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Second edition
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Industrial automation systems and integration — Distributed installation in industrial applications —

Part 3: Power distribution bus

*Systèmes d'automatisation industrielle et intégration — Installation
distribuée dans les applications industrielles —*

Partie 3: Bus de distribution d'énergie



Reference number
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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 23570-3 was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 1, *Physical device control*.

This second edition cancels and replaces the first edition (ISO 23570-3:2006), of which it constitutes a minor revision.

The following significant changes have been made to the first edition:

- a) addition of a third variant of motor connectors which is especially suitable for smaller motors, either in physical size, in power capacity, or both, and which can be used to interconnect the motor controller and the auxiliary motors;
- b) extension and reorganization of the contents of Clause 6 in order to describe the new motor connector;
- c) addition of a new Annex D, which describes the design elements of the new motor connector;
- d) renumbering of previous Annex D as Annex E.

ISO 23570 consists of the following parts, under the general title *Industrial automation systems and integration — Distributed installation in industrial applications*:

- *Part 1: Sensors and actuators*
- *Part 2: Hybrid communication bus*
- *Part 3: Power distribution bus*

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Introduction

Modern machine tools for the discrete parts manufacturing industry are complex systems, consisting of subsystems for material preparation (metal removal, material forming, etc.), material handling, fixturing and transfer lines for moving parts from one station to another. Each subsystem, in turn, is itself a complex system, including many sensors, actuators and control elements that receive and transmit electric signals and/or require electric power. To reduce down time in case of failure, most of them use cable assemblies for quick replacement. Proper operation of the system as a whole requires co-ordination of the subsystems, which requires more cables and connectors. As a consequence of this complexity, a large variety of cables and connectors are required for the proper operation of such a machine tool. The increasing number of sensors, actuators and control elements leads to an increasing variety of such cable assemblies. This variety results in increased maintenance costs due to complexity, large spare parts inventory and increased training costs for maintenance personnel.

ISO 23570 prescribes a set of requirements for cables, connectors and parameter selections within these elements, which, if implemented completely, will greatly reduce the wiring complexity and maintenance cost of such machine systems. The manufacturer of such systems will benefit in terms of decreased complexity costs, and the user of such systems will benefit in terms of decreased down time because of decreased parts inventory and simplified maintenance training.

The technology described in ISO 23570 may have applicability to other industries and processes, i.e. there is no intent to restrict it to discrete parts manufacturing.

The following three main areas are addressed within ISO 23570:

- the interconnection of sensors and actuators to the system backbone,
- a hybrid system backbone containing an information path (a fieldbus) and a source of power to the field devices, and
- a power trunk capable of providing power to all the auxiliary motors in the system.

Large power devices, such as spindle motors for metal removal, are not covered by ISO 23570.

Machine tools described in ISO 23570 are subject to constraints imposed by national and international safety standards. ISO 23570 is intended to specify system elements that support the compliance to such standards.

Figure 1 illustrates the system components addressed in ISO 23570. In the figure, the solid cable represents the power distribution bus providing three-phase a.c. power for electric motors. The open cable represents a hybrid communication bus, containing both a fieldbus communication channel and low voltage power.

The centre of the figure shows a control cabinet (3) serving three sets of distribution buses. This box contains the fieldbus communication front end, the low voltage power supplies and the three-phase power supplies.

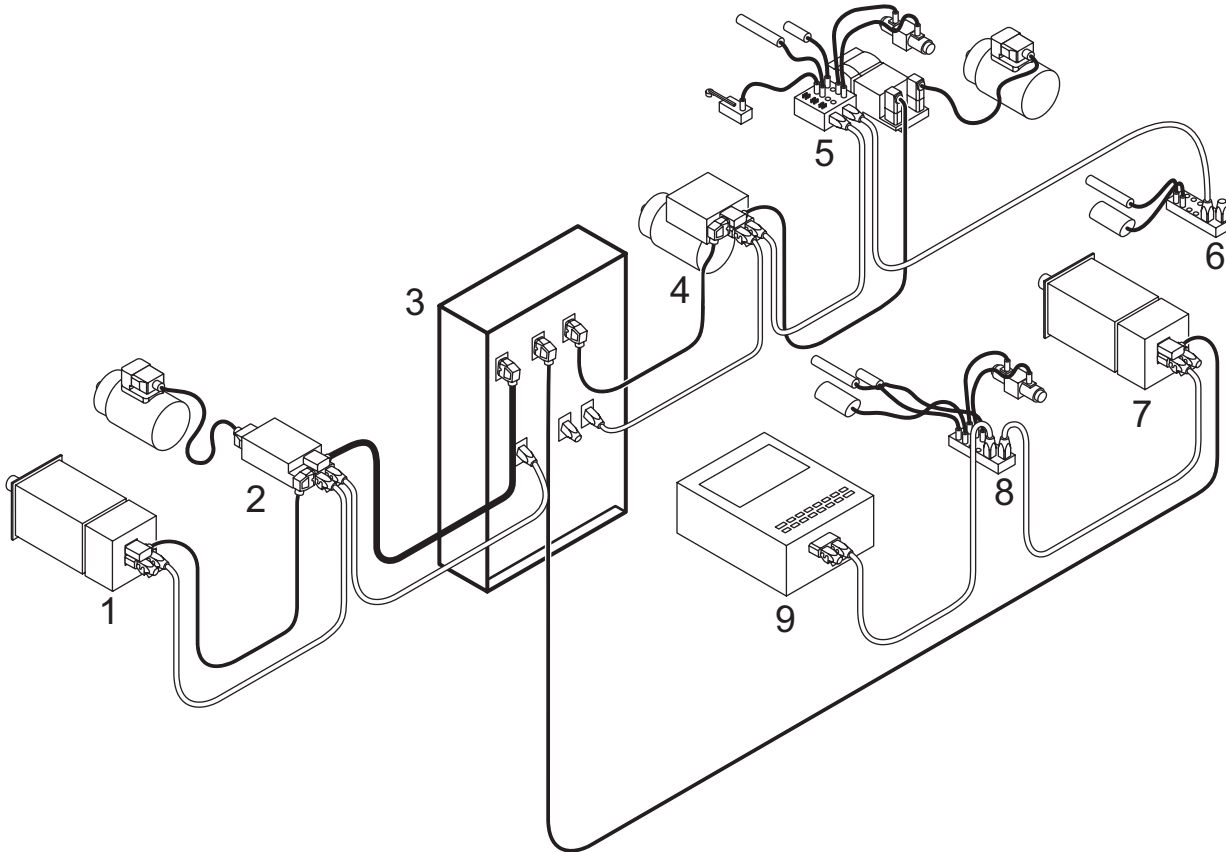
To the left of the control cabinet are a motor with integrated electronics (1) and a fixed speed motor with a separate motor controller (2). Both units are linked to the control cabinet by both the communication bus and the power distribution bus.

To the right of the control cabinet are a fixed speed motor with an attached motor controller (4), a variable speed motor with an integrated I/O module connected to several sensors and actuators (5), and another I/O module (6) connected to several sensors and actuators, including a hydraulic/pneumatic valve. The I/O module (6) is linked to the control cabinet only by the hybrid communication bus.

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In front of the control cabinet are three more units: a motor with integrated electronics (1), another I/O module connected to several sensors and actuators including a hydraulic/pneumatic valve (8), and a remote control terminal (9).

Figure 1 is intended to illustrate the variety of interconnections possible using the elements of ISO 23570.



Key

- 1 motor with integrated electronics (e.g. a stepping motor)
- 2 fixed speed motor with separate motor controller
- 3 power distribution and control cabinet
- 4 fixed speed motor with attached motor controller
- 5 variable speed motor with integrated I/O module together with sensors and actuators
- 6 I/O module with a set of sensors
- 7 motor with integrated electronics (e.g. a stepping motor)
- 8 I/O module connected to a set of sensors and actuators including a hydraulic/pneumatic valve
- 9 remote control terminal

Figure 1 — System components addressed in ISO 23570

ISO 23570-1 provides the requirements for sensors, actuators, and I/O modules that support this system requirement. ISO 23570-2 provides the requirements for a shared communication and low voltage power distribution system. This part of ISO 23570 provides the requirements for distribution of power to the low power motor systems.

While significant reduction in maintenance and operational costs may be achieved by adoption of individual parts of ISO 23570, the greatest benefit will occur only if all parts are implemented.

This part of ISO 23570 provides requirements for the distribution of power to the low power motor systems.