INTERNATIONAL STANDARD

ISO 23570-2

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

Part 2: Hybrid communication bus

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

Partie 2: Bus de communication hybride

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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 23570-2 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 1, *Physical device control*.

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

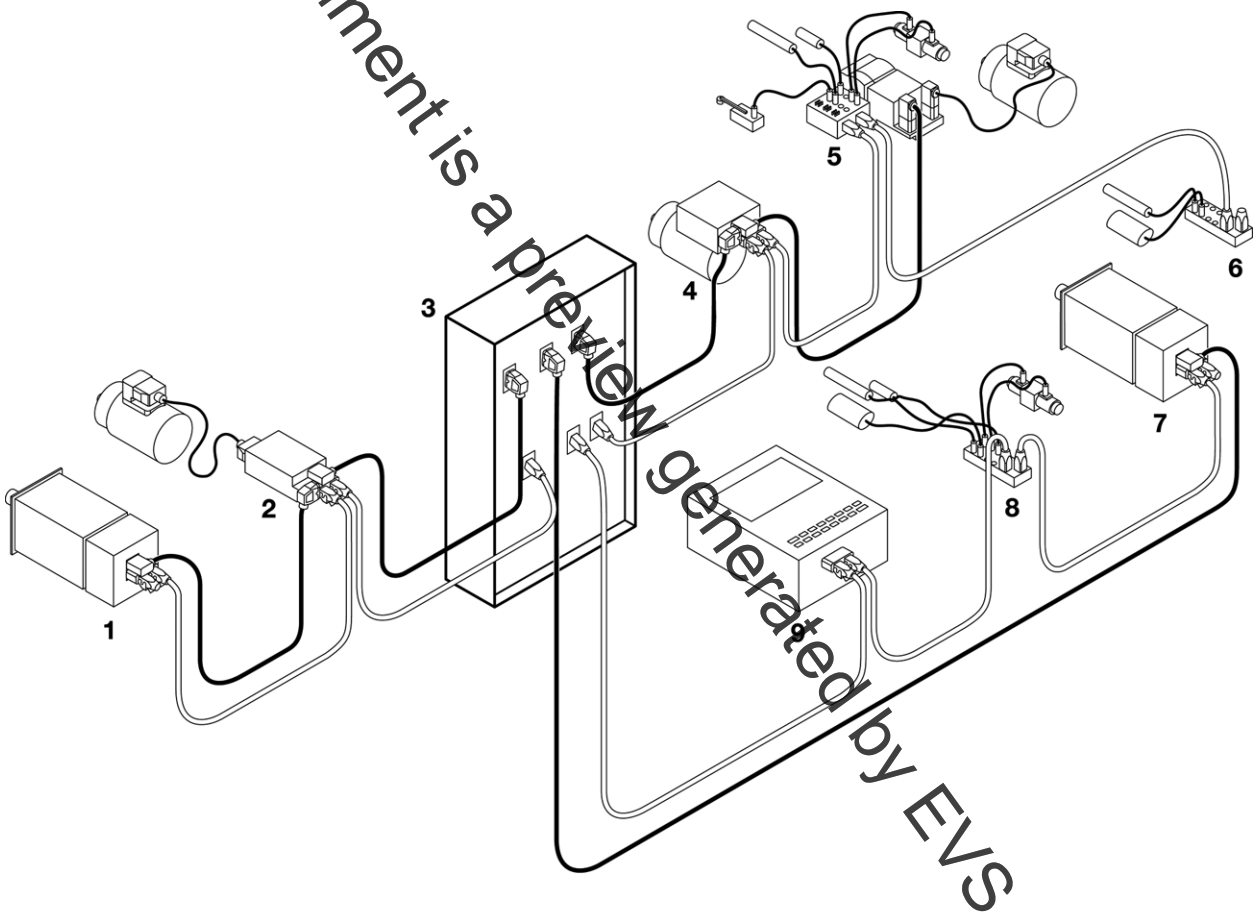
— *Part 1: Sensors and actuators*

— *Part 2: Hybrid communication bus*

— *Part 3: Power distribution bus*

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 is 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.



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 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. Benefits will occur to the manufacturer of such systems in the form of decreased complexity costs and to the user of such systems in the form 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; there is no intention of restricting it to discrete parts manufacturing.

There are three main areas 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;

— 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. It is the intent of ISO 23570 to specify system elements that support the compliance with such standards.

In Figure 1, 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 Figure 1 shows (3) a control cabinet 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 (1) a motor with integrated electronics and (2) a fixed speed motor with a separate motor controller. 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 (4) a fixed speed motor with an attached motor controller, (5) a variable speed motor with an integrated I/O module connected to several sensors and actuators, and (6) another I/O module 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.

In front of the control cabinet are three more units, (7) a motor with integrated electronics, (8) another I/O module connected to several sensors and actuators including a hydraulic/pneumatic valve, and (9) a remote control terminal.

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

ISO 23570-1 provides the requirements for sensors, actuators, and I/O modules that support this system requirement. This part of ISO 23570 provides the requirements for a shared communication and low voltage power distribution system. ISO 23570-3 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 the requirements for a shared communication and low voltage power distribution system that support this system requirement.

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

Part 2:
Hybrid communication bus

1 Scope

This part of ISO 23570 specifies the interconnection of elements in the control system of machine tools and similar large pieces of industrial automation. This specification includes cable types, sizes and sheath colours, connector types and contact assignments, and diagnostic functions appropriate to the sensors and actuators.

This part of ISO 23570 specifies the cabling for fieldbus communications and the distribution of power to the modules on this communications bus.

This part of ISO 23570 does not address operation of such equipment with respect to safety issues. Appropriate safety standards should be consulted for such requirements.

2 Conformance

Producers of modules, connectors, cable and cable assemblies may claim conformance to this part of ISO 23570 if they meet the requirements of Clause 5, including either 5.2 or 5.3.

Producers of discrete part manufacturing equipment may claim conformance to this part of ISO 23570 if all the components of the discrete part manufacturing equipment that are subject to the requirements of Clause 5 meet those requirements consistent with either 5.2 or 5.3.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60204-1:2000, Ed. 4.1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 61076-2-101:2004, *Connectors for electronic equipment — Part 2-101: Circular connectors — Detail specification for circular connectors M8 with screw- or snap-locking, M12 with screw-locking for low voltage applications*

IEC 60529:2001 Ed. 2.0, *Degrees of protection provided by enclosures (IP code)*

IEC 60793-2-40:2002-03, *Optical fibres — Part 2-40: Product specifications — Sectional specification for category A4 multimode fibres*