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Industrial automation systems — Manufacturing Message Specification —

Part 1: Service definition

*Systèmes d'automatisation industrielle — Spécification de messagerie
industrielle —*

Partie 1: Définition des services



Reference number
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Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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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 9506-1 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 5, *Architecture, communications and integration frameworks*.

This second edition of ISO 9506-1 cancels and replaces the first edition (ISO 9506-1:2000), of which it constitutes a technical revision. It incorporates several technical corrections to ISO 9506-1:2000. The first edition of ISO 9506-1:2000 included corrections published in ISO/IEC 9506-1/Cor.1:1995 and in ISO/IEC 9506-1/Cor.2:1995, the additional services published in ISO/IEC 9506-1/Amd.1:1993, and in ISO/IEC 9506-1/Amd.2:1995, and the material published in ISO/TR 13345.

ISO 9506 consists of the following parts, under the general title *Industrial automation systems — Manufacturing Message Specification*:

- *Part 1: Service definition*
- *Part 2: Protocol specification*

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This part of ISO 9506 provides a wide variety of services useful for various manufacturing and process control devices. It is designed to be used both by itself and in conjunction with Companion Standards that describe the application of subsets of these services to particular device types.

The services provided by the Manufacturing Message Specification (MMS) range from simple to highly complex. It is not expected that all of these services will be supported by all devices. The subset to be supported is limited in some cases by Companion Standards, and in all cases may be limited by the implementor. Characteristics important in selection of a subset of services to be supported include:

- a) applicability of the service to the device;
- b) the complexity of services and requirements;
- c) the complexity of provision of a particular class of service via the network versus the complexity of the device.

Security considerations

When implementing MMS in secure or safety critical applications, features of the OSI security architecture may need to be implemented. This International Standard provides simple facilities for authentication (passwords) and access control. Systems requiring a higher degree of security will have to consider features beyond the scope of this International Standard. This International Standard does not use facilities for non-repudiation.

Complexity of services and requirements

Some MMS services are quite complex and should be considered advanced functions. Devices used in very simple applications often will not require such advanced functions, and hence will not support such MMS services.

Keywords

Application Interworking	OSI Reference Model
Application Layer Protocol	Process Control System
Information Processing Systems	Programmable Controller
Manufacturing Communications Network	Programmable Device
Manufacturing Message Specification	Robotics Control System
Numerical Control System	Virtual Manufacturing Device
Open Systems Interconnection	

General

This part of ISO 9506 is one of a set of International Standards developed to facilitate the interconnection of information processing systems. It is positioned within the application layer of the Open Systems Interconnection Environment as an Application Service Element (ASE) with respect to other related standards by the Basic Reference Model for Open Systems Interconnection (ISO 7498).

The aim of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of information processing systems:

- a) from different manufacturers;
- b) under different managements;
- c) of different levels of complexity;
- d) of different ages.

Purpose

The purpose of this part of ISO 9506 is to define the services provided by the Manufacturing Message Specification. The Services specified in this part of ISO 9506 are realized by the Manufacturing Message

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independent of the exact form of the communication system insofar as possible. This International Standard does this by describing its support requirements as a set of abstract services present in a variety of communication environments. Realization of these abstract services in an OSI environment is described in Annex A.

This part of ISO 9506 is concerned, in particular, with the communication and interworking of programmable manufacturing devices. By using this standard together with other standards positioned within the OSI Reference Model, otherwise incompatible systems may work together in any combination.

ISO 9506-2 specifies the protocol that supports the Manufacturing Message Specification.

Edition

This part of ISO 9506 differs from the first edition of ISO 9506-1 by correcting several errors in the ASN.1 type definitions and modelling structures. It also corrects several typographical errors in that document.

This part of ISO 9506 differs from ISO/IEC 9506-1:1990 in the following ways.

- a) The informal object modelling used in ISO/IEC 9506-1 has been replaced by the use of the modelling techniques present in ASN.1, ISO/IEC 8824-2. Hence, this part of ISO 9506 defines an ASN.1 module, MMS-Object-Module-1, that contains the object models on which the service procedures are based.
- b) The material in ISO/IEC TR 13345 that specifies subsets of protocol for MMS has been used in this part of ISO 9506 to specify options within the object models. The material in ISO/IEC TR 13345 has been modified slightly to allow for use of the PER encoding rules, ISO/IEC 8825-2.
- c) All the material of Amendments 1 and 2 have been incorporated into the document, as well as the Technical Corrigenda.
- d) The services and protocol present in the Companion Standards already published, ISO/IEC 9506-3, ISO/IEC 9506-4, and ISO/IEC 9506-6, have been incorporated into the base standard, and new parameter CBBs have been added to the Initiate procedure to indicate their presence. The concept of Companion Standard has been simplified to a document that makes explicit the relationship between the abstract models in MMS and the requirements of the application field that is the subject of the Companion Standard.

As a result of this incorporation, the need for separate abstract syntaxes for each of the Companion Standards has been removed. All Companion Standards can now operate in the single abstract syntax of the base standard, although using other abstract syntaxes remains a possibility for backward compatibility.

- e) The communication requirements of MMS have been generalized so that MMS is described with respect to an abstract set of services needed for its support. The relation between this abstract set of services and the services provided by the suite of OSI communication protocols is specified in an annex. This opens the possibility of having MMS operating correctly over alternate communication systems (such as reduced stack implementations) as long as the equivalent of these abstract services is provided.
- f) The restrictions on the characters that can be used as an Identifier have been relaxed to allow an Identifier to begin with a numeric character, and by extension, to consist solely of numeric characters.
- g) Many (but not all) occurrences of VisibleString have been replaced by a new production MMSString that provides the option of using an arbitrary string of characters taken from ISO 10646. Similarly, these more general strings may also be used as Identifiers. A new parameter CBB has been added to provide for negotiation of the use of these more general strings.
- h) A new service, ReconfigureProgramInvocation, has been introduced into the clause on Program Invocation management. This service provides a technique of dynamically changing the constituent Domains of a running Program Invocation.
- i) A new field has been added to the object model of the Named Variable and Named Type. This field may be used to describe the semantics associated with the Named Variable or Named Type. The field is either predefined or has its value established as the name of the Named Type used to construct it in the DefineNamedVariable or DefineNamedType service. This field can be reported with the

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- j) The material of the document has been reorganized to provide shorter clauses.
- k) The Real Data type has been removed from the document.
- l) The Scattered Access has been removed from the base document and placed in an informative annex.
- m) In accordance with the recommendations in ISO/IEC 8824-1, all occurrences of EXTERNAL in the protocol have been replaced with CHOICE { EXTERNAL, EMBEDDED PDV }.

Protocol

Because of the use of the ASN.1 object modelling technique, the protocol now exists in two separate modules, one that is part of the object model contained in this part of ISO 9506, and a second module defined in ISO 9506-2 that describes the content and structure of all valid PDUs. Despite the fact that the ASN.1 formulation appears different in some cases, nevertheless the PDUs produced through application of the first edition of ISO/IEC 9506 are identical with those produced by this edition. For this reason, this edition continues to be identified by the major version number one. (The minor version number has been changed to reflect all the new additions to the document.)

There are exceptions to this statement that should be noted.

- a) Syntactic extensions defined by the companion standards are now identified by new parameter CBBs instead of a separate abstract syntax. Therefore, for any use of MMS involving companion standard facilities, there is a change in the Initiate PDU. However, if the companion standard facilities are not used, the Initiate PDU remains the same as that defined by the first edition.
- b) Some small changes have been made to the tagging in the ChangeAccessControl service (part of Amendment 2) to bring it into alignment with corresponding protocol in the GetNameList and Rename services.
- c) Encoding of the PDUs using PER (ISO/IEC 8825-2) may not be completely compatible with PDUs generated by the first edition of ISO/IEC 9506:1990; this is because replacement of a type by a CHOICE containing that type will result in a different encoding using PER; BER encoding for these two situations is identical. Thus, if the PDUs contain any elements that are EXTERNAL, according to item m) above, they will be replaced by a CHOICE resulting in a different PER encoding.

ASN.1 Modules

The ASN.1 modules defined in ISO 9506 may be obtained from the SC 4 Secretariat in computer readable format. The modules are available in two forms: as published and with the IF - ELSE - ENDIF brackets removed.

To obtain these files use the Internet location: <http://forums.nema.org:8080/~iso_tc184_sc5>.