SLOVENSKI STANDARD
SIST EN 60870-5-1:1997

01-avgust-1997

Telecontrol equipment and systems - Part 5: Transmission protocols - Section one: Transmission frame formats (IEC 870-5-1:1990)

Telecontrol equipment and systems -- Part 5: Transmission protocols - Section 1: Transmission frame formats

Fernwirkeinrichtungen und -systeme -- Teil 5: Übertragungsprotokolle - Hauptabschnitt 1: Telegrammformate

Matériels et systèmes de téléconduite -- Partie 5: Protocoles de transmission - Section 1: Formats de trames de transmission

Ta slovenski standard je istoveten z: EN 60870-5-1:1993

ICS:

33.200	Daljinsko krmiljenje, daljinske meritve (telemetrija)	Telecontrol. Telemetering

SIST EN 60870-5-1:1997   **en**

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EUROPEAN STANDARD

NORME EUROPEENNE

EUROPÄISCHE NORM

EN 60870-5-1

September 1993

UDC 621.398:621.316.1:681.3.04

Descriptors: Telecontrol, data-transmission, open system interconnection, protocol, data structure, frame, format

ENGLISH VERSION

Telecontrol equipment and systems
Part 5: Transmission protocols
Section One: Transmission frame formats
(IEC 870-5-1:1990)

Matériels et systèmes de
téléconduite
Partie 5: Protocoles de
transmission
Section un: Formats de trames de
transmission
(CEI 870-5-1:1990)

Fernwirkeinrichtungen und
Fernwirksysteme
Teil 5: Übertragungsprotokolle
Hauptabschnitt eins:
Telegrammformate
(IEC 870-5-1:1990)

This European Standard was approved by CENELEC on 1993-07-06.
CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations
which stipulate the conditions for giving this European Standard the status of
a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards
may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German).
A version in any other language made by translation under the responsibility of
a CENELEC member into its own language and notified to the Central Secretariat
has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium,
Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg,
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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

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FOREWORD

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 870-5-1:1990 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 60870-5-1 on 6 July 1993.

The following dates were fixed:

- latest date of publication of an
  identical national standard   (dop)   1994-08-01

- latest date of withdrawal of
  conflicting national standards   (dow)   1994-08-01

Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 870-5-1:1990 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD
WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE : When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
50(371)	1984	International Electrotechnical Vocabulary (IEV) Chapter 371: Telecontrol	-	-
870-1-1	1988	Telecontrol equipment and systems Part 1: General considerations Section One: General principles	-	-
870-5-2	1992	Part 5: Transmission protocols Section 2: Link transmission procedures	EN 60870-5-2	1993

Other publication

ISO 3309:1984 - Information processing systems - Data communication - High-level
data link control procedures - Frame structure

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NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
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870-5-1

Première édition
First edition
1990-02

Matériels et systèmes de téléconduite

Cinquième partie:
Protocoles de transmission.
Section un – Formats de trames de transmission

Telecontrol equipment and systems

Part 5:
Transmission protocols.
Section One – Transmission frame formats

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Commission Electrotechnique Internationale
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Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

TELECONTROL EQUIPMENT AND SYSTEMS
Part 5: Transmission protocols
Section One - Transmission frame formats

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by IEC Technical Committee No. 57: Telecontrol, teleprotection and associated telecommunications for electric power systems.

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

Six Months' Rule	Reports on Voting	Two Months' Procedure	Report on Voting
57(CO)31 57(CO)50	57(CO)37 57(CO)54	57(CO)40	57(CO)45

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

The following IEC publications are quoted in this standard:

Publications Nos. 50(371) (1984): International Electrotechnical Vocabulary, Chapter 371: Telecontrol.

870-1-1 (1988): Telecontrol equipment and systems, Part 1: General considerations - Section One: General principles.

870-5-2: Part 5: Transmission protocols - Section Two: Transmission procedures (in preparation)

Other publication quoted:

ISO 3309 (1984): Information processing systems - Data communication - High-level data link control procedures - Frame structure.

TELECONTROL EQUIPMENT AND SYSTEMS

Part 5: Transmission protocols

Section One - Transmission frame formats

INTRODUCTION

This section highlights specific requirements and conditions for data transmission in telecontrol systems and shows ways to meet those requirements. Existing standards for data transmission protocols are adopted where they fulfil the specific telecontrol requirements.

In terms of the OSI (Open System Interconnection) reference model of ISO-CCITT, which subdivides communication into seven layers, this specifies standards for the two lowest layers, namely the physical layer and the link layer. In particular the document specifies formats for bit serial frame transmission which comply with specified classes of data integrity.

Publication 870-5-2: Section Two: Transmission Procedures (in preparation) will specify further standards for the link layer and for higher layers. This comprises dispositions for data contents within frames, i.e. services in various traffic modes and for various link - and network configurations.
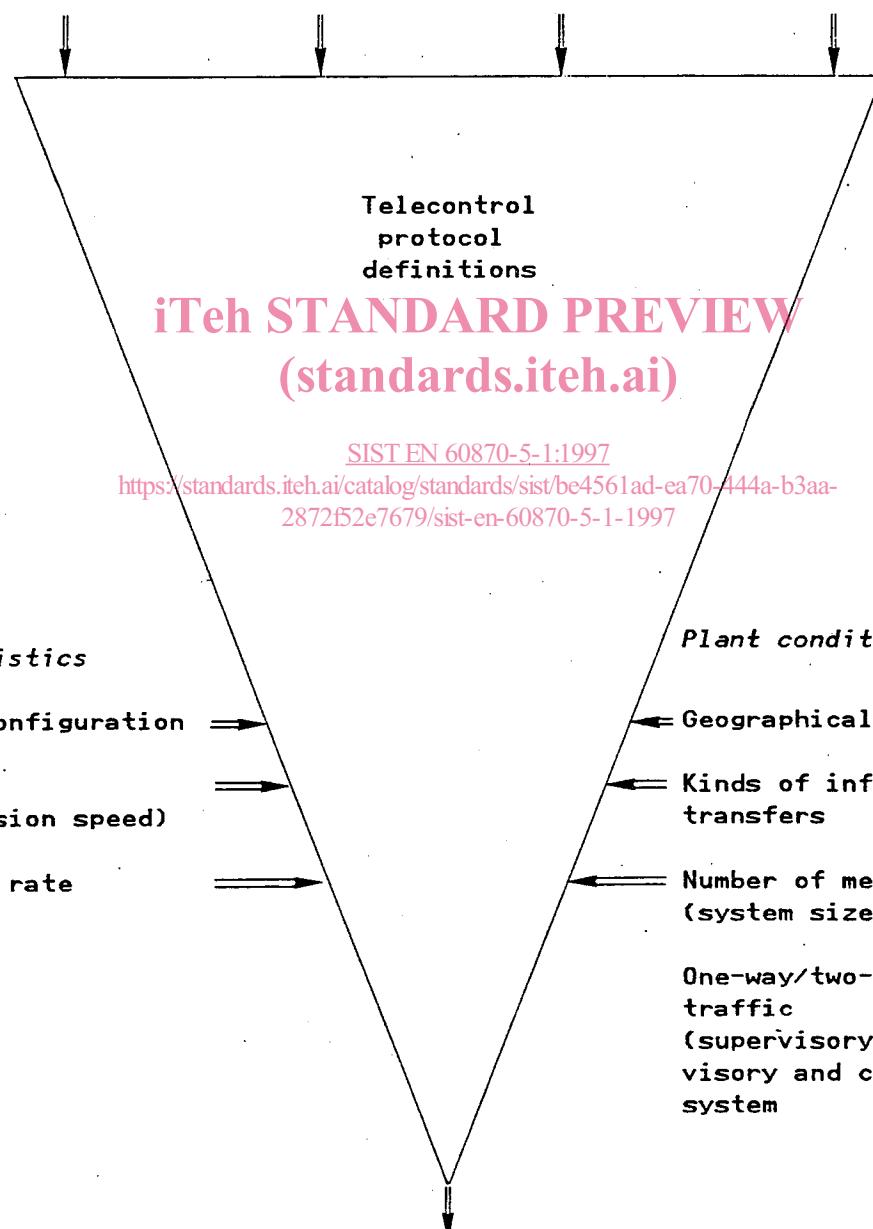
The ultimate purpose of the communication function in process monitoring and control is to achieve maximum system consistency, i.e. there should be no discrepancies between the physical states of process variables and their image in the data base of the telecontrol system. This ultimate goal cannot be achieved completely. The laws of causality dictate that the information about process states is delayed and environmental noise or component failures may falsify the information. All that can be expected is that the communication allows a high degree of system consistency to be maintained. For this reason the data transmission method shall support upgraded *reliable* and *efficient* information throughput in particular for short and urgent messages. The exploitation of the installed bandwidth with respect to these two qualities is the critical measure for telecontrol protocols, because the available bandwidths are limited.

In an imperfect environment, however, high data integrity and efficient data transmission are conflicting properties: increasing demands for data integrity can be fulfilled at the expense of decreasing net speed of information flow. It is necessary, therefore, to find an acceptable compromise between these two properties, based on an analysis of the requirements. A pre-supposition for analytical treatment is the objective measurement of the required properties.

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Data transport is only one function of the total system. The speed and integrity requirements of data transmission shall be chosen to be consistent with the accuracy of the total system, i.e. all the system parameters should be matched. In addition to the required compromise between transmission speed and transmission integrity there are further conditions which influence the choice of an appropriate telecontrol protocol, as shown in the following diagram:

Fonctional requirements

```
Required          Required          Required          Required
data             availability      response          accuracy
integrity                          time
```

Telecontrol
protocol
definitions

Network characteristics   *Plant conditions*

Network configuration   Geographical situation

Bandwidth   Kinds of information
(transmission speed)   transfers

Bit error rate   Number of messages
                                                   (system size)

                                                   One-way/two-way data
                                                   traffic
                                                   (supervisory/super-
                                                   visory and control
                                                   system

Recommended protocol

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1. Scope

This series of standards applies to telecontrol equipment and systems with coded bit serial data transmission for monitoring and controlling geographically widespread processes. This standard covers asynchronous data transmission with half duplex and duplex link protocols operating with window size one for message transfers.

2. Object

This section specifies the basic requirements for services to be provided by the link plus physical layers, for telecontrol applications. In particular it specifies standards on coding, formating and synchronizing data frames of variable and fixed lengths which meet specified data integrity requirements.

The specified block codes are suited for the transmission of bit serial frames over binary symmetric transmission channels using a *memoryless* bit encoding method. This means that the signal specification of each transmitted bit shall not depend on signals transmitted before that bit.

Note.- Recommendations for data transmission services using other than memoryless bit encoding methods (for example digital pulse duration modulation (DPDM), HDLC, etc.) and duplex link protocols with window sizes greater than one are under consideration.

3. Requirements for data transmission in telecontrol systems

According to the basic goals of telecontrol systems and to the particular environmental conditions, it is necessary that data transmission fulfils the following requirements:

3.1 *High data integrity and data consistency*

Correct data transmission is required in the presence of harsh environmental conditions, such as electromagnetic interferences, differences in earth potential, ageing components and other sources of disturbance and noise incident on the transmission path. Under these conditions it is necessary to provide efficient protection of messages against:

- undetected bit errors;

- undetected frame errors caused by synchronization errors;