

ASSEMBLY AND INSTALLATION

Please note:

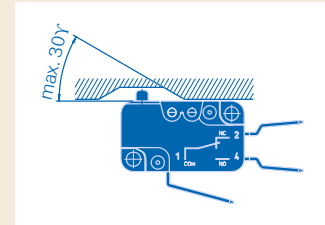
ZF snap switches should only be installed by trained staff. Generally, adherence to the required air gap and creepage distance must be ensured with suitable measures. These must also be adhered to for lines connected to the switch.

If installation is to occur on a conductive surface, insulating panels must be used. Under some circumstances, their use is also required between switches installed alongside one another and plug-in connections. Switches can be installed in any position. Power transmission to the connections of the switch is not permitted. When fastening with screws, screws with a co-planar contact surface must be used. (e.g. in accordance with DIN 84, DIN 912). Smooth, solid surfaces are suitable for installation. Exceeding of the following tightening torque values is not permissible. We recommend trial installations. If you wish to install your switches using coupling pins, we would be happy to advise you on suitable parameters.

If components are likely to be subjected to vibrations, we advise you to take additional measures to secure them. With solder connections, the product-specific solder recommendations must be heeded in order to prevent damage or destruction of the switches.

Cleaning agents and solvents in proximity to the switches can impair their function, especially in case of watertight models. When using greases (especially mineral oil-based ones), we recommend consultation with ZF. The switching action may be initiated by a force acting vertically on the actuator, or by an angled actuation lever.

Example:



The angle of the lever in relation to the top of the switch housing should not exceed 30°. The precise angle will also depend on the actuating speed, combination of materials, surface characteristics and so on. In case of auxiliary actuators with rollers or simulated rollers, steps should be taken to ensure that the lever does not impede its own action. This means that the direction of actuation should be away from the actuator's mounting point towards the roller, and the angle of actuation should be adjusted to allow for the geometry of the actuation system. We would always recommend a preliminary discussion with ZF.

The actuator may not be pre-stressed when at rest. When actuated, the switch should travel well beyond the switching point, for at least 50% of the predefined overtravel, in order to ensure that full contact is made. It is quite unacceptable for the switch to exceed the specified overtravel or end position. Using the switch as a mechanical end stop should be avoided. A high-impact actuation of the switch can have a negative effect on the switch's mechanical life.

Switch	Screw	max. tightening torque
DH	M 1.6	10 Ncm
DG	M 2	13 Ncm
DB, DZ	M 2.3	12 Ncm
DC	M 2.3	20 Ncm
D3, D4	M 3	60 Ncm

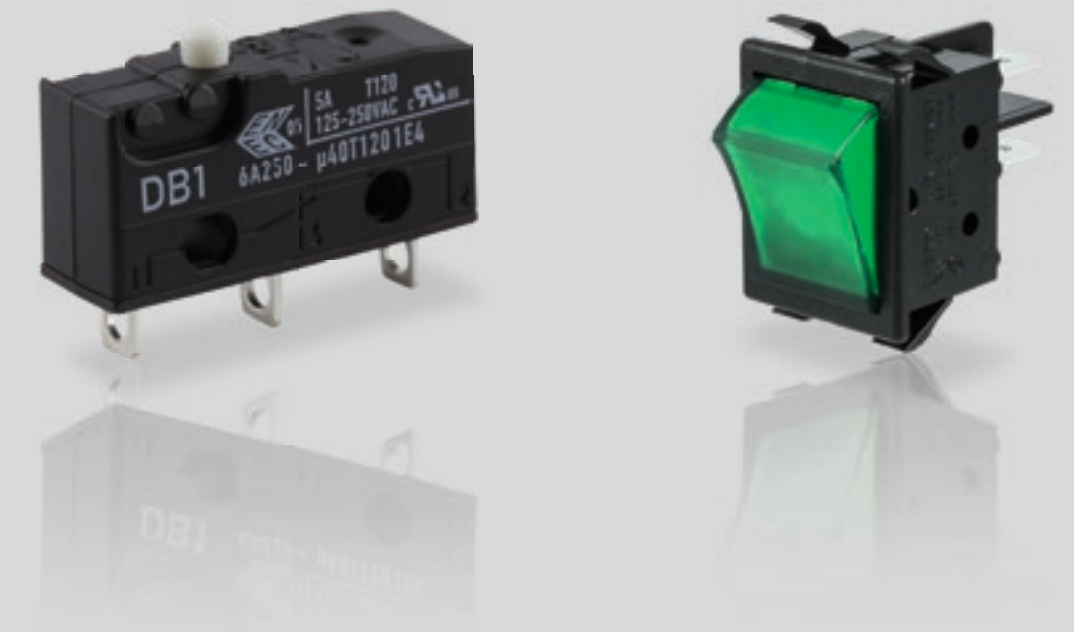
ZF Friedrichshafen AG
 Cherrystrasse
 91275 Auerbach
 Germany
 Phone +49 9643 18-0
 Fax +49 9643 18-1720
 www.switches-sensors.zf.com

ZF Electronic Systems Pleasant Prairie LLC
 11200 88th Avenue
 Pleasant Prairie, Wisconsin
 USA 53158
 Phone +1 262 942 6500
 Fax +1 262 942 6566

ZF Electronics Asia Limited
 2/F Technology Plaza
 29-35 Sha Tsui Road
 Tsuen Wan, New Territories
 Hong Kong
 Phone +852 25 65 66 78
 Fax +852 25 65 68 27

ZF Electronics TVS (India) Private Limited
 Madurai - Melur Road,
 Vellaripatti, Madurai - 625 122
 India
 Phone +91 452 24 202 08
 Fax +91 452 24 203 8

SNAP SWITCHES ROCKER SWITCHES



10 750 001 h EI 6011





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MATERIALS AND CONTACT RESISTANCE

Materials

For our standard switches, we use high-quality, cadmium-free plastics which are optimized for the intended application. As a rule, we seek to avoid the use of toxic or hazardous materials. You can find out more about our materials policy by consulting our hazardous substances exclusion list.

Behaviour of materials in fire

Insulating materials which are directly connected to electrically conductive parts are classified according to their degree of flammability. Most of the materials we use to manufacture housing are self-extinguishing and categorised under the UL 94 VO standard.

Proof tracking index

Most of the insulating materials we use in our snap switches have a proof tracking index of PTI 250 (PTI 300, e.g. D4) or PTI 175 (PTI 250, e.g. DB, DC). This means that they are capable of 50 drops of test fluid at a test voltage of 250 V without producing any leakage current (IEC 60112).

RoHS

Switches without leads already conform to RoHS. Switches with leads are available in RoHS-conforming models on request. In case of further processing with lead-free soldering, the product-specific solder recommendations must be heeded.

Glow wire test

The insulation materials used for snap switches with ENEC approval fulfil the required filament tests GWFI according to the household appliance standard IEC 60335-1 at 850°C and GWIT at 775°C or alternatively the filament test GWT at 750°C.

Contact resistance

The contact resistance of snap switches is composed of the contact resistance and the resistance of the conductive parts. It depends primarily on the construction and the contact material. The contact resistance of silver contacts is max. 100 mΩ, of gold contacts max. 50 mΩ when they are new.

Insulation resistance

The insulation resistance between the conductive parts of our snap switches and a conductive underlay or between the open contacts exceeds 10 MΩ when they are new, measured over a period of one minute at room temperature with 500 V DC.

Caution:







Humidity and soiling can decrease the insulation resistance.

Designations	
ASA	Acrylnitrat-Styrol-Acrylester
LCP	Liquid Crystal Polymer
PA	Polyamide
PBT	Polybutylenterephthalat
PET	Polyethylenterephthalat
POM	Polyoxymethylen (Polyacetal)
PPS	Polyphenylensulfid
PES	Polyethersulfon
SI	Silicone
TPE	Thermoplastic Elastomer
VMO	Vinyl-Methyl-Polysiloxan (Silicone rubber)

Degree of flammability	In vertical flammability test, goes out after no more thanh	Drops of molten material capable of igniting wadding	Max. duration of afterglow	
UL V-0	IEC/VDE FV-0	5 seconds	no	30 seconds
V-1	FV-1	25 seconds	no	30 seconds
V-2	FV-2	25 seconds	possible	60 seconds
HB	FH	Burning rate in horizontal flammability test: up to 3 mm thick < 7.5 mm/min; over 3 mm thick > 3.8 mm/min		

LEXICON

APPROVALS, MARKINGS AND PROTECTION

Approvals	
ENEC – VDE	 
ENEC – KEMA	 
UL USA	
UL USA and Kanada	

Remark

ENEC is the abbreviation for “European Norms Electrical Certification”. The ENEC mark is a common European safety certification mark, based on testing to harmonized European safety standards and includes also switches for appliances in accordance with EN 61058.

Degree of protection

Degrees of protection are expressed in terms of compliance with DIN 40050 part 9 and DIN VDE 0470. They are designated by the letters IP followed by two numbers. The first number indicates the extent to which the switch is protected against contact with live parts and the ingress of solid parts; the second number indicates the extent to which it is protected against the ingress of water. For the most part, our switches are covered by the following types of protection.

IP00	No special protection
IP40	Protected against access solid foreign objects of 1 mm diameter and greater
IP50	Dust-protected
IP65	Dustproof and protected against flowing water
IP67	Dustproof and protected against shortterm immersion

EN 61058-1 UL 61058-1	10 A	(3) A	250 V~	μ	40T85	5E4
	Rated current resistive load	Rated current motor load	Rated voltage alternating voltage	Microdisconnection Contact gap < 3 mm	Rated ambient temperature (-40°C up to +85°C)	Rated operation cycles: 50,000

UL 1054	10 A	1/2 HP	125–250 VAC
	Rated current inductive load	Rated current inductive load	Rated voltage



SWITCHES FROM ZF For many years, ZF Products have been synonymous with quality and reliability. Whether in household appliances, industrial applications or vehicles, electronic components ensure reliable performance as well as safety and comfort.

The quality of the overall system is determined by the quality of its individual components. So what exactly does the difference between good and excellent solutions consist of? Reliability, the strength for innovation and the advantage through technology are the cornerstone of success. Perfection down to the smallest detail is therefore the very essence of our corporate philosophy as a producer of electromechanical components.

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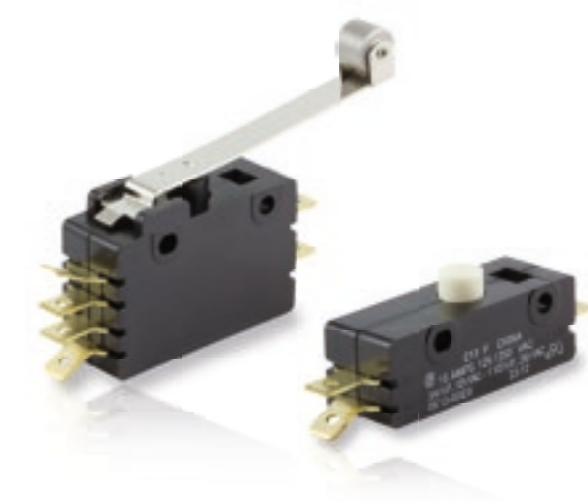
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GENERAL PURPOSE SWITCH E SERIES

General purpose switch E Series

5 button types in different versions and a variety of auxiliary actuators available

- 3 terminal types (optional screw terminals available)
- 3 contact arrangements
- Long-life coil spring mechanism
- High-temperature 150°C and 200°C available on select models (consult factory)



Electrical rating and operating life ②

Electrical rating according to	Electrical life (operations)		Code
	EN 61058-1	UL 1054	
Single pole			
– 15 A, 125/250 VAC 3/4HP, 125 VAC 1-1/2HP, 250 VAC 2 A, 48 VDC	–	6,000 (100,000*)	E13
– 25 A, 125/250 VAC 1HP, 125 VAC 2HP, 250 VAC 2 A, 48 VDC	–	6,000	E14
– 0.1 A, 125 VAC 0.1 A, 30 VDC	–	100,000	G13
Double pole			
– 15 A, 125/250 VAC 3/4HP, 1-1/2HP, 250 VAC	–	6,000 (100,000*)	E19
– 20 A, 125/250 VAC 1HP, 125 VAC 2HP, 250 VAC	–	6,000	E20
– 0.1 A, 125 VAC	–	100,000	G20

* Upon request

Technical specifications

Series	E ①
Electrical	
Ambient temperature	105°C standard 150°C optional (200°C optional) E13
Flammability rating	UL94HB
Materials	
Housing	General purpose phenolic
Actuator	Thermoplastic nylon
Common terminal	Copper Alloy
NO and NC terminals	Copper Alloy (E13, E19, G13, G20) Copper (E14, E20)
Moving blade	Copper Alloy (E13, E19, G13, G20) Copper (E14, E20)
Spring	Stainless steel
Auxiliary actuator	Cold-rolled steel (nickel-plated)
Roller	Sintered stainless steel
Contacts	Gold crosspoint (G13, G20) Silver alloy (E13, E14, E19, E20)

Mount point ③

Type	Code
Standard ratio actuator or button	0
High ratio actuator	5

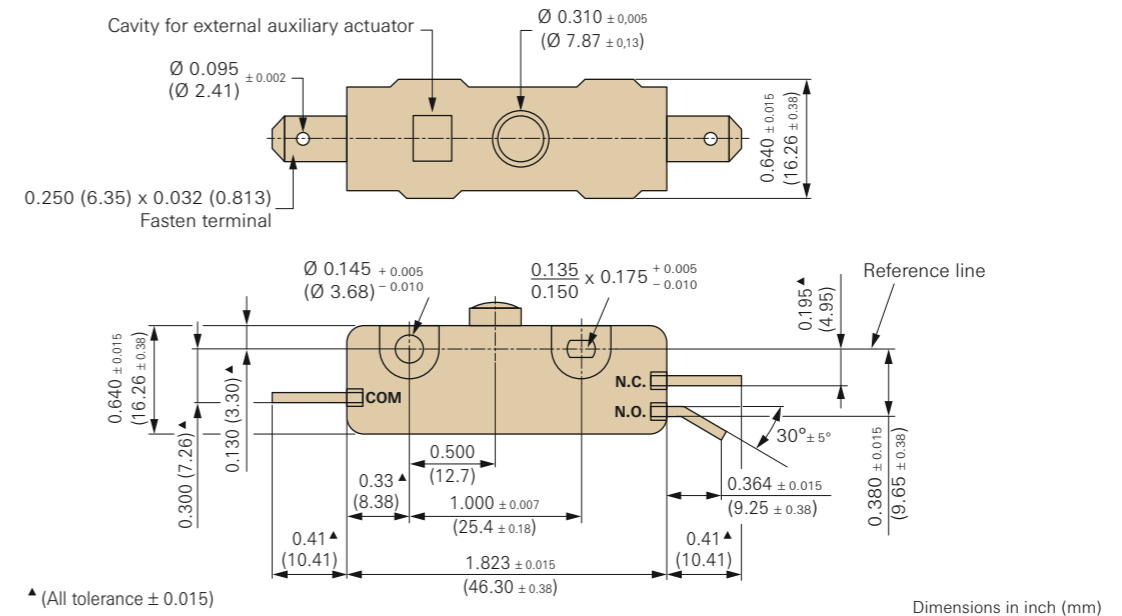
Circuitry ④

Type	Code
Double throw	0
Normally open	1
Normally closed	2

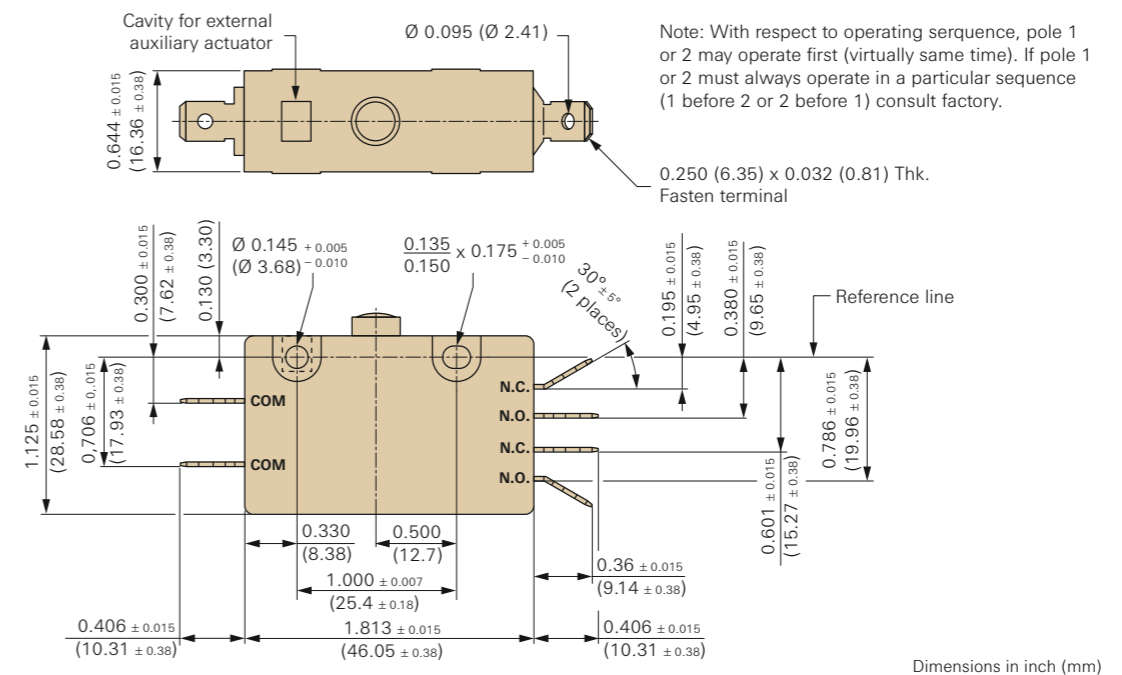
Actuator ⑤

Type	Code
Button	A E (only for E13)
Lever	H
Button with ferrule	J
Roller	K
Button with extra over-travel and ferrule	M

Single pole version



Double pole version



Generation of order code (example)

The order code consists of 5 parameters:

①	②	③	④	⑤
Series	Electrical rating	Mount point	Circuitry	Actuator
E = General purpose switch	19 = bipolar, 15 A, 125/250 VAC, 3/4HP, 1-1/2HP, 250 VAC	0 = Standard ratio actuator or button	0 = Double throw	A = Button

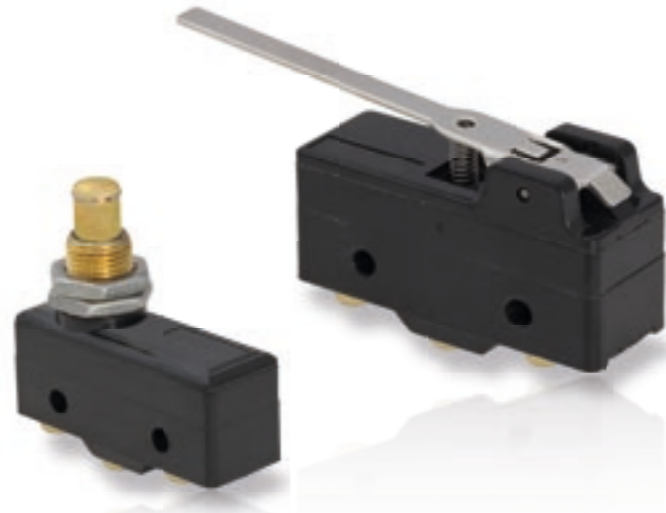
- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.

GENERAL PURPOSE SWITCH GP SERIES

General purpose switch GP Series

Heavy-duty snap-action switch with ultra-small travel differential

- Current rating up to 20 amps at 250 VAC
- Wide variety of actuators
- Screw or solder terminals available
- Mechanical life tested to over 20 million cycles
- Double throw switching function



Technical specifications

Series	GP 1
Ambient temperature	0°C to +55°C max. UL -5°C to +40°C VDE
Dielectric strength	1,000 VAC 50/60 Hz for 1 minute
Insulation resistance	100 MΩ min. at 500 VDC
Initial contact resistance	15 mΩ max.
Mounting	US Holes: #6-32 Fastener with 6.0 In-Lb max. torque Metric Holes: M4 Fastener with 6.0 In-Lb max torque
UL file number	E184788

Material specifications

Case/cover	Phenolic
Actuator	Thermoplastic nylon
Contacts	Silver alloy
Terminals	Screw terminals: brass Solder terminals: copper alloy
Lever actuator	Nickel plated steel

Terminals 2

Type	Code
Solder terminals	S
Screw terminals	T

Electrical rating and operating life 3

Type	Code	
according to EN *	according to UL	
-	20 A 250 VAC	B
15 A 250 VAC	15 A 250 VAC	C

* Only for versions with screw terminals

Actuator 4

Actuator types	Code, 1 st digit
Button	N
Straight lever	L
Roller	R

Actuator implementation

Code, 2 nd digit
Pin button actuator
Button actuator
Overtravel button actuator
Impulse roller lever
Panelmount overtravel button actuator
Short hinge roller lever
Leaf roller level
Long straight lever

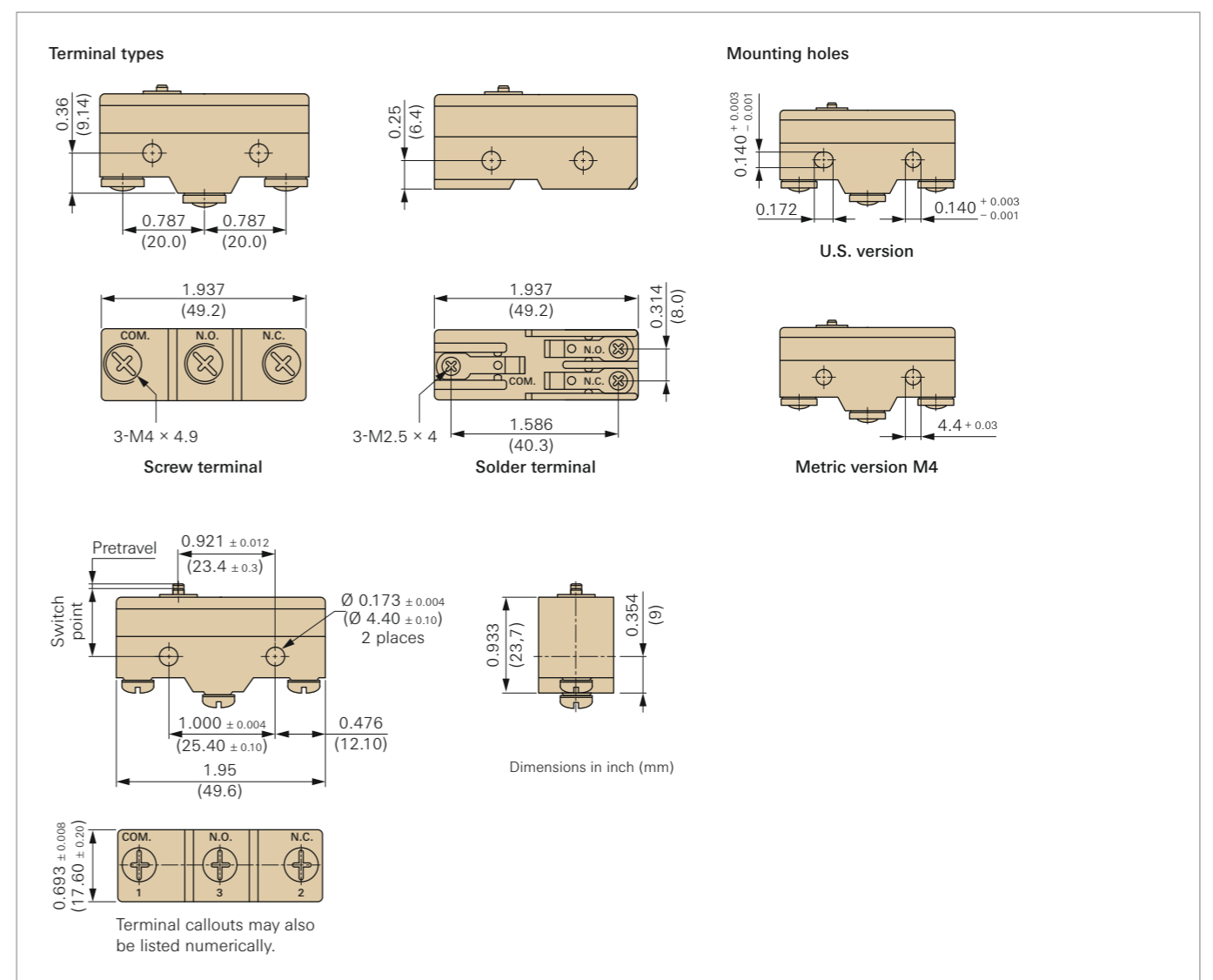
Mounting holes 5

Type	Code
Metric version m4	01
US version #6-32	11

Generation of order code (example)
The order code consists of 5 parameters:

1	2	3	4	5
Series	Terminals	Electrical rating	Actuator	Mounting holes
GP = General purpose switch	T = Screw terminal	B = 20 A, 250 VAC	LS = Long straight lever	01 = Metric version M4

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- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.



Commonly stocked parts

Switch	Contact arrangement	Electric rating according		Terminals	Actuator
		to EN	to UL		
GPTBLS01	Double throw	15 A 250 VAC	20 A 250 VAC	Screw terminal	Long straight lever
GPTBNA01	Double throw	15 A 250 VAC	20 A 250 VAC	Screw terminal	Pin button actuator
GPTBRM01	Double throw	15 A 250 VAC	20 A 250 VAC	Screw terminal	Short hinge roller lever
GPTCLR01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Leaf actuator
GPTCLS01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Long straight lever
GPTCLS02	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Straight lever
GPTCNA01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Pin button actuator
GPTCNC01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Button actuator
GPTCND01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Overtravel button actuator
GPTCNH01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Panelmount overtravel button actuator
GPTCRG01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Impuls roller lever
GPTCRH01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Panelmount overtravel roller actuator
GPTCRH02	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Panelmount overtravel cross roller actuator
GPTCRM01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Short hinge roller lever
GPTCRR01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Leaf roller lever
GPTCRS01	Double throw	15 A 250 VAC	15 A 250 VAC	Screw terminal	Long hinge roller lever

D3 MINIATURE SWITCH

D3 miniature switch

Standard switch proven millions of times over, extremely frictional, self-cleaning contacts. Version with contact gap > 3 mm on an identical basis.

- Flexible thanks to various auxiliary actuators and various mounting points
- Wide variety of terminal points
- Approved according to EN 61058 and UL 1054



Technical specifications

Series	D3 1
Contact configuration	S.P.S.T.-N.O., S.P.S.T.-N.C., S.P.D.T. (see table)
Contact gap	>3 mm
Switching voltage	250 VAC
Switching current max.	10 A (>3 mm)
Total travel	2.6 mm without auxiliary actuator
Mechanical life	1 x 10 ⁶ operations
Electrical life at max. load	50,000 switching cycles acc. to EN 61058-1 10,000 switching cycles acc. to UL 1054
Ambient temperature	40T85
Proof tracking index	PTI 250

Material

Housing/cover	PET (UL 94V-0)
Actuator	POM
Contact materials	AgNi
Terminals	Cu/CuZn
Auxiliary actuator	Nickel-plated steel, alternative stainless steel
Approvals	

Circuitry 3

Circuitry		Code
S.P.S.T.-N.O.	(only D3F and D36)	4
S.P.S.T.-N.C.	(only D3B)	5
S.P.D.T.	(only D3B)	6

Terminal type 4

Terminal type		Code
Q.C. terminal 6.8 x 0.8 mm, straight		V1
Q.C. terminal 6.8 x 0.8 mm, dog leg		V3
Q.C. terminal 4.8 x 0.8 mm, straight		Q1
Q.C. terminal 4.8 x 0.8 mm, dog leg		Q3
Solder terminal with temperature stop		S8

Auxiliary actuator 5

Model	Mounting point	Length	Code	Code		
Without auxiliary actuator			AA			
Material			Nickel-plated steel	Optional stainless steel		
		Straight	RM rear	21.2	LA	JA
			FM front	25.7	MA	KA
		Roller	RM rear	20.6	RA	RD
			FM front	25.1	TA	TD
		Simulated roller	RM rear	20.6	SA	
FM front	25.1		UA			

Generation of order code (example)
The order code consists of 5 parameters:

1	2	3	4	5
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
D3 = Miniature switch	6 = 4 (3) A, 250 VAC	2 = S.P.S.T.-N.C.	Q1 = Q.C. terminal, straight, 4.8 x 0.8 mm	MA = Straight, FM front, 25.7

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.
- Customer-specific models are marked with a G or W as the sixth digit of the article number.

Electrical rating and variants 2

Electrical rating according to	Availability	Housing mark	Code
EN 61058	UL 1054	S.P.S.T.-N.O. S.P.S.T.-N.C. S.P.D.T.	
4 (3) A, 250 VAC	4 A, 125–250 VAC	Yes – –	D3 6
8 (8) A, 250 VAC	10 A, 125–250 VAC	– Yes Yes	D3 B
10 (10) A, 250 VAC	10 A, 125–250 VAC	Yes – –	D3 F

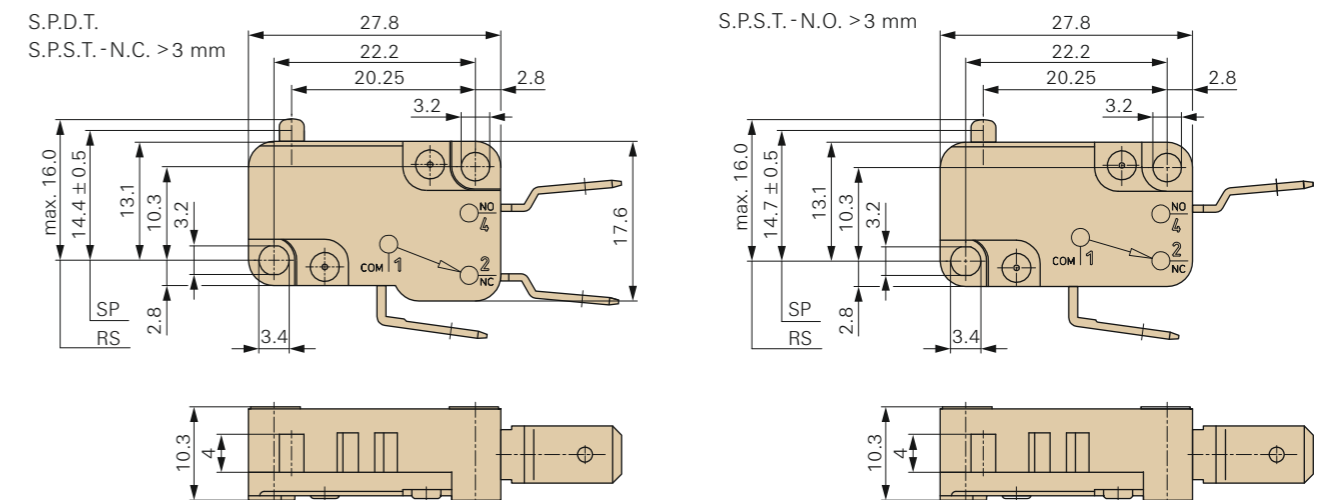
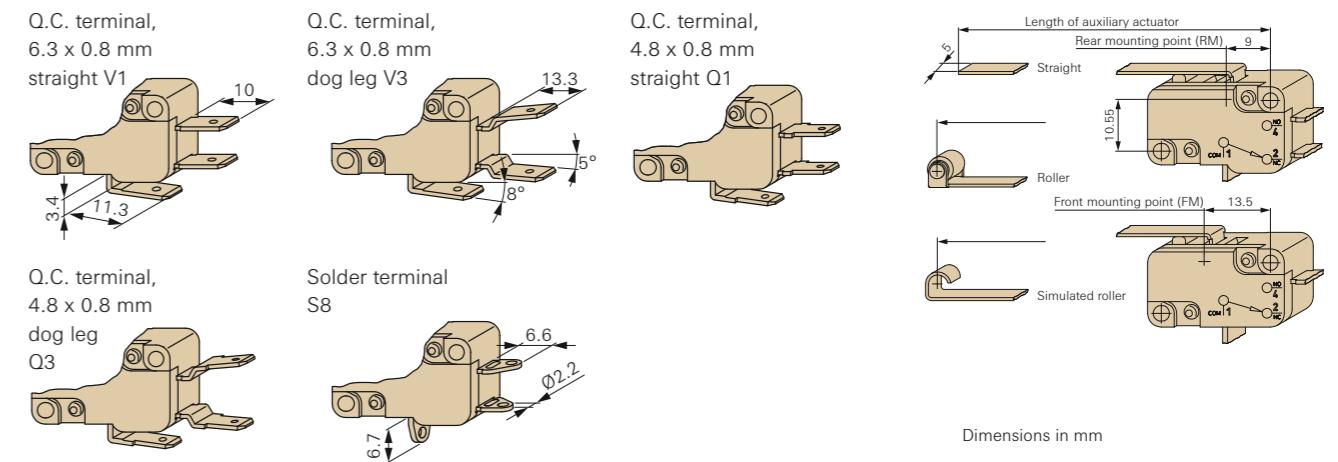
Additional breaking capacities on request

Switching parameters

Model	Operating force max. (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Max. Differential travel (mm)	Max. rest position (mm)	Operating point (mm)
Without auxiliary actuator	500	1.9	0.7	1.2	16.0	14.4 ± 0.5



Terminals



D4 MINIATURE SWITCH

D4 miniature switch

Versatile miniature snap action microswitch. A wide variety of auxiliary actuators and terminal options are available as standard and the switch fulfils the requirements of IEC 60335-1: GWFI at 850°C, GWIT at 775°C and GWT 750°C.

- High proof tracking index PTI 600
- High level of repeat accuracy
- High contact stability through application-specific contact materials up to a switching current of 0.1 to 21 A at 250 VAC
- Ambient temperature - 40 to + 150°C
- Approved according to IEC 61058-1/UL 61058-1



Technical specifications

Series	D4 ①
Contact configuration	S.P.D.T., S.P.S.T.-N.O., S.P.S.T.-N.C.
Contact gap	<3 mm (μ)
Switching voltage	250 VAC
Switching current	<0.1 to 21 A, depending on model
Total travel	2.6 mm
Mechanical life	see table on page 12
Electrical life	see table on page 12
Ambient temperature	40T85; 40T125; 40T150
Proof tracking index	PTI 300 (PET)/PTI 600 (PA6)

Materials

Housing/cover	PET/PA6 (UL 94V-0)
Actuator	POM (max. 85°C) alternative PET (UL 94V-0)
Contact materials	D41 AuAgPt (Crosspoint) D42 Ag D43-D48 AgNi
Terminals	CuZn, alternative Cu
Auxiliary actuator	Nickel-plated steel, alternative stainless steel

Approvals

Degree of protection IP40

Switch interior

Circuitry ③

Circuitry 40T85	Code
Standard operating force	
S.P.S.T.-N.O.	1
S.P.S.T.-N.C.	2
S.P.D.T.	3
Light operating force	Code
S.P.S.T.-N.O.	7
S.P.S.T.-N.C.	8
S.P.D.T.	9

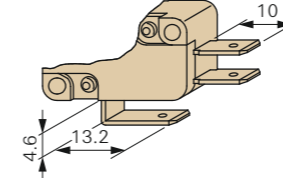
Circuitry 40T125	Code
Standard operating force	
S.P.S.T.-N.O.	G
S.P.S.T.-N.C.	H
S.P.D.T.	M
Light operating force	Code
S.P.S.T.-N.O.	N
S.P.S.T.-N.C.	P
S.P.D.T.	R

Circuitry 40T150*	Code
Standard operating force	
S.P.S.T.-N.O.	S
S.P.S.T.-N.C.	T
S.P.D.T.	U

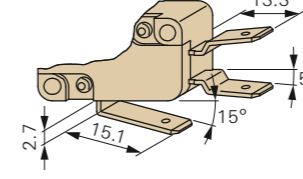
* Not for D48

Terminals

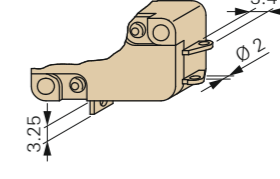
Q.C. terminal 6.3 x 0.8 mm straight V1



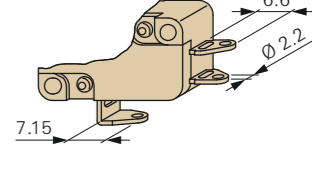
Q.C. terminal 6.3 x 0.8 mm dog leg V3



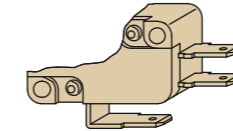
Solder terminal, short B8



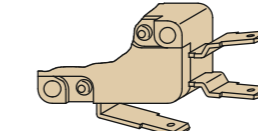
Solder terminal with temperature-stop S1



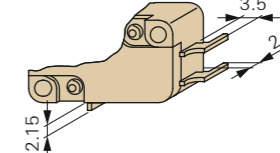
Q.C. terminal 4.8 x 0.8 mm straight Q1



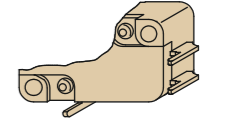
Q.C. terminal 4.8 x 0.8 mm dog leg Q3



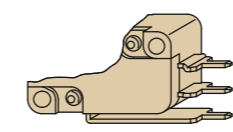
PCB terminal 1.3 x 0.8 mm housing side PA



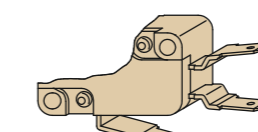
PCB terminal 1.3 x 0.8 mm cover side PB



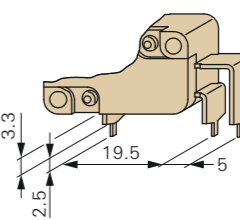
Q.C. terminal RAST 2.5 X5



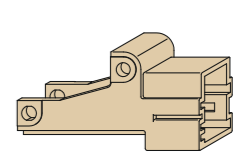
Q.C. terminal 4.8 x 0.5 mm dog leg R3



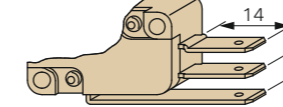
PCB terminal 1.3 x 0.5 mm, underside P4



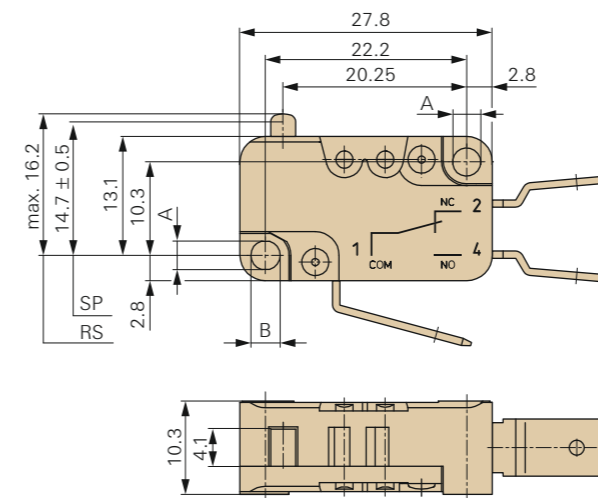
Connector housing for Q.C. terminal 6.3 x 0.8 mm, RAST 5



Q.C. terminal 6.3 x 0.8 mm RAST 5 Y5

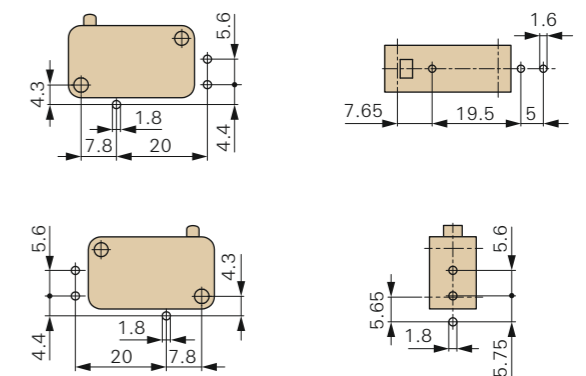


Other terminals available on request.



Dimensions in mm

Drilling patterns for PCB terminals



Mounting holes

Hole dimensions	Measurement „A“	Measurement „B“
	3.1 ± 0.15 mm	3.3 ± 0.15 mm

D4 MINIATURE SWITCH CONTINUED

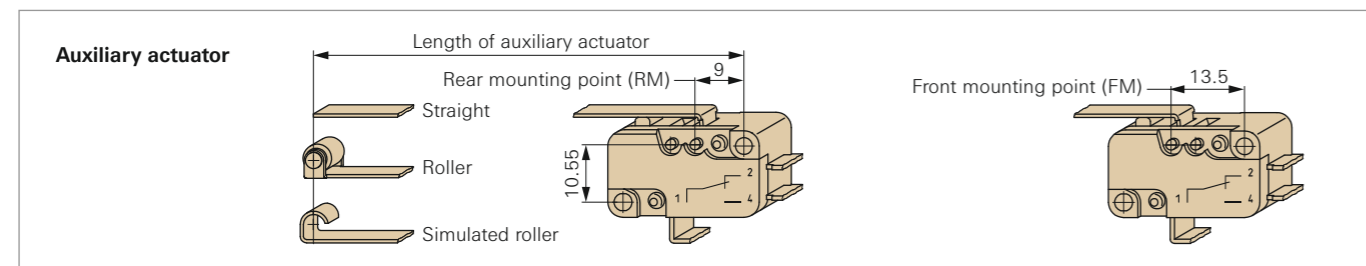
Electrical rating and operating life ②

Electrical rating according to***	Electrical life for 40T85* (operations)	Mechanical lifetime actuator material		Operating force max. (cN)	Housing mark	Code
		POM	PET			
EN/UL 61058-1	acc. to EN/UL	POM	PET	max. (cN)		
Standard operating force						
0.1 (0.05) A, 250 VAC	50,000	10 x 10 ⁶	1 x 10 ⁶	170	D4 1 Y	1
3 (1) A, 250 VAC	50,000	10 x 10 ⁶	1 x 10 ⁶	170	D4 2 Y	2
6 (2) A, 250 VAC	50,000	5 x 10 ⁶	25 x 10 ⁴	170	D4 3 Y	3
10 (3) A, 250 VAC	50,000	1 x 10 ⁶	1 x 10 ⁵	285	D4 4 Y	4
16 (4) A, 250 VAC	50,000	2 x 10 ⁵	1 x 10 ⁵	400	D4 5 Y	5
Light operating force						
0.1 (0.05) A, 250 VAC	50,000	10 x 10 ⁶	1 x 10 ⁶	45**	D4 1 X	1
3 (1) A, 250 VAC	50,000	10 x 10 ⁶	1 x 10 ⁶	45**	D4 2 X	2
6 (2) A, 250 VAC	50,000	10 x 10 ⁶	5 x 10 ⁵	45	D4 3 X	3
10 (3) A, 250 VAC	50,000	10 x 10 ⁶	25 x 10 ⁴	75	D4 4 X	4
16 (4) A, 250 VAC	50,000	10 x 10 ⁶	25 x 10 ⁴	100	D4 5 X	5
21 (8) A, 250 VAC	10,000	3 x 10 ⁶	25 x 10 ⁴	150	D4 8 X	8

* Operating life 40T125 and 40T150 on request
 ** Lower operating forces on request
 *** Additional electrical ratings according to UL 1054 on request

Switching parameters

Model	Type	Max. operating force (cN)		Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)	Code
		Standard	Light						
Without auxiliary actuator	D41	170	45	1.2	1.3	0.3	16.2	14.7 ± 0.5	AA
	D42	170	45	1.2	1.3	0.3	16.2	14.7 ± 0.5	
	D43	170	45	1.2	1.3	0.3	16.2	14.7 ± 0.5	
	D44	285	75	1.2	1.3	0.3	16.2	14.7 ± 0.5	
	D45	400	100	1.2	1.3	0.3	16.2	14.7 ± 0.5	
	D48	-	150	1.6	1.2	0.3	16.2	14.7 ± 0.5	



Terminal type ④

Terminal type	Code
Q.C. terminal 6.3 x 0.8 mm, straight	V1
Q.C. terminal 6.3 x 0.8 mm, dog leg	V3
Q.C. terminal 6.3 x 0.8 mm, RAST 5	Y5
Q.C. terminal RAST 2.5	X5
Q.C. terminal 4.8 x 0.8 mm, straight*	Q1
Q.C. terminal 4.8 x 0.8 mm, dog leg*	Q3
Q.C. terminal 4.8 x 0.5 mm, straight**	R1
Solder terminal short*	B8
Solder terminal with temperature-stop	S1
Welding terminal	A1
PCB terminal 1.3 x 0.8 mm, housing side*	PA
PCB terminal 1.3 x 0.8 mm, cover side*	PB
PCB terminal 1.3 x 0.5 mm, underside*	P4

* Not for D48
 ** D45 and D48 not with VDE approval, only UL1054

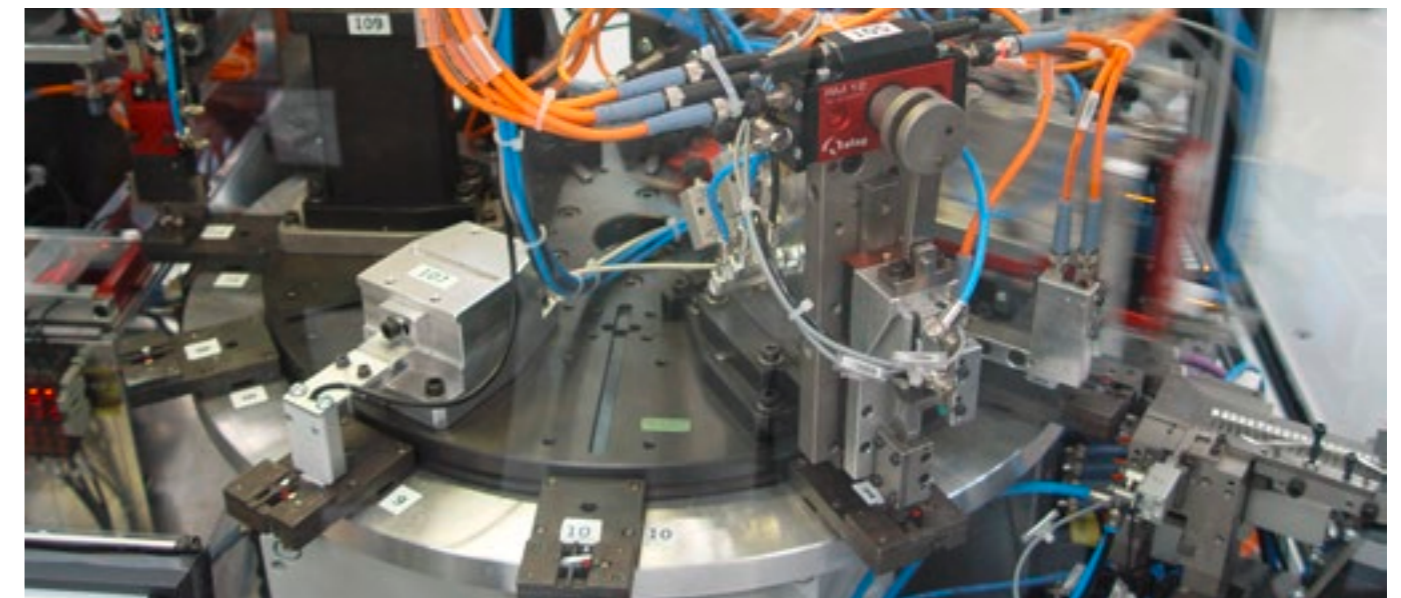
Auxiliary actuator ⑤

Type	Mounting point	Length	Code	Code
Without auxiliary actuator			AA	
	Material		Nickel-plated steel	Optional stainless steel
	Straight	RM rear	21.2	LA
35.6			LD	JD
69.9			LL	JL
FM front		25.7	MA	KA
		40.1	MD	KD
		74.4	ML	KL
Roller	RM rear	20.6	RA	
		34.1	RD	
	FM front	25.1	TA	
		38.6	TD	
Simulated roller	RM rear	20.6	SA	
	FM front	25.1	UA	

Generation of order code (example)
 The order code consists of 5 parameters:

①	②	③	④	⑤
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
D4 = Miniature switch	5 = 16 (4) A, 250 VAC	9 = S.P.D.T.	V3 = Q.C. terminal, dog leg, 6.3 x 0.8 mm	AA = without auxiliary actuator

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.
- Customer-specific models are marked with a G or W as the sixth digit of the article number.



D4 MINIATURE SWITCH WITH RAST 2.5 CONNECTOR

- D4 miniature switch with RAST 2.5 connector
 RAST 2.5 connection technology with integrated connector housing for external locking. Connector keying: R2.5/2-3adef according to RAST 2.5-Standard
- Case-sided wire direction
 - Preferred connecting system in the white goods industry
 - Cost-effective plug-system for the standardization of wire harness assemblies



Technical specifications

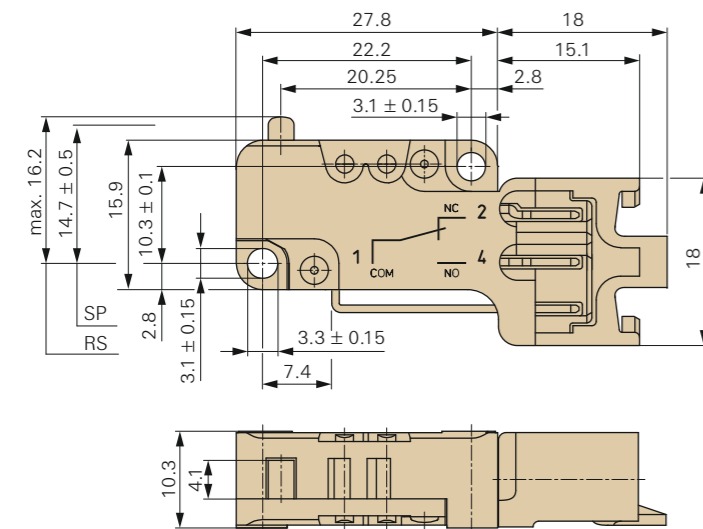
Series	D4 RAST 2.5
Switching current	< 0.1 to 6 A, depending on model
Ambient temperature	40T85

All other technical specifications are identical with D4 miniature switch (please see page 10)

Order code

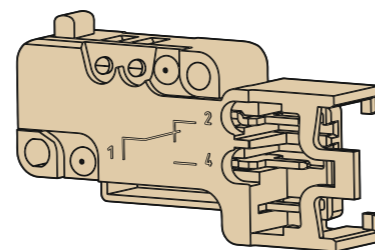
Order number on request

Dimensions



Dimensions in mm

Terminals D4 RAST 2.5



W4 MINIATURE SWITCH WITH WIPING CONTACT SYSTEM

- Miniature switch W4 with wiping contact system
 Wiping contact system suitable for special requirements such as capacitor loads
- Fulfills requirements of IEC 60335-1: GWFI at 850°C, GWIT at 775°C and GWT 750°C
 - Switching current 0.1 to 6 A at 250 VAC
 - Approved according to EN 61058 and UL 1054
 - Terminal versions available upon request



Technical specifications

Series	W4
Contact configuration	S.P.D.T., S.P.S.T.-N.O., S.P.S.T.-N.C.
Contact gap	< 3 mm (μ)
Switching voltage	250 VAC
Switching current	< 0.1 to 10 A
Total travel	2.6 mm
Electrical life	50,000 ENEC/UL
Ambient temperature	40T85
Proof tracking index	PTI 600 (PA6)

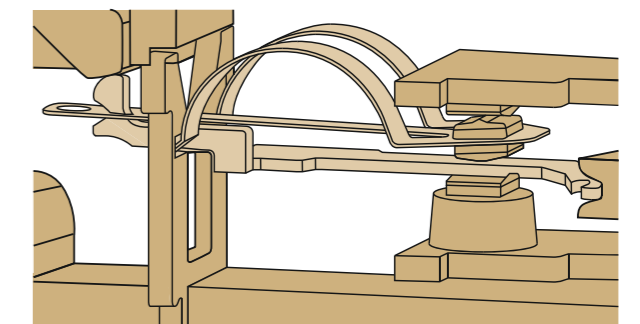
Materials

Housing/cover	PA6 (UL 94V-0)
Actuator	POM (max. 85°C) alternative PET (UL 94 V-0)
Contact materials	W41: AuAgPt (Crosspoint) W42: Ag W44: AgNi
Terminals	CuZn, silver-plated
Auxiliary actuator	Nickel-plated steel, alternative stainless steel
Approvals	UL US
Degree of protection	IP40
Switch interior	

Order code

Order number on request

Switch system



Dimensions identical with D4 (please see page 11)

DB SUBMINIATURE SWITCH

DB subminiature switch

Precision subminiature switch with high repeat accuracy, available up to an operating temperature of 120°C

- Nominal current up to 10 A at 250 V AC
- A wide variety of auxiliary actuators available
- Actuators can also be retrofitted, two mounting points
- High contact stability due to specific contact materials
- Mechanical life up to 15×10^6 actuations
- Wide variety of terminal types



Technical specifications

Series	DB 1
Contact configuration	S.P.D.T., S.P.S.T. - N.O., S.P.S.T. - N.C.
Contact gap	<3 mm (μ)
Switching voltage	250 VAC
Switching current	0.1 to 10 A AC, depending on model (see table on page 19)
Operating voltage	70 to 280 cN without auxiliary actuator, depending on model
Total travel	1.6 mm
Mechanical life	see table on page 18
Electrical life	see table on page 18
Ambient temperature	-40 to +85°C/120°C
Proof tracking index	PTI 175 (PTI 250 on request)

Materials

Base	PET (UL 94V-0)
Cover	PBT (UL 94V-0); PET (UL 94V-0)
Actuator	PBT (UL 94V-0) T120 POM (UL 94 HB) T85
Contacts	AgSnO ₂ , AgNi, AuAgPt (Crosspoint)
Terminals	CuZn silver-plated
Auxiliary actuator	Stainless steel or plastic
Approvals	depending on model

Degree of protection IP50
Switch interior

Circuitry 3

Operating temperature +85°C		Code
S.P.S.T. - N.O.		E
S.P.S.T. - N.C.		F
S.P.D.T.		G
Operating temperature +120°C		Code
S.P.S.T. - N.O.		A
S.P.S.T. - N.C.		B
S.P.D.T.		C

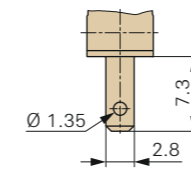
Generation of order code (example)
The order code consists of 5 parameters:

1	2	3	4	5
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
DB = subminiature switch	1 = 6 A, 250 VAC	C = S.P.D.T.	A1 = Solder terminal short	LB = Lever straight, RM rear 4.8

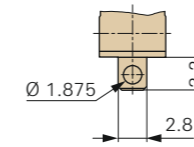
- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.
- Customer-specific models are marked with a G or W as the sixth digit of the article number.

Terminals

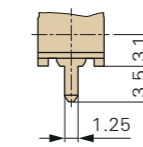
Q.C. terminal
2.8 x 0.5 mm



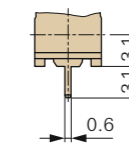
Solder terminal, short



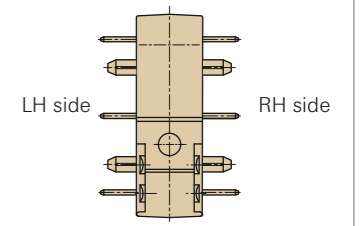
PCB terminal, straight
1.3 x 0.5 mm



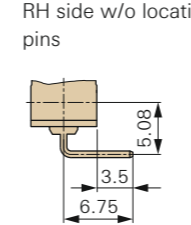
PCB terminal, straight
0.6 x 0.5 mm



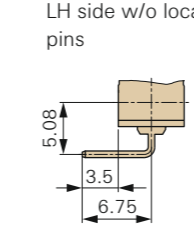
Side definition with terminals and location pins



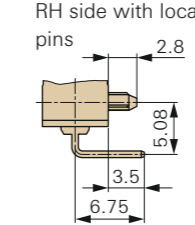
PCB terminal
0.6 x 0.5 mm
RH side w/o location pins



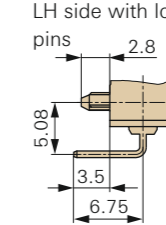
PCB terminal
0.6 x 0.5 mm
LH side w/o location pins



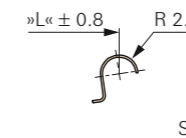
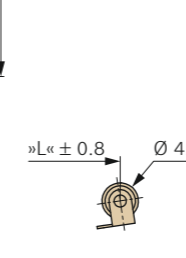
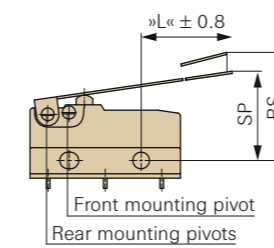
PCB terminal
0.6 x 0.5 mm
RH side with location pins



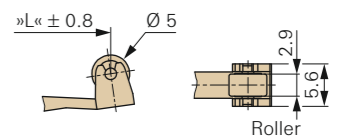
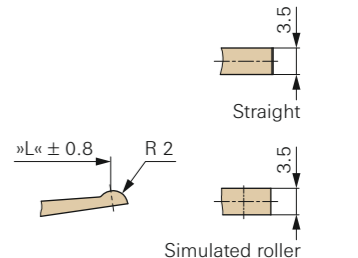
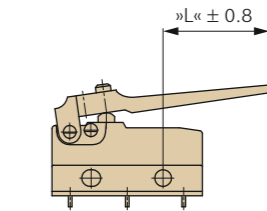
PCB terminal
0.6 x 0.5 mm
LH side with location pins



Steel auxiliary actuator

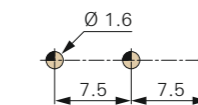


Auxiliary plastic actuator with/without adjusting screw

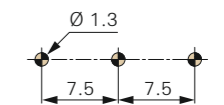


Drilling patterns

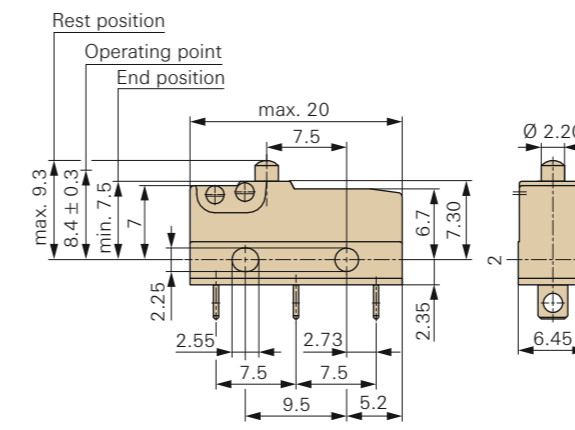
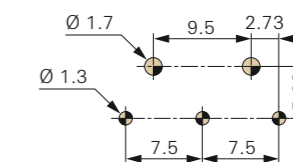
Drilling pattern for PCB terminal 1.3 x 0.5 mm



Drilling pattern for PCB terminal 0.6 x 0.5 mm straight/lateral



Drilling pattern for PCB terminal 0.6 x 0.5 mm lateral with location pins



Dimensions in mm

DB SUBMINIATURE SWITCH CONTINUED

Electrical rating and operating life ②

Electrical rating according to		Electrical life (operations)		Mechanical life	Operating force	Housing mark	Code
EN 61058-1	UL 1054	acc. to EN	acc. to UL		max. (cN)		
6 A 250 VAC	5 A 125–250 VAC	10,000	6,000	15 x 10 ⁶	150	DB 1	1
10 (1.5) A, 250 VAC	10.1 A, 125–250 AC, 1/4 HP, 125 VAC	10,000	6,000	10 x 10 ⁶	250	DB 2	2
0.1 A, 250 VAC	0.1 A 125–250 VAC	50,000	100,000	15 x 10 ⁶	150	DB 3	3
4 A, 250 VAC	4 A, 125–250 VAC	50,000	6,000	15 x 10 ⁶	90	DB 4	4
1 A, 250 VAC	1 A, 125–250 VAC	50,000	6,000	15 x 10 ⁶	70	DB 5*	5*
10 (3) A, 250 VAC	10.1 A, 125–250 VAC, 1/4 HP, 125 VAC	10,000	6,000	10 x 10 ⁶	280	DB L	L
6 (2) A, 250 VAC	5 A, 125–250 VAC	50,000	6,000	15 x 10 ⁶	150	DB O	O

Special versions with lower ratings upon request

* Only T85

Switching parameters

Model	Type	Max. operating force (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)	Length actuator (mm) ± 0.8
Spherical-head actuator or actuator with radius, without auxiliary actuator	DB5 DB1/O/3 DBL DB2 DB4	70 150 280 250 90	1.0 1.0 1.0 1.0 1.0	0.6 0.6 0.6 0.6 0.6	0.1 0.1 0.15 0.1 0.1	9.3 9.3 9.3 9.3 9.3	8.4 ± 0.3 8.4 ± 0.3 8.4 ± 0.3 8.4 ± 0.3 8.4 ± 0.3	– – – – –

Terminal type ④

Terminal type	Code
Q.C. terminal 2.8 x 0.5 mm, straight	B1
Solder terminal short	A1
PCB terminal 1.3 x 0.5 mm, straight	C1
PCB terminal 0.6 x 0.5 mm, straight	D1
PCB terminal 0.6 x 0.5 mm, RH side*	D2
PCB terminal 0.6 x 0.5 mm, LH side*	D3
PCB terminal 0.6 x 0.5 mm, RH side**	D4
PCB terminal 0.6 x 0.5 mm, LH side**	D5

* With location pins

** Without location pins

Electrical rating at DC voltage

Please see our technical specification for DC currents (TS-0002) which is available upon request.

Auxiliary actuator ⑤

Model	Mounting point	Length	Order code*	Code
Without lever, spherical head	–	–	–	AA
Without lever, radius shape	–	–	–	BA
Straight	RM rear	4.8	614-01232	LB
		7	614-01233	LC
	FM front	42	614-01234	LD
		7	614-01232	MB
		9.4	614-01233	MC
Roller	RM rear	43.5	614-01234	MD
		2.5	714-00260	RB
		4.7	714-00261	RC
	FM front	39.7	714-00262	RD
		4.7	714-00260	TB
Simulated roller	RM rear	7.1	714-00261	TC
		41.2	714-00262	TD
	FM front	2.5	614-01237	SB
		4.7	614-01238	SC
		39.7	614-01239	SD
Plastic, straight	RM rear	4.7	614-01237	UB
		7.1	614-01238	UC
	41.2	614-01239	UD	
Plastic roller	RM rear	7	614-01247	WB
		14	614-01253	WC
	FM front	9.4	614-01247	GB
Plastic simulated roller	RM rear	16.2	614-01253	GC
		5.2	714-00299	ZB
Plastic	FM front	7.3	714-00299	OB
		5.6	614-01249	VB
simulated roller	FM front	7.9	614-01249	HB

* For retrofitting



DZ SUBMINIATURE SWITCH

DZ subminiature switch

- Positive break action on NC contact
- Precision switch with high switch accuracy
- Various auxiliary actuators (can also be retrofitted), two mounting points
- Various terminal types available



Technical specifications

Series	DZ 1
Contact configuration	S.P.D.T., S.P.S.T. - N.C.
Contact gap	< 3 mm (μ)
Switching voltage max.	250 VAC
Switching current	3 (3) A
Operating voltage max.	220 cN without auxiliary actuator
Total travel	1.6 mm
Mechanical life	Min. 1 x 10 ⁶ operations
Electrical life	25E3
Ambient temperature	-20 to +85°C
Proof tracking index	PTI 250

Materials

Base/cover	PET (UL 94 V-0)
Actuator	POM (UL 94 HB)
Positive break lever	LCP (UL 94 V-0)
Contacts	AgSnO ₂
Terminals	CuZn silver-plated
Auxiliary actuator	Stainless steel



Degree of protection IP40
Switch interior

Circuitry 3

Model	Code
S.P.S.T. - N.C.	F
S.P.D.T.	G*

Terminal type 4

Model	Code
Q.C. terminal 2.8 x 0.5 mm, straight	B1*
Solder terminal short	A1*

Auxiliary actuator 5

Model	Code
Without auxiliary actuator	Radiusform BA

* This variety and others on request

Generation of order code (example)
The order code consists of 5 parameters:

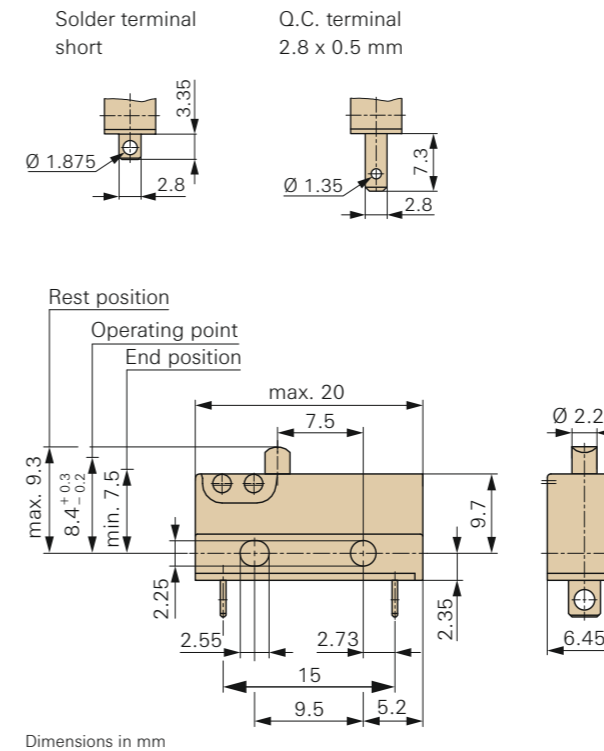
1	2	3	4	5
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
DZ = subminiature switch	1 = 3 (3) A 250 VAC	F = S.P.S.T. - N.C.	A1 = Solder terminal short	BA = without auxiliary actuator

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.
- Customer-specific models are marked with a G or W as the sixth digit of the article number.

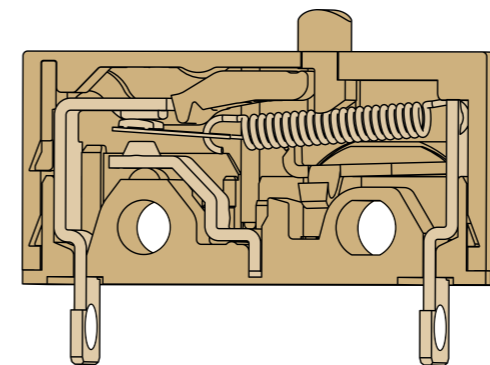
Electrical rating and operating life 2

Electrical rating according to	Electrical life (operations)	Mechanical life	Operating force	Housing mark	Code		
EN 61058-1	UL 1054	acc. to EN	acc. to UL	max. (cN)			
3 (3) A 250 VAC	5 A 125–250 VAC	25,000	6,000	1 x 10 ⁶	220	DZ 1	1

Switch options



Switch system



Positive break action on NC contact

DC SUBMINIATURE SWITCH

DC subminiature switch

Sealed switch IP67 protection

- Models available for 120°C operating temperature
- Nominal currents from 10A at 250 V AC
- Various auxiliary actuators available (can also be retrofitted)
- Various application-specific contact materials
- Mechanical operating life min. 1,000,000 operations
- Various terminal types available



Technical specifications

Series	DC ①
Contact configuration	S.P.D.T., S.P.S.T. - N.O., S.P.S.T. - N.C.
Contact gap	< 3 mm (μ)
Switching voltage (max.)	250 VAC
Switching current	0.1 to 10 A AC (see table on page 24) depending on model
Operating voltage	200 to 340 cN without auxiliary actuator, depending on model
Total travel	Approx. 1.6 mm
Mechanical life	(see table on page 23)
Electrical life	(see table on page 23)
Ambient temperature	-40 to +85°C/120°C
Model with leads	-40 to +105°C
Proof tracking index	PTI175, PTI250 on request
Materials	
Cover	PBT (UL 94V-0), PET (UL 94V-0)
Actuator	POM UL 94 HB (T85), PBT UL 94 V-0 (T120)
Base	PET (UL 94V-0)
Contacts	AgNi/AuAgPt (Crosspoint)
Terminals	CuZn silver-plated
Auxiliary actuator	Stainless steel or Plastic
Sealing gasket	VMQ
Leads	Cu, PVC-sheathed
Approvals	depending on model
Degree of protection	IP67
Switch interior	

Circuitry ③

Operating temperature +85°C	Code
S.P.S.T. - N.O.	E
S.P.S.T. - N.C.	F
S.P.D.T.	G
Operating temperature 120°C (with leads 105°C)	Code
S.P.S.T. - N.O.	A
S.P.S.T. - N.C.	B
S.P.D.T.	C

Terminal type ④

Model	Code
Solder terminal short*	A1
PCB terminal 1.3 x 0.5 mm, straight*	H1
PCB terminal 0.6 x 0.5 mm, straight*	K1
PCB terminal 0.6 x 0.5 mm RH side**	K8
PCB terminal 0.6 x 0.5 mm LH side**	K9
PCB terminal 0.6 x 0.5 mm RH side***	K6
PCB terminal 0.6 x 0.5 mm LH side***	K7
Q.C. terminal 2.8 x 0.5 mm, straight*	L1
Leads 0.5 mm ² , routed downwards	B5
Leads 0.5 mm ² , with leads	B3
Leads 0.5 mm ² , on side opposite actuator	B4
Leads 0.75 mm ² , routed downwards	C5
Leads 0.75 mm ² , with leads	C3
Leads 0.75 mm ² , on side opposite actuator	C4
Without leads (Form B), on side opposite actuator/ on actuator side*	N3/N4
Without leads (Form A), on side opposite actuator/ on actuator side*	P3/P4
Without leads (no cut-out), with solder terminal*	Q5

* Max. 30° twisted ** with location pin *** W/o location pin

Electrical rating and operating life ②

Electrical rating according to		Electrical life at rated load (operations)		Mechanical life	Operating force	Housing mark	Code
EN 61058-1	UL 1054	acc. to EN	acc. to UL		max. (cN)		
6 A 250 VAC	5 A 125–250 VAC	10,000	6,000	1 x 10 ⁶	200	DC 1	1
10 (1.5) A, 250 VAC	10.1 A, 125–250 VAC 1/4 HP, 125 VAC	10,000	6,000	1 x 10 ⁶	340	DC 2	2
0.1 A, 250 VAC	0.1 A 125–250 VAC	50,000	100,000	1 x 10 ⁶	200	DC 3	3
3 A, 250 VAC	3 A, 125–250 VAC	50,000	6,000	1 x 10 ⁶	200	DC 4*	4*

* only possible as line version with line diameter 0.5 mm² and AWG 22

Auxiliary actuator ⑤

Model	Length	Code
Without lever	–	AA
Straight	4.8	LB
	8	LC
	42	LD
Roller	2.5	RB
	4.7	RC
	39.7	RD
	–	–
Simulated roller	2.5	SB
	4.7	SC
	39.7	SD
Plastic, straight	7	WB
	14	WC
Plastic roller	5.2	ZB
Plastic simulated roller	5.6	VB

Generation of order code (example)
The order code consists of 5 parameters:

①	②	③	④	⑤
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
DC = subminiature switch	1 = 6 A, 250 VAC	C = S.P.D.T.	A1 = Solder terminal short	LB = Lever straight, 4.8

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.
- Customer-specific models are marked with a G or W as the sixth digit of the article number.



DC SUBMINIATURE SWITCH CONTINUED

Switching parameters

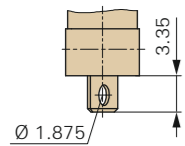
Model	Type	Max. operating force (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)	Length actuator
Without auxiliary actuator	DC1, 3, 4	200	1.0	0.6	0.1	9.3	8.4 ± 0.3	-
	DC2	340	1.0	0.6	0.1	9.3	8.4 ± 0.3	

Electrical rating at DC voltage

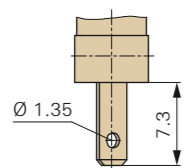
Please see our technical specification for DC currents (TS-0002) which is available upon request.

Terminals

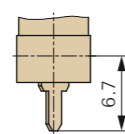
Solder terminal short max. 30° twisted



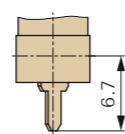
Q.C. terminal 2.8 x 0.5 mm max. 30° twisted



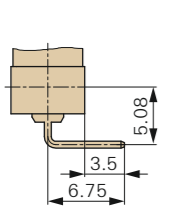
PCB terminal 1.3 x 0.5 mm max. 30° twisted



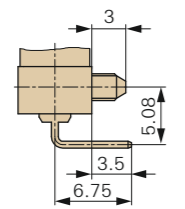
PCB terminal 0.6 x 0.5 mm max. 30° twisted



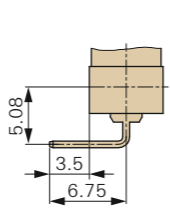
PCB terminal 0.6 x 0.5 mm RH side w/o location pin



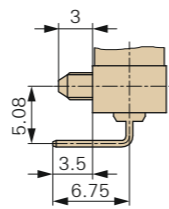
PCB terminal 0.6 x 0.5 mm RH side with location pin



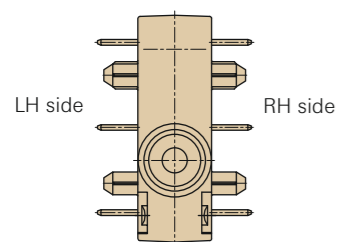
PCB terminal 0.6 x 0.5 mm LH side w/o location pins



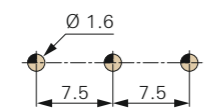
PCB terminal 0.6 x 0.5 mm LH side w/o location pins



Side definition with terminals and location pins

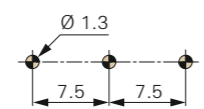


Drilling pattern for PCB terminal 1.3 x 0.5 mm

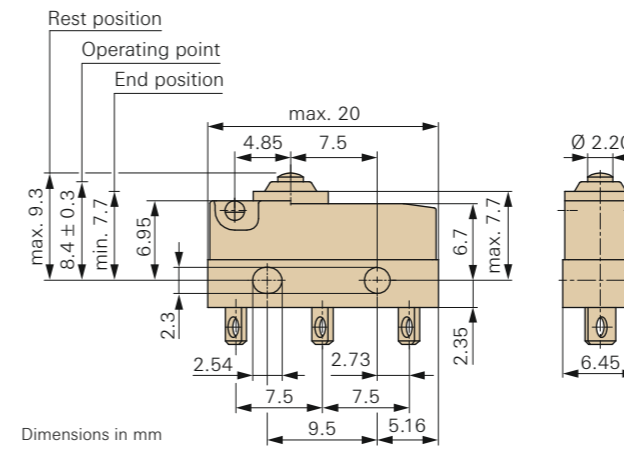
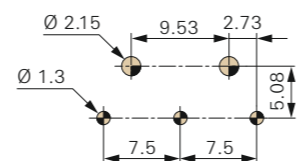


Dimensions in mm

Drilling pattern for PCB terminal 0.6 x 0.5 mm, straight/lateral



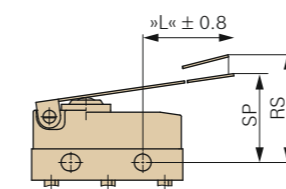
Drilling pattern for PCB terminal 0.6 x 0.5 mm, lateral with location pins



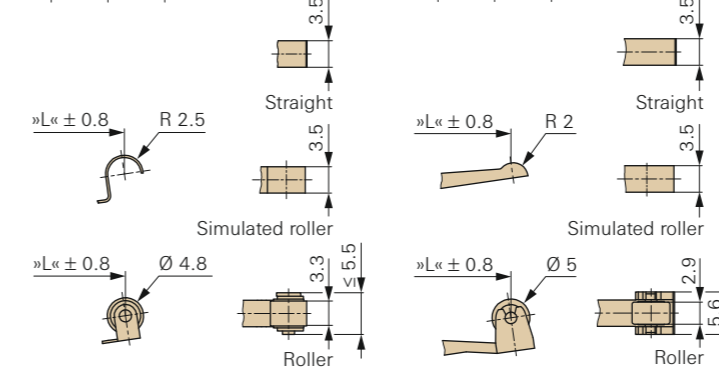
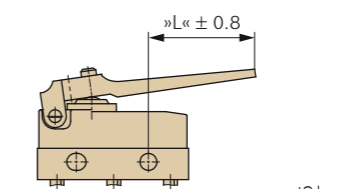
Dimensions in mm

Auxiliary actuator

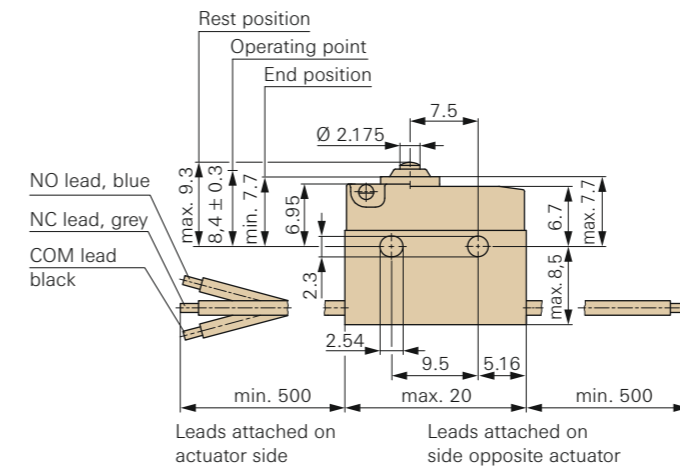
Steel auxiliary actuator



Plastic auxiliary actuator with/without adjusting screw



Model with connecting leads (IP67)



Form A

Form B

Special model with tall base available on request

DCJK SUBMINIATURE SWITCH

DCJK subminiature switch

Special variant of the DC switch for special applications with sealed protection type IP67

- Models available for 120°C operating temperature
- Nominal currents up to 10 A at 12 VDC (on request)
- Optional adjustment with 2 mounting positions and various auxiliary actuators, which can also be retrofitted
- Wide variety of terminal types, 3 pedestal heights
- High contact stability with various application-specific contact materials
- 4 different switching points can be selected
- No UL/EN approval



Technical specifications

Series	DCJK
Contact configuration	S.P.D.T., S.P.S.T.-N.O. or S.P.S.T.-N.C.
Contact gap	< 3 mm
Switching voltage (max.)	12 VDC
Switching current	0.005 to 3 A DC
Operating voltage	300 cN without auxiliary actuator depending on model
Total travel	Up to approx. 2.0 mm possible
Mechanical life	Up to 2 x 10 ⁶ operations
Electrical life depending on load	Up to 2 x 10 ⁶ operations
Ambient temperature	-40 to +85°C/120°C
Model with leads	-40 to +105°C

Materials

Housing	PET/PA
Actuator	POM (T85), PA (T120)
Auxiliary actuator	Stainless steel or plastic
Sealing gasket	VQM
Terminals	CuZn silver-plated
Leads	Cu, PVC-sheathed
Contacts	AgNi AgPd (Crosspoint) AuAg (Crosspoint)

Degree of protection IP67
Switch interior

Terminal type

Type of terminal available off-the-shelf:	Solder terminal, straight
Connecting leads on actuator side	
Connecting leads opposite actuator side	
Types of connector available on request:	Welding terminal
	Self cutting clamp connector
	Solder terminal, lateral
	PCB terminal 0.8 x 0.5 mm, straight
	PCB terminal 0.6 x 0.5 mm, straight

Auxiliary actuator

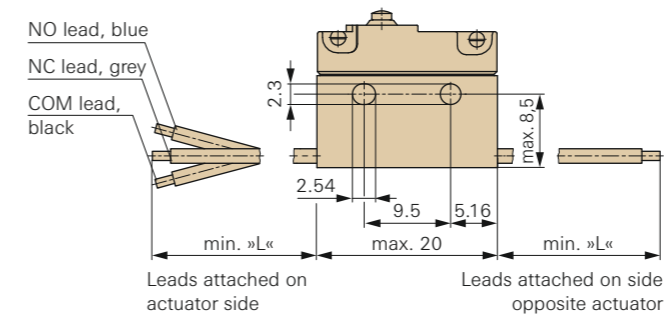
Switches in the DCJK family have two mountings for attaching auxiliary actuators. This, combined with the range of actuators available in the DC switch family and various operating points, means that a wide variety of operating forces and travel combinations are feasible. To find the perfect fit for your requirements, please contact us.

Order code

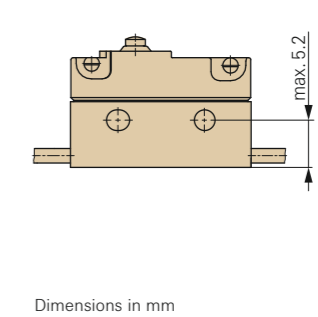
Order codes on request

Switch options

Model with leads,
8.1 mm from base to drill hole

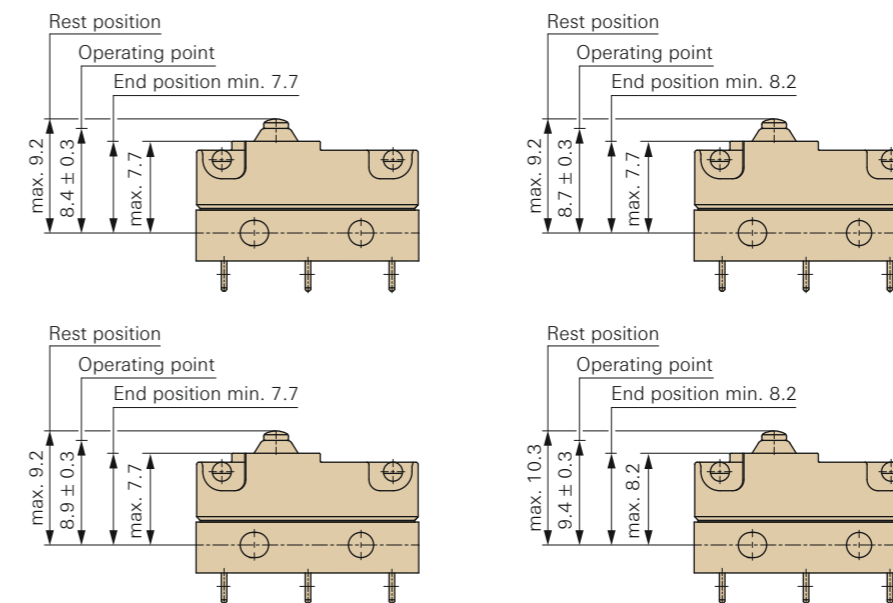


Model with leads,
5.2 mm from base to drill hole

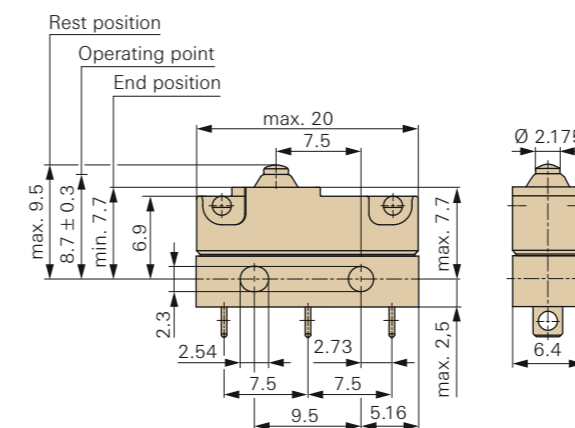


Switching point options

For customizing to individual requirements, switches in the DCJK family are available with four different switching points.



Dimensions in mm



Dimensions in mm

DK SUB-SUBMINIATURE SWITCH

DK sub-subminiature switch

Sealed switch up to protection IP65, IP 67 on request, smallest dimension

- Models available for up to 105°C operating temperature
- Nominal currents 5 mA to 2 A at 12 V DC
- Actuation vertically or with auxiliary actuator
- High contact stability thanks to AuAg crosspoint contacts
- Mechanical operating life min. 500,000 operations
- Many connection possibilities, also with leads



Technical specifications

Series	DK 1
Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage (max.)	12 VDC, up to 60 V on request
Switching current	0.005 to 2 A DC
Operating voltage	Max. 75 cN without auxiliary actuator
Total travel	Approx. 2.0 mm
Mechanical life	Min. 500,000 operations
Electrical life (max. load)	Min. 100,000 operations
Ambient temperature	-40 to +85°C/105°C

Materials

Base	PBT/PES
Cover	PBT + ASA
Actuator	POM (+85°C)/LCP (+105°C)
Auxiliary actuator	Stainless steel
Sealing gasket	VMQ
Terminals	CuZn silver-plated
Leads	Cu, PVC-sheathed
Contacts	AuAg (Crosspoint)
Degree of protection	IP65, IP67 on request
Switch interior	

Electrical rating 2

Electrical rating	Code
0.005 - 2 A 12 VDC	1

Circuitry 3

Circuitry	Code
S.P.D.T.	G
Model with leads:	
S.P.S.T. - N.O.	E
S.P.S.T. - N.C.	F

Generation of order code (example)				
The order code consists of 5 parameters:				
1	2	3	4	5
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
DK = sub-sub-miniature switch	1 = 0.005 - 2 A, 12 VDC	G = S.P.D.T.	RN = Solder terminal, straight 2.5 x 0.5 w/o location pins	A0 = without auxiliary actuator

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.

Terminal type 4

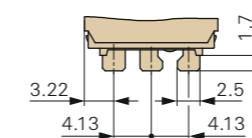
Terminal type	Code
Solder terminal, straight, 2.5 x 0.5 mm, w/o location pins	RN
Solder terminal, straight, 2.5 x 0.5 mm, RH side location pins	RR
Solder terminal, straight, 2.5 x 0.5 mm, LH side location pins	RL
PCB terminal, straight, 0.6 x 0.5 mm, w/o location pins	SN
PCB terminal, straight, 0.6 x 0.5 mm, RH side location pins	SR
PCB terminal, straight, 0.6 x 0.5 mm, LH side location pins	SL
PCB terminal RH side, 0.6 x 0.5 mm, RH side location pins	TR
PCB terminal LH side, 0.6 x 0.5 mm, LH side location pins	UL
Leads 250 mm, 0.35 mm ² , underside no location pins	W3
Leads 250 mm, 0.35 mm ² , RH side, underside with loc. pins	W9
Leads 250 mm, 0.35 mm ² , LH side, underside with loc. pins	W6
Leads 500 mm, 0.35 mm ² , underside no location pins	Z3
Leads 500 mm, 0.35 mm ² , RH side, underside with loc. pins	Z9
Leads 500 mm, 0.35 mm ² , LH side, underside with loc. pins	Z6

Auxiliary actuator 5

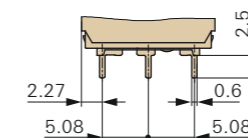
Model	Code
Without auxiliary actuator	A0
Straight, resilient auxiliary actuator	D1
Resilient, simulated roller	E1

Terminals

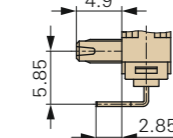
Solder terminal
2.5 x 0.5 mm



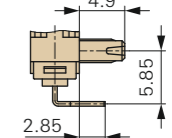
PCB terminal
0.6 x 0.5 mm



PCB terminal 0.6 x 0.5 mm
LH side with location pins

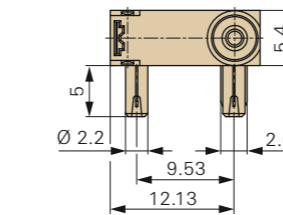
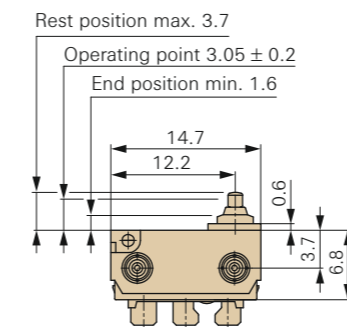
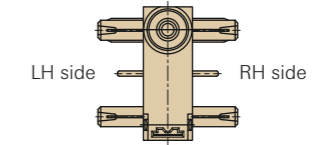


PCB terminal 0.6 x 0.5 mm
RH side with location pins



Dimensions in mm

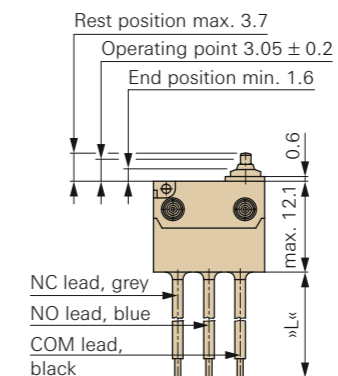
Side definition



Dimensions in mm

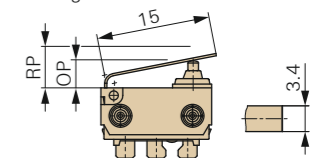
Dimensions

For DK sub-subminiature switch with leads (IP67)

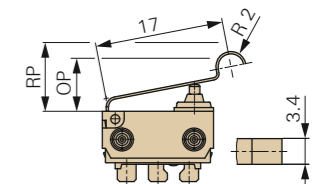


Auxiliary actuator

Straight



Simulated roller



Dimensions in mm

DJ SUB-SUBMINIATURE SWITCH

DJ sub-subminiature switch

Sealed switch up to IP67, suitable for actuations at angles up to 40° depending on slide partner material, etc.

- Easy installation thanks to connector pins or fastening nut
- Smallest dimensions
- Models available for up to 85°C operating temperature
- Nominal currents 5 mA to 2 A at 12 V DC
- High contact stability with AuAg crosspoint contacts
- Mechanical operating life min. 500,000 operations
- Many connection possibilities, also with leads



Technical specifications

Series	DJ 1
Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage (max.)	12 VDC up to 60 V on request
Switching current	0.005 to 2 A DC
Operating voltage	Max. 120 cN
Total travel	Approx. 2.0 mm
Mechanical life	Min. 500,000 operations
Electrical life (max. load)	Min. 100,000 operations
Ambient temperature	-40 to +85°C

Materials

Base	PBT/PES
Cover	PBT + ASA
Actuator	POM
Sealing gasket	VMQ
Terminals	CuZn silver-plated
Contacts	AuAg (Crosspoint)
Degree of protection	IP67
Switch interior	

Electrical rating 2

Model	Code
0.005 – 2 A DC, 12 V	1

Circuitry 3

Model	Code
S.P.D.T.	G

Terminal type 4

Model	Code
Solder terminal, straight, 2.5 x 0.5 mm, w/o location pins	AN
Solder terminal, straight, 2.5 x 0.5 mm, RH side location pins	AR
Solder terminal, straight, 2.5 x 0.5 mm, LH side location pins	AL
PCB terminal, straight, 0.7 x 0.5 mm, w/o location pins	BN
PCB terminal, straight, 0.7 x 0.5 mm, mit RH side loc. pins	BR
PCB terminal, straight, 0.7 x 0.5 mm, mit LH side loc. pins	BL

Auxiliary actuator 5

Model	Code
Without auxiliary actuator	A0

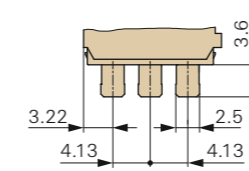
Generation of order code (example)
The order code consists of 5 parameters:

1	2	3	4	5
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
DJ = sub-sub-miniature switch	1 = 0.005 – 2 A DC, 12 V	G = S.P.D.T.	AN = Solder terminal, straight 2.5 x 0.5 w/o location pins	A0 = without auxiliary actuator

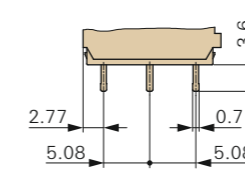
- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.

Terminals

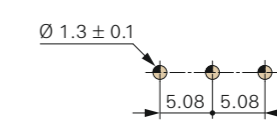
Solder terminal
2.5 x 0.5 mm



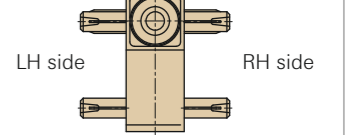
PCB terminal, straight
0.7 x 0.5 mm



Drilling pattern for PCB
terminal 0.7 x 0.5 mm



Side definition

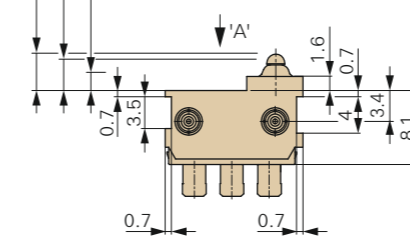


Dimensions in mm

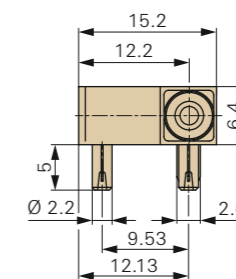
Rest position max. 4.1

Operating point 3.45 ± 0.2

End position min. 2.05



View 'A'



Dimensions in mm

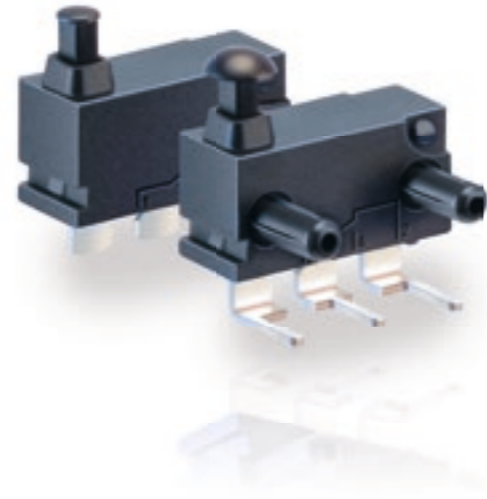


DR SUB-SUBMINIATURE SWITCH

DR sub-subminiature switch

Available with mushroom or panhead actuator for many actuation possibilities, degree of protection IP40

- Models available up to 105°C operating temperature
- Nominal currents 5 mA up to 2 A at 12 V DC
- Auxiliary actuator on request
- High contact stability thanks to AuAg crosspoint contacts
- Mechanical life min. 1x10⁶ operations
- Various connection possibilities



Technical specifications

Series	DR 1
Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage (max.)	12 VDC, to 60 V on request
Switching current	0.005 to 2 A DC
Operating voltage	Max. 75 cN without auxiliary actuator
Total travel	Approx. 2.0 mm
Mechanical life	Min. 1 x 10 ⁶ operations
Electrical life (max. load)	Min. 100,000 operations
Ambient temperature	-40 to +85°C/105°C

Materials

Base	PBT/PES
Cover	PBT
Actuator	PES/POM
Auxiliary actuator	Stainless steel
Terminals	CuZn silver-plated
Contacts	AuAg (Crosspoint)
Degree of protection	IP40
Switch interior	

Electrical rating 2

Model	Code
0.005 – 2 A DC, 12 V	1

Actuator type 3

Model	Code
Mushroom	P
Panhead	R

Terminal type 4

Terminal type	Code
Solder terminal 2.5 x 0.5 mm, w/o location pins	AN
Solder terminal 2.5 x 0.5 mm, RH side location pins	AR
Solder terminal, straight, 2.5 x 0.5 mm, LH side location pins	AL
PCB terminal, straight, 0.6 x 0.5 mm, w/o location pins	BN
PCB terminal, straight, 0.6 x 0.5 mm, RH side location pins	BR
PCB terminal, straight, 0.6 x 0.5 mm, LH side location pins	BL
PCB terminal RH side, 0.6 x 0.5 mm, RH side location pins	CR
PCB terminal LH side, 0.6 x 0.5 mm, LH side location pins	DL

Auxiliary actuator 5

Model	Code
Without auxiliary actuator	A0

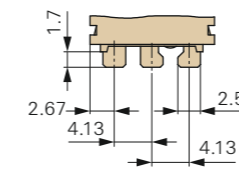
Generation of order code (example)
The order code consists of 5 parameters:

1	2	3	4	5
Series	Electrical rating	Actuator	Terminal type	Auxiliary actuator
DR = sub-sub-miniature switch	1 = 0.005 – 2 A DC, 12 V	P = Mushroom	AN = Solder terminal 2.5 x 0.5 w/o location pins	A0 = without auxiliary actuator

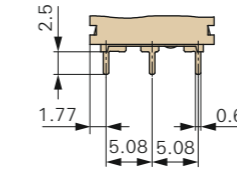
- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.

Terminals

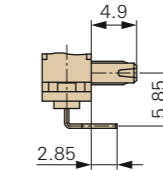
Solder terminal
2.5 x 0.5 mm



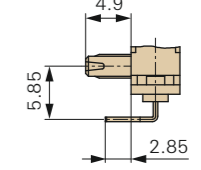
PCB terminal 0.6 x 0.5 mm



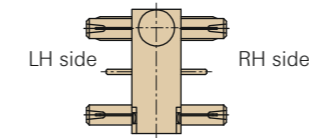
PCB terminal 0.6 x 0.5 mm
RH side with location pins



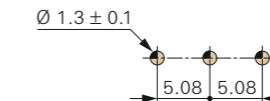
PCB terminal 0.6 x 0.5 mm
LH side with location pins



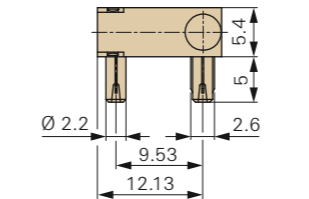
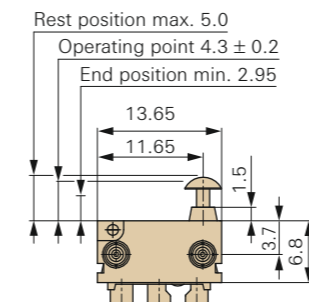
Side definition



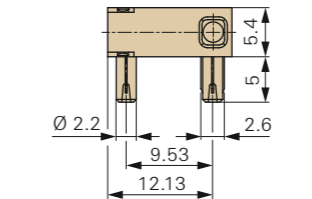
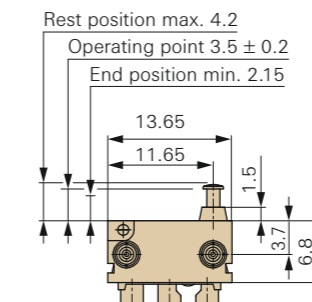
Drilling pattern for PCB terminal
0.6 x 0.5 mm side and underside



With mushroom actuator



With panhead actuator



Dimensions in mm



DG SUB-SUBMINIATURE SWITCH

DG sub-subminiature switch

Extremely small dimensions – only 12.8 × 5.8 × 6.5 mm.

Breaking capacity ranges from small switching currents and voltages to low-voltage applications up to 3 A 125 V AC.

- Available with or without auxiliary actuator
- Use on circuit boards with connections to the left or right and standing
- High mechanical operating life, depending on model > 1,000,000 operations



Technical specifications

Series	DG 1
Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage max.	125 VAC
Switching current max.	3 A AC
Operating voltage max.	75 cN oder 140 cN without auxiliary actuator
Total travel	0.7 mm without auxiliary actuator
Mechanical life	> 1 × 10 ⁶ operations
Electrical life (max. load)	see table on page 35
Ambient temperature	-25°C to +85°C

Materials

Base	PPS (UL 94V-0)
Cover	PBT (UL 94V-0)
Actuator	PBT (UL 94V-0)
Auxiliary actuator	Stainless steel
Terminals	CuZn striped silver-plated
Contacts DG 1	AgNi
DG 2	AgNi, gal. Au
Approvals	cRU S
Degree of protection	IP40
Switch interior	

Circuitry 3

Model	Code
S.P.D.T.	3

Terminal type 5

Model	Code
Solder terminal, straight	B1
PCB terminal, RH side	B2
PCB terminal, LH side	B3

Generation of order code (example)
The order code consists of 5 parameters:

1	2	3	4	5
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
DG = sub-sub-miniature switch	1 = 3 A, 125 VAC 2 A, 30 VDC	3 = S.P.D.T.	B1 = PCB terminal, straight	AA = without auxiliary actuator

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.

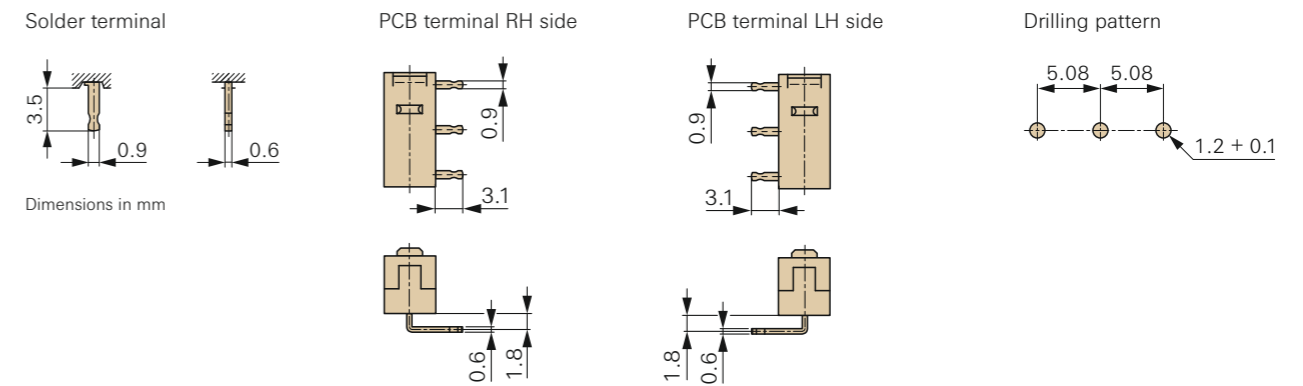
Electrical rating and operating life 2

Electrical rating according to UL and CSA	Operating life		
	Nominal load UL and CSA	mechanical	Code
3 A, 125 VAC 2 A, 30 VDC	6,000	1 × 10 ⁶	1
0.05 A, 30 VDC	6,000	1 × 10 ⁶	2

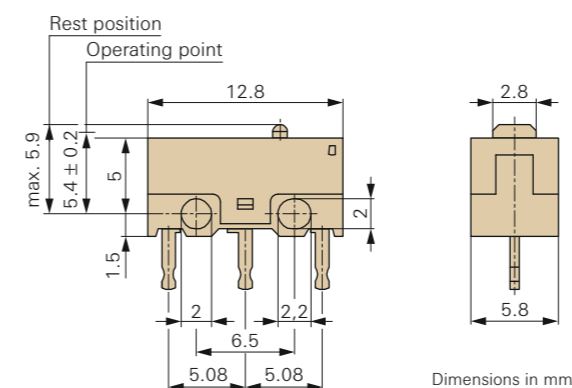
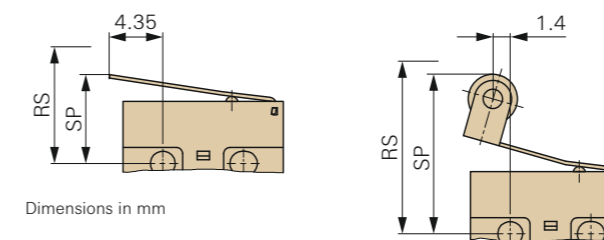
Auxiliary actuator 5

Model	Type	Operating force max.(cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)	Code
Without auxiliary actuator	DG 1.2 B	140	0.5	0.2	0.1	5.9	5.4 ± 0.2	AA
	DG 2 C	75	0.5	0.2	0.1	5.9	5.4 ± 0.2	
Auxiliary actuator, straight	DG 1.2 B	45	1.8	0.55	0.5	9.4	6.8 + 0.8/-0.4	LA
	DG 2 C	30	1.8	0.55	0.5	9.4	6.8 + 0.8/-0.4	
Auxiliary actuator roller	DG 1.2 B	60	1.5	0.55	0.5	13.9	12.4 ± 0.5	RA
	DG 2 C	35	1.5	0.55	0.5	13.9	12.4 ± 0.5	

Terminals



Auxiliary actuator



DH ULTRAMINIATURE SWITCH

DH ultraminiature switch

- Dimensions only 8.2 mm × 2.7 mm × 6.2 mm
- Designed for low switching currents and voltages
- Available with or without auxiliary actuator
- Solder connection or use lying or standing on a circuit board



Technical specifications

Series	DH ①
Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage max.	30 VDC
Switching current	5 to 500 mA DC
Operating voltage	Max. 90 cN
Total travel	Approx. 0.85 mm without auxiliary actuator
Mechanical life	> 50,000 operations
Electrical life (max. load)	> 30,000 operations
Ambient temperature	-25°C to +70°C

Materials

Housing	PPS (UL 94V-0)
Cover	PBT (UL 94V-0)
Auxiliary actuator	PBT (UL 94V-0)
Terminals	CuZn striped silver-plated
Contacts	AgNi, gal. Au
Degree of protection	IP40
Switch interior	

Electrical rating and operating life ②

Electrical rating	Operating life		
	at nominal load	mechanical	Code
5-500 mA 30 VDC	30,000	50,000	2

Circuitry ③

Model	Code
S.P.D.T.	C

Terminal type ④

Model	Code
Solder terminal, straight, 1.3 x 3.1 mm	B1
PCB terminal, straight, 0.64 x 3.1 mm	C4
PCB terminal, RH side, 0.64 x 3.1 mm	C5
PCB terminal, LH side, 0.64 x 3.1 mm	C6

Generation of order code (example)

The order code consists of 5 parameters:

①	②	③	④	⑤
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
DH = Ultraminiature switch	2 = 5-500 mA, 30 V DC	C = S.P.D.T.	B1 = Solder terminal, straight 1.3 x 3.1	PA = with auxiliary actuator

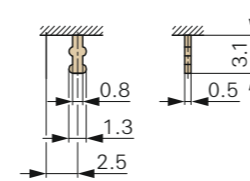
- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.

Auxiliary actuator ⑤

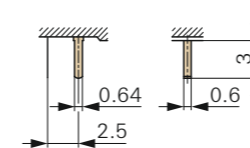
Auxiliary actuator Ausführung	Operating force max.(cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)	Code
Without auxiliary actuator	90	-	0.1	0.07	6.2	5.4 ± 0.15	AA
With auxiliary actuator	50	-	0.3	0.6	8.5	6.7 ± 0.5	PA

Terminals

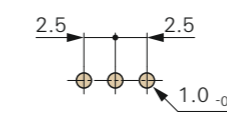
Solder terminal



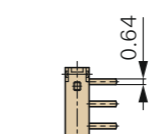
PCB terminal, straight



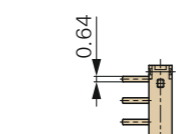
Drilling pattern



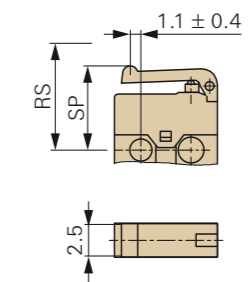
PCB terminal RH side



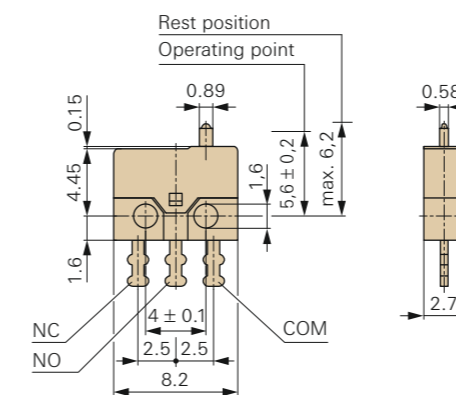
LH side



Auxiliary actuator (Plastic)



Dimensions in mm



E/F6 SERIES, E/F7 SERIES PANEL MOUNT SWITCHES

E/F6 Series, E/F7 Series panel mount switches

E/F6 are single pole versions, E/F7 are double pole versions

- Push buttons in various models
- Snap-in panel mounting
- Long-life coil spring, snap-action mechanism
- Agency approved extended-life versions available
- VDE approval available on select models (F Series)
- Various terminal forms available (consult factory)



Technical specifications

Series	Panel mount switch
Electrical	
Ambient temperature	-40° to +85°C
Flammability rating	UL94V-0

Materials

Housing	Thermoplastic Polyester, Valox (single pole versions), Vandar (double pole versions)
Actuator	Thermoplastic Acetal (E Series), Valox
Terminals*	Brass
Moving blade	Beryllium Copper
Spring	Stainless steel

Contacts

E65, E/F69, E/F77, E/F79	AgCdO
E/F68, E/F78	Au (Crosspoint)

* Common terminals are plated – the remaining terminals are not plated.

Approvals ①

Approvals	Code
UL	E
VDE & UL	F

Configuration ②

Configuration	Code
Single pole version	6
Double pole version	7

Actuator ④

Terminal type	Code
Basic momentary	00A
Push-pull momentary	20A
Momentary (cheat interlock)	30A
Short button momentary	40A
Momentary for auxiliary actuator	50A

Terminals

Series	Terminals
E68, E69, E77, E78, E79	Q.C. terminal 4.8 x 0.5 mm
E65, E75, F68, F69, F77, F78, F79	Q.C. terminal 4.8 x 0.8 mm

Generation of order code (example)
The order code consists of 5 parameters:

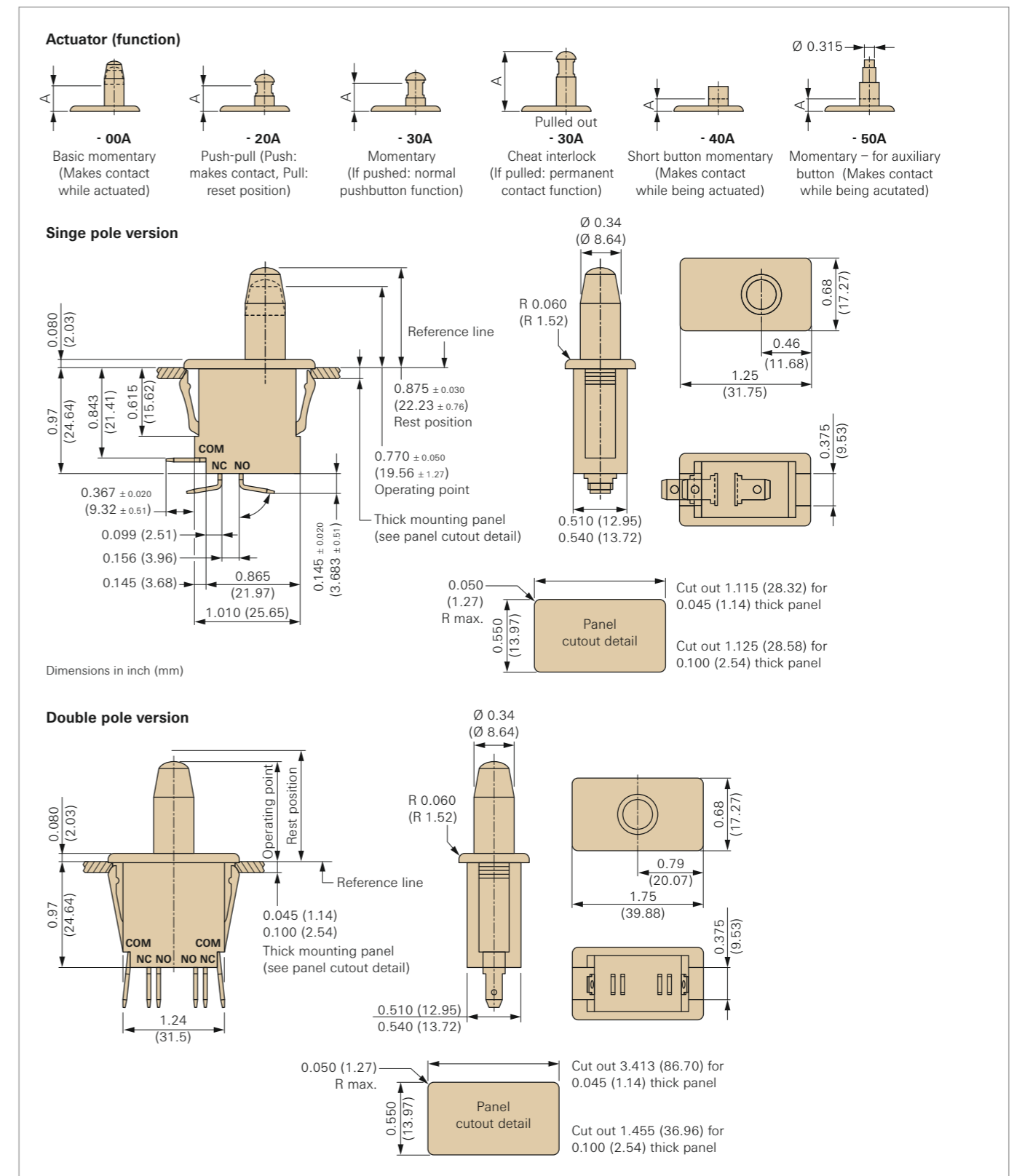
Series	Approvals	Circuitry	Electrical rating	Actuator
Panel mount switch	F = UL & VDE	6 = Single pole version	9 = 10(4) A, 250 VAC	00A = Basic momentary

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.
- Customer-specific models are marked with a G or W as the sixth digit of the article number.

Electrical rating and operating life ③

Electrical rating according to	Electrical life for 40T85 (operations)		Code	
	EN 61058-1	UL 1054		acc. to EN
-	16 A, 125/250 VAC; 1/3HP, 125/250 VAC	-	6,000	5
0.1(0.05) A, 125 VAC; 10(4) A, 250 VAC	0.1 A, 125 VAC; 10 A, 1/3HP, 125/250 VAC	50,000	6,000*	7
0.1(0.05) A, 125 VAC	0.1 A, 125 VAC	50,000	6,000*	8
10(4) A, 250 VAC	10 A, 125/250 VAC; 1/3HP, 125/250 VAC	50,000	6,000*	9

* Other ratings available upon request



F8 LINE INTERRUPT SWITCH

F8 line interrupt switch

Line interrupt panel mount pushbutton

- Snap-in mounting with long overtravel
- Choice of button barrier or standard housing
- 3 terminal types available
- Double make/double break shorting bars
- Agency approved extended-life versions available
- EN approval
- 3 mm (0.1") minimum contact gap
- Wide range of versions available



Technical specifications

Series	F8 ①
Electrical	
Ambient temperature	-25° to +85°C
Flammability rating	UL94V-O
Materials	
Housing	Thermoplastic polyester
Actuator	Thermoplastic polyester
Terminals*	Brass
Moving blade	Brass
Spring	Stainless steel
Contacts F81, F82	Silver alloy
F83	Gold crosspoint
F84	Silver alloy/gold crosspoint

* Common terminals are plated – the remaining terminals are not plated.

Circuitry ③

Model	Code
Double pole S.P.S.T. - N.O.	A
Single pole S.P.S.T. - N.O. and single pole S.P.S.T. - N.C.	D
Single pole S.P.S.T. - N.O. and single pole S.P.D.T.	J
Single pole S.P.S.T. - N.O.	X
Single pole S.P.S.T. - N.C.	Y
Single pole S.P.D.T.	Z

Housing ④

Model	Code
Basic case housing	A1
Button barrier housing	B1

Terminal type ⑤

Model	Code
Q.C. terminal 4.8 x 0.5 mm	10
Q.C. terminal 6.3 x 0.8 mm	20
Q.C. terminal 4.8 x 0.8 mm	40

Generation of order code (example)
The order code consists of 5 parameters:

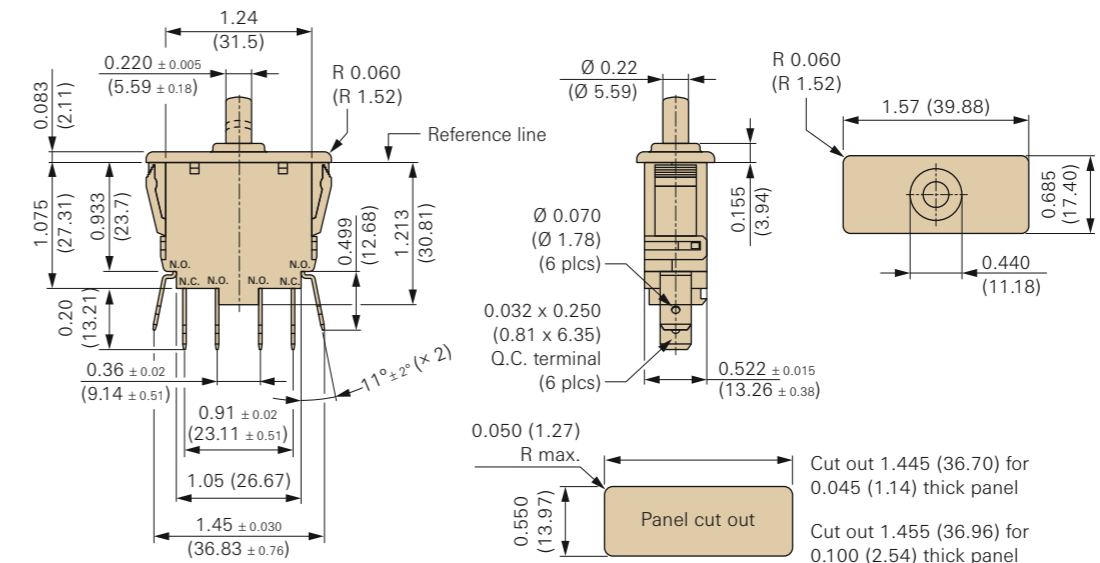
①	②	③	④	⑤
Series	Electrical rating	Circuitry	Housing	Terminal type
F8 = Panel mount switch	2 = 16(6) A, 250 VAC	A = Double break	B1 = Button barrier housing	20 = Q.C. terminal 6.3 x 0.8

- Not every configurable variant is available for order. Please contact us.
- The final two digits of article numbers on commercial documents refer to the index of the respective drawing.
- Customer-specific models are marked with a G or W as the sixth digit of the article number.

Electrical rating and operating life ②

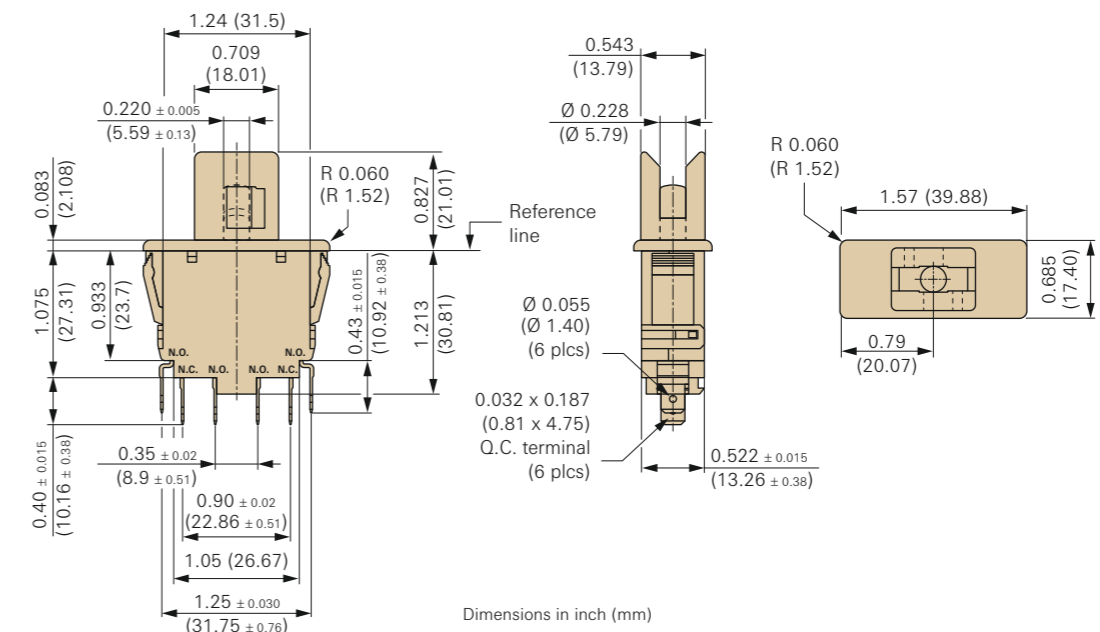
Electrical rating according to		Electrical life for 40T85 (operations)		Code
		acc. to EN	acc. to UL	
EN 61058-1	UL 1054			
10(3) A, 400 VAC	10 A, 125/250 VAC; 3/4HP, 125 VAC 1-1/2HP, 250 VAC; 6 A, 30 VDC	50,000	6,000	1
16(6) A, 250 VAC	16 A, 125/250 VAC; 3/4HP, 125 VAC 1-1/2HP, 250 VAC; 6 A, 30 VDC	50,000	6,000*	2
0.1(0.05) A, 250 VAC	0.1 A, 125/250 VAC	50,000	6,000*	3
on request	Combines two different ratings in a single switch. Available upon request.	50,000	6,000*	4
* Other ratings available upon request				

Basic case housing



Dimensions in inch (mm)

Button barrier housing



Dimensions in inch (mm)

NM02 CENTER-OFF SWITCH

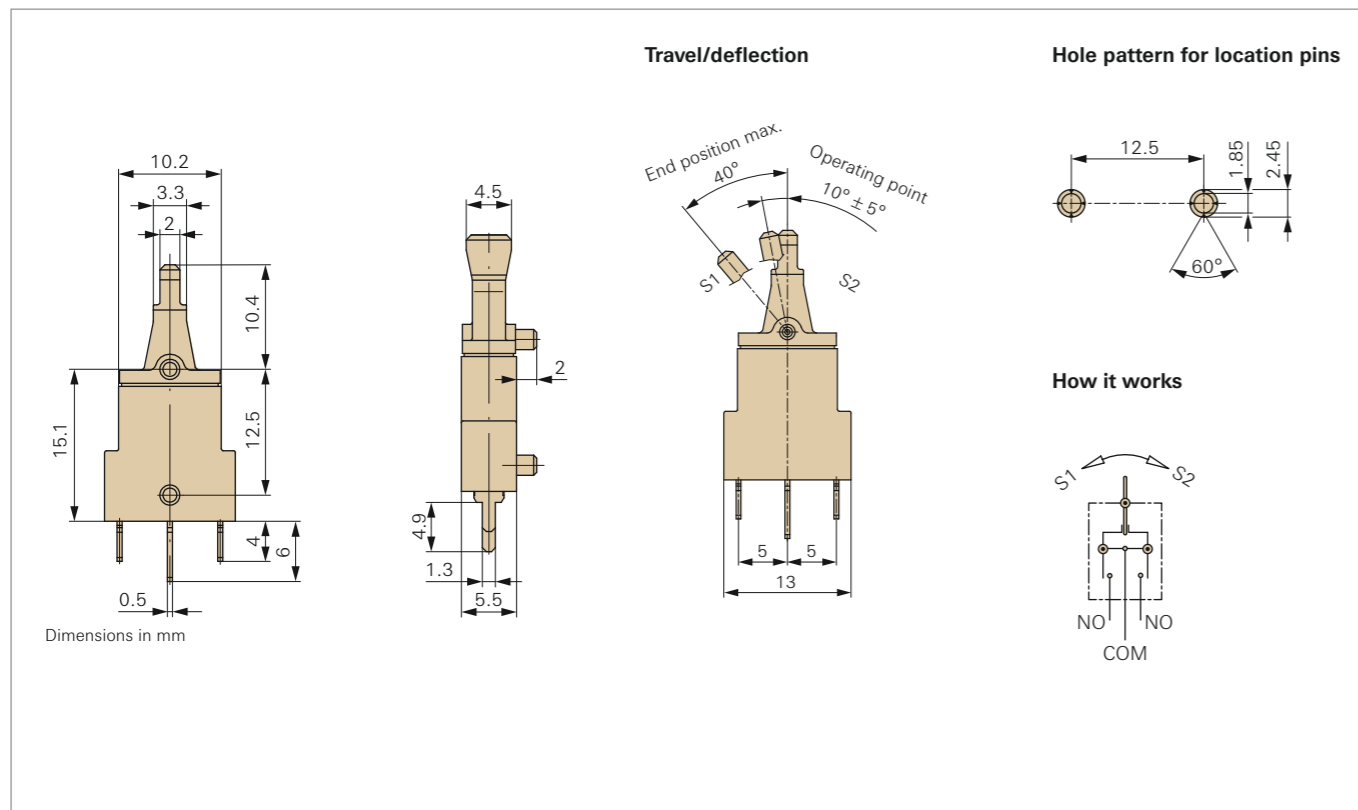
NM02 center-off switch

Switch in miniature construction with neutral middle setting and large actuation angle ($\pm 40^\circ$) to the left and right with a switching point of $10 \pm 5^\circ$

- Large overtravel for high switching stability
- Depending on the actuation direction, the opposite contact closes
- Operating life > 100,000 switch operations
- Waterproof according to protection type IP67 with silicone-free sealing gasket
- Ambient temperature -40 to +85°C
- Order code NM02-0058



Generation of order code (example)				
The order code consists of 5 parameters:				
1	2	3	4	5
Series	Electrical rating	Circuitry	Terminal type	Auxiliary actuator
NM02	0	0	5	8
= Center-off switch				



SK, SJ SLIDING CONTACT SWITCHES

SK, SJ sliding contact switches

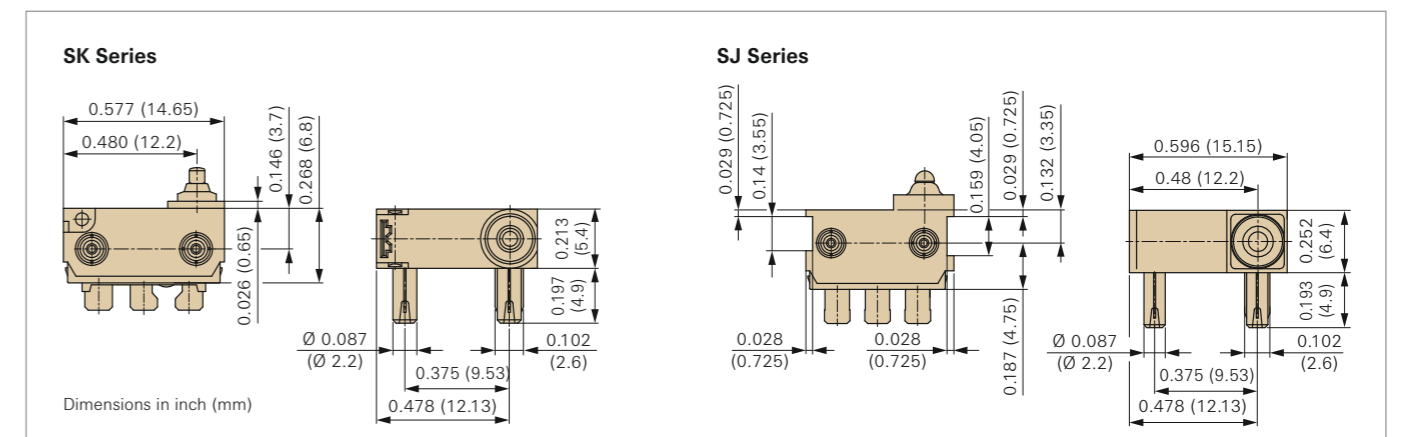
Sub-sub-miniature switch with high contact stability by double redundant contact system

- Easy installation thanks to connector pins and fastening nut
- Smallest dimensions
- Models available for up to 85°C operating temperature
- High operating life
- Many connection possibilities, also with leads available on request



Technical specifications

Series	SK	SJ
Type	sub-subminiature switch	sub-subminiature switch
Features	Sealed switch up to protection IP6K5, IP6K7 on request Actuation vertically or with auxiliary actuator	Sealed switch up to protection IP6K7 Suitable for actuation at angles of up to 40°
Electrical rating max.	0.1 A 12 VDC	0.1 A 12 VDC
Contact configuration	S.P.S.T. - N.O./ S.P.S.T. - N.C.	S.P.S.T. - N.O./ S.P.S.T. - N.C.
Dimensions mm (inch)	14.7 x 5.4 x 6.8 (0.57 x 0.21 x 0.27)	15.2 x 6.4 x 8.1 (0.59 x 0.25 x 0.32)
Actuator	Spherical head Straight auxiliary actuator Simulated roller auxiliary actuator	Spherical head



ROCKER SWITCHES

STANDARD

TR

Standard, single pole

- Slender design (11 mm)
- 16 A switching
- Lighted and non-lighted versions
- cULus and VDE approved

CR

Standard, single pole for higher loads

- Rugged design
- 2-color actuator available
- Lighted and non-lighted versions
- cULus and VDE approved

YR

Standard, double pole

- Round edge design
- High electrical rating, 20 A
- cULus and VDE approved
- Lighted and non-lighted versions

WR

Standard, double pole

- Rugged construction for 2-pole applications
- High electrical rating, 16 A
- cULus and VDE approved
- Lighted and non-lighted versions



Technical specifications*

Series	TR	CR	YR	WR
Electrical rating max.	16 A, 250 VAC 16 A, 125 VAC	16 A, 250 VAC 20 A, 125 VAC	16 A, 250 VAC 20 A, 125 VAC	16 A, 250 VAC 16 A, 125 VAC
Contact configuration	S.P.S.T. - N.O. S.P.D.T.	S.P.S.T. - N.O. S.P.D.T.	S.P.S.T. - N.O. S.P.S.T. - N.C. S.P.D.T. D.P.D.T.	S.P.S.T. - N.O. S.P.S.T. - N.C. S.P.D.T. D.P.D.T.
Panel cut-out dimensions mm (inch)**	30.4 x 11.0 (1.197 x 0.433)	28.45 x 12.09 (1.12 x 0.476)	30.2 x 22.0 (1.189 x 0.866)	30.2 x 22.0 (1.189 x 0.866)
Functions	On-Off	On-Off On-On On-Off-On	On-Off On-On	On-Off On-On (On)-On

* Please note the ordering information starting at page 48.

** Cut-out dimensions are approximate as they are affected by the panel thickness.

MINIATURE/ULTRA-MINIATURE

SRB

Miniature, single pole

- Non-lighted rocker switch
- Mechanical life min. 100,000 operations
- cULus and VDE approved

LR

Miniature, single and double pole

- High current switching
- Compact design
- cULus and VDE approved
- Lighted and non-lighted versions

RR

Miniature, round

- High electrical rating
- Compact design
- cULus and VDE approved

SRJ

Miniature, round

- Non-lighted rocker switch
- High electrical rating, 20 A
- cULus approved

PR

Ultra-Miniature

- Small agency-approved panel-mount power rocker switch
- Low-profile design
- cULus and VDE approved



Technical specifications*

Series	SRB	LR	RR	SRJ	PR
Electrical rating max.	10 A, 250 VAC 10 A, 125 VAC	10 A, 250 VAC 10 A, 125 VAC	10 A, 250 VAC 12 A, 125 VAC	12 A, 250 VAC 20 A, 125 VAC	3 A, 250 VAC 6 A, 125 VAC
Contact configuration	S.P.S.T. - N.O. S.P.D.T.	S.P.S.T. - N.O. S.P.S.T. - N.C.	S.P.S.T. - N.O. S.P.S.T. - N.C.	S.P.S.T. - N.O. S.P.D.T.	S.P.S.T. - N.O.
Panel cut-out dimensions mm (inch)**	19.2 x 12.9 (0.756 x 0.508)	19.2 x 12.9 (0.756 x 0.508)	Ø 21.0 (Ø 0.827)	Ø 21.0 (Ø 0.827)	13.7 x 9.2 (0.535 x 0.362)
Functions	On-Off On-On	On-Off	On-Off	On-Off On-On On-Off-On	On-Off

* Please note the ordering information starting at page 48.

** Cut-out dimensions are approximate as they are affected by the panel thickness.

ROCKER SWITCHES

SEALED

KC

- Complying to IP65
- Single pole
- Compact and round design
- AC and DC electrical ratings
- Lighted and non-lighted versions
- Snap-in mounting

KD

- Complying to IP65
- Double-pole
- Compact and round design
- AC and DC electrical ratings
- Lighted and non-lighted versions
- Snap-in mounting

KF

- Complying to IP65
- Compact and round design
- AC and DC electrical ratings
- Lighted and non-lighted versions
- Snap-in mounting

KG

- Complying to IP65
- Rugged design
- Single pole and double pole configurations
- AC and DC electrical ratings
- Snap-in mounting



Technical specifications*

Series	KC	KD	KF	KG
Electrical rating max.	10 A, 250 VAC 16 A, 125 VAC 20 A, 14 VDC; 10 A, 28 VDC	10 A, 250 VAC 16 A, 125 VAC 20 A, 14 VDC; 10 A, 28 VDC	6 A, 250 VAC 10 A, 125 VAC 20 A, 14 VDC; 10 A, 28 VDC	10 A, 250 VAC 20 A, 125 VAC 21 A, 14 VDC
Panel cut-out dimensions mm (inch)**	Ø 20.2 (Ø 0.795)	Ø 20.2 (Ø 0.795)	Ø 20.2 (Ø 0.795)	36.0 x 21.2 (1.449 x 0.835)
Functions	On-Off	On-Off On-On On-Off-On	On-Off (On)-Off	On-Off On-On
Terminals	4.8 mm Q.C. terminal	4.8 mm Q.C. terminal	4.8 mm Q.C. terminal	6.3 mm Q.C. terminal
Actuator	Flat	Flat	Flat	Curved

* Please note the ordering information starting at page 50.

** Cut-out dimensions are approximate as they are affected by the panel thickness.

KM

- Complying to IP56
- Single pole and double pole configurations
- AC and DC electrical ratings
- Lighted and non-lighted versions

KR

- Complying to IP65
- Single pole
- Compact miniature housing
- AC and DC electrical ratings
- Lighted and non-lighted versions

KS

- Complying to IP56
- AC and DC electrical ratings

KT

- Complying to IP56
- Single pole version
- AC and DC electrical ratings
- Color lense in various colors



Technical specifications*

Series	KM	KR	KS	KT
Electrical rating max.	10 A, 250 VAC 20 A, 125 VAC 21 A, 14 VDC	10 A, 250 VAC 16 A, 125 VAC 16 A, 12 VDC; 6 A, 28 VDC	10 A, 277 VAC 16 A, 125 VAC 21 A, 14 VDC	10 A, 250 VAC 20 A, 125 VAC 21 A, 14 VDC
Panel cut-out dimensions mm (inch)**	36.0 x 21.2 (1.449 x 0.835)	19.4 x 13.0 (0.780 x 0.512)	36.0 x 21.2 (1.449 x 0.835)	36.8 x 15.2 (1.454 x 0.602)
Functions	On-Off On-On	On-Off On-On (On)-Off	On-Off On-On	On-Off On-On On-Off-On
Terminals	6.3 mm Q.C. terminal	4.8 mm Q.C. terminal	6.3 mm Q.C. terminal	6.3 mm Q.C. terminal
Actuator	Curved 2-color-LEDs	Flat	Curved	Curved

* Please note the ordering information starting at page 50.

** Cut-out dimensions are approximate as they are affected by the panel thickness.

ROCKER SWITCHES

PART NUMBER BREAKDOWN

CR Series



CR Series	E 2	F	B	E
Circuitry	2 Single Pole	Switch Function	Actuator Type	Housing color
	2 On-Off	2 Curved One Color	B Black	Lighted
	3 On-On	4 Curved - Two Color Red Mold		N Non-Lighted
	4 On-Off-On			E* Bulb 250 VAC
				L* Bulb 125 VAC
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Body Type mm (inch)
E 20 A, 125 VAC; 16 A, 250 VAC; 3/4HP 250 VAC (cULus) 16(4) A, 250 V~, T125/55 (VDE)	F 6.3 (0.250) Q.C. terminal	B Blank D OFF NO F 0 - H I 0 II P OFF ON	G Green R Red B Black A Amber U Blue	E 12.10 (0.476) Non-Washable

* Only available on 3-position rocker

SR Series



SR Series	B 2	A 2	B	N
Circuitry	2 Single Pole	Switch Function	Actuator Type	Housing color
	2 On-Off	2 On-On	2 Curved	B Black
				N Non-Lighted
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof
B 10 A, 125 VAC 6 A, 250 VAC (cULus) 10(4) A, 250V~, T125/55 (VDE)	A 4.8 (0.187) Q.C. terminal	B Blank F 0 - D OFF ON	B Black R Red	N No Rocker Boot

LR Series



LR Series	A	2	H 2	B	N
Circuitry	2 Single Pole 3 Double Pole	Switch Function	Actuator Type	Housing color	Lighted
		2 On-Off	2 Curved	B Black	N Non-Lighted
					E Bulb 250 VAC
					L Bulb 125 VAC
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof	
A 10 A, 125 VAC 1/4HP; 8 A, 250 VAC 1/4HP (cULus) 10(4) A 250 V~, T125/55 (VDE)	H 4.8 (0.187) Q.C. terminal	B Blank D OFF NO E 0 I F 0 -	G Green R Red B Black	N No Rocker Boot	

TR Series



TR Series	G 2	2	F 2	B	N
Circuitry	2 Single Pole	Switch Function	Actuator Type	Housing color	Lighted
		2 On-Off	2 Curved	B Black	N Non-Lighted
					E Bulb 250 VAC
					L Bulb 125 VAC
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof	
G 16 A, 125/250 VAC; 1/4 HP; 3/4 HP 250 VAC (cULus) 16(4) A, 250 V~, T85/55 (VDE)	F 6.3 (0.250) Q.C. terminal	B Blank F 0 -	G Green R Red B Black	N No Rocker Boot	

PART NUMBER BREAKDOWN

WR Series



WR Series	G 3	F	B	N
Circuitry	3 Double Pole	Switch Function	Actuator Type	Housing color
		2 On-Off	2 Curved	B Black
		3 On-On	5 Flat	W White
		5 (On)-On	7 Curve-Dual	
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof
G 16 A, 125/250 VAC 1/4HP; 3/4HP 250 VAC (cULus) 16(4) A, 250 V~, T125/55 (VDE)	F 6.3 (0.250) Q.C. terminal	B Blank F 0 -	W White B Black G Green R Red	N No Rocker Boot

YR Series



YR Series	M 3	F 2	B	N
Circuitry	3 Double Pole	Switch Function	Actuator Type	Housing color
		2 On-Off	2 Curved	B Black
		3 On-On		
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof
M 20 A, 125 VAC; 16 A, 125/250 VAC; 3/4 HP (cULus) 16(4) A, 250V~ T125/55 (VDE)	F 6.3 (0.250) Q.C. terminal	B Blank F 0 -	R Red B Black	N No Rocker Boot

RR Series



RR Series	A	2	H 3	B	N
Circuitry	2 Single Pole 3 Double Pole	Switch Function	Actuator Type	Housing color	Lighted
		2 On-Off	3 Round	B Black	N Non-Lighted
					E Bulb 250 VAC
					H Lighted 12 VDC Bulb
					L Bulb 125 VAC
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof	
A 10 A, 125 VAC 1/4HP; 8 A, 250 VAC 1/4HP (cULus) 10(4) A, 250 V~ T125/55 (VDE)	H 4.8 (0.187) Q.C. terminal	B Blank E 0 I F 0 -	G Green R Red B Black A Amber	N No Rocker Boot	

PR Series



PR Series	K 2	2	J 5	B	N
Circuitry	2 Single Pole	Switch Function	Actuator Type	Housing color	Lighted
		2 On-Off	5 Flat	B Black	N Non-Lighted
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof	
K 6 A 125 VAC, 3 A 250 VAC cULus 3 A 250 V~ T100/55(VDE)	J 3.71 (0.146) Solder terminal	B Blank D OFF NO E 0 I	B Black	N No Rocker Boot	

SR Series



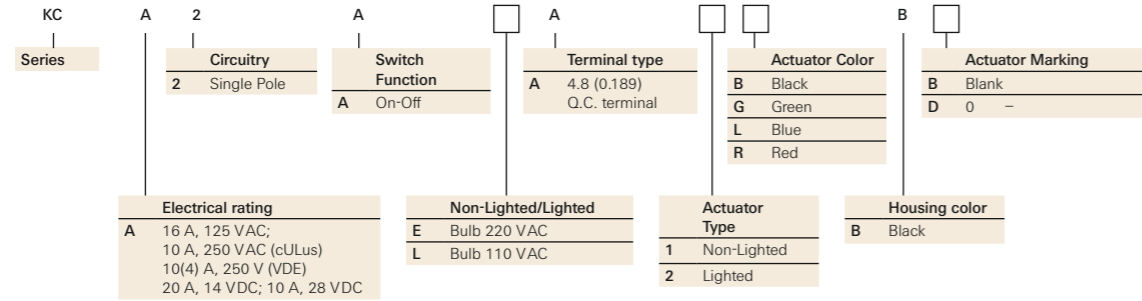
SR Series	J 2	A 3	N	N
Circuitry	2 Single Pole	Switch Function	Actuator Type	Housing color
		2 On-Off	3 Round	B Black
		3 On-On		W White
		4 On-Off-On		
Electrical rating	Terminal type mm (inch)	Actuator Marking	Actuator Color	Splashproof
J 20 A, 125 VAC 12 A, 250 VAC (cULus)	A 4.8 (0.187) Q.C. terminal	B Blank H I 0 II	B Black W White	N No Rocker Boot

Please note that not all part numbers configurable from these breakdowns are standard parts, and other combinations are possible for non-standard parts. For further information on the availability of variants, or to discuss your specific application requirements, please contact your local ZF representative.

ROCKER SWITCHES

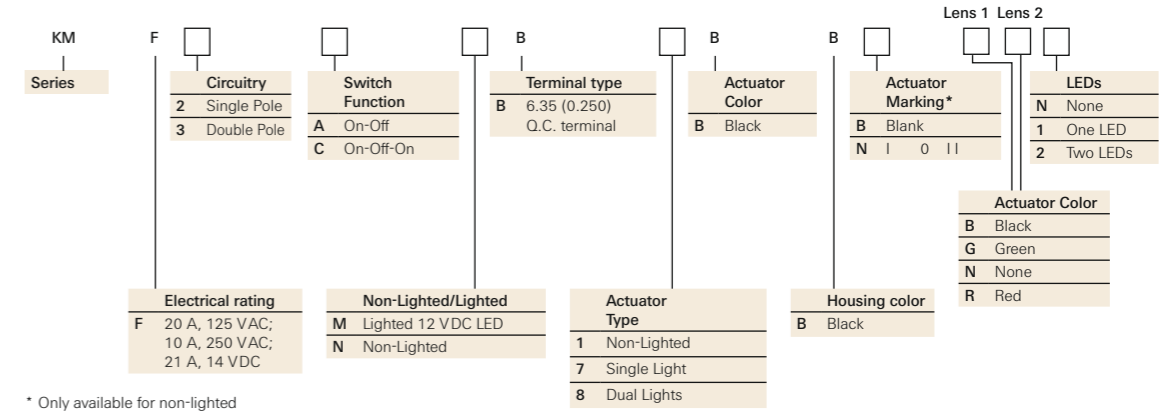
PART NUMBER BREAKDOWN

KC Series



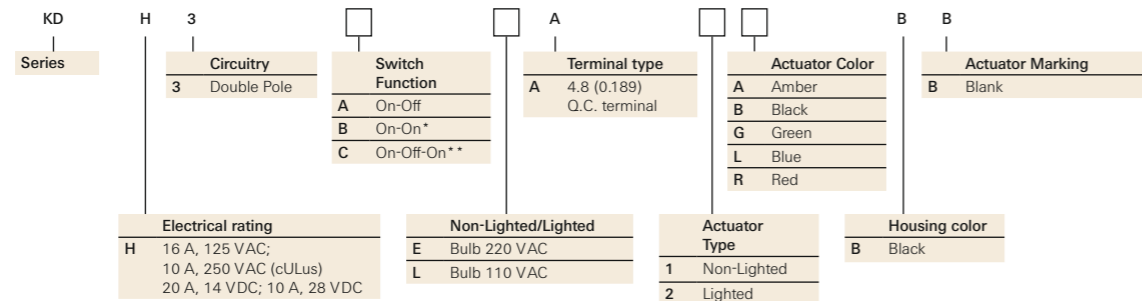
PART NUMBER BREAKDOWN

KM Series



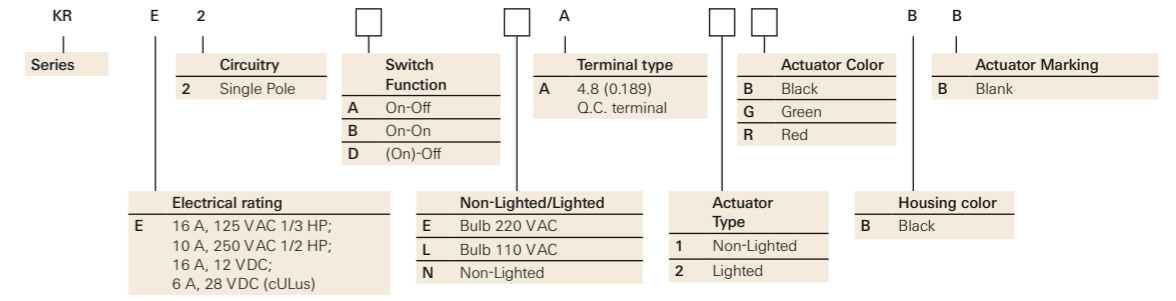
* Only available for non-lighted

KD Series

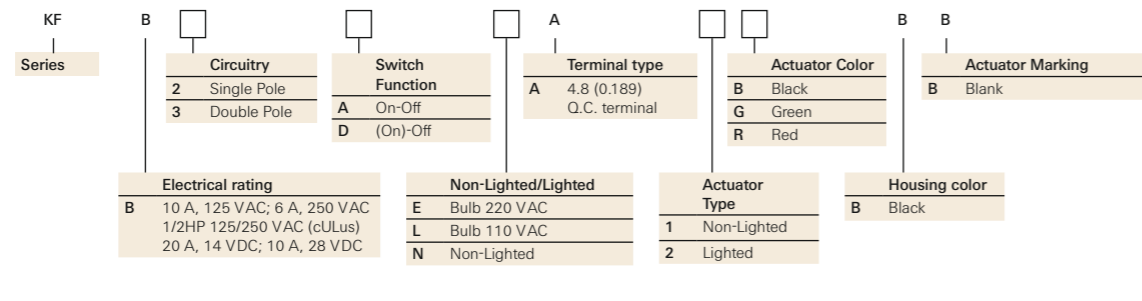


* On-On not available lighted
** On-Off-On not available lighted

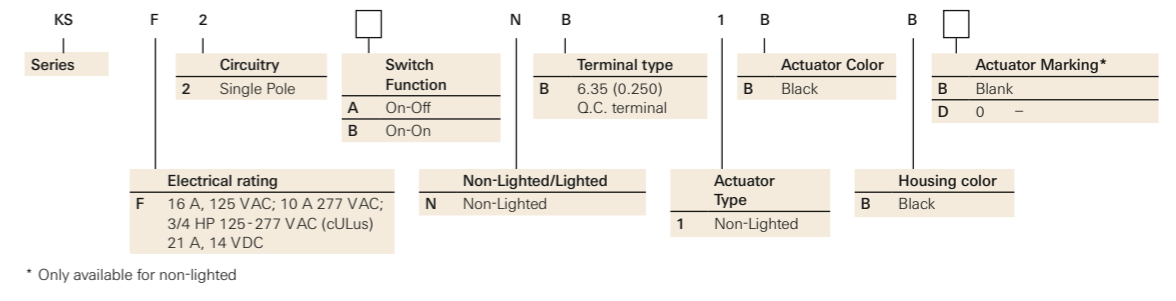
KR Series



KF Series

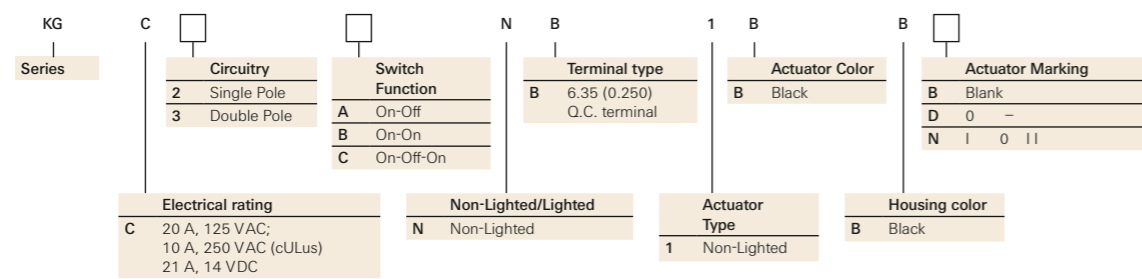


KS Series

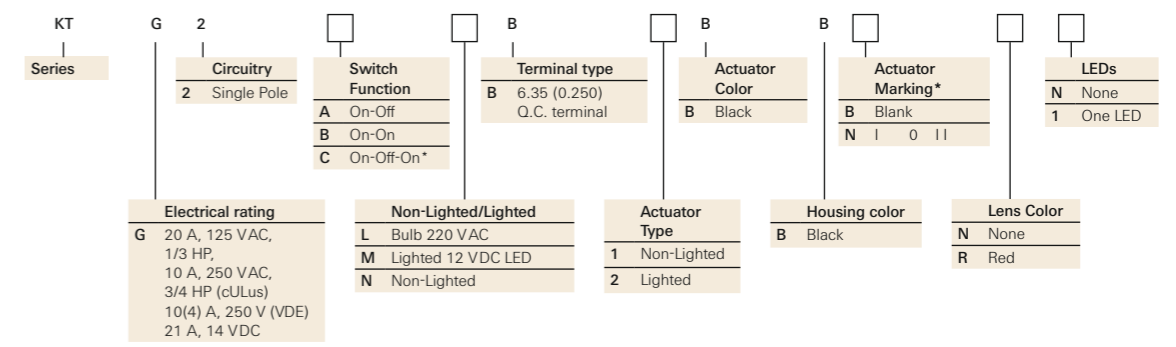


* Only available for non-lighted

KG Series



KT Series



* Only available for non-lighted

Please note that not all part numbers configurable from these breakdowns are standard parts, and other combinations are possible for non-standard parts. For further information on the availability of variants, or to discuss your specific application requirements, please contact your local ZF representative.

LEXICON

SNAP SWITCHES – DEFINITIONS AND DESCRIPTIONS

Snap switches, also called micro switches, are activated by a spring-operated (or “snap-action”) mechanism. Depressing the actuator triggers the switching operation, with a pre-defined force and travel. The switching speed itself is largely independent of the speed of actuation.

Actuator

Applying force to the actuator of a snap switch releases the snap-action mechanism, which in turn triggers the switching operation.

Auxiliary actuator

It is possible to attach an auxiliary actuator to a snap switch in order to meet the specific requirements of a given application. Doing so usually alters the travel and forces involved in the switching operation, depending on the length of the levers. By attaching an appropriate auxiliary actuator, it is possible to increase travel and/or reduce the actuating force required.

Terminals

COM (Common = 1): Base terminal

NC (Normally Closed = 2): The contact is closed in the rest position, that is, the terminal is connected to COM. When the switch is actuated, the contact opens.

NO (Normally Open = 4): The contact is open in the rest position, that is, the terminal is separated from COM. When the switch is actuated, the contact closes.

Contact gap (contact opening distance)

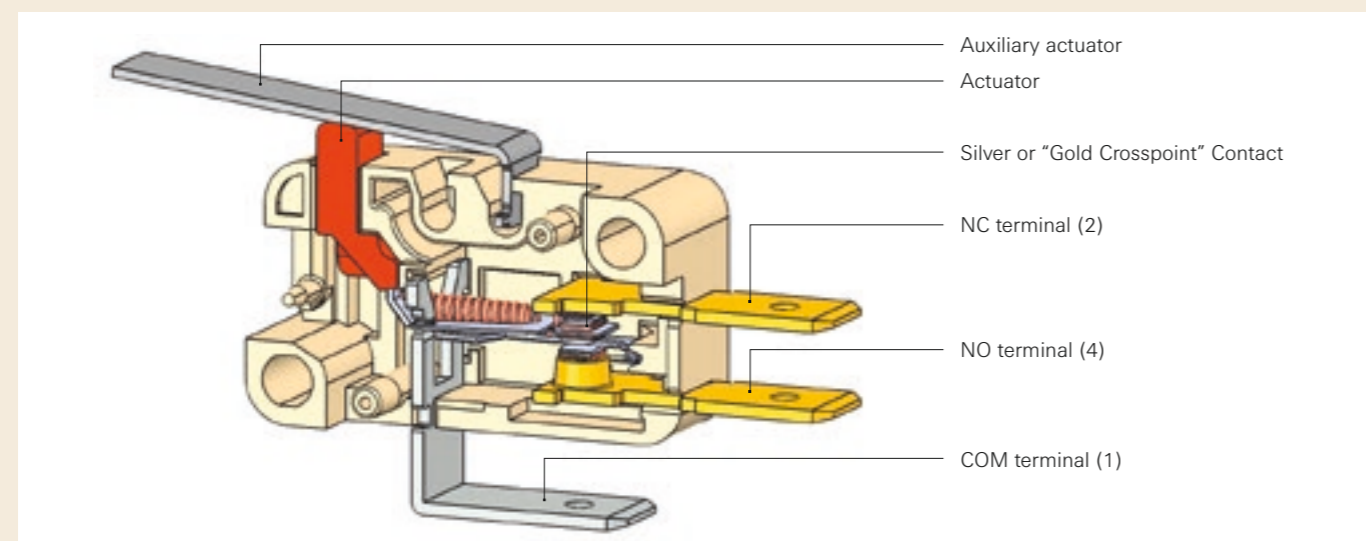
The contact gap is the distance between a pair of open contacts. For snap switches, it is usually around 0.3 mm. Generally speaking, for switches with contact gaps < 3 mm, additional measures are necessary for separation from the mains. These switches bear the mark μ for European approvals. Switches with a contact gap > 3 mm can generally be used directly for separation from the mains.

Clearance and creepage distance

Clearance is the shortest distance through the air between two electrically conductive parts.

The creepage distance is the shortest distance along the surface of an isolating material between two electrically conductive parts.

Please check the device specifications applying to your particular product, and if there is any doubt, please clarify with the responsible testing agencies.



Graphical symbols		
Description	Function	Circuit symbol
S.P.D.T. Single Pole Double Throw (Changeover contact)	In rest position the COM terminal is connected to the NC contact. When the actuator is depressed, COM and NC break contact and COM and NO make contact.	
S. P. S. T. -N.O. Single Pole Single Throw Normally Open (Make contact)	When the switch is actuated, contact is made.	
S. P. S. T. -N.C. Single Pole Single Throw Normally Closed (Break contact)	When the switch is actuated, contact is broken.	

LEXICON

POSITIONS, FORCES AND TRAVELS

Actuator positions

Dimensions for actuator positions are always specified in relation to a given reference line.

Rest point

The rest position is the position of the actuator when no external force is being applied.

Operating point (mech.)

The point along the actuator's travel path at which the spring-operated mechanism is actuated.

End position

The position of the actuator at the end of its travel.

Reset point (mech.)

The point along the actuator's path, as it travels back to its rest position, at which the spring-operated mechanism snaps back to its original position.

Actuator travel

Pretravel

The distance travelled between the actuator's rest position and the switching point.

Overtravel

The distance travelled between the switching point and the end position. To make absolutely sure that the switching operation takes place, an actuator should use up at least 50% of the available overtravel.

Reset travel

The distance travelled between the end position and the release point.

Free travel (open circuit travel)

The distance travelled between the reset point and the rest position.

Total travel

The sum of pretravel and overtravel, or of reset travel and free travel.

Movement differential

The distance travelled between the operating point and the rest point.

Forces

Initial force

The force required to move the actuator away from its rest position.

Operating force

The force required to move the actuator through the operating point.

Sustaining force

The force required to hold the actuator in its final position.

Reset force

The level to which the operating force must be reduced to allow the spring-operated mechanism to return to its original position.

Differential force

The difference between the operating force and the rest force.

Conversion of US-Units

Inch/millimeter

Generally, measures in this catalogue are based on the metric system and indicated in millimeter (mm). For the conversion please use the following relation:
1 millimeter = 0.03937 inches
Example: $27.8 \text{ mm} \times 0.03937 = 1.094 \text{ inches}$

And for the reverse calculation:

1 inch = 25.4 millimeters

Example: $0.51 \text{ inches} \times 25.4 = 12.95 \text{ mm}$

Forces

The specifications of the operating force for the switches are indicated in hundredth Newton (cN). For the conversion please use the following relation:
1 Newton (N) = 100 cN = 101.972 gf
1 cN = 1.01972 gf

Example: $250 \text{ cN} \times 1.01972 = 254.93 \text{ gf}$

The re-conversion corresponds to:

1 gf = 0.981 cN

Example: $850 \text{ gf} \times 0.981 = 833.85 \text{ cN}$

Actuator position

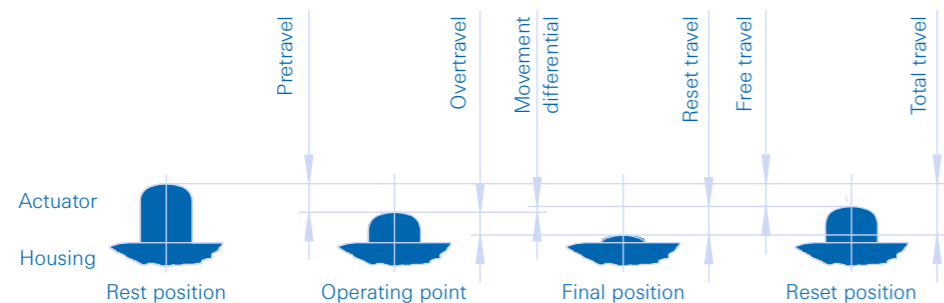


Diagram showing relationship between operating force and travel

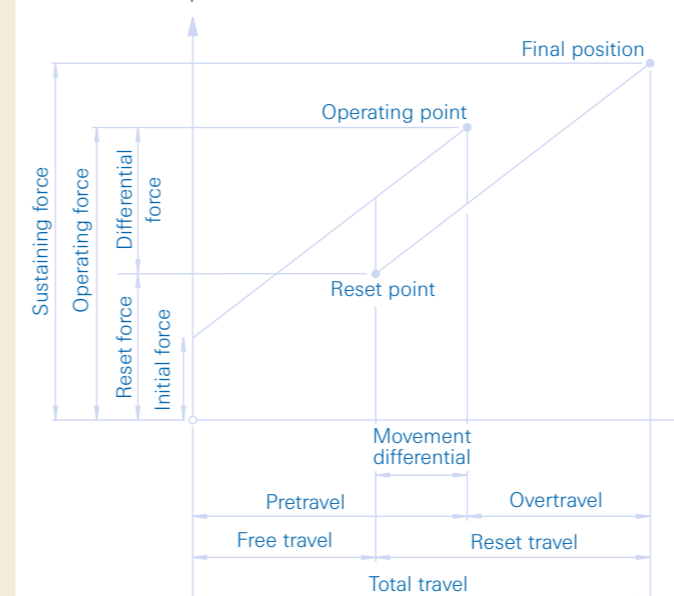
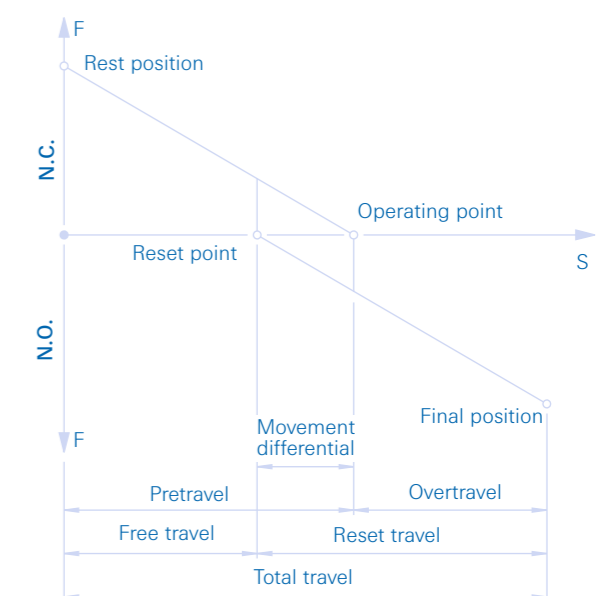


Diagram showing the relationship between contact force and travel



LEXICON

OPERATING LIFE, TEMPERATURE RESISTANCE, VIBRATION AND ELECTRIC RESISTANCE

Operating life

The operating life specifies the minimum number of switch cycles within the specific values. It depends on a large number of parameters that are determined by the intended application case. Among these are, for example:

- switched current and switching voltage
- type of load (e.g. ohmic, inductive or lamp load)
- Combination of materials in actuating element/actuator
- Actuator type
- Actuator speed
- Switching frequency (switching cycles/min)
- Pretravel/Overtravel
- Environmental factors such as climate conditions or harmful gases (e.g. SO₂).

Electrical life

The selection of the optimal contact material has great influence on the operating life. The electrical life test is conducted at rated voltage, rated current and resistive load. The lower the electrical current, the longer the electrical life – under some circumstances it may even equal the switch's mechanical life.

Please note:

Media such as greases, oils and materials which contain silicone must not be used on the switch. There is a distinction between mechanical and electrical operating life.

Mechanical life

Indicates how often a switch can be actuated without an electrical load. Mechanical endurance is calculated by actuating the snap switches axially in relation to the actuator in a sinusoidal pattern using about 80% overtravel at a switching frequency of 4 Hz at room temperature.

Please note:

For switching loads which deviate from the values specified in the catalogue, we recommend that you discuss the issues involved with ZF. This is especially important if you have other than linear resistances. These can be electrical circuits with inductive resistances (motors), capacitive resistances (condensers) or lamp loads. To ensure that a switch reaches the end of its electrical operating life, the switch should not be subjected to pressure in its rest position (pre-stressed) and at least 50% of the available overtravel must be used. Operating life specifications for direct current loads are available on request. Where higher switching capacities are involved, we recommend the use of fuses to provide protection against arcing.

Since the operating life of a snap switch depends on a number of factors, we recommend that field trials be performed in order to establish the likely electrical life of a switch in a given application. This is especially recommended when the application deviates considerably from the test conditions described above. Our specialists are always ready to provide you with more advice regarding possible solutions for your particular application.

Behaviour at different temperatures

Depending on the model, the operating temperatures of our switches range from -25 to +70°C and -40 to +150°C. If you attempt to use a switch at operating temperatures either above or below those recommended for your particular model, the switch's material properties will change and its reliability will be affected. Where switch model codes start with "T" (e.g. 40T125 in compliance with EN 61058), the switches involved have been approved for use at the corresponding temperatures.

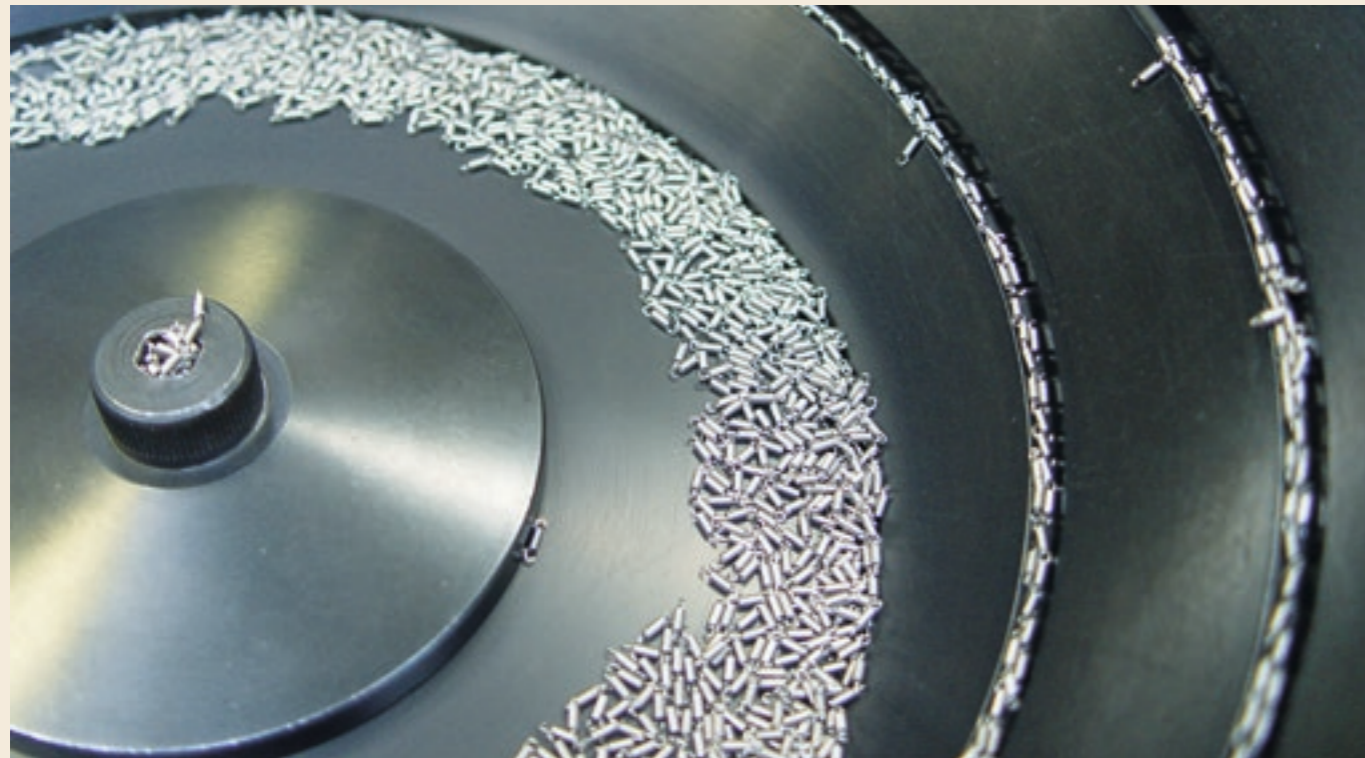
Vibration and shock resistance

Snap switches are naturally fairly resistant to shocks and vibrations thanks to their minimal mass of moving parts. They are at their most resistant when the actuator is in the rest position or end position, when vibration resistance is as high as 5 g at 20–200 Hz while shock resistance attains 20 g (6 ms).

Snap switches are more susceptible to vibrations at the switching point and at the release point. In certain conditions, this could result in transient make or break contacts (bouncing) to the detriment of the switch's operating life. This is why snap switches which are regularly exposed to vibration should, wherever possible, not be actuated slowly.

Electric strength

The electric strength of our snap switches is – in the case of models suited for mains voltages – exceeds 1500 VAC between conducting parts and the earth and 750 VAC between the terminals (open contacts) measured over a period of one minute at an ambient temperature of 23°C ± 5°C, relative humidity of <70% and normal atmospheric pressure.



LEXICON

OPERATION, CONTACT TYPES AND MATERIALS

Operating speed

Snap switches are suitable for a broad spectrum of operating speeds. However, extremely slow or fast actuations can affect the switch performance and operating life. For product-specific values, please see the technical specifications. The maximum switching frequency (switchings/s) is limited by the electric load. With low switch loads, up to 10 actuations per second are possible.

Sudden actuation must be avoided since it decreases the mechanical operating life.

Contact bounce

Bounce time is the time between the moment closing contacts first touch and final (definitive) contact closure. The typical bounce time for our snap switches is between 1.5 and 3 ms, depending on the series.

Transit time

In two-way (double-throw) switches, transit time is the time between the moment the break contact element (NC contact) first opens and the make contact element (NO contact) first closes. Transit time is generally determined by design features such as e.g. contact travel and elastic characteristics. It generally varies between 3 and 10 ms, depending on the model.

If transit time is critically important to the functioning of your application, don't hesitate to contact us.

Contacts

We supply switches with standard and crosspoint contact technology. For low-voltage and low-current applications, we strongly recommend the use of gold crosspoint contacts. The reduced surface area of the cross-shaped contacts means that the surface pressure is greater, which in turn enhances reliability. Standard contacts are more suitable for higher switched loads.

Contact materials

Gold and gold alloys: primarily AuAg; AuAgPt

Silver and silver alloys: primarily AgNi, AgSnO₂

Gold alloys are especially suitable for low currents and voltages.

Typically they are used in the range from 5 V, 1 mA DC to 12 V 100 mA DC.

But it may also make sense to use them in switches which are only occasionally operated or in atmospheres with a high sulphur content. For switching heavier loads, it usually makes sense to use silver or silver alloys.

In this case, the range typically extends from 12 V, 100 mA DC to 250 V 21 A AC.

Because choosing the right contact materials depends on a large number of factors, such as switching voltage and current, operating environment, atmospheric conditions, etc., we are always pleased to advise you on the best choice of material for your application. Before making any firm decisions, we do advise you to carry out field trials of our switches in real-life conditions.

MATERIALS AND CONTACT RESISTANCE

Materials

For our standard switches, we use high-quality, cadmium-free plastics which are optimized for the intended application. As a rule, we seek to avoid the use of toxic or hazardous materials. You can find out more about our materials policy by consulting our hazardous substances exclusion list.

Behaviour of materials in fire

Insulating materials which are directly connected to electrically conductive parts are classified according to their degree of flammability. Most of the materials we use to manufacture housing are self-extinguishing and categorised under the UL 94 VO standard.

Proof tracking index

Most of the insulating materials we use in our snap switches have a proof tracking index of PTI 250 (PTI 300, e.g. D4) or PTI 175 (PTI 250, e.g. DB, DC). This means that they are capable of 50 drops of test fluid at a test voltage of 250 V without producing any leakage current (IEC 60112).

RoHS

Switches without leads already conform to RoHS. Switches with leads are available in RoHS-conforming models on request. In case of further processing with lead-free soldering, the product-specific solder recommendations must be heeded.

Glow wire test

The insulation materials used for snap switches with ENEC approval fulfil the required filament tests GWFI according to the household appliance standard IEC 60335-1 at 850°C and GWIT at 775°C or alternatively the filament test GWT at 750°C.

Contact resistance

The contact resistance of snap switches is composed of the contact resistance and the resistance of the conductive parts. It depends primarily on the construction and the contact material. The contact resistance of silver contacts is max. 100 mΩ, of gold contacts max. 50 mΩ when they are new.

Insulation resistance

The insulation resistance between the conductive parts of our snap switches and a conductive underlay or between the open contacts exceeds 10 MΩ when they are new, measured over a period of one minute at room temperature with 500 V DC.

Caution:

Humidity and soiling can decrease the insulation resistance.

Designations	
ASA	Acrylnitril-Styrol-Acrylester
LCP	Liquid Crystal Polymer
PA	Polyamide
PBT	Polybutylenterephthalat
PET	Polyethylenterephthalat
POM	Polyoxymethylen (Polyacetal)
PPS	Polyphenylsulfid
PES	Polyethersulfon
SI	Silicone
TPE	Thermoplastische Elastomer
VMQ	Vinyl-Methyl-Polysiloxan (Silicone rubber)

Degree of flammability UL	IEC/VDE	In vertical flammability test, goes out after no more than	Drops of molten material capable of igniting wadding	Max. duration of afterglow
V-0	FV-0	5 seconds	no	30 seconds
V-1	FV-1	25 seconds	no	30 seconds
V-2	FV-2	25 seconds	possible	60 seconds
HB	FH	Burning rate in horizontal flammability test: up to 3 mm thick < 7.5 mm/min; over 3 mm thick > 3.8 mm/min		