



IEC 61970-407

Edition 1.0 2007-08

# INTERNATIONAL STANDARD

---

**Energy management system application program interface (EMS-API) –  
Part 407: Time Series Data Access (TSDA)**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

**S**

---

ICS 33.200

ISBN 2-8318-9253-8

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	7
3 Terms, definitions and identification conventions .....	7
3.1 Terms and definitions .....	7
3.2 Conventions .....	7
4 CIS Specification .....	7
4.1 Background (informative) .....	7
4.2 Historian use case (informative) .....	8
4.3 Data model.....	10
4.4 Messages (normative).....	13
4.5 Interface (normative).....	13
4.5.1 Objects and interfaces.....	13
4.5.2 Server and Session interfaces .....	16
4.5.3 Management interfaces .....	17
4.5.4 Browse interfaces .....	17
4.5.5 IO interfaces.....	18
4.5.6 Client interfaces .....	20
4.6 Mapping of TSDA .....	20
Figure 1 – Control system structure .....	9
Figure 2 – TSDA server and clients.....	10
Figure 3 – Data subscription .....	10
Figure 4 – TSDA data model.....	11
Figure 5 – TSDA objects and interfaces.....	14
Figure 6 – Typical Interaction between the TSDA objects.....	16

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ENERGY MANAGEMENT SYSTEM  
APPLICATION PROGRAM INTERFACE (EMS-API) –**

**Part 407: Time Series Data Access (TSDA)**

**FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as far as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61970-407 has been prepared by IEC Technical Committee 57: Power system management and associated information exchange.

The text of this standard is based on the following documents:

FDIS	Report on voting
57/889/FDIS	57/908/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

A list of all parts of the IEC 61970 series, under the general title *Energy Management System Application Program Interface (EMS-API)*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

Currently in preview, click buy full version

## INTRODUCTION

This part of IEC 61970 is part of the IEC 61970 series that defines Application Program Interfaces (APIs) for an Energy Management System (EMS). The IEC 61970-4XX and IEC 61970-5XX series documents comprise Component Interface Specifications (CISs). The IEC 61970-4XX series CIS are specified as Platform Independent Models (PIMs), which means they are independent of the underlying technology used to implement them. PIM specifications are also referred to as Level 1 specifications. The IEC 61970-5XX series CIS, on the other hand, are specified as Platform Specific Models (PSMs). PSM specifications are also referred to as Level 2 specifications.

IEC 61970-4XX CISs specify the functional requirements for interfaces that a component (or application) should implement to exchange information with other components (or applications) and/or to access publicly available data in a standard way. The component interfaces describe the specific event types and message contents that can be used by applications for this purpose.

IEC 61970-407 specifies an interface for the efficient transfer of time series data in a distributed environment. Small amounts of data are transferred with short delay, but also large amounts of data are transferred in short time but with possibly longer delay. Replay of time series data is also supported. This is a typical requirement for a SCADA system that acts as a real time data provider to other sub-systems. Other systems than SCADA may also benefit from the characteristics of TSDA. When short delay times as well as bulk data transfer is required TSDA is a good fit.

These component interface specifications refer to entity objects for the power system domain that is defined in the IEC 61970-3XX series, including IEC 61970-301.

## ENERGY MANAGEMENT SYSTEM APPLICATION PROGRAM INTERFACE (EMS-API) –

### Part 407: Time Series Data Access (TSDA)

#### 1 Scope

The IEC 61970-407 Time Series Data Access (TSDA) specification specifies a generalized interface for efficient exchange of data. The specification takes into account the latencies caused by a Local Area Network (LAN) providing efficient data exchange also over Local Area Networks.

IEC 61970-407 is derived from the Object Management Group (OMG) Historical Data Access from Industrial Systems (HDAIS) specification. OMG HDAIS relies on the OMG Data Access Facility (DAF) and OPC Historical Data Access (HDA) specifications. OMG HDAIS is a Platform Specific Model (PSM) with CORBA as the platform and OPC HDA is a PSM with Microsoft COM as the platform. The IEC 61970-407 specification describes the functionality of these PSMs in a technology independent way (i.e., as a Platform Independent Model (PIM)). Hence, it explains the functionality to a level that can be used to create additional PSMs or be an introduction to existing PSMs, i.e. HDAIS and OPC HDA. Implementers wanting an introduction to OMG HDAIS and OPC HDA should read these documents.

The TSDA interface is intended to interoperate with other IEC 61970 based interfaces. Hence, it is possible to use information retrieved from other interface to access the same information using this interface, for example:

- object identifiers,
- attribute names or identifiers,
- class names or identifiers.

Subclause 4.6 provides a generic mapping for the CIM classes and attributes.

The way data is organized in a server implementing the TSDA interface can be seen by using the browse interfaces for data and meta data. It is also possible to use the data access interface directly without using the browse interfaces if the client has an *a priori* knowledge of object, class and attribute identifiers. Object identifiers may be retrieved using data from other interfaces, for example a CIMXML file or the IEC 61970-404 interface. Information on what classes and attributes are available will be described in IEC 61970-45X documents, for example historical SCADA data, historical State Estimator results etc.

IEC 61970-1 provides the EMS-API reference model upon which this standard is based. In that reference model, the terminology used in this part of IEC 61970 is introduced and the role of the CIS is explained.

IEC 61970-401 provides an overview and framework for the CIS (IEC 61970-4XX) standards.

The mapping of IEC 61970-407 to implementation specific technologies or PSMs is further described in a separate series of documents, i.e. the future IEC 61970-5XX. For actual implementations the future IEC 61970-5XX, OMG HDAIS, OMG DAF or OPC HDA are used.

## 2 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 61970-1, *Energy management system application program interface (EMS-API) – Part 1: Guidelines and general requirements*

IEC/TS 61970-2, *Energy management system application program interface (EMS-API) – Part 2: Glossary*

IEC 61970-301:2005, *Energy management system application program interface (EMS-API) – Part 301: Common Information Model (CIM) base*

IEC 61970-401, *Energy management system application program interface (EMS-API) – Part 401: Component Interface Specification (CIS) Framework*

IEC 61970-402, *Energy management system application program interface (EMS-API) – Part 402: Component Interface Specification (CIS) - Common Services*

*Historical Data Access from Industrial Systems (HDAIS)*, OMG Adopted Specification Version 1.0, dtc/2003-02-01 November 2003 (Referred herein as 'OMG HDAIS')

*Utility Management System (UMS) Data Access Facility (DAF)*, OMG Adopted Specification, Version 2.0, formal/02-11-08, November 2002 (Referred to herein as 'OMG DAF')

*Data Acquisition from Industrial Systems (DAIS)*, OMG Adopted Specification Version 1.0, formal/2002-11-07 November 2002 (Referred herein as 'OMG DAIS')

*OPC Historical Data Access Custom Interface Specification*, Version 1.20, OPC Foundation, December 2003 (Referred to herein as 'OPC HDA')