



**SLOVENSKI STANDARD**  
**SIST EN 50040:1998**

**01-februar-1998**

---

**Low-voltage switchgear and controlgear for industrial use - Inductive proximity switches - Form A, for direct current, 2 terminals**

Low-voltage switchgear and controlgear for industrial use - Inductive proximity switches - Form A, for direct current, 2 terminals

Industrielle Niederspannung-Schaltgeräte - Induktive Näherungsschalter - Form A für Gleichspannung, 2 Anschlüsse

Appareillage industriel à basse tension - Détecteurs de proximité inductifs - Forme A, pour courant continu, 2 bornes

**STANDARD PREVIEW**  
**(standards.iteh.ai)**  
<https://standards.iteh.ai/catalog/standards/sist/b2bbf547-1680-48a3-894e-9a2bc0b47550/sist-en-50040-1998>

**Ta slovenski standard je istoveten z: EN 50040:1988**

---

**ICS:**

29.130.20	Nizkonapetostne stikalne in krmilne naprave	Low voltage switchgear and controlgear
-----------	---	--

**SIST EN 50040:1998**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 50040:1998

<https://standards.iteh.ai/catalog/standards/sist/b2bbf547-1680-48a3-894e-9a2bc0b47550/sist-en-50040-1998>

UDC: 621.316.542.9:621.3.011.3:621.3.024.027.2

Key words: electrical switchgear and controlgear; industrial use; low voltage; proximity switches; inductive proximity switches; operating distance; operating frequency

English version

## Low voltage switchgear and controlgear for industrial use. Inductive proximity switches. Form A, for direct current, 2 terminals

Appareillage industriel à basse tension. Détecteurs de proximité inductifs. Forme A, pour courant continu, 2 bornes

Industrielle Niederspannung-Schaltgeräte. Induktive Näherungsschalter. Form A, für Gleichspannung, 2 Anschlüsse

This European Standard was ratified by CENELEC on 3 December 1985. CENELEC members are bound to comply with the requirements of the 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 CENELEC General Secretariat or to any CENELEC member.

<https://standards.iteh.ai/catalog/standards/sist/b2bbf547-1680-48a3-894e-7d2bc0877350/sist/en-50040-1987>

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 CENELEC General Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

# CENELEC

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

General Secretariat: rue Bréderode 2, B-1000 Brussels

This European Standard has been prepared by the CENELEC Technical Committee 17B. Dimensions in mm.

## 1 Scope

This standard specifies only inductive proximity switches for direct current, in cylindrical form, with 2 terminals for rated voltage between 12 V and 48 V.

Two types are included:

Embeddable in metal (see figure 2) : A5●

Not embeddable in metal (see figure 3) : A6●

## 2 Definitions

Definitions are given in European Standard EN 50 032.

## 3 Dimensions

The dimensions to be observed are shown in figure 1 and the actual range of possible dimensions is given in table 1. Apart from these dimensions, the design of the proximity switch is not restricted.

Within the dimensions  $d_2$  and  $l_2$  are included all the rigid parts of cable entries.

The diameter of unthreaded portion  $d_2$  shall not exceed the minor diameter of the thread.

For type A5● the thread can be omitted and the diameter reduced to  $d_2$  on a length not exceeding  $l_3 = 1$  mm.

For type A6● the thread can be omitted and the diameter reduced to  $d_2$  on a length not exceeding  $l_3 = 2 s_n$ .

The length of connecting lead shall be 2 m.

## 4 Installation (see figures 2 and 3)

The dimensions are given for proximity switches installed in mild steel, Fe 360, according to Euronorm 27<sup>1)</sup>.

## 5 Designation

Example of designation of a proximity switch Form A●●  
Embeddable ●5● Size ●●3.

Proximity switch EN 50 040 — A53.

Additionally, the following are to be given:

- the rated voltage;
- the polarity of the output signal when current flows;
- the output current;
- the function (make or break).

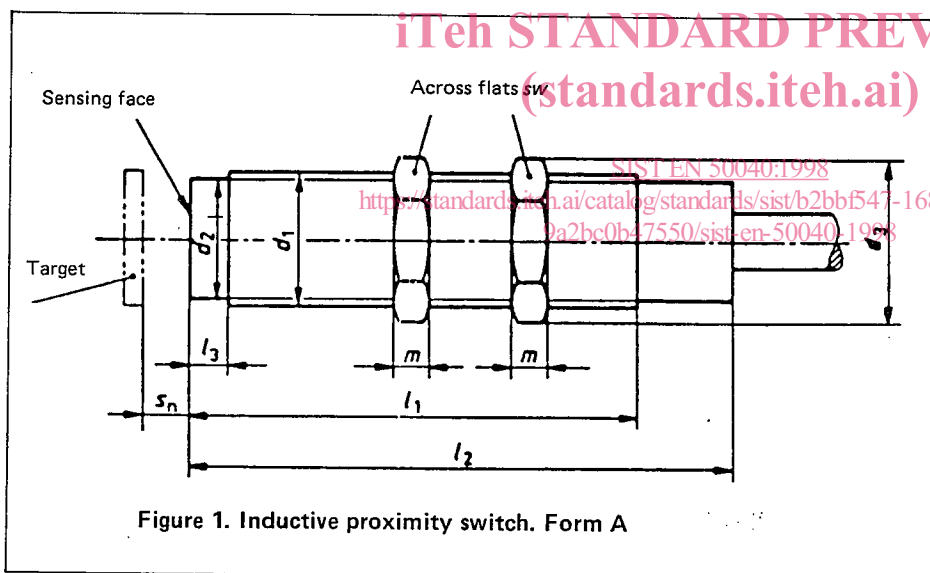


Figure 1. Inductive proximity switch. Form A

Table 1. Dimensions

Type		Dimensions					
A5● embeddable	A6● not embeddable	Body			Nuts		
Size	Size	$d_1$	$l_1$ min.	$l_2$ max.	$sw$ h 12	$m$ $\pm 0,15$	$d_3$ <sup>1)</sup> max.
●●2	●●2	M12 x 1	40	80	17	4	20
●●3	●●3	M18 x 1	50	100	24	4	28
●●4	●●4	M30 x 1,5	50	100	36	5	42

1)  $d_3$  min = 1.13  $sw$

1) Each national committee may indicate its own symbol.

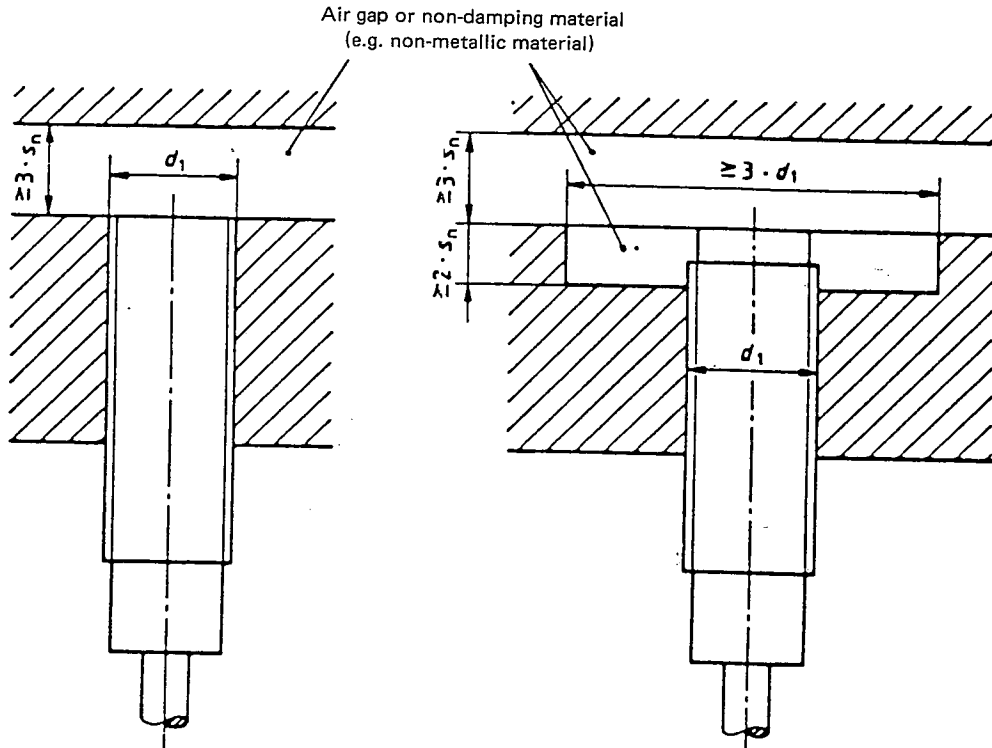


Figure 2. Type A5● Embedded installation in damping material

Figure 3. Type A6● Not embedded installation in damping material

(standards.iteh.ai)

SIST EN 50040:1998

6 Characteristics

The characteristics of the proximity switch shall be achieved even when mounted as shown in figures 2 and 3 of clause 4.

These characteristics are valid over the whole ambient temperature ( $T_a$ ) and the supply voltage ( $U_b$ ) ranges except when otherwise specified.

Requirements concerning the nature of the load and the corresponding tests are under consideration.

6.1 Operating distance  $s$

The operating distances are measured according to EN 50 010.

6.1.1 Rated operating distance  $s_n$

Rated operating distances are given in table 2.

Type A5● embeddable		Type A6● not embeddable	
Size	Rated operating distance $s_n$	Size	Rated operating distance $s_n$
●●2	2	●●2	4
●●3	5	●●3	8
●●4	10	●●4	15

6.1.2 Effective operating distance  $s_r$

The effective operating distance is measured at rated voltage ( $U_n$ ) and rated ambient temperature ( $T_n$ ). It shall be between 90 % and 110 % of the rated operating distance ( $s_n$ ):

$$0,9 s_n \leq s_r \leq 1,1 s_n$$

6.1.3 Usable operating distance  $s_u$

The usable operating distance is measured with the ambient temperature ( $T_a$ ) and the supply voltage ( $U_b$ ) being within the limits prescribed. It shall be between 90 % and 110 % of the effective operating distance  $s_r$ :

$$0,9 s_r \leq s_u \leq 1,1 s_r$$

6.1.4 Actuation distance  $s_a$

The actuation distance is between 0 and 81 % of the rated operating distance ( $s_n$ ):

$$0 \leq s_a \leq 0,9 \cdot 0,9 s_n$$

6.2 Repeat accuracy  $R$

The repeat accuracy of the usable operating distance ( $s_u$ ) is measured over an 8-hour period with an enclosure temperature between 15 °C and 30 °C and with a supply voltage between  $U_n + 5 \%$  and  $U_n - 5 \%$ . The difference between any two measurements shall not exceed 10 % of the rated operating distance ( $s_n$ ):

$$R \leq 0,1 s_n$$

### 6.3 Differential travel $H$

The differential travel is given as a percentage of the effective operating distance ( $s_r$ ). It shall be between 3 % and 20 % of the effective operating distance ( $s_r$ ). The measurement is made in accordance with European Standard EN 50 010 at rated ambient temperature ( $T_n$ ) and rated voltage ( $U_n$ ):

$$0,03 s_r \leq H \leq 0,20 s_r$$

### 6.4 Voltages $U$

#### 6.4.1 Rated voltage $U_n$

The rated voltage shall be between 12 V and 48 V:

$$12 \text{ V} \leq U_n \leq 48 \text{ V}$$

#### 6.4.2 Supply voltage $U_b$

The instantaneous value of the supply voltage shall be between 80 % and 115 % of the rated voltage ( $U_n$ ):

$$0,8 U_n \leq U_b \leq 1,15 U_n \text{ (instantaneous value)}$$

#### 6.4.3 Ripple voltage $\sigma$

The maximum value of the ripple voltage (peak to peak) shall not exceed  $0,1 U_n$ :

$$\sigma \leq 0,1 U_n$$

### 6.5 Output

#### 6.5.1 Voltage drop $U_d$

The voltage drop, measured across the proximity switch when closed and carrying the maximum permanent current ( $I_a$ ) at the minimum ambient temperature ( $T_a$ ) and supplied with the maximum supply voltage ( $U_b$ ) shall not exceed 8 V:

$$U_d \leq 8 \text{ V}$$

#### 6.5.2 Output operation

The output operation shall be snap action (for break and make function).

#### 6.5.3 Currents $I$

##### 6.5.3.1 Permanent current $I_a$

A proximity switch shall perform correctly for a permanent current between 5 mA and 50 mA:

$$5 \text{ mA} \leq I_a \leq 50 \text{ mA}$$

##### 6.5.3.2 Residual current $I_r$

The residual current shall not exceed 1,5 mA:

$$I_r \leq 1,5 \text{ mA}$$

### 6.6 Time characteristics

#### 6.6.1 Operating frequency $f$

The operating frequency is measured in accordance with the European Standard EN 50 010. The values obtained shall be not less than those given in table 3:

Type	Operating frequency $f$ min.
A52	200 Hz
A53	200 Hz
A54	100 Hz
A62	100 Hz
A63	200 Hz
A64	100 Hz

#### 6.6.2 Time delay before availability $t_v$

The time delay before availability shall not exceed 50 ms:

$$t_v \leq 50 \text{ ms}$$

During this time, the output shall not give any false signal longer than 2 ms when the distance between the target and the sensing face is greater than  $3 s_n$  for make output function or less than  $2/3 s_n$  for break output function proximity switches.

### 6.7 Temperatures $T$

#### 6.7.1 Rated ambient temperature $T_n$

The rated ambient temperature is  $20^\circ\text{C}$ :

$$T_n = 20^\circ\text{C}$$

#### 6.7.2 Ambient temperature $T_a$

The permissible range of ambient temperature is  $-25^\circ\text{C}$  to  $+70^\circ\text{C}$ :

$$-25^\circ\text{C} \leq T_a \leq +70^\circ\text{C}$$

### 6.8 Degree of protection

The degree of protection is indicated and measured in accordance with CENELEC Harmonization Document HD 365-S3 (IEC Publication 529\*).

This shall be IP 67.

### 6.9 Shock and vibration tests

The measurements are made in accordance with IEC Publications 68-2-27 and 68-2-6 or harmonized national standards. The operating characteristics of the proximity switch shall be maintained during the measurements.

#### 6.9.1 Shock tests

The conditions of the shock tests shall be as follows:

Pulse shape: half-sine;

Peak acceleration:  $\leq 30 g_n$ ;

Duration of the pulse: 11 ms.

#### 6.9.2 Vibration tests

The conditions of vibration tests shall be as follows:

Frequency: 10 Hz to 55 Hz;

Amplitude:  $\leq 1 \text{ mm}$ ;

Sweep cycle duration: 5 minutes;

Duration at resonant frequency or at 55 Hz: 30 minutes in each of the 3 axes (90 minutes in all).

\*or IEC Publication 144, when this is revised.