

**SIEMENS**

**Switches and pushbuttons  
Data Book 1990**

Since the last edition of the Data Book „Electronic components for electronic equipment“ was published, our range of products has been substantially extended, thus making it necessary to separate the ranges „Switches and pushbuttons“ and „Plug connectors“.

Publication of this Data Book renders section „Switches and pushbuttons“ of Data Book „Electronic components for electronic equipment, 1984/1985“ invalid.

### **Overall range of products of the Components Division**

#### Plug connectors

Data Book German edition	Order No. A23999-A310-A971-*-04
Data Book English edition	Order No. A23999-A310-A971-*-7604 <sup>1)</sup>
Data Book French edition	Order No. A23999-A310-A971-*-7704 <sup>1)</sup>

#### RF connectors

Data Book German edition	Order No. A23999-A521-A996-*-04
Data Book English edition	Order No. A23999-A521-A996-*-7604

#### Switches and pushbuttons

Data Book German edition	Order No. A23999-A530-A980-*-04
Data Book English edition	Order No. A23999-A530-A980-*-7604
Data Book French edition	Order No. A23999-A530-A980-*-7704 <sup>1)</sup>

#### Relays

Data Book German edition	Order No. A23999-A311-A959-*-04
Data Book English edition	Order No. A23999-A311-A959-*-7604
Data Book French edition	Order No. A23999-A311-A959-*-7704

We assume no warranty as regards exemptions from third-party rights in respect of the circuits, descriptions and tables specified.

The specifications merely serve to specify the components and do not serve to assure characteristics.

Subject to availability and technical modification.

For further information regarding specifications, prices and availability, please contact your nearest Siemens agency (see list at end of book).

<sup>1)</sup> Currently in preparation

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**List of order designations**

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**Please send orders to the Components Marketing Department (VB) at your nearest Siemens address.**

**Preferred items <sup>1)</sup>**

Preferred items are listed in this Data Book for many types of switch/pushbutton. Preferred items are types on stock; they are also stocked as „key types of the Siemens components service“ at our Fürth delivery center. We advise you to use these preferred types for new developments since, amongst other things, they are particularly economical.

## **Ordering made simple with the SBS price and stock list**



**For customers in the Federal Republic of Germany and West Berlin**

A new version of the SBS price and stock list with approximately 800 pages is published every year. It covers the key types from the overall Siemens range of components, with prices and the most important data

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Infoservice  
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8510 Fürth  
Telephone (0911) 3001-260  
Telex 623 313  
FAX (0911) 3001-271  
Ask for „SBS price and stock list“**

**For customers abroad**

Please contact the Components Marketing Department of your local Siemens branch or agent.

Note on internal orders:  
Order form recipient code (BEK): N4231  
(Please quote with every order)

Send orders to the following address: ECB WO LZ

All dimensions in mm

<sup>1)</sup> We reserve the right to amend availability of these items individually during the period of validity of this Data Book.



# General

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Definitions and remarks on electromechanical switches and pushbuttons	1.3
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# General

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## Components and component quality

Siemens Komponenten Division (electromechanical components) develops and manufactures a broad spectrum of components for the market. Thanks to extensive use of these components in its equipment and systems, Siemens has acquired many years of experience in the manufacture and handling of electromechanical components. All this experience has been incorporated in the switches and pushbuttons for electronic equipment covered in this book.

The quality assurance procedure at the plant is based upon the international quality standards ISO 9001, ISO 9002 and ISO 9003.

Electromechanical components required for universal application are standardized in accordance with German (DIN, VG <sup>1)</sup>) and international (IEC <sup>2)</sup>) standards. These standards define the qualification tests. IEC and CECC <sup>3)</sup> standards with quality assessment by the manufacturer are planned.

<sup>1)</sup> The Bundesamt für Wehrtechnik und Beschaffung (BWB) is the West German Military Procurement Agency, its standards applying specially to components which are standardized in accordance with VG (Defence Hardware) requirements.

<sup>2)</sup> International Electrotechnical Commission

<sup>3)</sup> European Committee for Electronic Components (affiliated to CENELEC, Committee for Electrotechnical Standards)

# General

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## Definitions and remarks on electromechanical components

in conformity with ZVEI publications

### Actuator

The actuator is the part on which an external force acts. Movement of the actuator produces the switching operation.

### Air gaps

The shortest distance between two live parts in air.

### Ambient conditions

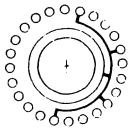
This is the generic term for the environmental conditions acting upon the component such as temperature, dust, pollution gas, water, condensation and air pollution etc.

### Ambient temperature

The temperature in the direct vicinity of the switch.

### Arm capability

A number of wiping contacts within one contact arrangement handle the same potential. Most switches are designed with 2, 3 or 4 arms.



4-arm

### Bounce

Unintentional opening and closing of the contacts one or more times when the switch is actuated.

### Center spacing

This is the distance between the centers of two neighboring contacts or mounting holes and so forth.

### Connection techniques

Methods of connecting wiring to electromechanical components. Only soldered connections (with a soldering iron, wave soldering or reflow soldering) are scheduled for the switches and pushbuttons offered in this book.

# General

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## Contact resistance

The electrical resistance between the connecting points of a switch whose contacts are closed. It comprises the resistance of the conductors and the resistance of the contacts. Unless otherwise stated, the measurement is conducted on the basis of the "millivolt method" DIN 41640, Part 4.

## Contact surfaces

The noble metals gold, palladium and silver are the most popular contact plating materials.

## Contact zone

Range of points of contact.

## Creepage distances

This is the shortest distance between live components on the surface of the dielectric. It is defined precisely in VDE 0110.

## Current rating

Current which a contact conducts after closing or before opening.

## Dielectrics

The electromechanical components presented in this book virtually all employ plastic dielectrics.

Dielectrics used:

ABS	Acrylonitrile-butadiene-styrene
DAP	Diallyl phthalate
PA	Polyamide
PBTP	Polybutylene terephthalate
PC	Polycarbonate
PDAP	Polydiallyl phthalate
PE	Polyethylene
PETP	Polyethylene terephthalate
POM	Polyoxy methylene
PP	Polypropylene
PPS	Polyphenyl sulphide
PSU	Polysulfone

## Dynamic stress

This is the generic term for stress such as vibration and shock.

## Indexing

This is a mechanical device for ensuring that the moving contact is held in any switch position.

## Indexing angle

The indexing angle is the angle between two switch positions on rotary switches.

# General

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## Insulation resistance

Resistance of the insulation between 2 conductive parts. Measuring and test methods in accordance with DIN 41640, Part 7.

## Moist heat

Test for various climatic modes (temperature and relative humidity as a function of time). "Moist heat" is standardized, constant, in accordance with DIN 41640, Part 27 and "moist heat" cyclic, in accordance with DIN 41640, Part 34.

## Operating temperature

This results from the self-heating and ambient temperature to which the component is subjected.

## Permissible current loading

Currents which may flow continuously at the same time via closed contacts. (Tests in accordance with DIN 41640, Part 3).

## Polarity

The polarity specifies how many individual circuits can be switched synchronously or the number of wiping contacts per switch deck.

## Proof voltage (dielectric strength)

The proof voltage is a measure of the insulation of a component. During voltage testing, the proof voltage must provide security against flashover, testing in accordance with DIN 41640, Part 8.

## Pushbutton

Switch which returns automatically to the starting position.

## Service life

Permitted number of switching cycles with/without electrical load. A switch is considered as having reached the end of its service life when one of its vital parameters is no longer assured.

## Solderability

See the notes on testing for processability, Page 1.10.

## Stacking

This is a term relating to rotary switches describing the number of switch decks arranged consecutively which can be actuated simultaneously.

## Stop strength

If the actuator travels in switches are limited, the stop strength specifies the reliable forces/torques with which the end position may be loaded. (See also Notes on processing, Page 1.11).

# General

## Switch

A component with actuator and contacts with which an electrical connection is made or broken.

### Switch capacity

The switch capacity specifies the power (W) which a switch can switch under defined conditions (product of current and voltage).

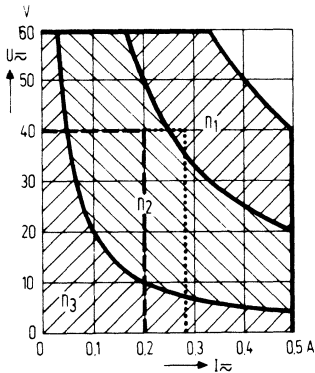
### Switch deck

Arrangement on the rotary switch with fixed contacts and connections, and one or more wiping contacts for switching specific combinations. Several switch decks can be arranged one behind the other.

### Switching cycle

This term refers to actuation of a switch over its full range (make and break). Specifications of the number of switching cycles attainable  $n$  can be specified as a function of the electrical load and the ambient temperature.

Example:



$n_1 \rightarrow 10^3$  switching cycles  
 $n_2 \rightarrow 10^4$  switching cycles  
 $n_3 \rightarrow 2 \cdot 10^4$  switching cycles

At temperatures  $> 40^\circ\text{C}$ , the current rating must be multiplied by a factor before reading off the relevant value.

Ambient temperature	50	60	70	80 °C
Factor	1.1	1.2	1.3	1.4

At 40 V and 0.2 A and an ambient temperature of  $< 40^\circ\text{C}$ , the point of intersection is located in zone  $n_2$ , corresponding to  $10^4$  switching cycles. However, if the ambient temperature is  $80^\circ\text{C}$ , the 0.2 A current must be multiplied by a factor of 1.4. The resultant 0.28 A produces a point of intersections for  $n_1$  for 40, thus corresponding to approx.  $10^3$  switching cycles.

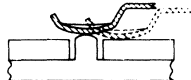
### Switching mode

In mating mode, the moving contacts briefly connect the neighboring stationary contacts for the duration of the action. In break mode, the two contacts are completely separated.

Mating contact



Breaking contact



Moving contact

Stationary contact  
Insulator

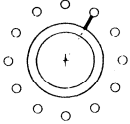
# General

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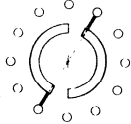
## Switch positions

This is the number of switch positions used in the switch, including the starting position.

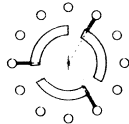
Examples:



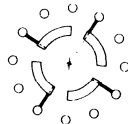
Single-pole, 12 positions



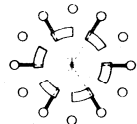
2-pole, 6 positions



3-pole, 4 positions



4-pole, 3 positions



6-pole, 2 positions

## Twin contact

Two contacts in parallel

## Voltage rating

Voltage across the contacts before closing or after opening.

## Washproofing

See notes on processing, Page 1.8

# General

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## Notes on processing

The following processing classes A to E are recommended, dependent upon component design. The relevant class is specified in the component data.

### Processing class A

For manual soldering with soldering iron for conventional wiring:

Soldering iron	Soldering iron bit, size approx. corresponding to that of the component connection lead; controlled, clean, pre-tinned. Temperature max. 350 °C
Soldering time	approx. 2 s (until solder flows)
Solder	Cored solder L-Sn60Pb
Flux	F-SW32 in accordance with DIN 8516

### Processing class B

Flow soldering with single or double wave:

Flux	F-SW 32 in accordance with DIN 8511
Application	With foam wave; it must be set so that the flux just reaches the surface of the holes when a PC board on which components have not been inserted passes through.

Preheating temperature	70 to 90 °C
Solder	L-Sn60Pb or L-Sn63PB DIN 1707
Solder temperature	260 ±5 °C
Soldering time	max. 5 s

Cleaning:

Method	Mechanical cleaning of the soldering side with brushes, dip-cleaning as far as the component contact level, immersion time 2 min.
Cleaning agent	Alcohol, trifluorotrchloroethylene and mixtures thereof with up to 35% (percent-by-weight) isopropyl alcohol

Temperature of the cleaning agent	Room temperature
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### Processing class C

Identical to class B. Except for the following points

Permitted cleaning methods	Brush cleaning (soldering side), spray cleaning (max. 1.5 bar, perpendicular spray angle), dip-cleaning (down to above component height)
Immersion time	Single-chamber immersion system, max. 2 min. Four-chamber immersion system max. 1 min per chamber

### Processing class D

Identical to class C; ultrasonic assistance may also be used for cleaning.

Exposure time	max. 30 s per chamber
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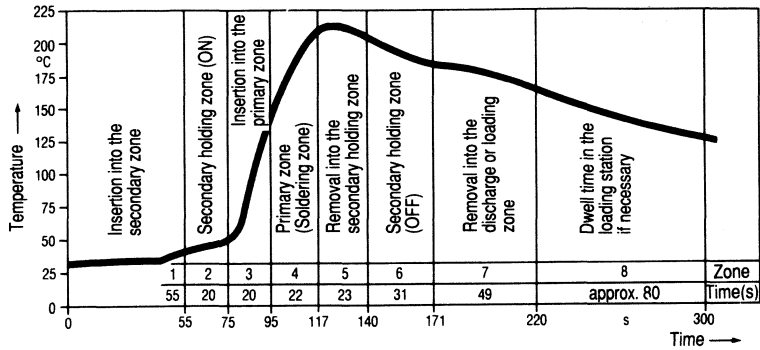
# General

## Processing class E (for SMDs)

Tested soldering method: Vapor-phase soldering; system MRT 30 SPS (Messrs. FSL)  
 Primary medium: Hostinert 216 (Messrs. Höchst AG)  
 Temperature of the primary medium: 216 °C

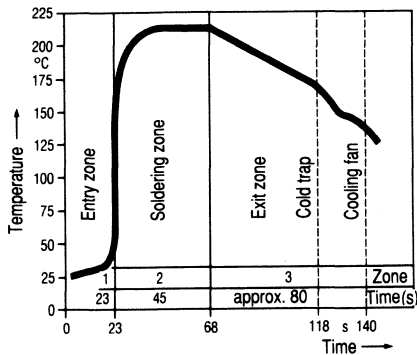
Temperature profile for the reciprocating system

Measurements were conducted on a PC board of size 280 mm x 160 mm.  
 Work lift speed was 300 mm/min.



Temperature profile for the continuous-pass system

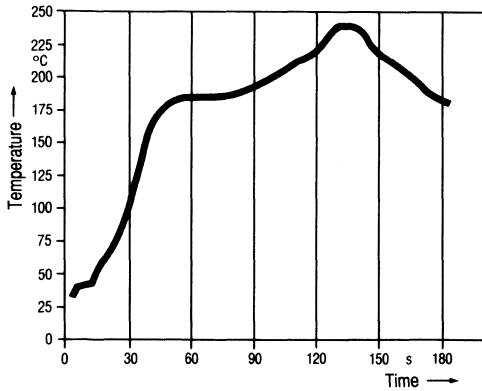
The specified temperature profile was recorded on 280 mm x 160 mm PC boards at a conveying speed of approx. 1700 mm/min.



# General

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Infrared soldering: system SMD 6024 (Messrs. RTC)  
Throughput speed: approx. 0.87 m/min.



Cleaning:  
Permitted cleaning methods corresponding to processing class D  
Cleaning agents corresponding to processing class B

# General

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## Tests for processability

### Solderability

Unless otherwise specified for the individual products, all components specified in this Data Book are designed in accordance with DIN IEC 68-2-20, Test Ta, Method 1. To provide an even greater margin of safety, the test is conducted with non-activated flux such as F-SW 32 in accordance with DIN 8511, Part 2 and after ageing.

In the case of Sn or SnPb surface on a base material made of Cu or Cu alloys, ageing is carried out for 4 hours at 155 °C (corresponding to the national preface further to DIN IEC 68). In the case of all other surfaces, including Sn and SnPb on Ni barrier junction, storage in steam for 8 hours is scheduled.

Unwetted surfaces of max. 10% per connection are permitted. Unplated cut edges are permitted inasmuch as enclosing of the soldering terminal with solder over at least 3/4 of its circumference is guaranteed during flow soldering in printed circuits.

SN 53063, Part 1 <sup>1)</sup> applies to SMDs until national or international standards are available.

### Resistance to soldering heat, „flux-tightness“

Unless otherwise listed, our components are designed as follows:

- for manual soldering, corresponding to DIN IEC 68-2-20, Test Tb, Method 2; soldering bit size B, soldering time  $5 \pm 1$  s (corresponding to Amendment No. 1 of July 1986)
- for printed circuits for plugging in corresponding to DIN 41640, Part 84. It has been announced that this standard is to be revised to bring it into line with international aims.
- SN 53063, Part 2 <sup>1)</sup> applies to SMDs until national or international standards are available.

### „Washproofing“, resistance and tightness with respect to cleaning agents

Components soldered onto printed circuits/PC boards.

„Washing“ is possible for the components in which this is stated in the specifications. The information specified such as permitted type and temperature of cleaning agent, immersion depth, exposure time or immersion time, more intensive cleaning action using ultrasonic methods, must be noted. Otherwise, there is a risk that

- „detergents“ will attack the plastics or lead to stress cracks,
- „detergents“ will penetrate the switches and endanger the contact stability (tarnish layer resulting from residue) and the service life (e.g. damage to the contact and bearing point lubrication).

DIN 41640, Part ... is currently in preparation for testing components for plugging in, and SN 53063, Part 3, is currently in preparation for SMDs.

<sup>1)</sup> SN = Siemens Standard (available on request).

# General

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## Knobs and stop strength

The stop strength specified along with the ratings for rotary switches serves to stipulate the knob diameter. The following rule of thumb applies to calculation of the diameter:

$$\begin{array}{ll} \text{Md (Ncm)} = 6 \text{ to } 7 \times \varnothing \text{ mm} & \text{Md (Ncm)} = \text{Achievable torque} = \text{stop strength} \\ & \varnothing \text{ mm} = \text{Knob diameter in mm} \\ & 6 \text{ to } 7 = \text{Fixed values} \end{array}$$

Example for multi-position switch A3:

Stop strength = 0.7 Nm = 70 Ncm

Md (Nm) = 6 x  $\varnothing$  mm

$$\frac{70 \text{ (Ncm)}}{6} = 11.6 \text{ mm, thus resulting in a knob diameter of 11 mm}$$

Caution!

Excessively large knobs may damage the switch during operation.

# Switches and pushbuttons for printed circuits

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# Switches and pushbuttons for printed circuits

## Summary of available types

Switch	Contact type or switch positions	Number of contacts or switch decks	Switching mode	Maximum voltage rating V	Maximum current rating A	Maximum switch capacity W	Actuation	Other features	Page
Slide switches A68	Max. 2 changeover contacts	Max. 2 contacts	Break	24	0.3	3	Top or side		2.4
Slide switches A60	2 changeover contacts	2 contacts	Break	60	0.5	20	Top or side		2.8
Dual-in-line switches A1341	Max. 10 make contacts	1 contact	Break	24	0.5	5	Top or side	Can be switched individually	2.12
Dual-in-line switches A3000	Max. 10 make contacts	1 contact	Break	24	0.5	5	Top	Can be switched individually SMD version also available	2.15
Single-deck rotary switches A1353	10 switch positions (BCD code) 16 switch positions (Hexadecimal code)		Break	24	0.2	1.5	Top or side	Actuation with screwdriver or with knurled shaft	2.18
Slide switches A46	Max. 10 switch positions	1 contact	Mating	60	0.5	20	Side		2.22
Slide switches A1345	Max. 12 switch positions	1 contact	Mating or break	24	0.5	5	Side		2.25
Turn-slide switches A61	Max. 10 switch positions	Max. 3 switching elements	Break	60	0.5	20	Top or side	Twist-lock feature	2.28
Pushbutton switches A60	2 changeover contacts	2 contacts	Break	60	0.5	5	Side		2.31
Pushbutton switches A9	1 changeover contact	1 contact	Mating	60	0.5	20	Side		2.33
Pushbutton switches A2	2 changeover contacts	2 contacts	Break	60	0.5	20	Side	With indexing	2.35
Multi-position switches A3	Max. 12 switch positions	1, 2 and 4 contacts Max. 5 switch decks	Mating or break	60	0.5	5	Front	Actuation with screwdriver or with rotary knob	2.38

# Switches and pushbuttons for printed circuits

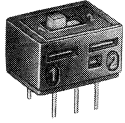
Switch	Contact type or switch positions	Number of contacts or switch decks	Switching mode	Maximum voltage rating V	Maximum current rating A	Maximum switch capacity W	Actuation	Other features	Page
Program controllers A3	Max. 12 switch positions	1 contact Max. 15 switch decks	Mating or break	60	0.5	20	Front	Actuation with screwdriver or with rotary knob	2.43
DIP-FIX link/switch A1347	1 make contact or 1 changeover contact	1 contact	Break	60	0.5	5	Top		2.48
Solder link block LBB 126								Separating the connection, e.g. with diagonal cutter; reconnection by soldering	2.52
Albis LED pushbutton switch V4028	Max. 2 make contacts or max. 2 changeover contacts		Break	110	1	30	Top	With LED and indexing	2.54
Albis electronic pushbutton switches C315-A73, -A74	1 make contact		Break	30	0.02	0.3	Top	A73: without lettering A74: for individual lettering 1 to 2 LEDs separate	2.60
Keyboard key switches STB 11	1 make contact for 1 changeover contact	1 contact	Break non-detent or detent	12	0.05	0.6	Top	Actuation via keytops, see Page 2.72	2.66
Keyboard key switches STB 21	1 make contact	1 contact	Break, non-detent	12	0.05	0.6	Top	Actuation via keytops, see Page 2.72	2.66
Keylock switches SPC 266 and SPC 758	Max. 2 make contacts	Max. 2 contacts	Break	48	0.05	1		Max. number of locking variants: SPC 266: 10.000 SPC 758: 960	2.88

# Switches and pushbuttons for printed circuits

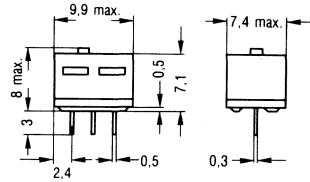
## Slide switches A68

### Slide switches A68

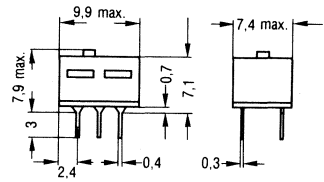
Actuated from the top, (-A1, -A3) <sup>1)</sup>



With 1 changeover contact



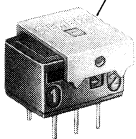
With 2 changeover contacts



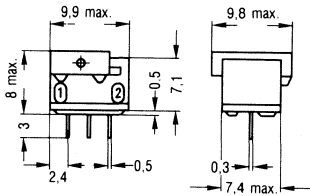
Travel  
S = 2 mm

Actuated from the top or at the side, (-A2, -A4) <sup>1)</sup>

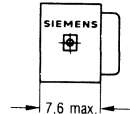
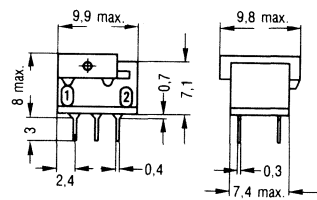
Adapter



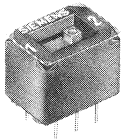
With 1 changeover contact



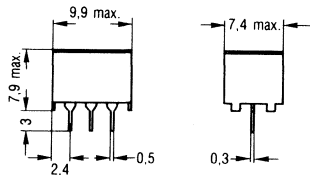
With 2 changeover contacts



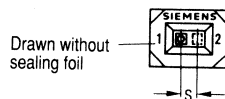
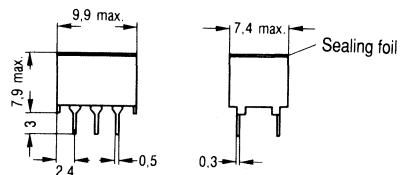
Actuated from the top, immersion-washproof (-A31, -A33) <sup>1)</sup>



With 1 changeover contact



With 2 changeover contacts



Travel  
S = 2 mm

All illustrations with 2 changeover contacts

<sup>1)</sup> See ordering information, Page 2.7



# Switches and pushbuttons for printed circuits

## Slide switches A68

Switch position

Circuit diagram



(Shown in position 1)

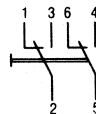
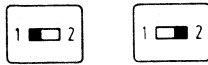
Position 1

Position 2

(Switch viewed from above)

Switch position

Circuit diagram



(Shown in position 1)

Position 1

Position 2

(Switch viewed from above)

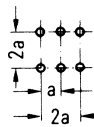
### Mounting holes (component side)

#### With 1 changeover contact



Dimension a optionally 2.5 or 2.54 mm  
 Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.  
 Coarse  $\geq 1.1$  mm  
 Moderate  $\geq 0.9$  mm  
 Fine  $\geq 0.8$  mm

#### With 2 changeover contacts

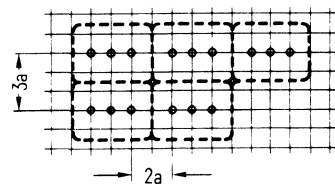


Dimension a optionally 2.5 or 2.54 mm  
 Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.  
 Coarse  $\geq 1.1$  mm  
 Moderate  $\geq 0.9$  mm  
 Fine  $\geq 0.8$  mm

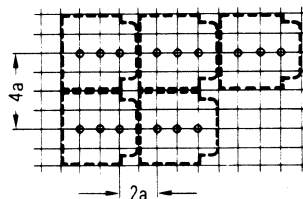
### Possible packing density

(identical for 1 and 2 changeover contacts, shown with 1 changeover contact)

#### Actuated from the top



#### Actuated from the top or at the side



Dimension a optionally 2.50 or 2.54 mm

# Switches and pushbuttons for printed circuits

## Slide switches A68

---

### Version

- Small switch for actuation from the top (also immersion-washproof version) or with adapter for actuation also at the side
- Switching mode: break mode
- Sliding wiping contacts with resilient twin contacts
- Tails suitable for center spacing 2.5 and 2.54 mm

### Materials

#### Version -A1 to -A4

— Dielectrics	Contact dielectric, housing	PSU
	Slide	PA11-GF
	Adapter	PC-GF
— Contact materials	Stationary contact	Cu-Ni18Zn20, nickel-plated and gold-plated
	Wiping contact	CuBe2, nickel-plated and gold-plated
— Soldering pins	Nickel-plated and tin-coated	

#### Version -A31, -A33

— Dielectrics	Cap and contact dielectric	PBTP-GF <sup>1)</sup>
	Slide	PA11-GE <sup>1)</sup>
— Contact materials	Stationary contacts	CuNi18Zn20, nickel-plated and gold-plated
	Moving contacts	CuBe2, nickel-plated and gold-plated
— Soldering terminals	Nickel-plated and tin-coated	
— Sealing foil	PETP	

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating		≤ 24 V AC/DC
Current rating		≤ 0.3 A
Switch capacity		≤ 3 W
Contact resistance		
new		≤ 40 mOhms
after stressing		≤ 80 mOhms
Service life, mechanical		≥ 1000 switching cycles
with resistive load	max. 3 W	≥ 100 switching cycles
	5 V DC/150 mA	≥ 500 switching cycles
Insulation resistance		
new		≥ 10 <sup>5</sup> MOhms
after stressing		≥ 10 <sup>3</sup> MOhms
Dielectric strength		≥ 500 V, 50 Hz
Capacitance		approx. 0.5 pF
Air gaps and creepage distances		
Contact-contact		≥ 0.5 mm
Contact-neighboring contact (with 2 changeover switches only)		≥ 1 mm
Ambient temperature range		—25 °C to 85 °C

<sup>1)</sup> UL-listed

# Switches and pushbuttons for printed circuits

## Slide switches A68

### Notes on processing

- Switches are supplied in bar packaging.
- Processing class B<sup>1)</sup> for -A1 to -A4
- Processing class D<sup>1)</sup> for -A31, -A33

### Ordering information

Item	Order designation	Quantity per packaging unit (Minimum acceptable order quantity) <sup>2)</sup>
Slide switch A68		
Actuated from the top, with		
1 changeover switch	C42315-A68-A3	80
2 changeover switches	C42315-A68-A1	80
Actuated also at the side, with		
1 changeover switch	C42315-A68-A4	80
2 changeover switches	C42315-A68-A2	80
Slide switch A68, immersion-washproof,		
actuated from the top, with		
1 changeover switch	C42315-A68-A33	80
2 changeover switches	C42315-A68-A31	80

2

<sup>1)</sup> See Page 1.8.

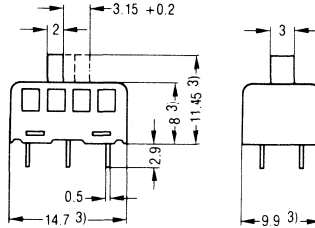
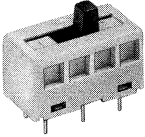
<sup>2)</sup> Smaller quantities are available from the Fürth delivery center.

# Switches and pushbuttons for printed circuits

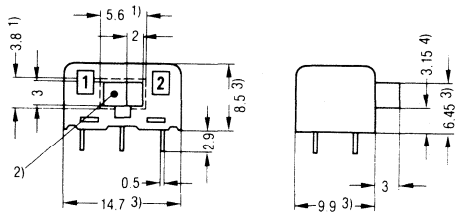
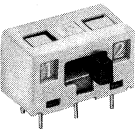
## Slide switches A60

### Slide switches A60

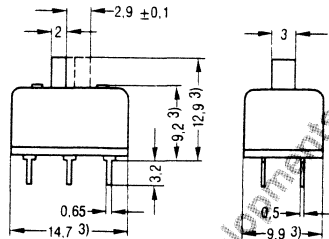
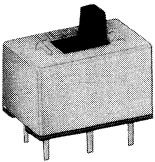
Actuated from the top, immersion-washproof, -A24



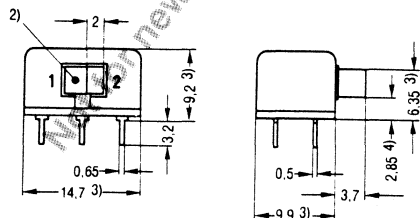
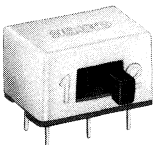
Actuated at the side, immersion-washproof, -A25, -A31



Actuated from the top, -A1



Actuated at the side, -A2, -A12

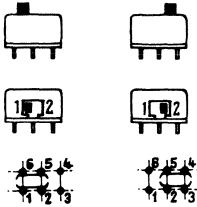


- 1) Minimum front panel cut-out
- 2) Red indicating dot; optional
- 3) Maximum dimension
- 4) Minimum dimension

# Switches and pushbuttons for printed circuits

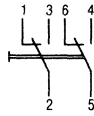
## Slide switches A60

### Switch position



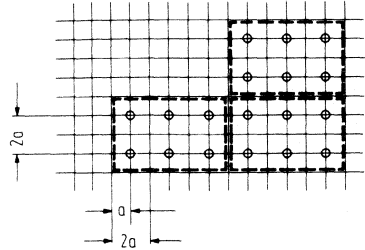
Position 1      Position 2  
(Switch viewed from above)

### Circuit diagram



(Shown in position 1)

### Mounting holes (component side) and possible packing density (only for actuation from the top)



Dimension a optionally 2.5 or 2.54 mm  
Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, 3.4.2.1.  
Coarse       $\geq 1.3$  mm  
Moderate    $\geq 1.1$  mm  
Fine         $\geq 1.0$  mm

### Version

- With 2 changeover contacts
- Slide button fitted either at the top or at the side
- Switch with slide button fitted at the side: optionally with or without red indicating dot; as an additional identification of the switch position
- Switching mode: break mode
- Tails suitable for center spacing 2.5 mm and 2.54 mm

### Materials

Versions -A24, -A25, -A31

- |                      |  |  |
|----------------------|--|--|
| —Dielectrics         | Housing<br>Contact dielectric<br>Slide | BTP<br>PBTB-GF<br>PA 11  |
| —Contact surface     | Stationary contact<br>Wiping contact   | Nickel-wire, gold-plated<br>CuSn6, nickel-plated and gold-plated |
| —Soldering terminals | Nickel-wire, gold-plated               |  |

Versions -A1, -A2, -A12

- |                      |                                      |  |
|----------------------|--------------------------------------|--|
| —Dielectrics         | Cap<br>Contact dielectric<br>Slide   | PC-GF<br>PSU<br>PA 11  |
| —Contact materials   | Stationary contact<br>Wiping contact | CuNi8Zn20, nickel-plated and gold-plated<br>CuSn6, nickel-plated and gold-plated |
| —Soldering terminals | Nickel-plated and tin-coated         |  |

# Switches and pushbuttons for printed circuits

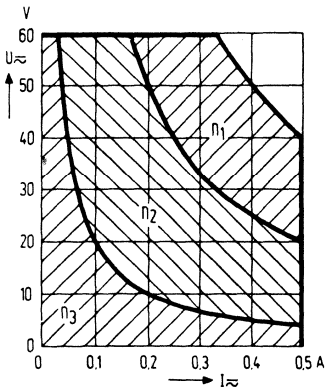
## Slide switches A60

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68, and DIN 41640 or IEC 512

	Versions		Remarks
	-A24,-A25,-A31	-A1,-A2,-A12	
Voltage rating	≤ 60 VAC/DC	≤ 60 VAC/DC	(See also diagram below) SZ=switching cycles
Current rating	≤ 0.5 A	≤ 0.5 A	
Switch capacity	≤ 20 W	≤ 20 W	
Service life, mechanical	≥ 2 · 10 <sup>4</sup> SZ	≥ 2 · 10 <sup>4</sup> SZ	Initial value After stressing Initial value After stressing
electrical with resistive load 20 W	≥ 10 <sup>3</sup> SZ	See diagram below	
Steady-state current (not switched)	≤ 1 A	≤ 1 A	
Proof voltage	500 V, 50 Hz	500 V, 50 Hz	
Contact resistance (millivolt method)	≤ 40 mOhms ≤ 100 mOhms	≤ 20 mOhms ≤ 40 mOhms	
Insulation resistance	≥ 10 <sup>5</sup> MOhms ≥ 10 <sup>3</sup> MOhms	≥ 10 <sup>6</sup> MOhms ≥ 10 <sup>4</sup> MOhms	
Capacitance (between neighboring contacts)	≤ 0.7 pF	≤ 0.7 pF	
Creepage distances	contact-contact ≥ 1.3 mm	≥ 0.9 mm	
contact-neighboring contact	≥ 1.3 mm	≥ 4.5 mm	
Air gaps	contact-contact ≥ 0.7 mm	≥ 0.9 mm	
contact-neighboring contact	≥ 0.7 mm	≥ 4.4 mm	
Ambient temperature range	-25 to +85°C	-25 to +85°C	

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term "one switching cycle" refers to actuation of the switch over the entire range and back again.

- $n_1 = 10^3$  switching cycles
- $n_2 = 10^4$  switching cycles
- $n_3 = 2 \cdot 10^4$  switching cycles

If the switches are operated at ambient temperatures exceeding 40 °C, current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	85 °C
Factor	1.1	1.2	1.3	1.4

# Switches and pushbuttons for printed circuits

## Slide switches A60

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### Notes on processing

- Switches are supplied in bar packaging
- Processing class C<sup>1)</sup> for -A24, -A25, -A31
- Processing class B<sup>1)</sup> for -A1, -A2, -A12

### Ordering Information

Item	Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Slide switch A60, immersion-washproof Actuated from the top Actuated at the side Actuated at the side, with red indicating dot	C42315-A60-A24 C42315-A60-A25 C42315-A60-A32	80 80 80
Slide switch A60 Actuated from the top Actuated at the side Actuated at the side, with red indicating dot	C42315-A60-A1 C42315-A60-A2 C42315-A60-A12	80 80 80

Version as pushbutton switch, see Page 2.31.

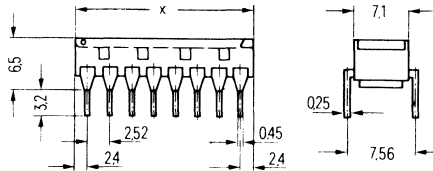
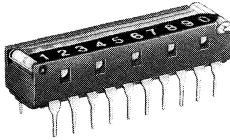
<sup>1)</sup> See Page 1.8.

# Switches and pushbuttons for printed circuits

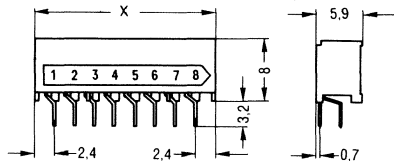
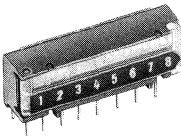
## Dual-in-line switches A1341

### Dual-in-line switches A1341

Actuated from the top



Actuated at the side

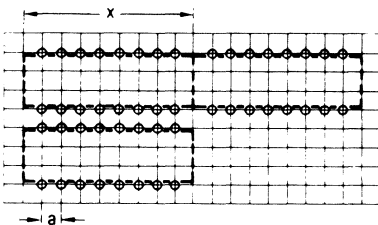


Version illustrated with 8 individual switches

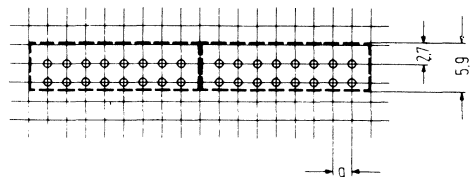
Version with n ON switches	Dimension x
4	12.4 mm
5	14.9 mm
6	17.4 mm
8	22.4 mm
10	27.5 mm

Mounting holes and possible packing density (component side)

Actuated from the top



Actuated at the side



Dimension a optionally 2.5 or 2.54 mm

Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.:

Coarse	> 1.2 mm
Moderate	≥ 1.0 mm
Fine	≥ 0.9 mm

The scope of application of the dual-in-line switches includes implementing programmed connections and thus avoiding the tedious task of inserting soldered straps.

### Version

- With 4, 5, 6, 8 or 10 switches; actuated individually and mutually independently by means of slides
- 4 to 10-position housings, largely corresponding to DIN 41870, Part 9 (housings for integrated circuits)
- Tails suitable for center spacing 2.5 mm and 2.54 mm
- Wiping contacts designed as resilient sliding contacts
- Hinged cover rendering the switches dustproof



# Switches and pushbuttons for printed circuits

## Dual-in-line switches A1341

### Other features

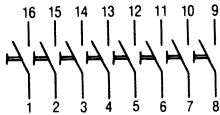
- Hinged cover with printed digits (for identifying the individual switches) and designation ON
- Cover transparent on one side, thus permitting the switch position to be identified even with the cover closed
- The switch position of the individual switches is fixed when the cover is closed

### Materials

— Dielectrics	Contact dielectric Slide Plate (slide guide) Hinged cover (6 and 8-position) Hinged cover (4, 5 and 10-position)	PBTP-GF PA11-GF PA6.6-GF  PSU  PA6.3-T
— Contact materials	Stationary contact  Wiping contact	CuNi18Zn20, nickel-plated and gold-plated CuBe2, nickel-plated and gold-plated
— Soldering terminals	Nickel-plated and tin-coated	

### Circuit diagram and coding

(Looking into switch)

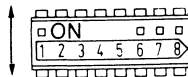


The version shown has 8 make contacts; the corresponding circuit diagram applies to 4, 5, 6 and 10 ON/OFF switches

### Switch position identification (setting examples)

Slide switch, single-pole, with ON/OFF switches

Actuating the slide in the direction of the arrow after opening the hinged cover



Slides 1, 6, 7, 8 visible through hinged cover: contact closed

Note: Switches are supplied in position „ON“ (contact closed).

# Switches and pushbuttons for printed circuits

## Dual-in-line switches A1341

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68, and DIN 41640 or IEC 512

Voltage rating	≤ 24 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 5 W
Steady-state current (not switched)	≤ 0.8 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	
Actuated from the top	≤ 50 mOhms initial value ≤ 100 mOhms; after stressing
Actuated at the side	≤ 70 mOhms; initial value ≤ 150 mOhms; after stressing
Insulation resistance	≥ 10 <sup>9</sup> MOhms; initial value ≥ 10 <sup>9</sup> MOhms; after stressing
Capacitance	approximately 0.5 pF
Creepage distances	
Contact-contact	≥ 0.5 mm
Contact-neighboring contact	≥ 0.9 mm
Air gaps	
Contact-contact	≥ 0.5 mm
Contact-neighboring contact	≥ 0.9 mm
Ambient temperature range	—25 °C to +85 °C
Service life, mechanical	≥ 500 switching cycles
with resistance 10 V, 0.5 A	≥ 50 switching cycles

### Notes on processing

- Switches are supplied in bar packaging
- Processing class B<sup>1)</sup>

### Ordering information

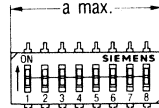
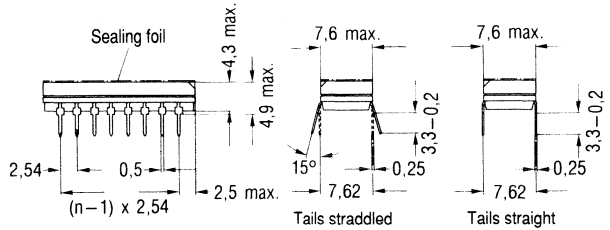
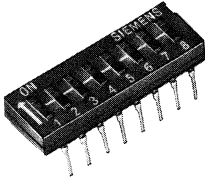
Item	Dimension x mm	Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Slide switch A1341, actuated from the top			
Single-pole, with 4 make contacts	12.4	<b>C42315-A1341-A1</b>	60
Single-pole, with 4 make contacts and cover lettering in BCD code, 8, 4, 2, 1	12.4	C42315-A1341-A101	60
Single-pole, with 5 make contacts	14.9	<b>C42315-A1341-A2</b>	50
Single-pole, with 6 make contacts	17.4	C42315-A1341-A3	40
Single-pole, with 8 make contacts	22.4	<b>C42315-A1341-A4</b>	30
Single-pole, with 10 make contacts	27.5	<b>C42315-A1341-A5</b>	25
Slide switch A1341, Actuated at the side			
Single-pole, with 8 make contacts	22.4	C42315-A1341-A24	15

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

## Dual-in-line switches A3000

### Dual-in-line switches A3000 Plug-in version



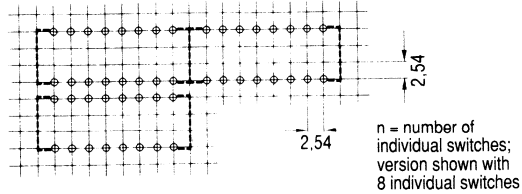
Shown without sealing foil

Version with n individual switches	Dimension a
4	12.42
5	14.96
8	22.58
10	27.66

Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1 Point 3.4.2.1.

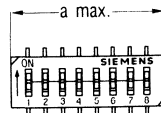
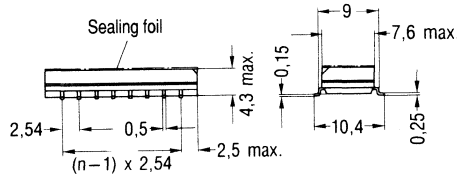
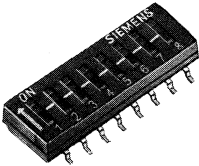
- Coarse     ≥ 1 mm
- Moderate   ≥ 0.9 mm
- Fine        ≥ 0.8 mm

### Mounting holes and possible packing density (component side)



2

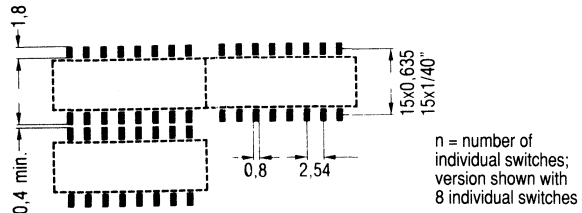
### SMD version



Shown without sealing foil

Version with n individual switches	Dimension a
4	12.42
5	14.96
8	22.58
10	27.66

### Mounting holes and possible packing density



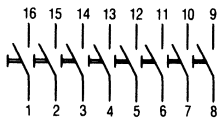
# Switches and pushbuttons for printed circuits

## Dual-in-line switches A3000

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### Circuit diagram

(View from the top)



The version with 8 individual switches is shown. The circuit diagram applies analogously also to versions with 4, 5 and 10 individual switches.

### Version

- Make contact (single-pole), actuated from the top
- 4, 5, 8 or 10 individual switches, actuated individually - mutually independently - by slide
- High-contrast lettering
- Tails suitable for hole center spacing 2.54 mm (plug-in version)  
Solder pad layout 2.54 mm/15 x 0.635 mm = 15 x 1/40" (SMD version)
- Can be processed automatically
- Immersion-washproof

### Other features

- Switch position identified by color contrast between slide and housing, designation ON and white center line on the upper side of the housing. The individual switches are marked with digits 1...n the housing.

Note: The switches are delivered in switch setting „ON“ - contact closed -.)

- High packing density possible thanks to minimum spacings on the PC board.

### Materials

- |                       |   |   |
|-----------------------|---|---|
| — Dielectrics         | Slide   | PETP <sup>1)</sup>                      |
| — Sealing foil        | Housing and cover<br>for plug-in version<br>for SMD version | PETP <sup>1)</sup><br>PETP<br>Polyamide |
| — Contact surface     | Stationary contact  | CuSn6, nickel-plated and<br>gold-plated |
|                       | Wiping contact  | CuBe2, nickel-plated and<br>gold-plated |
| — Soldering terminals | Nickel-plated and tin-coated                                |   |

<sup>1)</sup> Materials UL-listed

# Switches and pushbuttons for printed circuits

## Dual-in-line switches A3000

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating (open contact)	10 mV to 24 V AC/DC
Current rating (resistive load)	≤ 0.5 A
Switch capacity	≤ 5 W
Service life, mechanical	≥ 5000 switching cycles
electrical with resistive load 5 W	≥ 500 switching cycles
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 50 mOhms, initial value ≤ 100 mOhms, after stressing
Insulation resistance	≥ 10 <sup>9</sup> MOhms, initial value ≥ 10 <sup>2</sup> MOhms, after stressing
Capacitance	≤ 5 pF
Air gaps and creepage distances	≥ 0.4 mm
Ambient temperature range	—25...+85 °C

### Notes on processing

- Switches are supplied in bar packaging (suitable for automatic insertion).
- Lands and suction areas are provided for automatic insertion.
- Processing class D<sup>1)</sup> for plug-in version
- Processing class E<sup>1)</sup> for SMD version

### Ordering information

Item	Order designation			Quantity per packaging unit (Minimum acceptable order quantity)
	Plug-in version Tails straddled	Plug-in version Tails straight	SMD version	
Dual-in-line switch with n individual switches				
4	V23756-A3001-A4	V23756-A3003-A4	V23756-A3002-A4	50
5	V23756-A3001-A5	V23756-A3003-A5	V23756-A3002-A5	40
8	V23756-A3001-A8	V23756-A3003-A8	V23756-A3002-A8	25
10	V23756-A3001-A10	V23756-A3003-A10	V23756-A3002-A10	20

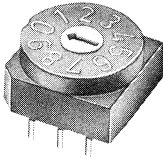
<sup>1)</sup> See Page 1.8.

# Switches and pushbuttons for printed circuits

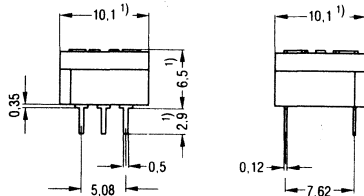
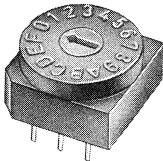
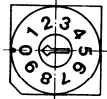
## Single-deck rotary switches A1353

### Single-deck rotary switches A1353

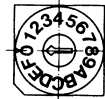
#### Actuated with screwdriver from the top



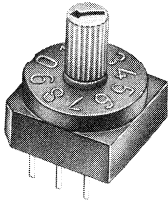
BCD code



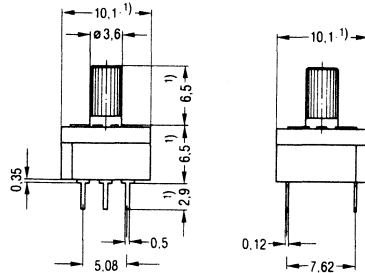
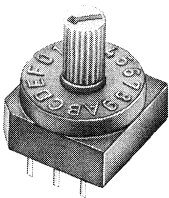
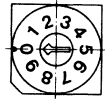
Hexadecimal code



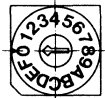
#### Actuated with screwdriver from the top or by hand (knurled shaft)



BCD code



Hexadecimal code

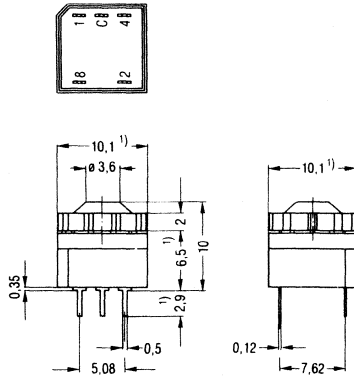
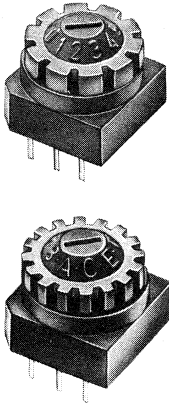


1) Maximum dimension

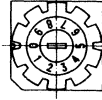
# Switches and pushbuttons for printed circuits

## Single-deck rotary switches A1353

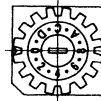
Actuated with screwdriver from the top or at the side or by hand (Indexing disk)



BCD code



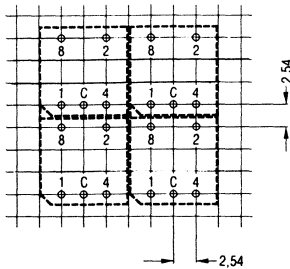
Hexadecimal code



### Code table

		Hexadecimal code															
		BCD code															
		Switch position															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Terminal C	1																
connected to	2	x		x			x		x		x		x		x		x
terminal	4		x	x				x	x			x	x			x	x
	8				x	x	x	x			x	x	x	x	x	x	x

### Mounting holes and possible packing density (component side)



Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.:

- Coarse  $\geq 1.0$  mm
- Moderate  $\geq 0.9$  mm
- Fine  $\geq 0.8$  mm

1) Maximum dimension

# Switches and pushbuttons for printed circuits

## Single-deck rotary switches A1353

---

### Version

- BCD-coded: 10 switch positions
- Hexadecimal-coded: 16 switch positions
- Immersion-washproof
- Switching mode: break mode
- Detent characteristic: without play, non-self-detent, without twist-lock feature
- Actuated by means of
  - screwdriver from the top
  - screwdriver from the top or by hand (knurled shaft)
  - screwdriver from the top or at the side or by hand (indexing disk)
- tails suitable for center spacing 2.54 mm

### Other features

- High contact reliability thanks to self-cleaning gold sliding contacts
- A screwdriver slot in the rotor, designed as an arrow (position indicator), a knurled pin or an indexing disk serve for setting, dependent upon the actuation variant
- The color of the rotor identifies the code variant: grey for BCD code, red for hexadecimal code
- Digits and letters on the housing upper side or on the indexing disk indicate the relevant switch position
- Baseplate with integrally injection-molded pin identification of the binary code and the C terminal
- Graded connection pins guarantee a defined spacing from the PC board and, thus, unhindered escape of the solder vapors.

### Materials

- |                       |   |  |
|-----------------------|---|--|
| — Dielectrics         | Baseplate and housing<br>Rotor (including knurled shaft)<br>Indexing disk | PBTP-GF<br>POM<br>PBTP   |
| — Contact materials   | Switch wafer<br>Contact spring, contact head                              | CuSn6, nickel-plated and gold-plated<br>CuBe2, nickel-plated and gold-plated |
| — Soldering terminals | Nickel-plated and tin-coated  |  |

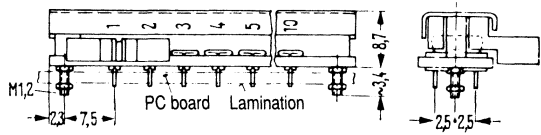
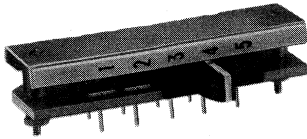




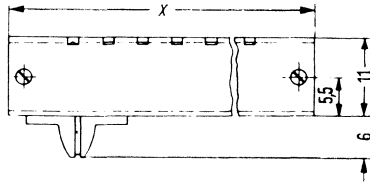
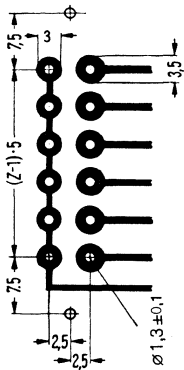
# Switches and pushbuttons for printed circuits

## Slide switches A46

### Slide switches A46



Mounting holes and printed conductors



Number of switch positions Z	Length x in mm
2	24.6
3	29.6
4	34.6
5	39.6
6	44.6
7	49.6
8	54.6
9	59.6
10	64.6

The switch can be used for switching electrically isolated circuits or, if the contacts of one row are electrically interconnected in the printed circuit, as a multi-position switch.

### Version

- With 2 to 10 switch positions, single-pole
- Switching mode: mating
- Tails suitable for center spacing 2.5 and 2.54 mm (only switches up to 5 switch positions)
- The switch is secured to the PC board by means of two studs M 1.2.
- The contacts are arranged adjacently in two rows on a phenolic paper board (dielectric DIN 40605 phenolic paper 2063). Each set of two opposite contacts is connected by means of a wiping contact which can be moved to and fro along the contact banks by means of a slide.

### Materials

- |                       |                    |   |
|-----------------------|--------------------|---|
| — Dielectrics         | Contact dielectric | Hp2063, DIN 40605 (phenolic paper)      |
|                       | Slide              | PF 31, DIN 7708 (phenolic formaldehyde) |
| — Contact materials   | Stationary contact | CuZn37, nickel-plated and gold-plated   |
|                       | Wiping contact     | CuSn6, nickel-plated and gold-plated    |
| — Soldering terminals | Gold-plated        |   |

# Switches and pushbuttons for printed circuits

## Slide switches A46

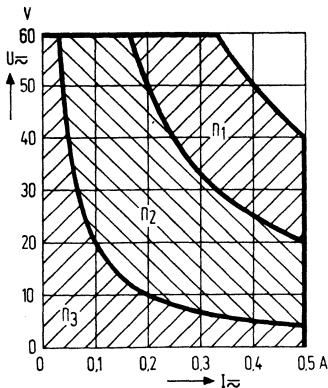
### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating		≤ 60 V AC/DC
Current rating		≤ 0.5 A
Switch capacity		≤ 20 W (see also diagram below)
Service life,	mechanical	≥ 2 · 10 <sup>4</sup> switching cycles
	electrical with resistive load	See diagram below
Steady-state current (not switched)		≤ 1 A
Proof voltage		500 V, 50 Hz
Contact resistance (millivolt method)		≤ 20 mOhms, initial value ≤ 40 mOhms, after stressing
Insulation resistance		≥ 10 <sup>4</sup> MOhms, initial value ≥ 10 <sup>2</sup> MOhms, after stressing
Creepage distances	contact-contact	≥ 1.8 mm
	contact-neighboring contact	≥ 0.65 mm
	contact-ground	≥ 3.5 mm
Air gaps	contact-contact	≥ 1.8 mm
	contact-neighboring contact	≥ 0.65 mm
	contact-ground	≥ 1.8 mm
Ambient temperature range		−20 °C to +60 °C



Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle" refers to actuation of the switch over the entire range and back again.

- $n_1 = 10^3$  switching cycles
- $n_2 = 10^4$  switching cycles
- $n_3 = 2 \cdot 10^4$  switching cycles

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60 °C
Factor	1.1	1.2

### Notes on processing

- Blister packaging
- Processing class B<sup>1)</sup>

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

## Slide switches A46

### Ordering information

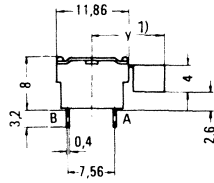
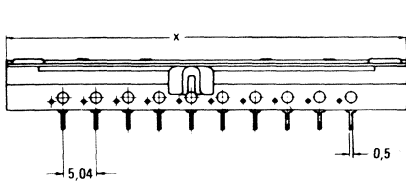
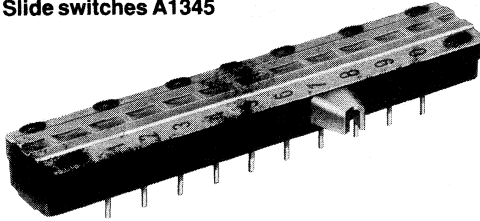
Item	Order designation <sup>1)</sup>	Quantity per packaging unit (minimum acceptable order quantity)
Slide switch A46		
with 2 switch positions	<b>V42264-K1-A1</b>	10
with 3 switch positions	<b>V42264-K1-A2</b>	10
with 4 switch positions	<b>V42264-K1-A3</b>	10
with 5 switch positions	<b>V42264-K1-A4</b>	5
with 6 switch positions	<b>V42264-K1-A5</b>	8
with 7 switch positions	V42264-K1-A6	5
with 8 switch positions	V42264-K1-A7	5
with 9 switch positions	V42264-K1-A8	5
with 10 switch positions	V42264-K1-A9	5

<sup>1)</sup> See „Slide switches A1345“, Page 2.25, for possible subsequent types

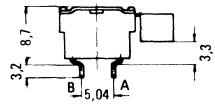
# Switches and pushbuttons for printed circuits

## Slide switches A1345

### Slide switches A1345

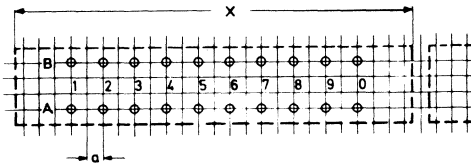


Version for tails with dual-in-line spacing



Version for tails with spacing 5.04 mm

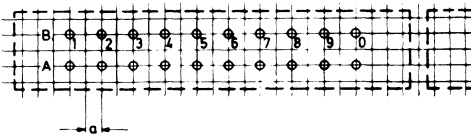
Mounting holes and possible packing density (component side)  
Version for tails with dual-in-line spacing



The figure shows 10-position slide switches. Corresponding mounting holes and circuit diagrams apply accordingly to switches with x stages.

Slide switch	Dimension x
3 switch positions	27.7
4 switch positions	32.6
10 switch positions	63.0

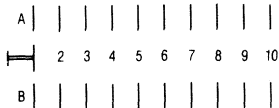
Version for tails with center spacing 5.04 mm



Dimension a optionally 2.5 mm or 2.54 mm  
Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.:

- Coarse  $\geq 1.3$  mm
- Moderate  $\geq 1.2$  mm
- Fine  $\geq 1.1$  mm

Circuit diagram, showing 10-position slide switch



The tails on the underside of the switch are numbered.

1) 11.5 or 17 mm, see also ordering information on Page 2.27.

# Switches and pushbuttons for printed circuits

## Slide switches A1345

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The switch can be used for switching electrically isolated circuits or, if the contacts of one bank are electrically interconnected in the printed circuit, as a multi-position switch.

### Version

- With 3, 4 or 10 switch positions, single-pole
- Switching mode, optionally with break or mating twin contact
- Tails with dual-in-line spacing (7.56 mm) or spacing 5.04 mm (as for slide switches A46); tails suitable for center spacing 2.5 mm and 2.54 mm
- Slides or levers available in various lengths

### Other features

- Actuated at the side by means of slide, switch position can be read off by means of digits on the cover
- Particularly high degree of contact reliability, even where subject to extreme mechanical and climatic stress
- Resilient wiping contact, spring arms of the twin contacts with different lengths, thus providing increased protection against discontinuity as the result of vibration or resonance
- Trough-shaped housing with integrally injection-molded contacts, suitable for flow soldering
- Self-cleaning wiping contact

### Materials

- |                       |                              |   |
|-----------------------|------------------------------|---|
| — Dielectrics         | Housing                      | PSU                                       |
|                       | Slide                        | PBTP                                      |
| — Contact materials   | Stationary contact           | CuNi18Zn20, nickel-plated and gold-plated |
|                       | Wiping contact               | CuBe2, nickel-plated and gold-plated      |
| — Soldering terminals | Nickel-plated and tin-coated |   |
| — Cover               | X5CrNi 189                   |   |
| — Actuating lever     | CuNi18Zn20                   |   |

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating		≤ 24 V AC/DC
Current rating		≤ 0.5 A
Switch capacity		≤ 5 W
Proof voltage		500 V, 50 Hz
Contact resistance (millivolt method)		≤ 30 mOhms, initial value ≤ 60 mOhms, after stressing
Insulation resistance		≥ 10 <sup>5</sup> MOhms, initial value ≥ 10 <sup>3</sup> MOhms, after stressing
Service life,	mechanical	≥ 100 000 switching cycles
	electrical with resistive load	(= on the 3-position slide switch 25 000 cycles)
	10 V, 0.5 A	≥ 50 000 switching cycles (= on the 3-position slide switch 12 500 cycles)
Creepage distances	contact-neighboring contact	≥ 1 mm
Air gaps	contact-neighboring contact	≥ 0.5 mm
Ambient temperature range		—25 °C to +85 °C

# Switches and pushbuttons for printed circuits

## Slide switches A1345

### Notes on processing

- Blister packaging
- Processing class B<sup>1)</sup>

### Ordering information

Item		Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Switch position	Lever length y (see dimension diagram on Page 2.25)		
Slide switch A1345 with tails with DIL spacing, break mode			
3	11.5	C42315-A1345-A31	10
	17	C42315-A1345-A61	10
4	11.5	C42315-A1345-A32	10
	17	C42315-A1345-A62	10
10	11.5	C42315-A1345-A38	5
Slide switch A1345 with tails with DIL spacing, mating mode			
3	11.5	C42315-A1345-A1	10
	17	C42315-A1345-A71	10
4	11.5	C42315-A1345-A2	10
	17	C42315-A1345-A72	10
Slide switch A1345 with tails with spacing 5.04 mm, break mode			
3	11.5	C42315-A1345-A41	10
4	11.5	C42315-A1345-A42	10
10	11.5	C42315-A1345-A48	5
Slide switch A1345 with tails with spacing 5.04 mm, mating mode			
3	11.5	C42315-A1345-A11	10
4	11.5	C42315-A1345-A12	10
10	11.5	C42315-A1345-A18	5

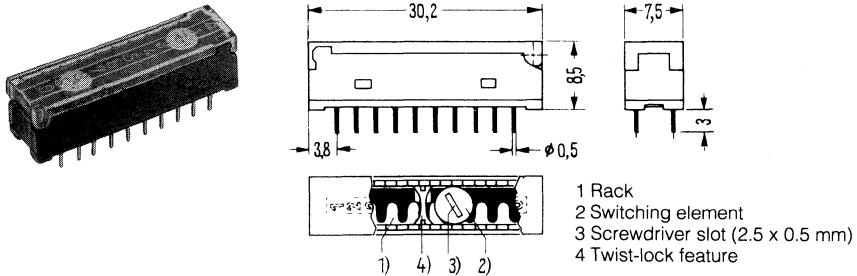
<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

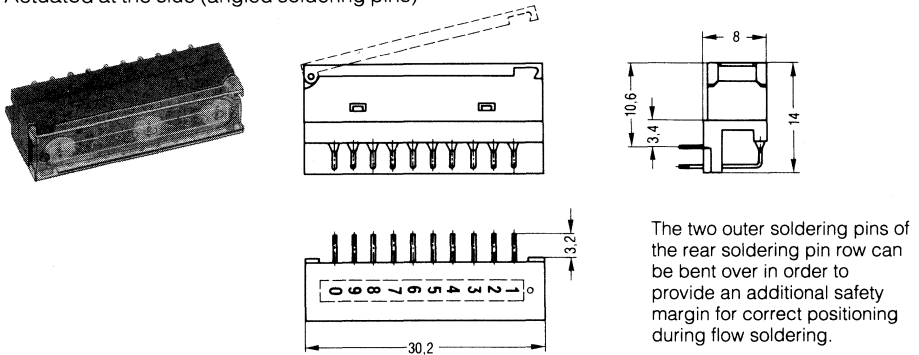
## Turn-slide switches A61

### Turn-slide switches A61

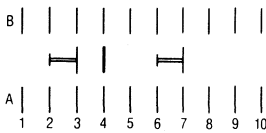
Actuated from the top (straight soldering pins)



Actuated at the side (angled soldering pins)

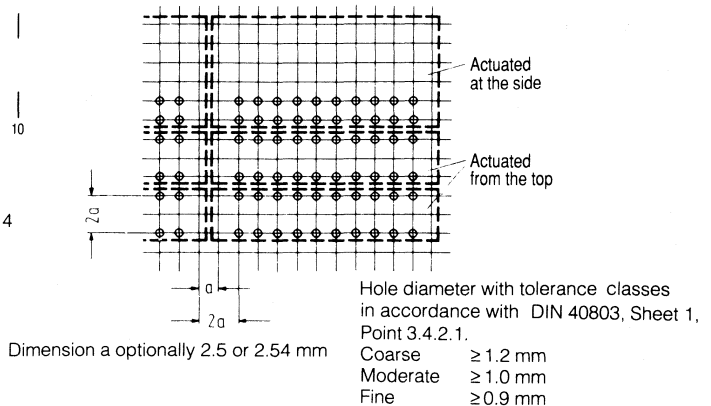


Circuit diagram



e.g. switching elements  
in switch positions 3 and 7  
Twist-lock feature in position 4

Mounting holes (component side) and possible packing density



The switch can be used for switching electrically isolated circuits or, if the contacts of one bank are electrically interconnected in the printed circuit, as a multi-position switch. This includes applications such as setting programs and operating statuses in data processing systems.



# Switches and pushbuttons for printed circuits

## Turn-slide switches A61

### Version

- With 1, 2 or 3 switching elements; maximum of 10 switch positions
- Detent switch positions, plug-in twist-lock features for limiting the rotary range (required in the case of 2 or 3 switching elements)
- Switching mode: break mode
- Tails suitable for center spacing 2.5 mm and 2.54 mm
- Contact springs designed as twin contacts
- Hinged cover rendering the switch dustproof

### Other features

- Switch elements set by means of screwdriver
- Transparent cover with printed digits, thus permitting the switch positions to be identified even with the cover closed
- Low overall height  $\leq 8.5$  mm

### Materials

— Dielectrics	Housing, hinged cover, pin plate Switching element, knob rotor	PSU POM PC PP
— Contact materials	Twist-lock feature Stationary contact Wiping contact	Nickel-wire, gold-plated CuBe1.7, nickel-plated and gold-plated
— Soldering terminals	Gold-plated	

### Technical data

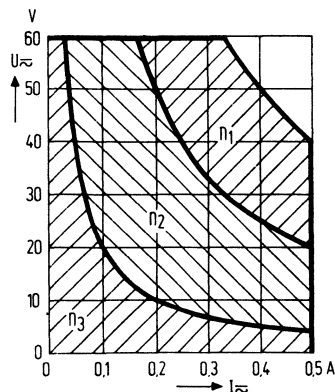
Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating		$\leq 60$ V AC/DC
Current rating		$\leq 0.5$ A
Switch capacity		$\leq 20$ W (see also diagram Page 2.30)
Service life, mechanical		$\geq 5 \cdot 10^5$ switching cycles
	electrical with resistive load	See diagram on Page 2.30
Steady-state current (not switched)		$\leq 1$ A
Proof voltage		500 V, 50 Hz
Contact resistance (millivolt method)		
Actuated from the top		$\leq 35$ mOhms, initial value
		$\leq 70$ mOhms, after stressing
Actuated at the side		$\leq 40$ mOhms, initial value
		$\leq 80$ mOhms, after stressing
Insulation resistance		$\geq 10^8$ MOhms, initial value
		$\geq 10^8$ MOhms, after stressing
Capacitance		$\leq 0.3$ pF
Creepage distances	contact-contact	$\geq 5$ mm
	contact-neighboring contact	$\geq 2$ mm
Air gaps	contact-contact	$\geq 4.8$ mm
	contact-neighboring contact	$\geq 2$ mm
Ambient temperature range		$-40^\circ\text{C}$ to $+85^\circ\text{C}$

# Switches and pushbuttons for printed circuits

## Turn-slide switches A61

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle“ refers to actuation of the switch over the entire range and back again.

$n_1 = 100$  switching cycles  
 $n_2 = 10^3$  switching cycles  
 $n_3 = 5 \cdot 10^3$  switching cycles

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80 °C
Factor	1.1	1.2	1.3	1.4

### Notes on processing

- Bar packaging with actuation from the top
- Blister packaging with actuation at the side
- Processing class B<sup>1)</sup>)

### Ordering information

Item	Order designation	Quantity per packaging unit (minimum acceptable order quantity)
Turn-slide switch A61, actuated from the top, with		
1 switching element	<b>V42264-V1501-D10</b>	25
1 switching element, 2 twist-lock features	<b>V42264-V1501-D12</b>	15
2 switching elements, 3 twist-lock features	<b>V42264-V1502-D13</b>	15
3 switching elements, 3 twist-lock features	<b>V42264-V1503-D13</b>	15
Turn-slide switch A61 actuated at the side, with		
1 switching element	<b>V42264-V1501-D10</b>	15
1 switching element, 2 twist-lock features	V42264-V1501-D12	15
2 switching elements, 3 twist-lock features	V42264-V1502-D13	15
3 switching elements, 3 twist-lock features	V42264-V1503-D13	15

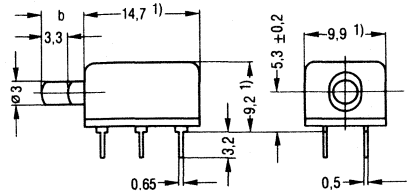
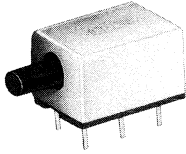
Note: Twist-lock features are supplied loosely. Switches are also available with twist-lock features already fitted on request.

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

## Pushbutton switches A60

### Pushbutton switches A60

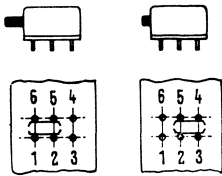


Dimension b = 5.4 mm or 9.4 mm

### Connection diagram

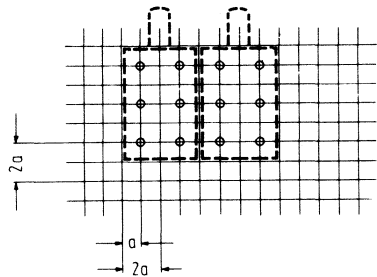
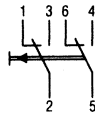
### Circuit diagram

### Mounting holes (component side)



Idle  
position

Actuated



Dimension a optionally 2.5 or 2.54 mm

Hole diameter with tolerance classes  
in accordance with DIN 40803, Sheet 1,  
Point 3.4.2.1.

Coarse	≥ 1.3 mm
Moderate	≥ 1.1 mm
Fine	≥ 1.0 mm

2

### Version

- With 2 changeover switches
- 2 different actuator lengths
- Switching mode: break mode (sliding contacts)
- Tails suitable for center spacing 2.5 mm and 2.54 mm

### Materials

- Dielectrics	Cap Contact dielectric Slide	PC-GF PSU POM
- Contact materials	Stationary contact Wiping contact	CuNi18Zn20, nickel-plated and gold-plated CuSn6, nickel-plated and gold-plated
- Soldering terminals	Nickel-plated and tin-coated	

1) Maximum dimension

# Switches and pushbuttons for printed circuits

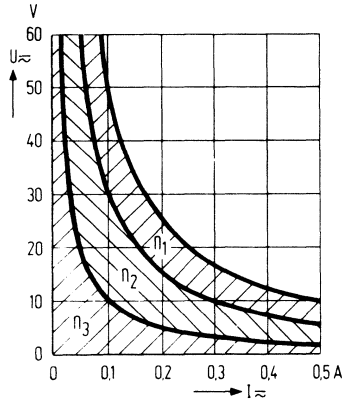
## Pushbutton switches A60

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 60 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 5 W (see also diagram below)
Service life, mechanical	≥ 2 · 10 <sup>4</sup> switching cycles
electrical with resistive load	See diagram below
Steady-state current (not switched)	≤ 1 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 20 mOhms, initial value ≤ 40 mOhms, after stressing
Insulation resistance	≥ 10 <sup>6</sup> MOhms, initial value ≥ 10 <sup>4</sup> MOhms, after stressing
Capacitance (between neighboring contacts)	≤ 0.7 pF
Creepage distances contact-contact	≥ 0.9 mm
contact-neighboring contact	≥ 4.5 mm
Air gaps contact-contact	≥ 0.9 mm
contact-neighboring contact	≥ 4.4 mm
Ambient temperature range	—25 °C to +85 °C
Minimum stroke for reliable switchover	3.1 mm
Overall stroke	3.5 mm

### Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle“ refers to actuation of the switch over the entire range and back again.

$$n_1 = 10^3 \quad \text{switching cycles}$$

$$n_2 = 10^4 \quad \text{switching cycles}$$

$$n_3 = 2 \cdot 10^4 \quad \text{switching cycles}$$

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80 °C
Factor	1.1	1.2	1.3	1.4

### Notes on processing

- Bar packaging
- Processing class B<sup>1)</sup>

### Ordering information

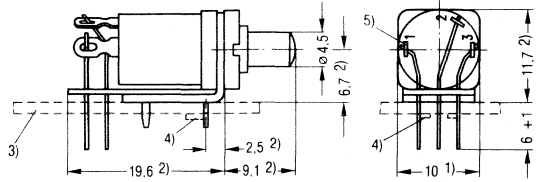
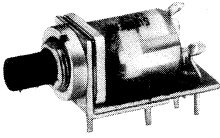
Item	Order designation	Quantity per packaging unit (minimum acceptable order quantity)
Pushbutton switch A60, actuator length b = 5.4 mm actuator length b = 9.4 mm	<b>C42315-A60-A3</b>	60
	<b>C42315-A60-A4</b>	50

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

## Pushbutton switches A9

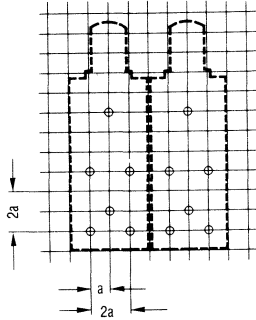
### Pushbutton switches A9



Circuit diagram



Mounting holes (component side)



Dimension optionally 2.5 or 2.54 mm  
 Hole diameter with tolerance classes  
 in accordance with DIN 40803, Sheet 1,  
 Point 3.4.2.1.  
 Coarse  $\geq 1.3$  mm  
 Moderate  $\geq 1.1$  mm  
 Fine  $\geq 1.0$  mm

### Version

- With 1 chageover switch
- Button arranged horizontally on a mounting bracket
- Switching mode: mating
- Tails suitable for center spacing 2.5 mm and 2.54 mm

Version for conventional wiring, see Page 3.31

### Materials

- |                       |                    |   |
|-----------------------|--------------------|---|
| — Dielectrics         | Actuator           | POM                                       |
|                       | Housing            | PC-GF                                     |
| — Contact materials   | Stationary contact | CuZn37, nickel-plated and gold-plated     |
|                       | Wiping contact     | CuNi18Zn20, nickel-plated and gold-plated |
| — Soldering terminals | Tin-coated         |   |

- 1) Maximum dimension
- 2) Installation dimension
- 3) Mounting plate
- 4) Tab bent over (if necessary connect to ground at this point)
- 5) Soft-soldered



# Switches and pushbuttons for printed circuits

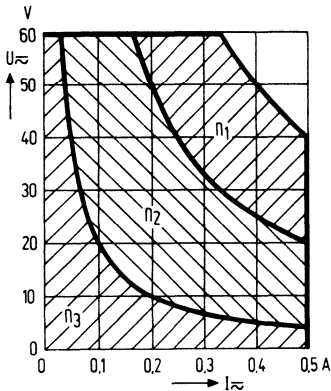
## Pushbutton switches A9

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 60 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 20 W (see also diagram below)
Service life, mechanical	≥ 2 · 10 <sup>4</sup> switching cycles
electrical with resistive load	See diagram page below
Steady-state current (not switched)	≤ 1 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 50 mOhms, initial value ≤ 100 mOhms, after stressing
Insulation resistance	≥ 10 <sup>9</sup> MOhms, initial value ≥ 10 <sup>4</sup> MOhms, after stressing
Capacitance	≤ 1 pF
Creepage distances contact-ground	≥ 0.5 mm
Air gaps contact-ground	≥ 0.5 mm
Switch-on stroke	≥ 2.8 mm
Overall stroke	≥ 3.7 mm
Ambient temperature range	−40 °C to +100 °C

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle“ refers to actuation of the switch over the entire range and back again.

$n_1 = 10^3$	switching cycles
$n_2 = 10^4$	switching cycles
$n_3 = 2 \cdot 10^4$	switching cycles

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80	90	100 °C
Factor	1.1	1.2	1.3	1.4	1.5	1.6

### Notes on processing

- Blister packaging
- Processing class B<sup>1)</sup>

### Ordering information

Item	Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Pushbutton switch A9, button color black button color white button color red	<b>C42315-A9-A1</b>	15
	C42315-A9-A2	15
	C42315-A9-A3	15

<sup>1)</sup> See Page 1.8

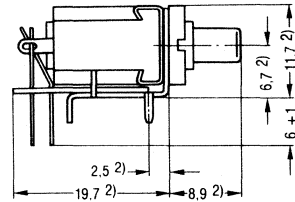
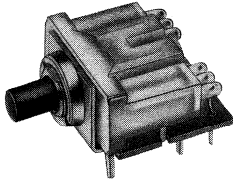
Other button colors available on request.

# Switches and pushbuttons for printed circuits

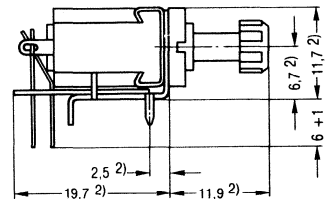
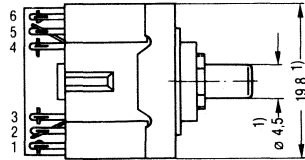
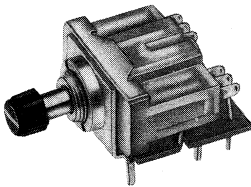
## Pushbutton switches A2

### Pushbutton switches A2

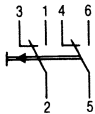
Without indexing



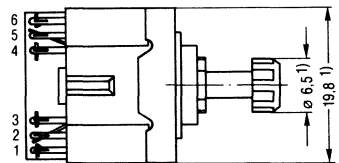
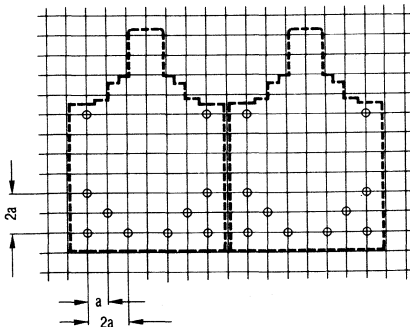
With indexing



Circuit diagram



Mounting holes (component side)



Dimension optionally 2.5 or 2.54 mm  
Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.

Coarse	≥ 1.3 mm
Moderate	≥ 1.1 mm
Fine	≥ 1.0 mm

### Version

- With 2 changeover switches
- Buttons arranged horizontally on a mounting bracket
- Switching mode: break mode
- Tails suitable for center spacing 2.5 mm and 2.54 mm
- In the case of version with indexing (knurled button), the button can be locked in operating position by turning the button through 90° in a clockwise direction.
- Version for conventional wiring, see Page 3.34.

1) Maximum dimension  
2) Installation dimension



# Switches and pushbuttons for printed circuits

## Pushbutton switches A2

### Materials

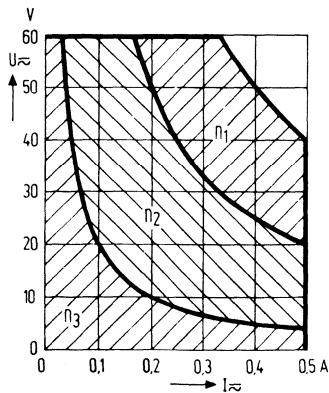
— Dielectrics	Actuator	POM
	Housing	PC-GF
— Contact materials	Stationary contact	CuZn37, nickel-plated and gold-plated
	Wiping contact	CuNi18Zn20, nickel-plated and gold-plated
— Soldering terminals	Tin-coated	

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 60 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 20 W (see also diagram below)
Service life, mechanical	≥ 2 · 10 <sup>6</sup> switching cycles
electrical with resistive load	See diagram page below
Steady-state current (not switched)	≤ 1 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 30 mOhms, initial value ≤ 60 mOhms, after stressing
Insulation resistance	≥ 10 <sup>6</sup> MOhms, initial value ≥ 10 <sup>4</sup> MOhms, after stressing
Capacitance	≤ 0.8 pF
Creepage distances contact-ground	≥ 1.8 mm
Air gaps contact-ground	≥ 1.8 mm
Switch-on stroke	≥ 2.6 mm
Overall stroke	≥ 2.85 mm
Stroke for indexing	≥ 2.8 mm
Ambient temperature range	—40 °C to +100 °C

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle“ refers to actuation of the switch over the entire range and back again.

$n_1 = 10^3$	switching cycles
$n_2 = 10^4$	switching cycles
$n_3 = 2 \cdot 10^4$	switching cycles

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80	90	100 °C
Factor	1.1	1.2	1.3	1.4	1.5	1.6



# Switches and pushbuttons for printed circuits

## Pushbutton switches A2

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### Notes on processing

- Blister packaging
- Processing class B<sup>1)</sup>

### Ordering information

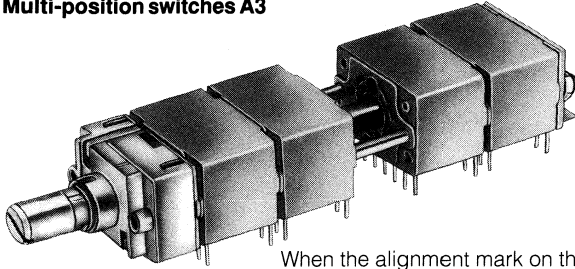
Item	Order designation	Quantity per packaging unit (minimum acceptable order quantity)
Pushbutton switch A2 without indexing, button color black	<b>C42315-A2-A13</b>	8
Pushbutton switch A2 with indexing, button color black	<b>C42315-A2-A19</b>	8

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

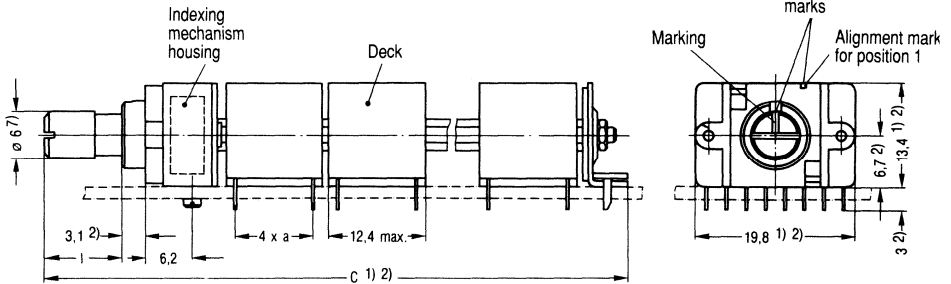
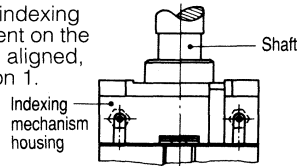
## Multi-position switches A3

### Multi-position switches A3

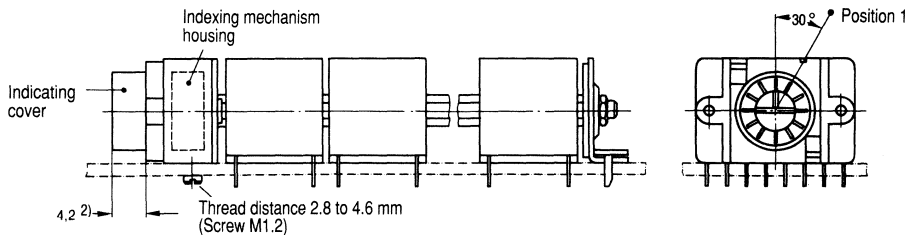


When the alignment mark on the indexing mechanism shaft and the alignment on the indexing mechanism housing are aligned, this corresponds to switch position 1.

With knob adjustment



With screwdriver adjustment



- a) Optionally 2.5 or 2.54 mm
- c) Maximum installation length, see ordering code Page 2.42
- l) Shaft length see ordering code Page 2.42

- 1) Maximum dimension
- 2) Installation dimension
- 3) Minimum dimension
- 4) Switch center line
- 5) Mounting hole for center spacing 2.54 mm:  $\varnothing 1.5 \text{ mm} + 0.1 \text{ mm}$
- 6) Overall length of decks
- 7)  $\varnothing 4 \text{ mm}$  on request

# Switches and pushbuttons for printed circuits

## Multi-position switches A3

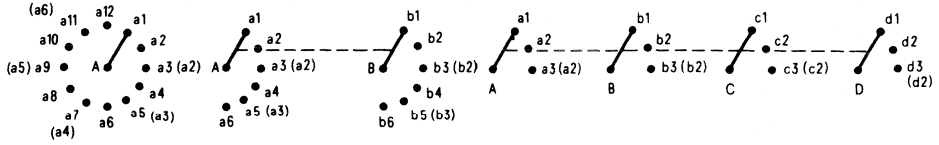
Circuit diagrams

Single-pole

2-pole

4-pole

Indexing mechanism (drive side)



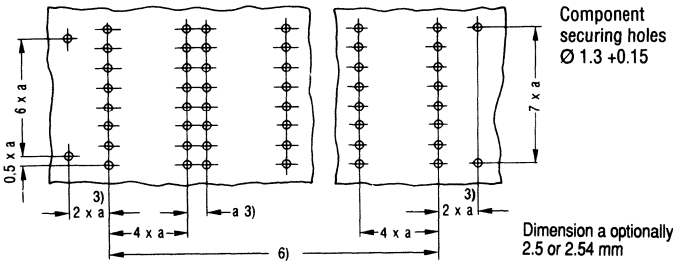
12 switch positions with  
12-position indexing or  
6 switch positions with  
6-position indexing

6 switch positions with  
12-position indexing or  
3 switch positions with  
6-position indexing

3 switch positions with  
12-position indexing  
or 2 switch positions with  
6-position indexing

( ) Information in parenthesis applies to 6-position indexing

Mounting holes (component side)



### Version

- With 1 to 5 decks, arranged adjacently; different spacings between the decks along the axis are possible
- Indexing mechanism with 6 switch positions, 6-position indexing (pitch 60°)  
or  
indexing mechanism with 12 switch positions, 12-position indexing (pitch 30°)
- With 1, 2 or 4-pole deck
- With or without stops for limiting the rotary range; possible for all switch positions
- With knob or screwdriver adjustment (for setting the graduated scale, optionally in white or grey, pressed on)
- Switching mode: optionally mating <sup>1)</sup> or break mode
- Tails suitable for center spacing 2.5 mm or 2.54 mm; 16 tails per deck, arranged in 2 banks

<sup>1)</sup> Max. 3 ms permissible undefined switching conditions



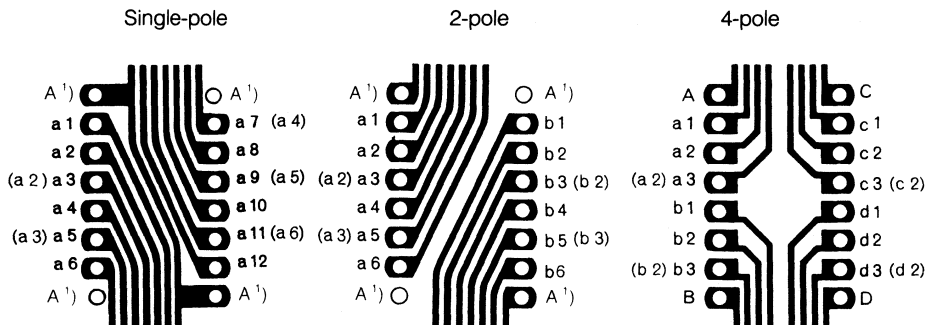
# Switches and pushbuttons for printed circuits

## Multi-position switches A3

### Configuration

Each deck forms a self-contained unit. It comprises a housing and a rotor with resilient contacts. The rotor is driven by a stainless steel shaft with machined flats. Both halves of the deck have contacts and soldering terminals. The wiping contacts, spring-mounted in the rotor, have a three-point seating. They connect the common ring to the individual contacts. The tails of the decks guarantee firm seating on the PC board and reliable contacting after flow soldering.

### Possible printed conductor configuration for a deck (switch seen from below)



( ) Information in parenthesis applies to 6-position indexing

### Mounting

The indexing mechanism housing is secured with two floating-mounted nuts. The terminating bracket which also guides the shaft at the end of the switch forms a third securing point. In the case of double-faced PC boards, insulating strips are available, if required, for the indexing mechanism housing and the mounting brackets (on request).

The following securing hardware is required:

2 screws M1.2 (thread distance in the indexing mechanism housing 2.8 mm to 4.6 mm); commercial-ly available

### Materials

— Dielectrics	Deck, rotor	PC
— Contact materials	Stationary contact	CuNi18Zn20, nickel-plated and silver-plated
	Wiping contact	CuSn6, gold-plated
— Soldering terminals	Nickel-plated and tin-coated	

<sup>1)</sup> The soldering pins A, B, with identical identification, are interconnected in the switch.

# Switches and pushbuttons for printed circuits

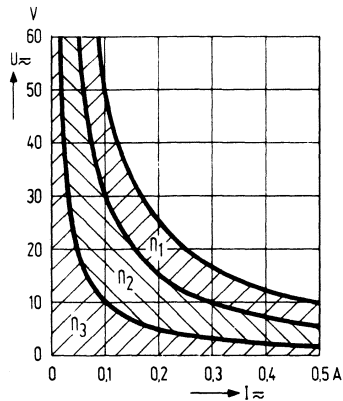
## Multi-position switches A3

**Technical data** (in accordance with DIN 41619, IEC Publ. 132-1)

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating		≤ 60 V AC/DC
Current rating		≤ 0.5 A
Switch capacity		≤ 5 W (see also diagram below)
Service life,	mechanical	≥ 2 · 10 <sup>4</sup> switching
	electrical with resistive load	See diagram below
Steady-state current (not switched)		≤ 1 A
Proof voltage		500 V, 50 Hz
Contact resistance (millivolt method)		≤ 50 mOhms, initial value ≤ 100 mOhms, after stressing
Insulation resistance		≥ 10 <sup>8</sup> MOhms, initial value ≥ 10 <sup>7</sup> MOhms, after stressing
Capacitance	contact-neighbor contact	≤ 0.5 pF
	contact-sliding contact	≤ 1.0 pF
	closed contact-ground	≤ 4.5 pF
	closed contact-neighbor contact	≤ 1.0 pF
Creepage distances	contact-neighbor contact	≥ 0.5 mm
	contact-ground	≥ 1.4 mm
Air gaps	contact-neighbor contact	≥ 0.5 mm
	contact-ground	≥ 0.5 mm
Actuating torque of a switch with 20 wiping contacts		approx. 0.1 Nm
Stop strength		≥ 0.7 Nm
		(See also section „General“, Pages 1.3 and 1.11)
Ambient temperature range		−40 °C to +85 °C

Switch capacity with resistive load



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle“ refers to actuation of the switch over the entire range and back again.

$$n_1 = 10^3 \quad \text{switching cycles}$$

$$n_2 = 10^4 \quad \text{switching cycles}$$

$$n_3 = 2 \cdot 10^4 \quad \text{switching cycles}$$

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	85 °C
Factor	1.1	1.2	1.3	1.4

### Notes on processing

- Blister packaging
- Processing class B<sup>1)</sup>

<sup>1)</sup> See Page 1.8.

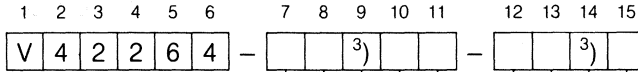


# Switches and pushbuttons for printed circuits

## Multi-position switches A3

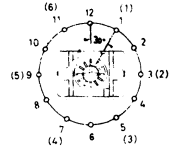
### Ordering code

Position



Actuation	Identification letter	Indexing	Stop	Indicating cover	Identification number	Installation length in mm <sup>1)</sup> 2)	Decks					Indexing	Rotary range from switch position	Identification letter	Rotary range to switch position	Identification number	Pole	Switching mode	Identification number				
							1	2	3	4	5												
Screw driver	P	6-position	with	Black	1	29,1	01					6-position and 12-position	Without stop	A	-	-	1	Mating	1				
			White	2	34,2	03				2	2			2									
		without	Black	9	36,7	04				4	4			4									
		White	10																				
	12-position	with	Black	5	44,2	07	31						1	1	1	1	1	1	1				
		White	6	49,3	09	33							2	2	2	2	2	2	2				
		without	Black	13	51,8	10	34						3	3	3	3	3	3	3				
		White	14										4	4	4	4	4	4	4				
Knob	Q	6-position	with	7	2	59,3	13	37	55			Only 12-position	6-position and 12-position	H	7	7	5	Break	5				
			9,6	1	61,8	14	38	56								6				6	6	6	
		14	3	64,4	15	39	57																
		without	9,6	9	66,9	16	40	58															
	12-position	with	7	6	74,4	19	43	61	73				7	7	7	7	7	7	7				
		9,6	5	89,5	25	49	67	79	85				8	8	8	8	8	8	8				
		14	7	102,1	30	54	72	84	90				9	9	9	9	9	9	9				
		without	7	14									10	10	10	10	10	10	10				
			9,6	13							11	11	11	11	11	11	11						
			9,6	13							12	12	12	12	12	12	12						

( ) Information in parenthesis applies to 6-position indexing



Maximum permissible rotary ranges:

Pitch	30°	60°
Single-pole		Any
2-pole from position 1 to	6	3
4-pole from position 1 to	3	2

Packed in units of: 1 ea.

Example order: V42264-Q537-B115

Multi-position switch with 12 switch positions, shaft end for knob, 2 decks, length 59.3 mm, with stops for rotary range from position 1 to 11, single-pole, break mode.

2 screws M1.2 are required for mounting (thread distance in the indexing mechanism housing max. 4.6 mm).

<sup>1)</sup> See also dimension diagram Page 2.38

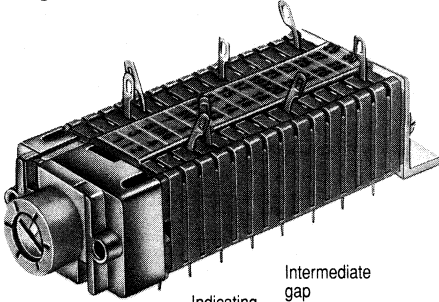
<sup>2)</sup> Other installation lengths on request.

<sup>3)</sup> This position is omitted if the identification number has only one digit.

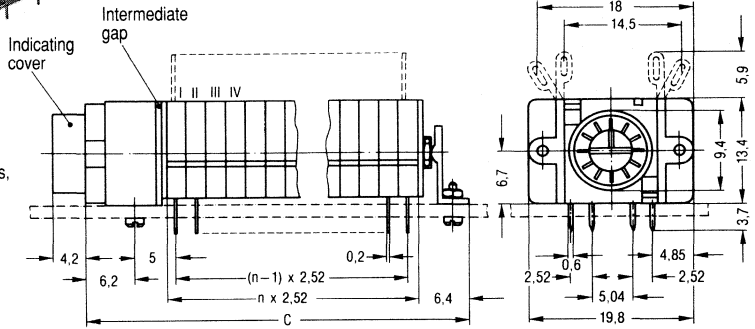
# Switches and pushbuttons for printed circuits

## Programm controllers A3

### Program controllers A3

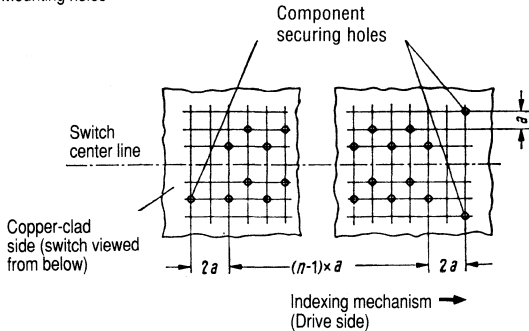


With screwdriver adjustment (with knob adjustment, see Multi-position switches, Page 2.38)



Dimension  $c = 16 \text{ mm} \pm 0.3 \text{ mm} + n \times 2.52$   
 $n \approx$  number of decks

#### Mounting holes



Dimension optionally 2.5 or 2.54 mm  
 Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.

Coarse	$\geq 1.3 \text{ mm}$
Moderate	$\geq 1.2 \text{ mm}$
Fine	$\geq 1.1 \text{ mm}$

The program controller is chiefly used for solving difficult switching problems which could either not be solved or which could only be solved uneconomically using a multi-position switch. Such applications include setting attenuators, equalizers or balancing circuits, binary coding and negation of binary coding.

#### Version

- With 1 to 15 separate decks, arranged adjacently
- Indexing mechanism with 6 switch positions, 6-position indexing (pitch 60°) or indexing mechanism with 12 switch positions, 12-position indexing (pitch 30°)

# Switches and pushbuttons for printed circuits

## Program controllers A3

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- With or without stops for limiting the rotary range, possible for all switch positions
- With screwdriver slot or knob (for setting the graduated scale, optionally in white or grey, pressed on)
- Switching mode: mating or break, individually selectable for each deck
- Terminals for printed circuits, suitable for center spacing 2.5 mm and 2.54 mm or soldering lugs, straight or bent, for conventional wiring at the upper side of the switch or both types of connection (e.g. for additionally equipping the switch with components)

### Configuration

Each deck includes a pair of pressed-in contact springs and a printed circuit switch wafer actuated by a common flat shaft. The conductor pattern on the wafer and the arrangement of the wafer relative to the shaft determine the switching program.

### Mounting

The indexing mechanism housing is secured with two floating-mounted nuts. The terminating bracket which also guides the shaft at the end of the switch forms a third securing point. In the case of double-faced PC boards, insulating strips are available, if required, for the indexing mechanism housing and the mounting brackets (on request).

The following securing hardware is required:

3 screws and 1 nut M 1.2 (thread distance in the indexing mechanism housing 2.8 mm to 4.6 mm); commercially available.

### Materials

— Dielectrics	Housing	PA6.6-GF
	Switch wafer	Phenolic paper
— Contact materials	Contact spring	CuSn6, nickel-plated and gold-plated
	Switch wafer	Copper clad, nickel-plated and gold-plated
— Soldering terminals	Tin-coated	
— Terminating bracket, plate	PA6.10	

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 60 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 20 W (see also diagram Page 2.45)
Service life, mechanical	≥ 2 · 10 <sup>4</sup> switching cycles
electrical with resistive load	See diagram Page 2.45
Steady-state current (not switched)	≤ 1 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 150 mOhms, initial value ≤ 300 mOhms, after stressing
Insulation resistance	≥ 10 <sup>4</sup> MOhms, initial value ≥ 10 <sup>2</sup> MOhms, after stressing

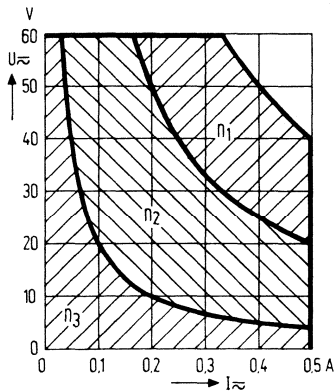


# Switches and pushbuttons for printed circuits

## Program controllers A3

Capacitance	deck-neighboring deck	≤ 2.5 pF
	deck-next deck but one	≤ 1.5 pF
	contact-contact (not switched)	≤ 2.5 pF
	1st deck-ground (not switched)	≤ 3 pF
	1st deck-ground (switched)	≤ 4 pF
	last deck-ground (not switched)	≤ 4 pF
	last deck-ground (switched)	≤ 6 pF
Inductance of soldering terminal to soldering terminal		≤ 25 nH
Creepage distances	contact-contact	≥ 0.5 mm
	contact-ground	≥ 1.5 mm
Air gaps	contact-contact	≥ 0.5 mm
	contact-ground	≥ 1.1 mm
Stop strength		≥ 0.7 Nm
Ambient temperature range		−40 °C to +85 °C

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle“ refers to actuation of the switch over the entire range and back again.

$$n_1 = 10^3 \quad \text{switching cycles}$$

$$n_2 = 10^4 \quad \text{switching cycles}$$

$$n_3 = 2 \cdot 10^4 \quad \text{switching cycles}$$

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	85 °C
Factor	1.1	1.2	1.3	1.4

### Notes on processing

- Blister packaging
- Processing class B<sup>1)</sup>

### Ordering information

Item	Order designation	Quantity per packaging unit
Program controller A3	V42264-H9★★-+★★★ <sup>2)</sup>	1

<sup>1)</sup> See Page 1.8.

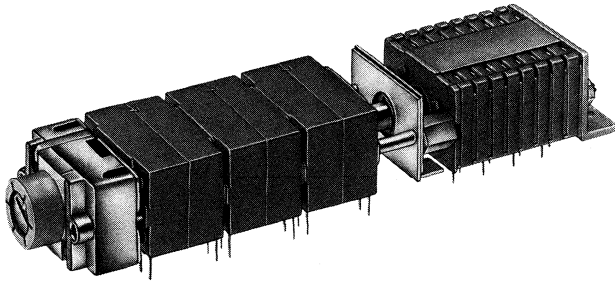
<sup>2)</sup> Since the switch is designed to meet specific customer requirements, an ordering data sheet must be requested from the responsible Siemens office. This sheet must be completed and returned. The office will then inform you of the binding order designation.

# Switches and pushbuttons for printed circuits

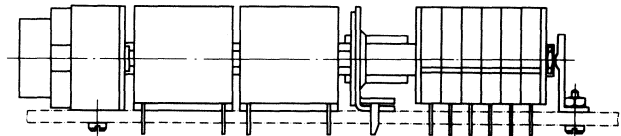
## Multi-position switches and program controllers A3

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### Multi-position switches and program controllers A3



Example of a combined multi-position switch and program controller



The combination of program controllers and the matching multi-position switches permits a comprehensive range of decked switches for all low-power equipment incorporating PC boards. The dimensions of multi-position switches corresponds to those of program controllers. This means that they can even be operated simultaneously with only one continuous drive shaft and one common indexing mechanism. The same common indexing mechanism with 6 or 12 switch positions is used for both types of switch.

### Mounting

The indexing mechanism housing is secured with two floating-mounted nuts. The terminating bracket which also guides the shaft at the end of the switch forms a third securing point. In the case of double-faced PC boards, insulating strips are available, if required, for the indexing mechanism housing and the mounting brackets (on request).

The following securing hardware is required:  
3 screws and 1 nut M 1.2 (thread distance in the indexing mechanism housing 2.8 mm to 4.6 mm); commercially available.

# Switches and pushbuttons for printed circuits

## Multi-position switches and program controllers A3

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### Technical data

See „Multi-position switches“ (Page 2.38) for the multi-position switch section and „Program controllers“ (Page 2.43) for the program controller section.

### Notes on processing

- Blister packaging
- Processing class B<sup>1)</sup>

### Ordering information

Item	Order designation	Quantity per packaging unit
Multi-position switch and program controller A3	V42264-H100★-+★★★ <sup>2)</sup>	1

2

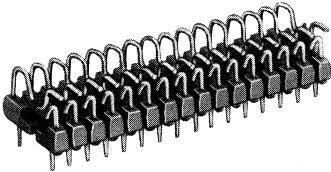
<sup>1)</sup> See Page 1.8.

<sup>2)</sup> Since the switch is designed to meet specific customer requirements, it is not possible to state complete order designations at this point. Please inquire with your responsible Siemens office.

# Switches and pushbuttons for printed circuits DIP-FIX links/switches A1347

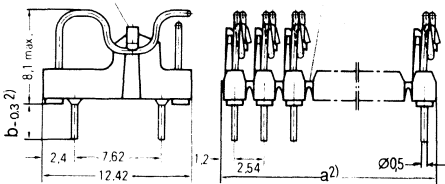
## DIP-FIX links/switches A1347

DIP-FIX make contact (8 or 24-section in-line switches <sup>3)</sup>)

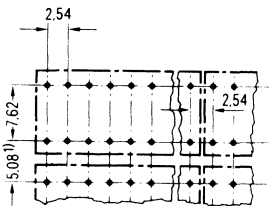


Plastic lug for locating the spring contact in the OFF position

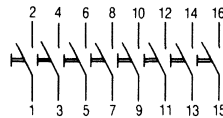
Separating points, for individual connection



Mounting holes and packing density



Circuit diagram and recommended coding for the connections  
(Example: 8 make contacts)



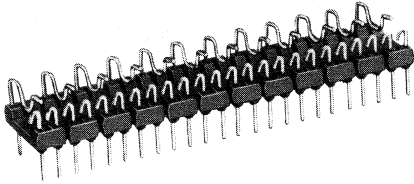
Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.:  
Coarse  $\geq 0.9$  mm  
Moderate and fine  $\geq 0.8$  mm

<sup>1)</sup> In the case of the minimum dimension 5.08 mm, the switches must be mounted mirror-inverse:  
 (make contact), (changeover contact)

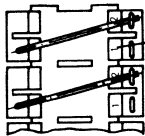
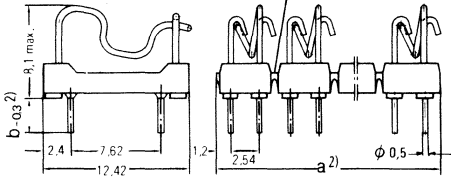
<sup>2)</sup> Dimensions „a“ and „b“, see ordering information on Page 2.51  
<sup>3)</sup> Other numbers of sections on request.

# Switches and pushbuttons for printed circuits DIP-FIX links/switches A1347

DIP-FIX changeover contacts (4 or 12-section in-line switches)

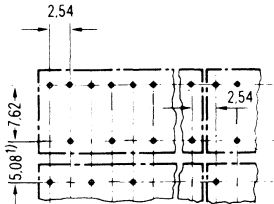


Separating points, for individual connections



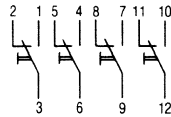
Identification numbers on the switch

Mounting holes and packing density



Hole diameter with tolerance classes in accordance with DIN 40803, Sheet 1, Point 3.4.2.1.:  
Coarse  $\geq 0.9$  mm  
Moderate and fine  $\geq 0.8$  mm

Circuit diagram and recommended coding for connections  
(Example: 4 changeover switches)



1) In the case of the minimum dimension 5.08 mm, the switches must be mounted mirror-inverse:  
 (make contact), (changeover contact)

2) Dimensions „a“ and „b“, see ordering information on Page 2.51

3) Other numbers of sections on request.

# Switches and pushbuttons for printed circuits

## DIP-FIX links/switches A1347

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As a component, the DIP-FIX link/switch is a highly simplified dual-in-line switch for use as a low-cost alternative to solder links or switches. The ON/OFF or changeover switches are eminently suitable for programming, updating the address and code of instruments and assemblies. Indeed, in any application previously involving solder links either individually or as modules.

### Version

- Make contact in the form of 8 or 24-section in-line switch (8 or 24 switches)
- Changeover contact in the form of 4 or 12-section in-line switch (4 or 12 switches)
- Tails with center spacing 2.54 x 7.62 mm
- Individual switches can be separated from the multi-section in-line switch using a knife
- Operating tools (accessories) for actuating the switches; ball-point pens with fitted plastic prong

### Materials

- |                        |         |                 |
|------------------------|---------|-----------------|
| — Dielectric           | PBTP-GF | } whisker-proof |
| — Contact surface      | Sn Pb   |                 |
| — Surface of the tails | Sn Pb   |                 |

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	10 mV to 60 V	} connection not soldered <sup>1)</sup>
Current rating	≤ 0.5 A	
Switch capacity	≤ 5 W	
Service life, mechanical and electrical with resistive load	50 switching cycles	
Contact resistance (millivolt method)	≤ 100 mOhms, initial value ≤ 200 mOhms, after stressing	
Insulation resistance	≥ 10 <sup>5</sup> MOhms, initial value ≥ 10 <sup>3</sup> MOhms, after stressing	
Creepage distances	≥ 1 mm	
Air gaps	≥ 0.5 mm	
Proof voltage	500 V, 50 Hz	
Ambient temperature range	—40 °C to +85 °C	

<sup>1)</sup> Safeguarding in the ON position is possible by manual soldering, if required.

# Switches and pushbuttons for printed circuits

## DIP-FIX links/switches A1347

### Notes on processing

- Blister packaging
- Processing class D<sup>1)</sup> (with open or closed contacts)

### Ordering information

Item	Dimension a	Dimension b	Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Make contact				
8-section in-line switch	20.32	3.1	<b>C42315-A1347-A108</b>	75
24-section in-line switch	60.62	3.1	<b>C42315-A1347-A124</b>	25
Changeover contact				
4-section in-line switch	20.32	3.1	<b>C42315-A1347-A204</b>	75
4-section in-line switch	20.32	5.4	C42315-A1347-A304	25
12-section in-line switch	60.62	3.1	<b>C42315-A1347-A212</b>	75
12-section in-line switch	60.62	5.4	<b>C42315-A1347-A312</b>	25
Accessories				
Operating tools			C42407-A78-A1	



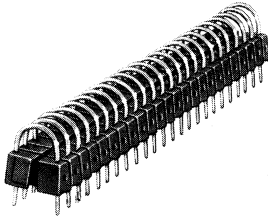
Note: The switches are delivered unhooked

<sup>1)</sup> See Page 1.8

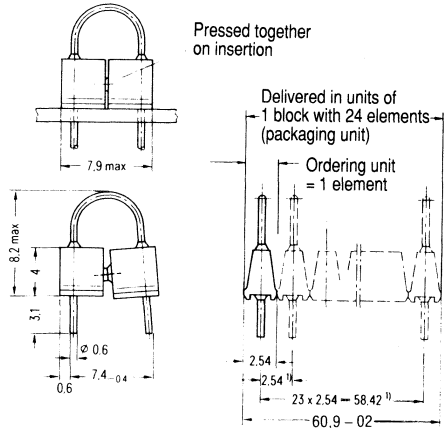
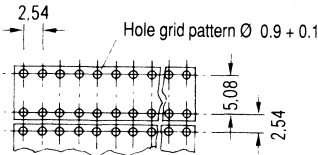
# Switches and pushbuttons for printed circuits

## Solder link block LBB 126

### Solder link block LBB 126



#### Mounting holes (component side)



The solder link block is a block of snap-off solder links for measurement and test purposes in electronic circuitry. Each link can be snapped open with a pair of side cutting pliers and the connection re-established by soldering.

#### Version

- Block of 24 snap-off solder links
- Tails with center spacing 2.54 x 5.08 mm

#### Materials

- Dielectric PBTP-GF30
- Soldering terminals CuNi18Zn20F41, tin-coated

#### Technical data

Current rating per link at ambient temperature	+20 °C:	3 A
	+70 °C:	1.5 A
	+100 °C:	0.8 A
Proof voltage		500 V/50 Hz
Insulation resistance		$\geq 10^4$ MOhms
Minimum interlink creepage distance		3 mm
Minimum interlink air gap		1.8 mm
Ambient temperature range		-55 °C to +125 °C

<sup>1)</sup> Maximum dimension



# Switches and pushbuttons for printed circuits

## Solder link block LBB 126

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### Notes on processing

- Packaged in box
- Processing class D<sup>1)</sup>

### Ordering information

Item	Order designation	Quantity per packaging unit (minimum acceptable order quantity)
Solder link, 1 contact	<b>C42195-A126-A1</b> <sup>2)</sup>	1 block of 24 solder links

<sup>1)</sup> See Page 1.8.

<sup>2)</sup> **Note on ordering**

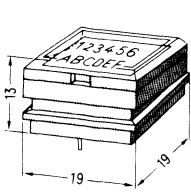
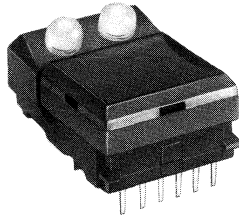
The order designation is for 1 solder link. Only blocks of 24 snap-off solder links are delivered.

**The quantity ordered must be divisible by 24!**

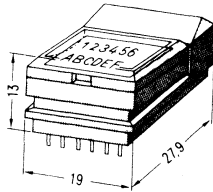
# Switches and pushbuttons for printed circuits

## Albis LED pushbutton switches V4028

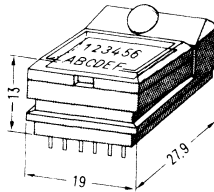
### Albis LED pushbutton switches



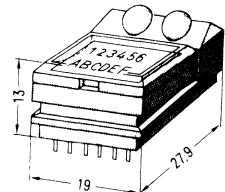
Shape: square, without LED



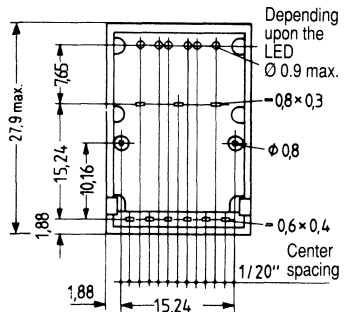
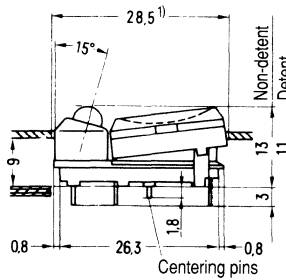
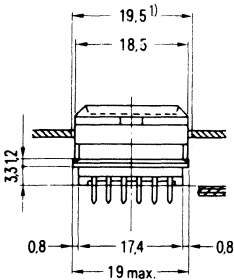
Shape: rectangular, without LED



Shape: rectangular, with 1 LED



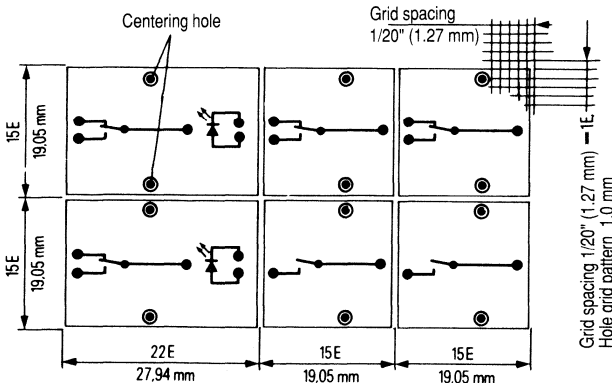
Shape: rectangular, with 2 LEDs



Depending upon the LED  
 $\varnothing$  0.9 max.

Mounting compartmentalization for various switch arrangements

Number of tails, depending on version



View of soldering side Grid spacing  $1/20''$  (1.27 mm) = 1 E; hole grid pattern  $\varnothing$  1.0 mm

<sup>1)</sup> Installation dimensions

# Switches and pushbuttons for printed circuits

## Albis LED pushbutton switches V4028

### Version

- Square 19 x 19 mm (DIN 9753) or rectangular 19 x 27.9 mm
- With 1 to 3 make contacts or changeover contacts; twin contacts
- With or without LEDs and with or without detent
- Switching mode: break mode
- Tails suitable for center spacing 1.27 mm or 1/20"
- Tactile feedback, i.e. action point
- Pushbutton caps transparent or colored, eggshell finish, thus reducing reflection. Must be ordered separately
- Interchangeable caption card inserts made of white card, for labelling by the customer. Must be ordered separately

### Materials

— Dielectrics	Housing Rocker Diode cap Pushbutton cap	Polycarbonate, black Polyamid, black Polycarbonate, black Acrylonitrile-styrene
— Contact material	Silver-palladium-gold	
— Soldering terminals	Tin-coated	

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68, IEC 512, DIN 40046 and DIN 41640

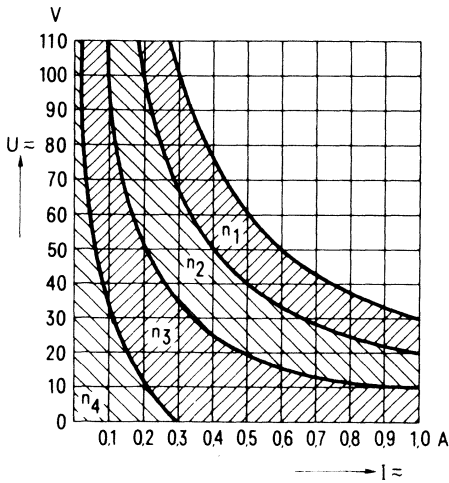
Voltage rating	≤ 110 V AC/DC
Current rating	≤ 1 A
Switch capacity	≤ 30 W (see also diagram Page 2.56)
Service life, mechanical	
Pushbutton without detent	≥ 10 <sup>6</sup> switching cycles
Pushbutton with detent	2 · 15 <sup>6</sup> switching cycles
Service life, electrical with resistive load	See diagram Page 2.56
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 100 mOhms, initial value
Insulation resistance	≥ 10 <sup>6</sup> MOhms, initial value
Capacitance (between neighboring contacts)	≤ 1 pF
Contact bounce time	≤ 1 ms

		Make contact	Changeover contact
Creepage distances	contact-contact (within the contact)	> 10 mm	> 0.9 mm
	contact-neighboring contact	> 2 mm	> 0.5 mm
Air gaps	contact-contact (within the contact)	> 1 mm	> 0.4 mm
	contact-neighboring contact	> 1.4 mm	> 0.5 mm
Actuating force		approx. 90 cN for pushbutton with 1 make contact approx. 20 cN for pushbutton with 3 changeover contacts	
Enclosure in acc. with DIN 40050		IP40	
Ambient temperature range		—25 °C to +70 °C	

# Switches and pushbuttons for printed circuits

## Albis LED pushbutton switches V4028

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term „one switching cycle“ refers to actuation of the switch over the entire range and back again.

$n_1 = 10^4$  switching cycles  
 $n_2 = 5 \cdot 10^4$  switching cycles  
 $n_3 = 2 \cdot 10^5$  switching cycles  
 $n_4 = 10^6$  switching cycles

### Notes on processing

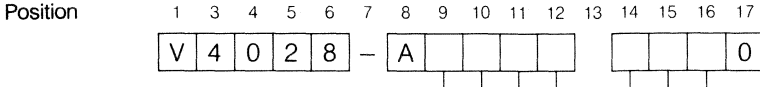
- Bar or blister packaging
- Processing class B<sup>1)</sup>, but immersion depth when cleaning down to 2 mm above the upper edge of the PC board on the component side.

<sup>1)</sup> See Page 1.8.

# Switches and pushbuttons for printed circuits

## Albis LED pushbutton switches V4028

### Ordering code



	Shape	Locking		Contact assembly			LEDs Color and position			Diode caps Number of holes		
		0	1	00	a	u	Left	Center	Right			
1	Square	0	Without detent	00	Without contact			A 10	Without indicator		-	
2	Rectangular	1	With detent	01	a	a	a	A11	Only diode cap		0	
				02	a	a	a	B20	Red Yellow Green Red/ green		1	
				03	a	a	a	B40			1	
				04		u	u	B50			1	
				05	u	u	u	C70			1	
				00	u	u	u	D22		Red	Red	2
								B24		Red	Yellow	2
								B24		Red	Green	2
								B42	Yellow	Red	2	
								B44	Yellow	Yellow	2	
								B45	Yellow	Green	2	
								B52	Green	Red	2	
								B54	Green	Yellow	2	
								B55	Green	Green	2	
								C74	Red/ green	Yellow	2	
								C77	Red/ green	Red/ green	2	
								C47	Yellow	Red/ green	2	

a = make contact  
u = changeover contact

### Ordering information for basic types

#### 1. Basic types, square, without pushbutton cap

Contacts	Order designation
Without	V4028-A1000-A100
1 make contact	V4028-A1001-A100
2 make contacts	V4028-A1002-A100
3 make contacts	V4028-A1003-A100
1 changeover contact	V4028-A1004-A100
2 changeover contacts	V4028-A1005-A100
3 changeover contacts	V4028-A1006-A100
1 make contact with detent	V4028-A1101-A100
2 make contacts with detent	V4028-A1102-A100
3 make contacts with detent	V4028-A1103-A100
1 changeover contact with detent	V4028-A1104A100
2 changeover contacts with detent	V4028-A1105-A100
3 changeover contacts with detent	V4028-A1106-A100



# Switches and pushbuttons for printed circuits

## Albis LED pushbutton switches V4028

### Ordering information for basic types, continued

#### 2. Basic types, rectangular, without pushbutton cap

Contacts	Order designation
Without	V4028-A2000-A110
1 make contact	V4028-A2001-A110
2 make contacts	V4028-A2002-A110
3 make contacts	V4028-A2003-A110
1 changeover contact	V4028-A2004-A110
2 changeover contacts	V4028-A2005-A110
3 changeover contacts	V4028-A2006-A110
1 make contact with detent	V4028-A2101-A110
2 make contacts with detent	V4028-A2102-A110
3 make contacts with detent	V4028-A2103-A110
1 changeover contact with detent	V4028-A2104-A110
2 changeover contacts with detent	V4028-A2105-A110
3 changeover contacts with detent	V4028-A2106-A110

#### 3. Basic types with LEDs red, green or yellow without pushbutton caps

Contacts	Diode	Order designation
1 make contact	1	V4028-A2001-B★00
2 make contacts	1	V4028-A2002-B★00
3 make contacts	1	V4028-A2003-B★00
1 changeover contact	1	V4028-A2004-B★00
2 changeover contacts	1	V4028-A2005-B★00
3 changeover contacts	1	V4028-A2006-B★00
1 make contact	2	V4028-A2001-B★★0
2 make contacts	2	V4028-A2002-B★★0
3 make contacts	2	V4028-A2003-B★★0
1 changeover contact	2	V4028-A2004-B★★0
2 changeover contacts	2	V4028-A2005-B★★0
3 changeover contacts	2	V4028-A2006-B★★0
1 make contact with detent	1	V4028-A2101-B★00
2 make contacts with detent	1	V4028-A2102-B★00
3 make contacts with detent	1	V4028-A2103-B★00
1 changeover contact with detent	1	V4028-A2104-B★00
2 changeover contacts with detent	1	V4028-A2105-B★00
3 changeover contacts with detent	1	V4028-A2106-B★00
1 make contact with detent	1	V4028-A2101-B★★0
2 make contacts with detent	1	V4028-A2102-B★★0
3 make contacts with detent	1	V4028-A2103-B★★0
1 changeover contact with detent	1	V4028-A2104-B★★0
2 changeover contacts with detent	1	V4028-A2105-B★★0
3 changeover contacts with detent	1	V4028-A2106-B★★0

★ See ordering code Page 2.57, positions 14 to 16

# Switches and pushbuttons for printed circuits

## Albis LED pushbutton switches V4028

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### Ordering information for basic types, continued

#### 4. Pushbutton caps (the pushbutton caps are supplied loosely)

Item	Order designation
Clear-transparent	C315-A70-C32
Black	C315-A70-C33
Yellow-transparent	C315-A70-C34
Red-transparent	C315-A70-C35
Green-transparent	C315-A70-C36
Blue-transparent	C315-A70-C37

#### 5. Caption card insert

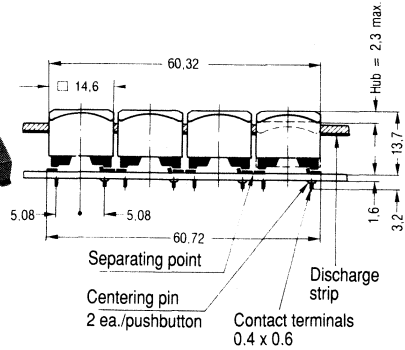
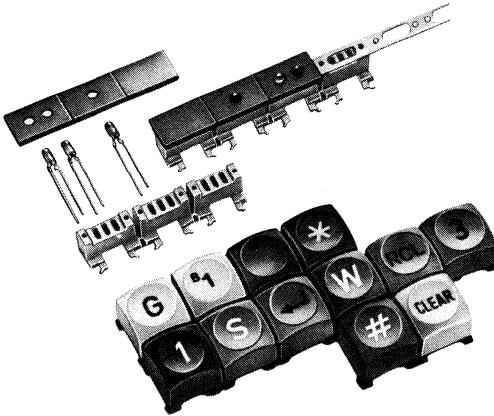
108-section	C315-A70-C3
12-section	C315-A70-C4

Other versions and individual parts on request.

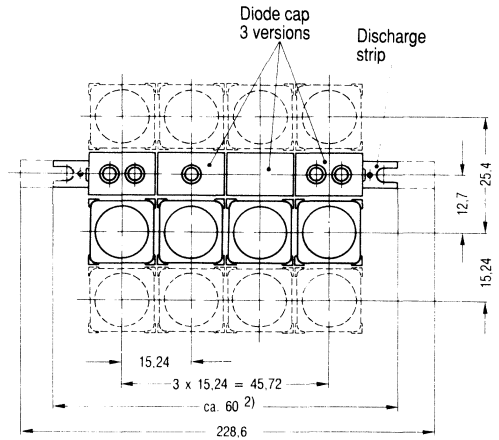
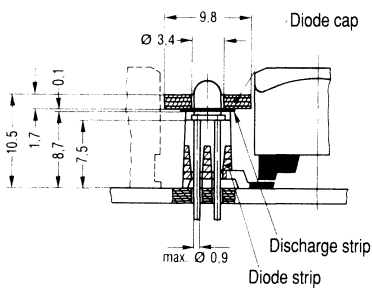
# Switches and pushbuttons for printed circuits

## Albis electronic pushbutton switches C315-A73 and -A74

### Albis electronic pushbutton switches C315-A73



Detailed view with diode cap and discharge strip



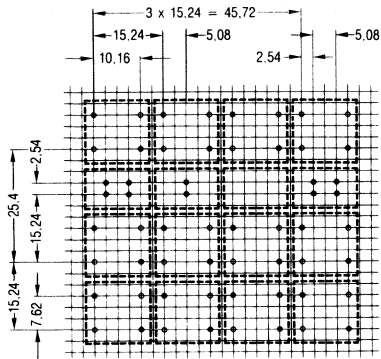
<sup>2)</sup> The length and installation of the discharge strip can be selected as required.



# Switches and pushbuttons for printed circuits

## Albis electronic pushbutton switches C315-A73 and -A74

Mounting holes (soldering side)



- ◆ Soldering terminal  $\varnothing$  1 mm
- ◆ Centering hole  $\varnothing$  1 mm  
Hole without surface

For installation in PC boards to produce large keypads. The contact system is particularly suitable for controlling electronic circuits.

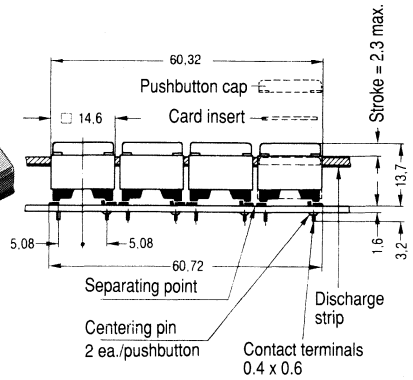
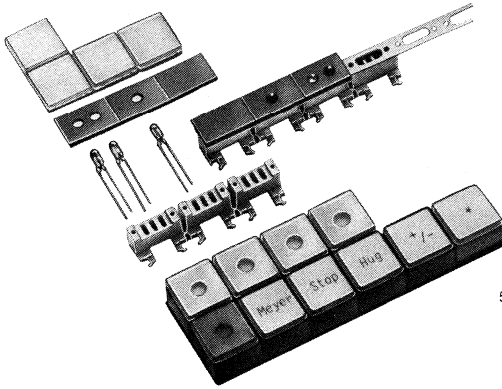
Ordering information, see Page 2.64

# Switches and pushbuttons for printed circuits

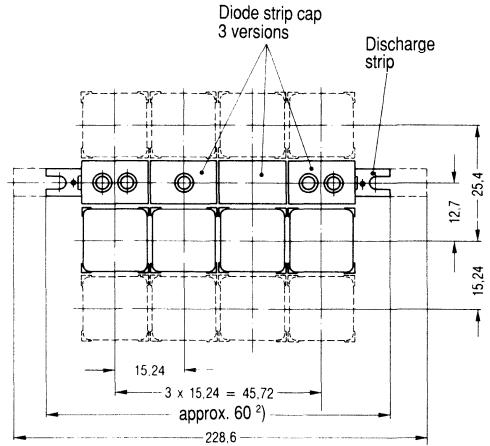
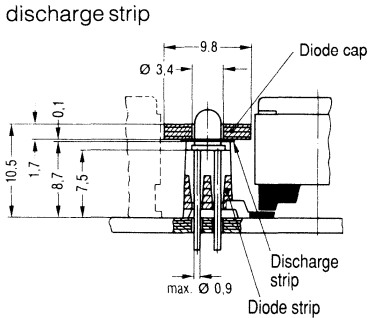
## Albis electronic pushbutton switches C315-A73 and -A74

### Albis LED electronic pushbutton switches C315-A74

with caption card insert for individual lettering



Detailed view with diode cap and discharge strip

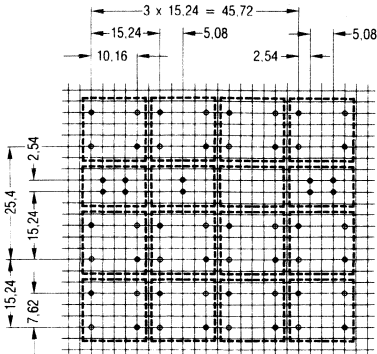


<sup>2)</sup> The length and installation of the discharge strip can be selected as required

# Switches and pushbuttons for printed circuits

## Albis electronic pusbutton switches C315-A73 and -A74

Mounting holes (soldering side)



- ◆ Soldering terminal  $\varnothing$  1 mm
- ◆ Centering hole  $\varnothing$  1 mm  
Hole without surface

For use in keypads of any size for controlling electronic circuits, such as microprocessors, TTL, DTL circuits etc.

Ordering information, see Page 2.65

### Version C315-A73 and -A74

- 4-section pushbutton strip, with separating points for use as single, double or triple pushbutton.
- Diode strip also as 4-section strip element with separating points, optionally, for installation of 1 or 2 LEDs per button
- Plug-on diode cap, optionally. Required if the diodes are not covered by the front panel when installed (see detailed view).
- Discharge strip to prevent electrostatic discharge <sup>1)</sup>; this is fitted over the diode strip.
- Pushbuttons each equipped with one make contact.
- Switching mode: break mode

### Technical data

Voltage rating	$\leq 30$ V
Current rating	$\leq 20$ mA
Switch capacity	$\leq 0.3$ W
Service life with resistive load 0.1 W	$\geq 10^6$ actuation cycles
Contact resistance (millivolt method)	$\leq 500$ Ohms (dependent upon actuating pressure)
Insulation resistance	$> 10^9$ MOhms, initial value
Contact bounce	$< 3$ ms
Actuating force	$> 100$ cN
Enclosure in acc. with DIN 40050	IP53
Ambient temperature range	$-25$ °C to $+70$ °C

### Notes on processing

- Bar packaging
- Processing class B<sup>2)</sup>, but immersion depth when cleaning down to 2 mm above the upper edge of the PC board on the component side.

<sup>1)</sup> For protection of sensitive electronic circuits. The strip serves to drain electrostatic discharge currents which may occur if the pushbutton switch is touched in the area of the diodes.

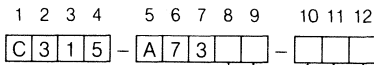
<sup>2)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

## Albis electronic pushbutton switches C315-A73 and -A74

### Ordering code for C315-A73

Position



	Pushbutton color		Color of the lettering		Lettering		Lettering		Lettering
0	–	0	Without lettering	A1	Without lettering	A24	M	A47	.
1	Dark grey	1		A2	1	A25	N	A48	–
2	Light grey	2		A3	2	A26	O	A49	+
3	Black	3	Black	A4	3	A27	P	A50	STO
4	Green	4		A5	4	A28	Q	A51	RCL
5	Red	5		A6	5	A29	R	A52	ENTER
6	White	6	White	A7	6	A30	S	A53	CLEAR
7	Light beige	7		A8	7	A31	T	A54	SEL
8	Light blue	8		A9	8	A32	U	A55	CE
9		9		A10	9	A33	V	A56	↵
Quantity per packaging unit (Minimum acceptable order quantity)  20 pushbutton switches of the same version				A11	0	A34	W	A57	LF
				A12	A	A35	X	A58	CL
				A13	B	A36	Y	A59	/
				A14	C	A37	Z	A60	^
				A15	D	A38	A	A61	START
				A16	E	A39	O	A62	STOP
				A17	F	A40	U	A63	ON
				A18	G	A41	00	A64	OFF
				A19	H	A42	*	A65	EIN
				A20	I	A43	#	A66	AUS
A21	J	A44	→	A67	↶				
A22	K	A45	↑	A68	↷				
A23	L	A46	.	A69	SET				

Electronic pushbutton switches with other symbols, characters or letters on request.

# Switches and pushbuttons for printed circuits

## Albis electronic pushbutton switches C315-A73 and -A74

### Ordering information

Item	Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Electronic pushbutton switch A74 for individual lettering Dark grey Light grey Black	<b>C315-A7410-A1</b> <b>C315-A7420-A1</b> <b>C315-A7430-A1</b>	5 strips = 20 pushbutton switches
Accessories		
Diode strip (4-section strip element)	<b>C315-A73-C10</b>	20 strips
Diode cap: dark grey without hole with 1 hole with 2 holes Discharge strip	<b>C315-A73-C90</b> <b>C315-A73-C100</b> <b>C315-A73-C110</b> <b>C315-A73-C11</b>	20 caps 20 caps 20 caps 10 strips
Pushbutton cap, clear, transparent (for A74) Caption card inserts for individual lettering (for A74)	<b>C315-A73-C20</b>  <b>C315-A73-B1</b>	1 ea.  Sheet of 40 caption card insertss

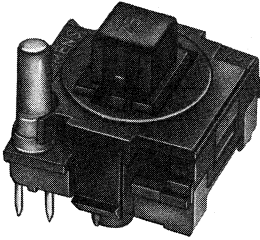
# Switches and pushbuttons for printed circuits

## Keyboard key switches STB 11 and STB 21

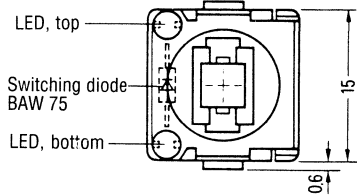
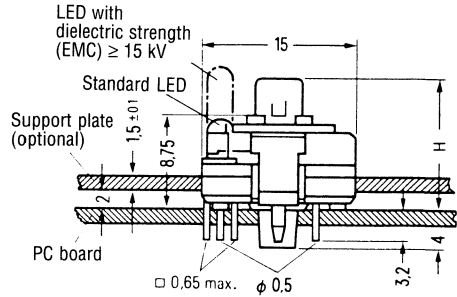
### Keyboard key switches STB 11 and STB 21

for keyboards and switch panels

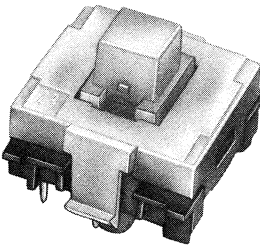
STB 11



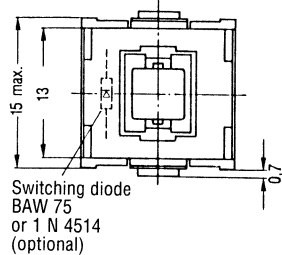
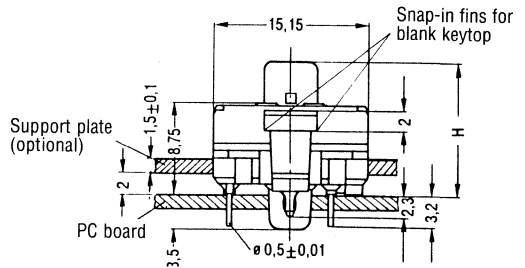
Travel mm	Dimension H mm
4	12.6
2.5	11.1



STB 21



Travel mm	Dimension H mm
4	12.9
2.5	11.4



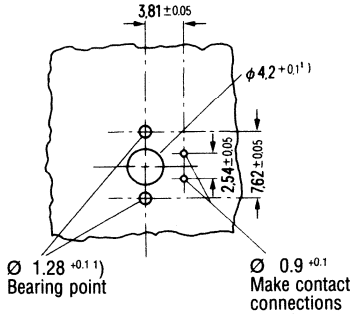
Position of the LED: anode is marked on the housing base with +

# Switches and pushbuttons for printed circuits

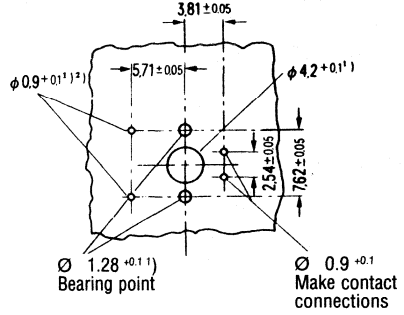
## Keyboard key switches STB 11 and STB 21

### Mounting holes in the PC board (component side)

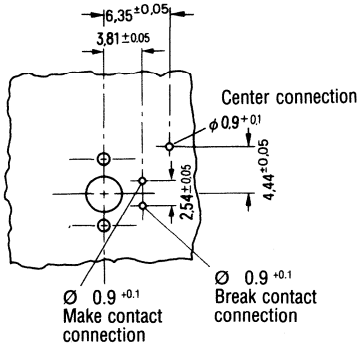
Key STB 11 with make contact (basic grid pattern)



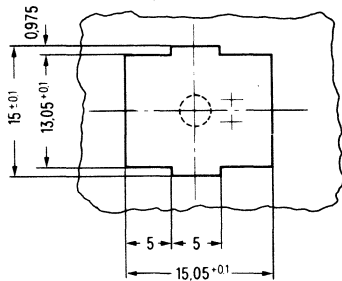
Key STB 11 with make contact and switching diode BAW 75 and key STB 21



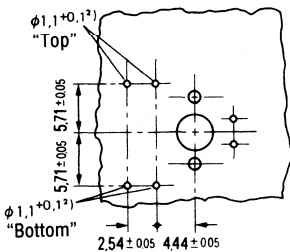
Key STB 11 with changeover contact



Holes in the support plate for STB 11 and STB 21

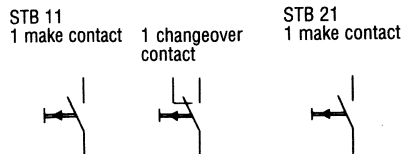


Key STB 11, additional holes for LED



### Circuit diagrams

(See mounting holes for position of the connections)



- When locating the key in a support plate or with automated assembly, the hole diameter must be stipulated in accordance with additional tolerances.
- Recommendation: use circular soldering lugs if switching diode LED is used.

2

# Switches and pushbuttons for printed circuits

## Keyboard key switches STB 11 and STB 21

The range of key switches comprises the type series STB 11 and STB 21. The key STB 21 is the standard version for the key types. The STB 11 also offers extensive possible variations.

### Version

- With 1 make contact or 1 changeover contact (break mode)
- With or without detent
- With 4 mm or 2.5 mm travel
- With or without LEDs
- Switch complement 1 make contact (without detent), also available with switching diode BAW 75
- Keyboard height - important for correct working posture - in accordance with DIN 66234, Part 6 < 30 mm (measured from the left top to the center key row). This requirement is reliably achieved thanks to the fact that the key height is only 17.5 mm (with 4 mm travel) or 16 mm (with 2.5 mm travel) from the upper edge of the PC board to the upper edge of the keytop.
- Center spacing - important as regards finger width - in accordance with DIN 2112 and 2127 - 19.05 mm spacing for keytops
- Tactile feedback, i.e. perceptible action point and rebound

### Other features

	STB 11	STB 21
Contact complement	1 make contact with or without detent 1 changeover contact (break mode) with or without detent	1 make contact with detent
Also	Switching diode BAW 75 or 1 N 4154 1 LED or 2 LEDs	Switching diode BAW 75 or 1 N 4154
Actuating characteristic	~0.75 N or ~ 0.65 N or ~1.15 N (sealing foil) Rebound	~ 0.7 N Rebound

### Materials

Dielectrics Housing Slide Cover	PPS-GF POM PA6.6-GF	PA 6.6-GF POM PBTP-GF
Contact materials Stationary contact Moving contact	CuSn6, with AgPd CuBe2, nickel-plated and gold-plated	CuSn6, with AgPd CuNi9Sn2, nickel-plated and palladium-plated and gold-flashed
Soldering terminals (surface) Make contact Diode LED Center connection for changeover contact	AgPd Tin-coated Tin-coated Tin-coated	1xAgPd, 1 x tin-coated Tin-coated — —



# Switches and pushbuttons for printed circuits

## Keyboard key switches STB 11 and STB 21

### Common technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating (open contact)	12 V DC	
Current rating (resistive load)	50 mA DC	
Service life with electrical load 5 V DC, 2 mA (resistive load)	Make contact, non-detent $\geq 10^7$ actuation cycles Changeover contact, non-detent $\geq 10^6$ actuation cycles Detent versions $\geq 10^5$ actuation cycles	
Contact resistance (millivolt method)	< 500 mOhms, initial value and after stressing	
Insulation resistance	> $10^5$ MOhms, initial value > $10^2$ MOhms; after stressing	
Dielectric strength	500 V, 50 Hz	
Immunity to electrostatic discharge (ESD)	$\geq 15$ kV, no flashover to the connections during 10 individual measurements. (With keytop C26383-F11★★ or V23770-A10★★); if necessary, provide earthed screen	
Overall height (upper edge of PC board to upper edge of keytop)	17.5 mm	16.0 mm 23.5 mm (STB 11 for sealing foil)
Actuation		
Travel	4 mm	2.5 mm
Switching point	$2 \pm 0.4$ mm	$1.6 \pm 0.4$ mm (STB 11) $1.7 \pm 0.4$ mm (STB 11)
Actuating force: start	~0.5 N	
end	~1.0 N	
Contact bounce time	$\leq 5$ ms with normal actuation (Actuating speed 400 mm/s)	
Ambient temperature range	-25 °C to +85 °C	
Enclosure in acc. with DIN 40050	IPX2 (vertically mounted with keytop C26382-F11★★)	
Protection against dust in acc. with DIN 40046, Part 47 Test Lb	1 day	

### Notes on processing

- Suitable lands provided to facilitate automated assembly. Bar packaging to meet automatic handling requirements; however, STB 11 with LED in blister packaging
- Self-locating on PC board. Centering pins with press-in fins align the component and hold it in position during soldering.
- Suitable for flow soldering. Resistant to flux, soldering heat and cleaning agents. Integrally injection-molded tails prevent the penetration of flux and solder.
- Also compatible with support plate mounting.
- Processing class B<sup>2)</sup>, but immersion depth when cleaning down to 2 mm above the upper edge of the PC board on component side.

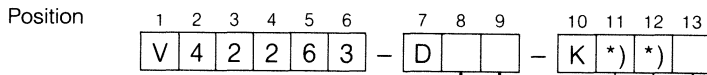
<sup>1)</sup> In the case of smaller quantities, it is also possible to fit the key switches with simple tools. Information available on request.

<sup>2)</sup> See Page 1.8.

# Switches and pushbuttons for printed circuits

## Keyboard key switches STB 11 and STB 21

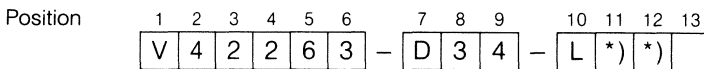
### Ordering code for keyboard key switches STB 11



Travel	Type of contact	Version with Switching diode	Detent	LED complement			
				Type	Top	Bottom	
4 mm	1 make contact Rebound 0.75 N	1	-	-	-	00	
			X	-	Red	11	
			-	X	Green	12	
		5	-	-	-	Red	20
			-	X	Green	21	
			-	-	-	Green	31
	1 changeover contact Rebound 0.75 N	2	-	-	Red	30	
			X	-	Red	40	
			-	-	Red	60	
		3	-	-	-	-	-
			X	-	-	-	-
			-	-	-	-	-

Minimum order quantities/packaging units, see Page 2.71

### Ordering code for keyboard key switches STB 11 for sealing foil



Travel	Type of contact	Version with Switching diode	Detent	LED complement		
				Type	Top	Bottom
2,5 mm	1 make contact Rebound 1.15 N	4	-	-	-	00
			X	-	-	-
			-	-	-	-

Minimum order quantities/packaging units, see Page 2.71

Also to be ordered: spacer C42315-A1348-C159

\*) Leading zeros are not necessary for ordering.

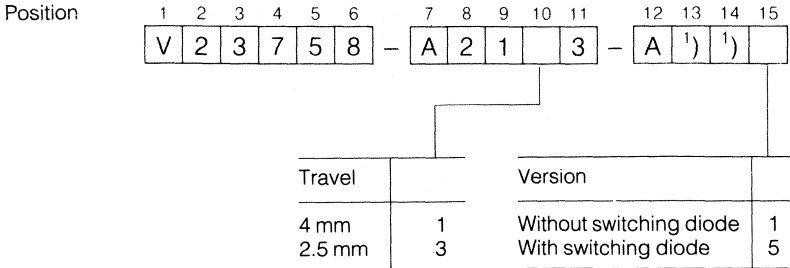
1) For keytops with holes for LED, e.g. C26382-F9..., V23770-A11..., C26382-F304-C10★, C26382-F22★★-C1, V23770-A13...

2) For keytops with rectangular caption card insert C26382-F302-C10★

# Switches and pushbuttons for printed circuits

## Keyboard key switches STB 11 and STB 21

### Order designations for keyboard key switches STB 21



Example order: V42263-D11-K125  
 Keyboard key switch STB 11 with 4 mm travel, 1 make contact (rebound 0.75 N) and integrated switching diode BAW 75, in addition to 1 long, green LED, bottom

### Preferred items

V23758-A2113-A1  
 V23758-A2113-A5

Minimum order quantities:	Key switch with LED	4 ea. per order number
	Others	8 ea. per order number
Packaging units:	Blister packaging for key switches with LED or changeover contact	20 ea. per order number
	Bar packaging for others	160 ea. per order number



### Visual distinguishing features of the keyboard key switches STB 11 and STB 21

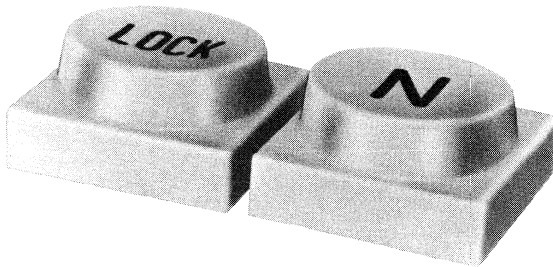
Key switch version	Travel	Cover color	Slide color with rebound			
			0.65 N	0.7 N	0.75 N	1.15 N
STB 11	4 mm	Black	Flame red	—	Black	—
	2.5 mm	Black	Silver grey	—	—	—
	2.5 mm for sealing foil	Black	—	—	—	Natural-colored
STB 21 without switching diode	4 mm	Yellowish	—	Natural-colored	—	—
	2.5 mm	Yellowish	—	Silver grey	—	—
STB 21 with switching diode	4 mm	Natural-colored	—	Natural-colored	—	—
	2.5 mm	Natural-colored	—	Silver grey	—	—

<sup>1)</sup> Leading zeros are not necessary for ordering.

# Switches and pushbuttons for printed circuits Keytops for key switches STB 11 and STB 21

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Keytops V23770 and C26382



**The following features of the keytop are crucial to ergonomic design of a keyboard:**

- Minimum reflection owing to appropriate surface structure, recess radii and color selection.
- Abrasion-resistant lettering providing a service life of  $10^7$  for the corresponding keys using laser-engraving methods or two-color injection methods.
- Good contrast between lettering and background owing to appropriate selection of keytop color and production method for the lettering.
- A wide variety of standard keytop versions permits matching to an extremely wide range of applications. (Special versions available on request.)

## Version

- Normal keytops and keytops with flat, with 1/4 or 1/2 flat LH or RH, with or without symbol (character)
- Keytops 1 3/4, with recessed actuating surface, with or without character
- 8-unit keytop (space keytop)
- Flat keytops, 1/1, 1 3/4, duplex and 3-unit
- Keytops with character pads
- Blank keytops, blanks, illuminated signal keytops and related adapters
- Keytop sets

## Other features and notes:

Advantages of the laser-engraving method:

- difficult characters, e.g. Chinese characters, can be produced,
- flexibility owing to low additional effort required to produce new character combinations,
- supplied as of 20 ea. for all keytops V23770...

Advantages of the two-color injection method:

- Adequate contrast even with dark colors with black lettering, e.g. dark beige,
- colored lettering possible.

Disinfectants (e.g. SAGROSEPT cloths, available from chemist's shops) can be used to clean the keytops.

## Materials

Keytop	ABS-PC or ABS
Guide, guide pin	POM
Retaining clip	X12CrNi177

# Switches and pushbuttons for printed circuits

## Keytops for key switches STB 11 and STB 21

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### Minimum acceptable order quantities per order number

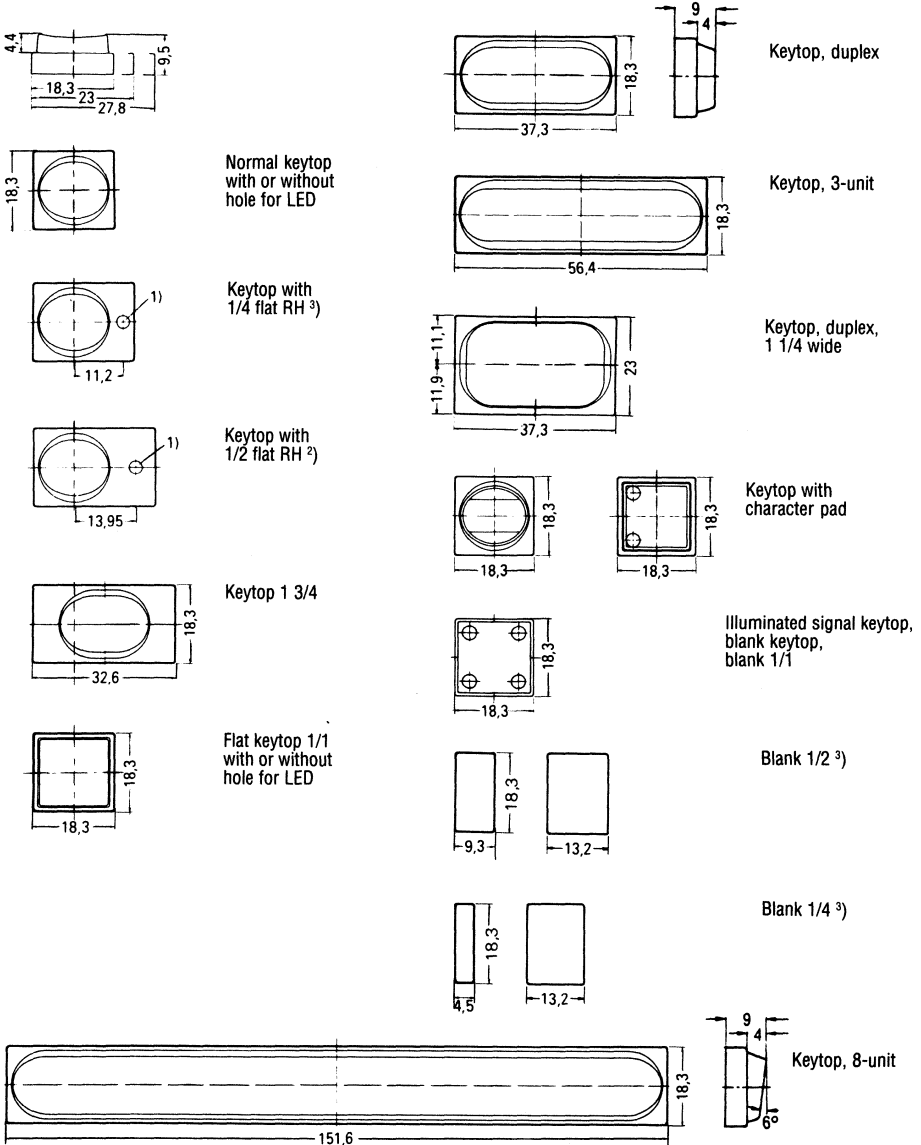
—Keytops V23770-... (laser-engraving method) for all keytop shapes (Packaging units 20, 160, 480 ea.)	20 ea. <sup>1)</sup>
—Keytops C26382-... (two-color injection method) for ex-warehouse items	10 ea. <sup>1)</sup>
for normal keytops C26382-F11★★-+★★★	400 ea. <sup>1)</sup>
for all other keytop shapes	200 ea. <sup>1)</sup>

<sup>1)</sup> or integral multiples thereof

# Switches and pushbuttons for printed circuits

## Keytops for key switches STB 11 and STB 21

### Dimension diagrams



1) Hole for LED (not applicable in the case of keytops without LED), LED diameter 3 mm, installation height (upper edge of PC board to upper edge of LED), 7.5 mm












2) Keytops with flat LH have a mirror-inverted design.

3) In the case of keytops with support plate, allow for the cutouts or holes.

# Switches and pushbuttons for printed circuits

## Keypops for key switches STB 11 and STB 21

### Normal keytops and keytops with flats

Illustration	Item	Order designation	
		Position 7, 8, 9 V23770-... <sup>1)</sup>	C26382-... <sup>2)</sup>
	Normal keytop	A10 <sup>4)</sup>	F11 <sup>5)</sup>
	Normal keytop with hole for LED	A11 <sup>4)</sup>	F9 <sup>6)</sup>
	Normal keytop 2 holes for LED	A13	
	Keytop with 1/4 flat RH without hole	A20 <sup>4)</sup>	F14
	Keytop with 1/4 flat RH with hole <sup>3)</sup>	A21	F15
	Keytop with 1/4 flat LH without hole	A25	F16
	Keytop with 1/4 flat LH with hole <sup>3)</sup>	A26	F17
	Keytop with 1/2 flat RH without hole	A30 <sup>4)</sup>	F12
	Keytop with 1/2 flat RH with hole <sup>3)</sup>	A31	F18
	Keytop with 1/2 flat LH without hole	A35	F13
	Keytop with 1/2 flat LH with hole <sup>3)</sup>	A36	F19

<sup>1)</sup> For laser-engraving method

<sup>2)</sup> For two-color injection method

<sup>3)</sup> Order illuminated button  
C26382-F300-C50 separately.  
Notes on installation, see Page 2.87

<sup>4)</sup> Ex-warehouse item  
(can be turned through 180°):  
without lettering,  
light beige V23770-★★+00-K1

<sup>5)</sup> Ex-warehouse item: without lettering,  
ocher, green, dark beige, grey brown  
C26382-F11★★-C1  
Order designations for colors,  
see Page 2-78

<sup>6)</sup> Position 9 is omitted

Ordering code, see Page 2.78

Dimension diagram, see Page 2.74

# Switches and pushbuttons for printed circuits

## Keypops for key switches STB 11 and STB 21

### The most popular characters and symbols

for normal keytops and keytops with flats (selection)

V23770-A★★★★ <sup>-3)</sup>	K1	A89	A90	A91	A92	A93	A94	A95	A96	A97
C26382-F★★★★ <sup>-4)</sup>	C1	C2 <sup>1)</sup>	C3 <sup>1)</sup>	C4 <sup>1)</sup>	C5 <sup>1)</sup>	C6 <sup>1)</sup>	C7 <sup>1)</sup>	C8 <sup>1)</sup>	C9 <sup>1)</sup>	C10 <sup>1)</sup>
V23770-A★★★★ <sup>-3)</sup>	A98	A1	A2	A3	A4	A5	A6	A7	A8	A9
C26382-F★★★★ <sup>-4)</sup>	C11 <sup>1)</sup>	C12 <sup>1)</sup>	C13 <sup>1)</sup>	C14 <sup>1)</sup>	C15 <sup>1)</sup>	C16 <sup>1)</sup>	C17 <sup>1)</sup>	C18 <sup>1)</sup>	C19 <sup>1)</sup>	C20 <sup>1)</sup>
V23770-A★★★★ <sup>-3)</sup>	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19
C26382-F★★★★ <sup>-4)</sup>	C21 <sup>1)</sup>	C22 <sup>1)</sup>	C23 <sup>1)</sup>	C24 <sup>1)</sup>	C25 <sup>1)</sup>	C26 <sup>1)</sup>	C27 <sup>1)</sup>	C28 <sup>1)</sup>	C29 <sup>1)</sup>	C30 <sup>1)</sup>
V23770-A★★★★ <sup>-3)</sup>	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29
C26382-F★★★★ <sup>-4)</sup>	C31	C32	C33 <sup>1)</sup>	C34 <sup>1)</sup>	C35 <sup>1)</sup>	C36 <sup>1)</sup>	C37 <sup>1)</sup>	C38	C39	C40
V23770-A★★★★ <sup>-3)</sup>	A68	K52	A84	K26	K45	Z407	K7	K69	A72	K106
C26382-F★★★★ <sup>-4)</sup>	C45 <sup>1)</sup>	C57	C58 <sup>1)</sup>	C59 <sup>1)</sup>	C60	C61	C62	C63	C64	C65
V23770-A★★★★ <sup>-3)</sup>	K14	K16	K47	K13	K12	K55	K27	L2	L3	X321
C26382-F★★★★ <sup>-4)</sup>	C46 <sup>2)</sup>	C48 <sup>2)</sup>	C50	C52	C53	C75	D216	C91	C92	C744
V23770-A★★★★ <sup>-3)</sup>	X304	X320	X308	X303	L5	X301	X323	X305	L6	X318
C26382-F★★★★ <sup>-4)</sup>	C93	C94	C95	C96	C98	C99	D255	C100	C101	C488
V23770-A★★★★ <sup>-3)</sup>	L7	X325	L8	L26	X302	X306	L27	U4	U6	U7
C26382-F★★★★ <sup>-4)</sup>	C102	C746	C103	C494	C105	C180	C498	C106	C108	C109

<sup>1)</sup><sup>2)</sup><sup>3)</sup><sup>4)</sup> See Page 2.77

Continued on next page



# Switches and pushbuttons for printed circuits

## Keypops for key switches STB 11 and STB 21

### The most popular characters and symbols

for normal keytops and keytops with flats (selection), cont.

V23770-A★★★★- <sup>3)</sup>	U8	X307	Z2	L15	L14	L13	L12	Z1	L11	L9
C26382-F★★★★- <sup>4)</sup>	C110	C111	C112	C113	C114	C115	C117	C118	C120	C121
V23770-A★★★★- <sup>3)</sup>	X317	U5	L24	U1	U3	U9	W312	L25	Z5	Z401
C26382-F★★★★- <sup>4)</sup>	C123	C126	C127	C136	C137	C158	C179	C452	C460	C279
V23770-A★★★★- <sup>3)</sup>	K3	E202	W601	E502	E503	E504	E505	E506	E507	E508
C26382-F★★★★- <sup>4)</sup>	C778	C904	C630	C305	C306	C307	C308	C309	C310	C545
V23770-A★★★★- <sup>3)</sup>	E509	E510	E511	E512	E513	E401	F902	E203	E101	E305
C26382-F★★★★- <sup>4)</sup>	C546	C547	C548	C549	C550	C184	C231	C239	C240	C286
V23770-A★★★★- <sup>3)</sup>	F518	E207	F715	E411	F901	Z204	U13	F813	F517	E405
C26382-F★★★★- <sup>4)</sup>	C242	C243	C694	C565	D301	E182	E188	E401	E402	E403
V23770-A★★★★- <sup>3)</sup>	E213	X1	X2	W2	X601	W3	W4	W5	X602	Z405
C26382-F★★★★- <sup>4)</sup>	E404	E773	E852	F105	F106	F94	F95	F96	F97	F104
V23770-A★★★★- <sup>3)</sup>	W6	Z404								
C26382-F★★★★- <sup>4)</sup>	F107	F118								

Other characters and symbols on request.  
Ordering code, see Page 2.78

1) Ex-warehouse item: light beige C26382-F1101-+★★★

2) Ex-warehouse item: light beige C26382-F1101-+★★★ and green C26382-F1103-+★★★

3) For laser-engraving method

4) For two-color injection method

# Switches and pushbuttons for printed circuits

## Keypots for key switches STB 11 and STB 21

In addition to the characters and symbols shown, the following range is available:

- over 1000 characters and symbols for laser-engraving method
- over 3000 characters and symbols for two-color injection method

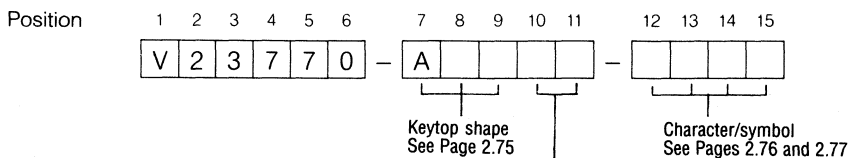
The alphanumeric characters and symbols are defined

- for laser-engraving method in accordance with Unifers Series 55/57
- for two-color injection method in accordance with DIN 1451

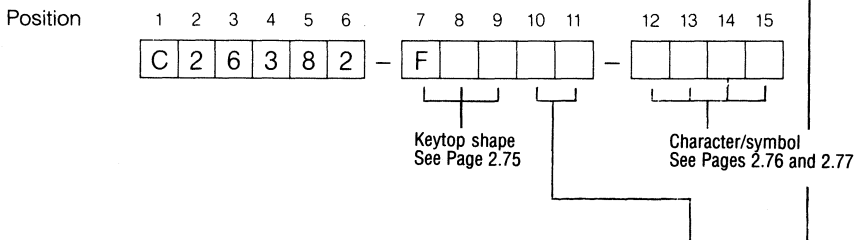
The keytops can also be used turned through 180°. This permits opposite characters to be implemented (e.g. arrow) or the position of two characters to be reversed (e.g. brackets).

### Ordering code for normal keytops and keytops with flats

Laser engraving method



Two-color injection method



Color of the keytop	Color of the character/symbol	Two-color injection method	Laser-engraving method
Light beige	Black	01 <sup>1)</sup>	00 <sup>1)</sup>
Ocher	Black	02	
Green	Black	03	
Red	Black	04	
Dark beige	Black	05	
Beige	Black		06
Yellow	Black		07
Warm grey	Black		09
Ergo grey	Black	15	10
Dark beige	White	25	
Grey brown	White	29	
Blue	White	31	
Black	White	32	

Dimension diagrams, see Page 2.74  
Minimum acceptable order quantities, see Page 2.73


<sup>1)</sup> Preferred color

Other colors on request

# Switches and pushbuttons for printed circuits

## Keypots for key switches STB 11 and STB 21

### Keypot with tactile orientation point

Illustration	Item	Order designation
	Single keytop	V23770-X15★★-A93
	Raised dot in the recess	C26382-F305-C1★★

Other characters and symbols on request.  
 Dimension diagram, see Page 2.74  
 Minimum acceptable order quantities,  
 see Page 2.73

Color of the keytop	Color of the character/symbol	Two-color injection method	Laser-engraving method
Light beige	Black	01 <sup>1)</sup>	00 <sup>1)</sup>
Ocher	Black	02	
Green	Black	03	
Red	Black	04	
Dark beige	Black	05	
Beige	Black		06
Yellow	Black		07
Warm grey	Black		09
Ergo grey	Black	15	10
Dark beige	White	25	
Grey brown	White	29	
Blue	White	31	
Black	White	32	

Other colors on request



<sup>1)</sup> Preferred color



# Switches and pushbuttons for printed circuits

## Keypots for key switches STB 11 and STB 21

### Keypot 1 3/4, with recessed actuating surface

Illustration	Item	Order designation
	Keypot 1 3/4, without character  Light beige Other colors	V23770-A9000-K1 <sup>1)</sup> V23770-A90★★-K1  C26382-F4★★-C1
	Keypot 1 3/4, with character SHIFT  Laser-engraved Two color injected	V23770-A90★★-F801  C26382-F4★★-C2

Other characters and symbols on request.  
Dimension diagram, see Page 2.74  
Minimum acceptable order quantities,  
see Page 2.73

Color of the keytop	Color of the character/symbol	Two-color injection method	Laser-engraving method
Light beige	Black	11 <sup>2)</sup>	00 <sup>2)</sup>
Ocher	Black	12	
Green	Black	13	
Red	Black	14	
Dark beige	Black	15	
Beige	Black		06
Yellow	Black		07
Warm grey	Black		09
Ergo grey	Black	17	10
Grey brown	White	28	
Black	White	29	

Other colors on request

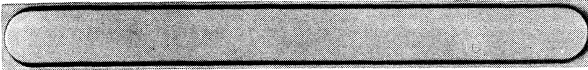
<sup>1)</sup> Ex-warehouse item

<sup>2)</sup> Preferred color

# Switches and pushbuttons for printed circuits

## Keytops for key switches STB 11 and STB 21

### 8-unit keytop (space bar)

Illustration	Item	Order designation
	8-unit keytop <sup>1)</sup> Light beige Other colors	V23770-A990-K1 <sup>2)</sup> V23770-A99★★-K1 C26382-F330-C★★

Dimension diagram, see Page 2.74  
 Hole pattern for guide pieces,  
 see Page 2.87  
 Minimum acceptable order quantity,  
 see Page 2.73

Color of the keytop	Two-color injection method	Laser-engraving method
Light beige Dark beige Grey brown Black Warm grey Ergo grey	01 <sup>3)</sup> 04 05 06 10	00 <sup>3)</sup> 09

Other colors on request



<sup>1)</sup> Also order 1 set of guide pieces (see Page 2.87)



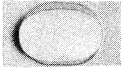



<sup>2)</sup> Ex-warehouse item

<sup>3)</sup> Preferred color

# Switches and pushbuttons for printed circuits

## Keypops for key switches STB 11 and STB 21

### Flat keytops

Illustration	Item	Order designation
	Flat keytop, single 1/1 Two-color injected	C26382-F21★★ <sup>1)</sup> -+★★★ <sup>2)</sup>
	Flat keytop, single 1/1 with hole for LED für LED Without character	C26382-F22★★ <sup>1)</sup> -C1
	Flat keytop, 1 3/4 Without character With character (two-color injected) On request	C26382-F25★★ <sup>1)</sup> -C1 C26382-F25★★ <sup>1)</sup> -F★★★ <sup>2)</sup>
	Flat keytop, duplex <sup>3)</sup> Without character, light beige, laser-engraved Two-color injected	V23770-A9100-K1 <sup>4)</sup> V23770-A91★★ <sup>1)</sup> -+★★★ <sup>2)</sup> <sup>5)</sup> C26382-F28★★ <sup>1)</sup> -+★★★ <sup>2)</sup>
	Flat keytop, 3-unit <sup>3)</sup> Two-color injected	C26382-F29★★ <sup>1)</sup> -+★★★ <sup>2)</sup> <sup>5)</sup>
	Flat keytop, duplex, 1 1/4 wide <sup>3)</sup> Without character, light beige, laser-engraved Two-color injected	V23770-A9200-K1 <sup>4)</sup> V23770-A92★★ <sup>1)</sup> -+★★★ <sup>2)</sup> <sup>5)</sup> C26382-F27★★ <sup>1)</sup> -+★★★ <sup>2)</sup>

Dimension diagrams, see Page 2.74

Hole pattern for guide pieces, see Page 2.87

Minimum acceptable order quantities, see page 2.73

<sup>1)</sup> Order designations for colors, see Page 2.78, top

<sup>2)</sup> Order designations for characters/symbols, see Page 2.83, bottom

<sup>3)</sup> Also order 1 set of guide pieces (see Page 2.87)

<sup>4)</sup> Ex-warehouse item

<sup>5)</sup> Order designation for characters/symbols, see also Pages 2.76 and 2.77

# Switches and pushbuttons for printed circuits

## Keypops for key switches STB 11 and STB 21

### Colors for flat keytops and characters/symbols

Color of the keytop	Color of the character/symbol	Order designation 2nd block	
		Two-color injection method	Laser-engraving method
Light beige	Black	01 <sup>1)</sup>	00 <sup>1)</sup>
Ocher	Black	02	
Green	Black	03	
Red	Black	04	
Dark beige	Black	05	
Beige	Black		06
Yellow	Black		07
Warm grey	Black		09
Ergo grey	Black	15	10
Dark beige	White	25	
Grey brown	White	29	
Blue	White	31	
Black	White	32	

Other colors on request

### Characters/symbols for flat keytops

Short characters/symbols (not for keytop 1 3/4)

V23770-A★★★-+★★★ <sup>2)</sup>	K1	A98		K66	K17	K14	F901	F801	F815	E402	F816
C26382-F21★★-+★★★ <sup>3)</sup>	C1	C2	C3	C6	C8	C9	C48	C62	C91	C98	C100
F27★★-+★★★ <sup>3)</sup>											
F28★★-+★★★ <sup>3)</sup>											
F29★★-+★★★ <sup>3)</sup>											

Long characters/symbols

V23770-A91★★-+★★★ <sup>2)</sup>	K1	E406			
A92★★-+★★★ <sup>2)</sup>					
C26382-F28★★-+★★★ <sup>3)</sup>	C1	E26	E30	E41	E42

Other characters/symbols on request.

<sup>1)</sup> Preferred color




<sup>2)</sup> Laser-engraving method

<sup>3)</sup> Two-color injection method

# Switches and pushbuttons for printed circuits

## Keypads for key switches STB 11 and STB 21

### Keypads with character pads

Illustration	Item	Order designation
	Keytop for oval pad  Required: Character pad, light beige Cover, transparent	Light beige Other colors  C26382-F301-C100 <sup>2)</sup> C26382-F301-C1 <sup>★★</sup>  C26382-F301-C200 <sup>1)</sup> C26382-F301-C1 <sup>2)</sup>
	Keytop for oval pad with hole for LED  Required: Character pad, light beige Cover, transparent	Light beige Other colors  C26382-F304-C100 <sup>2)</sup> C26382-F304-C1 <sup>★★</sup>  C26382-F304-C200 <sup>1)</sup> C26382-F304-C1 <sup>2)</sup>
	Keytop for square pad  Required: Character pad, light beige Cover, transparent	Light beige Ocher Green Dark beige Other colors  C26382-F302-C100 <sup>2)</sup> C26382-F302-C101 <sup>2)</sup> C26382-F302-C102 <sup>2)</sup> C26382-F302-C104 <sup>2)</sup> C26382-F302-C1 <sup>★★</sup>  C26382-F302-C200 <sup>1)</sup> C26382-F302-C1 <sup>2)</sup>

Dimension diagrams, see Page 2.74

Minimum acceptable order quantities, see Page 2.73

Color of the keytop	
Light beige	00
Ocher	01
Green	02
Red	03
Dark beige	04
Grey brown	05
Ergo grey	14

Other colors  
on request.

<sup>1)</sup> Supplied in sheets of 36 ea., order designation applies to 1 ea.

<sup>2)</sup> Ex-warehouse item



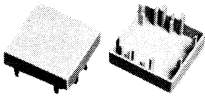


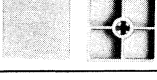




# Switches and pushbuttons for printed circuits

## Keypots for key switches STB 11 and STB 21

### Blank keytops, blanks, illuminated signal keytops and adapters

These accessories are intended for keyboards comprising keys with 4 mm travel. The blank keytop is engaged on the key switch and prevents it from being actuated. The keytop can be removed at a later date, if required, and replaced by a real keytop. Blanks serve to cover vacant spaces.

Adapters are able to accommodate blanks (single 1/1 wide) or illuminated signal keytops and can be equipped with LEDs at the four corners. The adapters fit the key switch mounting holes.

Illustration	Item	Order designation	
	Blank keytop Light beige Other colors	C26382-F300-C100 <sup>2)</sup> C26382-F300-C1★★	
	Blank 1/4 width Self-adhesive	C26382-F300-B5★★	
	Blank 1/2 width Self-adhesive	C26382-F300-B4★★	
	Blank Light beige Other colors	C26382-F300-C300 <sup>2)</sup> C26382-F300-C3★★	
	Adapter required	Illuminated signal keytops <sup>1)</sup> for 1 LED	C26382-F500-C10★
		Illuminated signal keytops <sup>1)</sup> for 2 LEDs	C26382-F500-C12★
		Illuminated signal keytop for 4 LEDs	C26382-F500-C14★
	Adapter for blanks and illuminated signal keytops	C26382-F500-C23 <sup>2)</sup>	

Dimension diagrams, see Page 2.74  
 Hole patterns for illuminated signal keytops, see Page 2.87  
 Minimum acceptable order quantities, see Page 2.73

- <sup>1)</sup> The keytops can be turned through 90° steps,  
thus permitting the position of the diodes to be selected.
- <sup>2)</sup> Ex-warehouse item
- <sup>3)</sup> In the case of illuminated signal keytops, ergo grey,  
the last block of the order designation is as follows:  
for 1 LED -C114  
for 2 LEDs -C134  
for 4 LEDs -C154

Other colors on request.

Color of the keytop		
Light beige	0	00
Ocher	1	01
Green	2	02
Red	3	03
Dark beige	4	04
Grey brown	5	05
Ergo grey <sup>3)</sup>		14



# Switches and pushbuttons for printed circuits

## Keytops for key switches STB 11 and STB 21

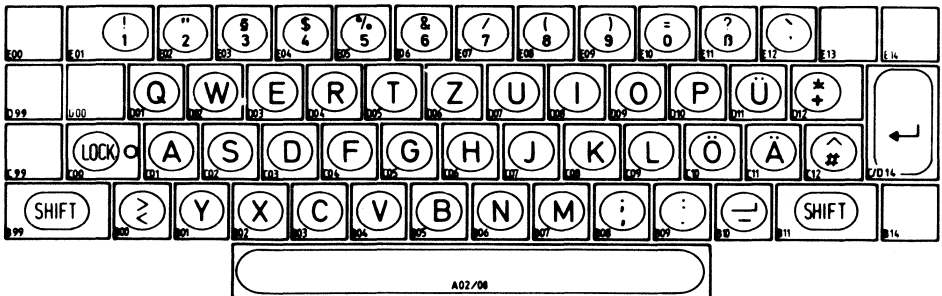
### Keytop sets

Item	Order designation
Keytop set for alphanumeric keyboard with German keyset, similar to DIN 2137, Part 2 (1976), supplemented with space and return keytops, 2 SHIFT keytops and 7 keytops without characters, including the required guide pieces (see below).  Color of the keytops: light beige Color of the characters/symbols: black (two-color injection method)	C26382-F7-B1
Keytop set with digits 1...9 (Characters -C2...C10, see Page 2.76)  Color of the keytops: light beige Color of the characters/symbols: black (two-color injection method)	C26382-F7-B2
Keytop set with characters P1...P10 (Symbols -C204...-C213)  Color of the keytops: light beige Color of the characters/symbols: black (two-color injection method)	C26382-F7-B3

Dimension diagrams, see Page 2.74

Quantity per packaging unit: 1 keytop set

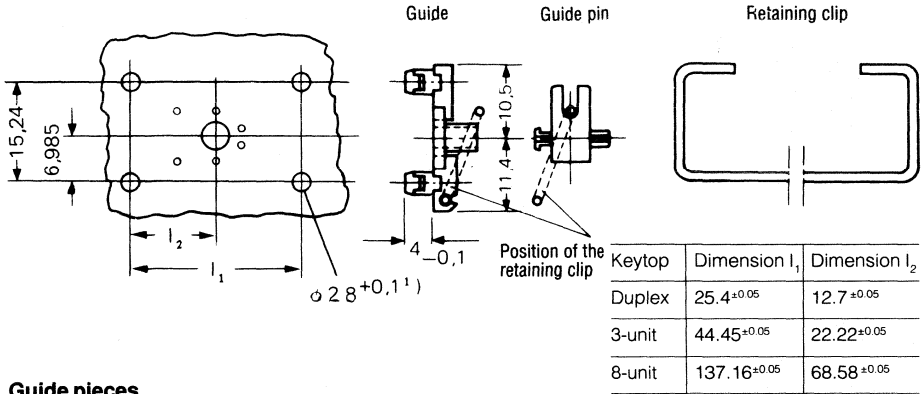
### Keytop set C26382-F7-B1



# Switches and pushbuttons for printed circuits

## Guide pieces for key switches STB 11 and STB 21

### Hole pattern for guide pieces <sup>1)</sup> in the PC board

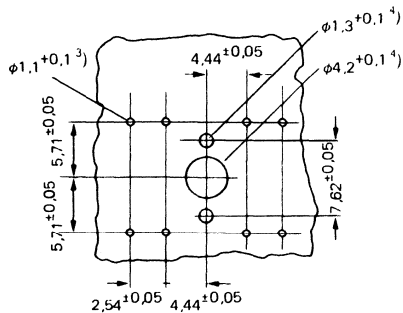


### Guide pieces

Guide pieces must be ordered individually.

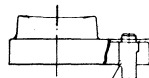
1 set consisting of	Keytop, duplex	Keytop, 3-unit	Keytop, 8-unit
2 ea. guides	C26382-F300-C7 <sup>2)</sup>	C26382-F300-C7 <sup>2)</sup>	C26382-F300-C7 <sup>2)</sup>
2 ea. guides	C26382-F300-C8 <sup>2)</sup>	C26382-F300-C8 <sup>2)</sup>	C26382-F300-C8 <sup>2)</sup>
1 ea. retaining clip	C26382-F300-C1 <sup>2)</sup>	C26382-F300-C3	C26382-F300-C2 <sup>2)</sup>

### Hole pattern for illuminated signal keytop in the PC board

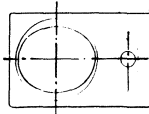


### Note on installation for keytops with flats and illuminated buttons <sup>5)</sup>

#### Keytop with flat and hole



Press in illuminated button (accessory)



For LED with  $\varnothing$  3 mm; the LED is fitted next to the key switch. Installation height (upper edge of PC board to upper edge of LED) 7.5 mm max.

<sup>1)</sup> Allow for the recesses for guide pieces on keyboards with support plate

<sup>2)</sup> Ex-warehouse item

<sup>3)</sup> For LED

<sup>4)</sup> Without conductive surface

<sup>5)</sup> Provide a hole in the support plate if keys are to be fitted in the support plate.

# Switches and pushbuttons for printed circuits

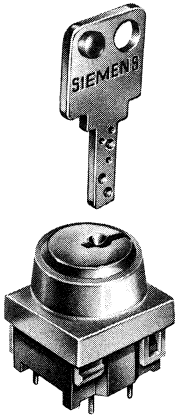
## Keylock switches

### Keylock switches SPC 266 and SPC 758

for keyboards and control panels

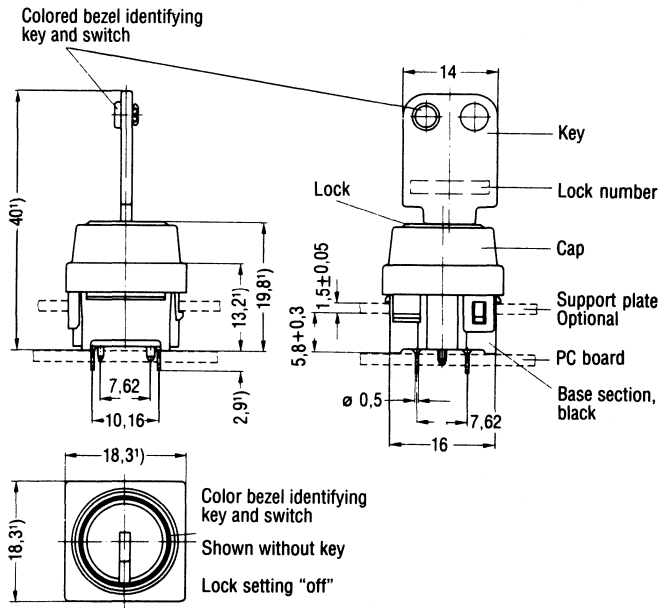
#### Version

- With 1 or 2 locking positions and 1 or 2 contacts
- SPC 266 with cylinder lock system with reversible key, available with lock cylinder KABA-MICRO (max. 10 000 locking variants)
- SPC 758 with wafer-type lock and bit key (120 locking variants)
- Keylock switch caps available in various colors, in addition to bezel and knob in various coding colors
- SPC 266 also with switch-position indicator (arrow-shaped identification mark on the colored bezel, recommended for versions with 2 locking positions)
- SPC 758 also with "POST OFFICE" with plastic grip
- As a single switch, with or without preset lock number.



#### Special features

- Low overall height - 19.8 mm from the PCB surface - thus fully compatible with keyboard contours. It can be flow-soldered with the keys in one single operation.
- The design reliably prevents the ingress of flux, solder and cleaning agents.
- High dielectric strength (flashover resistance) to prevent discharge of static electricity.



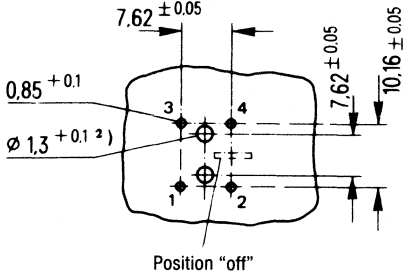
<sup>1)</sup> Maximum dimension

<sup>2)</sup> Minimum dimension

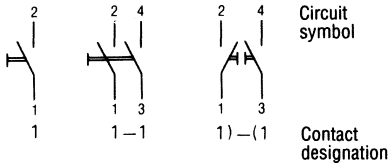
# Switches and pushbuttons for printed circuits

## Keylock switches

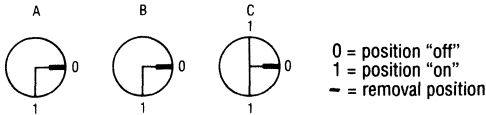
Mounting holes (component side)



Circuit diagrams



Key position



Position "off": key removal position;  
other key removal positions possible

### Installation

- The switch is positioned on the PCB by a centering lug or by a support plate.
- The switch is secured by soldering the connecting pins.
- Reliable securing of the switch is assured by locking the switch in a support plate
- For special applications, it is possible, on the SPC 266, to retrofit the lock cylinder in switches already soldered into the PCB.

### Materials

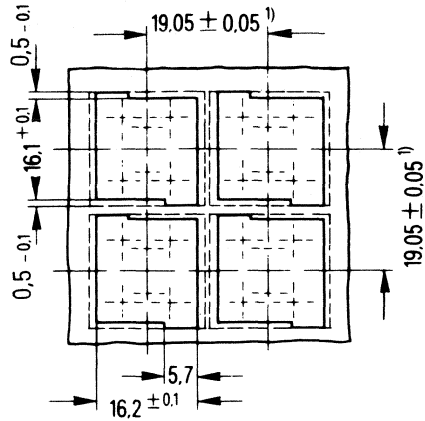
— Dielectrics	Switch housing	PA6.6-GF <sup>3)</sup>
	Switching rotor	POM <sup>3)</sup>
	Cap	PC-ABS <sup>3)</sup> or ABS <sup>3)</sup>
— Contact materials	Stationary contact	Nickel-wire, gold-plated
	Moving contact	CuBe <sub>2</sub> -wire, gold-plated
— Soldering terminals	SPC 266	Tin-coated
	SPC 758	Gold-plated
— Lock	Bright-chrome-plated on the front face	

<sup>1)</sup> Spacing for mounting holes and for recess

<sup>2)</sup> Without conductive surface

<sup>3)</sup> UL-listed

Recess and packing density in support plate



# Switches and pushbuttons for printed circuits

## Keylock switches

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### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 48 V AC/DC
Current rating (resistive load)	≤ 50 mA
Switch capacity	≤ 1 W
Service life with resistive load 1 W	20 000 cycles
Contact resistance (millivolt method)	< 60 mOhms (SPC 266); initial value < 200 mOhms (SPC 758); initial value < 200 mOhms (SPC 266); after stressing < 500 mOhms (SPC 758); after stressing
Insulation resistance	> 10 <sup>5</sup> MOhms, initial value > 10 <sup>2</sup> MOhms; after stressing
Proof voltage	500 V, 50 Hz
Air gaps and creepage distances	≥ 0.5 mm
Switching angle	90° or 2 x 90°, key can be removed in 1, 2 or 3 positions, perceptible end position of key
Switching point	After approx. 65°
Capacitance between key and tails	0.4 pF with 1 contact <sup>1)</sup> 0.45 pF with 2 contacts <sup>1)</sup>
Ambient temperature range	—25 °C to +85 °C
Immunity to electrostatic discharge (ESD)	> 15 kV, no flashover to the tails during 10 individual measurements; if necessary, provide earthed screening.

### Note on processing

- Blister packaging
- Processing class B <sup>2)</sup>

### Notes on ordering

2 keys are supplied for each lock. Further keys and spare keys can be ordered by the equipment manufacturer with our approval directly from the lock manufacturer. The equipment manufacturer then assumes responsibility for preventing unauthorized use of keys. Grand master key systems, central locking systems and master key systems can be supplied on request. The lock numbers 4001, 4002 and 4003 are preferred numbers for cases in which the user wishes to provide cylinders with identical locking for one type of device specifically for instance. Other lock numbers on request.

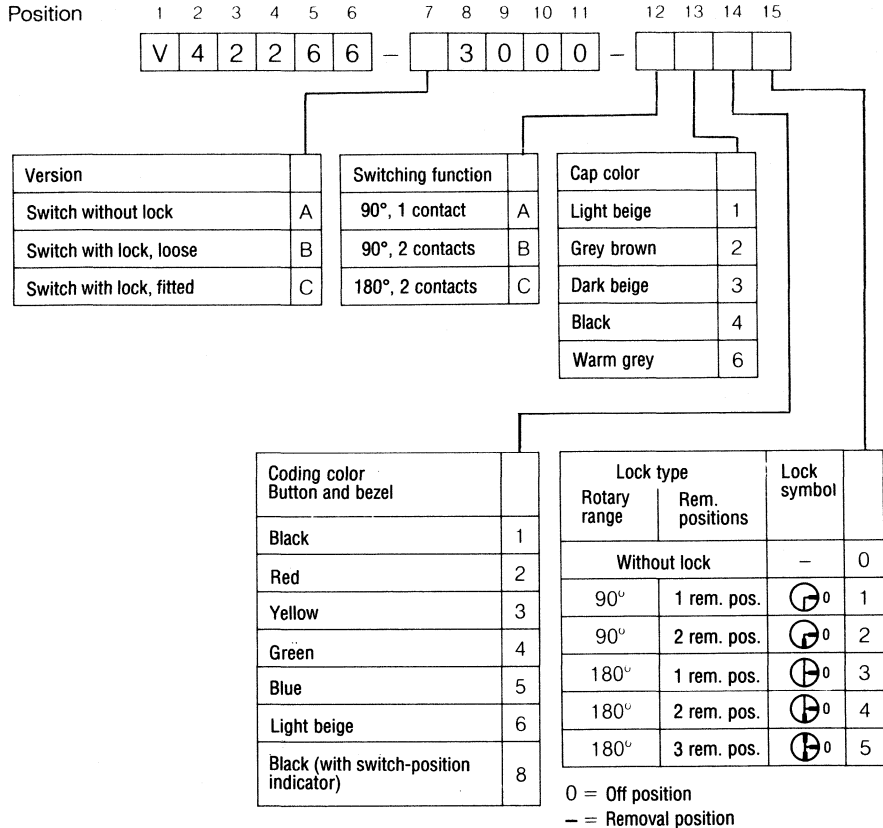
<sup>1)</sup> Without PCB, if necessary provide "discharge capacitors" for instance

<sup>2)</sup> See Page 1.8

# Switches and pushbuttons for printed circuits

## Keylock switches

### Ordering code for keylock switches SPC 266



2

**Important!** For positions 12 and 15, combine only version with same rotary range (90° or 180°).

**Example order: V42266-C3000-B122**

Key lock switch, with different locking, lock fitted, with 2 contacts (make contacts), lock system KABA-MICRO, key rotation 90°, key removable in 2 positions, cap color light beige, bezel and button red

**Preferred items V42266-C3000-B122  
V42266-C3000-C125**

Quantity per packaging unit (minimum acceptable order quantity): 5 per order number

# Switches and pushbuttons for printed circuits





## Keylock switches

### Ordering code for keylock switches SPC 758 with standard key

Position      1   2   3   4   5   6      7   8   9   10   11      12   13   14   15

V
2
3
7
5
8
-
B
2
0
0
0
-
 
 
 
 

Cap color		Coding color	
Light beige	K	Button and bezel	
Grey brown	L	Without coding	1
Dark beige	M	Black	2
Black	N	Red	3
		Yellow	4
		Green	5
		Blue	6
		Light beige	7

Switching function		Lock type			Lock symbol
		Rotary range	Rem. positions		
90°, 1 contact	1	90°	1 rem. pos.	1	
90°, 2 contacts	2	90°	2 rem. pos.	2	
180°, 2 contacts	3	180°	1 rem. pos.	3	
		180°	2 rem. pos.	5	

0 = Off position  
 - = Removal position

### Example order: V23758-B2000-K111

Keylock switch, with different locking, with one contact (make contact), without coding, key rotation 90°, key removable in "off" position, cap color light beige.



# Switches and pushbuttons for conventional wiring

Contents	Page
Summary of available types	3.2
General	3.3
Multi-position rotary switches 41 mm x 54 mm	3.4
Multi-position rotary switches 28 mm x 39 mm	3.13
Multi-position rotary switches 17 mm	3.19
Multi-position rotary switches 23 mm	3.25
Pushbutton switches A11	3.31
Pushbutton switches A2	3.34

# Switches and pushbuttons for conventional wiring

## Summary of available types

Switch	Switch positions or switch type	Switch decks		Number of contacts	Switching mode	Contacts	Voltage rating	Current rating	Switch capacity	Other features	Description
		Number of decks	Material								
Multi-position rotary switches 41 x 54 mm	max. 13 or max. 26	max. 6	Phenolic paper or ceramic material	1 to 4 and 6	Mating or break	Silver-plated or gold-plated	≤ 250 (Ag) ≤ 150 (Au)	A ≤ 3 (Ag) ≤ 0.5 (Au)	VA See diagram	Various shaft ends with stop	Page 3.4
Multi-position rotary switches 28 x 39 mm	max. 6 or max. 12	max. 6	Phenolic paper or ceramic material	max. 4	Mating or break	Silver-plated or gold-plated	≤ 250 (Ag) ≤ 150 (Au)	≤ 3 (Ag) ≤ 0.5 (Au)	See diagram	Various shaft ends with stop	3.13
Multi-position rotary switches Ø 17 mm	max. 6 or max. 12	max. 5	Plastic	max. 4	Mating or break	Gold-plated	≤ 100	≤ 0.5	≤ 5	Various shaft ends with stop, soft indexing mechanism, waterproof installation	3.19
Multi-position rotary switches Ø 23 mm	max. 6 or max. 12	max. 6	Plastic	max. 6	Mating or break	Gold-plated	≤ 100	≤ 0.5	≤ 10	Various shaft ends with stop, waterproof installation, also non-detent position	3.25
Pushbutton switch A11	1 change-over contact				Mating or break	Gold-plated	≤ 60	≤ 0.5	≤ 20		3.31
Pushbutton switch A2	2 change-over contacts				Break	Gold-plated	≤ 60	≤ 0.5	≤ 20	With indexing	3.34

# Switches and pushbuttons for conventional wiring

## General

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In order to avoid misunderstandings, it is advisable to use the following expressions when making inquiries:

On the multi-position rotary switches 41 mm x 54 mm and 28 mm x 39 mm

- ... position      Number of positions used per switching cycle, including first position
- ... deck          Number of decks
- ... hofe          Number of electrically isolated wipers per deck
- ... wiper         Number of electrically connected wipers per deck

For multi-position rotary switches 17 mm and 23 mm

- ... position      Number of positions, including the first position
- ... deck          Number of decks
- ... pole          Number of wiping contacts per deck

Note:

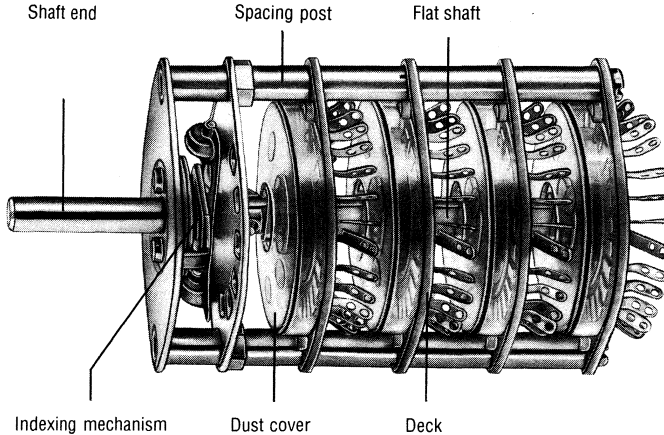
See the notes on processing on Page 1.12 for selection of the size of knobs.

# Switches and pushbuttons for conventional wiring

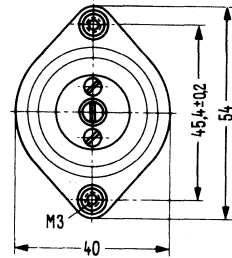
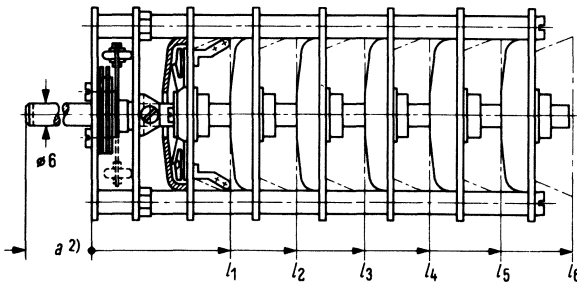
## Multi-position rotary switches 41 mm x 54 mm

**Multi-position rotary switches 41 mm x 54 mm in accordance with DIN 41631 and IEC Publ. 132-5**

This high-quality, versatile, multi-position rotary switch is particularly suitable for communications equipment, test and control equipment of all kinds. It complies with the requirements of DIN 41631 and IEC Publ. 132-5. Its main features are as follows: flexible design, convenient dimensions, long service life, consistent, reliable contact mating.



### Switches with decks made of phenolic paper



Installation length (maximum dimension)

$l_1$ (1 deck)	33.3 mm
$l_2$ (2 decks)	48.9 mm
$l_3$ (3 decks)	64.5 mm
$l_4$ (4 decks)	80.1 mm
$l_5$ (5 decks)	95.7 mm
$l_6$ (6 decks)	111.3 mm

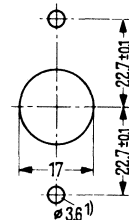
Length of the spacing posts 14 mm

Wire diameter per soldering terminal 2 x Ø 0.5 mm

1) If necessary, countersink for M3

2) Dimension a, see Page 3.10

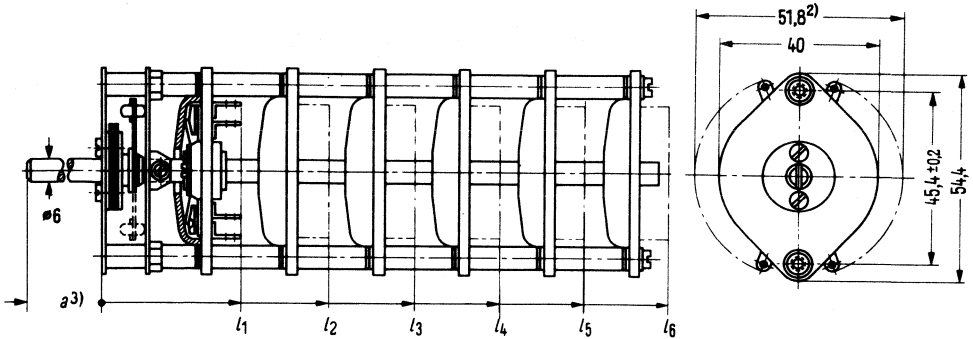
Mounting hole



# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 41 mm x 54 mm

### Switches with decks made of ceramic material

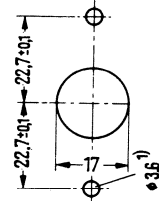


Installation length (maximum dimension)

$l_1$ (1 deck)	36.0 mm
$l_2$ (2 decks)	57.7 mm
$l_3$ (3 decks)	79.4 mm
$l_4$ (4 decks)	101.1 mm
$l_5$ (5 decks)	122.8 mm
$l_6$ (6 decks)	144.5 mm

Wire diameter per soldering terminal  $2 \times \varnothing 0.5$  mm

Mounting hole



### Version and materials

- Decks made of phenolic paper: 1 to 4-pole or decks made of ceramic material: 1 to 4-pole, 6-pole
- 1 to 5 deck with decks made of phenolic paper, contacts silver-plated, or 1 to 6 decks with decks made of phenolic paper, contacts gold-plated, or 1 to 6 decks with decks made of ceramic material, contacts gold-plated
- Soldering terminals tin-coated
- Indexing mechanism with 13 or 26 positions. In the case of 13-position indexing mechanism (pitch  $27^{\circ}42'$ ) break mode, in the case of 26-position indexing mechanism (pitch  $13^{\circ}51'$ ) mating mode
- Dust cover (transparent) for protecting the decks against dust
- Shaft ends with various lengths and in various versions
- Spacing posts (various spacings from deck to deck available on request)
- Adjustable stops for limiting the rotary range

<sup>1)</sup> If necessary, countersink for M3

<sup>2)</sup> Maximum dimension in the case of soldering lugs arranged radially

<sup>3)</sup> Dimension a, see Page 3.10

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 41 mm x 54 mm

**Technical data** (in accordance with DIN 41619, IEC Publ. 132-1)

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

		Phenolic paper	Ceramic material
Dielectric of the decks			
Voltage rating	for silver-plated contacts	≤ 250 V	≤ 250 V
	for gold-plated contacts	≤ 150 V	≤ 150 V
Current rating	for silver-plated contacts	≤ 3 A	≤ 3 A
	for gold-plated contacts	≤ 0.5 A	≤ 0.5 A
Switch capacity		See diagram Page 3.7	See diagram Page 3.7
Service life	mechanical	$5 \cdot 10^5$ switching cycles	$5 \cdot 10^5$ switching cycles
	electrical with resistive load	See diagram Page 3.7	See diagram Page 3.7
Steady-state current (not switched)		≤ 5 A AC/DC	≤ 5 A AC/DC
Proof voltage		750 V, 50 Hz	750 V, 50 Hz
Contact resistance (millivolt method)			
	for silver-plated contacts	≤ 5 mOhms	≤ 5 mOhms
	for gold-plated contacts	≤ 20 mOhms	≤ 20 mOhms
Insulation resistance		≥ 10 <sup>4</sup> MOhms; initial value ≥ 10 <sup>2</sup> MOhms after stressing	≥ 10 <sup>6</sup> MOhms; initial value ≥ 10 <sup>4</sup> MOhms after stressing
Capacitance	contact-neighbor contact	≤ 0.5 pF	≤ 0.75 pF
	contact-sliding contact	≤ 0.8 pF	≤ 1.0 pF
Creepage distances	contact-neighbor contact	≥ 1.7 mm	≥ 1.7 mm
	contact-ground	≥ 1.4 mm	≥ 1.2 mm
Air gaps	contact-neighbor contact	≥ 0.5 mm	≥ 0.5 mm
	contact-ground	≥ 0.8 mm <sup>1)</sup>	≥ 0.8 mm <sup>1)</sup>
Stop strength		1.2 Nm	1.2 Nm
Ambient temperature range		−25 °C to +70 °C	−25 °C to +70 °C

<sup>1)</sup> Please note the following when soldering the terminals: the distance between the soldering lugs 6; 7 and 9; 20 and the spacing posts must not be less than the given air gap.

# Switches and pushbuttons for conventional wiring

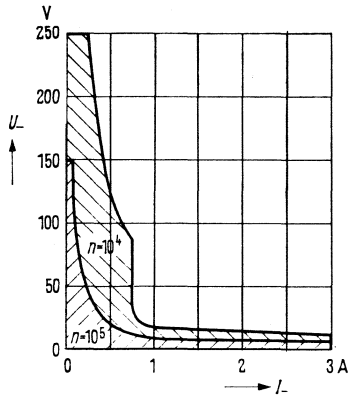
## Multi-position rotary switches 41 mm x 54 mm

### Switch capacity and service life

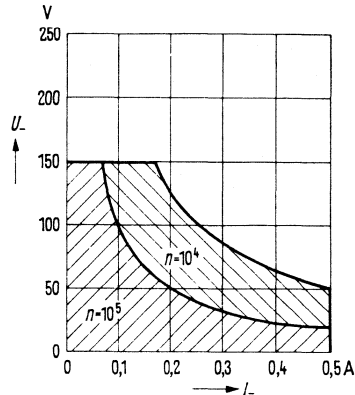
#### 1. DC voltage and resistive load

The number of switching cycles can be derived from the following diagrams as a function of the current rating. The term "one switching cycle" refers to actuation of the switch over the entire range and back again.

Silver-plated contacts



Gold-plated contacts



$n$  = Number of attainable switching cycles; without electrical load  $n \geq 5 \cdot 10^5$

#### 2. AC voltage

In the case of AC voltage (40 to 60 Hz,  $\cos\phi \geq 0.7$ ), the current ratings must be multiplied by a factor of 0.7 before reading off the relevant values from the curve.

#### 3. At increased ambient temperature (DC or AC operation)

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70 °C
Factor	1.1	1.2	1.3

### Decks (general)

In the case of the ceramic decks, the inner contact ring comprises 13 contacts (No. 27 ... 39), which can be separately wired. In the case of phenolic paper decks, the inner contact ring comprises a common ring or common segment. The outer contacts (max. of 26) are generally provided with bent soldering lugs. Ceramic decks are also available with radial soldering lugs.

The spoon-shaped wiping contacts are silver or gold-plated and mounted in a plastic holder. They are pressed on the contact by leaf springs.

Notes, further to the diagrams (see following pages):

In the case of switches with 13-position indexing, only the contacts enclosed in circles are selected. In the case of decks with phenolic paper insulation, some contacts have no soldering lug and a connection to them cannot be established since the soldering lugs for the common segments are arranged at these points. The contacts are not numbered on the diagrams. The soldering lugs for the common segments are drawn as a broken line.

The hatched wiping contacts indicate a momentary position.

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 41 mm x 54 mm

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### Decks made of phenolic paper

Single-pole:

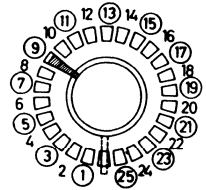
One wiping contact connects one of the outer contacts to the continuous common ring.

Contact 26 has no soldering lug since the connection for the common ring is established at this point.

Number of usable positions

26-position indexing mechanism: 25 (mating mode)

13-position indexing mechanism: 13 (break mode)



2-pole:

Two wiping contacts connect the separate outer contacts to each of the two common-ring segments. Contacts 13 and 26 have no soldering lug since the connections for the common-ring segments are established at these points.

Number of usable positions

26-position indexing mechanism: 12 (mating mode)

13-position indexing mechanism: 6 (break mode)



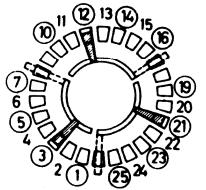
3-pole:

Three wiping contacts connect separate outer contacts to each of the three common-ring segments. Contacts 8, 17 and 26 have no soldering lugs since the connections for the common-ring segments are established at these points.

Number of usable positions

26-position indexing mechanism: 7 (mating mode)

13-position indexing mechanism: 4 (break mode)



4-pole:

Four wiping contacts connect separate outer contacts to each of the four center segments. Contacts 6, 13, 19 and 26 have no soldering lug since the connections for the common-ring segments are established at these points.

Number of usable positions

26-position indexing mechanism: 5 (mating mode)

13-position indexing mechanism: 3 (break mode)





# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 41 mm x 54 mm

### Decks made of ceramic material

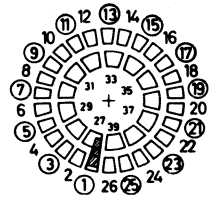
#### Single-pole

One wiping contact connects one outer contact to one inner contact.

#### Number of usable positions

26-position indexing mechanism: 25 (mating mode), without stops 26

13-position indexing mechanism: 13 (break mode)



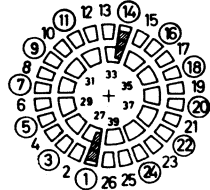
#### 2-pole:

Two wiping contacts connect separate outer contacts to each of two inner contacts.

#### Number of usable positions

26-position indexing mechanism: 12 (mating mode)

13-position indexing mechanism: 6 (break mode)



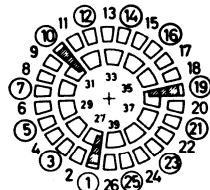
#### 3-pole:

Three wiping contacts connect separate outer contacts to each of three inner contacts.

#### Number of usable positions

26-position indexing mechanism: 8 (mating mode)

13-position indexing mechanism: 4 (break mode)



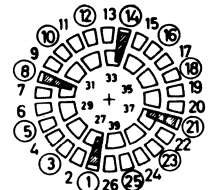
#### 4-pole:

Four wiping contacts connect separate outer contacts to each of four inner contacts.

#### Number of usable positions

26-position indexing mechanism: 5 (mating mode)

13-position indexing mechanism: 3 (break mode)



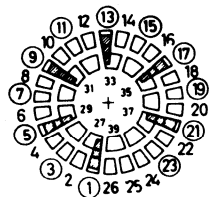
#### 6-pole:

Six wiping contacts connect separate outer contacts to each of six inner contacts.

#### Number of usable positions

26-position indexing mechanism: 4 (mating mode)

13-position indexing mechanism: 2 (break mode)



# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 41 mm x 54 mm

### Shaft ends

Identification letter for shape of the shaft end (Please refer to order designation, 3rd block):		Dimension of the shaft end <sup>1)</sup> Dimension a
26-position indexing	13-position indexing	
A	B	
C	D	
M	N	

Additional parts for single-hole mounting of the switches on request.

### Indexing mechanism

Setting the stops:

Slacken the front screws on the left and right of the shaft end.

Rotate the switch to one of the positions used.

Engage the lugs on the stop rings on both sides of the shaft dog.

Rotate the switch in both directions to the required end positions.

Retighten the front screws.

### Notes on processing

- Blister packaging
- Processing class A <sup>2)</sup>



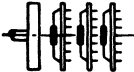



<sup>1)</sup> Dimensions in parenthesis: minimum dimensions for cylindrical section of the shaft end

<sup>2)</sup> See Page 1.8

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 41 mm x 54 mm

### Ordering information

Switches with decks made of phenolic paper	Contacts: silver-plated		Quantity per pack- aging unit (Minimum acceptable order quantity)	Contacts: gold-plated	
		Order designation			Order designation
1 deck 	Single-pole	C40315-M161-★226 <sup>1)</sup>	1	C40315-M251-★1	1
	2-pole	C40315-M162-★226 <sup>2)</sup>	1	–	1
	3-pole	C40315-M163-★226 <sup>2)</sup>	1	C40315-M253-★1	1
	4-pole	C40315-M164-★226	1	C40315-M254-★1	1
2 decks 	Single-pole	C40315-M161-★227 <sup>1)</sup>	1	C40315-M251-★2	1
	2-pole	C40315-M162-★227 <sup>2)</sup>	1	C40315-M252-★2	1
	3-pole	C40315-M163-★227 <sup>2)</sup>	1	C40315-M253-★2	1
	4-pole	–	1	C40315-M254-★2	1
3 decks 	Single-pole	C40315-M161-★228	1	C40315-M251-★3	1
	2-pole	C40315-M162-★228	1	C40315-M252-★3	1
	3-pole	C40315-M163-★228	1	C40315-M253-★3	1
	4-pole	C40315-M164-★228	1	–	1
4 decks 	Single-pole	C40315-M161-★229	1	C40315-M251-★4	1
	2-pole	C40315-M162-★229	1	C40315-M252-★4	1
	3-pole	C40315-M163-★229	1	C40315-M253-★4	1
5 decks 	Single-pole	C40315-M161-★230	1	–	1
	2-pole	C40315-M162-★230	1	C40315-M252-★5	1
	3-pole	–	1	C40315-M253-★5	1
	4-pole	–	1	C40315-M254-★5	1
6 decks 	Single-pole	–	1	C40315-M251-★6	1
	2-pole	–	1	C40315-M252-★6	1
	3-pole	–	1	C40315-M253-★6	1
	4-pole	–	1	C40315-M254-★6	1

Other types on request

#### Preferred items

**C40315-M161-A226**    **C40315-M161-C226**  
**C40315-M161-A227**    **C40315-M161-C227**  
**C40315-M161-B227**    **C40315-M161-D226**

Switch versions with strengthened or hard indexing mechanism (increased torque for more rugged operation as well as switches with more than six decks) and versions without stop, i.e. continuously rotatable, on request.

\* Identification letter for indexing and dimensions of the shaft end, see Page 3.10







<sup>1)</sup> Preferred shaft ends A, B, C, D

<sup>2)</sup> Preferred shaft end C

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 41 mm x 54 mm

### Ordering information

Switches with decks made of ceramic material		Contacts: gold-plated	Quantity per packaging unit (Minimum acceptable order quantity)
		Order designation	
<b>1 deck</b> 	Single-pole	C40315-M231-★1	1
	2-pole	C40315-M232-★1	1
	3-pole	C40315-M233-★1	1
	4-pole	C40315-M234-★1	1
<b>2 decks</b> 	Single-pole	C40315-M231-★2	1
	2-pole	C40315-M232-★2	1
	3-pole	C40315-M233-★2	1
	4-pole	C40315-M234-★2	1
	6-pole	C40315-M236-★2	1
<b>3 decks</b> 	Single-pole	C40315-M231-★3	1
	2-pole	C40315-M232-★3	1
	3-pole	C40315-M233-★3	1
	4-pole	C40315-M234-★3	1
	6-pole	C40315-M236-★3	1
<b>4 decks</b> 	Single-pole	C40315-M231-★4	1
	2-pole	C40315-M232-★4	1
	3-pole	C40315-M233-★4	1
	4-pole	C40315-M234-★4	1
	6-pole	C40315-M236-★4	1
<b>5 decks</b> 	Single-pole	C40315-M231-★5	1
	2-pole	C40315-M232-★5	1
	3-pole	C40315-M233-★5	1
	4-pole	C40315-M234-★5	1
<b>6 decks</b> 	Single-pole	C40315-M231-★6	1
	2-pole	C40315-M232-★6	1
	3-pole	C40315-M233-★6	1
	4-pole	C40315-M234-★6	1

Other types on request

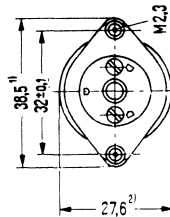
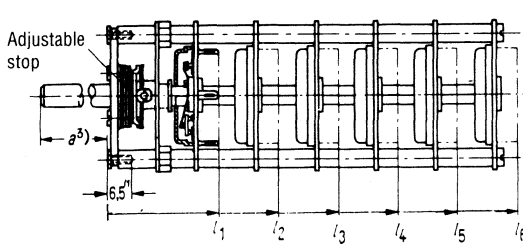
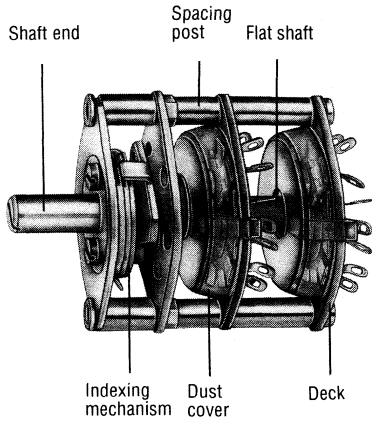
\* Identification letter for indexing and dimensions of the shaft end, see Page 3.10

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 28 mm x 39 mm

### Multi-position rotary switches 28 mm x 39 mm in accordance with DIN 41632

This switch is a high-quality, versatile multi-position rotary switch suitable for use in communications equipment as well as in test and control equipment of all kinds. Its main features are as follows: adaptability of design, long service life, consistently reliable contact mating.



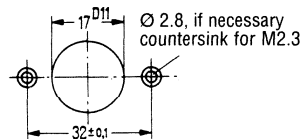
Installation length (maximum dimension)

$l_1$ (1 deck)	27.5 mm	
$l_2$ (2 decks)	42.0 mm	
$l_3$ (3 decks)	56.6 mm	
$l_4$ (4 decks)	71.2 mm	} contacts gold-plated
$l_5$ (5 decks)	85.8 mm	
$l_6$ (6 decks)	100.4 mm	

Length of the spacing posts 13 mm

Wire diameter per soldering terminal  $2 \times \varnothing 0.5$  mm

Mounting holes



Caution!  
Securing thread  
M2.3

<sup>1)</sup> Maximum dimension

<sup>2)</sup> Installation dimension

<sup>3)</sup> Dimension a, see Page 3.17

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 28 mm x 39 mm

---

### Version and materials

- Decks made of phenolic paper: 1 to 4-pole.
- 1 to 3 decks, contacts silver-plated, or gold-plated, or  
1 to 6 decks, contacts gold-plated
- Soldering terminals tin-coated
- Indexing mechanism with 6 or 12 positions. In the case of 6-position indexing mechanism (pitch 60°), break mode. In the case of 12-position indexing mechanism (pitch 30°), mating mode.
- Dust cover (transparent) for protecting the decks against dust
- Shaft ends with various lengths and in various versions
- Spacing posts (various spacings from deck to deck available on request)

### Technical data (in accordance with DIN 41619, IEC Publ. 132-1)

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	for silver-plated contacts	≤ 250 V
	for gold-plated contacts	≤ 150 V
Current rating	for silver-plated contacts	≤ 3 A
	for gold-plated contacts	≤ 0.5 A
Switch capacity		See diagram Page 3.15
Service life	mechanical	≥ 5 · 10 <sup>5</sup> switching cycles
	electrical with resistive load	See diagram Page 3.15
Steady-state current (not switched)		≤ 5 A
Proof voltage		750 V, 50 Hz
Contact resistance (millivolt method)		
	for silver-plated contacts	≤ 5 mOhms
	for gold-plated contacts	≤ 20 mOhms
Insulation resistance		≥ 10 <sup>4</sup> MOhms; initial value ≤ 10 <sup>2</sup> MOhms; after stressing
Capacitance	contact-neighbor contact	≤ 0.3 pF
	contact-sliding contact	≤ 0.7 pF
Creepage distances	contact-neighbor contact	≥ 1.6 mm
	contact-ground	≥ 1.7 mm
Air gaps	contact-neighbor contact	≥ 0.5 mm
	contact-ground	≥ 2.2 mm <sup>1)</sup>
Stop strength		1.2 Nm
Ambient temperature range		—25 °C to +70 °C

<sup>1)</sup> Please note the following when soldering the terminals: the distance between the soldering lugs 6; 7 and 9; 20 and the spacing posts must not be less than the given air gap.

# Switches and pushbuttons for conventional wiring

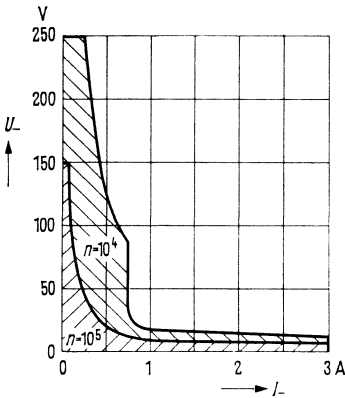
## Multi-position rotary switches 28 mm x 39 mm

### Switch capacity and service life

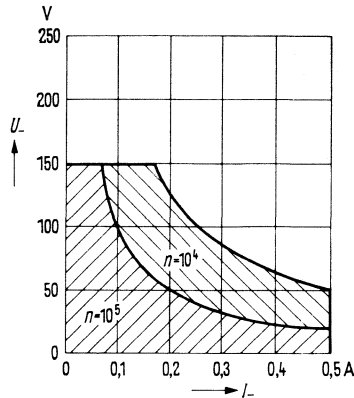
#### 1. DC voltage and resistive load

The number of switching cycles can be derived from the following diagrams as a function of the current rating. The term "one switching cycle" refers to actuation of the switch over the entire range and back again.

#### Silver-plated contacts



#### Gold-plated contacts



$n$  = Number of attainable switching cycles; without electrical load  $n \geq 5 \cdot 10^5$

#### 2. AC voltage

In the case of AC voltage (40 to 60 Hz,  $\cos \geq 0.7$ ), the current ratings must be multiplied by a factor of 0.7 before reading off the relevant values from the curve.

#### 3. At increased ambient temperature (DC or AC operation)

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70 °C
Factor	1.1	1.2	1.3

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 28 mm x 39 mm

### Decks

12 contacts always form an outer contact ring. Spoon-shaped, silver or gold-plated wiping contacts establish the electrical connection to an inner common ring or to common segments. The wiping contacts are mounted in a plastic holder and are pressed onto the contact by M-shaped leaf springs.

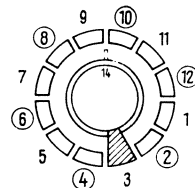
#### Single-pole:

One wiping contact connects one of the outer contacts to the continuous common ring.

Number of usable positions

12-position indexing mechanism: 12 (mating mode)

6-position indexing mechanism: 6 (break mode)



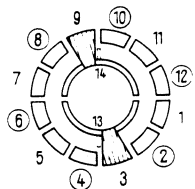
#### 2-pole:

Two wiping contacts connect separate outer contacts to each of the two common-ring segments.

Number of usable positions

12-position indexing mechanism: 6 (mating mode)

6-position indexing mechanism: 3 (break mode)



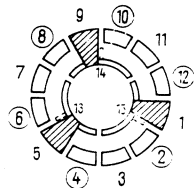
#### 3-pole:

Three wiping contacts connect separate outer contacts to each of the three common-ring segments.

Number of usable positions

12-position indexing mechanism: 4 (mating mode)

6-position indexing mechanism: 2 (break mode)

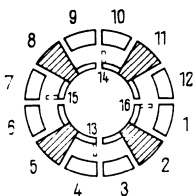


#### 4-pole:

Four wiping contacts connect separate outer contacts to each of the four center segments.

Number of usable positions

12-position indexing mechanism: 3 (mating mode)



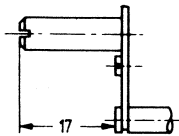
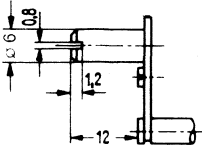
The contact side of the decks is shown from the front. In the case of switches with 6-position indexing, only the contacts enclosed in circles are selected. The hatched wiping contacts indicate a momentary position.



# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 28 mm x 39 mm

### Shaft ends

Identification letter for shape of the shaft end (Please refer to order designation, 3rd block):		Dimensions of the shaft end
12-position indexing	6-position indexing	Dimension a
A	M	
B	N	

### Indexing mechanism

Setting the stops:

Slacken the front screws on the left and right of the shaft.

Rotate the switch to one of the positions used.

Engage the lugs on the stop rings on both sides of the shaft dog.

Rotate the switch in both directions to the required end positions.

Tighten the front screws.

### Notes on processing


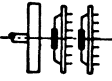
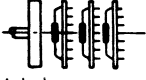
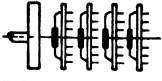


- Blister packaging
- Processing class A <sup>1)</sup>

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches 28 mm x 39 mm

### Ordering information

Switches with decks made of phenolic paper		Contacts: silver-plated	Quantity per pack- aging unit (Minimum acceptable order quantity)	Contacts: gold-plated	Quantity per pack- aging unit (Minimum acceptable order quantity)
		Order designation		Order designation	
	Single-pole	C40315-M301-★1	1	C40315-M331-★1	1
	2-pole	C40315-M302-★1	1	C40315-M332-★1	1
	3-pole	C40315-M303-★1	1	C40315-M333-★1	1
	4-pole	C40315-M304-★1	1	C40315-M334-★1	1
	Single-pole	C40315-M301-★2	1	C40315-M331-★2	1
	2-pole	C40315-M302-★2	1	C40315-M332-★2	1
	3-pole	C40315-M303-★2	1	—	—
	4-pole	C40315-M304-★2	1	—	—
	Single-pole	C40315-M301-★3	1	C40315-M331-★3	1
	2-pole	C40315-M302-★3	1	C40315-M332-★3	1
	3-pole	C40315-M303-★3	1	C40315-M333-★3	1
	Single-pole	—	—	C40315-M331-★4	1
	2-pole	—	—	C40315-M332-★4	1
	3-pole	—	—	C40315-M333-★4	1
	Single-pole	—	—	C40315-M331-★5	1
	2-pole	—	—	C40315-M332-★5	1
	Single-pole	—	—	—	—
	2-pole	—	—	C40315-M332-★6	1

Other types on request

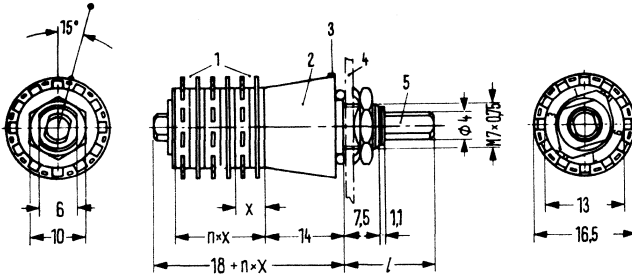
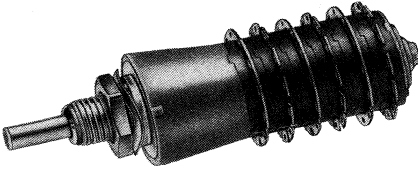
**Preferred items**  
**C40315-M301-A1**  
**C40315-M301-A2**

\* Identification letter for indexing and dimensions of the shaft end, see Page 3.17

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 17 mm

Multi-position rotary switches Ø 17 mm in accordance with DIN 41634 and VG 95318, Parts 2 and 5

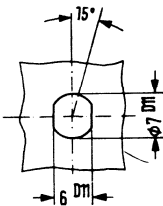


- x Height of deck = 7 mm
- n Number of decks
- l 12, 17, 20, 25, 32, 50 mm

Wire diameter per soldering terminal: 2 x Ø 0.6 mm

- 1 Decks
- 2 Indexing
- 3 Marking for switch position and soldering lug No. 1
- 4 Panel, gauge 0.8 to 3.5 mm (thickness)
- 5 Shaft end

Mounting holes



3

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 17 mm

---

### Version

- 1 to 5 decks, maximum 15 wiping contacts
- 6-position indexing (pitch 60°) with
  - 1 to 3-pole decks
  - mating or break mode
- or
- 12-position indexing (pitch 30°) with
  - 1 to 4-pole decks
  - mating mode
- Normal or soft indexing mechanism (soft indexing mechanism for switches which are to be actuated with knobs 10 mm, maximum of 6 wiping contacts)
- Rotary range with or without limiting (stops)
- Shaft shape and installation
  - Various lengths
  - Shaft ends with or without screwdriver slot
- Optionally for pressure-resistant installation (shaft bushing and mounting); test pressure 1 bar

### Other features

- High reliability thanks to twin contacts
- Contacting surfaces protected against dust and flux
- Compact design
- Single-hole mounting, non-turn

### Materials

- |                       |                |   |
|-----------------------|----------------|---|
| — Dielectrics         | Deck           | DAP                                       |
|                       | Rotor          | POM                                       |
| — Contact materials   | Deck           | CuNi18Zn20, nickel-plated and gold-plated |
|                       | Wiping contact | CuBe2, nickel-plated and gold-plated      |
| — Soldering terminals | Gold-plated    |   |

# Switches and pushbuttons for conventional wiring

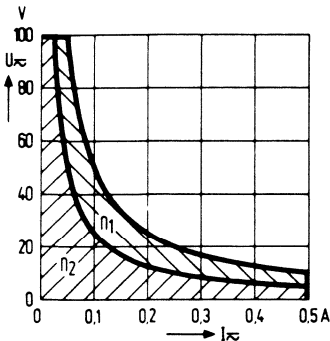
## Multi-position rotary switches Ø 17 mm

**Technical data** (in accordance with DIN 41634, IEC Publ. 132-1 and VG 95318, Part 5)

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating		≤ 100 V AC/DC
Current rating		≤ 0.5 A
Switch capacity		≤ 5 W (see also diagram below)
Service life,	mechanical	≥ 3 · 10 <sup>4</sup> switching cycles
	electrical with resistive load	See diagram below
Steady-state current (not switched)		≤ 1 A
Proof voltage		500 V, 50 Hz
Contact resistance (millivolt method)		≤ 30 mOhms
Insulation resistance		≥ 10 <sup>5</sup> MOhms; initial value ≥ 10 <sup>3</sup> MOhms after stressing
Capacitance	contact-neighboring contact	≤ 0.8 pF
	contact-sliding contact	≤ 1.5 pF
	closed contact-ground	≤ 4.0 pF
	closed contact-neighboring contact	≤ 1.5 pF
Creepage distances	contact-neighboring contact	≥ 0.5 mm
	contact-ground	≥ 1.5 mm <sup>1)</sup>
Air gaps	contact-neighboring contact	≥ 0.5 mm
	contact-ground	≥ 0.9 mm
Actuating torque of a switch with 15 wiping contacts <sup>2)</sup>		approx. 0.2 Nm
Stop strength		≥ 0.7 Nm
Ambient temperature range		—55 °C to +85 °C
Storage temperature range		—65 °C to +100 °C
Vibration, 20 g at 10 to 2000 Hz		No discontinuity ≥ 1ms
Shock, 50 g, 7 ms		No discontinuity ≥ 1ms

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term "one switching cycle" refers to actuation of the switch over the entire range and back again.

$$n_1 = 10^4 \quad \text{switching cycles}$$

$$n_2 = 3 \cdot 10^4 \quad \text{switching cycles}$$

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80	85 °C
Factor	1.1	1.2	1.3	1.4	1.5

<sup>1)</sup> On the last deck ≥ 1.0 mm

<sup>2)</sup> With soft indexing mechanism approx. 0.08 Nm

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 17 mm

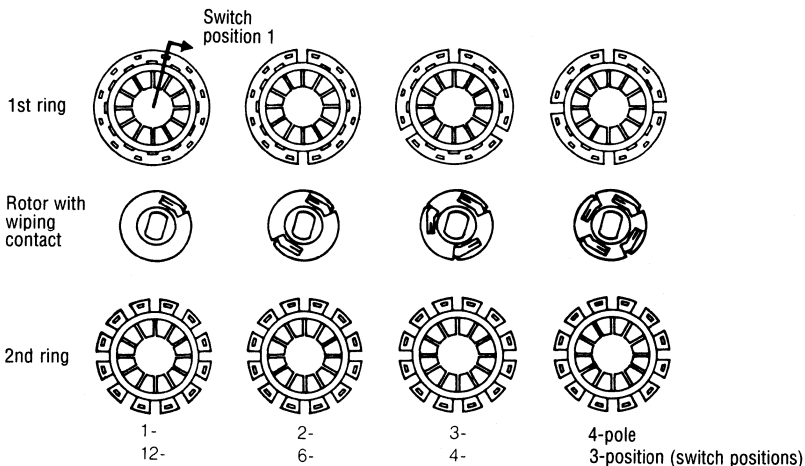
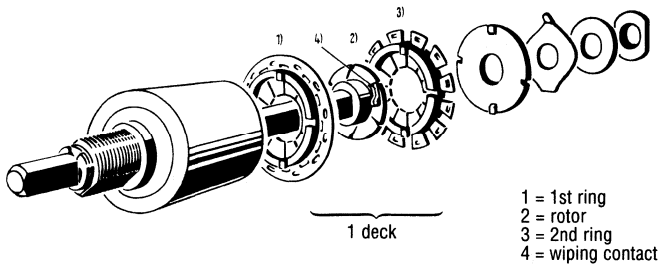
### Decks

Each deck consists of two wafers with twelve contact blades each and a rotor with up to four wiping contacts, each of which interconnect two axially adjacent contact blades.

The two wafers are of the same basic design: a punched wafer made of nickel-plated and gold-plated German silver with a spacing ring molded from thermosetting plastic. On the inside of the ring are the contact blades and on the outside, the soldering lugs. On the single-pole version, all the soldering lugs of the first wafer are connected by straps. On the multiple versions, the first wafer is divided into 2, 3 or 4 segments, each with 6, 4 or 3 contact blades. The second wafer has 12 separate contacts which are held in position by the insulating ring.

Depending upon the number of poles, the rotor houses 1 to 4 wiping contacts whose contacting surfaces are plated with gold alloy. The wiping contacts are mounted axially floating in the rotor and have twin contacts on both sides.

When used as a program controller, the first wafer is divided into segments with differing numbers of blades, corresponding to the program and the rotor is provided with matching wiping contacts.



# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 17 mm

### Shaft ends

The shaft ends, made of stainless steel, have a circular cross-section with flats at the side. Two different types of shaft end are available: smooth or with a slot for a screwdriver. It is thus suitable for rotary knobs with clamping collet and knobs with slots and lateral securing screws.

Shaft end lengths of 12, 17, 20, 25, 32 and 50 mm are available for the various types (measured from the panel).

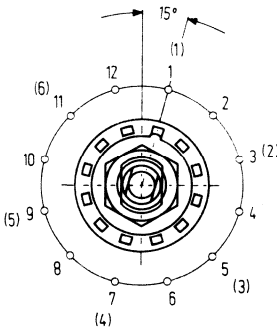
Special versions with waterproof shaft bushings and flange are available for mounting in waterproof housings.

### Indexing mechanism

Three-ball axial indexing mechanism on which the balls only roll on metal parts, thus substantially reducing wear.

### Rotary ranges

The rotary range is dependent upon the number of contacts, available optionally either or without stop.



Maximum permissible rotary ranges:

Single-pole from position 1 to 12 (6)

2-pole from position 1 to 6 (3)

3-pole from position 1 to 4 (2)

4-pole from position 1 to 3 (2)

With a 6-position indexing mechanism, the digits in parenthesis apply.

Only the values not in parenthesis appear on the switch.

### Installation

Non-rotatable single-hole mounting: fine thread M7 x 0.75 with nut and spring washer.

Permissible thickness of the mounting panel: 0.8 to 3.5 mm.

### Notes on processing

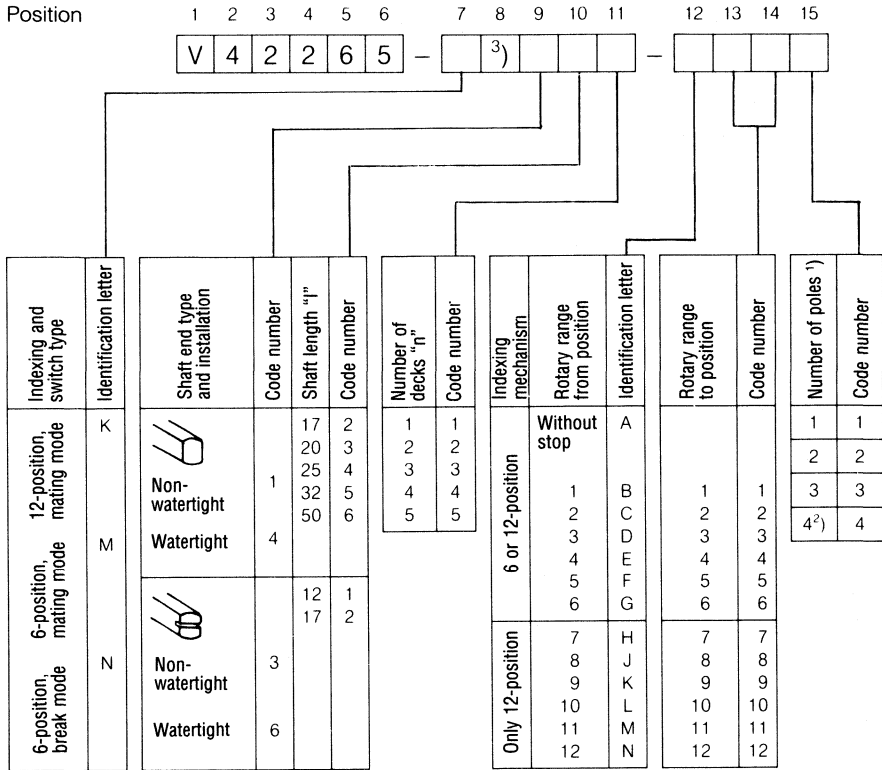
- Blister packaging
- Processing class A <sup>1)</sup>

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 17 mm

### Ordering code



Example order: V42265-K123-B121

Multi-position rotary switch with 12-position indexing, mating mode, normal indexing mechanism, non-watertight, shaft length 17 mm, 3 decks, rotary range from switch position 1 to switch position 12, single-pole

### Preferred items

**V42265-K121-B121**    **V42265-K122-B121**    **V42265-K123-B121**  
**V42265-K121-B62**    **V42265-K122-B62**    **V42265-N121-B61**  
**V42265-K121-B43**    **V42265-K122-B43**    **V42265-N122-B61**

Quantity per packaging unit (minimum acceptable order quantity): 6 ea. per order number

<sup>1)</sup> Max. 15 wiping contacts per switch

<sup>2)</sup> Not for 6-position indexing

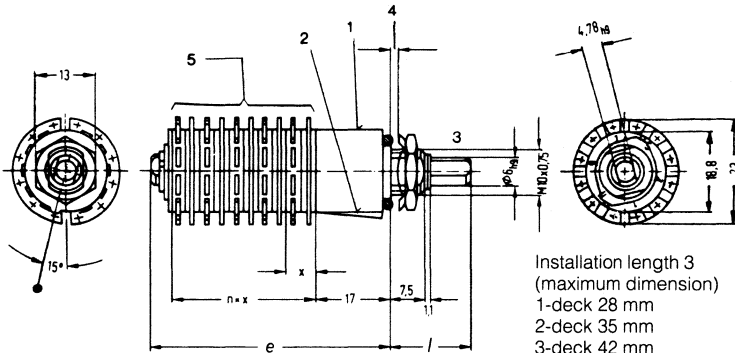
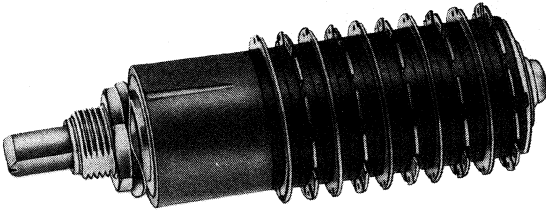
<sup>3)</sup> With soft indexing "1" (max. 6 wiping contacts)



# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 23 mm

### Multi-position rotary switches Ø 23 mm



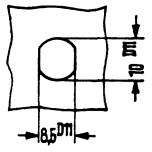
- Installation length 3  
(maximum dimension)
- 1-deck 28 mm
  - 2-deck 35 mm
  - 3-deck 42 mm
  - 4-deck 49 mm
  - 5-deck 56 mm
  - 6-deck 63 mm

- $x$  Height of deck = 7 mm
- $n$  Number of decks
- $l$  12, 17, 20, 25, 32, 50 mm

Wire diameter per soldering terminal: 2 x Ø 0.6 mm

- 1 Indexing
- 2 Marking for switch position and soldering lug No. 1
- 3 Shaft end (continuous)
- 4 Panel, gauge 0.8 to 3.5 mm (thickness)
- 5 Decks

### Mounting holes



# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 23 mm

---

### Version

- 1 to 6 decks, maximum 16 wiping contacts
- 6-position indexing mechanism (pitch 60°) with:
  - 1 to 3-pole decks
  - or
  - 12-position indexing mechanism (pitch 30°) with:
    - 1 to 4-pole and 6-pole decks
- Switching mode optionally break or mating
- Rotary range with or without limitation (stops)
- Shaft shape
  - Various lengths
  - Shaft ends with or without screwdriver slot
- Optionally for watertight installation (shaft bushing and mounting); test pressure 1 bar
- With soft indexing mechanism and non-detent position "spring return" on request

### Special features

- High reliability thanks to twin contacts
- Contacting surfaces protected against dust and flux
- Compact design
- Non-turn, mounting holes

### Materials

- |                       |                     |   |
|-----------------------|---------------------|---|
| — Dielectrics         | Decks               | PEEK-GF                                   |
|                       | Rotor               | POM                                       |
| — Contact materials   | Stationary contacts | CuNi18Zn20, nickel-plated and gold-plated |
|                       | Moving contacts     | CuBe2, nickel-plated and gold-plated      |
| — Soldering terminals | Gold-plated         |   |

# Switches and pushbuttons for conventional wiring

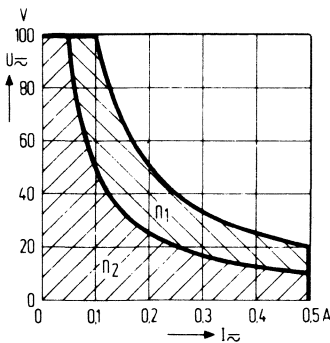
## Multi-position rotary switches Ø 23 mm

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 100 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 10 W (see diagram below)
Service life,	≥ 3 · 10 <sup>4</sup> switching cycles
mechanical	See diagram below
electrical with resistive load	
Steady-state current (not switched)	≤ 1 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 30 mOhms
Insulation resistance	≥ 10 <sup>5</sup> MOhms; initial value ≥ 10 <sup>3</sup> MOhms after stressing
Creepage distances	contact-contact contact-ground
contact-contact	≥ 0.5 mm
contact-ground	≥ 1.5 mm <sup>1)</sup>
Air gaps	contact-contact contact-ground
contact-contact	≥ 0.5 mm
contact-ground	≥ 1.3 mm <sup>1)</sup>
Actuating torque of a switch with 16 wiping contacts <sup>2)</sup>	approx. 0.2 Nm
Stop strength	≥ 1 Nm
Ambient temperature range	−55 °C to +85 °C
Vibration resistance	20 g (10 to 2000 Hz)
Shock resistance (six directions, shock duration 7 ms)	50 g

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term "one switching cycle" refers to actuation of the switch over the entire range and back again.

$$n_1 = 10^4 \quad \text{switching cycles}$$

$$n_2 = 3 \cdot 10^4 \quad \text{switching cycles}$$

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80	85 °C
Factor	1.1	1.2	1.3	1.4	1.5

<sup>1)</sup> On the last deck ≥ 1.0 mm

<sup>2)</sup> With soft indexing mechanism approx. 0.08 Nm

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 23 mm

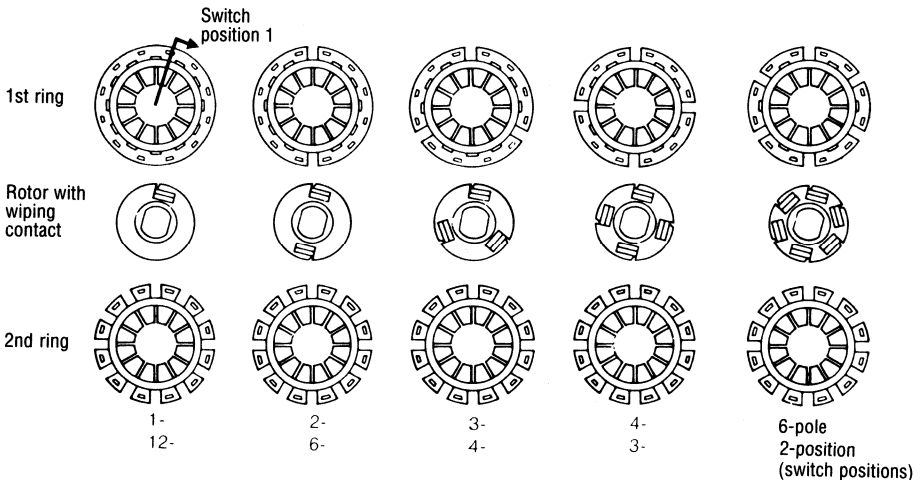
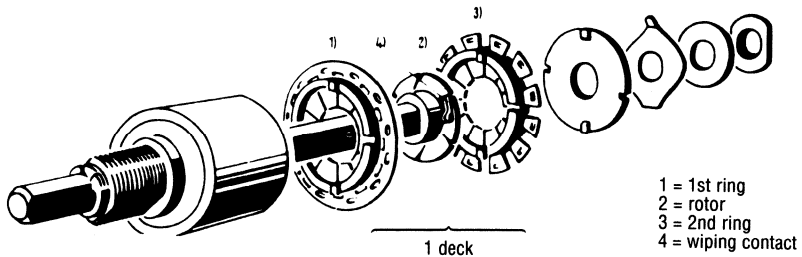
### Decks

Each deck consists of two wafers with twelve contact blades each and a rotor with up to six wiping contacts, each of which interconnect two axially adjacent contact blades.

The two wafers are of the same basic design: a punched wafer made of nickel-plated and gold-plated German silver and a spacing ring molded from thermosetting plastic. On the inside of the ring are the contact blades and on the outside, the soldering lugs. On the single-pole version, all the soldering lugs of the first wafer are connected by straps. On the multiple versions, the first wafer is divided into 2, 3, 4 or 6 segments, each with 6, 4, 3 or 2 contact blades. The second wafer has 12 separate contacts which are held in position by the insulating ring.

Depending upon the number of poles, the Hostaform rotor houses 1, 2, 3, 4 or 6 wiping contacts whose contacting surfaces are plated with gold alloy. The wiping contacts are mounted axially floating in the rotor and have twin contacts on both sides.

When used as a program controller, the first wafer is divided into segments with differing numbers of blades, corresponding to the program and the rotor is provided with matching wiping contacts.



# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 23 mm

### Shaft ends

The end of a switch shaft made of stainless steel is provided with flats on two sides to a length of 4.78 mm. It is suitable for commercial knobs and bar knobs. Shaft ends with screwdriver slot or M3 thread can also be supplied.

Different shaft lengths of  $l = 12, 17, 20, 25, 32$  and 50 mm are provided for mounting.

Special versions with waterproof shaft bushings and flange are available for mounting in waterproof housings.

### Indexing mechanism

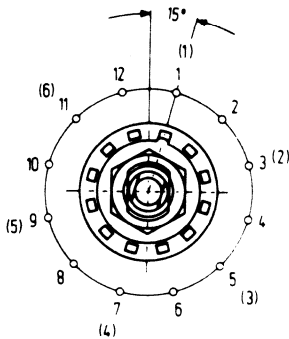
Three-ball axial indexing mechanism on which the balls only roll on metal parts, thus substantially reducing wear.

### Rotary ranges

The rotary range is dependent upon the number of poles, optionally with or without stops at the start and end of the rotary range.

Restricted rotary range, e.g. on single or 2-pole switches.

Also available, on request, with a non-detent position (spring return) at the end of the rotary range, i.e. the switch switches back to the last position but one when the knob is released. A non-detent position on both sides is also possible.



Maximum permissible rotary ranges on switches with stops:

Single-pole from position 1 to 12 (6)

2-pole from position 1 to 6 (3)

3-pole from position 1 to 4 (2)

4-pole from position 1 to 3 (2)

6-pole from position 1 to 2

With a 6-position indexing mechanism, the digits in parenthesis apply.

Only the values not in parenthesis appear on the switch.

3

### Installation

Non-rotatable single-hole mounting: fine thread M10 x 0.75 with nut and spring washer for panels, gauge 0.8 to 3.5 mm (thickness).

### Notes on processing

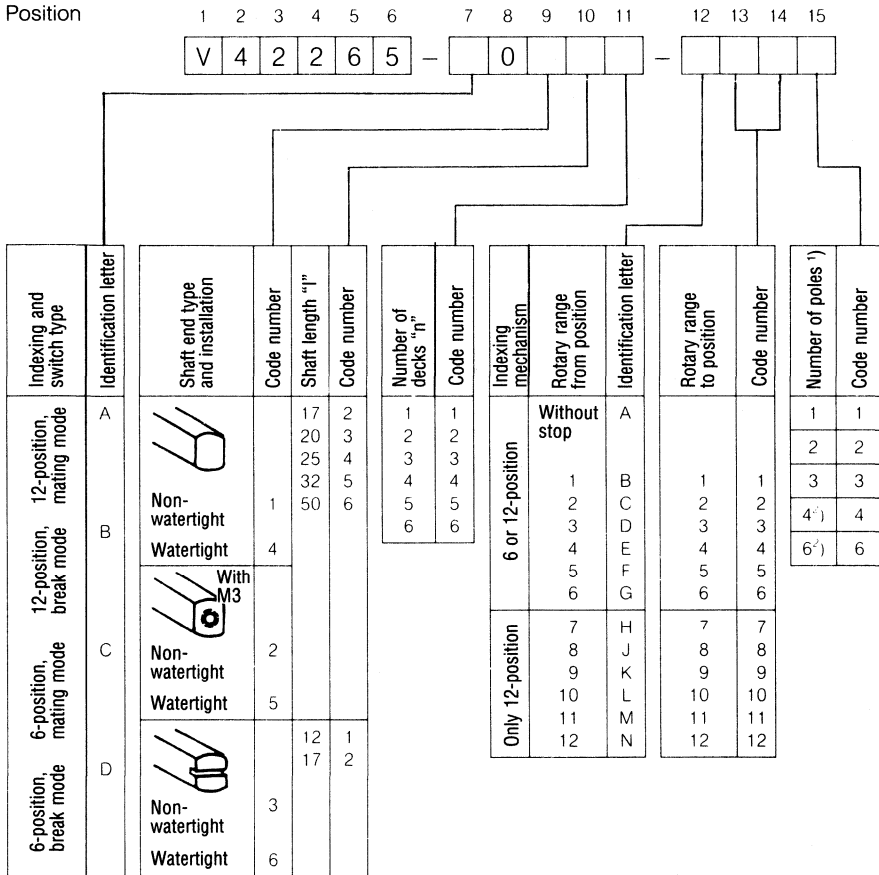
- Blister packaging
- Processing class A <sup>1)</sup>

<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for conventional wiring

## Multi-position rotary switches Ø 23 mm

### Ordering code



Example order: V42265-A142-B121

Multi-position rotary switch with 12-position indexing, mating mode, non-watertight, shaft length 25 mm, 2 decks, rotary range from switch position 1 to switch position 12, single-pole.

### Preferred items

**V42265-A141-B121      V42265-D142-B61**

Quantity per packaging unit (minimum acceptable order quantity): 5 ea. per order number

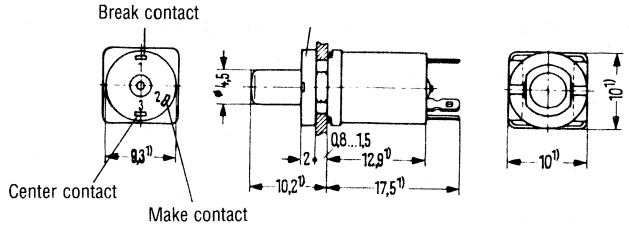
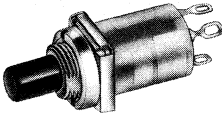
<sup>1)</sup> Max. 16 wiping contacts per switch

<sup>2)</sup> Not for 6-position indexing

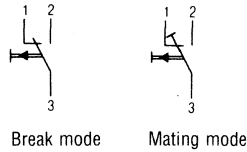
# Switches and pushbuttons for conventional wiring

## Pushbutton switches A11

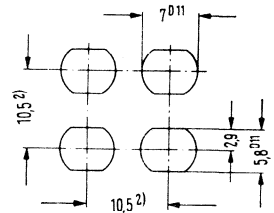
### Pushbutton switches A11



Circuit diagram



Mounting holes  
(Example for 4 pushbutton switches)



Wire diameter per soldering  
terminal 2 x Ø 0.7 mm

### Version

- With 1 changeover contact
- Switching mode: optionally mating or break
- Mounting: single-hole mounting, non-turn

Version for printed circuits, see Page 2.33

### Materials

— Dielectrics	Button	POM
	Housing	PC-GF
— Contact materials	Stationary contact	CuZn37, nickel-plated and gold-plated
	Wiping contact	CuNi18Zn20, nickel-plated and gold-plated
— Soldering terminals	Nickel-plated and tin-coated	

<sup>1)</sup> Maximum dimension

<sup>2)</sup> Minimum dimension

<sup>3)</sup> Installation aid: socket wrench C42407-A31-A1

# Switches and pushbuttons for conventional wiring

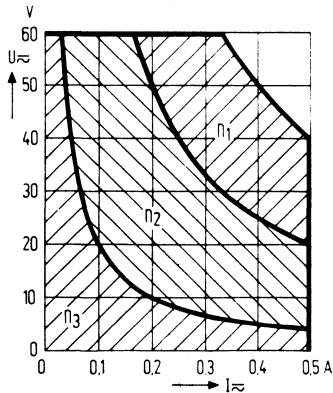
## Pushbutton switches A11

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 60 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 20 W (see diagram below)
Service life, mechanical	≥ 2 · 10 <sup>4</sup> switching cycles
electrical with resistive load	See diagram below
Steady-state current (not switched)	≤ 1 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 50 mOhms initial value ≤ 100 mOhms after stressing
Insulation resistance	≥ 10 <sup>6</sup> MOhms; initial value ≥ 10 <sup>4</sup> MOhms after stressing
Capacitance	≤ 1 pF
Creepage distances contact-ground	≥ 0.5 mm
Air gaps contact-ground	≥ 0.5 mm
Switch-on stroke mating mode	≥ 2.8 mm
break mode	≥ 3.3 mm
Overall stroke	≥ 3.7 mm
Ambient temperature range	−40 °C to +100°C

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term "one switching cycle" refers to actuation of the switch over the entire range and back again.

- $n_1 = 10^3$  switching cycles
- $n_2 = 10^4$  switching cycles
- $n_3 = 2 \cdot 10^4$  switching cycles

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80	90	100 °C
Factor	1.1	1.2	1.3	1.4	1.5	1.6

1) Maximum dimension  
2) Minimum dimension



# Switches and pushbuttons for conventional wiring

## Pushbutton switches A11

---

### Notes on processing

- Blister packaging
- Processing class A <sup>1)</sup>

### Ordering information

Item	Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Pushbutton switch A 11, mating mode		
Button color black	<b>C42315-A11-A2</b>	20
Button color white	<b>C42315-A11-A3</b>	20
Button color red	<b>C42315-A11-A4</b>	20
Pushbutton switch A 11, break mode		
Button color black	<b>C42315-A11-A8</b>	20
Button color white	<b>C42315-A11-A9</b>	20
Button color red	<b>C42315-A11-A10</b>	20

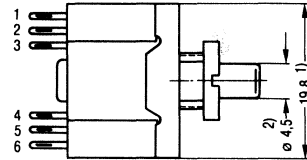
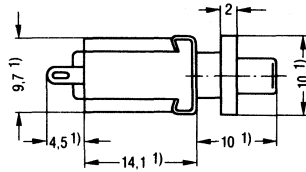
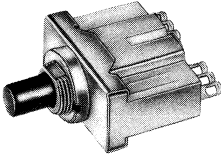
<sup>1)</sup> See Page 1.8

# Switches and pushbuttons for conventional wiring

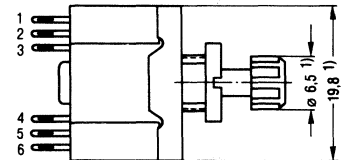
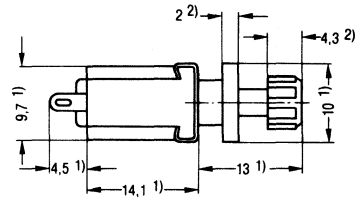
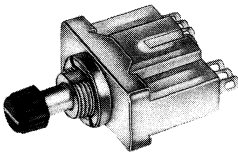
## Pushbutton switches A2

### Pushbutton switches A2

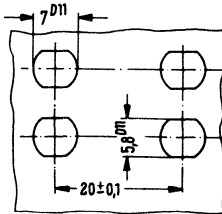
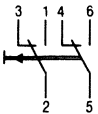
Without indexing



With indexing



Circuit diagram    Mounting holes  
(Example: cluster of  
4 pushbutton switches)



Thickness of the panel  
0.8 to 1.6 mm

### Version

- With 2 changeover contacts
- Switching mode: break mode
- Mounting: single-hole mounting, non-turn
- On the version with indexing (knurled knob), the operating position of the button can be locked by rotating the button 90° in a clockwise direction.

Version for printed circuits, see Page 2.35

1) Maximum dimension  
2) Installation dimension

# Switches and pushbuttons for conventional wiring

## Pushbutton switches A2

### Materials

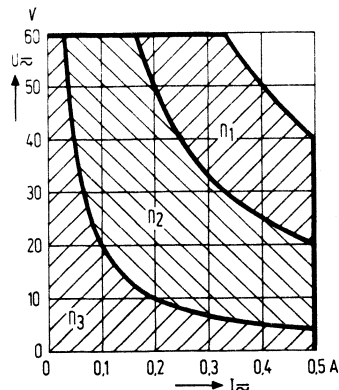
— Dielectrics	Actuator	POM
	Housing	PC-GF
— Contact materials	Contact plate	CuZn37, nickel-plated and gold-plated
	Wiping contact/stationary contact	CuNi18Zn20, nickel-plated and gold-plated
— Soldering terminals	Tin-coated	

### Technical data

Load capability, measuring and test methods in accordance with DIN IEC 68 and DIN 41640 or IEC 512

Voltage rating	≤ 60 V AC/DC
Current rating	≤ 0.5 A
Switch capacity	≤ 20 W (see diagram below)
Service life, mechanical	≥ 2 · 10 <sup>4</sup> switching cycles
electrical with resistive load	See diagram below
Steady-state current (not switched)	≤ 1 A
Proof voltage	500 V, 50 Hz
Contact resistance (millivolt method)	≤ 30 mOhms initial value ≤ 60 mOhms after stressing
Insulation resistance	≥ 10 <sup>6</sup> MOhms; initial value ≥ 10 <sup>4</sup> MOhms after stressing
Capacitance	≤ 0.8 pF
Creepage distances contact-ground	≥ 1.8 mm
Air gaps contact-ground	≥ 1.8 mm
Switch-on stroke	≥ 2.6 mm
Stroke for indexing	≥ 2.8 mm
Overall stroke	≥ 2.85 mm
Ambient temperature range	—40 °C to +100 °C

Switch capacity with resistive load and service life



The number of switching cycles attainable with DC and AC can be derived from the adjacent diagram as a function of the current rating. The term "one switching cycle" refers to actuation of the switch over the entire range and back again.

$n_1 = 10^3$	switching cycles
$n_2 = 10^4$	switching cycles
$n_3 = 2 \cdot 10^4$	switching cycles

If the switches are operated at ambient temperatures exceeding 40 °C, the current ratings must be multiplied by the following factors before reading off the relevant values from the curves:

Ambient temperature	50	60	70	80	90	100 °C
Factor	1.1	1.2	1.3	1.4	1.5	1.6

# Switches and pushbuttons for conventional wiring

## Pushbutton switches A2

---

### Notes on processing

- Blister packaging
- Processing class A <sup>1)</sup>

### Ordering information

Item	Order designation	Quantity per packaging unit (Minimum acceptable order quantity)
Pushbutton switch A 2, without indexing, button color black	<b>C42315-A2-A1</b>	15
Pushbutton switch A 2, with indexing, button color black	<b>C42315-A2-A7</b>	15

<sup>1)</sup> See Page 1.8

# List of order designations

# Switches and pushbuttons

## List of order designations

Order designation	Section/Page	Order designation	Section/Page
C315-A70-C★★	2.59	V23770-A91★★-+★★★★	2.82
C315-A73★★-A★★	2.65	V23770-A92★★-+★★★★	2.82
C26382-F★★★★-+★★★★	2.75	V23770-A99★★-+★★★★	2.80
C26382-F7-B★	2.86	V23770-X15★★-A93	2.79
C26382-F2★★★-+★★★★	2.82	V42263-D★★-+★★★★	2.70
C26382-F300-B★★★★	2.85	V42264-H9★★-+★★★★	2.45
C26382-F300-C★★★★	2.85 and 2.87	V42264-H100★★-+★★★★	2.47
C26382-F301-C★★★★	2.84	V42264-K1-A★	2.24
C26382-F302-C★★★★	2.84	V42264-P★★★★-+★★★★	2.42
C26382-F304-C★★★★	2.84	V42264-Q★★★★-+★★★★	2.42
C26382-F305-C1★★	2.79	V42264-V150★-D★★	2.30
C26382-F330-C★★	2.81	V42264-W150★-D★★	2.30
C26382-F4★★-C★	2.80	V42265-A★★★★-+★★★★	3.30
C26382-F500-C★★	2.85	V42265-B★★★★-+★★★★	3.30
C40315-M1★★-+★★★★	3.11	V42265-C★★★★-+★★★★	3.30
C40315-M23★★-+★★★★	3.12	V42265-D★★★★-+★★★★	3.30
C40315-M25★★-+★★★★	3.11	V42265-K★★★★-+★★★★	3.24
C40315-M3★★★★-+★	3.18	V42265-M★★★★-+★★★★	3.24
C42195-A126-A1	2.53	V42265-N★★★★-+★★★★	3.24
C42315-A2-A1	3.36	V42266-+3000-+★★★★	2.91
C42315-A2-A7	3.36		
C42315-A2-A13	2.37		
C42315-A2-A19	2.37		
C42315-A9-A★	2.34		
C42315-A11-A★★	3.33		
C42315-A60-A1	2.11		
C42315-A60-A2	2.11		
C42315-A60-A3	2.32		
C42315-A60-A4	2.32		
C42315-A60-A12	2.11		
C42315-A60-A24	2.11		
C42315-A60-A25	2.11		
C42315-A60-A32	2.11		
C42315-A68-A★★	2.7		
C42315-A1341-A★★★★	2.14		
C42315-A1345-A★★	2.27		
C42315-A1347-A★★★★	2.51		
C42315-A1353-A★★	2.21		
C42407-A78-A1	2.51		
V4028-A★★★★-+★★0	2.57		
V23756-A300★-A★★	2.17		
V3758-A21★3-A★★★★	2.71		
V23758-B2000-+★★★★	2.92		
V23770-A★★★★-+★★★★	2.75, 2.83		
V23770-A90★★-K1	2.80		











**For your notes**

Lined paper for taking notes, consisting of approximately 25 horizontal lines.



















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☎ 52817

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PO B 775/11511 Cairo  
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☎ 93199 sre un

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