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Analogue signals for process control systems - Part 1: Direct current signals

Analogue signals for process control systems -- Part 1: Direct current signals

Analoge Signale für Regel- und Steueranlagen -- Teil 1: Analoge Gleichstromsignale

Signaux analogiques pour systèmes de commande de processus -- Partie 1: Signaux à courant continu

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CENELEC

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ANALOGUE SIGNALS FOR PROCESS CONTROL SYSTEMS
PART 1: DIRECT CURRENT SIGNALS

Signaux analogiques pour systèmes de commande de processus
Première partie: Signaux à courant continu

Analoge Signale für Regel- und Steueranlagen.
Teil 1: Analoge Gleichstromsignale

BODY OF HD

The Harmonization Document consists of:

- IEC 381-1 (1982) edition 2; IEC/SC 65A, not appended

This Harmonization Document was approved by CENELEC on **11 September 1984**

The English and French versions of this HD are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level

by or before **1985-03-01**

to publish their new harmonized national standard

by or before **1986-03-01**

to withdraw all conflicting national standards

by or before **1986-03-01.**

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC General Secretariat.

The CENELEC National Committees are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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Signaux analogiques pour systèmes de commande de processus

Première partie:
Signaux à courant continu

Analogue signals for process control systems

Part 1:
Direct current signals

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ANALOGUE SIGNALS FOR PROCESS CONTROL SYSTEMS

Part 1: Direct current signals

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 Sub-Committee 65A: System Considerations, of IEC Technical Committee No. 65: Industrial-process Measurement and Control.

A draft was discussed at the meeting held in Philadelphia in 1979. As a result of this meeting, a draft, Document 65A(Central Office)8, was submitted to the National Committees for approval under the Six Months' Rule in October 1980.

The National Committees of the following countries voted explicitly in favour of publication:

Australia	Germany
Austria	Hungary
Belgium	Italy
Brazil	Netherlands
Bulgaria	Poland
Canada	Romania
China	South Africa (Republic of)
Czechoslovakia	Sweden
Denmark	Switzerland
Egypt	Turkey
France	United States of America

As a consolidated revision of the first edition of IEC Publication 381, issued in 1971, and its first supplement (Publication 381A), issued in 1975, this standard, which forms Part 1 of IEC Publication 381, is published as a second edition.

This standard should be read in conjunction with IEC Publication 381-2: Analogue Signals for Process Control Systems, Part 2: Direct Voltage Signals.

ANALOGUE SIGNALS FOR PROCESS CONTROL SYSTEMS

Part 1: Direct current signals

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1. Scope

This standard is applicable to analogue direct current signals used in industrial-process measurement and control systems to transmit information between elements of systems.

This standard does not apply to signals used entirely within an element.

2. Definitions

2.1 *Elements of industrial-process measurement and control systems*

Functional units, or integrated combinations thereof, which transduce, process or transmit measured values, controlling, controlled and reference variables.

2.2 *Analogue direct current signal*

A direct current signal, which varies in a continuous manner within its ranges, used in industrial-process measurement and control systems to transmit information.

2.3 *Range of an analogue direct current signal*

The range is all values of the signal which lie between defined limits.

2.4 *Lower limit*

The specified lowest value of the range.

Note. — The lower limit may be either zero or a finite value; when zero is used, this is called "true zero"; when a finite value is used, this is called "live zero".

2.5 *Upper limit*

The specified highest value of the range.

2.6 *Load impedance*

The resultant of the impedances of all connected receiving elements and connecting lines within the signal circuit.

2.7 *Ripple content of the direct current signal*

The ratio of the peak-to-peak value of the alternating component with respect to the analogue direct current signal range.

2.8 *Signal circuit common*

A number of "signal" circuits may have a common direct electrical connection. This is the "signal" circuit common, which may, or may not, be connected to earth.

2.9 *Power supply*

The supply which enables a system element to generate direct current signals by supplying the necessary d.c. power.

2.10 *Ripple content of the power supply voltage*

The ratio of the peak-to-peak value of the alternating component with respect to the nominal power supply voltage.

3. Specified values

3.1 *Ranges of analogue direct current signals*

The ranges of analogue direct current signals shall be as given in Table I.

TABLE I

Ranges of analogue direct current signals

Lower limit (mA)	Upper limit (mA)	Notes
4	20	1)
0	20	2)

1) Preferred values.
2) Non-preferred values. At some future date these will be withdrawn.

3.2 *Out-of-range values of analogue direct current signals*

In the case of the preferred signal the 0 mA-value is exclusively reserved for indication of a signal circuit or power supply failure.

3.3 *Ripple content of the direct current signal*

The ripple content of the signal shall be specified, and shall not exceed 3%.

In cases where the information is taken from the instantaneous value of the signal, for example in digital system elements with fast multiplexed inputs, the ripple content shall be specified for the element.

3.4 *Signal common*

The point in the signal circuit with the lowest potential shall be the signal common. If the signal common is connected to the power supply it shall be connected to the power supply negative terminal (or zero volt terminal in the case of a bipolar power supply).

3.5 *Earthing*

If a signal circuit is to be earthed, the signal common or the power supply negative terminal (or zero volt terminal in the case of a bipolar power supply) shall be earthed.

3.6 *Load impedance*

A transmitting or control system element shall be capable of continuously driving any load between 0 and 300 Ω.

3.7 *Power supplies*

Any transmitting system element using a power supply external to it shall be capable of operating with a power supply voltage which can vary between 20 V d.c. and 30 V d.c.

The ripple content of the power supply voltage shall be specified and shall not exceed 10% of the nominal power supply voltage.

A stabilized power supply may be used.

For evaluation and comparison of system element characteristics, a reference power supply voltage of 24 V d.c. is recommended.