished product.



1.2 Recommended method of mounting

Fixed (receptacle) connector where the source of power originates from, shall have female contacts.

1.2.1 Number of contacts or contact cavities are 2 to 5 positions

1.3 Ratings and characteristics

Table 1 – Ratings of connectors

Coding	Style	Contacts	Rated voltage, ac or dc	Rated current
E-coding	5 way	3 (2+PE), 4 (3+PE) and 5 (4+PE)	600 volts	12 amperes
F-coding	4 way	2 to 4	600volts	12 amperes

—Insulation resistance: 10megaohms minimum

—Climatic category: 0 °C to 80 °C

—Contact spacing: see 3.4

1.4 References

The following normative documents contain provisions which, through reference in this text, constitute provisions of this national standard. At the time of publication, the editions indicated were valid. All reference documents are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the reference documents indicated below.

ASME Y14.5
EIA-364

Dimensioning and Tolerancing
Electrical Connector Test Procedures

1.5 Marking

The marking of the connector and package shall be in accordance with the manufacturer's standard practices and include manufacturer's identification and date code as a minimum.

2 Technical information

2.1 Definition

None

2.2 Survey of styles and variants for fixed (receptacle) connectors

Table 2 - Styles and variants for fixed (receptacle) connectors

Connector orientation	Position			
	2	3	4	5
Straight male with square flange front mounting – Style DM	See figures 1, 14-18	See figures 1, 14-18	See figures 1, 14-18	See figures 1, 14-18
Straight male with M16 x 1.5 thread mounting – Style EM	See figures 2, 14-18	See figures 2, 14-18	See figures 2, 14-18	See figures 2, 14-18
Straight male with M20 x 1.5 thread mounting – Style FM	See figures 3, 14-18	See figures 3, 14-18	See figures 3, 14-18	See figures 3, 14-18
Straight female with M16 x 1.5 thread mounting – Style EF	See figures 4, 14-18	See figures 4, 14-18	See figures 4, 14-18	See figures 4, 14-18
Straight female with M20 x 1.5 thread mounting – Style FF	See figures 5, 14-18	See figures 5, 14-18	See figures 5, 14-18	See figures 5, 14-18