SLOVENSKI STANDARD
SIST EN 50227:1998

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Control circuit devices and switching elements proximity sensors, d.c. interface for proximity sensors and switching ampliefiers (NAMUR)

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Steuergeräte und Schaltelemente - Näherungssensoren Gleichstrom-Schnittstelle für Näherungssensoren und Schaltverstärker (NAMUR)

Appareils et éléments de commutation pour circuit de commande, interface DC pour capteurs de proximité et amplificateurs de commutation (NAMUR)

Ta slovenski standard je istoveten z: **EN 50227:1997**

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English version

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Steuergeräte und Schaltelemente Näherungssensoren Gleichstrom-Schnittstelle für Näherungssensoren und Schaltverstärker (NAMUR)

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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

This European Standard was prepared by the Technical Committee CENELEC TC 17B, Low-voltage switchgear and controlgear including dimensional standardization.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50227 on 1996-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-04-01

1. SCOPE

This standard applies to proximity sensors connected for operation by a two-wire connecting conductor to the control input of a switching amplifier. The switching amplifier contains a d.c. source to supply the control circuit and is controlled by the variable internal resistance of the proximity sensor.

Note 1: These devices can be used in an explosive atmosphere if they also comply with EN 50020 "Electrical equipment for explosive atmospheres, intrinsic safety i".

2: These devices have been defined by the German organization "Normenausschuß für Meß-und Regelungstechnik (NAMUR)"

2. NORMATIVE REFERENCES

EN 50020	Electrical equipment for explosive atmospheres, intrinsic safety "i" (CENELEC specification for flame- proof and explosion-protected electrical equipment)
EN 60529	Degrees of protection provided by enclosures (IP Code) (IEC 60529)
EN 60947-5-2	Low-voltage switchgear and controlgear Part 5: Control circuit devices and switching elements Section 2: Proximity switches (IEC 60947-5-2, modified)

Additional standards

EN 50008	Industrial low-voltage switchgear; inductive proximity switches, form A, for d.c. voltage, 3 or 4 connections
EN 50010	Industrial low-voltage switchgear; inductive proximity switches; measuring methods for determining switching frequency
EN 50025	Industrial low-voltage switchgear; inductive proximity switches, shape C, for d.c. voltage, 3 or 4 connections
EN 50026	Industrial low-voltage switchgear; inductive proximity switches, shape D, for d.c. voltage, 3 or 4 connections
EN 50032	Industrial low-voltage switchgear; inductive proximity switches, definitions, classification, designation
EN 50036	Industrial low-voltage switchgear; inductive proximity switches, shape A, for a.c. voltage, 2 connections
EN 50037	Industrial low-voltage switchgear; inductive proximity switches, shape C, for a.c. voltage, 2 connections
EN 50038	Industrial low-voltage switchgear; inductive proximity switches, shape D, for a.c. voltage, 2 connections
EN 50040	Industrial low-voltage switchgear; inductive proximity switches, shape A, for d.c. voltage, 2 connections
EN 50044	Industrial low-voltage switchgear; inductive proximity switches, designation of connections

3. DEFINITIONS

3.1 Proximity sensor

Converts the travel of an influencing body relative to it into an output signal. The proximity sensor is preferably contactless (e. g. inductive, capacitive, magnetic, photoelectric).

Note: The proximity sensor may be operated with or without mechanical contact.

3.2 Switching amplifier

The switching amplifier converts the signal from the proximity sensor presented at the control input into a binary output signal which may be produced e.g. by an electromagnetic relay or a semiconductor switching element.

3.3 Control circuit

The proximity sensor and the control input of the switching amplifier together with the two-wire connecting conductor, form the control circuit of the system described here.

3.4 Output signal of the proximity sensor

The output current as a function of the variable internal resistance.

3.5 Distance/current characteristic of the proximity sensor

The relationship of the output signal (the current value) in the steady state to the distance of the influencing body relative to the sensor.
Both continuous and discontinuous characteristics are permitted
(see subclauses 5.3 and 5.4 and figures 1 and 2).

3.6 Actuating range (ΔI_1)

A range defined by 4 straight lines in the current-voltage graph of the control input of the switching amplifier to which is assigned a switching function of the switching amplifier.
There are 3 actuating ranges covered by the current-voltage characteristic of the control input (see figure 3 a,b and d).

3.7 Slope

The change in the continuous characteristic of a proximity sensor in the actuating range (ΔI_1) (see figure 1).

Note: The slope can assume different values within the control span.

3.8 Operating frequency

3.8.1 Operating frequency of the proximity sensor

The maximum switching frequency achieved through periodic influencing at which the limits of the actuating range (ΔI_1) are reached
(see figures 1 and 2).

3.8.2 Operating frequency and switching time(s) of the switching amplifier

These are determined when the input signal is changed discontinuously between the limit values of the actuating range (ΔI_1).

3.9 Switching current difference

Change in control current within the actuating range (ΔI_1) at which the switching amplifier changes its output signal (see figures 1,2 and 3).

3.10 Switching travel difference

Travel of the influencing body which changes the output signal of the switching amplifier. With discontinuous characteristic of the proximity sensor, the switching travel difference is identical to the control span s.

3.11 Line resistance

The effective resistance of the two-wire connecting conductor between the switching amplifier and the proximity sensor.

3.12 Insulation resistance

The effective resistance between the wires of the two-wire conductor connecting the switching amplifier to the proximity sensor.

3.13 Time delay before availability (t_v)

The time between the switching ON of the supply voltage and the instant at which the proximity sensor becomes ready to operate correctly.

3.14 Control span s

The travel of the influencing body in which the actuating range (ΔI_1) is operative. With a discontinuous characteristic, the control span is identical to the switching travel difference (see figures 1 and 2).

4. CLASSIFICATION

4.7 Classification according to "NAMUR function"

The ability to have NAMUR function is designated by a capital letter N placed in the eighth position.

Table 1 - Classification of proximity switches

1st pos./1digit	2nd pos./1digit	3rd pos./3digits	4th pos./1digit	5th pos./1digit	6th pos./1digit	8th pos./1digit
SENSING MEANS 3.1	MECHANICAL INSTALLATION 3.2	CONSTRUCTION FORM AND SIZE 3.3	SWITCHING ELEMENT FUNCTION 3.4	TYPE OF OUTPUT 3.5	METHOD OF CONNECTION 3.6	NAMUR FUNCTION 4.7
I = inductive C = capacitive U = ultrasonic D = diffuse refl. photoelectric R = retroref. photoelectric T = through beam photoel.	1 = embeddable 2 = non-embeddable 3 = either	FORM (1 capital letter) A = cylindrical threaded barrel B = cylindrical smooth barrel C = rectangular with square cross section D = rectangular with rectangular cross section SIZE (2 numbers) for diameter or side length	A = NO (make) B = NC (break) P = programmable by user S = other	D = 2 terminal d.c. S = other	1 = integral leads 2 = plug in 3 = screw 9 = other	N =NAMUR function

Note: This table is in line with table 1 of EN 60947-5-2

5. CHARACTERISTICS

5.1 Control input of the switching amplifier

The binary output signal of the switching amplifier shall only change when the operating point of the control circuit is within the relevant actuating range (see figure 3).

5.2 Interaction between proximity sensor and switching amplifier

The proximity sensor shall be designed in such a way, that when actuated by the intended influence the current-voltage characteristic reliably reaches the "high impedance" and "low impedance" states.

The "high impedance" state is shown in figure 4 and the "low impedance" state in figure 5.

Note: The limits for the permitted characteristic range of proximity sensor and switching amplifier have been selected so as to provide a safety margin.