

INTERNATIONAL  
STANDARD

**ISO**  
**4400**

Third edition  
1994-09-01

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**Fluid power systems and components —  
Three-pin electrical plug connectors with  
earth contact — Characteristics and  
requirements**

*Transmissions hydrauliques et pneumatiques — Connecteurs électriques  
à trois broches avec contact de sécurité — Caractéristiques et exigences*



Reference number  
ISO 4400:1994(E)

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 4400 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components*.

This third edition cancels and replaces the second edition (ISO 4400:1985), of which it constitutes a technical revision. In particular, subclause 8.3 and clause 10 have been added, and the range of the temperatures of use has been modified.

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## Introduction

In fluid power systems, power is transmitted and controlled through a fluid under pressure within an enclosed circuit. Typical components found in such systems are hydraulic and pneumatic controls. These devices are used to regulate the function of a component or system.

Some control components found in fluid power systems are electrically actuated. The electrical plug connector described in this International Standard is used with control and regulation assemblies for use in hydraulic and pneumatic fluid power systems.

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# Fluid power systems and components — Three-pin electrical plug connectors with earth contact — Characteristics and requirements

## 1 Scope

This International Standard specifies the following characteristics and requirements for a general purpose three-pin electrical plug connector with earth contact for use with a single solenoid:

- the electrical characteristics of the connector;
- the dimensions of the pins and earth contact;
- the means for fixing the socket to the plug;
- the sealing procedure between the plug and the socket;
- usage requirements.

The electrical plug connector specified in this International Standard is intended to be used under working conditions where the connector cannot be damaged by external action (for example, shock or excessive loading).

## 2 Normative references

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

Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4413:1979, *Hydraulic fluid power — General rules for the application of equipment to transmission and control systems*.

ISO 4414:1982, *Pneumatic fluid power — Recommendations for the application of equipment to transmission and control systems*.

ISO 5598:1985, *Fluid power systems and components — Vocabulary*.

IEC 309-1:1988, *Plugs, socket-outlets and couplers for industrial purposes — Part 1: General requirements*.

IEC 529:1989, *Degrees of protection provided by enclosures (IP Code)*.

## 3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5598 and the following definition apply.

**3.1 electrical connector:** Two-piece assembly (plug and socket) which, when joined, provides electrical continuity.

## 4 Connector components

The components of the connector are illustrated and identified in figure 1.

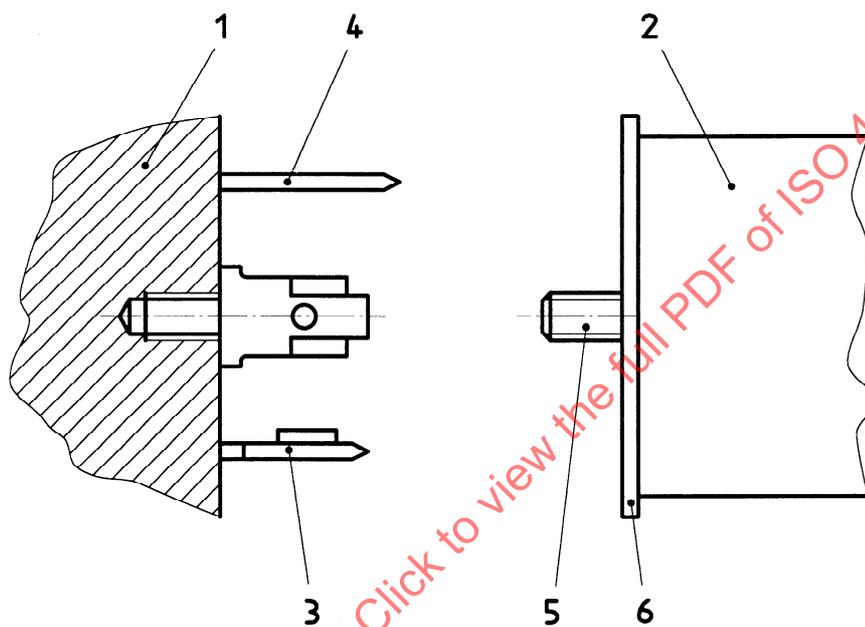
### 5 Connector characteristics

The connector shall be designed to meet the following requirements:

- a) voltage: 250 V;
- b) current: 10 A;

- c) temperature of use:  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$ ; at elevated temperatures, the variation of current with temperature is given in figure 2;
- d) degree of protection after fixing the socket onto the plug: IP 65, in accordance with IEC 529;
- e) insulation and dielectric strength: the connector shall meet the requirements stated in IEC 309-1.

NOTE 1 If it is necessary to specify the mechanical degree of protection, reference should be made to IEC 529.



- |          |                       |
|----------|-----------------------|
| 1 Plug   | 4 Earth contact       |
| 2 Socket | 5 Screw for fastening |
| 3 Pin    | 6 Seal                |

Figure 1 — Connector components

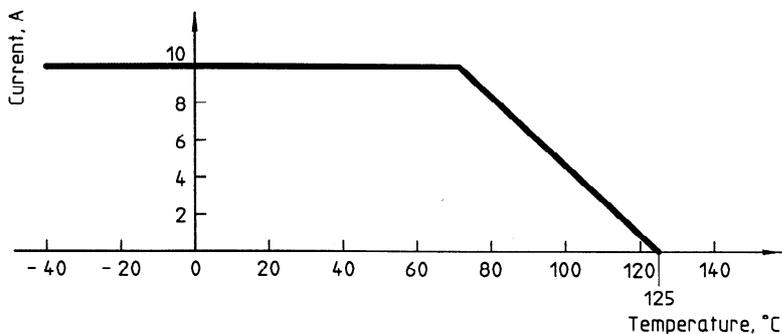


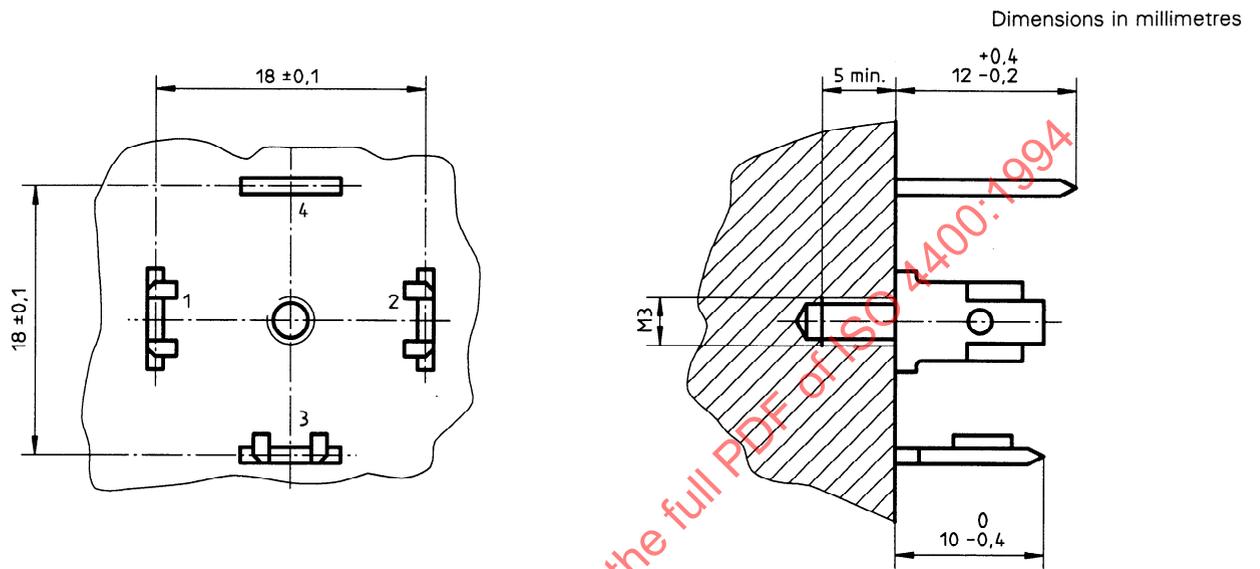
Figure 2 — Variation of current with temperature

## 6 Position of pins and earth contact

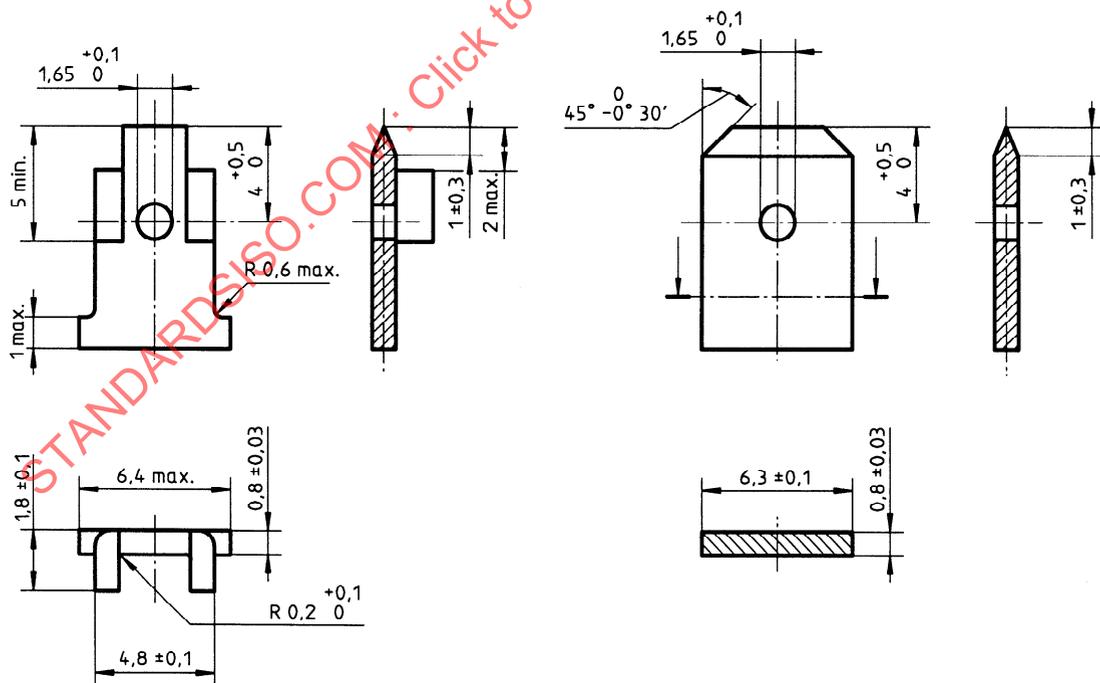
**6.1** The pins and earth contact shall be fitted on the plug.

**6.2** The earth contact shall be fixed in such a way that earth connection is ensured before current enters the pins.

**6.3** The position, dimensions and marking information of pins and the earth contact shall comply with figure 3.



a) Position and marking of pins and earth contact



b) Pin dimensions

c) Earth contact dimensions

**Figure 3 — Connector details**

**6.4** Pins 1 and 2 are the main pins.

**6.5** Pin 3 is an additional pin for auxiliary purposes, such as indicator lamps, stroke limiter, etc.

**6.6** Pin 4 (which is 2 mm longer than pins 1, 2 and 3) is the earth contact.

## 7 Fixing the socket on to the plug

An M3 screw shall be used to fix the socket on to the plug in accordance with figure 3a).

## 8 Socket/plug tightness

**8.1** A flat seal shall be provided on the plug to protect against dust and fluid (IP 65) in the socket/plug assembly.

**8.2** The seal shall be fitted on the socket to suit the overall dimension requirements indicated in figure 4.

**8.3** Alternative seal profiles within the dimensions of figure 4 are possible.

## 9 Mechanical protection

A cover plate shall be provided to protect the electrical

plug specified in this International Standard when the socket has been removed. The cover plate may be made of plastic or similar material.

## 10 Usage

**10.1** The connector shall not be used to interrupt the current. It shall be connected or disconnected only after the electricity has been switched off.

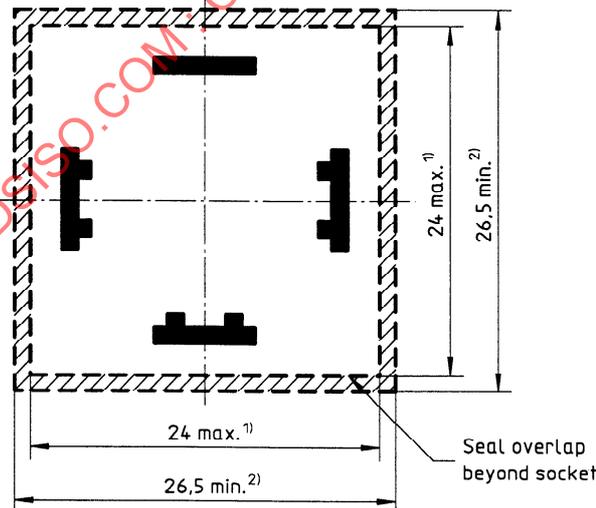
**10.2** Connectors or leads in installations in which incorrect connection is possible shall be permanently identified according to the actuator identification requirements given in ISO 4413 and ISO 4414.

## 11 Identification statement (Reference to this International Standard)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this International Standard:

"Electrical plug connector conforms to ISO 4400:1994, *Fluid power systems and components — Three-pin electrical plug connectors with earth contact — Characteristics and requirements.*"

Dimensions in millimetres



1) Maximum dimensions of the plug.

2) Minimum dimensions of the socket.

**Figure 4 — Overall dimensions**

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