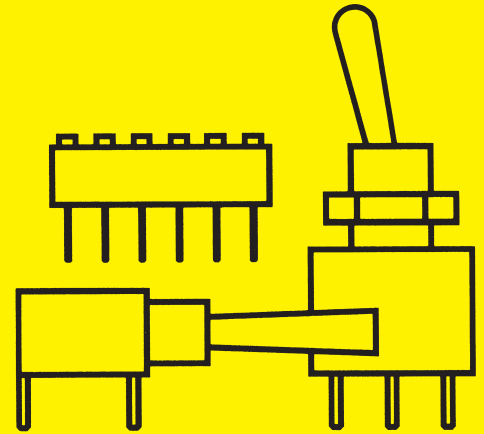
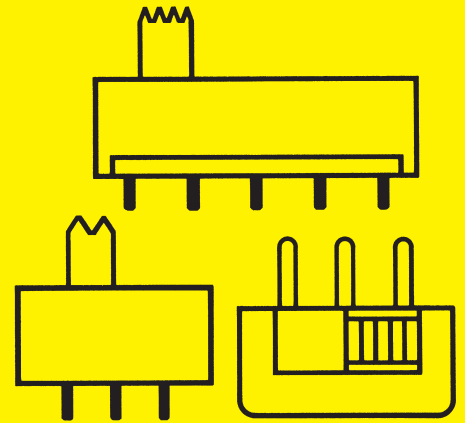


knitter switch

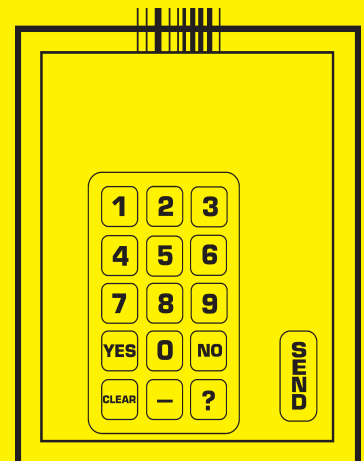
Professional Switches



Low Cost Series



Membrane & Keypads



INDEX

	1. General Information	4
	2. Toggle Switches	7
	3. Pushbutton Switches	31
	4. Pushbutton Switches illuminated	51
	5. Tact Switches	69
	6. Slide Switches	95
	7. Dual-in-line Switches	121
	8. Rotary Coded Switches	143
	9. Rotary Switches	159
	10. Encoder	165
	11. Micro / Snap Action Switches	179
	12. Special Switches	191
	13. LEDs	203
	14. Membrane Keypads and Rubber Keypads	209
	15. Steel Keyboards	217

General Information

1

The catalog details are without obligation and subject to modifications after print.

Current datasheets and product change notifications can be found on www.knitter-switch.com.

This catalogue is divided by switch types: toggle switches, pushbutton switches, slide switches, dual-in-line switches, rotary coded switches, rotary switches, encoder, LED's and membranes.

The chapters include professional, semi-professional and low-cost components.

The technical specification for each series is specifically stated. Unless otherwise specified, the figures for contact rating apply for the standard version.

For several series, especially MT... and MP..., the following is available:

Standard version: silver or silver-plated contacts and terminals

Configuration B: gold-plated (over Nickel) contacts and terminals

Configuration G: gold-plated (over silver) contacts and terminals

All switches are sealed on the terminal side.

Switches for SMT as well as most series for PCB mounting are generally fully washable.

Unless otherwise specified, components for auto- (wave-) soldering are limited to pre-heat max. 60s, max. 100 °C, soldering max. 5s, max. 260 °C.

Signs and symbols:



component is UL-listed

ESD: component is ESD-resistant. Resistance is depending from switch size and is listed in the technical data

IP 67: component has an approved IP rating or is according to an IP rating

CE: our products meet all relevant regulations



all components in this catalogue are compliant with regulation 2011/65/EU



IR-reflow soldering according to JEDEC ST-020 D
(peak 260 °C, 10s max.)

Type naming/switching functions

A group of a maximum of 4 identification letters is followed by up to 4 digits (excepted membranes and some switches with specific features).

The letters are specific for the type of actuation, the digits describes certain technical features.

This is followed by the characteristic letters for the different switching functions (if there are):

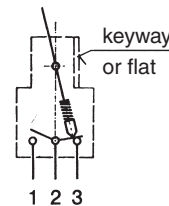
First column is used for 1/3 pole-, second column for 2/4 pole switches. For switches using same housing for 1 and 2 pole versions, only column 1 is used	A		off	–	on	
	B		on	–	(mom)	
	C		off	–	mom	
	D	N	on	–	on	
	E	P	on	off	on	
	F	R	mom	–	on	mom: momentary on
	G	S	mom	off	mom	(mom): momentary off
	H	T	mom	off	on	
	EA	PA	on	on	on	
		SA	mom	on	mom	
		TA	mom	on	on	

For all toggle switches, a dot on the top of the switching function table indicates the switching position with the lever in the direction of the keyway or the flattened thread. The closed contacts are always opposite to the position of the lever.

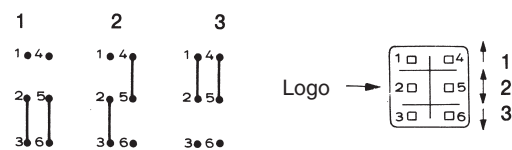
For PA, SA and TA types the poles are switched separately as shown in the diagram below:

Lever position:

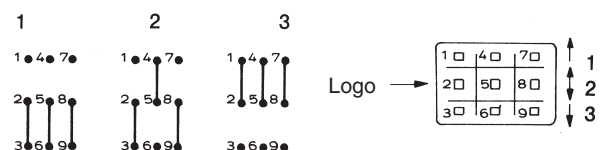
- 1 lever up
- 2 lever at middle
- 3 lever down



DPDT



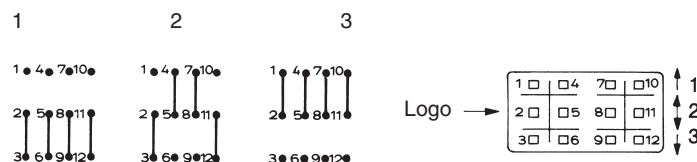
3PDT



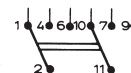
A connection between terminals 3 and 5 forms a one-pole three-position switch.



4PDT



Connections between terminals 3 and 5 and 8 and 12 form a two-pole three-position switch.



2

Toggle Switches

2.1 Miniature Toggle Switches



General		8– 9
Series MTA	standard	10–11
Series MTE	waterproof IP 67	12–13
Series MTL	with locking lever	14–15
Series MTG	mustang type	16–17
Series MTW	mustang type/waterproof IP 67	18
Series MZME	ESD proof, waterproof IP 67	19
Series STM	with short lever	20–21

2.2 Subminiature Toggle Switches



Series ATE	waterproof IP 67	22–24
Series SST	SMD / waterproof IP 67	25
Series TST	low-cost/ESD proof, waterproof IP 67	26–27

2.3 Microminiature Toggle Switches



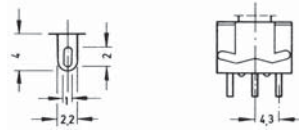
Series FT	ESD proof	28–29
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Miniature Toggle Switches

Available for miniature toggle switches series MT./ST.
and also for miniature pushbutton switches series MP.

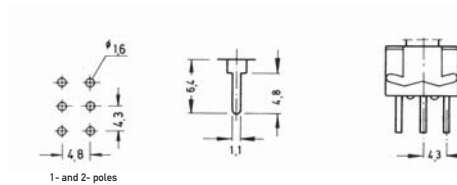
Solder tags:

Series MT./MP.



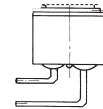
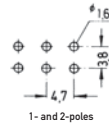
PC terminals:

- PC



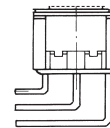
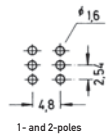
horizontal actuation on PCB*

- RA



vertical actuation on PCB*

- VM



* Series ST./SP. only

Standard switches with RA and VM are without thread. Special versions upon request.

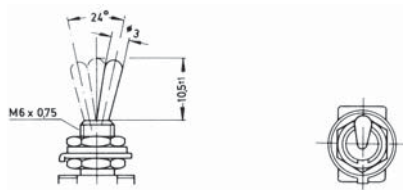
Partly non-stock items; minimum quantity and delivery time on request.

Miniature Toggle Switches

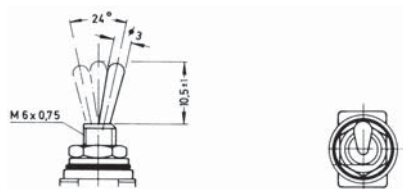
2

Standard levers:

Series MTA

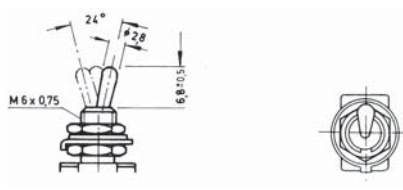


waterproof IP 67
Series MTE

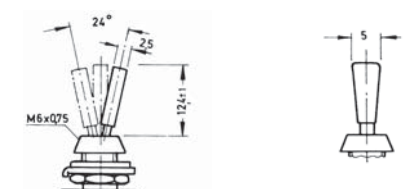


Special levers:

short
Series MTM

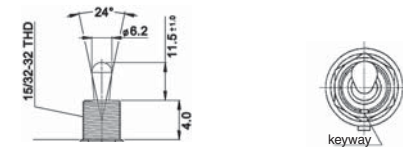


flat, with decorative nut
Series MTF

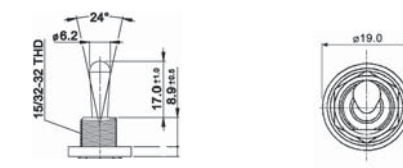


Mustang levers:

Series MTG

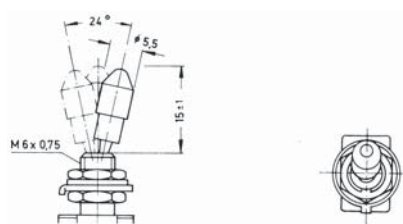


long, waterproof IP 67
Series MTW



Locking lever:

Series MTL



Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 45 °C to + 140 °C
Mechanical life:	minimum 300 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated, version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated further terminal versions see page 8
Material:	case: diallyle-phthalate, meets UL 94 V–0, black lever: chromium-plated, metal parts: nickel-plated
Mounting:	bushing M 6 x 0.75 with locking plate, key 9 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

Accessories:

Knurled nut, nickel-plated
M 6 x 0,75, Ø 8 mm R 675



Plastic caps (height 11.5 mm)

orange	C 1103
blue	C 1104
black	C 1105
green	C 1106
grey	C 1107
yellow	C 1108
red	C 1109
white	C 1110



Waterproof sealing caps (height 14.3 mm)

black	ET 102
yellow	ET 108
red	ET 109



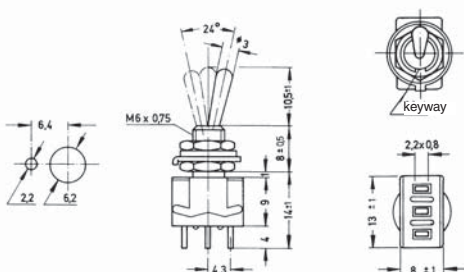
Waterproof sealing cap with mounting screw

Models: Switching functions

SPDT



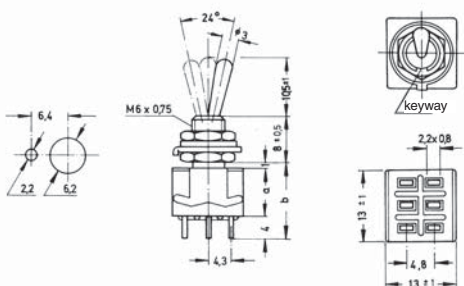
MTA 106 D	on	—	on
MTA 106 E	on	off	on
MTA 106 F	mom	—	on
MTA 106 G	mom	off	mom
MTA 106 H	mom	off	on



DPDT

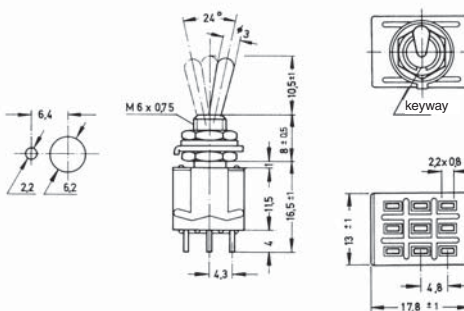
MTA 206 N	on	—	on
MTA 206 P	on	off	on
MTA 206 R	mom	—	on
MTA 206 S	mom	off	mom
MTA 206 T	mom	off	on
MTA 206 PA	on	on	on
MTA 206 SA	mom	on	mom
MTA 206 TA	mom	on	on

measures: a = 9, b = 14 ± 1



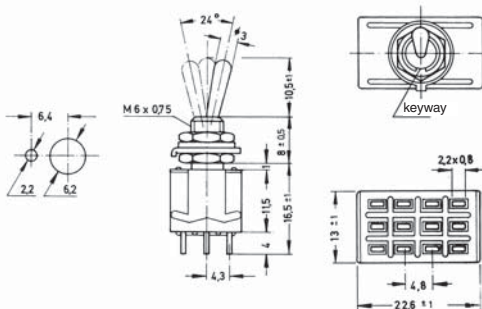
3PDT

MTA 306 D	on	—	on
MTA 306 E	on	off	on
MTA 306 F	mom	—	on
MTA 306 G	mom	off	mom
MTA 306 H	mom	off	on
MTA 306 EA	on	on	on



4PDT

MTA 406 N	on	—	on
MTA 406 P	on	off	on
MTA 406 R	mom	—	on
MTA 406 S	mom	off	mom
MTA 406 T	mom	off	on
MTA 406 PA	on	on	on
MTA 406 SA	mom	on	mom
MTA 406 TA	mom	on	on



Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 45 °C to + 140 °C
Mechanical life:	minimum 100 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated, version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated further terminal versions see page 8
Protection:	30 minutes at 1 m water column; IP 67
Sealing:	neoprene O-rings between toggle/bushing and bushing/panel
Material:	case: diallyle-phthalate, meets UL 94 V–0, black lever: chromium-plated, metal parts: nickel-plated
Mounting:	bushing M 6 x 0,75 locking through flat bush, key 9 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

Accessories:

Plastic caps (height 11.5 mm)

orange	C 1103
blue	C 1104
black	C 1105
green	C 1106
grey	C 1107
yellow	C 1108
red	C 1109
white	C 1110



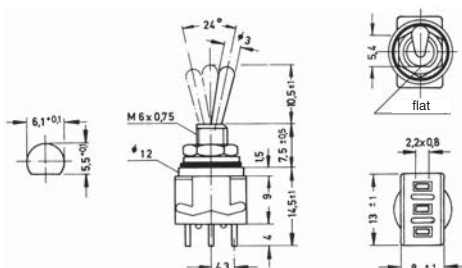


Miniature Toggle Switches waterproof

Models: Switching functions

S P D T

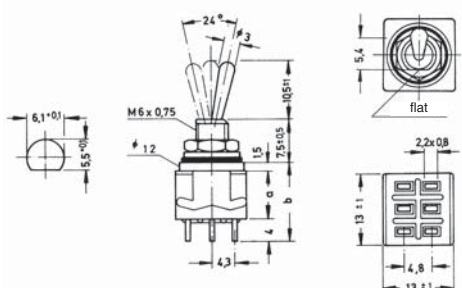
MTE 106 D	on	—	on
MTE 106 E	on	off	on
MTE 106 F	mom	—	on
MTE 106 G	mom	off	mom
MTE 106 H	mom	off	on



D P D T

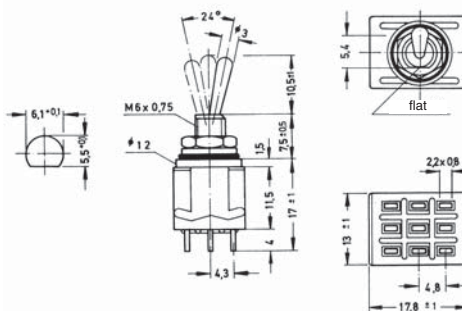
MTE 206 N	on	—	on
MTE 206 P	on	off	on
MTE 206 R	mom	—	on
MTE 206 S	mom	off	mom
MTE 206 T	mom	off	on
MTE 206 PA	on	on	on
MTE 206 SA	mom	on	mom
MTE 206 TA	mom	on	on

measures: a = 9, b = 14,5±1



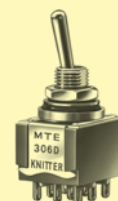
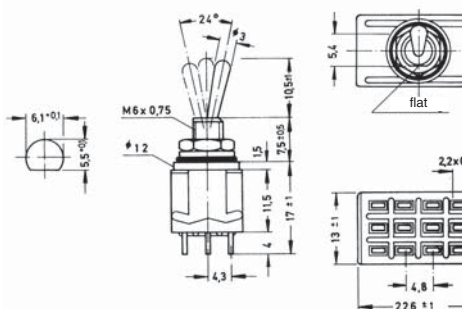
3 P D T

MTE 306 D	on	—	on
MTE 306 E	on	off	on
MTE 306 F	mom	—	on
MTE 306 G	mom	off	mom
MTE 306 H	mom	off	on



4 P D T

MTE 406 N	on	—	on
MTE 406 P	on	off	on
MTE 406 R	mom	—	on
MTE 406 S	mom	off	mom
MTE 406 T	mom	off	on
MTE 406 PA	on	on	on
MTE 406 SA	mom	on	mom
MTE 406 TA	mom	on	on



Miniature Toggle Switches with locking lever



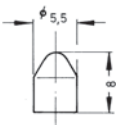
Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 45 °C to + 140 °C
Mechanical life:	minimum 300 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated, version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated
Material:	case: diallyle-phthalate, meets UL 94 V–0, black lever: chromium-plated, metal parts: nickel-plated
Mounting:	bushing M 6 x 0.75, with locking plate, key 9 mm, tightening torque 49 Ncm max.
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

Accessories:

Standard version: lever and cap anodized aluminium.
On request, caps are available in the following colours:

blue	KL 104
black	KL 105
red	KL 109
silver	KL 110





Miniature Toggle Switches with locking lever

Models

Switching functions

SPDT



MTL 106 D

on — on

MTL 106 E

on off on

DPDT

MTL 206 N

on — on

MTL 206 P

on off on

measures: a = 9, b = 15 ± 1

MTL 206 PA

on on on

measures: a = 11,5, b = 17,5 ± 1

3PDT

MTL 306 D

on — on

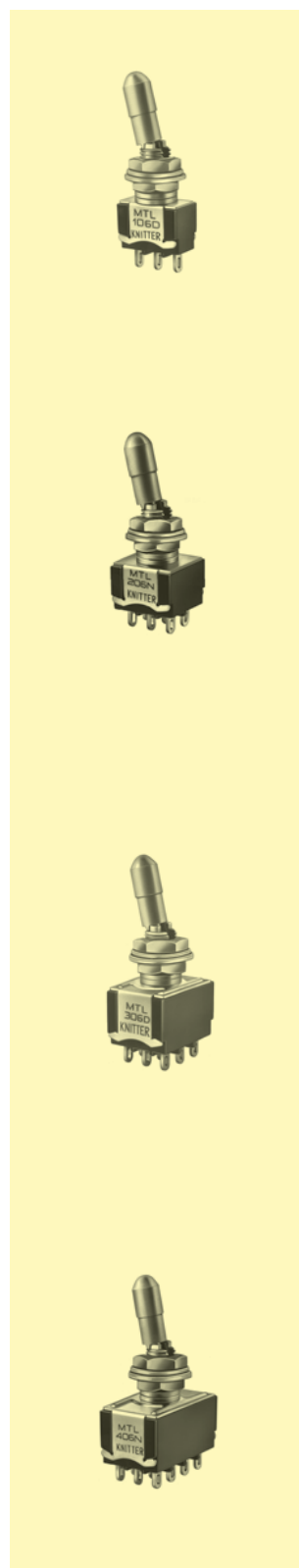
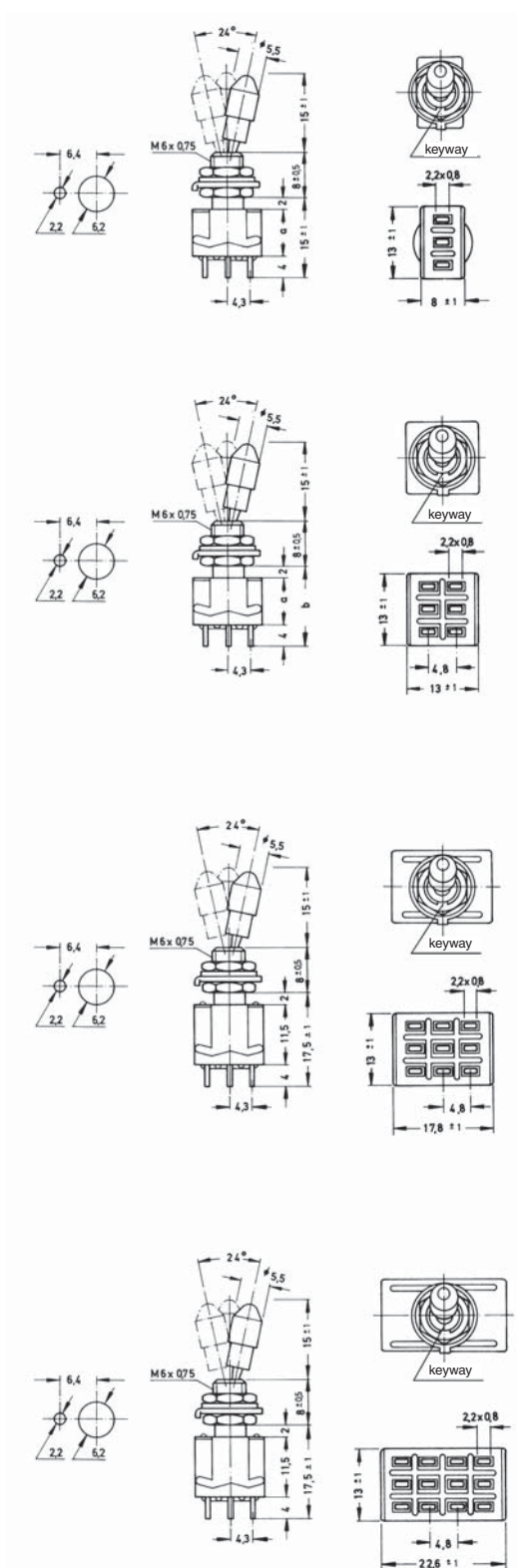
4PDT

MTL 406 N

on — on

MTL 406 P

on off on



Mustang Toggle Switches

Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 45 °C to + 140 °C
Mechanical life:	minimum 200 000 operations (100 000 cycles for SA and TA)
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated further terminal versions see page 8
Material:	case: diallyle-phthalate, meets UL 94 V–0, green lever: chromium-plated, metal parts: nickel-plated
Mounting:	bushing 15/32-32 THD with locking plate (M 12 x 0.75), key 14 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

Accessories:

Plastic caps (height 12.7 mm)

orange	C 2103
blue	C 2104
black	C 2105
green	C 2106
grey	C 2107
yellow	C 2108
red	C 2109
white	C 2110



Waterproof sealing cap (height 21.4 mm)

grey	ET 307
------	--------



Waterproof sealing cap (height 11 mm)

grey	ET 507 Z
------	----------

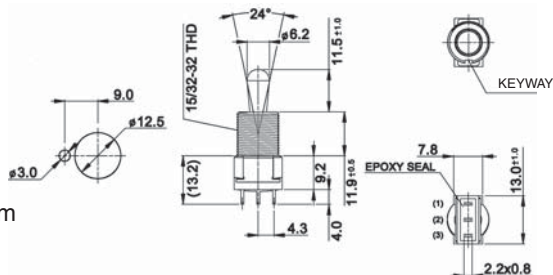


Models: Switching functions

S P D T



MTG 106 D	on	–	on
MTG 106 E	on	off	on
MTG 106 F	mom	–	on
MTG 106 G	mom	off	mom
MTG 106 H	mom	off	on



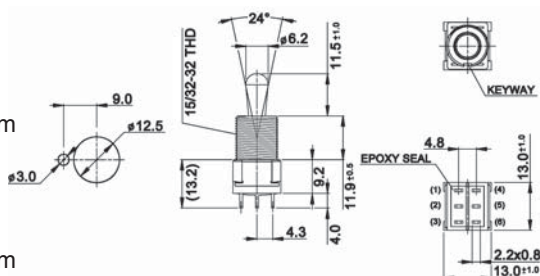
D P D T

MTG 206 N	on	–	on
MTG 206 P	on	off	on
MTG 206 R	mom	–	on
MTG 206 S	mom	off	mom
MTG 206 T	mom	off	on

measures: a = 9, b = 13 ± 1

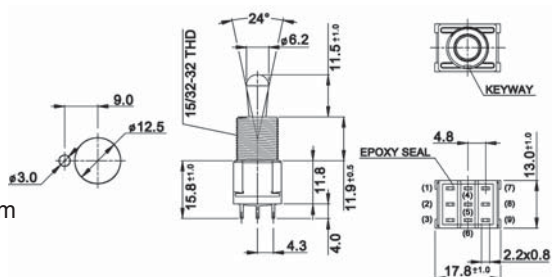
MTG 206 PA	on	on	on
MTG 206 SA	mom	on	mom
MTG 206 TA	mom	on	on

measures: a = 11,5, b = 15,5 ± 1



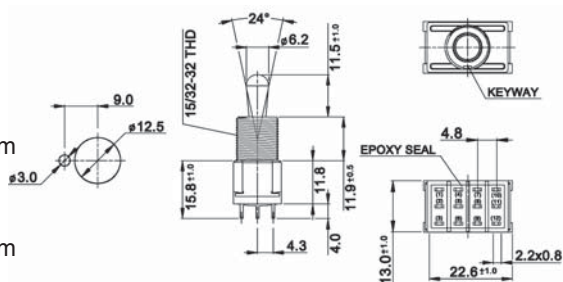
3 P D T

MTG 306 D	on	–	on
MTG 306 E	on	off	on
MTG 306 F	mom	–	on
MTG 306 G	mom	off	mom
MTG 306 H	mom	off	on



4 P D T

MTG 406 N	on	–	on
MTG 406 P	on	off	on
MTG 406 R	mom	–	on
MTG 406 S	mom	off	mom
MTG 406 T	mom	off	on
MTG 406 PA	on	on	on
MTG 406 SA	mom	on	mom
MTG 406 TA	mom	on	on



Mustang Toggle Switches waterproof



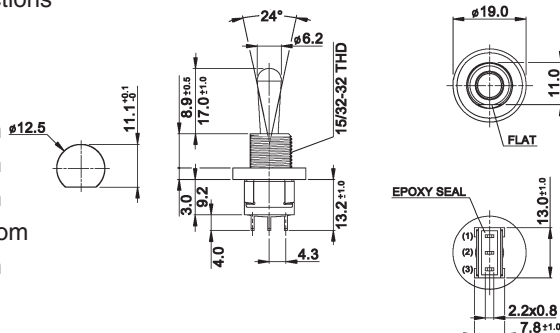
Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 45 °C to + 140 °C
Mechanical life:	minimum 100 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated
Protection:	IP 67
Sealing:	neoprene O-rings between toggle/bushing and bushing/panel
Material:	case: diallyle-phthalate, meets UL 94 V–0, green lever: chromium-plated, metal parts: nickel-plated
Mounting:	bushing 15/32-32 THD locking through flat bush, key 14 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

Models: Switching functions

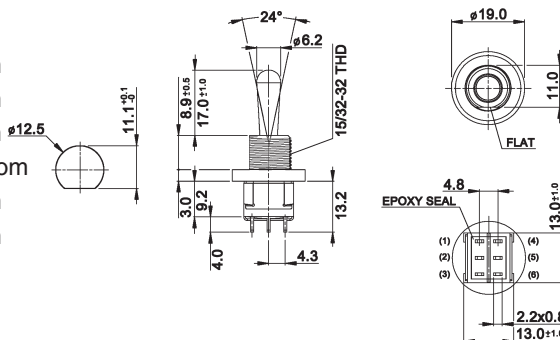
SPDT

MTW 106 D	on	–	on
MTW 106 E	on	off	on
MTW 106 F	mom	–	on
MTW 106 G	mom	off	mom
MTW 106 H	mom	off	on



DPDT

MTW 206 N	on	–	on
MTW 206 P	on	off	on
MTW 206 R	mom	–	on
MTW 206 S	mom	off	mom
MTW 206 T	mom	off	on
MTW 206 PA	on	on	on





Miniature Toggle Switches ESD proof

2

Specifications:

Contact rating:	20 V AC, 0.4 VA
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	- 30 °C to + 85 °C
Mechanical life:	minimum 30 000 operations
Contacts:	gold-plated over nickel barrier
Terminals:	solder tags or PC terminals
Material:	case: PA / PES meets UL 94 V-0, waterproof lever: PA meets UL 94 V-0, waterproof
Protection:	IP 67
Mounting:	bushing 1/4" (6,35 mm), with locking ring or on pc-board
Soldering conditions:	hand-soldering – max.: 5 sec, 350 °C wave-soldering – max.: 10 sec, 260 °C
ESD resistance:	> 8 kV (between lever and terminals)

Models:

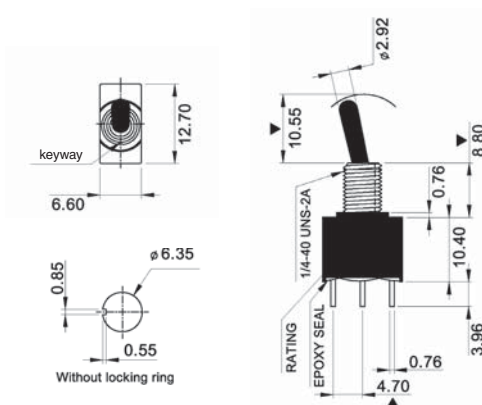
Switching positions: the closed contacts are opposite to the lever position

washable

S P D T

MZME 1 DB-ESD

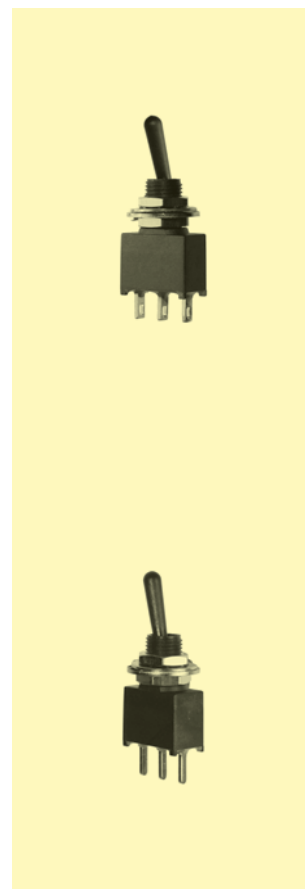
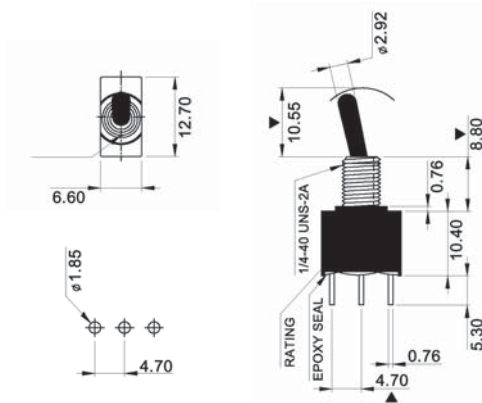
on – on



S P D T

MZME 1 DB-PC-ESD

on – on



Miniature Toggle Switches for horizontal mounting, without thread



Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 80 °C
Mechanical life:	minimum 100 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated)
Terminals:	PC terminals, copper alloy silver-plated
Material:	case: diallyle-phthalate, meets UL 94 V–0, green lever: chromium-plated, metal parts: nickel-plated
Mounting:	on pc-board, horizontal mounting
Soldering conditions:	wave-soldering – max.: 5 sec, 270 °C

Models:

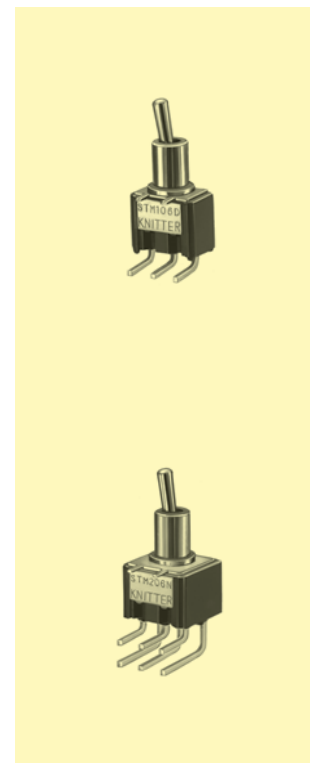
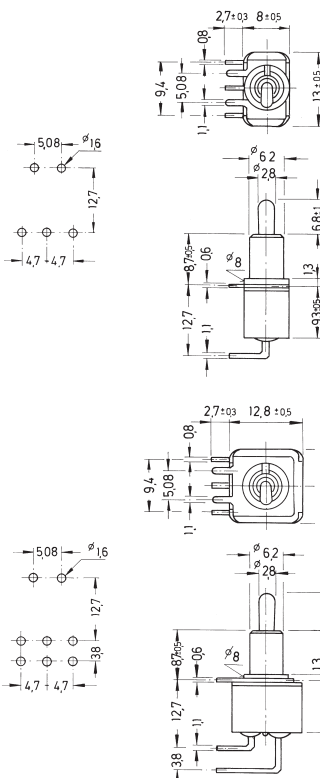
Switching functions

S P D T

STM 106 D – RA	on	–	on
STM 106 E – RA	on	off	on
STM 106 F – RA	mom	–	on
STM 106 G – RA	mom	off	mom
STM 106 H – RA	mom	off	on

D P D T

STM 206 N – RA	on	–	on
STM 206 P – RA	on	off	on
STM 206 R – RA	mom	–	on
STM 206 S – RA	mom	off	mom
STM 206 T – RA	mom	off	on





Miniature Toggle Switches for vertical mounting, without thread

2

Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 80 °C
Mechanical life:	minimum 100 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated)
Terminals:	PC terminals, copper alloy silver-plated
Material:	case: diallyle-phthalate, meets UL 94 V–0, green lever: chromium-plated, metal parts: nickel-plated
Mounting:	on pc-board, vertical mounting
Soldering conditions:	wave-soldering – max.: 5 sec, 270 °C

Models:

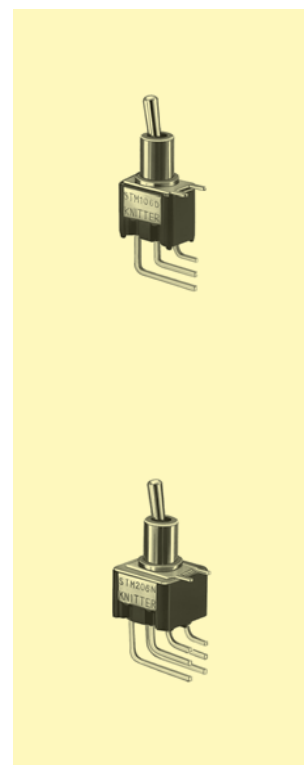
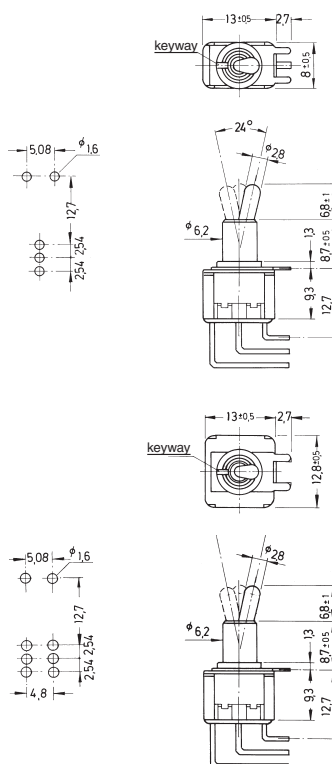
Switching functions

S P D T

STM 106 D – VM	on	–	on
STM 106 E – VM	on	off	on
STM 106 F – VM	mom	–	on
STM 106 G – VM	mom	off	mom
STM 106 H – VM	mom	off	on

D P D T

STM 206 N – VM	on	–	on
STM 206 P – VM	on	off	on
STM 206 R – VM	mom	–	on
STM 206 S – VM	mom	off	mom
STM 206 T – VM	mom	off	on

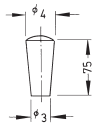


Specifications:

Contact rating:	max. 48 V AC/DC, 0.4 VA / max. 50 mA min. 20 mV AC/DC, 1 μ A
Contact resistance:	< 50 m Ω
Insulation resistance:	> 1000 M Ω
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	–20 °C to +85 °C
Electrical life:	minimum 40 000 operations
Contacts:	phosphor-bronze, gold-plated over nickel barrier
Terminals:	phosphor-bronze, gold-plated over nickel barrier
Protection:	IP 67
Material:	case: PBT meets UL 94 V-0, washable bushing/frame: stainless steel switch-support: brass, tin-plated actuator: brass, chromium-plated
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 $\pm$ 1 sec, 260 °C $\pm$ 5 °C

Accessories:

Plastic caps	Order number
black	C 3105
green	C 3106
grey	C 3107
yellow	C 3108
red	C 3109
white	C 3110





Subminiature Toggle Switches

Models:

Switching functions:

Switching functions F / H:

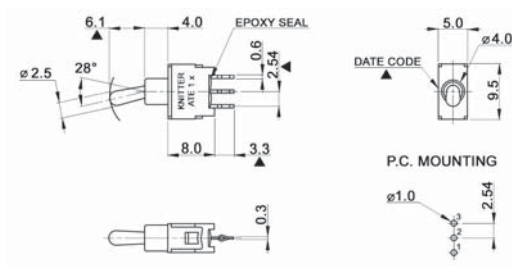
the closed contacts are opposite to the lever position;
when looking at the brand name on the right hand side

washable

2

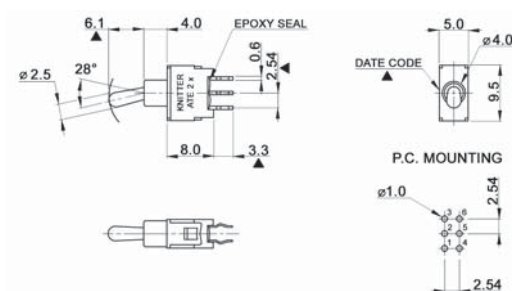
SPDT

ATE 1 D	on	–	on
ATE 1 E	on	off	on
ATE 1 F	mom	–	on
ATE 1 G	mom	off	mom
ATE 1 H	mom	off	on



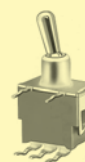
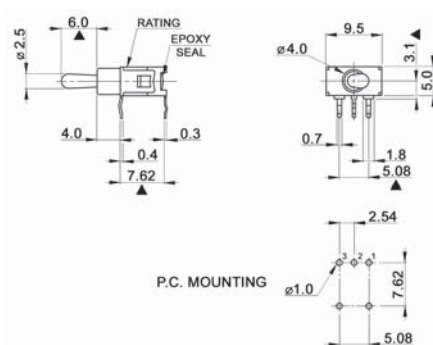
DPDT

ATE 2 D	on	–	on
ATE 2 E	on	off	on
ATE 2 F	mom	–	on
ATE 2 G	mom	off	mom
ATE 2 H	mom	off	on



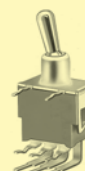
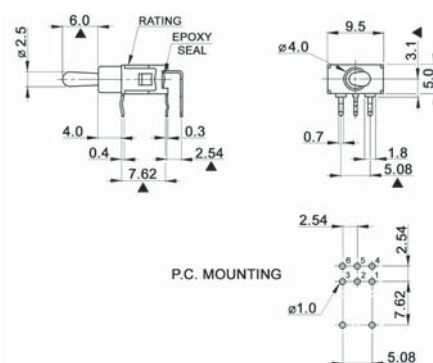
SPDT

ATE 1 D – RA	on	–	on
ATE 1 E – RA	on	off	on
ATE 1 F – RA	mom	–	on
ATE 1 G – RA	mom	off	mom
ATE 1 H – RA	mom	off	on



DPDT

ATE 2 D – RA	on	–	on
ATE 2 E – RA	on	off	on
ATE 2 F – RA	mom	–	on
ATE 2 G – RA	mom	off	mom
ATE 2 H – RA	mom	off	on



Subminiature Toggle Switches waterproof



Specifications: see page 22

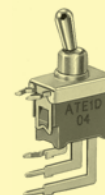
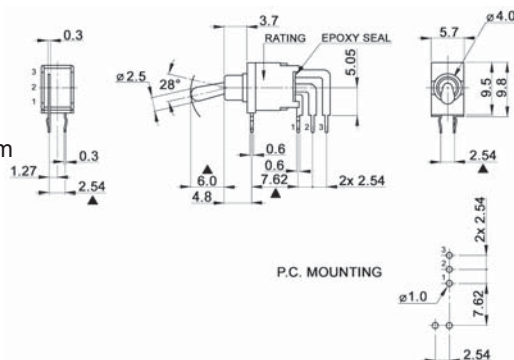
Models: Switching functions the closed contacts are opposite to the lever position;
Switching functions F/H: when looking at the brand name on the right hand side.

2

washable

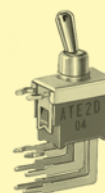
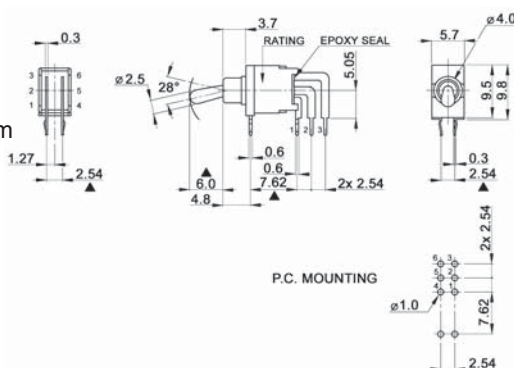
SPDT

ATE 1 D – VM	on	–	on
ATE 1 E – VM	on	off	on
ATE 1 F – VM	mom	–	on
ATE 1 G – VM	mom	off	mom
ATE 1 H – VM	mom	off	on

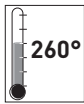


DPDT

ATE 2 D – VM	on	–	on
ATE 2 E – VM	on	off	on
ATE 2 F – VM	mom	–	on
ATE 2 G – VM	mom	off	mom
ATE 2 H – VM	mom	off	on



Accessories: see page 22.



Subminiature Toggle Switches for SMT, waterproof

2

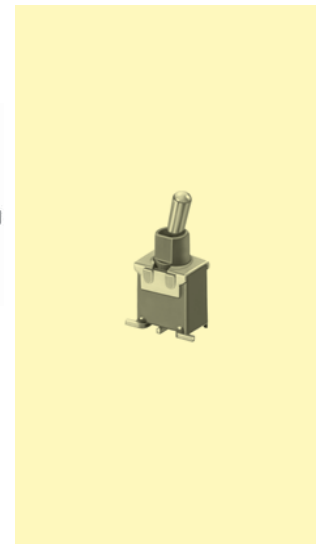
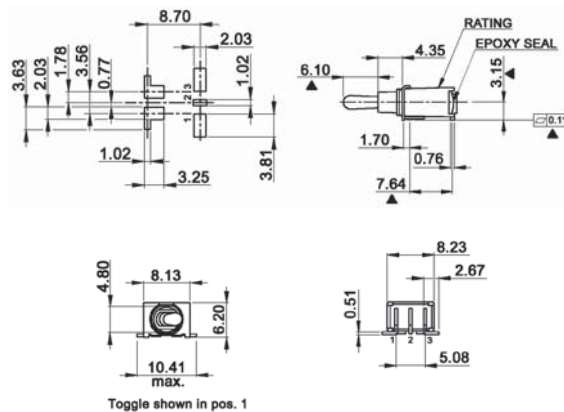
Specifications:

Contact rating:	max. 20 V AC/DC, 0.4 VA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V RMS at sea level
Operating temperature:	– 30 °C to + 85 °C
Electrical life:	30000 operations at full load
Contacts:	copper alloy, with gold plate over nickel plate
Terminals:	copper alloy, with gold plate over nickel plate
Protection:	IP 67
Material:	case and bushing: glass filled nylon 6/6 (UL 94 V–0) actuator: brass, chromium-plated switch support: brass, tin-plated
Mounting:	on pc-board – SMD

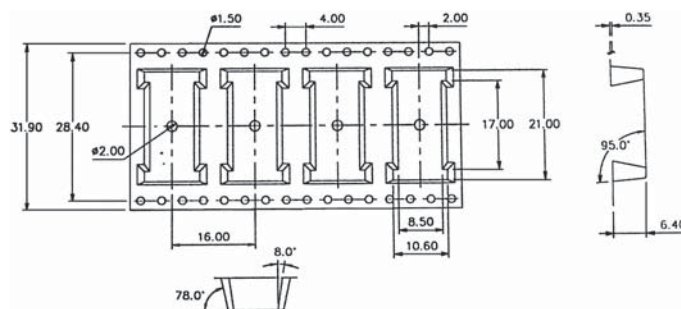
washable

Model: Switching
function

SST 1 DB-R on – on



Packing:
500 pcs/reel



Subminiature Toggle Switches ESD proof, waterproof



Specifications:

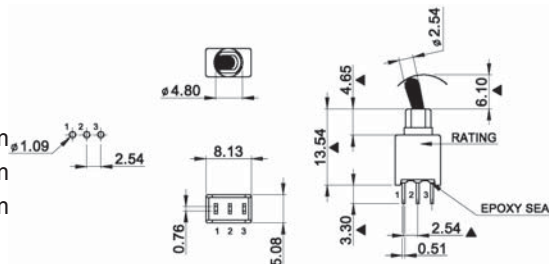
Contact rating:	max. 20 V AC / DC, 0.4 VA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 30 °C to + 85 °C
Mechanical life:	minimum 30 000 operations
Contacts/Terminals:	copper alloy
Material:	case: nylon with glass fibre, meets UL 94 V–0, washable support: brass, tin-plated lever: brass, chromium-plated (...-ESD: PA, ESD resistance 6 kV)
Protection:	IP 67
Mounting:	on pc-board

Models: Switching functions: the closed contacts are opposite to the lever position.

washable

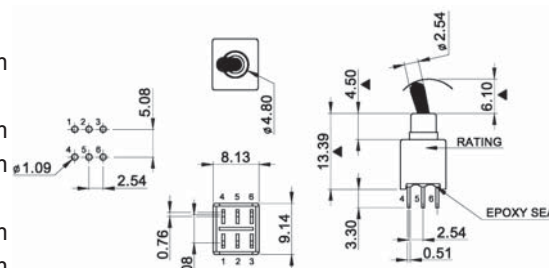
S P D T

TST 1 D (-ESD)	on	–	on
TST 1 E (-ESD)	on	off	on
TST 1 F (-ESD)	on	–	mom
TST 1 G (-ESD)	mom	off	mom
TST 1 H (-ESD)	on	off	mom



D P D T

TST 2 N (-ESD)	on	–	on
TST 2 R (-ESD)	on	–	mom
TST 2 P (-ESD)	on	off	on
TST 2 S (-ESD)	mom	off	mom
TST 2 T (-ESD)	on	off	mom
TST 2 PA (-ESD)	on	on	on
TST 2 SA (-ESD)	mom	on	mom
TST 2 TA (-ESD)	on	on	mom





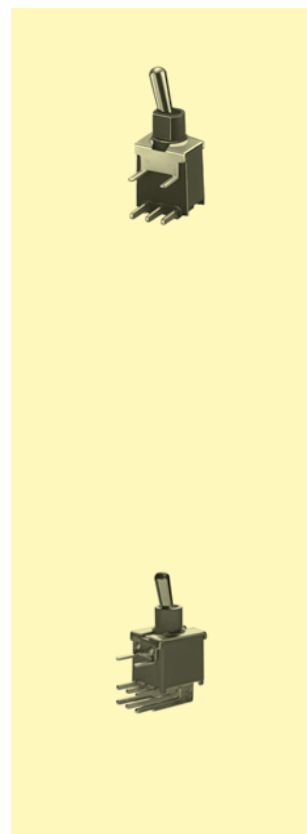
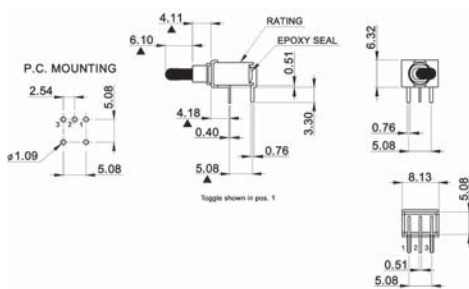
Subminiature Toggle Switches ESD proof, waterproof

Models: Switching functions: the closed contacts are opposite to the lever position.

washable

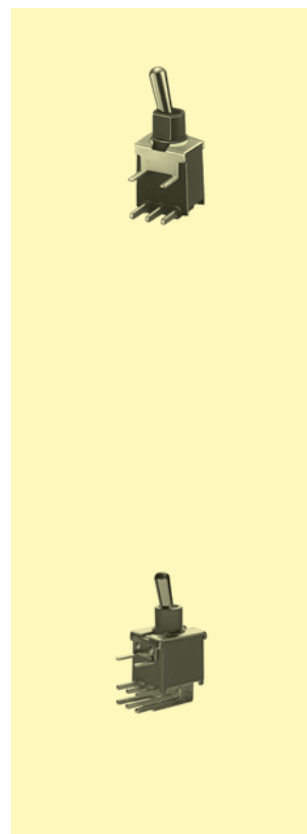
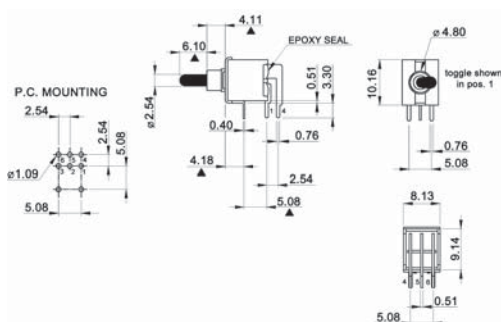
SPDT

TST 1 D – RA (-ESD) on – on
TST 1 E – RA (-ESD) on off on
TST 1 F – RA (-ESD) on – mom
TST 1 G – RA (-ESD) mom off mom
TST 1 H – RA (-ESD) on off mom



DPDT

TST 2 N – RA (-ESD) on – on
TST 2 R – RA (-ESD) on – mom
TST 2 P – RA (-ESD) on off on
TST 2 S – RA (-ESD) mom off mom
TST 2 T – RA (-ESD) on off mom
TST 2 PA – RA (-ESD) on on on
TST 2 SA – RA (-ESD) mom on mom
TST 2 TA – RA (-ESD) on on mom



2

Microminiature Toggle Switches ESD proof



Specifications:

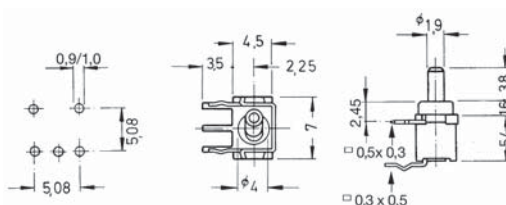
Contact rating:	max. 28 V DC, 0.4 VA min. 20 mV DC, 1 μ A
Contact resistance:	< 100 m Ω
Insulation resistance:	> 500 M Ω at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 40 °C to + 85 °C
Mechanical life:	minimum 30 000 operations
Contacts:	phosphor bronze, gold-plated
Terminals:	PC terminals, crimped, phosphor bronze, gold-plated
Material:	case and lever: PES, meets UL 94 V–0, washable
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 7 sec, 250 °C $\pm$ 5 °C – max.: 5 sec, 270 °C $\pm$ 5 °C
ESD resistance:	> 8 kV (between lever and terminals)

Models :	Switching functions:	the closed contacts are opposite to the lever position;
	Switching functions F/H:	when looking at the brand name on the right hand side.

washable

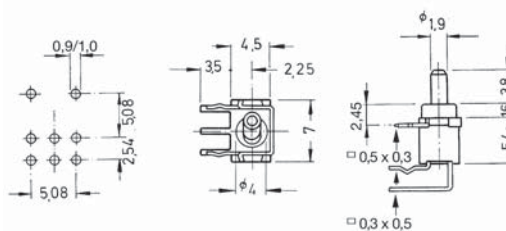
SPDT

FT 1 D – RA	on	–	on
FT 1 E – RA	on	off	on
FT 1 F – RA	mom	–	on
FT 1 G – RA	mom	off	mom
FT 1 H – RA	mom	off	on



DPDT

FT 2 D – RA	on	–	on
FT 2 E – RA	on	off	on
FT 2 F – RA	mom	–	on
FT 2 G – RA	mom	off	mom
FT 2 H – RA	mom	off	on





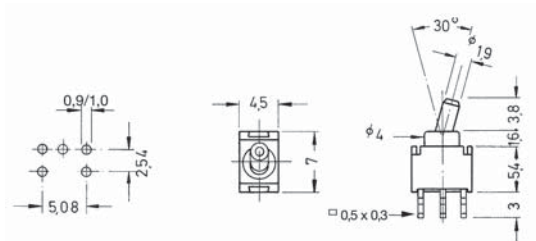
Microminiature Toggle Switches ESD proof

Models: Switching functions: the closed contacts are opposite to the lever position;
Switching functions F/H: when looking at the brand name on the left hand side.

washable

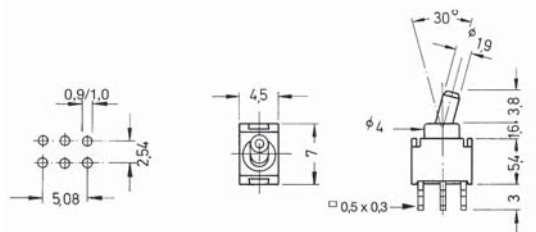
SPDT

FT 1 D	on	–	on
FT 1 E	on	off	on
FT 1 F	mom	–	on
FT 1 G	mom	off	mom
FT 1 H	mom	off	on



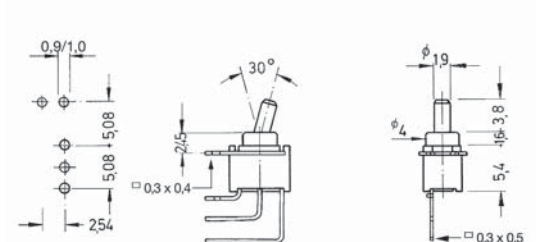
DPDT

FT 2 D	on	–	on
FT 2 E	on	off	on
FT 2 F	mom	–	on
FT 2 G	mom	off	mom
FT 2 H	mom	off	on



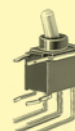
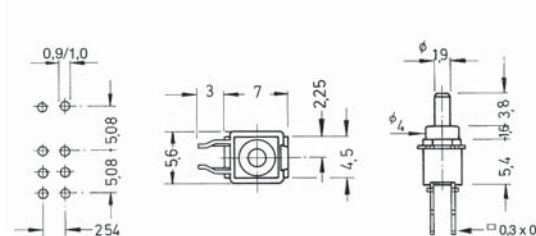
SPDT

FT 1 D – VM	on	–	on
FT 1 E – VM	on	off	on
FT 1 F – VM	mom	–	on
FT 1 G – VM	mom	off	mom
FT 1 H – VM	mom	off	on



DPDT

FT 2 D – VM	on	–	on
FT 2 E – VM	on	off	on
FT 2 F – VM	mom	–	on
FT 2 G – VM	mom	off	mom
FT 2 H – VM	mom	off	on



3

Pushbutton Switches

3.1 Miniature Pushbutton Switches



Series MPA	standard	32–33
Series MPE	waterproof IP 67	34–35
Series MPG	heavy duty	36–37
Series MPS	snap action	38–39
Series MSP		40–42
Series MPBS	2–6 poles	43
Series MPSA	0.6 N – 3.5 N operating force	44

3.2 Subminiature Pushbutton Switches



Series APE	standard	45
Series MZP	low cost	46
Series TSP	waterproof IP 67	47
Series SSP	for SMT/waterproof IP 67	47

3.3 Microminiature Pushbutton Switches



Series FP	ESD proof	48–49
Series SSP	for SMT	50

Miniature Pushbutton Switches

Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−45 °C to +140 °C
Mechanical life:	minimum 30 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated, version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated further terminal versions see page 8
Material:	case: diallyl-phthalate meets UL 94 V-0, black metal parts: nickel-plated
Mounting:	bushing M 6 x 0,75 with locking plate, key 9 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

Accessories:

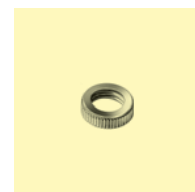
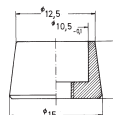
Buttons	Ø (height 8 mm)		Ø (height 10 mm)	
orange	10 mm	KM 403	15 mm	KM 603
blue	10 mm	KM 404	15 mm	KM 604
black	10 mm	KM 405	15 mm	KM 605
green	10 mm	KM 406	15 mm	KM 606
grey	10 mm	KM 407	15 mm	KM 607
yellow	10 mm	KM 408	15 mm	KM 608
red	10 mm	KM 409	15 mm	KM 609
white	10 mm	KM 410	15 mm	KM 610

Knurled nut, nickel-plated

M 6 x 0,75	8 mm	R 675
------------	------	-------

Covers

M 6 x 0,75	
Brass chromium-plated	CO 106
Brass black, matt finish	CO 106 S



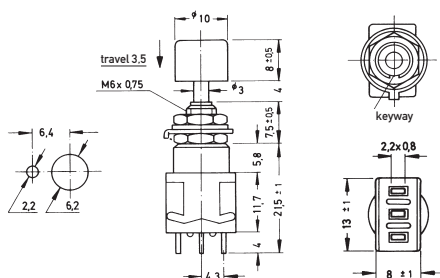
Models:

Switching functions

SPDT

MPA 106 F
MPA 106 D

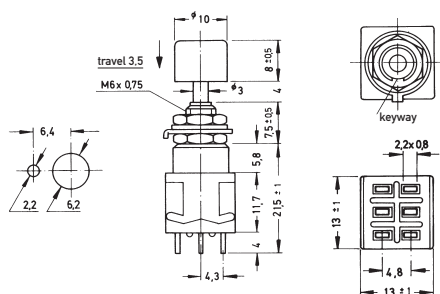
* on — mom
on — on



DPDT

MPA 206 R
MPA 206 N

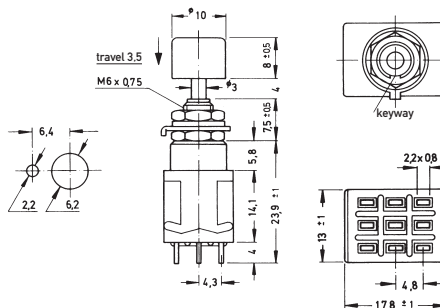
* on — mom
on — on



3PDT

MPA 306 F
MPA 306 D

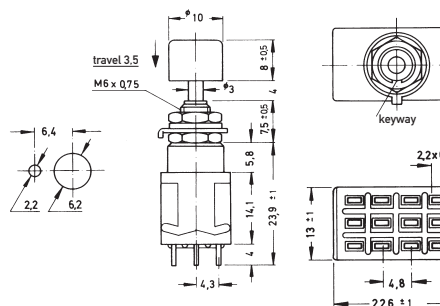
* on — mom
on — on



4PDT

MPA 406 R
MPA 406 N

* on — mom
on — on



* When looking at the brand name the normally closed contact is on the right-hand side.



Miniature Pushbutton Switches waterproof



Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A / 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−45 °C to +140 °C
Mechanical life:	minimum 30 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated, version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated further terminal versions see page 8
Case material:	diallyl-phthalate, black metal parts: nickel-plated
Protection:	30 minutes at 1 m water column; IP 67
Sealing:	neoprene O-rings between toggle/bushing and bushing/panel
Mounting:	bushing M 6 x 0.75, key 9 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

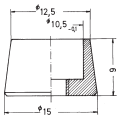
Accessories:

Buttons	Ø (height 8 mm)		Ø (height 10 mm)	
orange	10 mm	KM 403	15 mm	KM 603
blue	10 mm	KM 404	15 mm	KM 604
black	10 mm	KM 405	15 mm	KM 605
green	10 mm	KM 406	15 mm	KM 606
grey	10 mm	KM 407	15 mm	KM 607
yellow	10 mm	KM 408	15 mm	KM 608
red	10 mm	KM 409	15 mm	KM 609
white	10 mm	KM 410	15 mm	KM 610



Covers

M 6 x 0.75	
Brass, chromium-plated	CO 106
Brass, black, matt finish	CO 106 S

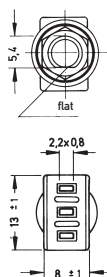
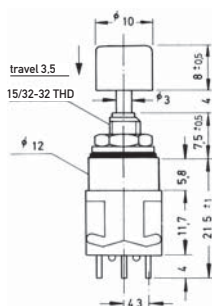


Models: Switching functions

S P D T

MPE 106 F
MPE 106 D

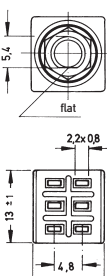
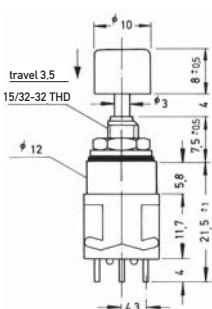
* on – mom
on – on



D P D T

MPE 206 R
MPE 206 N

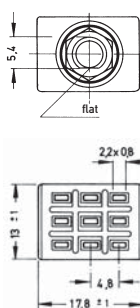
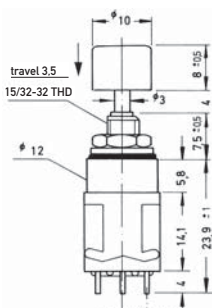
* on – mom
on – on



3 P D T

MPE 306 F
MPE 306 D

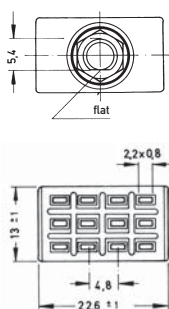
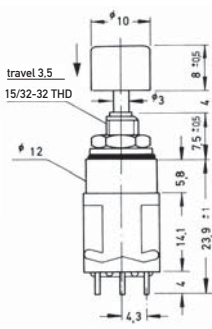
* on – mom
on – on



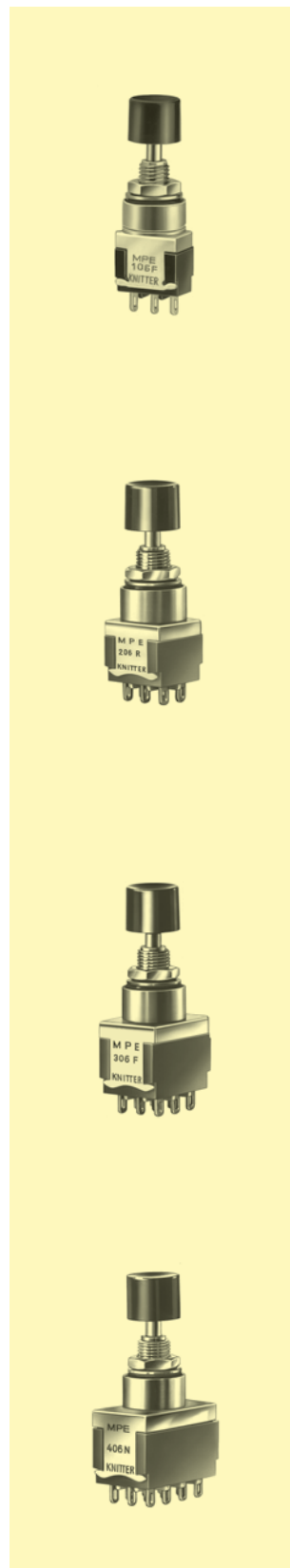
4 P D T

MPE 406 R
MPE 406 N

* on – mom
on – on



* When looking at the brand name the normally closed contact is on the right-hand side.



Miniature Pushbutton Switches

heavy duty series



Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	–45 °C to +140 °C
Mechanical life:	minimum 30 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated, version B and G, see page 4
Terminals:	solder tags, copper alloy silver-plated further terminal versions see page 8
Material:	case: diallyl-phthalate meets UL 94 V–0, black metal parts: nickel-plated
Mounting:	bushing 15/32-32 THD (M 12 x 0.75), key 14 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C wave-soldering – max.: 5 sec, 270 °C

Accessories:

Plastic caps (height 3.5 mm)	Ø	
black	9 mm	CB 505
red	9 mm	CB 509



Waterproof sealing caps (height 14.8 mm)

grey	ET 207
red	ET 209

also available in fluoro silicone material





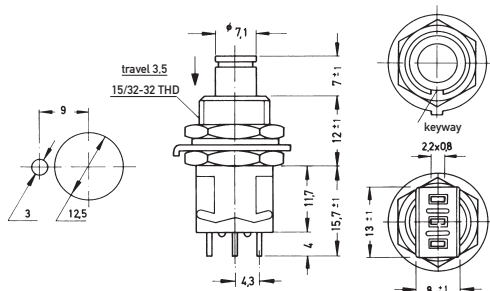
Miniature Pushbutton Switches heavy duty series

Models: Switching functions

S P D T

MPG 106 F
MPG 106 D

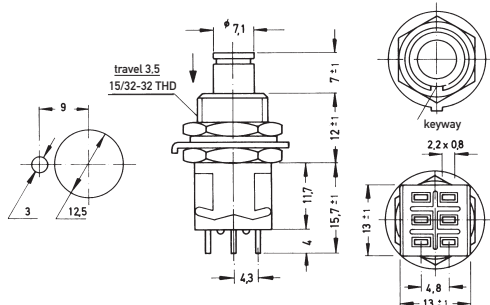
* on — mom
on — on



D P D T

MPG 206 R
MPG 206 N

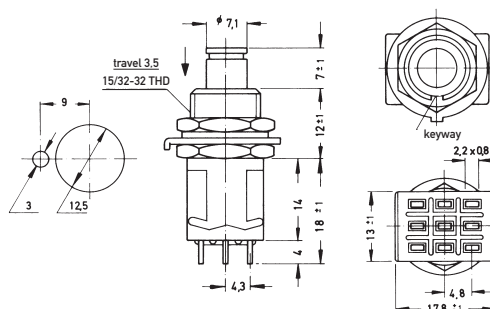
* on — mom
on — on



3 P D T

MPG 306 F
MPG 306 D

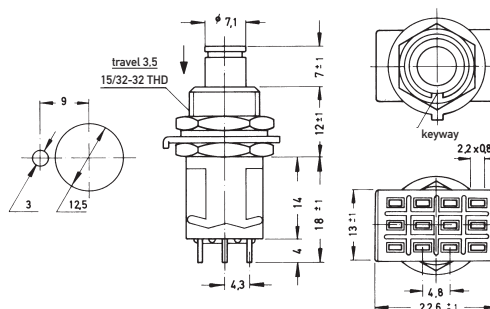
* on — mom
on — on



4 P D T

MPG 406 R
MPG 406 N

* on — mom
on — on



* When looking at the brand name the normally closed contact is on the right-hand side.

3

Miniature Pushbutton Switches snap action



Specifications:

Contact rating:	125 V AC, 3 A 30 V DC, 1 A / 12 V DC, 2 A / 6 V DC, 3 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +80 °C
Mechanical life:	minimum 100 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available gold-plated version B, see page 4
Terminals:	solder tags, copper alloy silver-plated
Case material:	phenol resin, black
Mounting:	bushing M 6 x 0.75 with locking plate, key 9 mm
Soldering conditions:	hand-soldering – max.: 60 W, 3 sec, 420 °C

Accessories:

Buttons

	Ø (height 8 mm)		Ø (height 10 mm)	
orange	10 mm	KM 403	15 mm	KM 603
blue	10 mm	KM 404	15 mm	KM 604
black	10 mm	KM 405	15 mm	KM 605
green	10 mm	KM 406	15 mm	KM 606
grey	10 mm	KM 407	15 mm	KM 607
yellow	10 mm	KM 408	15 mm	KM 608
red	10 mm	KM 409	15 mm	KM 609
white	10 mm	KM 410	15 mm	KM 610



Covers

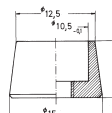
M 6 x 0.75

Brass, chromium-plated

Brass, black, matt finish

CO 106

CO 106 S





Miniature Pushbutton Switches snap action

Models: Switching functions

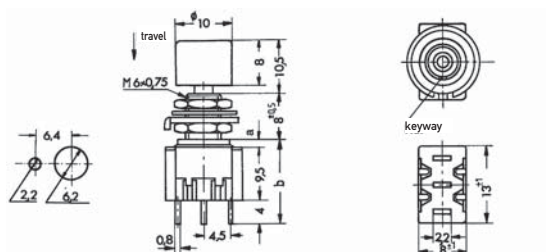
S P D T

MPS 103 F on — mom

measures: a = 1.5, b = 15⁻¹
travel 1,0

MPS 103 D on — on

measures: a = 2.5, b = 16⁻¹
travel 2,5



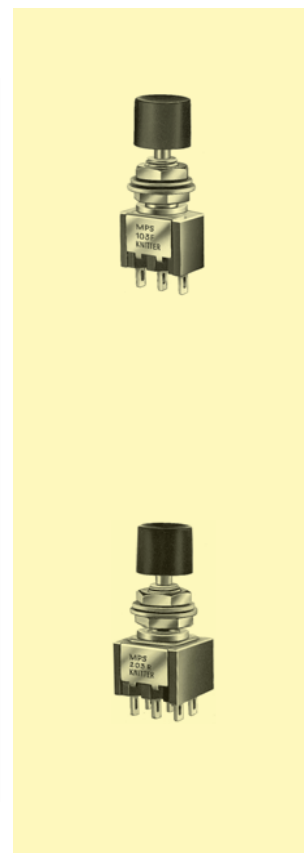
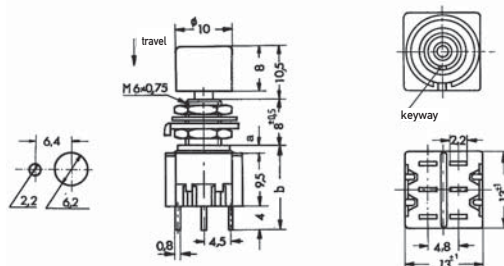
D P D T

MPS 203 R on — mom

measures: a = 1.5, b = 15⁻¹
travel 1.0

MPS 203 N on — on

measures: a = 2.5, b = 16⁻¹
travel 2.5



3

Circuit diagram:



Miniature Pushbutton Switches

Specifications:

Contact rating:	250 V AC, 1 A / 125 V AC, 3 A 24 V DC, 2 A
Contact resistance:	< 30 mΩ
Insulation resistance:	> 500 MΩ at 500 V DC
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	−45 °C to +110 °C
Mechanical life:	minimum 30 000 operations
Contacts:	coin silver, also available gold-plated, version G (see page 4)
Terminals:	solder tags
Material:	phenolformaldehyde MSP 103 B black, MSP 103 C brown
Mounting:	bushing M 6 x 0,75
Soldering conditions:	hand-soldering – max.: 20 W, 3 sec, 350 °C

Models:

Switching functions

S P S T

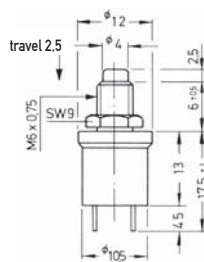
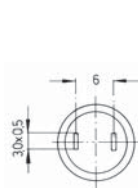
MSP 103 B

MSP 103 C

on – (mom)

off – mom

Button colour: orange



S P S T

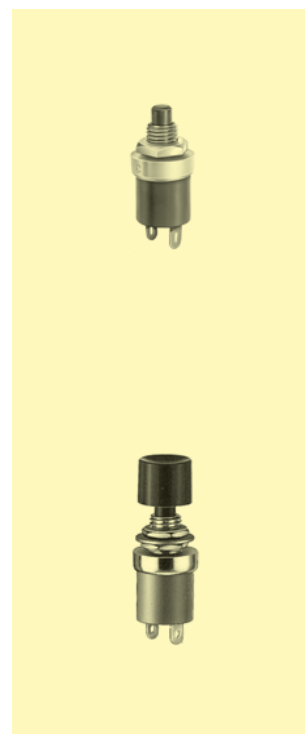
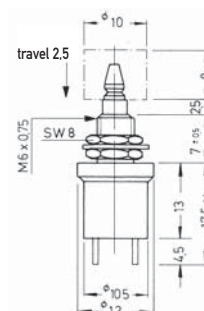
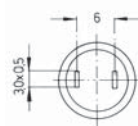
MSP 103 BK

MSP 103 CK

on – (mom)

off – mom

Buttons see page 38.





Miniature Pushbutton Switches

Specifications:

Contact rating:	250 V AC, 0.5 A / 120 V AC, 1 A 28 V DC, 1 A
Contact resistance:	< 30 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 70 °C
Mechanical life:	more than 10 000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	PC terminals, brass silver-plated
Material:	case: copper alloy, nickel-plated / POM button: PA 66
Mounting:	single-hole mounting, Ø 6.35 mm or on pc-board
Soldering conditions:	wave-soldering – 5 sec ± 0.5 sec, 260 °C

3

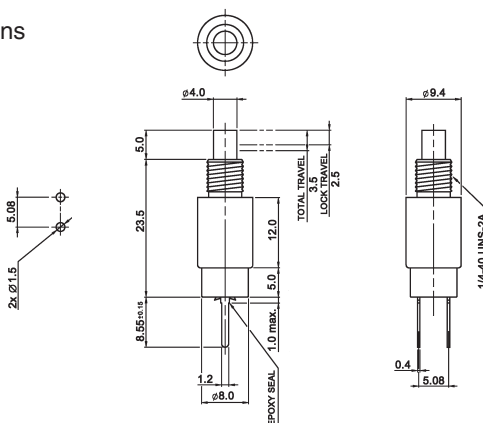
Models:

Switching functions

SPST

MSP 101 A

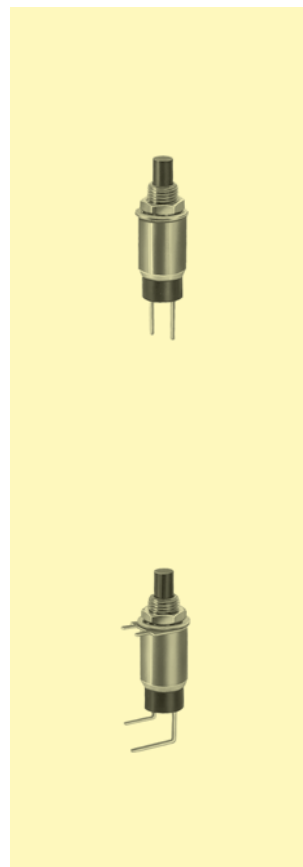
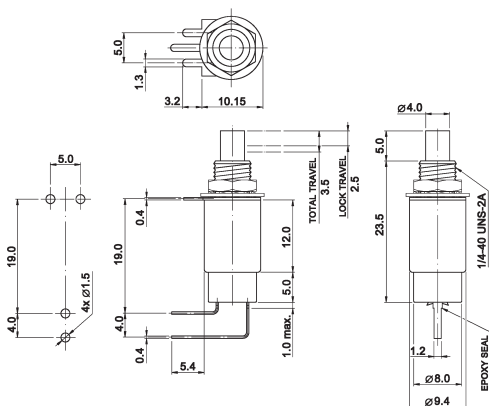
on – off



SPST

MSP 101 A – RA

on – off



Miniature Pushbutton Switches

Specifications:

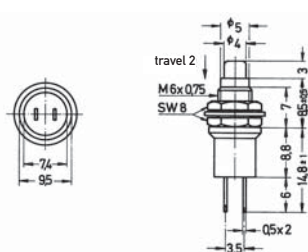
Contact rating:	30 V DC, 650 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 500 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +60 °C
Mechanical life:	minimum 20 000 operations
Contacts:	brass, silver-plated
Terminals:	solder tags
Material:	phenolformaldehyde, black
Mounting:	single-hole
Soldering conditions:	hand-soldering – max.: 3 sec, 260 °C ± 5 °C

Models:

Contact arrangement

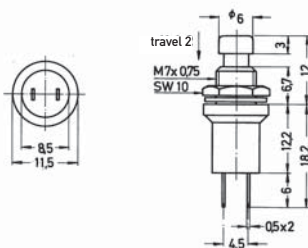
MSP 101 C
button colour: red

normally open



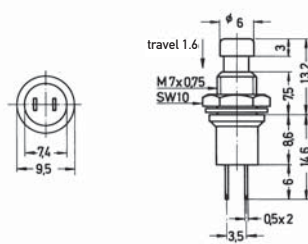
MSP 121 B
button colour: black
red

normally closed



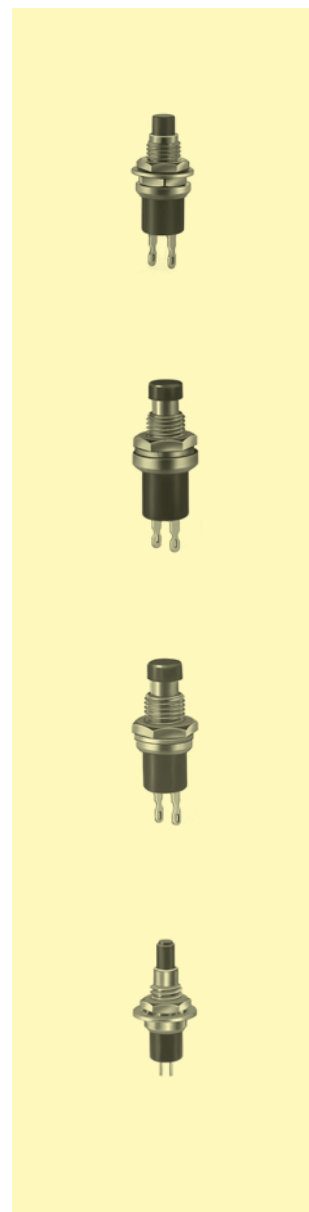
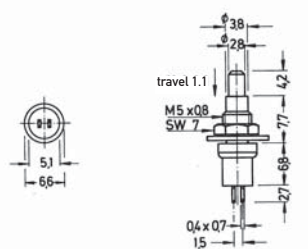
MSP 121 C
button colour: black
red

normally open



MSP 131 C
button colour: black

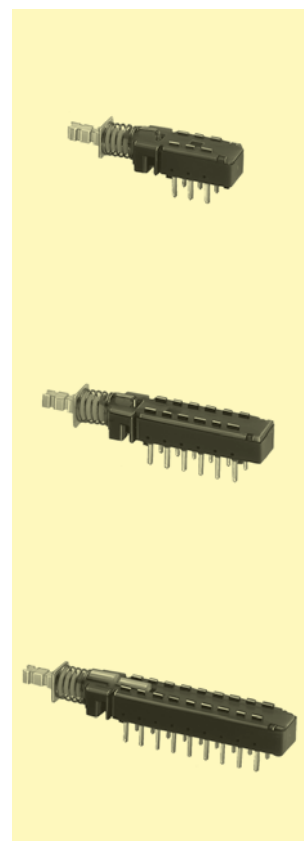
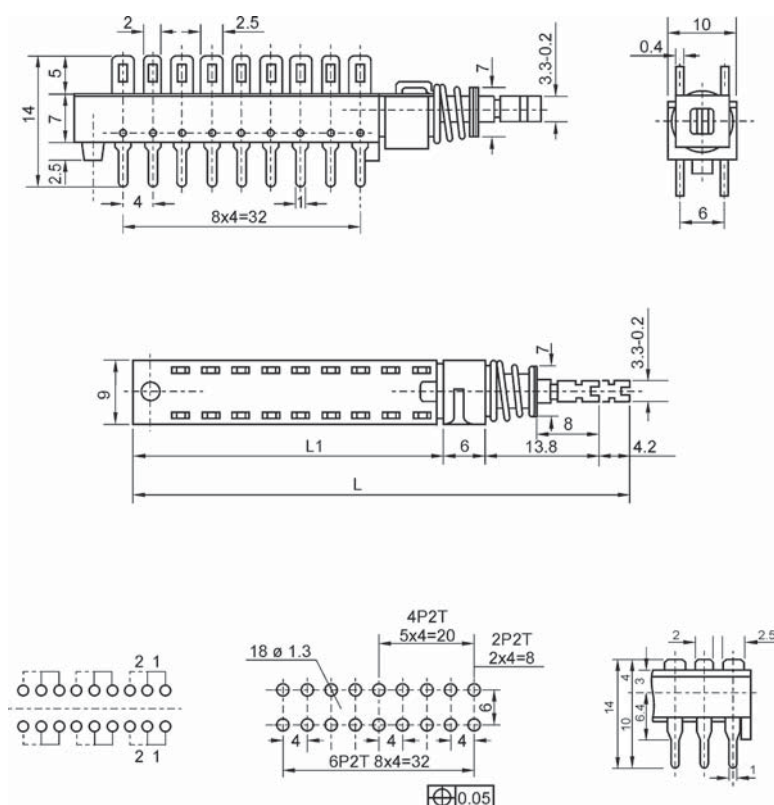
normally open



Specifications:

Contact rating:	100 V AC, 0.5 A / 25 V DC, 1 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−10 °C to +60 °C
Mechanical life:	minimum 30 000 operations
Contacts:	phosphor-bronze, silver-plated
Terminals:	brass, silver-plated
Case:	base: ABS, cover: ABS, actuator: POM
Mounting:	on pc-board
Timing:	non-shorting
Travel:	switch-travel: 3.2 mm, total travel: 4.7 mm
Soldering conditions:	wave-soldering – max. 5 sec, 260 °C ± 5 °C

Series MPBS



Ordering code:

MPBS - - 14

Number of poles:

- ☐ 22H01 2 poles
☐ 42H01 4 poles
☐ 62H01 6 poles

Switching mode:

- ☐ mom – on
☐ L on – on

Operating force:

- ☐ F 3.0 N ± 1.0 N
☐ F0 1.5 N ± 0.5 N
 2.0 N ± 0.5 N (for 62H01)

Type	L (mm)	L1 (mm)
MPBS-22H01...	42	18
MPBS-42H01...	54	30
MPBS-62H01...	66	42

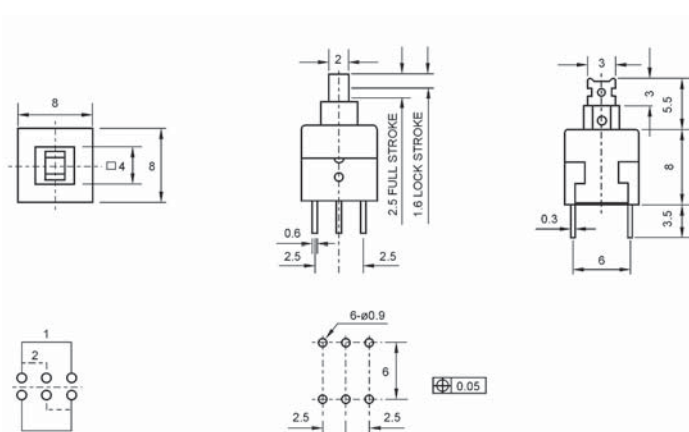
Miniature Pushbutton Switches

Specifications:

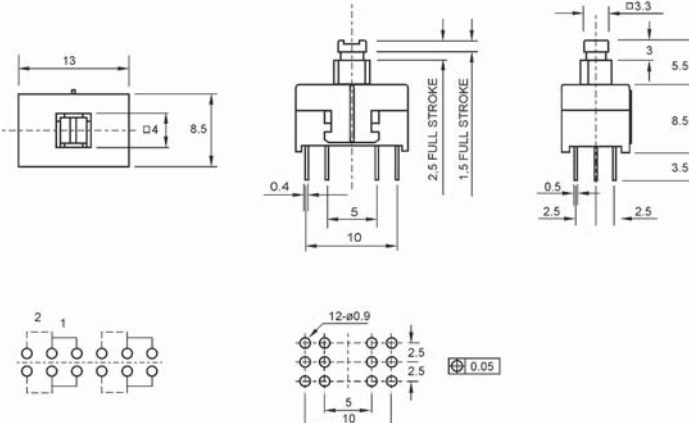
Contact rating:	30 V DC, 100 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Electrical life:	minimum 10 000 operations
Contacts:	beryllium-copper, silver-plated
Terminals:	brass, silver-plated
Case:	base: PBT, cover: POM, actuator: POM
Mounting:	on pc-board
Timing:	non-shorting
Soldering conditions:	wave-soldering – max. 5 sec, 260 °C ± 5 °C

Models:

MPSA-22E08L-0
MPSA-22E08-0



MPSA-42E06L-0
MPSA-42E06-0



Minimum order quantity 1.000 pcs

Ordering code:

MPSA - -	
Number of poles:	Operating force:
22E08 2 poles	060 0.6 N +0.25 N/-0.1 N
42E06 4 poles	100 1.0 N ±0.3 N
Switching mode:	150 1.5 N ±0.5 N
☐ mom – on	250 2.5 N +0.5 N/-0.3 N
☐ L on – on	350 3.5 N ±1.0 N



Subminiature Pushbutton Switches

Specifications:

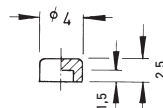
Contact rating:	max. 48 V AC/DC, 0.4 VA / max. 50 mA min. 20 mV AC/DC, 1 μ A
Contact resistance:	< 50 m Ω
Insulation resistance:	> 500 M Ω at 250 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +80 °C
Mechanical life:	minimum 60 000 operations
Contacts:	phosphor bronze, gold-plated over nickel barrier
Terminals:	APE – PC terminals, crimped, phosphor bronze, gold-plated over nickel barrier
Material:	case: PBT, meets UL 94 V-0, washable metal parts: brass, nickel-plated
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max. 5 sec, 260 °C $\pm$ 5 °C

The stability can be improved by using a supporting bracket.

Accessories:

Plastic caps

black	KA 3105	yellow	KA 3108
green	KA 3106	red	KA 3109
grey	KA 3107	white	KA 3110



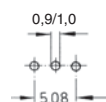
Models:

Switching functions: when looking at the brand name,
the normally closed contact is on the right-hand side

SPDT

APE 1 F

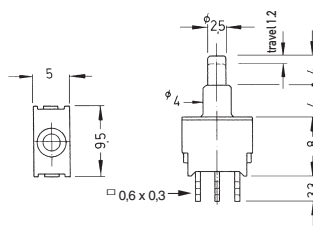
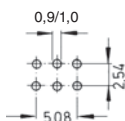
on – mom



DPDT

APE 2 F

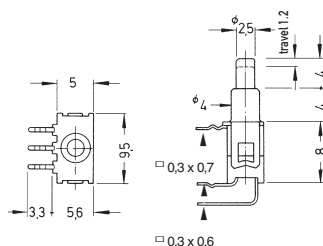
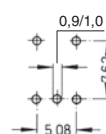
on – mom



SPDT

APE 1 F – RA

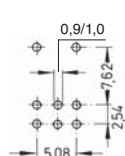
on – mom



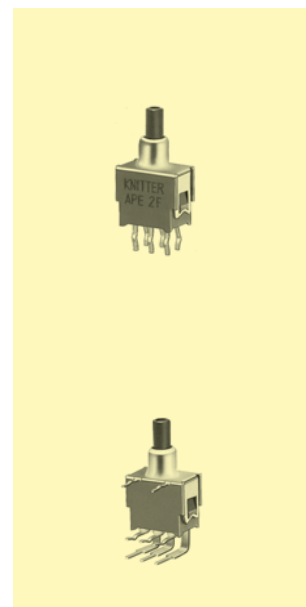
DPDT

APE 2 F – RA

on – mom

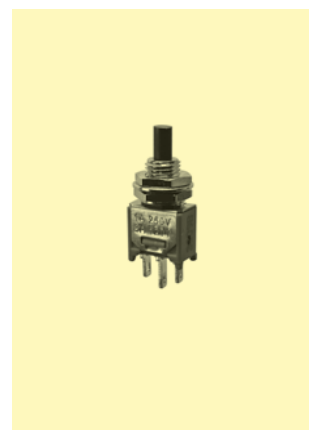


washable



Contact rating:	250 V AC, 1 A / 120 V AC, 3 A / 28 V DC, 3 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	–30 °C to +85 °C
Mechanical life:	minimum 50 000 operations
Contacts:	brass, silver-plated
Terminals:	brass, silver-plated
Case:	base: PA, cover: stainless steel, actuator: PA
Mounting:	single-hole
Timing:	non-shorting
Soldering conditions:	wave-soldering – max. 10 sec, max. 260 °C (pre-heat: max. 120 sec, max. 150 °C) manual soldering – max. 5 sec, max 350 °C

MZP 1 D on – on

46 | **knitter-switch**

Microminiature Pushbutton Switches ESD proof



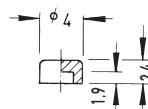
Specifications:

Contact rating:	max. 28 V DC, 0.4 VA min. 20 mV DC, 1 μ A
Contact resistance:	< 100 m Ω
Insulation resistance:	> 500 M Ω at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 30 000 operations
Contacts:	phosphor bronze, gold-plated
Terminals:	PC terminals, crimped, phosphor bronze gold-plated
Material:	case and button: PES, meets UL 94 V-0, washable
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 7 sec, 250 °C $\pm$ 5 °C max.: 5 sec, 270 °C $\pm$ 5 °C
ESD resistance:	> 8 kV (between button and terminals)

Accessories:

Plastic caps

black	KF 4105
grey	KF 4107
red	KF 4109
white	KF 4110



Models:

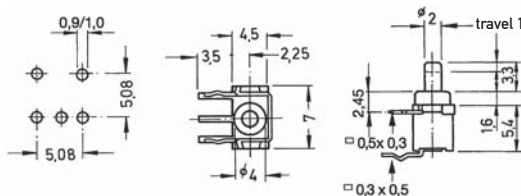
Switching functions: when looking at the brand name,
the normally closed contact is on the right hand side.

washable

S P D T

FP 1 F – RA

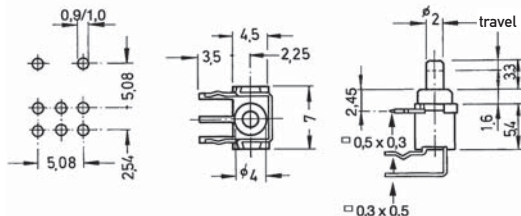
mom – on



D P D T

FP 2 F – RA

mom – on





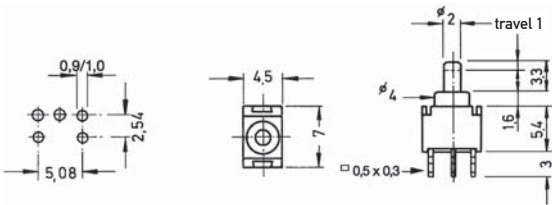
Microminiature Pushbutton Switches ESD proof

Models: Switching functions: when looking at the brand name, the normally closed contact is on the left hand side.

washable

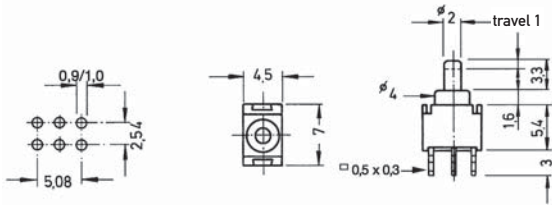
SPDT
FP 1F

on – mom



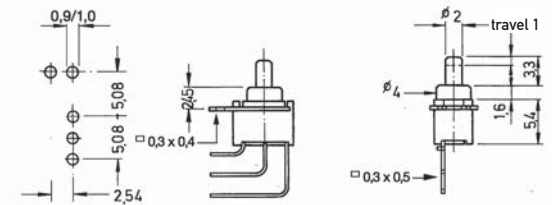
DPDT
FP 2F

on – mom



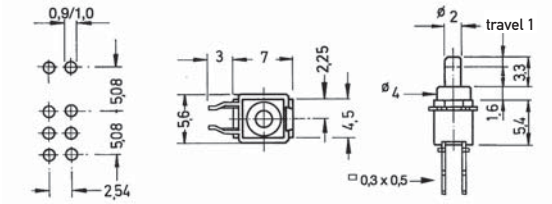
SPDT
FP 1F – VM

on – mom

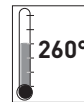


DPDT
FP 2F – VM

on – mom



Microminiature Pushbutton Switches for SMT

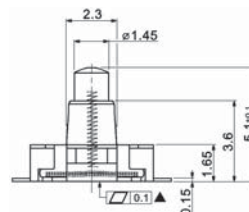
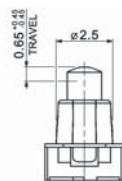
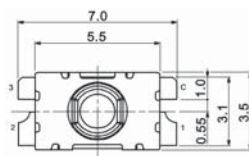


Specifications:

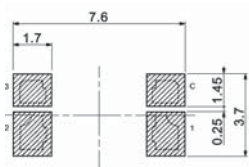
Contact rating:	50 V DC, 10 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	>1000 MΩ
Dielectric strength:	100V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Operating force:	1.1 ± 0.8 N
Mechanical life:	minimum 100 000 operations
Material:	Contacts, Terminals: phosphor-bronze, gold-plated Stem: brass, nickel-plated Case: HTN, black Cover: stainless steel
Travel:	0.65 ± 0.45 mm

Models: Switching function

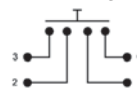
SSP 129 T off – mom



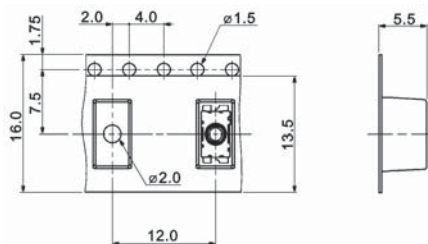
PCB Layout



Circuit diagram



Packing:
1000 pcs/reel



4

Illuminated Pushbutton Switches



Type	latching	momentary	form		also non illuminated	number of colours / combinations	special feature	Page
			round	square				
DPL 1		•	•			6		52
DPW 1	•	•	•	•	•		waterproof IP 67	53
DPWL	•	•	•	•		11	waterproof IP 67	54-56
LP 2	•	•		•		3	Illumination with 1 or 2 LEDs	57
LP 10		•		•		2	Legend change at colour change	58
LP 14		•		•	•	6	Combination of up to 4 LEDs	59
LTR/LTM 1/2-L		•	•	•	•	3	also rubber contact (noiseless)	60-61
MPLS 12	•	•	•			7	Operating at the side SMT	62
TM 81		•	•		•	8	Operating at the side	63
TP 2	•	•	•	•	•	3		64-65
TR/TM 1/2L/3L		•		•	•	3	also rubber contact (noiseless)	66-67
TSSL		•		•		25	8x4.3 mm, 2 mm flat SMT	68

Illuminated Pushbutton Switches waterproof



Specifications:

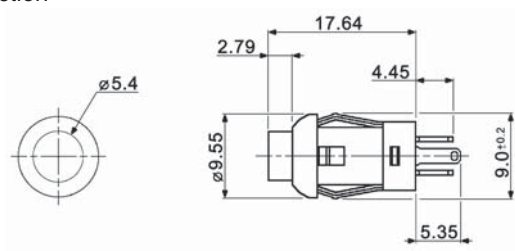
Contact rating:	30 V DC, 100 mA
Contact resistance:	<50 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Operating force:	2.5 N ± 1 N
Mechanical life:	minimum 50 000 operations
Material:	Surface of contacts, terminals: gold over nickel plated Case: PA 66 Cap: PC
Mounting:	snap-in, mounting-hole diameter 8 mm, panel thickness 0.8...1.2 mm
Soldering conditions:	hand-soldering – max. 3 sec, 300 °C
Travel:	1.2 mm

Models:

Switching function

DPL 1 CB x

off – mom



Ordering Code:

DPL 1 CB

LEDs:

- white
- red
- yellow
- green
- blue
- blue/green



Illuminated Pushbutton Switches waterproof

Specifications:

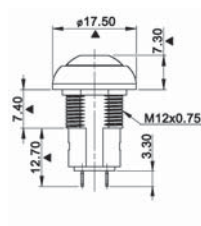
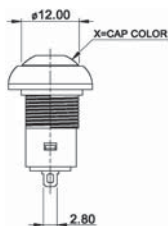
Contact rating:	momentary: 125 V AC, 125 mA	32 V AC, 400 mA	50 V DC, 100 mA
	latching: 125 V AC, 2 A	24 V DC, 100 mA	
Contact resistance:	<50 mΩ		
Insulation resistance:	>1000 MΩ		
Dielectric strength:	1000V, 50 Hz for the duration of 1 minute		
Operating temperature:	-30 °C to +85 °C		
Operating force:	3.5 N ± 1.5 N		
Mechanical life:	minimum 1 000 000 operations		
Material:	Surface of contacts, terminals: gold over silver plated		
	Base: DAP, UL 94 V-0		
	Case, Cap: PA 66		
Ingress Protection:	IP 67		
Mounting:	snap-in or bushing M12x0.75, key 14 mm		
Soldering conditions:	hand-soldering – max. 5 sec, 350 °C		
Travel:	momentary: 1.5 mm, latching: 2.5 mm		

Models:

Switching functions

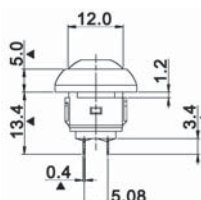
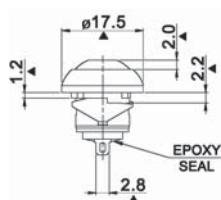
DPW 1 AG-K

off – on



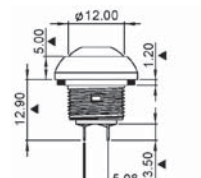
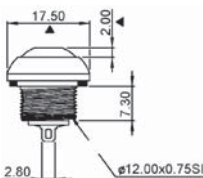
DPW 1 BG S-K

on – (mom)



DPW 1 CG-B

off – mom



Ordering Code:

DPW 1 ☐ G ☐ ☐ - ☐

Switching function:

- ☐ A on – off
- ☐ B on – (mom)
- ☐ C off – mom

Bushing:

- ☐ Thread
- ☐ S Snap-in (not for switching function A)

Actuator:

- ☐ W white
- ☐ K black
- ☐ R red
- ☐ O orange
- ☐ Y yellow
- ☐ G green
- ☐ B blue

Terminals:

- ☐ Solder tags
- ☐ FO Fast-on

Illuminated Pushbutton Switches waterproof



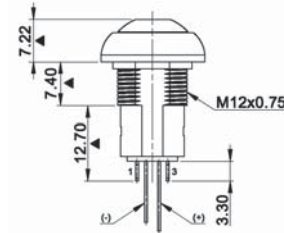
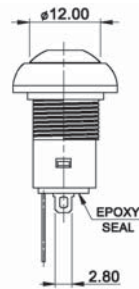
Specifications:

Contact rating:	125 V AC, 125 mA / 50 V DC, 100 mA / 32 V AC, 400 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	−30 °C to + 85 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	gold-plated over silver
Terminals:	gold-plated
Travel:	1.5 mm
Material:	case: thermoplastic meets UL 94 V-0; button: PA
Protection:	IP 67
Soldering conditions:	hand-soldering – max.: 3 sec, 300 °C

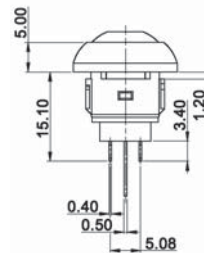
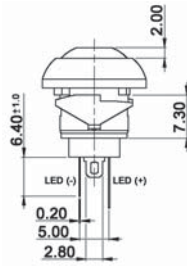
Models:

Switching functions

DPWL 1 AG KG off – on



DPWL 1 CG S-KY off – mom



Ordering Code:

DPWL 1 ☐ G ☐ ☐ - ☐

Switching function:

- ☐ A on – off
- ☐ B on – (mom)
- ☐ C off – mom

Bushing:

- ☐ Thread
- ☐ S Snap-in (not for switching function A)

Actuator:

- ☐ W white
- ☐ K black
- ☐ R red
- ☐ O orange
- ☐ Y yellow
- ☐ G green
- ☐ B blue

LEDs:

- ☐ W white
- ☐ R red
- ☐ Y yellow
- ☐ G green
- ☐ B blue
- ☐ YG yellow/green
- ☐ YB yellow/blue
- ☐ YR yellow/red
- ☐ RG red/green
- ☐ RB red/blue
- ☐ GB green/blue

Terminals:

- ☐ Solder tags
- ☐ FO Fast-on



Illuminated Pushbutton Switches waterproof

Specifications:

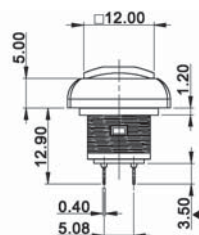
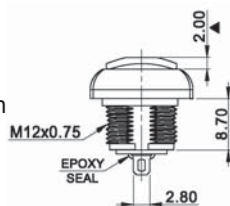
Contact rating:	250 V AC, 200 mA 48 V AC, 500 mA 50 V DC, 200 mA
Contact resistance:	<50 mΩ
Insulation resistance:	>1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	−30 °C to +85 °C
Operating force:	3.5 N ± 1.5 N
Mechanical life:	minimum 1 000 000 operations
Material:	Surface of contacts, terminals: gold over silver plated Base: DAP, UL 94 V-0 Case: Zinc alloy Cap: PA 66
Ingress Protection:	IP 67
Mounting:	bushing M12x0.75, key 14 mm
Soldering conditions:	hand-soldering – max. 5 sec, 350 °C
Travel:	1.5 mm

Models:

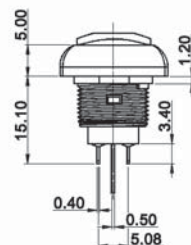
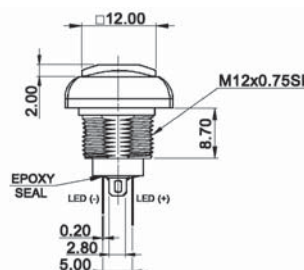
Switching functions

DPW 1 CG D1P R

off – mom



DPWL 1 CG D1C BG off – mom



Ordering Code:

DPW ☐ 1 ☐ G D1 ☐ ☐ ☐ - ☐

Lighting:

- ☐ without
- ☐ light

Switching function:

- ☐ on – (mom)
- ☐ off – mom

Housing surface:

- ☐ black ED-coated
- ☐ shining chrome
- ☐ Nickel-tin coated
- ☐ matt chrome plated
- ☐ matt nickel plated

Actuator:

- ☐ white
- ☐ black
- ☐ red
- ☐ orange
- ☐ yellow
- ☐ green
- ☐ blue

LEDs:

- ☐ white
- ☐ red
- ☐ yellow
- ☐ green
- ☐ blue
- ☐ yellow/green
- ☐ yellow/blue
- ☐ yellow/red
- ☐ red/green
- ☐ red/blue
- ☐ green/blue

Terminals:

- ☐ Solder tags
- ☐ Fast-on

Illuminated Pushbutton Switches waterproof



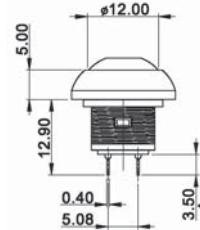
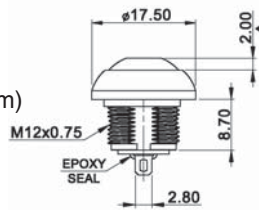
Specifications:

Contact rating:	250 V AC, 200 mA	48 V AC, 500 mA	50 V DC, 200 mA
Contact resistance:	<50 mΩ		
Insulation resistance:	>1000 MΩ		
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute		
Operating temperature:	-30 °C to +85 °C		
Operating force:	3.5 N ± 1.5 N		
Mechanical life:	minimum 1 000 000 operations		
Material:	Surface of contacts, terminals: gold over silver plated		
	Base: DAP, UL 94 V-0		
	Case: Zinc alloy		
	Cap: PA 66		
Ingress Protection:	IP 67		
Mounting:	bushing M12x0.75, key 14 mm		
Soldering conditions:	hand-soldering – max. 5 sec, 350 °C		
Travel:	1.5 mm		

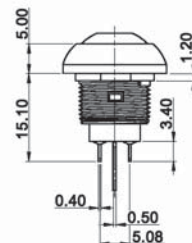
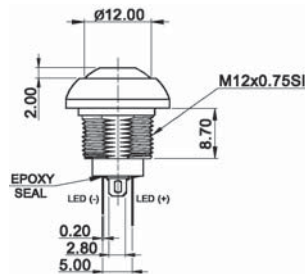
Models:

Switching functions

DPW 1 CG D2P R off – (mom)



DPWL 1 CG D2C KG off – mom



Ordering Code:

DPW ☐ 1 ☐ G D2 ☐ ☐ - ☐

Lighting:

- ☐ without
☐ light

Switching function:

- ☐ on – (mom)
☐ off – mom

Housing surface:

- ☐ black ED-coated
☐ shining chrome
☐ Nickel-tin coated
☐ matt chrome plated
☐ matt nickel plated

Actuator:

- ☐ white
☐ black
☐ red
☐ orange
☐ yellow
☐ green
☐ blue

LEDs:

- ☐ white
☐ red
☐ yellow
☐ green
☐ blue
☐ yellow/green
☐ yellow/blue
☐ yellow/red
☐ red/green
☐ red/blue
☐ green/blue

Terminals:

- ☐ Solder tags
☐ Fast-on

Specifications:

Contact rating:	250 V AC, 3 A / 125 V AC, 3 A 30 V DC, 3 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	–25 °C to +70 °C
Mechanical life:	minimum 30 000 operations
Contacts/Terminals:	solder tags or PC terminals, brass, silver-plated also available gold-plated, version B (see page 4)
Case material:	PA, black
Mounting:	single-hole mounting or on pc-board
Soldering conditions:	hand-soldering – max.: 30 W, 5 sec, 270 °C wave-soldering – max.: 3 sec, 245 °C ± 10 °C

Models: Switching functions

D P D T

LP 2 SR. – PC on – mom

LP 2 SN. – PC on – on

Illumination by **one** LED

D P D T

LP 2 SR. on – mom

LP 2 SN. on – on

Illumination by **one** LED

R (LED red)

G (LED green)

Y (LED yellow)

D P D T

LP 2 WR. – PC on – mom

LP 2 WN. – PC on – on

Illumination by **two** LEDs

D P D T

LP 2 WR. on – mom

LP 2 WN. on – on

Illumination by **two** LEDs

R (LED red)

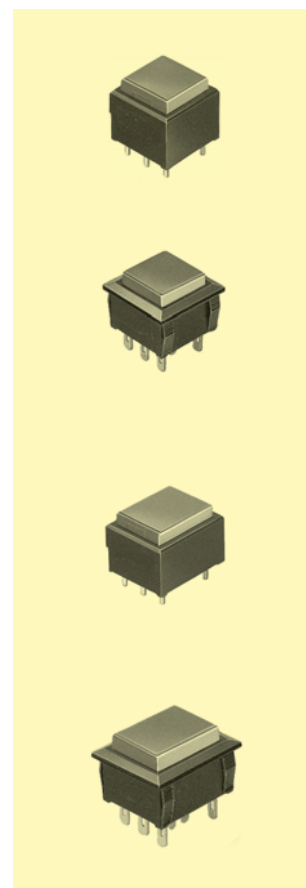
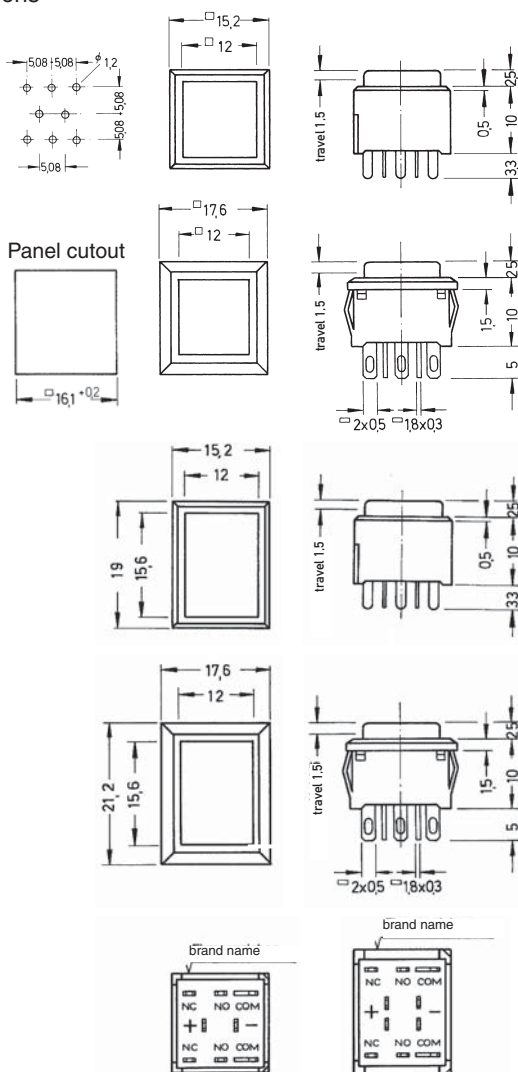
G (LED green)

Y (LED yellow)

LP 2 .. R: I_F = 30 mA; U_F = 2,0 V

LP 2 .. G: I_F = 20 mA; U_F = 1,95 V

LP 2 .. Y: I_F = 20 mA; U_F = 1,9 V



Illuminated Pushbutton Switches

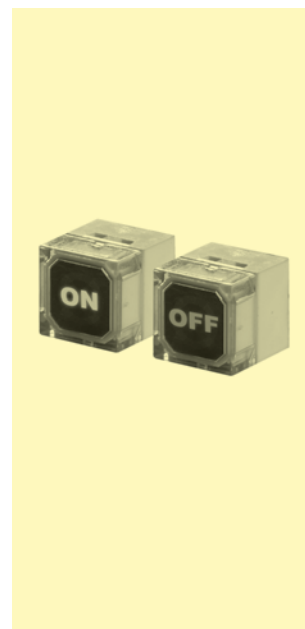
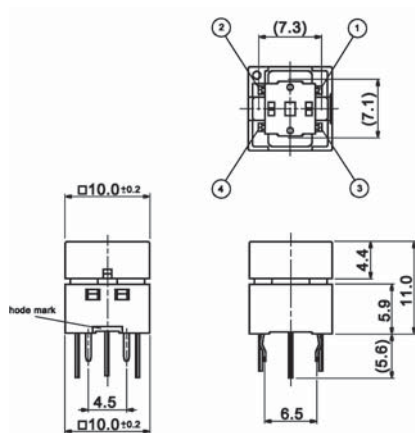
Specifications:

Contact rating:	24 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−25 °C to +70 °C
Operating force:	1.6 N ± 0.2 N
Mechanical life:	minimum 500 000 operations
Material:	Contacts: stainless steel, silver plated Terminals: brass, silver plated Case: PBT, UL 94 V-0, white Actuator: PC
Mounting:	on pc-board
Soldering conditions:	wave-soldering: max. 5 sec, max. 260 °C; pre-heat; max. 60 sec, max. 100 °C
Travel:	0.25 mm +0.2/-0.1 mm

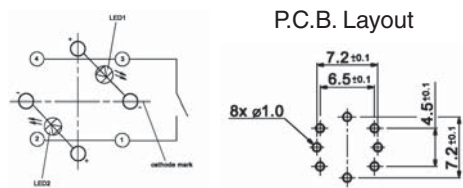
Models:

Switching functions

LP 10 02GA11 off – mom



P.C.B. Layout



Ordering Code:

LP 10 2 A1

Actuator:

- 0 clear
- 1 white transparent

LEDs:

- B red/blue
- G red/green

Inlay:

- 0 without inscription
- 1 OFF (red) and ON (second colour)
- 2 切 (rot) und 入 (second colour)
- 3 X (red) and O (second colour)

Specifications:

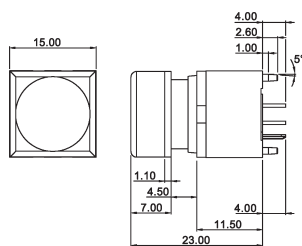
Contact rating:	12 V DC, 100 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	600 V, 50 Hz for the duration of 1 minute
Operating temperature:	–25 °C to +50 °C
Operating force:	180 gf ± 50 gf
Mechanical life:	minimum 500 000 operations
Material:	Contacts: Brass, Gold-plated over nickel Terminals: Phosphor-Bronze, Tin-plated over nickel Case: PA66 Cap, diffusor: PC
Mounting:	on pc-board
Soldering conditions:	LP 14...: IR-reflow-soldering, LP 14...-PC: wave-soldering: max. 5 sec, max. 260 °C, pre-heat: max. 60 sec, max. 100 °C
Travel:	Operating point 2.9 mm, total travel 4.3 mm
Individual Marking:	possible by polyester-film inlay, recommended size 12.8 mm x 12.8 mm x 0.1 mm

Models:

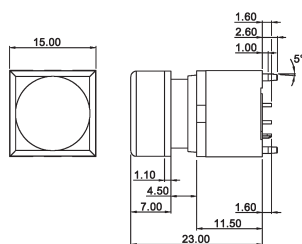
Switching functions

D P D T

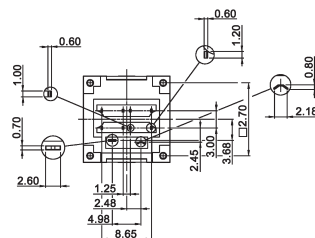
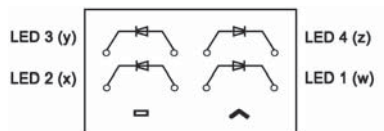
LP 14 CG RGBW-PC off – mom



LP 14 CG RGBW off – mom



pin-assignment



Ordering code:

LP 14 CG ☐ ☐ ☐ ☐ - ☐

LED colour:

- ☐ N without LED
- ☐ W white
- ☐ Y yellow
- ☐ R red
- ☐ G green
- ☐ B blue

Terminals:

- ☐ -PC on pc-board (for wave-soldering)
- ☐ short terminals (THR)

Illuminated Pushbutton Switches

Specifications:

Contacts:	LTR = rubber contact LTM = metal contact
Contact rating:	LTR 12 V DC, 10 mA LTM 48 V DC, 50 mA max. 1 W
Contact resistance:	LTR < 500 Ω at 2 V DC, 1 mA, at 1.5 N operating force LTM < 100 m Ω at 200 μ V AC, 1.5 mA, at 2 N operating force
Insulation resistance:	> 100 M Ω
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Mechanical life:	LTR minimum 100 000 operations LTM minimum 300 000 operations
Contacts:	LTR rubber contact bridge fixed contact phosphor bronze, gold-plated LTM stainless steel, silver-plated
Terminals:	LTR gold-plated LTM silver-plated
Travel:	LTR 1 mm LTM 0.25 mm
Material:	case: PBT meets UL 94 V-0 caps: LTR/LTM 1: ABS LTR/LTM 2: polycarbonat
Soldering conditions:	LTR: wave-soldering – max.: 3 sec, 245 °C $\pm$ 10 °C LTM: wave-soldering – max.: 5 sec, 300 °C

Models:

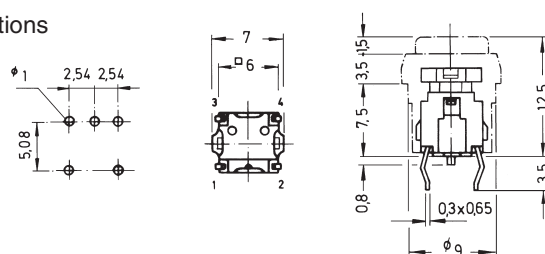
Switching functions

without LED

LTR 1

LTM 1

off – mom



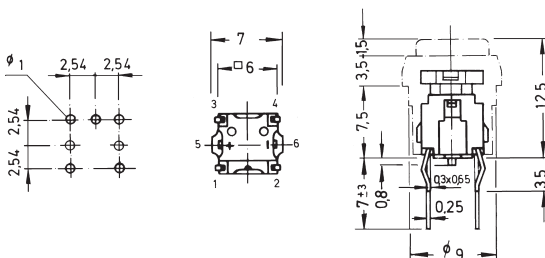
with LED

LTR 2 – L.

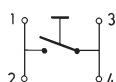
LTM 2 – L.

off – mom

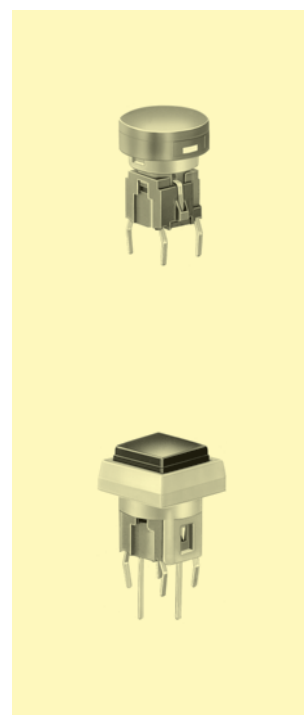
- LR (LED red)
- LG (LED green)
- LY (LED yellow)



Circuit diagram:



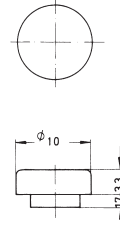
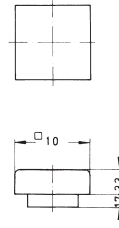
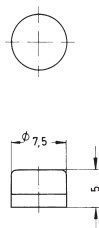
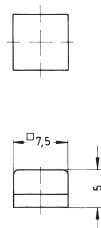
LTR/LTM 2-LR: $I_F = 20$ mA; $U_F = 2.0$ V
LTR/LTM 2-LG: $I_F = 10$ mA; $U_F = 1.95$ V
LTR/LTM 2-LY: $I_F = 10$ mA; $U_F = 1.90$ V



Accessories:

Caps

LTR 1/LTM 1



dark grey
grey
light grey
red

KT 7317
KT 7307
KT 7327
KT 7309

KT 7217
KT 7207
KT 7227
KT 7209

KT 8317
KT 8307
KT 8327
KT 8309

KT 8217
KT 8207
KT 8227
KT 8209

4

LTR 2/LTM 2

transparent:

clear
red
green
yellow

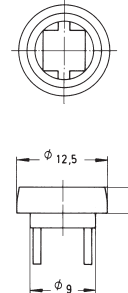
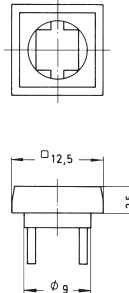
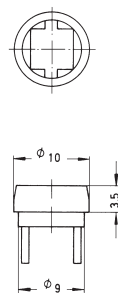
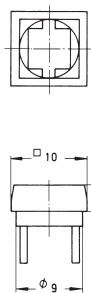
KT 7390
KT 7399
KT 7396
KT 7398

KT 7290
KT 7299
KT 7296
KT 7298

KT 8390
KT 8399
KT 8396
KT 8398

KT 8290
KT 8299
KT 8296
KT 8298

Bezels*



dark grey
grey

FM 7317
FM 7307

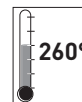
FM 7217
FM 7207

FM 8317
FM 8307

FM 8217
FM 8207

* further colours on request

Illuminated Pushbutton Switches for SMT



Specifications:

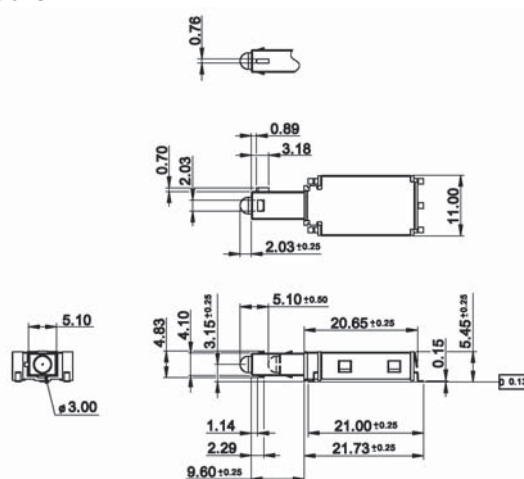
Contact rating:	50 V DC, 250 mA; max. 3,5 VA
Contact resistance:	<50 mΩ at 2–4 V DC, 100 mA
Insulation resistance:	> 1000 MΩ
Dielectric strength:	250 V AC (50–60 Hz) for 1 minute
Operating temperature:	–30 °C to +85 °C
Mechanical life:	minimum 30 000 operations
Material:	case and actuator: glass filled LCP, UL 94 V–0, grey Housing: stainless steel Contact and terminal: copper alloy, silver plated with gold flash
Operating force:	250 ± 100 gf
Mounting:	on pc-board – SMD

Models: Switching functions

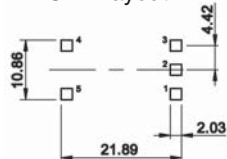
S P D T

MPLS 12 F ☐ on – mom

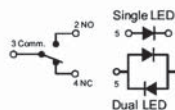
MPLS 12 D ☐ on – on



P.C.B. Layout



Circuit diagram



MPLS 12 F ☐

MPLS 12 D ☐

LED colour:

- ☐ W white
- ☐ Y yellow
- ☐ R red
- ☐ G green
- ☐ AG amber/green
- ☐ RG red/green

Packing: 450 pcs/reel



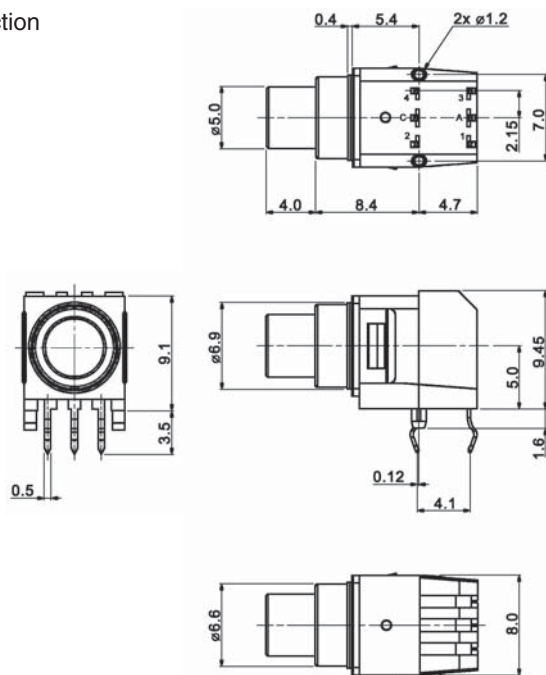
Illuminated Pushbutton Switches

Specifications:

Contact rating:	32 V DC, 100 mA, 1 VA
Contact resistance:	< 150 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Operating force:	4 N ± 1.2 N
Mechanical life:	minimum 25 000 operations
Material:	Contacts: stainless steel, silver plated Terminals: brass, gold plated Case: LCP, UL 94 V-0 Actuator: PC
Mounting:	on pc-board
Soldering conditions:	wave-soldering: max. 5 sec, max. 260 °C; pre-heat: max. 60 sec, max. 100 °C
Travel:	2.4 mm ± 0.3 mm

Models: Switching function

TM 81 FW-RA mom – on



Ordering Code:

TM 81 F - RA

LEDs:

☐ without LED

☐ W white

☐ R red

☐ Y yellow

☐ G green

☐ B blue

☐ YG yellow/green

☐ RG red/green

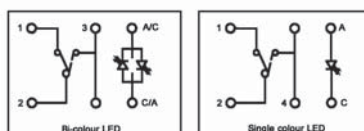
☐ BA blue/amber

☐ A amber

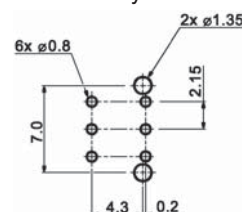
☐ BR blue/red

☐ BG blue/green

☐ AG amber/green



P.C.B. Layout



Illuminated Pushbutton Switches

Specifications:

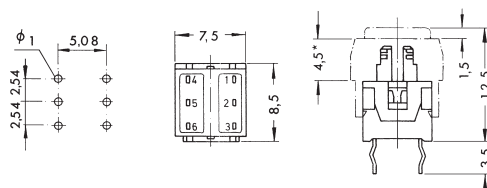
Contact rating:	30 V DC, 0.1 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +70 °C
Mechanical life:	minimum 10 000 operations
Contacts/Terminals:	PC terminals, phosphor bronze, silver-plated
Travel:	1.5 mm
Case material:	PBT meets UL 94 V-0
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 3 sec, 245 °C ± 10 °C

Models: Switching functions

D P D T

without LED

TP 2 R	on – mom
TP 2 N	on – on

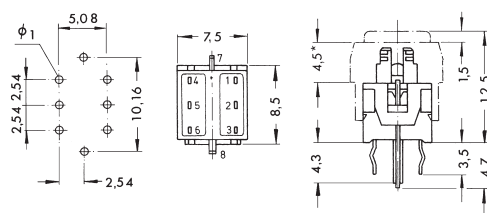


* 10 mm bezel = 3.8 mm

D P D T

with LED

TP 2 R – L.	on – mom
TP 2 N – L.	on – on
– LR (LED red)	
– LG (LED green)	
– LY (LED yellow)	



* 10 mm bezel = 3.8 mm

Circuit diagram:



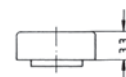
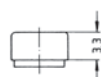
TP 2.-LR: $I_F = 20 \text{ mA}$; $U_F = 2.0 \text{ V}$
 TP 2.-LG: $I_F = 15 \text{ mA}$; $U_F = 1.95 \text{ V}$
 TP 2.-LY: $I_F = 15 \text{ mA}$; $U_F = 1.9 \text{ V}$



Illuminated Pushbutton Switches

Accessories:

Caps



opaque:

dark grey

KT 5317

KT 5217

KT 6317

KT 6217

grey

KT 5307

KT 5207

KT 6307

KT 6207

light grey

KT 5327

KT 5227

KT 6327

KT 6227

ivory

KT 5311

KT 5211

KT 6311

KT 6211

red

KT 5309

KT 5209

KT 6309

KT 6209

green

KT 5306

KT 5206

KT 6306

KT 6206

blue

KT 5304

KT 5204

KT 6304

KT 6204

transparent:

frame

—

—

grey

ivory

grey

ivory

window:

red

KT 5399

KT 5299

KT 6389 KT 6399

KT 6289 KT 6299

green

KT 5396

KT 5296

KT 6386 KT 6396

KT 6286 KT 6296

yellow

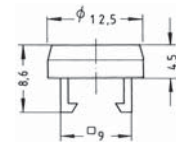
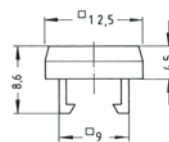
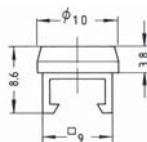
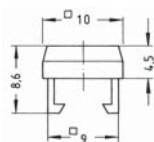
KT 5398

KT 5298

KT 6388 KT 6398

KT 6288 KT 6298

Bezels



dark grey

FM 5317

FM 5217

FM 6317

FM 6217

grey

FM 5307

FM 5207

FM 6307

FM 6207

light grey

FM 5327

FM 5227

FM 6327

FM 6227

ivory

FM 5311

FM 5211

FM 6311

FM 6211

Illuminated Pushbutton Switches

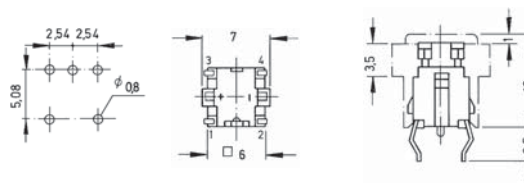
Specifications:

Contacts:	TR = rubber contact TM = metal contact
Contact rating:	TR 12 V DC, 10 mA, TM 48 V DC, 50 mA max. 1 W
Contact resistance:	TR < 500 Ω at 1,5 N operating force TM < 100 m Ω at 2 N operating force
Insulation resistance:	> 100 M Ω at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Electrical life:	TR minimum 100 000 operations TM minimum 300 000 operations
Contacts:	TR rubber contact bridge; fixed contact phosphor bronze, gold-plated TM stainless steel, silver-plated
Terminals:	PC terminals, TR gold-plated; TM silver-plated
Travel:	TR 1 mm; TM 0,25 mm
Material:	button: PBT; case: TR: PA meets UL 94 V-0, TM: 6T PA resin; caps: ABS
Mounting:	on pc-board
Soldering conditions:	TR: wave-soldering – max.: 3 sec, 245 °C $\pm$ 10 °C TM: wave-soldering – max.: 5 sec, 300 °C

Models: Switching functions

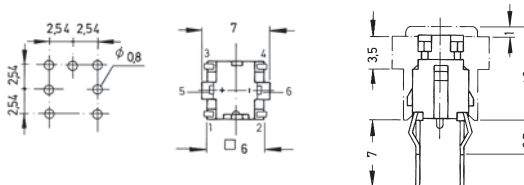
without LED

TR 1
TM 1 off – mom

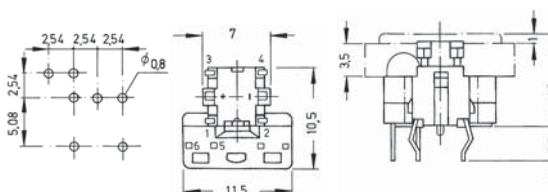


with LED

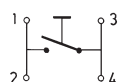
TR 2 – L.
TM 2 – L. off – mom
– LR (LED red)
– LG (LED green)
– LY (LED yellow)



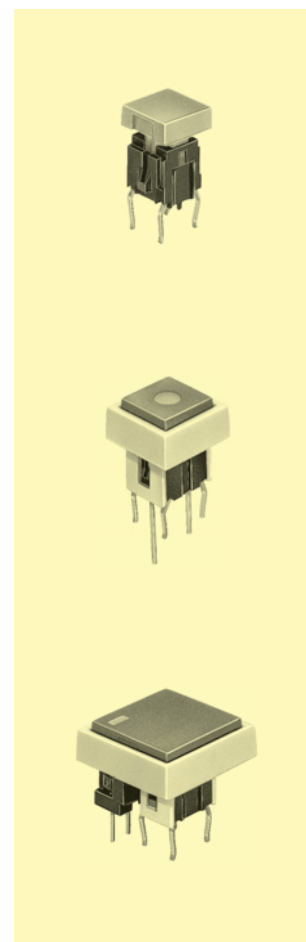
TR 3 – L.
TM 3 – L. off – mom
– LR (LED red)
– LG (LED green)
– LY (LED yellow)



Circuit diagram:



TR/TM 2-LR: $I_F = 20$ mA; $U_F = 2.0$ V
TR/TM 2-LG: $I_F = 10$ mA; $U_F = 1.95$ V
TR/TM 2-LY: $I_F = 10$ mA; $U_F = 1.90$ V
TR/TM 3-L: $I_F = 10$ mA; $U_F = 2.1$ V



Accessories:

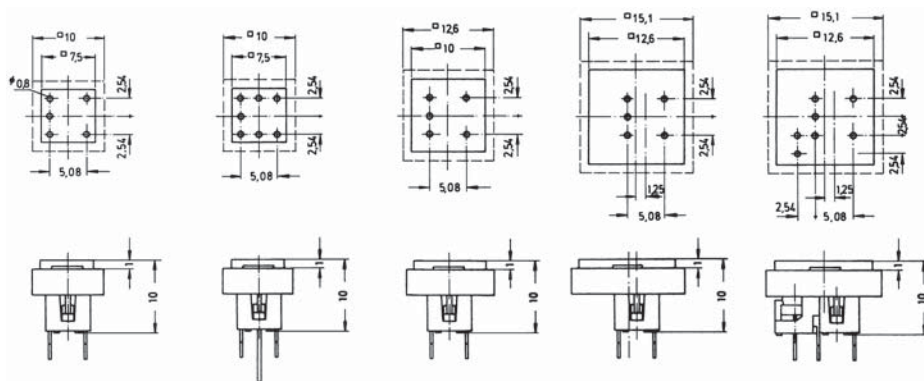
Caps

	TR 1 / TM 1	TR 2 / TM 2	TR 1 / TM 1	TR 1 / TM 1	TR 3 / TM 3
dark grey	KT 1017	KT 1117	KT 2017	KT 3017	KT 3117
grey	KT 1007	KT 1107	KT 2007	KT 3007	KT 3107
light grey	KT 1027	KT 1127	KT 2027	KT 3027	KT 3127
ivory	KT 1011	KT 1111	KT 2011	KT 3011	KT 3111
silver	KT 1021	KT 1121	KT 2021	KT 3021	KT 3121
red	KT 1009	KT 1109	KT 2009	KT 3009	KT 3109
blue	KT 1004	KT 1104	KT 2004	KT 3004	KT 3104
brown	KT 1002	KT 1102	KT 2002	KT 3002	KT 3102

Bezels

dark grey	FM 1017	FM 2017	FM 3017
grey	FM 1007	FM 2007	FM 3007
light grey	FM 1027	FM 2027	FM 3027
ivory	FM 1011	FM 2011	FM 3011

Mounting dimensions



Illuminated Pushbutton Switches for SMT



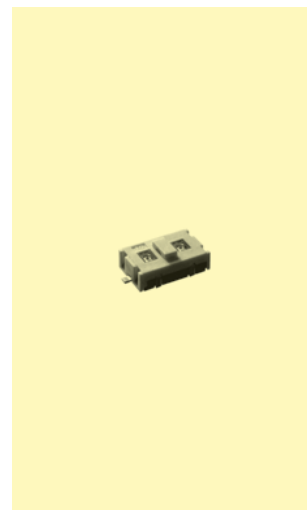
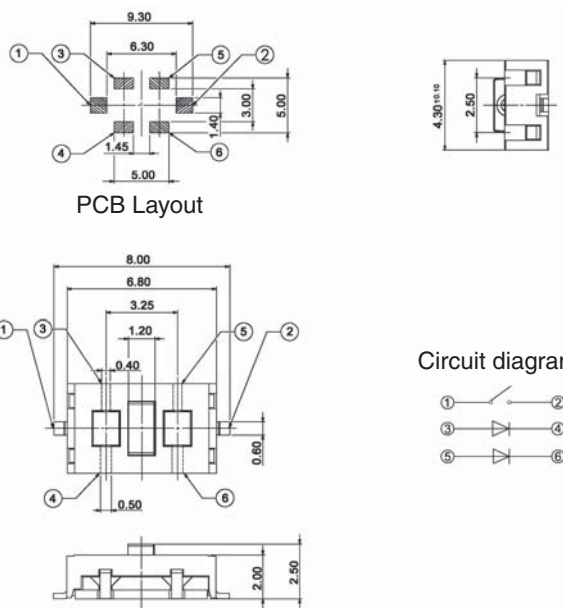
Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50–60 Hz) for 1 minute
Operating temperature:	–20 °C to +70 °C
Operating force:	1.6 N +0.8/–0.3 N
Mechanical life:	minimum 50 000 operations
Stem/cover:	high-temp. PA 9T UL 94 V–0, white
Terminal:	brass, silver-plated
Contact:	stainless steel, silver-plated
Base:	high-temp. PA 9T UL 94 V–0, molded black

4

Models:

TSSL 3W □ □



Ordering Code:

TSSL 3W □ □

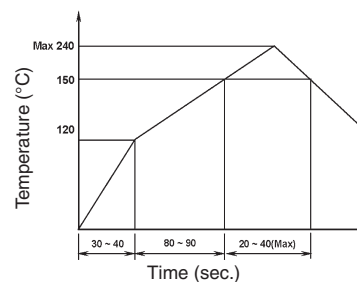
Left LED:

- R red
- G green
- O soft orange
- W white
- B blue

Right LED:

- R red
- G green
- O soft orange
- W white
- B blue

Soldering conditions (reflow-soldering)



5

Tact Switches

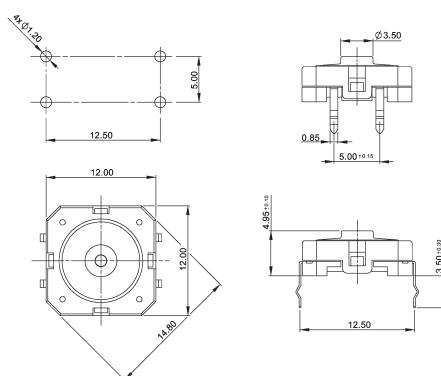
Type	Operating		Terminals		IP 67	wash-able	Size	Special feature	Page
	top	side	T/H	SMT					
TSE 12	•		•				12x12	1 Mill. operations	70
TSSE 12	•			•			12x12	1 Mill. operations	70
TS 2x	•		•				12x12		71
TSS 2x	•			•			12x12		72
TSE 2x	•		•		•	•	12x12	1 Mill. operations	73
TSSE 2x	•			•	•	•	12x12	1 Mill. operations	74
TSE 8	•		•				8.4x8.4	1 Mill. operations	75
TSSE 8	•			•			8.4x8.4	1 Mill. operations	75
TMP 1	•		•		•	•	7.6x7.6	1 Mill. operations	76
TMP 1-R		•	•		•	•	7.6x7.6	1 Mill. operations	76
TMPS 1	•			•	•	•	7.6x7.6	1 Mill. operations	77
TME 1	•		•			•	7.5x6.5		78
TMS 1	•			•			7.5x6.5		79
TMS 3	•			•			7.0x6.8		79
TMSE 3	•			•		•	7.0x6.8		79
TSE 6x	•		•		•	•	6.2x6.3		80
TSSE 6x	•			•	•	•	6.2x6.3		81-82
TSSE 6x-RA		•		•		•	6.1x7.02		83
TS 6x	•		•				6.2x6.2		84
TS 6x-RA		•	•				7.4x7.2		85
TS 637-RA		•	•				7.4x4.3		86
TSS 6x	•			•			6.2x6.2		87
TSS 650-J	•			•			6.0x6.0	1,3 mm travel	88
TSS 507	•			•			4.9x4.9	extreme flat	89
TMSE 10	•			•		•	4.9x4.5	−55 °C to +125 °C	90
TMSE 10 J-RA		•		•		•	5.0x5.44	−55 °C to +125 °C	90
TSS 300	•			•			3.8x6.0	1 Mill. operations	91
TSSE 300	•			•	•		3.8x6.0	1 Mill. operations	91
TS 3x	•		•				3.5x6.0		92
TSS 3x	•			•			3.5x6.0		92
TSS 313-RA		•		•			4.0x2.0		93
TSS 4-RA		•		•			7.2x3.5	250 000 operations	94

Specifications:

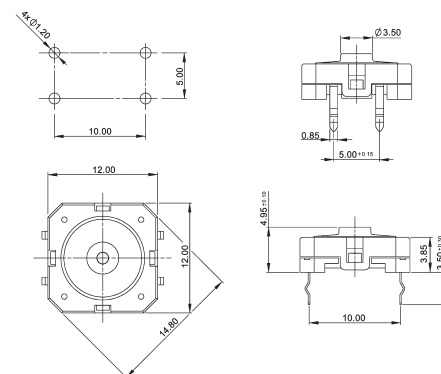
Contact rating:	42 V AC/DC, 100 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ bei 100 V DC
Dielectric strength:	250 V DC, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +80 °C
Mechanical life:	1 000 000 operations
Contacts:	gold-plated
Terminals:	terminal pin, copper alloy, gold-plated
Material:	case: PA46 / PA6T
	button: silicon caoutchouc
Mounting:	on pc-board, TSSE 12 S: SMD

Models: Switching functions

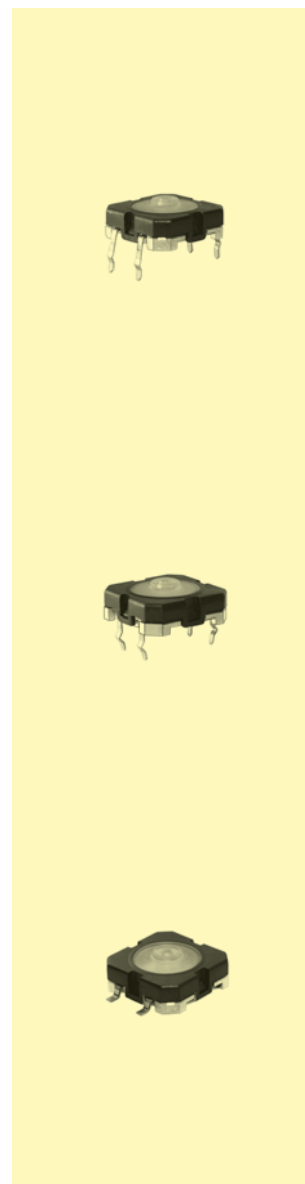
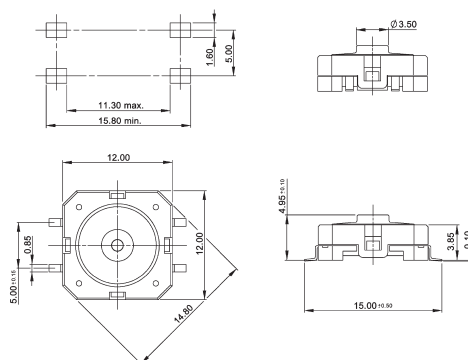
TSE 12 S off – mom



TSE 12 S-1 off – mom



TSSE 12 S off – mom



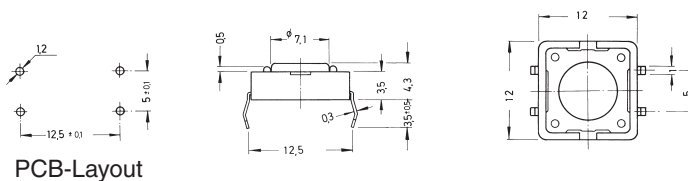
Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−25 °C to +70 °C
Electrical life:	2.6 N: minimum 100 000 cycles 1.6 N: minimum 200 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	PC terminals, brass, silver-plated
Material:	cover: stainless steel base and stem: nylon meets UL 94 V-0
Mounting:	on pc-board
Soldering conditions:	hand-soldering – max.: 30 W, 2 sec, 320 °C wave-soldering – max.: 5 sec, 260 °C subject to PCB 1.6 mm thickness
Travel:	0.35 mm + 0.2/− 0.1 mm

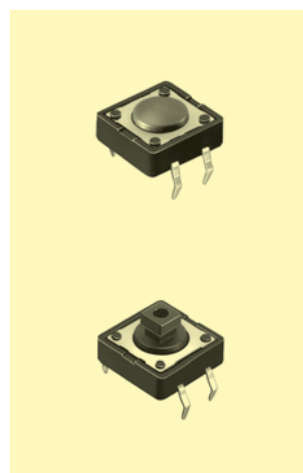
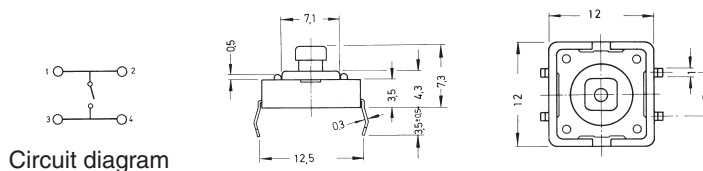
5

Models:

TS 21 ☐



TS 24 ☐



Caps for TS 24 ☐



Ordering code:

Switches TS 2 ☐ ☐

Dimension: ☐ 1 4.3 mm ☐ 4 7.3 mm

Colour of stem for operating force: ☐ N 1.6 N, brown ☐ R 2.6 N, red

Caps KTSC-2 ☐ ☐

Cap type: ☐ 1 square ☐ 2 round

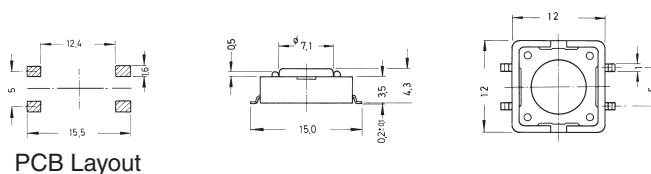
Cap colour: ☐ Y yellow ☐ B blue ☐ R red ☐ I ivory ☐ K black ☐ G green

Specifications:

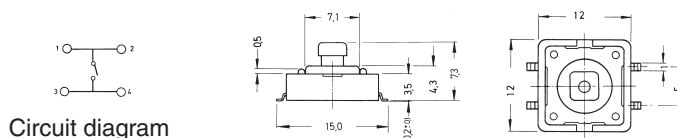
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−25 °C to +70 °C
Electrical life:	2.6 N: minimum 100 000 cycles 1.6 N: minimum 200 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Material:	cover: stainless steel base and stem: high-temp. nylon meets UL 94 V-0; caps ABS
Mounting:	on pc-board – SMD
Soldering conditions:	hand-soldering – max.: 30 W, 2 sec, 320 °C
Packing:	on tapes – see ordering code
Travel:	0.35 mm + 0.2/− 0.1 mm

Models:

TSS 21 □



TSS 24 □



Caps for TSS 24 □



Ordering code:

Switches

TSS 2 □ □

Dimension H/Packing:

- 1 4.3 mm / 700 pcs/reel
- 4 7.3 mm / 500 pcs/reel

Colour of stem
for operating force:

- N 1.6 N, brown
- R 2.6 N, red

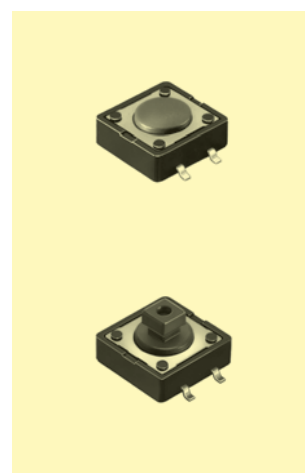
Caps KTSC-2 □ □

Cap type:

- 1 square
- 2 round

Cap colour:

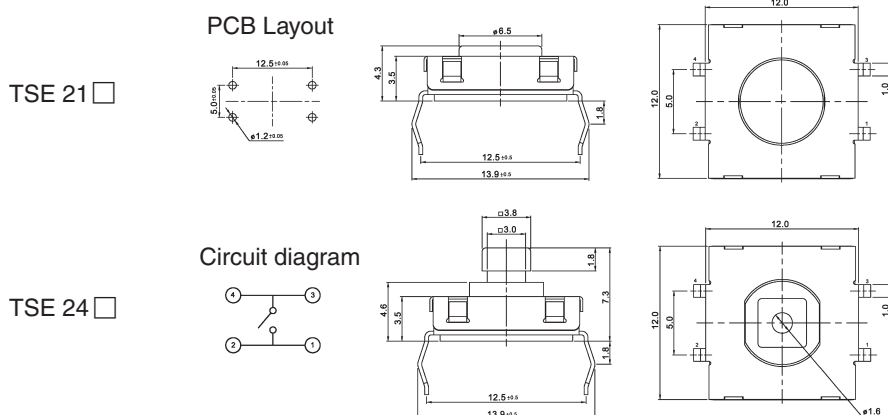
- Y yellow
- B blue
- R red
- I ivory
- K black
- G green



Specifications:

Contact rating:	50 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Operating force:	N: 1.6 N ± 0.5 N R: 2.6 N ± 0.5 N W: 3.2 N ± 0.8 N Y: 5.2 N ± 1.3 N
Mechanical life:	N, R: minimum 1 000 000 operations; W, Y: minimum 300 000 operations
Material:	Contacts: stainless steel, silver-plated Terminals: brass, silver plated Cover: stainless steel Base: LCP, UL 94 V-0, black, washable Stem: PA, UL 94 V-0
Protection:	IP 67
Mounting:	on pc-board
Soldering conditions:	wave soldering, max. 5 s max. 260 °C; pre-heat max. 60 s max. 100 °C
Travel:	0.4 mm ± 0.2 mm

Models:



Caps for TSE 24



Ordering code:

Switches **TSE 2**

Dimension:	Colour of stem for operating force:
4.3 mm	1.6 N, brown
7.3 mm	2.6 N, red
	3.2 N, white
	5.2 N, yellow

Caps **KTSC-2**

Cap type:	Cap colour:
square	yellow
round	blue
	red
	ivory
	black
	green

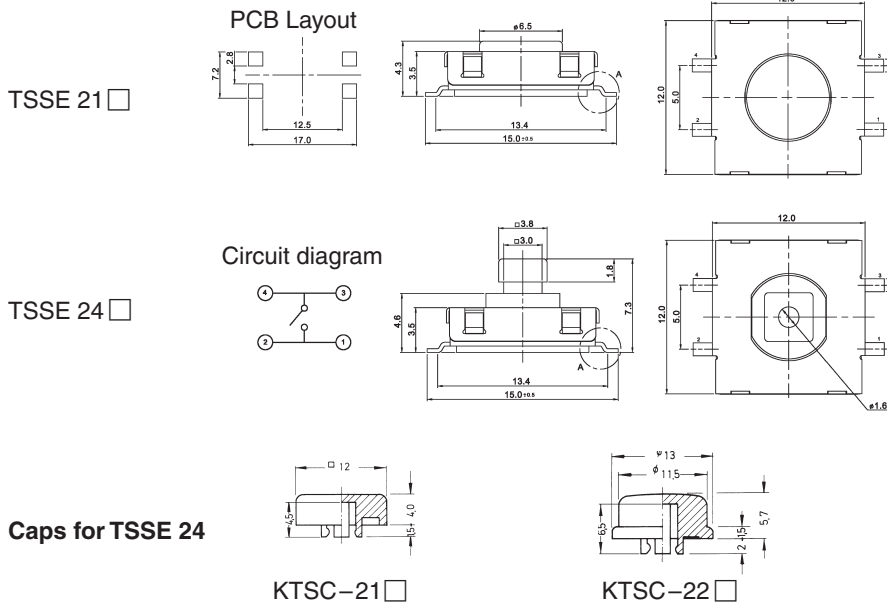
Tact Switches for SMT, waterproof



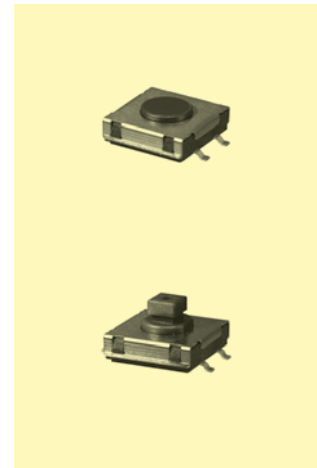
Specifications:

Contact rating:	50 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Operating force:	N: 1.6 N ± 0.5 N R: 2.6 N ± 0.5 N W: 3.2 N ± 0.8 N Y: 5.2 N ± 1.3 N
Mechanical life:	N, R: minimum 1 000 000 operations; W, Y: minimum 300 000 operations
Material:	Contacts: stainless steel, silver-plated Terminals: brass, silver plated Cover: stainless steel Base: LCP, UL 94 V-0, black, washable Stem: PA, UL 94 V-0
Protection:	IP 67
Mounting:	on pc-board – SMD
Travel:	0.4 mm ± 0.2 mm

Models:



washable



Ordering code:

Switches **TSSE 2**

Dimension H/Packing:

- 4.3 mm / 700 pcs/reel
- 7.3 mm / 500 pcs/reel

Colour of stem for operating force:

- 1.6 N, brown
- 2.6 N, red
- 3.2 N, white
- 5.2 N, yellow

Caps **KTSC-2**

Cap type:

- square
- round

Cap colour:

- yellow
- blue
- red
- ivory
- black
- green

Specifications:

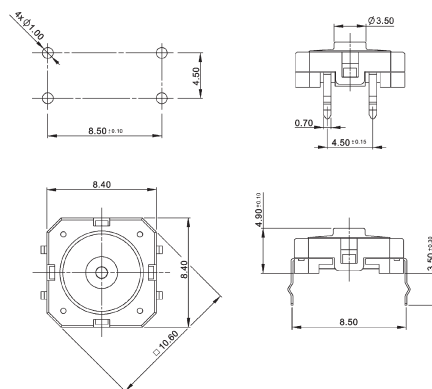
Contact rating:	42 V AC/DC, 100 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ bei 100 V DC
Dielectric strength:	250 V DC, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +80 °C
Mechanical life:	1 000 000 operations
Contacts:	gold-plated
Terminals:	terminal pin, copper alloy, gold-plated
Material:	case: PA6, washable button: TPE-S
Mounting:	on pc-board, TSSE 12 S: SMD

Models:

Switching functions

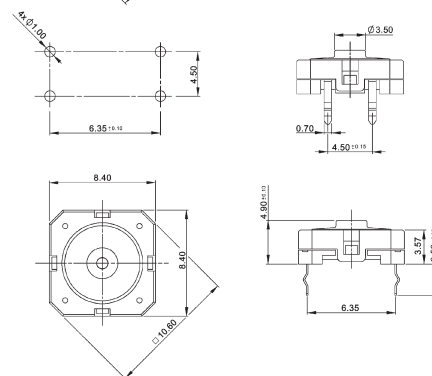
TSE 8 S

off – mom



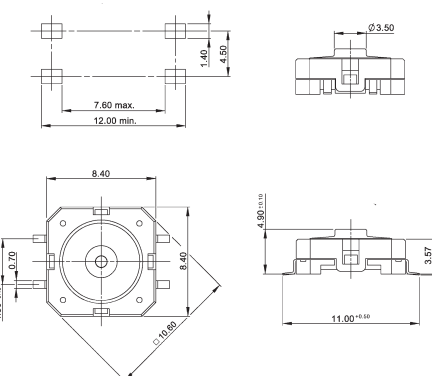
TSE 8 S-1

off – mom



TSSE 8 S

off – mom



Specifications:

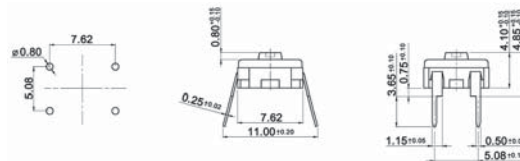
Contact rating:	24 V DC, 20 mA; max. 0.5 W
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	gold-plated over nickel barrier
Travel:	0.75 ± 0.25 mm
Operating force:	4.5 ± 1.0 N
Terminals:	PC terminals, tin-plated over nickel barrier
Material:	case: PBT (UL 94 V-0), blue, TMP 1-1: red button: silicon rubber, ivory; caps: PC meets UL 94 V-0
Protection:	IP 67
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 sec, 270 °C

washable

Models: Switching functions

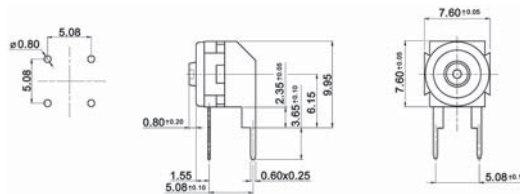
TMP 1
TMP 1-1

off – mom



TMP 1 – R

off – mom



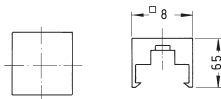
Circuit diagramm:



Accessories and mounting dimensions:

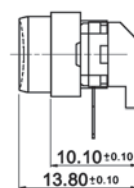
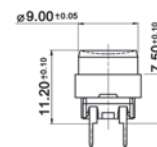
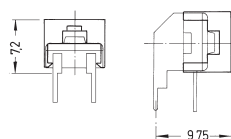
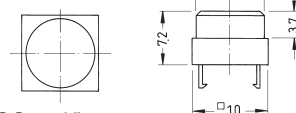
Caps

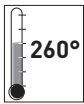
light grey KTT 107



dark grey KTT 217
light grey KTT 227
red KTT 209

(More colours in request, MOQ 25 K)





Tact Switches for SMT, waterproof

Specifications:

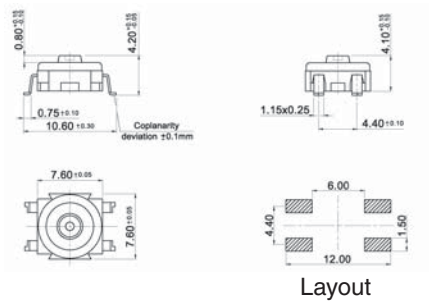
Contact rating:	24 V DC, 20 mA; max. 0.5 W
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	gold-plated over nickel barrier
Travel:	0.75 ± 0.25 mm
Operating force:	4.5 ± 1.0 N
Terminals:	tin-plated over nickel barrier
Material:	case: PA meets UL 94 V-0, black, TMPS 1-1: white button: silicon rubber, ivory
Protection:	IP 67
Mounting:	on pc-board, SMD

5

Models: Switching function

TMPS 1 off — mom

TMPS 1-1

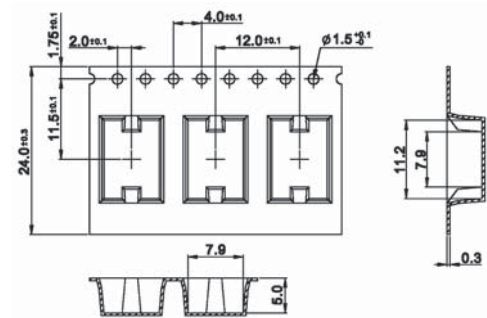


Circuit diagramm: TMPS 1 TMPS 1-1



Packing:

TMPS 1, TMPS 1-1	50 pieces in stick
TMPS 1T, TMPS 1-1T	1 100 pieces/reel



Tact Switches

Specifications:

Contact rating:	48 V DC, 50 mA, max. 1 W
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−25 °C to +70 °C
Mechanical life:	minimum 300 000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	PC terminals
Material:	case: 6TPA resin, washable; frame: stainless steel
	button: perbunan, black
Operating force:	2,0 N
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 6 sec, 275 °C ± 10 °C

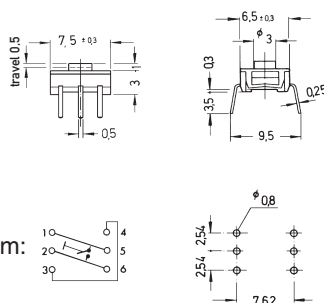
5

Models: Switching functions

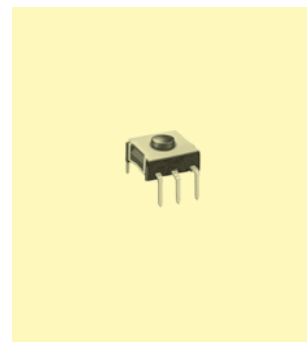
TME 1

off – mom

Circuit diagram:



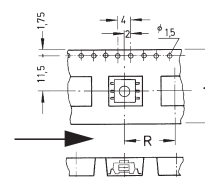
washable



Packing series TMS (next page): sticks or tapes

for order on tape: additional to type number: T
example of order: TMS 1 T

Models	Stick	Tape	Reel	Tape width	Rapport
				(A)	(R)
TMS 1	50 pieces; L 400 mm	1000 pieces	Ø 330 mm	24 mm	16 mm
TMS 3	50 pieces; L 375 mm	1000 pieces	Ø 330 mm	16 mm	12 mm
TMSE 3	50 pieces; L 375 mm	1000 pieces	Ø 330 mm	16 mm	12 mm



Specifications:

Contact rating:	TMS 1	48 V DC, 50 mA, max. 1 W
	TMS 3 / TMSE 3	24 V DC, 30 mA, max. 0.6 W
Contact resistance:		< 100 mΩ
Insulation resistance:		> 100 MΩ at 100 V DC
Dielectric strength:		250 V, 50 Hz for the duration of 1 minute
Operating temperature:		-25 °C to +70 °C
Mechanical life:		minimum 100 000 operations
Contacts:		silver-plated, terminals tin-plated; TMSE 3 with ground terminals
Material:	TMS 1	case: 6TPA resin; button: silicon, black; frame: stainless steel
	TMS 3	case: PA; button: PA, black; frame: stainless steel
	TMSE 3	case: PA washable; button: silicon, grey; frame: stainless steel
Operating force:	TMS 1 / TMSE 3	2.0 N
	TMS 3	1.2 N
Mounting:		on pc-board – SMD

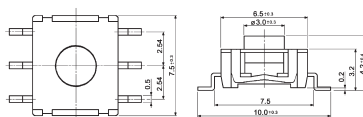
5

Models:

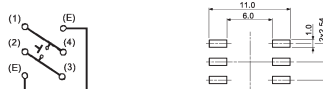
Switching functions

TMS 1
travel 0.5

off – mom

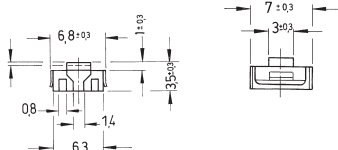


Circuit diagram:



TMS 3
travel 0.25

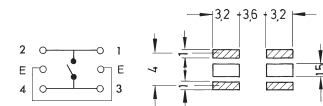
off – mom



TMSE 3
travel 0.5

off – mom

Circuit diagram:



Soldering conditions:	TMS1	reflow-soldering – max.: 40 sec, 230° C
		peak temperature: 250° C
	TMS3/TMSE3	reflow-soldering – max.: 40 sec., 230° C
		peak temperature: 255° C

Packing see previous page

Tact Switches

Specifications:

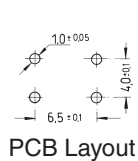
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +70 °C
Electrical life:	TSE 66/68 minimum 100 000 cycles TSE 69 minimum 500 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	PC terminals brass, silver-plated
Material:	cover: stainless steel base: high-temp. nylon meets UL 94 V-0, washable stem: TSE 66: nylon – TSE 68/69: silicone rubber
Protection:	IP 67
Mounting:	on pc-board
Soldering conditions:	hand-soldering – max.: 30 W, 2 sec, 320 °C wave-soldering – max.: 5 sec, 260 °C subject to PCB 1.6 mm thickness

Packing: 75 pcs/tube

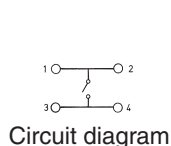
washable

Models:

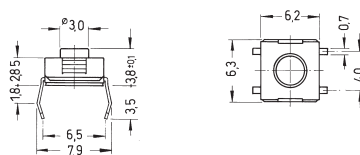
TSE 66 □



TSE 68 □



TSE 69 □



Ordering code:

TSE □ □ □

Dimension

66	3.1 mm, travel: 0.25 + 0.2/− 0.1	brown (N)
68	2.3 mm, travel: 0.25 + 0.2/− 0.1	silver (S)
69	3.8 mm, travel: 0.45 ± 0.2	red (R)
69	3.8 mm, travel: 0.45 ± 0.2	brown (N)

Further types on request

Colour of stem for operating force:

S	1.6 N, silver
N	1.6 N, brown
R	2.6 N, red

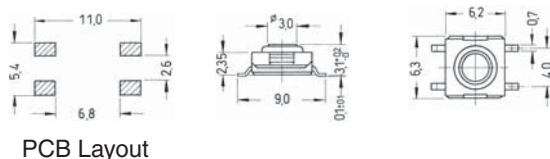
Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Electrical life:	TSSE 66/68 minimum 100 000 cycles TSSE 65/67/69 minimum 500 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Material:	cover: stainless steel base: high-temp. nylon meets UL 94 V-0, washable stem: TSSE 66: nylon – TSSE 65/67/68/69: silicone rubber
Protection:	IP 67
Mounting:	on pc-board – SMD
Packing:	on tapes – see ordering code

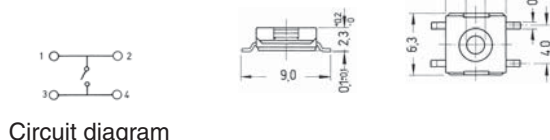
5

Models:

TSSE 66 ☐



TSSE 68 ☐



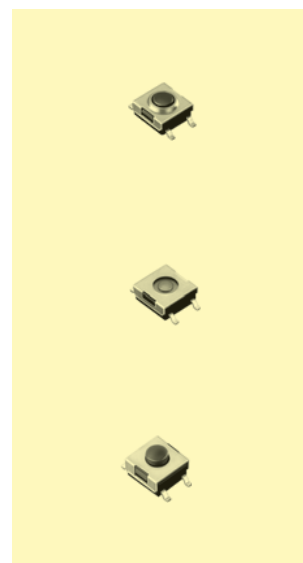
TSSE 65 ☐

TSSE 67 ☐

TSSE 69 ☐



washable



Ordering code:

TSSE ☐ ☐

Dimension H

☐ 65	3.5 mm, travel: 0.45 ± 0.2	brown	(N) / 1900 pieces/reel
☐ 65	3.5 mm, travel: 0.45 ± 0.2	red	(R) / 1900 pieces/reel
☐ 65	3.5 mm, travel: 0.45 ± 0.2	transparent	(T) / 1900 pieces/reel
☐ 66	3.1 mm, travel: 0.25 + 0.2/− 0.1	brown	(N) / 2000 pieces/reel
☐ 67	5.2 mm, travel: 0.45 ± 0.2	brown	(N) / 900 pieces/reel
☐ 67	5.2 mm, travel: 0.45 ± 0.2	red	(R) / 900 pieces/reel
☐ 67	5.2 mm, travel: 0.6 ± 0.2	transparent	(T) / 900 pieces/reel
☐ 68	2.3 mm, travel: 0.25 + 0.2/− 0.1	silver	(S) / 2000 pieces/reel
☐ 69	3.8 mm, travel: 0.45 ± 0.2	red	(R) / 1900 pieces/reel
☐ 69	3.8 mm, travel: 0.45 ± 0.2	brown	(N) / 1900 pieces/reel
☐ 69	3.8 mm, travel: 0.6 ± 0.2	transparent	(T) / 1900 pieces/reel

Colour of stem

for operating force:

☐ S	1.6 N, silver
☐ N	1.6 N, brown
☐ R	2.6 N, red
☐ T	3.6 N, transparent

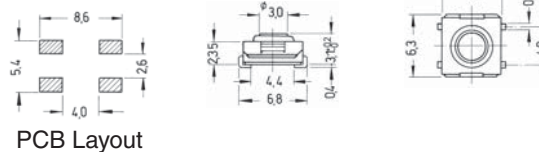
Further types on request

Specifications:

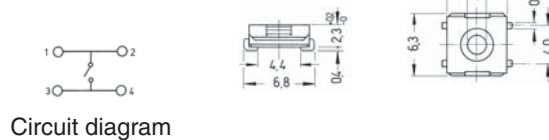
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Electrical life:	TSSE 66–J/68–J: minimum 100 000 cycles TSSE 65–J/67–J/69–J: minimum 500 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Material:	cover: stainless steel base: high-temp. nylon meets UL 94 V–0, washable stem: TSSE 66 J: nylon – TSSE 65/67/68/69 J: silicone rubber
Protection:	IP 67
Mounting:	on pc-board – SMD
Packing:	on tapes – see ordering code

Models:

TSSE 66 □–J



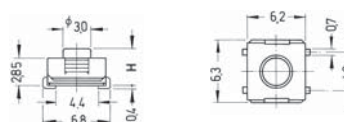
TSSE 68 □–J



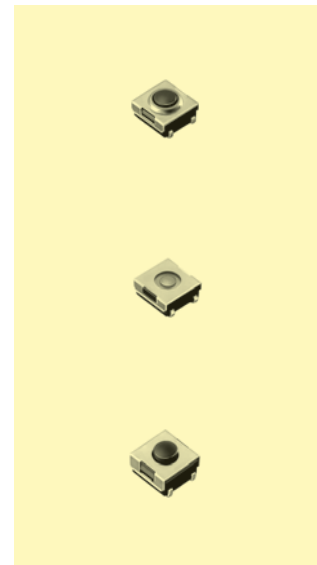
TSSE 65 □–J

TSSE 67 □–J

TSSE 69 □–J



washable



Ordering code:

TSSE □ □–J

Dimension H

65	3.5 mm, travel: 0.45 ± 0.2	brown	(N) / 1800 pieces/reel
65	3.5 mm, travel: 0.45 ± 0.2	red	(R) / 1800 pieces/reel
65	3.5 mm, travel: 0.45 ± 0.2	transparent	(T) / 1800 pieces/reel
66	3.1 mm, travel: 0.25 + 0.2/– 0.1	brown	(N) / 1900 pieces/reel
67	5.2 mm, travel: 0.45 ± 0.2	brown	(N) / 900 pieces/reel
67	5.2 mm, travel: 0.45 ± 0.2	red	(R) / 900 pieces/reel
67	5.2 mm, travel: 0.6 ± 0.2	transparent	(T) / 900 pieces/reel
68	2.3 mm, travel: 0.25 + 0.2/– 0.1	silver	(S) / 2700 pieces/reel
69	3.8 mm, travel: 0.45 ± 0.2	red	(R) / 1800 pieces/reel
69	3.8 mm, travel: 0.45 ± 0.2	brown	(N) / 1800 pieces/reel
69	3.8 mm, travel: 0.6 ± 0.2	transparent	(T) / 1800 pieces/reel

Colour of stem

for operating force:

S	1.6 N, silver
N	1.6 N, brown
R	2.6 N, red
T	3.6 N, transparent

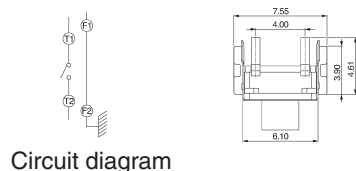
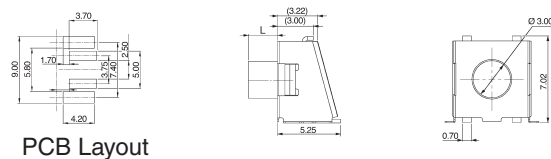
Further types on request

Specifications:

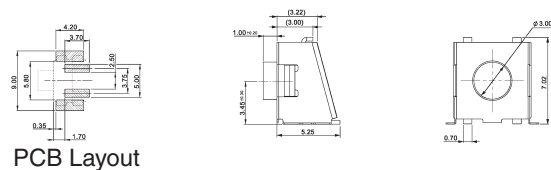
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	-25 °C to +70 °C
Operating force:	see ordering code
Mechanical life:	minimum 500 000 cycles
Material:	cover: nickel, silver-plated case: high-temp. PA 9T UL 94 V-0, black stem: silicone
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Protection:	IP 57
Packing:	on tapes – see ordering code

Models:

TSSE 6 ☐ ☐ -RA



TSSE 6 ☐ ☐ -RA-1



washable

5



Ordering code:

TSSE 6 ☐ ☐ -RA ☐

Actuator height (L):

☐ 00	0 mm	700 pcs / reel
☐ 08	0.8 mm	700 pcs / reel
☐ 10	1.0 mm	700 pcs / reel
☐ 23	2.35 mm	700 pcs / reel
☐ 33	3.3 mm	500 pcs / reel

Operating force:

☐ N	1.8 N (brown)
☐ R	2.6 N (red)
☐ NK	1.8 N (black)
☐ RK	2.6 N (black)

☐ No support terminals

☐-1 With support terminals

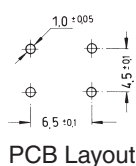
Tact Switches

Specifications:

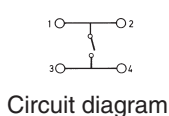
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Electrical life:	1.0 N/1.6 N: minimum 200 000 cycles 2.6 N: minimum 100 000 cycles 3.2 N/5.2 N: minimum 50 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	PC terminals, brass, silver-plated
Material:	cover: stainless steel base and stem: nylon meets UL 94 V-0; caps ABS
Mounting:	on pc-board
Soldering conditions:	hand-soldering – max.: 30 W, 2 sec, 320 °C wave-soldering – max.: 5 sec, 260 °C subject to PCB 1.6 mm thickness
Travel:	0.25 mm + 0.2/− 0.1 mm

Models:

TS 6 ☐ ☐



TS 644 ☐



Caps for TS 644 ☐



Ordering code:

Switches TS 6 ☐ ☐

Dimension H

- ☐ 1 4.3 mm
- ☐ 2 5.0 mm
- ☐ 3 7.0 mm
- ☐ 44 7.3 mm*
- ☐ 5 9.5 mm
- ☐ 6 13.0 mm

* only with square stem

Colour of stem
for operating force:

- ☐ K 1.0 N, black
- ☐ N 1.6 N, brown
- ☐ R 2.6 N, red
- ☐ S 3.2 N, salmon
- ☐ Y 5.2 N, yellow

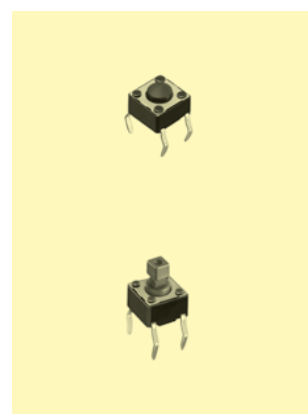
Caps KTSC-6 ☐ ☐

Cap type:

- ☐ 1 square
- ☐ 2 round

Cap colour:

- ☐ Y yellow
- ☐ B blue
- ☐ R red
- ☐ I ivory
- ☐ K black
- ☐ G green



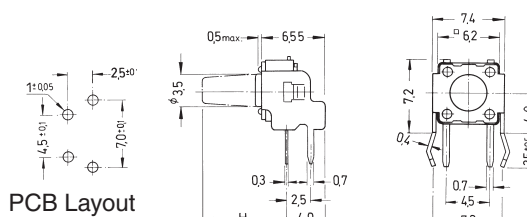
Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Electrical life:	1.0 N/1.6 N: minimum 200 000 cycles 2.6 N: minimum 100 000 cycles 3.2 N/5.2 N: minimum 50 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	PC terminals, brass, silver-plated
Material:	cover: steel, tin-plated base and stem: nylon meets UL 94 V-0; caps ABS
Mounting:	on pc-board
Soldering conditions:	hand-soldering – max.: 30 W, 2 sec, 320 °C wave-soldering – max.: 5 sec, 260 °C subject to PCB 1.6 mm thickness
Travel:	0.25 mm + 0.2/− 0.1 mm

5

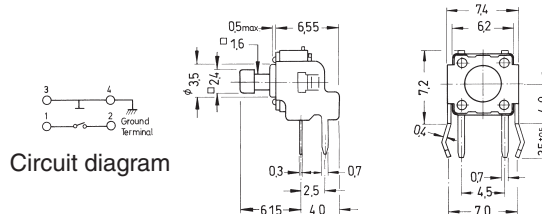
Models:

TS 6□□–RA



PCB Layout

TS 644□–RA



Circuit diagram

Caps for TS 644□–RA



KTSC-61□

KTSC-62□

Ordering code:

Switches TS 6□□–RA

Dimension H

1	3.15 mm
2	3.85 mm
3	5.85 mm
44	6.15 mm*
5	8.35 mm
6	11.85 mm

Colour of stem for operating force:

K	1.0 N, black
N	1.6 N, brown
R	2.6 N, red
S	3.2 N, salmon
Y	5.2 N, yellow

* only with square stem

Caps KTSC-6□□

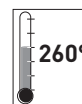
Cap type:

1	square
2	round

Cap colour:

Y	yellow
B	blue
R	red
I	ivory
K	black
G	green

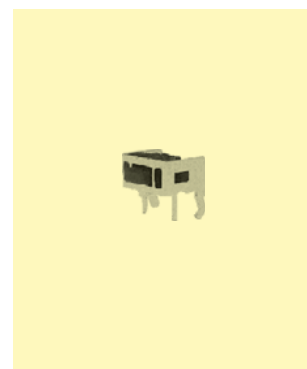
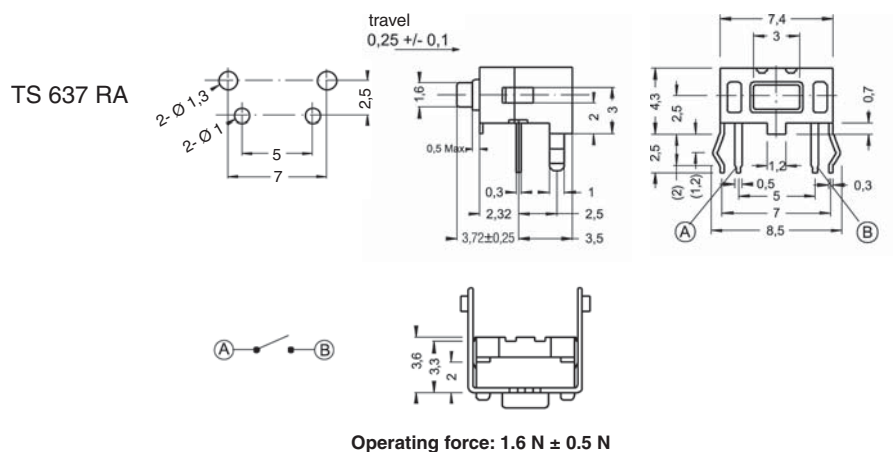
Tact Switches



Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50–60 Hz for the duration of 1 minute
Operating temperature:	–20 °C to +70 °C
Mechanical life:	minimum 50 000 cycles
Contacts:	silver-plated
Mounting:	on pc-board

Models:



Packing unit: 500 pieces/bag

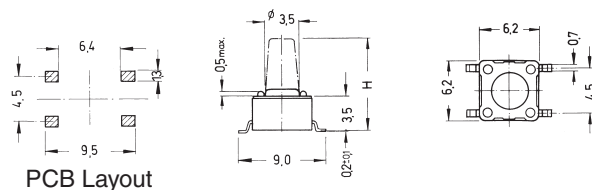
Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Electrical life:	1.0 N/1.6 N: minimum 200 000 cycles 2.6 N: minimum 100 000 cycles 3.2 N/5.2 N: minimum 50 000 cycles
Operating force:	see ordering code
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Material:	cover: stainless steel base and stem: nylon meets UL 94 V-0; caps ABS
Mounting:	on pc-board – SMD
Soldering conditions:	hand-soldering – max.: 30 W, 2 sec, 320 °C
Travel:	0.25 mm + 0.2/− 0.1 mm

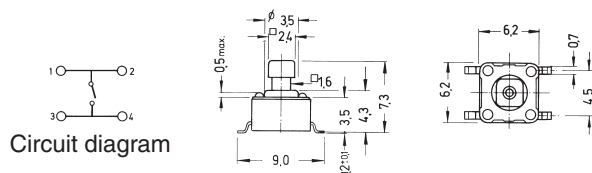
5

Models:

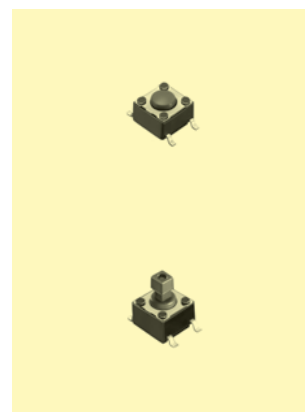
TSS 6 ☐ ☐



TSS 644 ☐



Caps for TSS 644 ☐



Ordering code:

Switches

TSS 6 ☐ ☐

Colour of stem
for operating force:

Dimension H / Packing:

☐ 1	4.3 mm / 1000 pcs/reel	☐ K	1.0 N, black
☐ 2	5.0 mm / 900 pcs/reel	☐ N	1.6 N, brown
☐ 3	7.0 mm / 700 pcs/reel	☐ R	2.6 N, red
☐ 44	7.3 mm / 700 pcs/reel*	☐ S	3.2 N, salmon
☐ 5	9.5 mm / 380 pcs/reel	☐ Y	5.2 N, yellow
☐ 6	13.0 mm / 77 pcs/tube, 200 pcs/reel		
☐ 7	11.0 mm / 77 pcs/reel		

* only with square stem

Caps KTSC-6 ☐ ☐

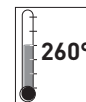
Cap type:

☐ 1	square
☐ 2	round

Cap colour:

☐ Y	yellow
☐ B	blue
☐ R	red
☐ I	ivory
☐ K	black
☐ G	green

Long Travel Tact switch for SMT



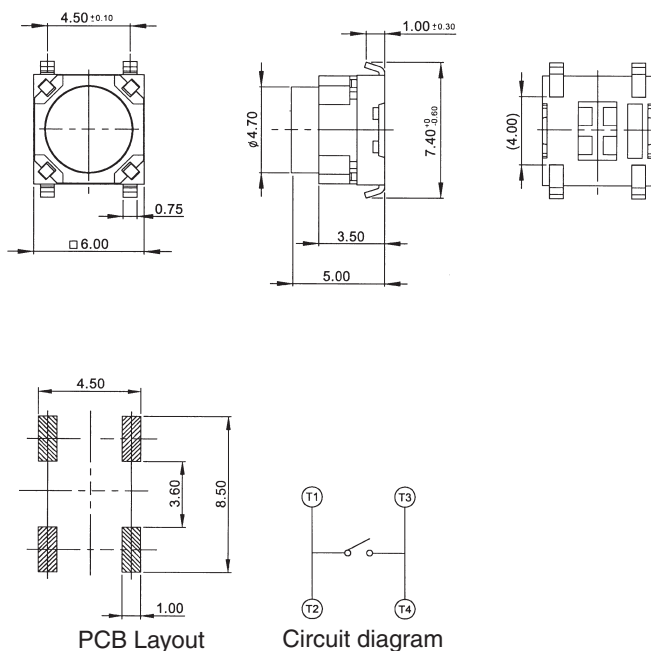
Specifications:

Contact rating:	12 V DC, 50 mA,
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 100 000 cycles
Operating force:	R: 200 gf ± 50 gf S: 350 gf ± 100 gf
Contacts:	gold-plated
Terminals:	silver-plated
Material:	case and actuator: Nylon meets UL 94V-0
Mounting:	on pc-board – SMD
Travel:	1.3 mm + 0.1/−0.3 mm
Packing:	900 pieces/reel

5

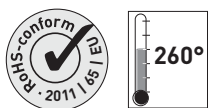
Models:

TSS 650 □-J



Ordering code: TSS 650 □-J

Operating force: R 2.0 N
S 3.5 N



Tact Switches for SMT

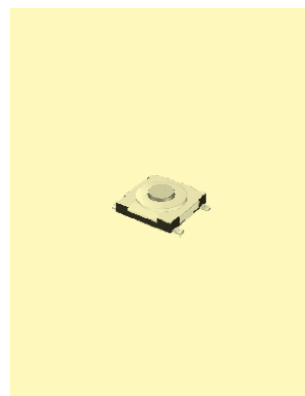
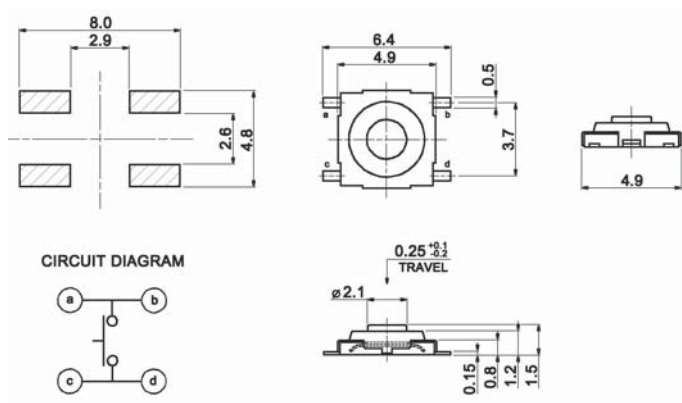
Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V (50/60 Hz) for the duration of 1 minute
Operating temperature:	−20 °C to +70 °C
Operating force:	2.5 N ± 0.7 N
Mechanical life:	100 000 cycles
Contacts:	silver-plated
Mounting:	on pc-board – SMD
Travel:	0.25 mm ± 0.1 mm
Packing:	4000 pcs/reel

5

Model:

TSS 507



Specifications:

Contact rating:	24 V DC, 100 mA max.
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V AC, 50 Hz for the duration of 1 minute
Operating temperature:	-55 °C to +125 °C
Electrical life:	minimum 100 000 cycles
Operating force:	3.0 ± 1.0 N
Contacts/terminals:	gold-plated/silver-plated
Material:	cover: stainless steel, base: high-temp. nylon meets UL 94 V-0, stem: silicone rubber
Mounting:	on pc-board – SMD
Soldering conditions:	max.: 5 sec, 260 °C
Travel:	max. 1.27 mm

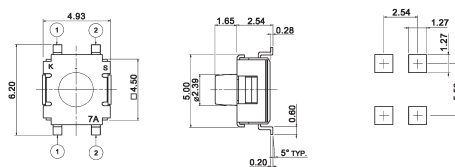
5

Models: Switching functions:

washable

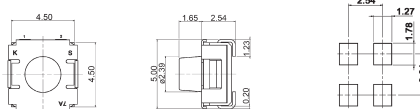
TMSE 10

off – mom



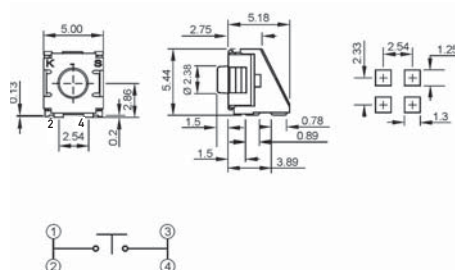
TMSE 10 J

off – mom



TMSE 10 J-RA

off – mom



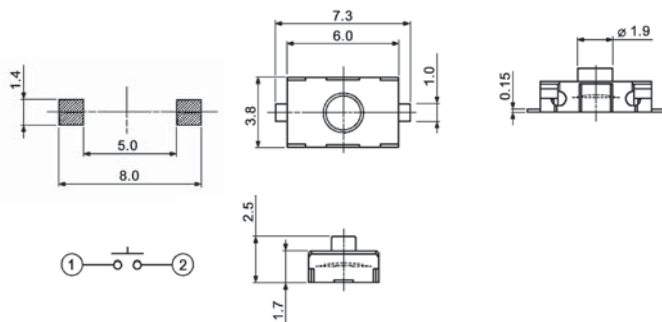
Packing:	TMSE 10:	500 pcs/reel
	TMSE 10 J:	500 pcs/reel
	TMSE 10 J-RA:	200 pcs/reel

Specifications:

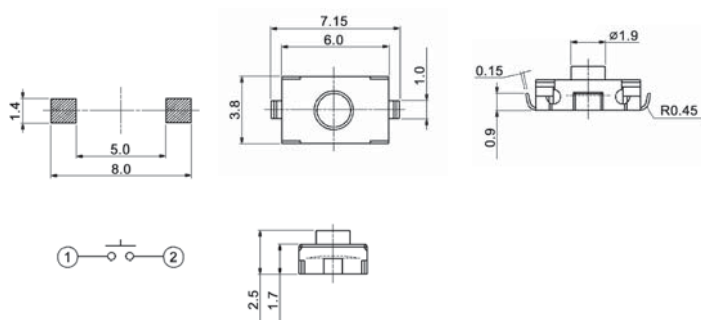
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 10 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Operating force:	N: 1.8 N ± 0.5 N S: 3.5 N ± 0.9 N
Mechanical life:	minimum 1 000 000 operations
Material:	contacts: stainless steel, silver-plated terminals: phosphor-bronze, silver-plated case: PA46, black Actuator: TSS 309: PA46, blue, TSSE 310: silicone rubber, black
Protection:	TSSE 310: IP 67
Mounting:	on pc-board
Packing:	2500 pcs/reel

Models:

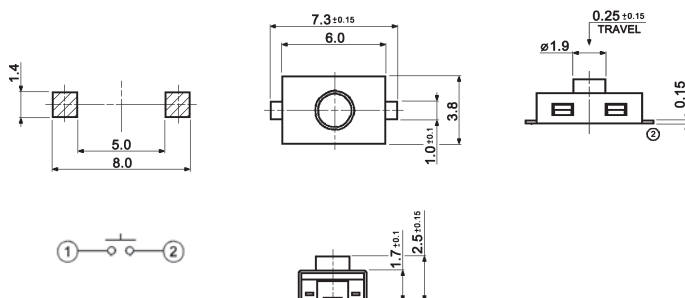
TSS 309 □



TSS 309 □-J



TSSE 310 S

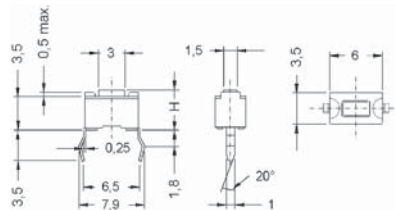
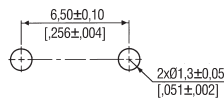


Specifications:

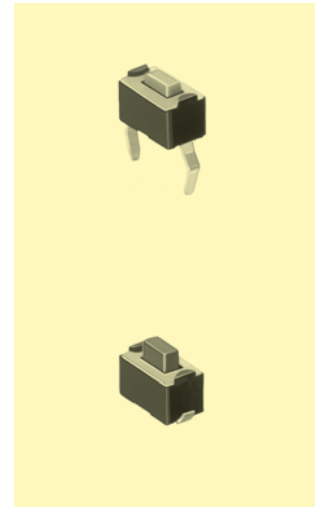
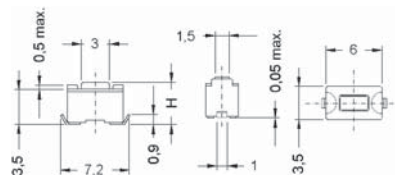
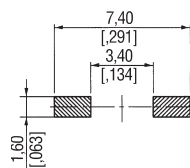
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−25 °C to +70 °C
Electrical life:	1.6 N: minimum 50 000 cycles 2.6 N / 3.2 N / 5.2 N: minimum 30 000 cycles
Operating force:	see ordering code
Contacts:	stainless steel, silver-plated
Terminals:	brass, silver-plated
Material:	cover: stainless steel base and stem: high-temp. nylon meets UL 94 V-0 or PPA
Mounting:	TS 3: on pc-board TSS 3: on pc-board – SMD
Soldering conditions:	TS 3: hand-soldering – max.: 30 W, 2 sec, 320 °C wave-soldering – max.: 5 sec, 260 °C subject to PCB 1.6 mm thickness TSS 3: reflow-soldering, see page 5
Travel:	0.25 mm + 0.2/− 0.1 mm

Models:

TS 3 □ □



TSS 3 □ □



Ordering Code:

TS 3 / TSS 3 □ □

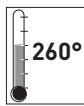
Dimension H

- 1 4.3 mm
- 2 5.0 mm

Colour of stem
for operating force:

- N brown, 1.6 N
- R red, 2.6 N
- S salmon, 3.2 N
- Y yellow, 5.2 N

Packing:	TS 3	in tubes, 135 pieces / tube
	TSS 31	on tape, 1800 pieces / reel
	TSS 32	on tape, 1600 pieces / reel

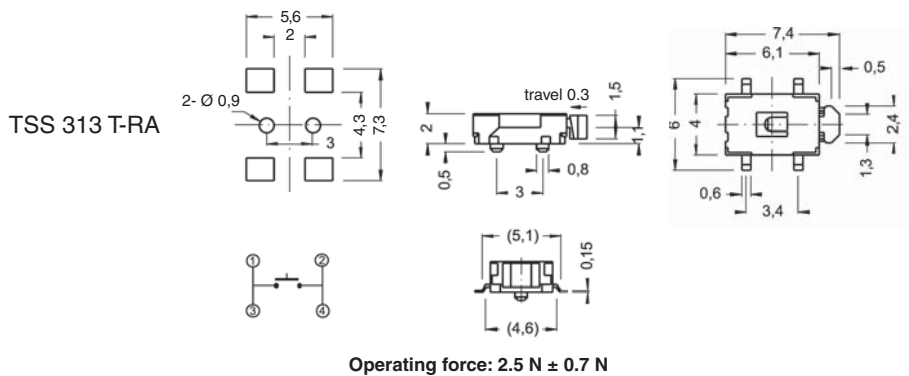


Tact Switches

Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50–60 Hz for the duration of 1 minute
Operating temperature:	–20 °C to +70 °C
Mechanical life:	minimum 50 000 cycles
Contacts:	silver-plated
Mounting:	on pc-board – SMD

Models:



5

Packing unit: 1700 pieces/reel

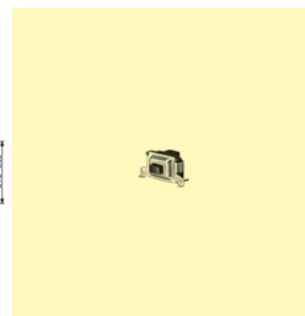
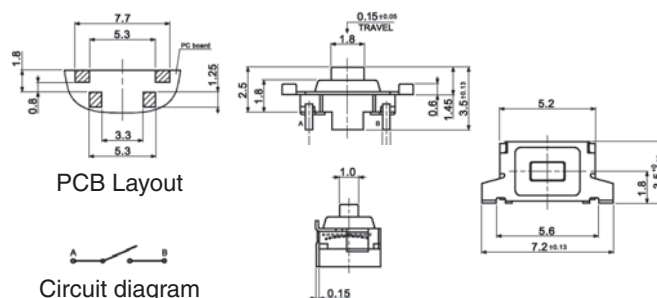
Specifications:

Contact rating:	12 V DC, 50 mA / 1 V DC, 0.5 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 2 GΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Electrical life:	minimum 250 000 cycles
Operating force:	2.16 N ± 0.59 N
Contacts:	metal contact, stainless steel, silver-plated
Terminals:	phosphor bronze, silver-plated
Material:	case: PA9T button: PA9T frame: phosphor bronze, tin-plated
Mounting:	on pc-board – SMD
Travel:	0.15 mm ± 0.05 mm

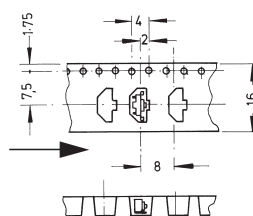
5

Model:

TSS 4-RA



Packing: 2000 pcs/reel



6

Slide Switches

6.1 Professional Slide Switches



Type	Operating		Case		Operating positions	Poles	Page
	top	side	Plastic	Metal			
ASE	•		•		2-3	1-2	96-97
ASE-RA		•	•		2-3	1-2	96-97
MFP/MFS 106	•		•		2	1	98
MSS 3000	•	•	•		2	1-2	99
MFP 100	•			•	2-5	1	100
MFP 100-R		•		•	2-5	1	100
MFP 200	•			•	2-6	2	100
MFP 1000	•			•	2-6	1	101-102
MFP 1000-R		•		•	2-6	1	101-102
MFP 2000	•			•	2-6	2	103
MFP 2000-R		•		•	2-3	2	103
MFP x6x	•		•		1-3	1-6	104
MFP x6x-RA		•	•		1-3	2-4	105
other	•	•		•	1-3	1-2	106-112

6.2 Microminiature Slide Switches



Type	Operating		Terminals		Operating positions	Poles	Page
	top	side	T/H	SMD			
MMP 100	•		•		2-3	1	113
MMP 200	•		•		2-3	2	113
MMP 100-R		•	•		2-3	1	114
MMP 200-R		•	•		2-3	2	115
MMS 100/200		•		•	2-3	1-2	116
MMS 200 T	•			•	2-3	2	117
MMP 1010	•		•		2	1	118-119
MMP 1010-R		•	•		2	1	118-119
MMS 1010-R		•		•	2	1	118

Subminiature Slide Switches



Specifications:

Contact rating:	max. 48 V AC/DC, 0.4 VA / max. 50 mA min. 20 mV AC/DC, 1 μ A
Contact resistance:	< 50 m Ω
Insulation resistance:	> 500 M Ω
Dielectric strength:	500V, 50Hz for the duration of 1 minute
Operating temperature:	-20 °C to +85 °C
Electrical life:	minimum 40 000 operations
Contacts:	phosphor-bronze, gold-plated over nickel barrier
Terminals:	phosphor-bronze, gold-plated over nickel barrier
Protection:	IP 67
Material:	case: PBT meets UL 94 V-0, washable switch-support: brass, tin-plated actuator: PBT meets UL 94 V-0 protective cover: silicone rubber
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 $\pm$ 1 sec, 260 °C $\pm$ 5 °C

The cap can be removed after washing, the protection of IP 67 is no longer existing.

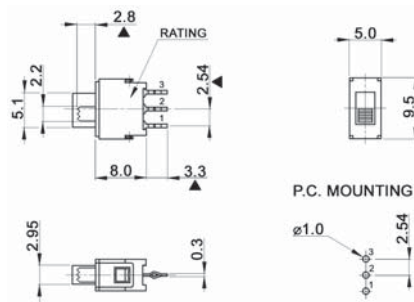
One pole switches with flat terminals have a limited stability against side force.
The stability can be improved by using a supporting bracket.

Models: Switching function – the closed contacts correspond to the slide position

washable

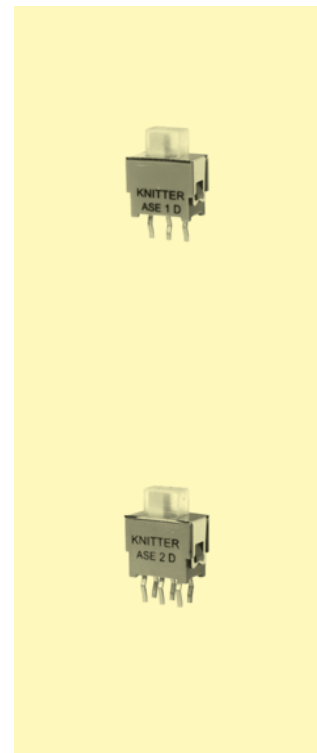
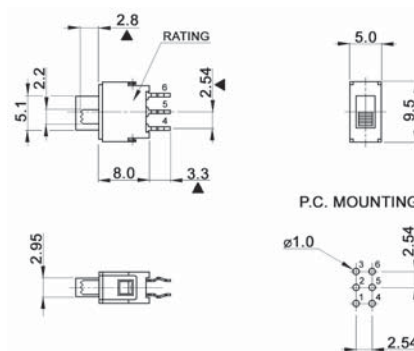
S P D T

ASE 1 D on – on
ASE 1 E on off on



D P D T

ASE 2 D on – on
ASE 2 E on off on





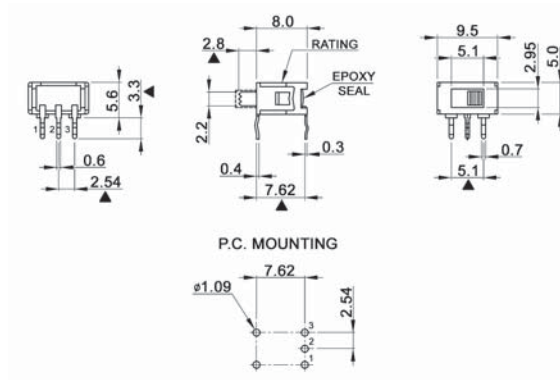
Subminiature Slide Switches

Models: Switching function – the closed contacts correspond to the slide position

washable

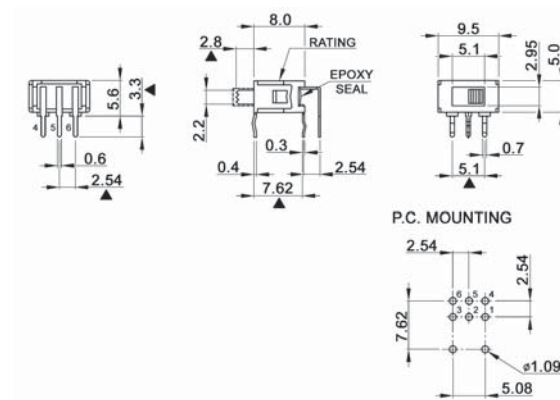
S P D T

ASE 1 D – RA on – on
ASE 1 E – RA on off on



D P D T

ASE 2 D – RA on – on
ASE 2 E – RA on off on



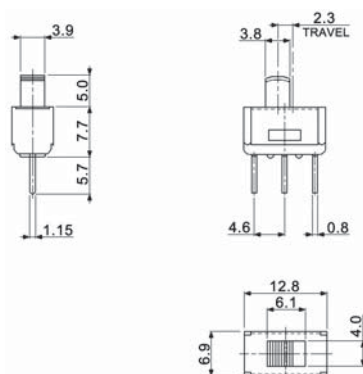
Miniature Slide Switches

Specifications:

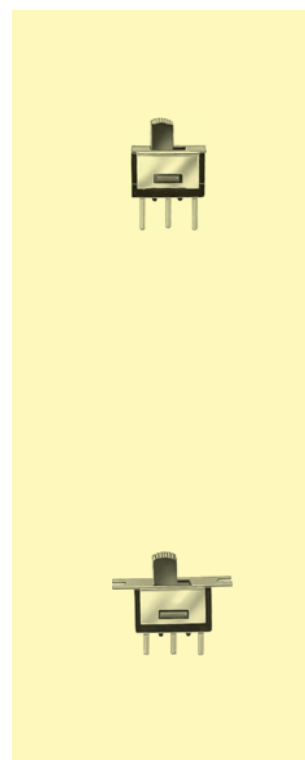
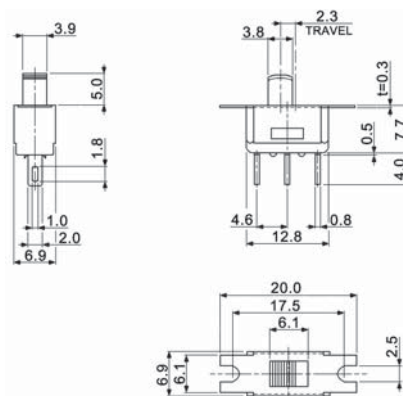
Contact rating:	250 V AC, 3 A / 125 V AC, 6 A / 30 V DC, 4 A
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Mechanical life:	minimum 20 000 operations
Contacts:	coin silver (common contact copper alloy, silver-plated) also available: gold-plated, version G, see page 4
Terminals:	MFP PC terminals; MFS solder tags
Case material:	PBT, with glass fibre
Slide colour:	black
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C hand-soldering – max.: 5 sec, 300 °C

Models: Switching functions

S P D T
MFP 106 D on – on



S P D T
MFS 106 D on – on

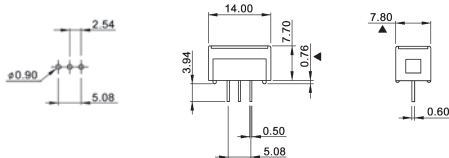


Specifications:

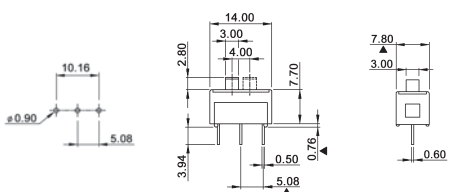
Contact rating:	250 V AC, 1 A / 120 V AC or 28 V DC, 3 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 20 000 operations
Material:	Actuator: nylon, black Case: nylon, black Base: nylon, white
Contacts/Terminals:	copper alloy, silver-plating
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

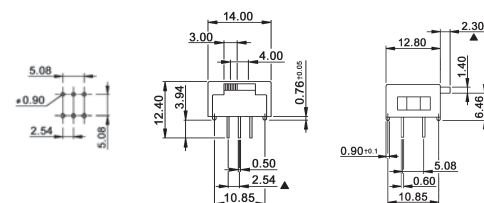
MSS 3011 D on – on



MSS 3112 D on – on



MSS 3121 N-R on – on



Ordering code:

MSS 3

Actuator:

- ☐ Recessed
- ☐ Raised

Terminal spacing:

- ☐ 2,54 mm
- ☐ 5,08 mm

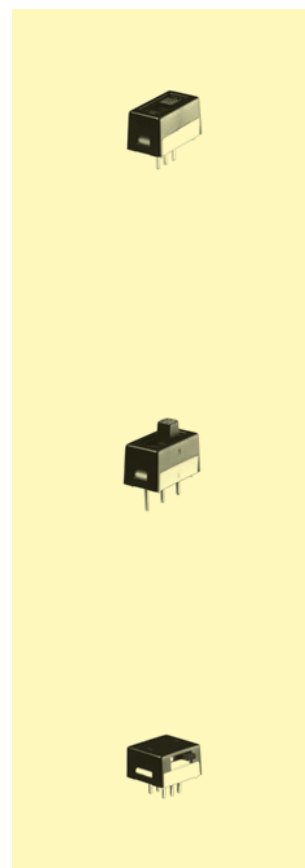
Number of Poles:

- ☐ Single pole
- ☐ Double pole

Switching function:

- ☐ SP, ON – ON
- ☐ DP, ON – ON

- ☐ Top actuated
- ☐ Side actuated



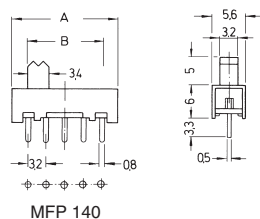
Miniature Slide Switches

Specifications:

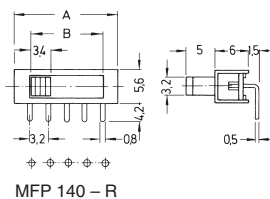
Contact rating:	30 V DC, 350 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Contact timing:	non-shorting
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 3 sec, 260 °C ± 5 °C

Models:	Operating positions	Length (mm)	
		A	B

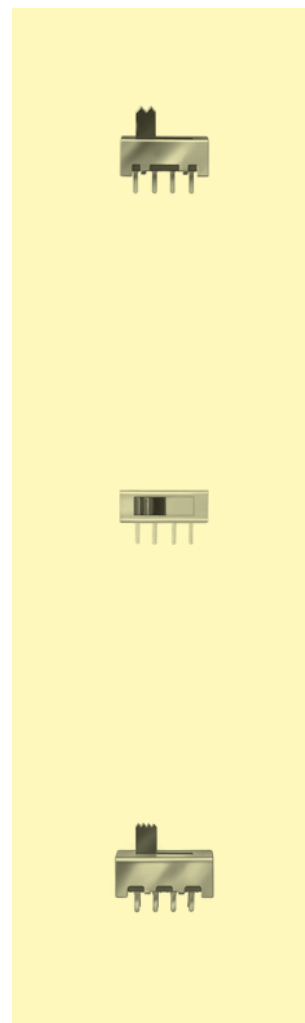
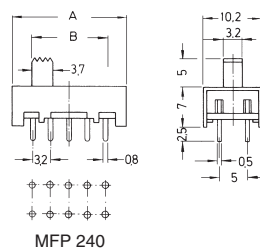
MFP 120	2	11.0	6.6
MFP 130	3	15.0	10.0
MFP 140	4	18.2	13.2
MFP 150	5	21.4	16.4



MFP 120 – R	2	11.0	6.6
MFP 130 – R	3	15.0	10.0
MFP 140 – R	4	18.2	13.2
MFP 150 – R	5	21.4	16.4



MFP 220	2	13.6	6.9
MFP 230	3	16.8	10.1
MFP 240	4	20.0	13.3
MFP 250	5	23.2	16.5
MFP 260	6	26.4	19.7





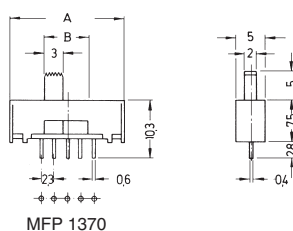
Miniature Slide Switches

Specifications:

Contact rating:	30 V DC, 350 mA
Contact resistance:	< 25 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Contact timing:	non-shorting
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 10 sec, 260 °C

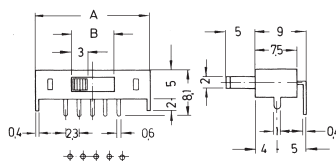
Models:	Operating positions		Length (mm)	
			A	B

MFP 1370	3		20.0	7.6
MFP 1470	4		20.0	9.9
MFP 1570	5		22.0	12.2

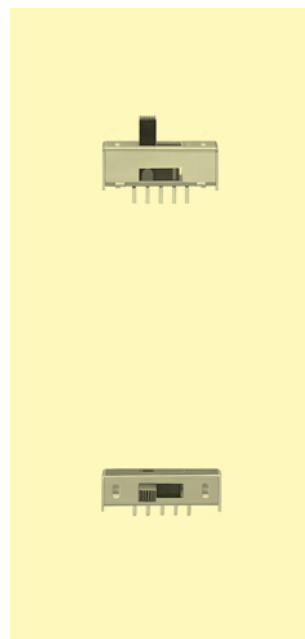


MFP 1370

MFP 1370 – R	3		20.0	7.6
MFP 1470 – R	4		20.0	9.9
MFP 1570 – R	5		22.0	12.2



MFP 1370 – R



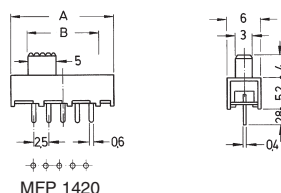
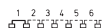
Miniature Slide Switches

Specifications:

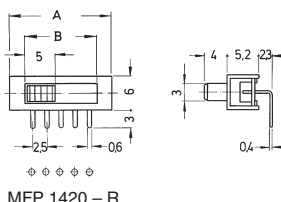
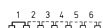
Contact rating:	30 V DC, 350 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Contact timing:	shorting (non-shorting only if specified)
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models:	Operating positions	Length (mm)	
		A	B

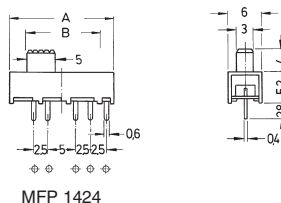
MFP 1220	2	13.0	7.5
MFP 1320	3	15.5	10.0
MFP 1420	4	18.0	12.5
MFP 1520	5	20.5	15.0
MFP 1620	6	23.0	17.5



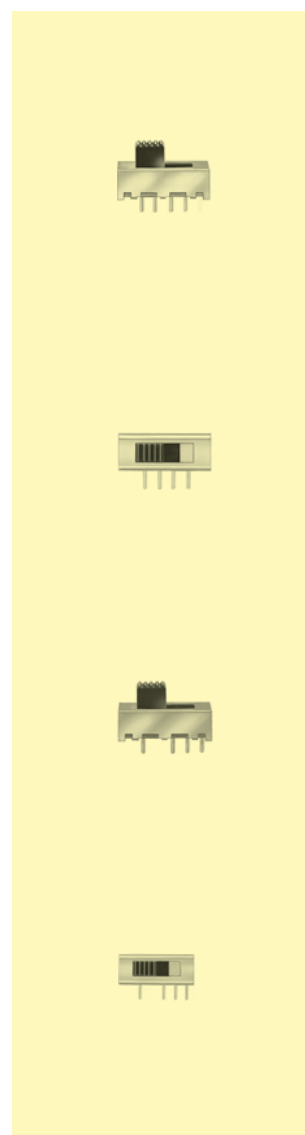
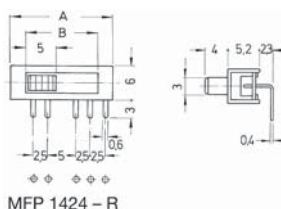
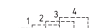
MFP 1220 – R	2	13.0	7.5
MFP 1320 – R	3	15.5	10.0
MFP 1420 – R	4	18.0	12.5
MFP 1520 – R	5	20.5	15.0
MFP 1620 – R	6	23.0	17.5



MFP 1323	3	15.5	10.0
MFP 1424	4	18.0	12.5



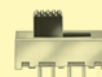
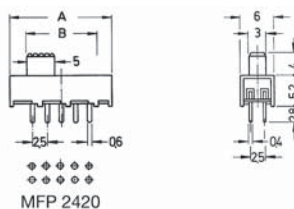
MFP 1323 – R	3	15.5	10.0
MFP 1424 – R	4	18.0	12.5



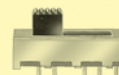
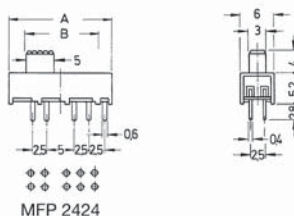


Models:	Operating positions	Length (mm)	
		A	B

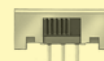
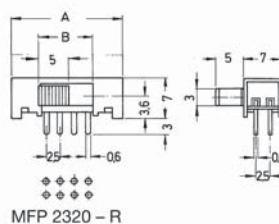
MFP 2220	2		13.0	7.5
MFP 2320	3		15.5	10.0
MFP 2420	4		18.0	12.5
MFP 2520	5		20.5	15.0
MFP 2620	6		23.0	17.5



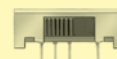
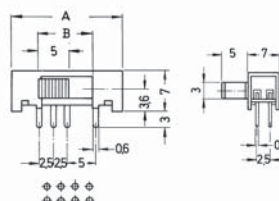
MFP 2323	3		16.0	10.0
MFP 2424	4		18.0	12.5



MFP 2220 – R	2		17.0	6.5
MFP 2320 – R	3		19.5	9.0



MFP 2323 – R	3		19.5	9.0
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Miniature Slide Switches

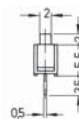
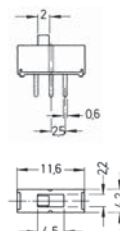
Specifications: see page 100

Material: plastic housing, terminals sealed

Models: Switching functions

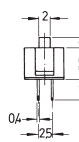
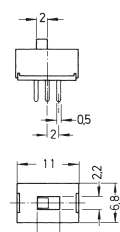
MFP 161 D
non-shorting

on on



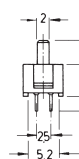
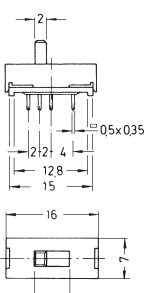
MFP 261 N
non-shorting

on on



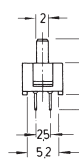
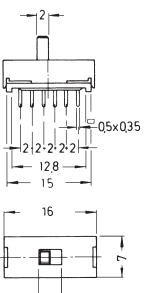
MFP 263 P
n.n.

on on on



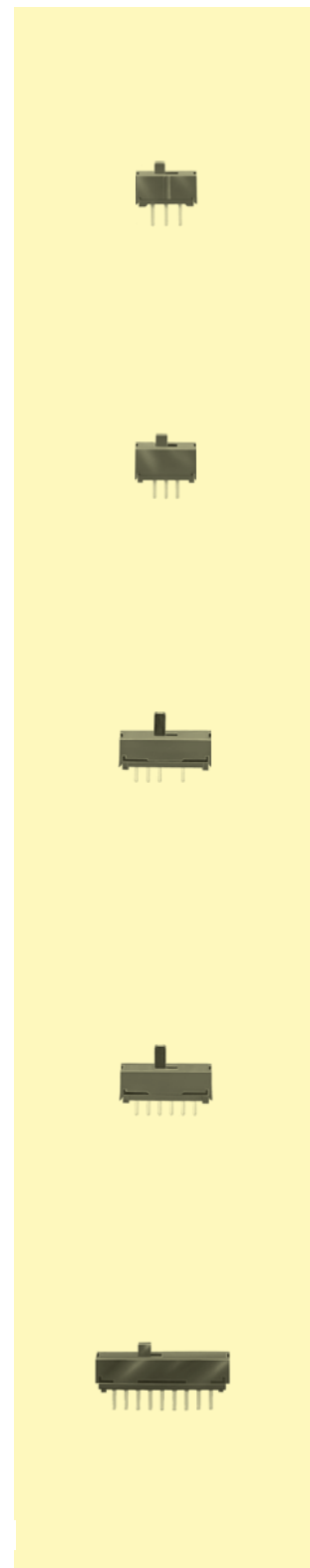
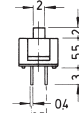
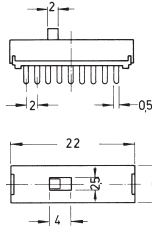
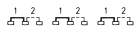
MFP 461 N
non-shorting

on on



MFP 661 N

on on

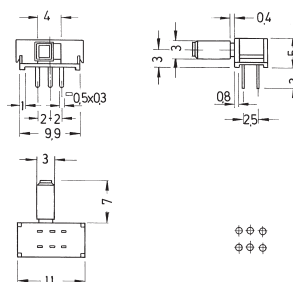


Specifications: see page 100

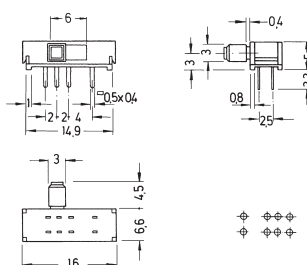
Material: plastic housing, terminals sealed

Models: Switching functions

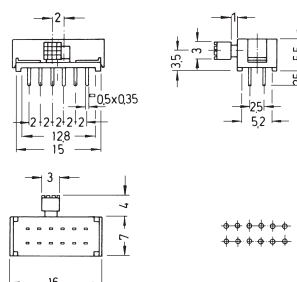
MFP 261 N – RA on on shorting



MFP 263 P – RA on on on n.n.



MFP 461 N – RA on on non-shorting



Miniature Slide Switches

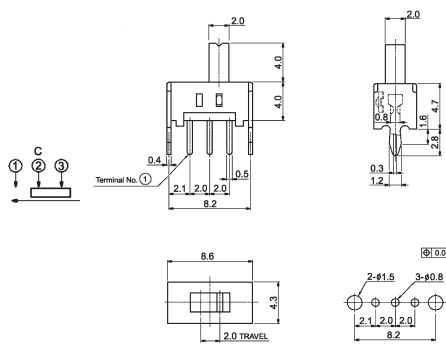
Specifications:

Contact rating:	12 V DC, 100 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +85 °C / MFP 213x: −25 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

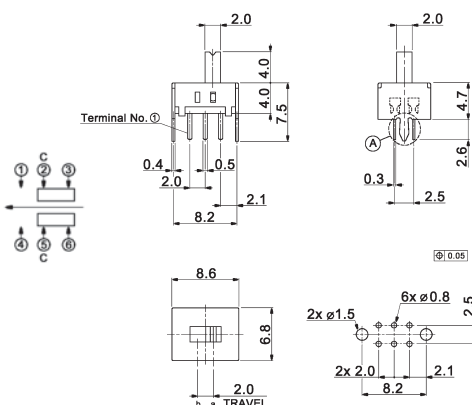
MFP 113 D
non-shorting

on on



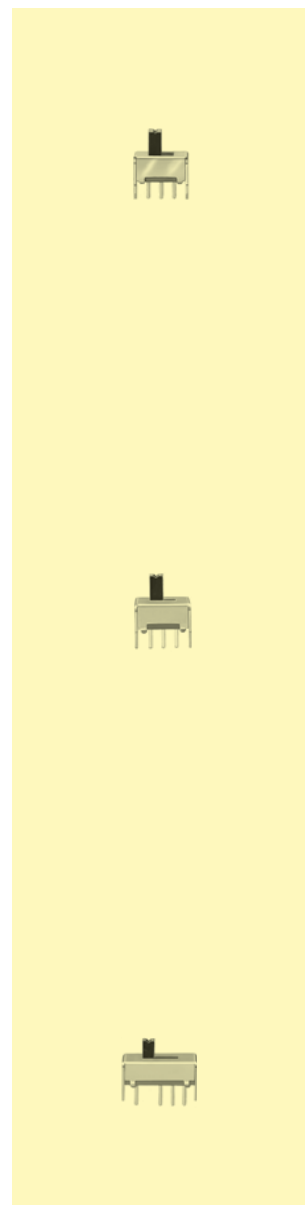
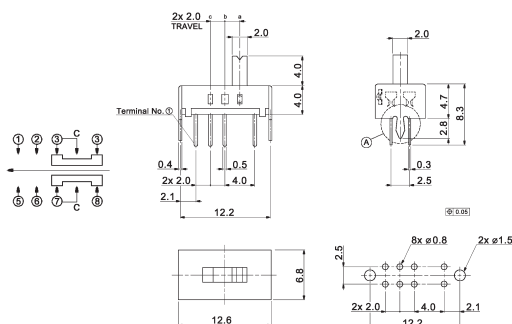
MFP 213 N
non-shorting

on on



MFP 213 P
shorting

on on on

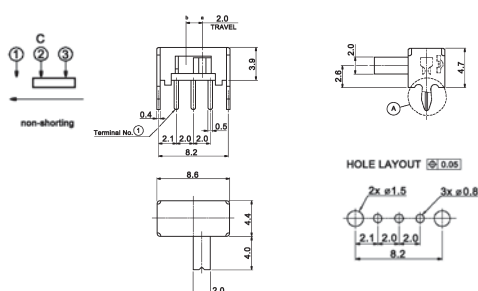


Specifications:

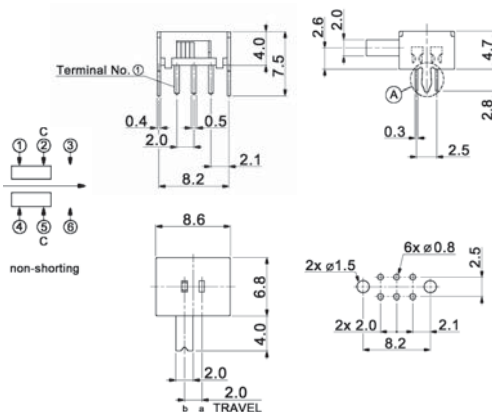
Contact rating:	12 V DC, 100 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 85 °C / MFP 213x: – 25 °C to + 85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

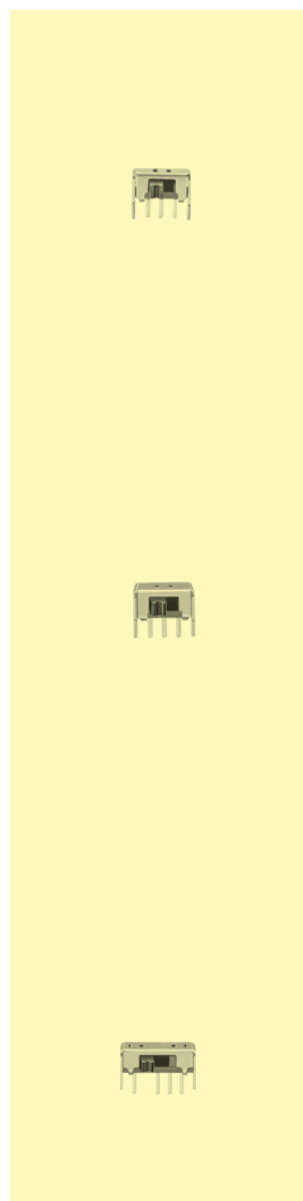
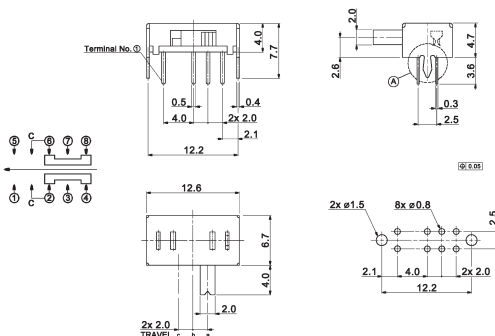
MFP 113 D – RA on on
non-shorting



MFP 213 N – RA on on
non-shorting



MFP 213 P – RA on on on
shorting



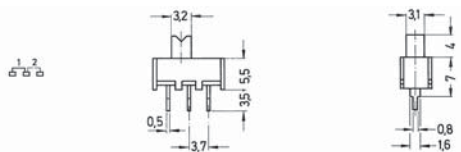
Miniature Slide Switches

Specifications:

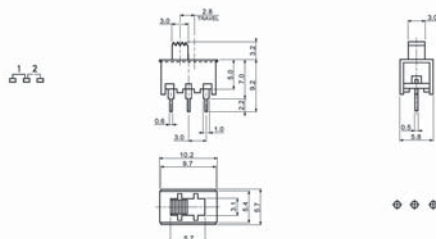
Contact rating:	30 V DC, 350 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Contact timing:	non-shorting
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

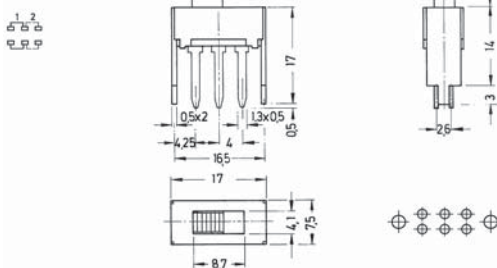
MFP 102 D on on



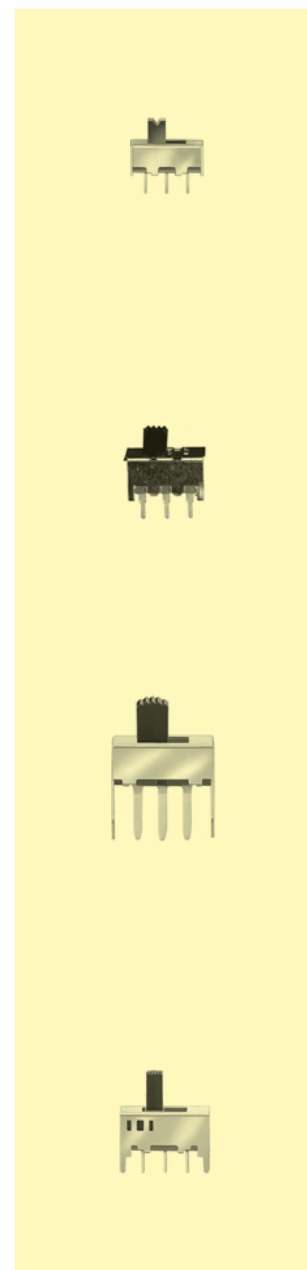
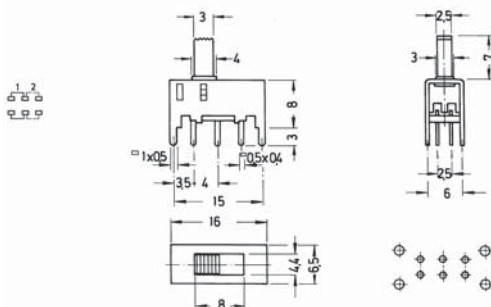
MFP 191 D on on



MFP 201 N on on



MFP 211 N on on

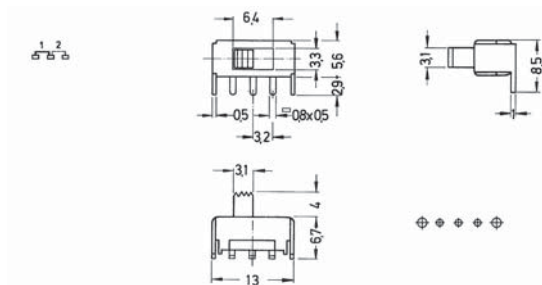


Specifications:

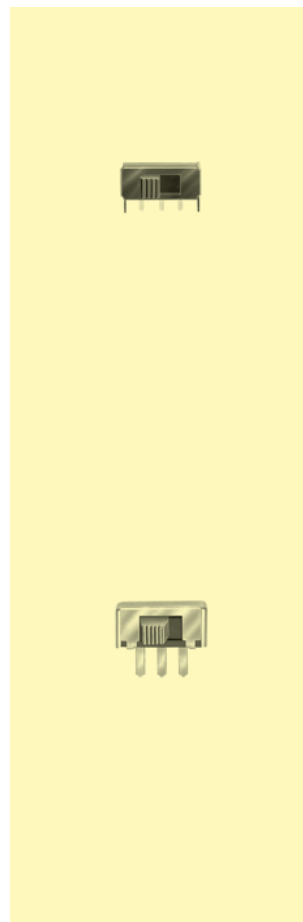
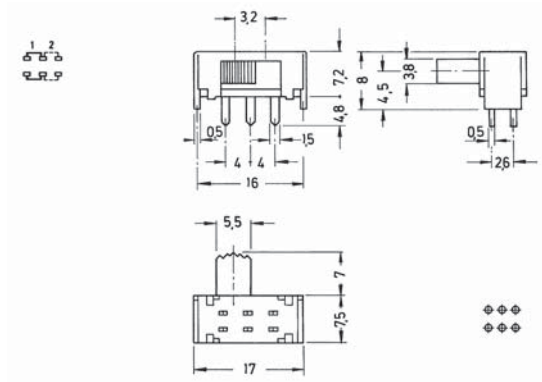
Contact rating:	30 V DC, 350 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC; MFPP 130 – RA: 250 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	–20 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

MFP 121 D – RA on on non-shorting



MFP 201 N – RA on on non-shorting



Miniature Slide Switches

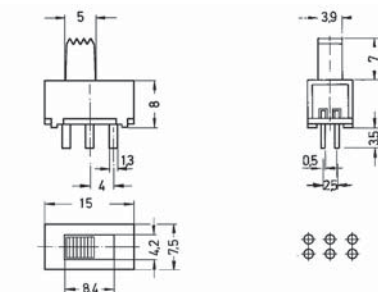
Specifications:

Contact rating:	30 V DC, 350 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +85 °C / MFP 223 P: −10 °C to +60 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Slide colour:	black, further colours on request
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

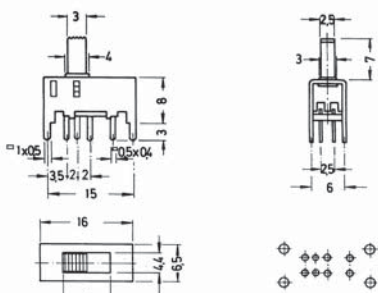
MFP 221 N
non-shorting

on on



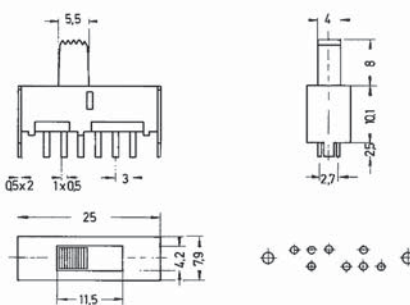
MFP 223 P
shorting

on on on



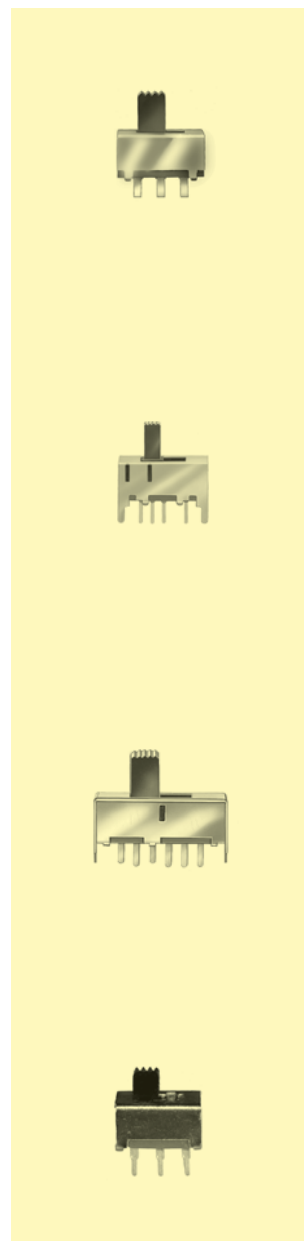
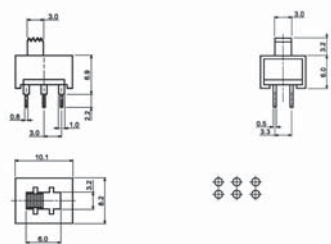
MFP 231 P
shorting

on on on



MFP 291 N
non-shorting

on on



Specifications:

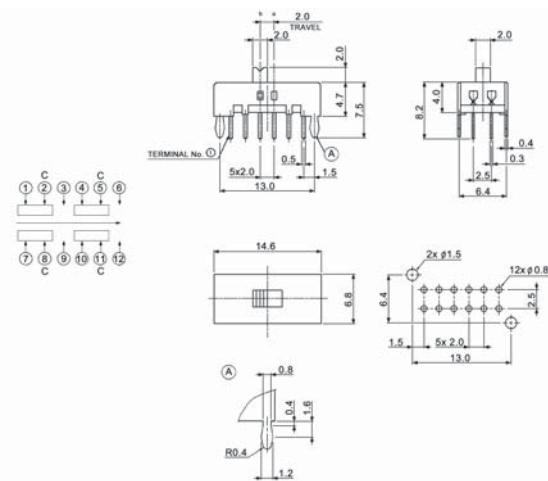
Contact rating:	MFP 421 N: 12 V DC, 0.1 A	MFP 421 N-RA: 30 V DC, 0.2 A
Contact resistance:	MFP 421 N: < 20 mΩ	MFP 421 N-RA: < 30 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC for 1 minute	
Dielectric strength:	500 V AC (50/60 Hz, 2 mA) for 1 minute	
Operating temperature:	-10 °C to +60 °C	
Mechanical life:	minimum 10 000 cycles	
Contacts:	copper alloy, silver-plated over nickel barrier	
Slide colour:	black, further colours on request	
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C	

Models:

Switching
functions

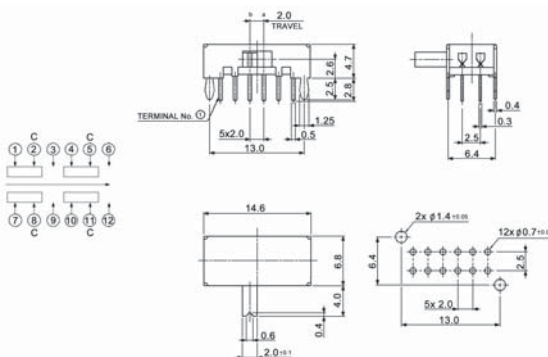
MFP 421 N
non-shorting

on on



MFP 421 N-RA
non-shorting

on on



Miniature Slide Switches

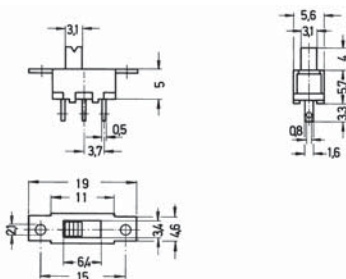
Specifications:

Contact rating:	30 V DC, 350 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Slide colour:	black, further colours on request
Soldering conditions:	hand-soldering – max.: 5 sec, 270 °C

Models: Switching functions

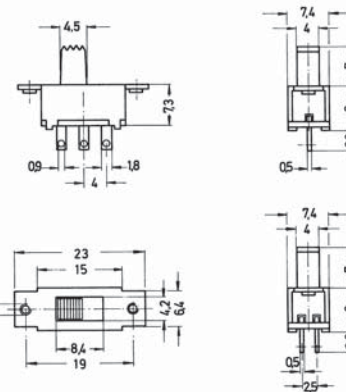
MFS 121 D
non-shorting

on on



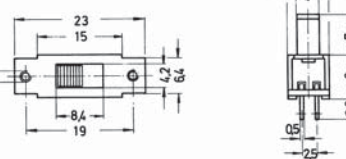
MFS 131 D
non-shorting

on on



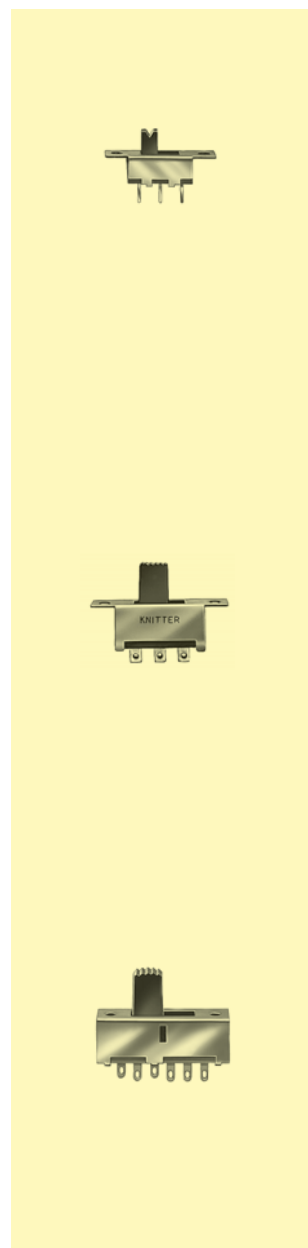
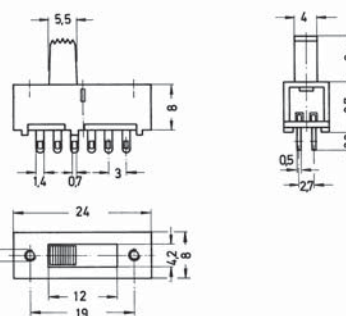
MFS 201 N SW
non-shorting

on on



MFS 231 P
shorting

on on on



Specifications:

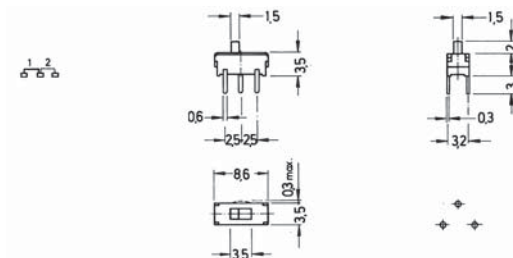
Contact rating:	12 V DC, 200 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−10 °C to +60 °C
Mechanical life:	minimum 5000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	brass silver-plated
Contact timing:	non-shorting
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models:

Switching
functions

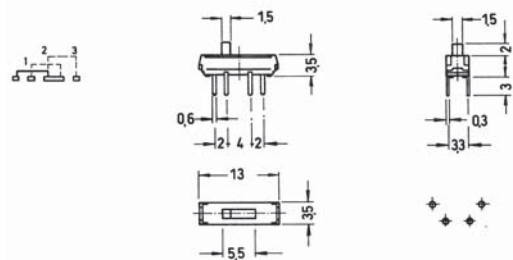
MMP 121

on on



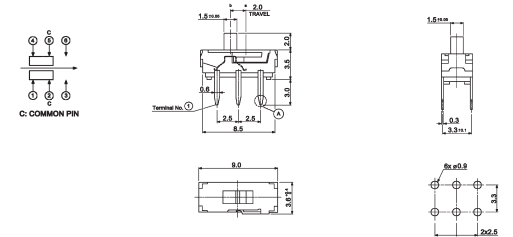
MMP 131

on on on



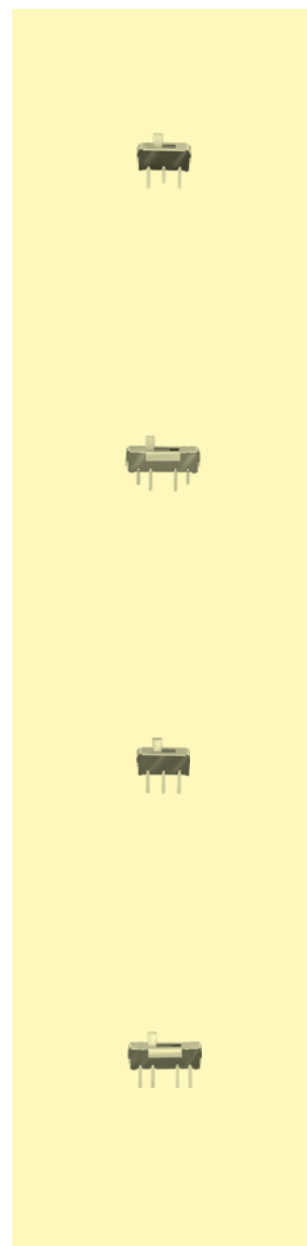
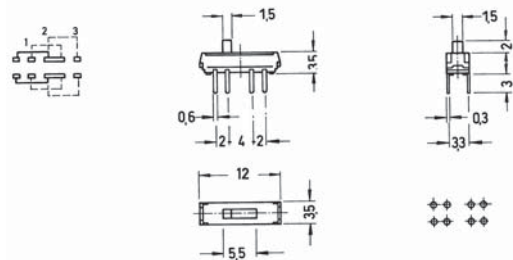
MMP 221

on on



MMP 231

on on on



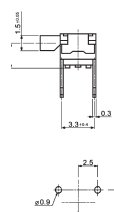
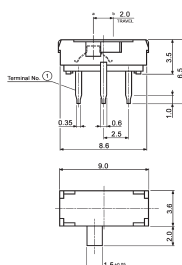
Microminiature Slide Switches

Specifications:

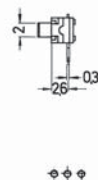
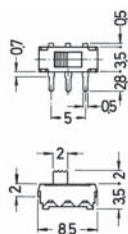
Contact rating:	12 V DC, 200 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Mechanical life:	minimum 5000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Contact timing:	non-shorting
Slide colour:	white; MMP 122 – R: black
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

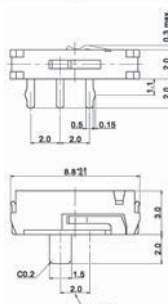
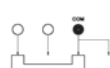
MMP 121 – R on on



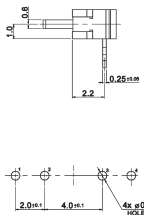
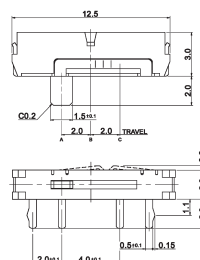
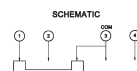
MMP 122 – R on on



MMP 124 – R on on

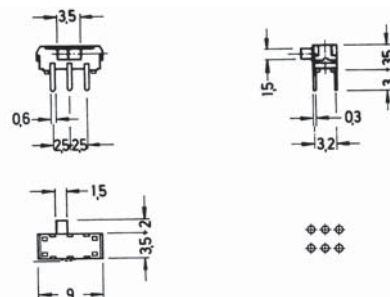


MMP 134 – R on on on

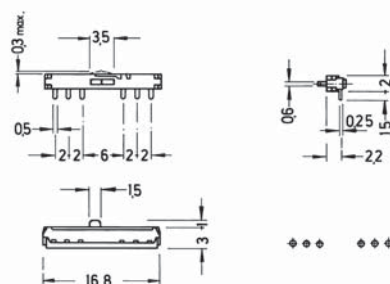


Models: Switching functions

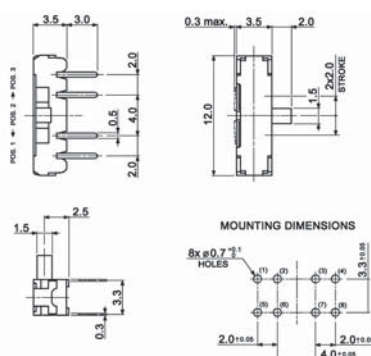
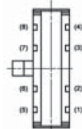
MMP 221 – R on on



MMP 224 – R on on



MMP 231 – R on on on



Microminiature Slide Switches for SMT

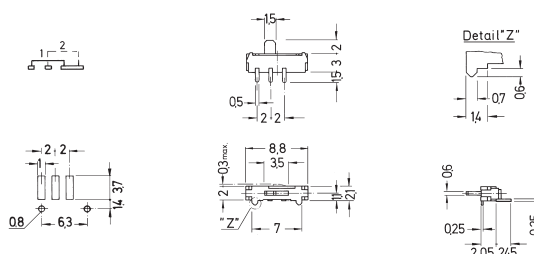


Specifications:

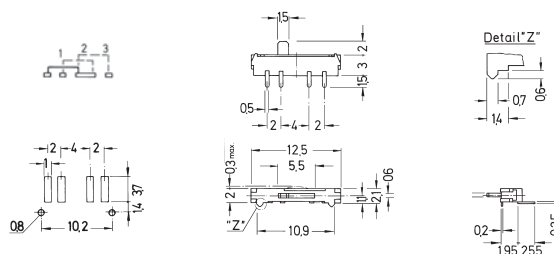
Contact rating:	12 V DC, 200 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Storage temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Contact timing:	non-shorting
Slide colour:	white

Models: Switching functions

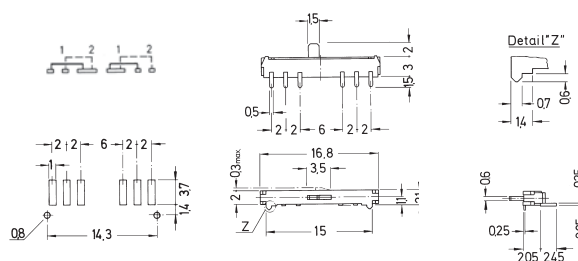
MMS 124 on on



MMS 134 on on on

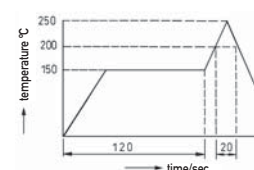


MMS 224 on on



Soldering conditions: reflow-soldering – max.: 20 sec, 200° C
peak temperature: 250° C

Packing: cardboard boxes, on tapes on request





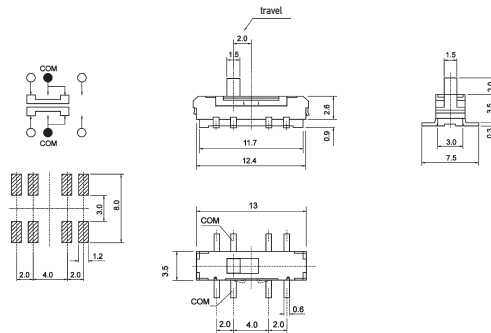
Microminiature Slide Switches for SMT

Specifications:

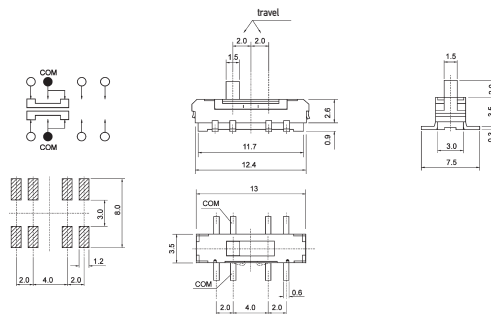
Contact rating:	12 V DC, 200 mA / 6 V DC, 300 mA
Contact resistance:	< 70 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Mechanical life:	MMS 228 T: minimum 10 000 operations MMS 238 T: minimum 5 000 operations
Contacts/Terminals:	stainless steel, silver-plated
Contact timing:	non-shorting
Slide colour:	blue
Soldering conditions:	reflow-soldering

Models: Switching functions

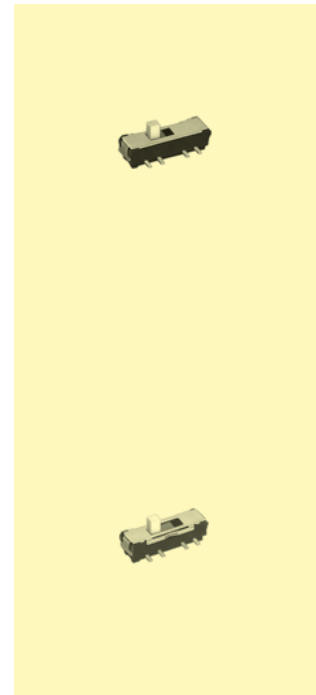
MMS 228 T on on



MMS 238 T on on on



Packing: on tapes, 900 pieces / tape



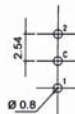
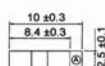
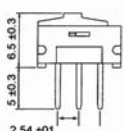
Microminiature Slide Switches

Specifications:

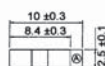
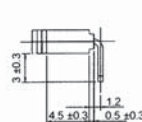
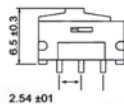
Contact rating:	24 V DC, 0.2 A, / 12 V DC, 0.5 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 10 000 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Storage temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5000 operations
Contacts:	phosphor bronze, gold-plated
Terminals:	brass, gold-plated
Soldering conditions:	MMP: wave-soldering – max.: 3 sec, 260 °C ± 3 °C MMS: reflow-soldering – max.: 5 sec, 260 °C ± 3 °C

Models: Switching functions

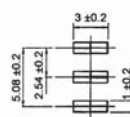
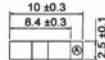
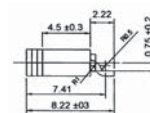
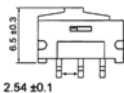
MMP 1010 D on on



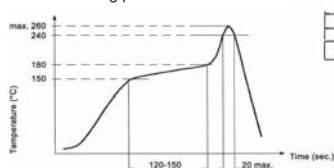
MMP 1010 D-RA on on



MMS 1010 D-R on on



Soldering profile MMS 1010 D-R





Microminiature Slide Switches

Specifications:

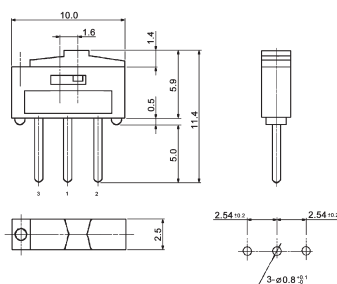
Contact rating:	0.5 A, 12 V DC; 0.3 A, 24 V (AC/DC)
Contact resistance:	< 30 mΩ
Insulation resistance:	> 10 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Storage temperature:	−40 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	brass, gold plated
Terminals:	brass, gold plated
Case:	PA
Soldering conditions:	wave-soldering – max. 5 sec. max. 270 °C

Models

Switching functions

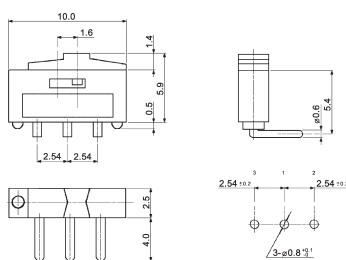
MMP 1010 D – 1

on on



MMP 1010 D-RA – 1

on on



7

Dual-in-line Switches

Type	Poles	Gold plating	Actuator	SMT	Description	Page
Box-Type						
DSS 100 N	1 – 10 / 12	1,25 µm	raised			122
DSS 200 N	1 – 10 / 12	0,2 µm	raised			122
DBS 2000	1 – 10 / 12	0,1 µm	recessed		washable	123
DBS 2100	1 – 10 / 12	0,1 µm	raised			123
DBS 6000	2 – 10 / 12 / 15	0,1 µm	recessed		washable	124
DBS 6100	2 – 10 / 12 / 15	0,1 µm	raised			124
Piano-Type						
DBP 2000	2–10 / 12	0,1 µm	recessed			125
DBP 2100	2–10 / 12	0,1 µm	raised			125
SBP 8000 T	2 / 4 / 6 / 8 / 10	0,1 µm	recessed	●	end-stackable	126
SBP 8100 T	2 / 4 / 6 / 8 / 10	0,1 µm	raised	●	end-stackable	126
DBP 8000	2 / 4 / 6 / 8 / 10	0,1 µm	recessed	●	end-stackable	127
DBP 8100	2 / 4 / 6 / 8 / 10	0,1 µm	raised	●	end-stackable	127
IC-Type						
DSS 500	2 / 4 / 6 / 8 / 10	0,3 µm	recessed		ultra flat, washable	128
SMS 500	2 / 4 / 6 / 8 / 10	0,3 µm	recessed	●	ultra flat, washable	129
DBS 5000 G	1 – 10 / 12	0,3 µm	recessed		end-stackable, washable	130
DBS 5100 G	1 – 10 / 12	0,3 µm	raised		end-stackable	130
SBS 5000 TG	1 – 10 / 12	0,3 µm	recessed	●	end-stackable, washable	131
DBS 1000	1 – 10 / 12	0,1 µm	recessed		washable	132
DBS 1100	1 – 10 / 12	0,1 µm	raised			132
SBS 1000	1 – 10 / 12	0,1 µm	recessed	●	washable	133
DBS 60000	1 – 10 / 12	0,1 µm	recessed		tin-plated terminals, washable	134
DBS 61000	1 – 10 / 12	0,1 µm	raised		tin-plated terminals	134
SBS 60000	1 – 10 / 12	0,1 µm	recessed	●	tin-plated terminals, end-stackable, washable	135
SBS 60000 J	2 – 10 / 12	0,1 µm	recessed	●	J-hooks/tin-plated terminals, washable	136
DBS 5000	1 – 10 / 12	0,1 µm	recessed		end-stackable, washable	137
DBS 5100	1 – 10 / 12	0,1 µm	raised		end-stackable	137
SBS 5000 T	1 – 10 / 12	0,1 µm	recessed	●	end-stackable, washable	138
SBS 5100 T	1 – 10 / 12	0,1 µm	raised	●	end-stackable	138
Half-Pitch-Type						
DHP 600	2 / 4 / 6 / 8 / 10	0,1 µm	raised	●		139
DHS 100	2 / 4 / 6 / 8 / 10	0,3 µm	recessed	●	washable	140
DHS 600	2/4/6/8/10	0,1 µm	recessed	●	washable	141
DHS 600-J	2/4/6/8/10	0,1 µm	recessed	●	J-hooks	141

Dual-in-line Switches

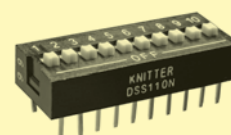
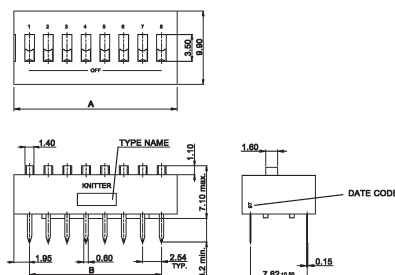
Specifications:

Contact rating:	50 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Capacity:	< 5 pF between 2 poles
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 10 000 operations per pole
Shock resistance:	contact interruption < 10 μsec with triple shock in all 6 directions shock conditions: 20 G, 11 msec duration (sine half wave)
Vibration:	contact interruption < 10 μsec at vibration test in accordance with MIL-STD-202 D, method 204, condition C
Contact/Terminals:	PC terminals, phosphor bronze, Series 100 N: 1.25 μm gold-plated over 1 μm nickel Series 200 N: 0.2 μm gold-plated over 1 μm nickel
Material:	case: PBT, slide: PA
Construction:	case sealed
Slide position:	OFF
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

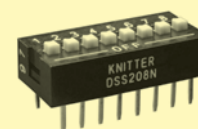
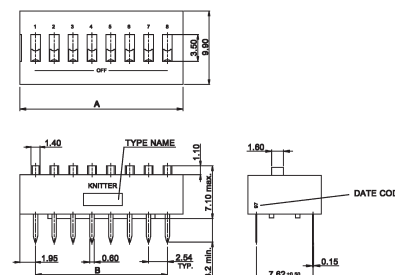
Series DSS 100 N

Type	Poles	Length (A)
DSS 101 N	1	3.90 mm
DSS 102 N	2	6.44 mm
DSS 103 N	3	8.98 mm
DSS 104 N	4	11.52 mm
DSS 105 N	5	14.06 mm
DSS 106 N	6	16.60 mm
DSS 107 N	7	19.14 mm
DSS 108 N	8	21.68 mm
DSS 109 N	9	22.44 mm
DSS 110 N	10	26.76 mm
DSS 112 N	12	31.84 mm



Series DSS 200 N

Type	Poles	Length (A)
DSS 201 N	1	3.90 mm
DSS 202 N	2	6.44 mm
DSS 203 N	3	8.98 mm
DSS 204 N	4	11.52 mm
DSS 205 N	5	14.06 mm
DSS 206 N	6	16.60 mm
DSS 207 N	7	19.14 mm
DSS 208 N	8	21.68 mm
DSS 209 N	9	24.22 mm
DSS 210 N	10	26.76 mm
DSS 212 N	12	31.84 mm





Dual-in-line Switches

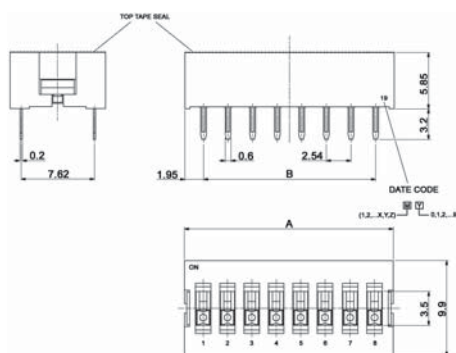
Specifications:

Contact rating:	24 V DC, 25 mA / 6 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +70 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	PBT meets UL 94 V-0
Contacts:	gold-plated over nickel
Construction:	case sealed
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

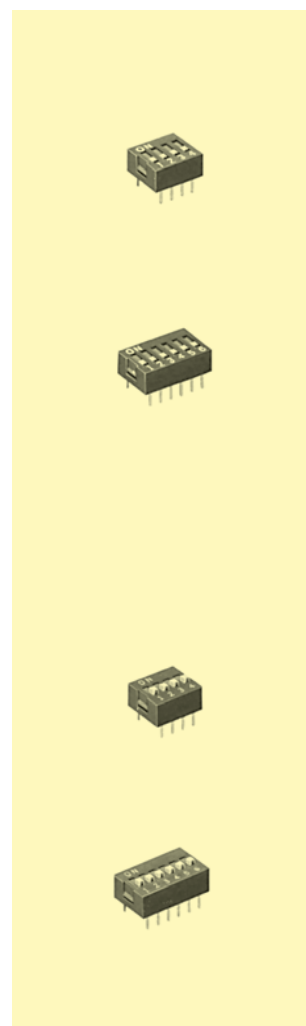
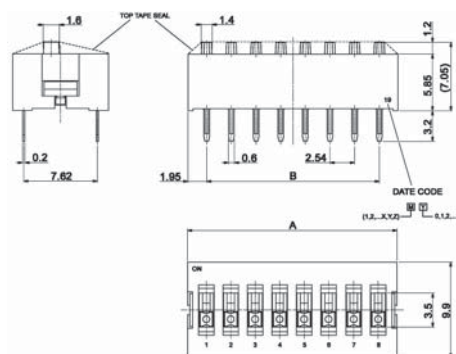
Series DBS 2000

Type	Poles	Length (A)
DBS 2001	1	3.90 mm
DBS 2002	2	6.44 mm
DBS 2003	3	8.98 mm
DBS 2004	4	11.52 mm
DBS 2005	5	14.06 mm
DBS 2006	6	16.60 mm
DBS 2007	7	19.14 mm
DBS 2008	8	21.68 mm
DBS 2009	9	24.22 mm
DBS 2010	10	26.76 mm
DBS 2012	12	31.84 mm



Series DBS 2100

Type	Poles	Length (A)
DBS 2101	1	3.90 mm
DBS 2102	2	6.44 mm
DBS 2103	3	8.98 mm
DBS 2104	4	11.52 mm
DBS 2105	5	14.06 mm
DBS 2106	6	16.60 mm
DBS 2107	7	19.14 mm
DBS 2108	8	21.68 mm
DBS 2109	9	24.22 mm
DBS 2110	10	26.76 mm
DBS 2112	12	31.84 mm



Dual-in-line Switches

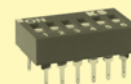
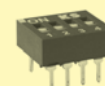
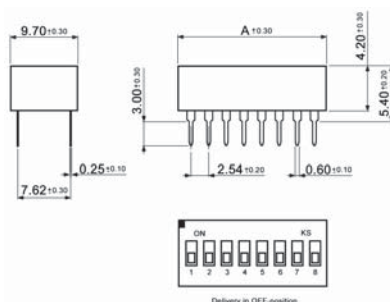
Specifications:

Contact rating:	50 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5 000 operations per pole
Material:	Thermoplastic meets UL 94 V-0, case: blue, slide: white
Contacts:	gold-plated over nickel
Terminals:	tin-plated
Construction:	Terminals sealed
	DBS 60xx: sealed with protective tape, washable
Slide position:	OFF
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 10 sec, 260 °C

Models:

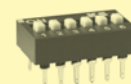
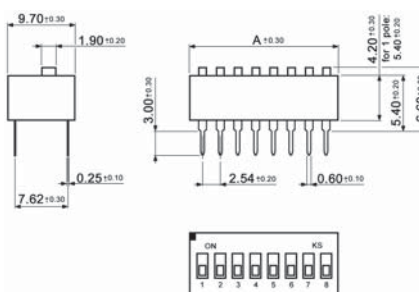
Series DBS 6000

Type	Poles	Length (A)
DBS 6002	2	6.70 mm
DBS 6003	3	9.20 mm
DBS 6004	4	11.70 mm
DBS 6005	5	14.20 mm
DBS 6006	6	16.70 mm
DBS 6007	7	19.20 mm
DBS 6008	8	21.70 mm
DBS 6009	9	24.20 mm
DBS 6010	10	26.70 mm
DBS 6012	12	31.80 mm
DBS 6015	15	39.50 mm



Series DBS 6100

Type	Poles	Length (A)
DBS 6102	2	6.70 mm
DBS 6103	3	9.20 mm
DBS 6104	4	11.70 mm
DBS 6105	5	14.20 mm
DBS 6106	6	16.70 mm
DBS 6107	7	19.20 mm
DBS 6108	8	21.70 mm
DBS 6109	9	24.20 mm
DBS 6110	10	26.70 mm
DBS 6112	12	31.80 mm
DBS 6115	15	39.50 mm



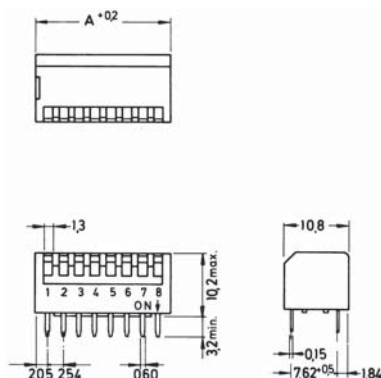
Specifications:

Contact rating:	24 V DC, 25 mA / 6 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +70 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	PBT meets UL 94 V-0
Contacts:	gold-plated over nickel
Construction:	case sealed; Series DBP 2000 lever recessed
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

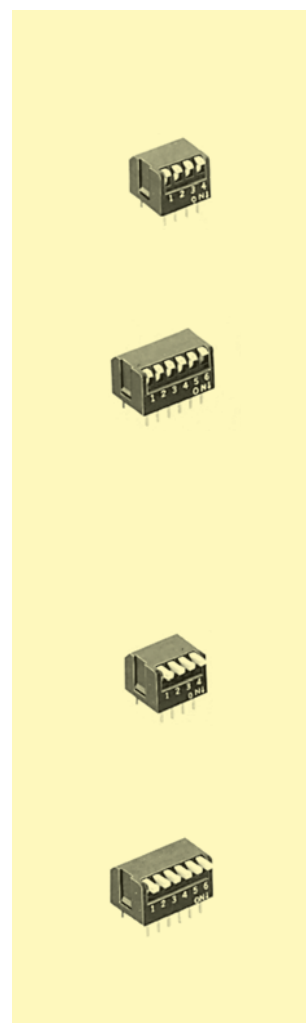
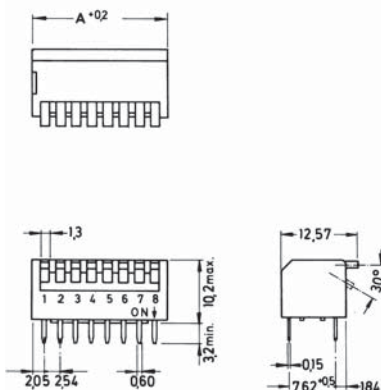
Series DBP 2000

Type	Poles	Length (A)
DBP 2002	2	6.64 mm
DBP 2003	3	9.18 mm
DBP 2004	4	11.72 mm
DBP 2005	5	14.26 mm
DBP 2006	6	16.80 mm
DBP 2007	7	19.34 mm
DBP 2008	8	21.88 mm
DBP 2009	9	24.42 mm
DBP 2010	10	26.96 mm
DBP 2012	12	32.04 mm

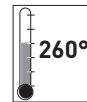


Series DBP 2100

Type	Poles	Length (A)
DBP 2102	2	6.64 mm
DBP 2103	3	9.18 mm
DBP 2104	4	11.72 mm
DBP 2105	5	14.26 mm
DBP 2106	6	16.80 mm
DBP 2107	7	19.34 mm
DBP 2108	8	21.88 mm
DBP 2109	9	24.42 mm
DBP 2110	10	26.96 mm
DBP 2112	12	32.04 mm



Dual-in-line Switches end-stackable



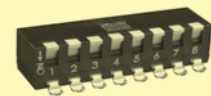
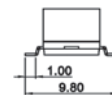
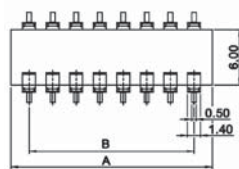
Specifications:

Contact rating:	24 V DC, 25 mA / non-switching: 100 mA, 50 V DC
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	cover/base: high-temp. PA-9T UL 94 V-0, black; actuator: LCP UL 94 V-0, white
Contact:	copper; gold-plated at contact area
Terminal:	brass, gold-plated
Construction:	case sealed
Mounting:	on pc-board – SMD
Slide position:	OFF

Models:

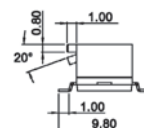
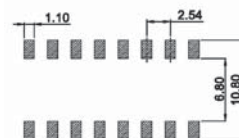
Series SBP 8000 T

Type	Poles	Length (A)
SBP 8002 T	2	6.48 mm
SBP 8004 T	4	11.56 mm
SBP 8006 T	6	16.64 mm
SBP 8008 T	8	21.72 mm
SBP 8010 T	10	26.80 mm



Series SBP 8100

Type	Poles	Length (A)
SBP 8102 T	2	6.48 mm
SBP 8104 T	4	11.56 mm
SBP 8106 T	6	16.64 mm
SBP 8108 T	8	21.72 mm
SBP 8110 T	10	26.80 mm



Packing: on tapes

Type	Tape	Reel	Tape width (A)
SBP 8002 T	700 pieces;	Ø 300 mm	16.0 mm
SBP 8004 T	700 pieces;	Ø 300 mm	24.0 mm
SBP 8006 T	700 pieces;	Ø 300 mm	24.0 mm
SBP 8008 T	700 pieces;	Ø 300 mm	32.0 mm
SBP 8010 T	700 pieces;	Ø 300 mm	44.0 mm
SBP 8102 T	700 pieces;	Ø 300 mm	16.0 mm
SBP 8104 T	700 pieces;	Ø 300 mm	24.0 mm
SBP 8106 T	700 pieces;	Ø 300 mm	24.0 mm
SBP 8108 T	700 pieces;	Ø 300 mm	32.0 mm
SBP 8110 T	700 pieces;	Ø 300 mm	44.0 mm



Dual-in-line Switches end-stackable

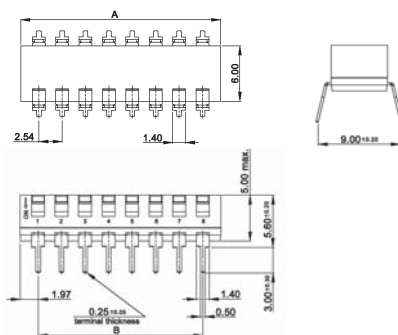
Specifications:

Contact rating:	24 V DC, 25 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	cover/base: PA-9T UL 94 V-0, black; actuator: LCP UL 94 V-0, white
Contacts:	copper, gold-plated at contact area
Terminals:	brass, gold-plated
Construction:	case sealed
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave soldering – max.: 5 sec, 260 °C

Models:

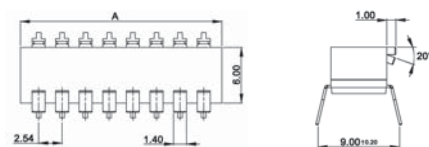
Series DBP 8000

Type	Poles	Length (A)
DBP 8002	2	6.48 mm
DBP 8004	4	11.56 mm
DBP 8006	6	16.64 mm
DBP 8008	8	21.72 mm
DBP 8010	10	26.80 mm



Series DBP 8100

Type	Poles	Length (A)
DBP 8102	2	6.48 mm
DBP 8104	4	11.56 mm
DBP 8106	6	16.64 mm
DBP 8108	8	21.72 mm
DBP 8110	10	26.80 mm



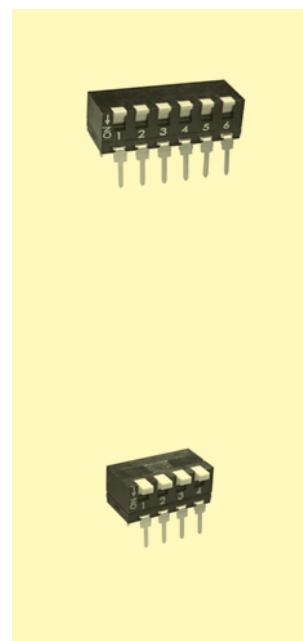
Circuit diagram



Packing: Sticks

Type Stick

DBP 8002 / 8102	70 pieces
DBP 8004 / 8104	40 pieces
DBP 8006 / 8106	28 pieces
DBP 8008 / 8108	20 pieces
DBP 8010 / 8110	16 pieces



Dual-in-line Switches ultra-low profile



Specifications:

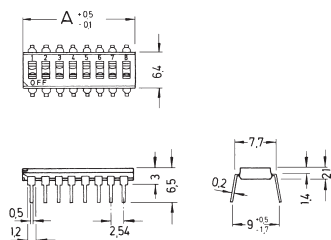
Contact rating:	50 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Capacity:	< maximum 5 pF between 2 poles
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +80 °C
Mechanical life:	minimum 1 000 operations per pole
Shock resistance:	contact interruption < 10 μsec with triple shock in all 6 directions shock conditions: 20 G, 11 msec duration (sine half wave)
Vibration:	contact interruption: < 10 μsec at vibration test in accordance with MIL-STD-202 D, method 204, condition C
Contacts:	copper beryllium, gold-plated over nickel
Terminals:	PC terminals, nickel silver, gold-plated
Material:	case and slide: PA
Construction:	case sealed, slide recessed, sealed with protective tape
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave-soldering – max.: 3 sec, 245 °C ± 10 °C

7

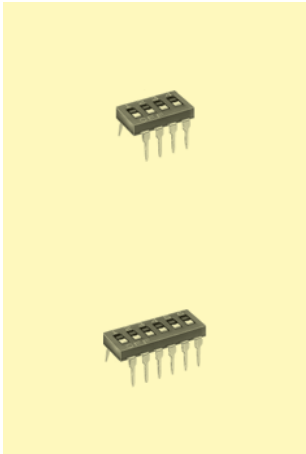
Models:

Series DSS 500

Type	Poles	Length (A)
DSS 502	2	6.30 mm
DSS 504	4	11.40 mm
DSS 506	6	16.50 mm
DSS 508	8	21.55 mm
DSS 510	10	26.65 mm



washable





Dual-in-line Switches

ultra-low profile, for SMT

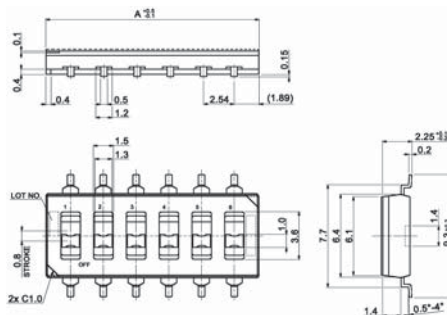
Specifications:

Contact rating:	50 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Capacity:	maximum 5 pF between 2 poles
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +100 °C
Mechanical life:	minimum 1 000 operations per pole
Shock resistance:	contact interruption < 10 μsec with triple shock in all 6 directions shock conditions: 20 G, 11 msec duration (sine half wave)
Vibration:	contact interruption: < 10 μsec at vibration test in accordance with MIL-STD-202 D, method 204, condition C
Contacts:	copper beryllium, gold-plated over nickel
Terminals:	nickel silver, gold-plated
Material:	case and slide: PA
Construction:	case sealed, slide recessed, sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF
Soldering conditions:	reflow-soldering

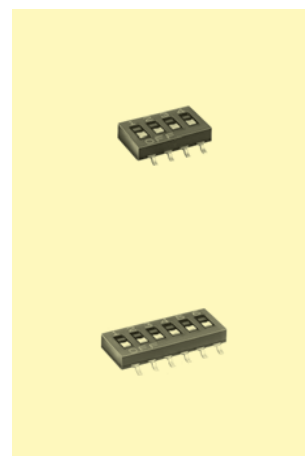
Models:

Series SMS 500

Type	Poles	Length (A)
SMS 502	2	6.30 mm
SMS 504	4	11.40 mm
SMS 506	6	16.50 mm
SMS 508	8	21.55 mm
SMS 510	10	26.65 mm



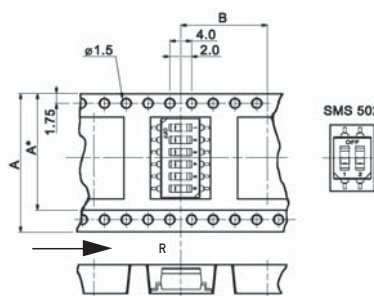
washable



7

Packing:	sticks or tapes
for order on tape:	additional to type number: T
	example of order: SMS 502 T

Models	Stick	Tape	Reel	Tape width (A)	Rapport (R)
SMS 502	72 pieces; L 507 mm	2000 pieces	Ø 330 mm	16.0 mm	8.0 mm
SMS 504	40 pieces; L 507 mm	1000 pieces	Ø 330 mm	24.0 mm	12.0 mm
SMS 506	28 pieces; L 507 mm	1000 pieces	Ø 330 mm	24.0 mm	12.0 mm
SMS 508	20 pieces; L 507 mm	1000 pieces	Ø 330 mm	32.0 mm	12.0 mm
SMS 510	16 pieces; L 507 mm	1000 pieces	Ø 330 mm	44.0 mm	12.0 mm



Dual-in-line Switches

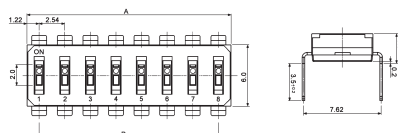
Specifications:

Contact rating:	50 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5 000 operations per pole
Electrical life:	minimum 1 000 operations per pole
Shock resistance:	contact interruption <10 μs with triple shock in all 6 directions, shock conditions: 40 G, 11 ms duration (sin half wave)
Vibration:	contact interruption <10 μs at vibration test in accordance with MIL-STD 202 G, method 204, condition C
Materials:	Case: PA-9T, UL 94 V-0, black Slide: LCP, UL 94 V-0, white Contacts and Terminals: 0.3 μm gold-plated over nickel
Construction:	Case sealed Series 5000 G: slide recessed, sealed with protective tape, washable
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave soldering – max. 10 sec, max. 260 °C; pre-heat – max. 60 sec, max. 100 °C

Models:

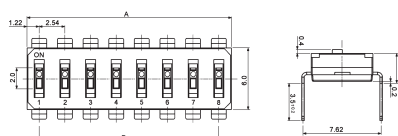
Series DBS 5000 G

Type	Poles	Length (A)
DBS 5001 G	1	2.44 mm
DBS 5002 G	2	4.98 mm
DBS 5003 G	3	7.52 mm
DBS 5004 G	4	10.06 mm
DBS 5005 G	5	12.60 mm
DBS 5006 G	6	15.14 mm
DBS 5007 G	7	17.68 mm
DBS 5008 G	8	20.22 mm
DBS 5009 G	9	22.76 mm
DBS 5010 G	10	25.30 mm
DBS 5012 G	12	30.38 mm

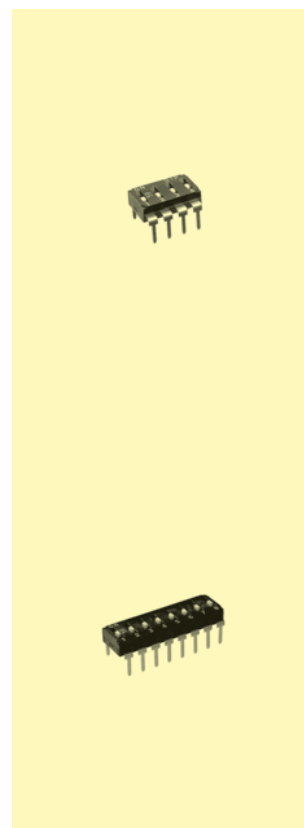


Serie DBS 5100 G

DBS 5101 G	1	2.44 mm
DBS 5102 G	2	4.98 mm
DBS 5103 G	3	7.52 mm
DBS 5104 G	4	10.06 mm
DBS 5105 G	5	12.60 mm
DBS 5106 G	6	15.14 mm
DBS 5107 G	7	17.68 mm
DBS 5108 G	8	20.22 mm
DBS 5109 G	9	22.76 mm
DBS 5110 G	10	25.30 mm
DBS 5112 G	12	30.38 mm



Packing: sticks





Contact rating:	50 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5 000 operations per pole
Electrical life:	minimum 1 000 operations per pole
Shock resistance:	contact interruption <10 μs with triple shock in all 6 directions, shock conditions: 40 G, 11 ms duration (sin half wave)
Vibration:	contact interruption <10 μs at vibration test in accordance with MIL-STD 202 G, method 204, condition C
Materials:	Case: PA-9T, UL 94 V-0, black Slide: LCP, UL 94 V-0, white Contacts and Terminals: 0.3 μm gold-plated over nickel
Construction:	Case sealed, slide recessed, sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF

Type	Poles	Length (A)
SBS 5001 TG	1	2.44 mm
SBS 5002 TG	2	4.98 mm
SBS 5003 TG	3	7.52 mm
SBS 5004 TG	4	10.06 mm
SBS 5005 TG	5	12.60 mm
SBS 5006 TG	6	15.14 mm
SBS 5007 TG	7	17.68 mm
SBS 5008 TG	8	20.22 mm
SBS 5009 TG	9	22.76 mm
SBS 5010 TG	10	25.30 mm
SBS 5012 TG	12	30.38 mm

knitter-switch | 131

Dual-in-line Switches

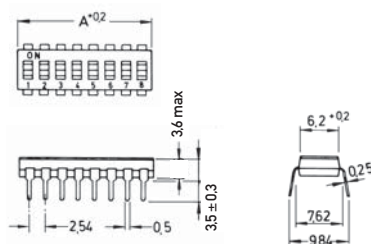
Specifications:

Contact rating:	24 V DC, 25 mA / 6 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	PPS meets UL 94 V−0
Contacts:	gold-plated over nickel
Construction:	case sealed
Mounting:	Series DBS 1000: slide recessed, front sealed with protective tape, washable
Slide position:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

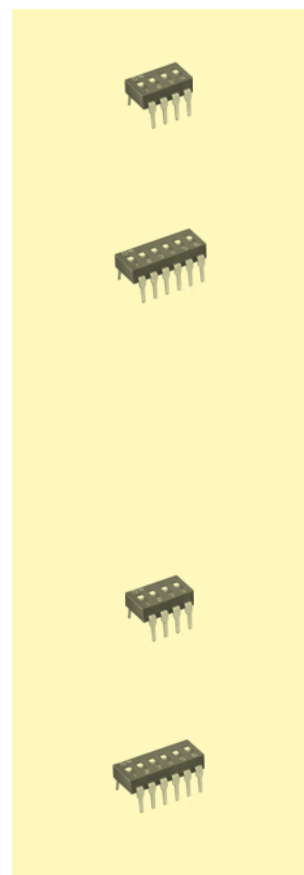
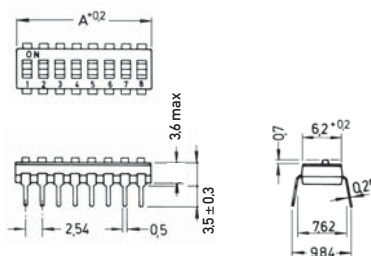
Series DBS 1000

Type	Poles	Length (A)
DBS 1001	1	3.48 mm
DBS 1002	2	6.02 mm
DBS 1003	3	8.56 mm
DBS 1004	4	11.10 mm
DBS 1005	5	13.64 mm
DBS 1006	6	16.18 mm
DBS 1007	7	18.72 mm
DBS 1008	8	21.26 mm
DBS 1009	9	23.80 mm
DBS 1010	10	26.34 mm
DBS 1012	12	31.42 mm



Series DBS 1100

Type	Poles	Length (A)
DBS 1101	1	3.48 mm
DBS 1102	2	6.02 mm
DBS 1103	3	8.56 mm
DBS 1104	4	11.10 mm
DBS 1105	5	13.64 mm
DBS 1106	6	16.18 mm
DBS 1107	7	18.72 mm
DBS 1108	8	21.26 mm
DBS 1109	9	23.80 mm
DBS 1110	10	26.34 mm
DBS 1112	12	31.42 mm



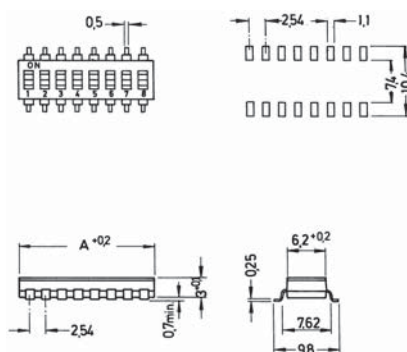
Specifications:

Contact rating:	24 V DC, 25 mA / 6 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	PPS meets UL 94 V-0
Contacts:	gold-plated over nickel
Construction:	case sealed, slide recessed, front sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF

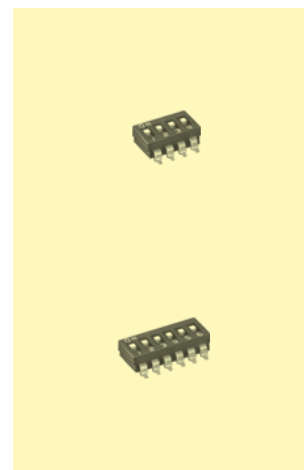
Models:

Series SBS 1000

Type	Poles	Length (A)
SBS 1001	1	3.48 mm
SBS 1002	2	6.02 mm
SBS 1003	3	8.56 mm
SBS 1004	4	11.10 mm
SBS 1005	5	13.64 mm
SBS 1006	6	16.18 mm
SBS 1007	7	18.72 mm
SBS 1008	8	21.26 mm
SBS 1009	9	23.80 mm
SBS 1010	10	26.34 mm
SBS 1012	12	31.42 mm

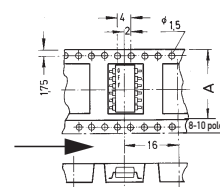


washable



Packing: sticks or tapes
for order on tapes: additional to type number: T
example of order: SBS 1002 T

Models:	Stick	Tape/Reel	Tape width (A)
SBS 1001	—	800 pieces; Ø 330 mm	16.0 mm
SBS 1002	76 pieces	900 pieces; Ø 330 mm	16.0 mm
SBS 1003	55 pieces	900 pieces; Ø 330 mm	24.0 mm
SBS 1004	42 pieces	900 pieces; Ø 330 mm	24.0 mm
SBS 1005	35 pieces	900 pieces; Ø 330 mm	24.0 mm
SBS 1006	28 pieces	900 pieces; Ø 330 mm	24.0 mm
SBS 1007	25 pieces	900 pieces; Ø 330 mm	32.0 mm
SBS 1008	22 pieces	900 pieces; Ø 330 mm	32.0 mm
SBS 1009	20 pieces	900 pieces; Ø 330 mm	44.0 mm
SBS 1010	18 pieces	900 pieces; Ø 330 mm	44.0 mm
SBS 1012	15 pieces	900 pieces; Ø 330 mm	44.0 mm



Dual-in-line Switches

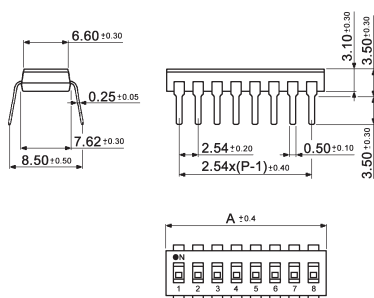
Specifications:

Contact rating:	50 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5 000 operations per pole
Material:	PA9T meets UL 94 V-0
Contacts:	gold-plated over nickel
Terminals:	tin-plated
Construction:	case sealed
	Series DBS 600xx: slide recessed, front sealed with protective tape, washable
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

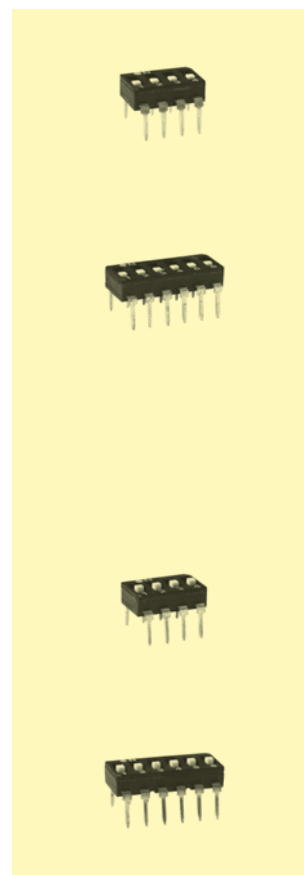
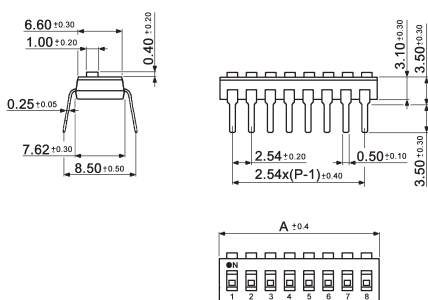
Series DBS 600xx

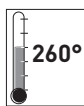
Type	Poles	Length (A)
DBS 60001	1	2.50 mm
DBS 60002	2	5.04 mm
DBS 60003	3	7.58 mm
DBS 60004	4	10.12 mm
DBS 60005	5	12.66 mm
DBS 60006	6	15.20 mm
DBS 60007	7	17.74 mm
DBS 60008	8	20.28 mm
DBS 60009	9	22.82 mm
DBS 60010	10	25.36 mm
DBS 60012	12	30.43 mm



Series DBS 610xx

Type	Poles	Length (A)
DBS 61001	1	2.50 mm
DBS 61002	2	5.04 mm
DBS 61003	3	7.58 mm
DBS 61004	4	10.12 mm
DBS 61005	5	12.66 mm
DBS 61006	6	15.20 mm
DBS 61007	7	17.74 mm
DBS 61008	8	20.28 mm
DBS 61009	9	22.82 mm
DBS 61010	10	25.36 mm
DBS 61012	12	30.43 mm





Dual-in-line Switches for SMT

Specifications:

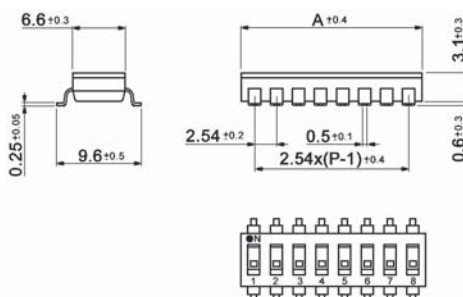
Contact rating:	50 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5 000 operations per pole
Material:	PA9T meets UL 94 V-0
Contacts:	gold-plated over nickel
Terminals:	tin-plated
Construction:	case sealed, slide recessed front sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF

Models:

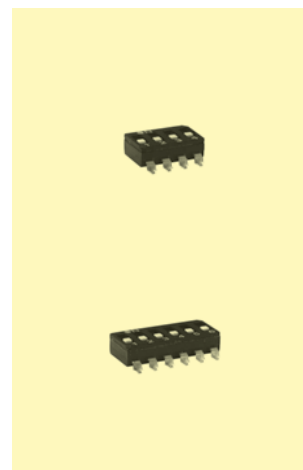
Series SBS 600xx

Type Poles Length (A)

SBS 60001	1	2.50 mm
SBS 60002	2	5.04 mm
SBS 60003	3	7.58 mm
SBS 60004	4	10.12 mm
SBS 60005	5	12.66 mm
SBS 60006	6	15.20 mm
SBS 60007	7	17.74 mm
SBS 60008	8	20.28 mm
SBS 60009	9	22.82 mm
SBS 60010	10	25.36 mm
SBS 60012	12	30.43 mm

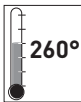


washable



Packing: sticks or tapes
for order on tapes: additional to type number: T
example of order: SBS 60006 T

Models:	Stick	Tape/Reel	Tape width (e)
SBS 60001	100 pieces	2000 pieces; Ø 330 mm	24.0 mm
SBS 60002	100 pieces	1300 pieces; Ø 330 mm	24.0 mm
SBS 60003	68 pieces	1000 pieces; Ø 330 mm	16.0 mm
SBS 60004	51 pieces	1000 pieces; Ø 330 mm	24.0 mm
SBS 60005	40 pieces	1000 pieces; Ø 330 mm	24.0 mm
SBS 60006	34 pieces	1000 pieces; Ø 330 mm	24.0 mm
SBS 60007	29 pieces	1000 pieces; Ø 330 mm	32.0 mm
SBS 60008	26 pieces	1000 pieces; Ø 330 mm	32.0 mm
SBS 60009	22 pieces	1000 pieces; Ø 330 mm	44.0 mm
SBS 60010	20 pieces	1000 pieces; Ø 330 mm	44.0 mm
SBS 60012	17 pieces	1000 pieces; Ø 330 mm	44.0 mm



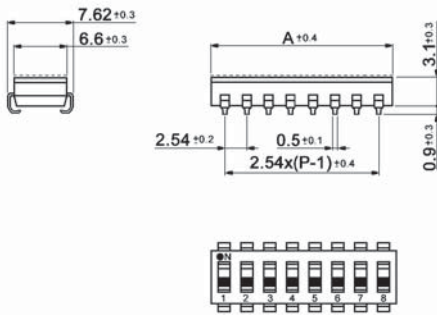
Specifications:

Contact rating:	50 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	<50 mΩ
Insulation resistance:	>1000 MΩ at 100 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 5 000 operations per pole
Material:	PA9T meets UL 94 V-0
Contacts:	gold-plated over nickel
Terminals:	tin-plated
Construction:	case sealed, slide recessed front sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF

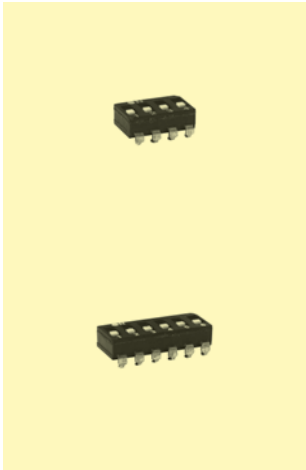
Models:

Series SBS 600xx J

Type	Poles	Length (A)
SBS 60002 J	2	5.04 mm
SBS 60003 J	3	7.58 mm
SBS 60004 J	4	10.12 mm
SBS 60005 J	5	12.66 mm
SBS 60006 J	6	15.20 mm
SBS 60007 J	7	17.74 mm
SBS 60008 J	8	20.28 mm
SBS 60009 J	9	22.82 mm
SBS 60010 J	10	25.36 mm
SBS 60012 J	12	30.43 mm



washable



Packing: sticks or tapes
for order on tapes: additional to type number: T
example of order: SBS 60006 TJ

Models:	Stick	Tape/Reel	Tape width (e)
SBS 60002 J	100 pieces	1300 pieces; Ø 330 mm	24.0 mm
SBS 60003 J	68 pieces	1000 pieces; Ø 330 mm	16.0 mm
SBS 60004 J	51 pieces	1000 pieces; Ø 330 mm	24.0 mm
SBS 60005 J	40 pieces	1000 pieces; Ø 330 mm	24.0 mm
SBS 60006 J	34 pieces	1000 pieces; Ø 330 mm	32.0 mm
SBS 60007 J	29 pieces	1000 pieces; Ø 330 mm	32.0 mm
SBS 60008 J	26 pieces	1000 pieces; Ø 330 mm	32.0 mm
SBS 60009 J	22 pieces	1000 pieces; Ø 330 mm	44.0 mm
SBS 60010 J	20 pieces	1000 pieces; Ø 330 mm	44.0 mm
SBS 60012 J	17 pieces	1000 pieces; Ø 330 mm	44.0 mm



Dual-in-line Switches end-stackable

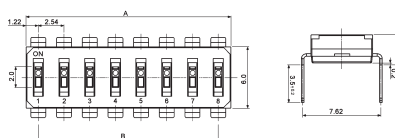
Specifications:

Contact rating:	24 V DC, 25 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	cover/base: PA-9T UL 94 V-0, black; actuator: LCP UL 94 V-0, white
Contacts:	copper, gold-plated at contact area
Terminals:	brass, gold-plated
Construction:	case sealed
	Series DBS 5000: slide recessed, front sealed with protective tape, washable
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave soldering – max.: 5 sec, 260 °C

Models:

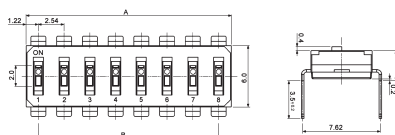
Series DBS 5000

Type	Poles	Length (A)
DBS 5001	1	2.44 mm
DBS 5002	2	4.98 mm
DBS 5003	3	7.52 mm
DBS 5004	4	10.06 mm
DBS 5005	5	12.60 mm
DBS 5006	6	15.14 mm
DBS 5007	7	17.68 mm
DBS 5008	8	20.22 mm
DBS 5009	9	22.76 mm
DBS 5010	10	25.30 mm
DBS 5012	12	30.38 mm



Series DBS 5100

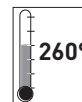
Type	Poles	Length (A)
DBS 5101	1	2.44 mm
DBS 5102	2	4.98 mm
DBS 5103	3	7.52 mm
DBS 5104	4	10.06 mm
DBS 5105	5	12.60 mm
DBS 5106	6	15.14 mm
DBS 5107	7	17.68 mm
DBS 5108	8	20.22 mm
DBS 5109	9	22.76 mm
DBS 5110	10	25.30 mm
DBS 5112	12	30.38 mm



Packing: sticks



Dual-in-line Switches end-stackable, for SMT



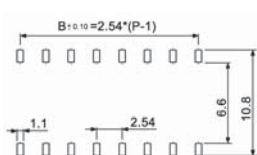
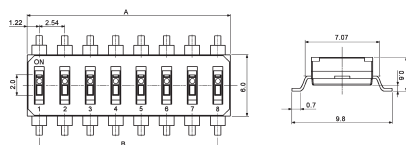
Specifications:

Contact rating:	24 V DC, 25 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	−40 °C to +85 °C
Mechanical life:	minimum 2 000 operations per pole
Material:	cover/base: high-temp. PA-9T UL 94 V-0, black; actuator: LCP UL 94 V-0, white
Contact:	copper; gold-plated at contact area
Terminal:	brass, gold-plated
Construction:	case sealed
Mounting:	Series SBS 5000 T: slide recessed, front sealed with protective tape, washable
Slide position:	on pc-board – SMD
	OFF

Models:

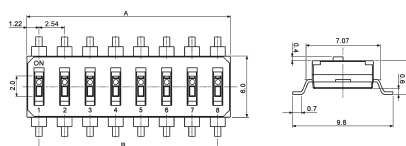
Series SBS 5000 T

Type	Poles	Length (A)
SBS 5001 T	1	2.44 mm
SBS 5002 T	2	4.98 mm
SBS 5003 T	3	7.52 mm
SBS 5004 T	4	10.06 mm
SBS 5005 T	5	12.60 mm
SBS 5006 T	6	15.14 mm
SBS 5007 T	7	17.68 mm
SBS 5008 T	8	20.22 mm
SBS 5009 T	9	22.76 mm
SBS 5010 T	10	25.30 mm
SBS 5012 T	12	30.38 mm

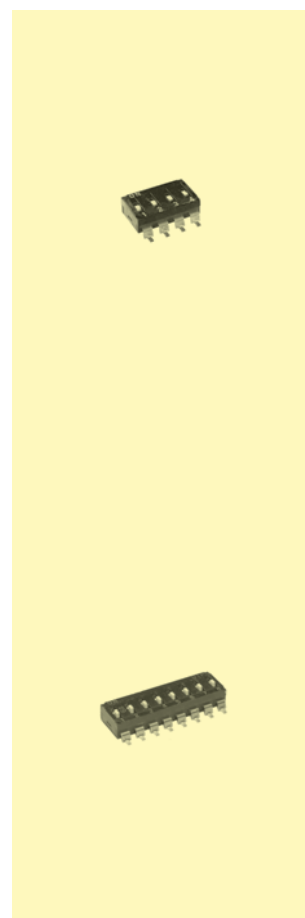


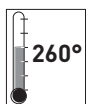
Series SBS 5100 T

Type	Poles	Length (A)
SBS 5101 T	1	2.44 mm
SBS 5102 T	2	4.98 mm
SBS 5103 T	3	7.52 mm
SBS 5104 T	4	10.06 mm
SBS 5105 T	5	12.60 mm
SBS 5106 T	6	15.14 mm
SBS 5107 T	7	17.68 mm
SBS 5108 T	8	20.22 mm
SBS 5109 T	9	22.76 mm
SBS 5110 T	10	25.30 mm
SBS 5112 T	12	30.38 mm



Packing: on tapes (900 pieces; Ø 300 mm)





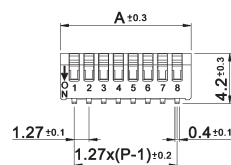
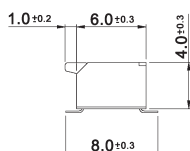
Half-pitch Dual-in-line Switches

Specifications:

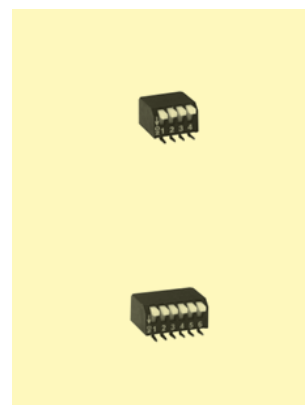
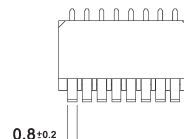
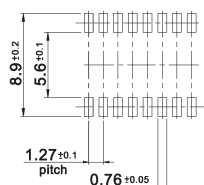
Contact rating:	24 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Mechanical life:	minimum 1000 operations per pole
Materials:	Case: PA, UL 94 V-0, black Slide: PA, UL 94 V-0, ivory Contacts and Terminals: copper-alloy, gold-plated over nickel
Mounting:	on pc-board – SMD
Slide position:	OFF

Model:

Type	Poles	Length (A)
DHP 602	2	3.68 mm
DHP 604	4	6.22 mm
DHP 606	6	8.76 mm
DHP 608	8	11.30 mm
DHP 610	10	13.84 mm



Actuator top side "off"



7

Packing:

Type	Tape	Stick
DHP 602	900 pieces	148 pieces
DHP 604	900 pieces	88 pieces
DHP 606	900 pieces	62 pieces
DHP 608	900 pieces	48 pieces
DHP 610	900 pieces	39 pieces

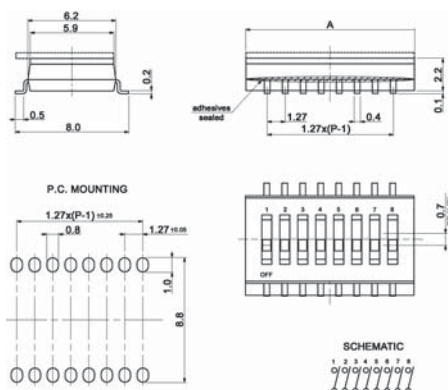
Half-Pitch Dual-in-line Switches for SMT



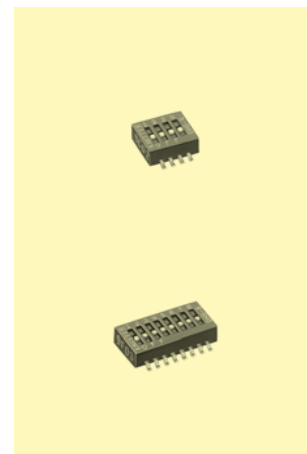
Specifications:

Contact rating:	50 V DC, 100 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +80 °C
Storage temperature:	−55 °C to +85 °C
Mechanical life:	minimum 1 000 operations per pole
Contacts/Terminals:	copper beryllium, gold-plated over nickel
Material:	case: PPS, black; slide: PA
Construction:	case sealed, slide recessed, sealed with protective tape
Mounting:	on pc-board – SMD – 1.27 mm
Slide position:	OFF
Soldering conditions:	reflow-soldering – max.: 10 sec, 250 °C max.

Models:	Poles	Length (A)
DHS 104	4	6.81 mm
DHS 106	6	9.35 mm
DHS 108	8	11.89 mm
DHS 110	10	14.43 mm

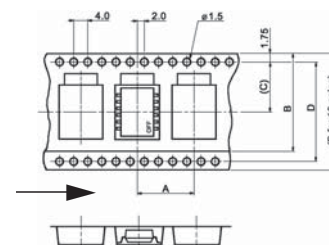


washable



Packing: on tapes

Models	Tape	Reel	Tape width (A)	Rapport (R)
DHS 104	1000 pieces	Ø 250 mm	24.0 mm	12.0 mm
DHS 106	700 pieces	Ø 250 mm	24.0 mm	16.0 mm
DHS 108	1000 pieces	Ø 250 mm	24.0 mm	12.0 mm
DHS 110	700 pieces	Ø 250 mm	32.0 mm	16.0 mm



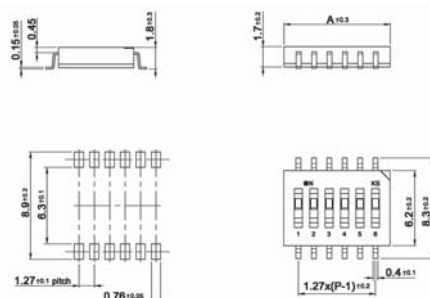
Specifications:

Contact rating:	50 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 100 mΩ
Insulation resistance:	> 500 MΩ
Dielectric strength:	300V, 50Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Storage temperature:	−40 °C to +85 °C
Mechanical life:	minimum 1000 operations per pole
Contacts/Terminals:	copper-alloy, gold-plated over nickel
Material:	PA9T/PA, UL 94 V-0
Construction:	case sealed, slide recessed, sealed with protective tape
Mounting:	on pc-board – SMD – 1.27 mm
Slide position:	OFF

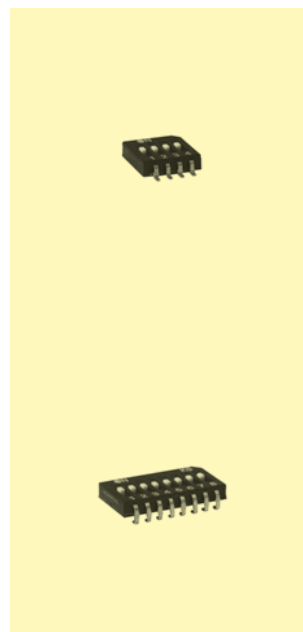
Models:

Series DHS 600

Type	Poles	Length (A)
DHS 602	2	3.70 mm
DHS 604	4	6.20 mm
DHS 606	6	8.75 mm
DHS 608	8	11.30 mm
DHS 610	10	13.80 mm

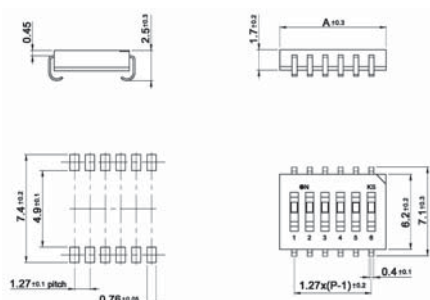


washable



Series DHS 600-J

Type	Poles	Length (A)
DHS 602-J	2	3.70 mm
DHS 604-J	4	6.20 mm
DHS 606-J	6	8.75 mm
DHS 608-J	8	11.30 mm
DHS 610-J	10	13.80 mm

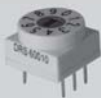


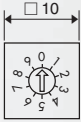
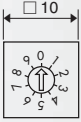
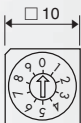
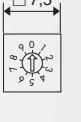
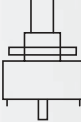
Packing: on tapes

Models	Tape	Reel	Tape width (A)	Rapport (R)
DHS 602 / DHS 602-J	2000 pieces;	Ø 330 mm	16.0 mm	12.0 mm
DHS 604 / DHS 604-J	2000 pieces;	Ø 330 mm	16.0 mm	12.0 mm
DHS 606 / DHS 606-J	2000 pieces;	Ø 330 mm	16.0 mm	12.0 mm
DHS 608 / DHS 608-J	2000 pieces;	Ø 330 mm	24.0 mm	12.0 mm
DHS 610 / DHS 610-J	2000 pieces;	Ø 330 mm	24.0 mm	12.0 mm

8

Rotary Coded Switches



Series	Size / Foot print	Shaft w w.o.		Mounting stan- dard	right angle	front- panel	SMT	IP 67	Page
DRS 3000/4000 DRR 3000/4000 SMR 5000		•	•	•					144 144 145
DRS 20 000/21 000 DRR 20 000/21 000 SMR 20 000		•	•	•					146 146 147
DRS/DRR/SMR 60 000/61 000		•	•	•	•		•	•	148 149
DRS 7000/8000 DRR 7000/8000 SMR 7000-1/8000-1 SMRR 7000-1/8000-1		•	•	•					150 150 151 151
DRS 13 000/14 000 SMR 13 000/14 000		•	•	•					152 153
DRS 15 000/16 000 SMR 15 000/16 000		•	•	•				•	154 155
DRS 20		•		•		•			156

All types available with the codes BCD, Hexadecimal, BCD inverse, Hexadecimal inverse.

Subminiature Rotary Coded Switches

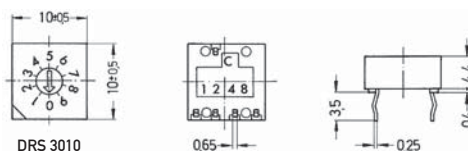


Specifications:

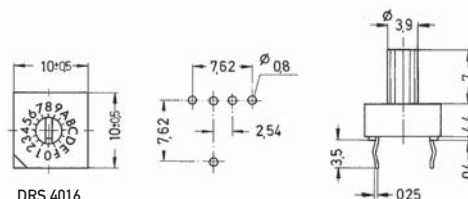
Contact rating:	50 V DC, 100 mA, non switching 15 V DC, 30 mA, switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 40 °C to + 85 °C
Mechanical life:	minimum 20 000 operations
Contacts:	gold-plated
Terminals:	PC terminals, phosphor bronze, gold-plated
Case material:	PBT black, rotor: standard types yellow; inverse types red
Construction:	case totally sealed, suitable for washing by immersion
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max. 6 sec, 260 °C through hole reflow – 4-6 sec, 260 ± 5 °C

washable

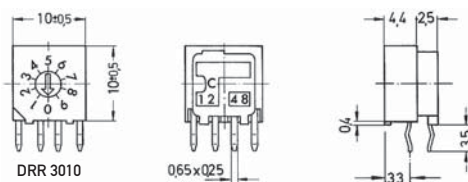
Models:	Code
DRS 3010	BCD
DRS 3110	BCD Inverse
DRS 3016	Hexadecimal
DRS 3116	Hexadecimal Inverse



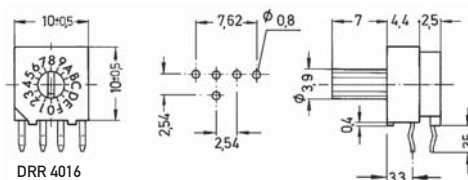
DRS 4010	BCD
DRS 4110	BCD Inverse
DRS 4016	Hexadecimal
DRS 4116	Hexadecimal Inverse



DRR 3010	BCD
DRR 3110	BCD Inverse
DRR 3016	Hexadecimal
DRR 3116	Hexadecimal Inverse



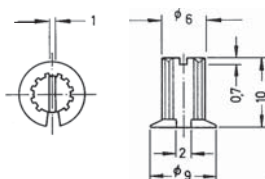
DRR 4010	BCD
DRR 4110	BCD Inverse
DRR 4016	Hexadecimal
DRR 4116	Hexadecimal Inverse



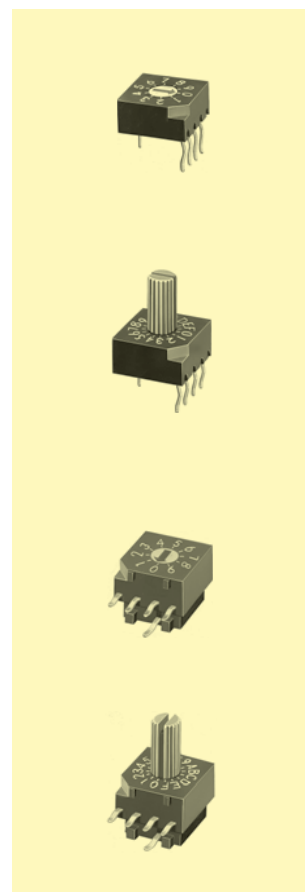
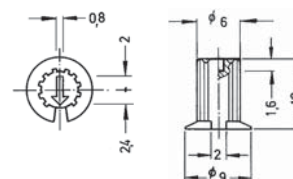
Accessories:

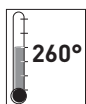
Caps

yellow	KR 108
red	KR 109
white	KR 110



grey KR 207





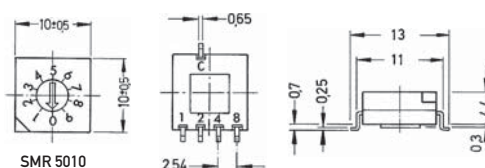
Subminiature Rotary Coded Switches for SMT

Specifications:

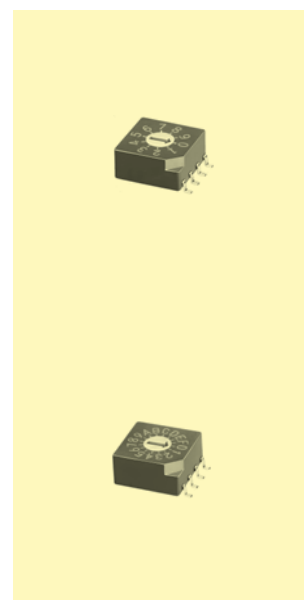
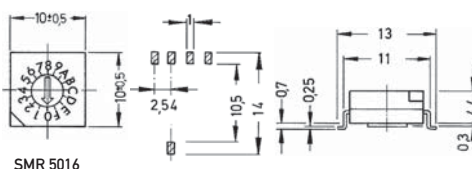
Contact rating:	50 V DC, 100 mA, non switching 15 V DC, 30 mA, switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 40 °C to + 85 °C
Mechanical life:	minimum 20 000 operations
Contacts:	phosphor bronze, gold-plated
Terminals:	phosphor bronze, gold-plated
Case material:	PPS black, rotor: standard types yellow; inverse types red
Construction:	case totally sealed with protective tape
Mounting:	on pc-board – SMD

washable

Models:	Code
SMR 5010	BCD
SMR 5110	BCD Inverse

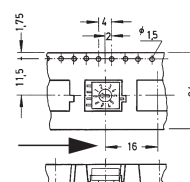


SMR 5016	Hexadecimal
SMR 5116	Hexadecimal Inverse



Packing:	sticks or tapes for order on tape: additional to type number: T example of order: SMR 5010 T
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Stick	Tape	Reel
48 pieces	500 pieces	Ø 330 mm



Subminiature Rotary Coded Switches



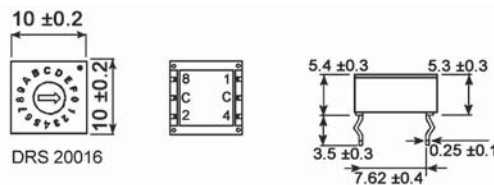
Specifications:

Contact rating:	24 V DC, 25 mA switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 25 °C to + 70 °C
Mechanical life:	minimum 2000 operations
Terminals:	phosphor bronze, gold-plated over nickel barrier
Material:	case: PBT blue, meets UL 94 V–0, washable, rotor: white; inverse type red
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

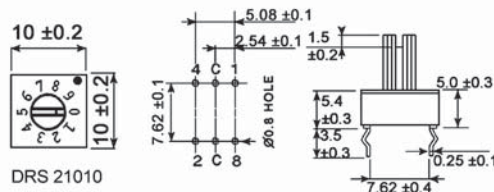
washable

Models: Code

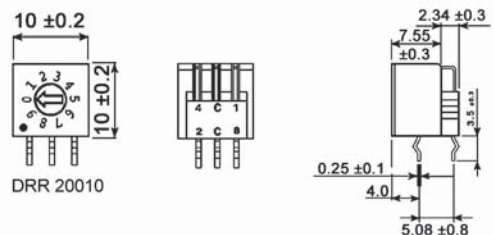
DRS 20010	BCD
DRS 20110	BCD Inverse
DRS 20016	Hexadecimal
DRS 20116	Hexadecimal Inverse



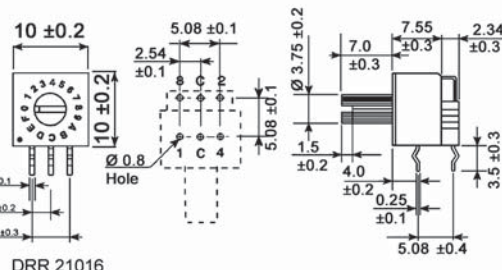
DRS 21010	BCD
DRS 21110	BCD Inverse
DRS 21016	Hexadecimal
DRS 21116	Hexadecimal Inverse



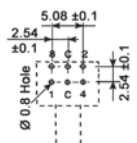
DRR 20010	BCD
DRR 20110	BCD Inverse
DRR 20016	Hexadecimal
DRR 20116	Hexadecimal Inverse



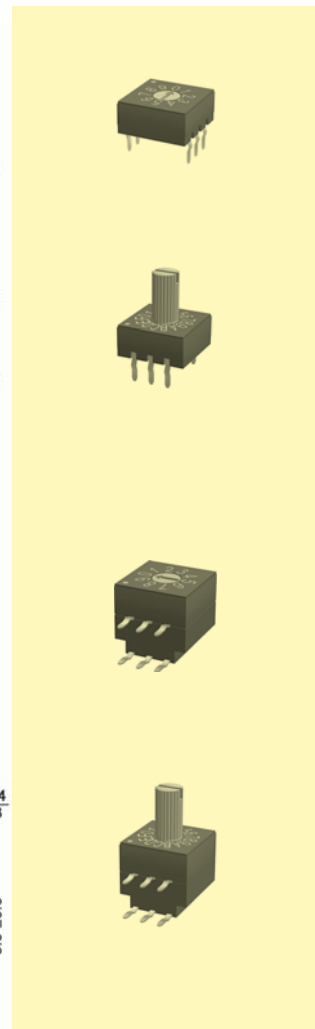
DRR 21010	BCD
DRR 21110	BCD Inverse
DRR 21016	Hexadecimal
DRR 21116	Hexadecimal Inverse

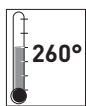


Special version:



Spacing 2.54 mm
Additional to type number: –1
Example of order: DRR 20010-1





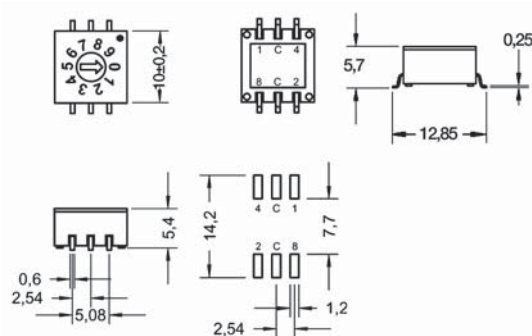
Subminiature Rotary Coded Switches for SMT

Specifications:

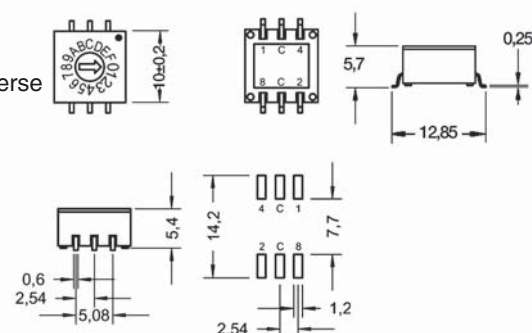
Contact rating:	24 V DC, 25 mA switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 25 °C to + 70 °C
Mechanical life:	minimum 2000 operations
Terminals:	phosphor bronze, gold-plated over nickel barrier
Material:	case: PBT black, meets UL 94 V–0, washable, rotor: white; inverse type red
Mounting:	on pc-board

Models: Code

SMR 20010 BCD
SMR 20110 BCD Inverse



SMR 20016 Hexadecimal
SMR 20116 Hexadecimal Inverse



washable



Packing: 700 pieces per reel

Subminiature Rotary Coded Switches waterproof

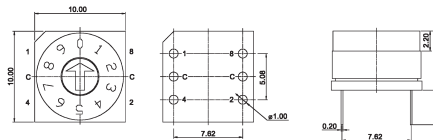


Specifications:

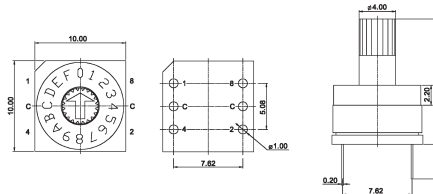
Contact rating:	switching: 150 mA, 42 V non-switching: 200 mA, 42 V
Contact resistance:	< 80 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Storage temperature:	−40 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Terminals:	phosphor bronze, gold-plated over nickel barrier
Material:	case: PA6T meets UL 94 V−0, cover light grey, base black rotor: grey, inverse type beige
Protection:	IP 67
Mounting:	on pc-board with spacing 2.54 mm
Soldering conditions:	wave-soldering – max. 10 sec, 260 °C pre-heat – max. 70 sec, max. 120 °C

Models: Code

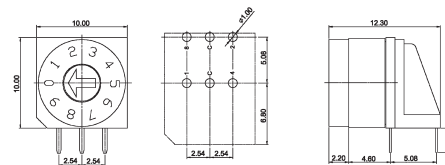
DRS 60010	BCD
DRS 60110	BCD Inverse
DRS 60016	Hexadecimal
DRS 60116	Hexadecimal Inverse



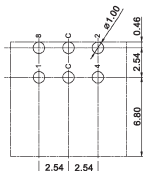
DRS 61010	BCD
DRS 61110	BCD Inverse
DRS 61016	Hexadecimal
DRS 61116	Hexadecimal Inverse



DRR 60010	BCD
DRR 60110	BCD Inverse
DRR 60016	Hexadecimal
DRR 60116	Hexadecimal Inverse



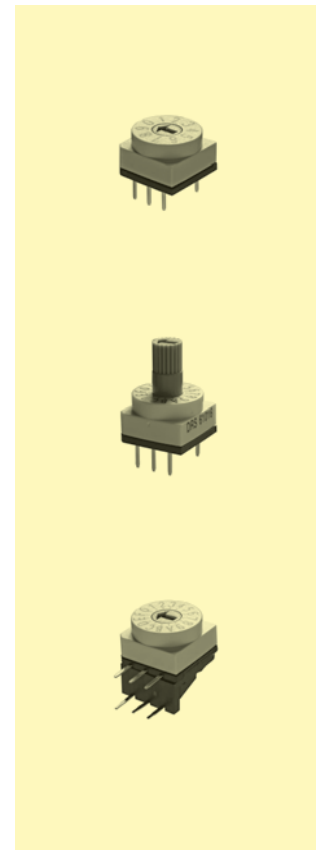
Special version:

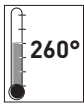


Spacing 2.54 mm

Additional to type number: −1

Example for order: DRR 60010-1





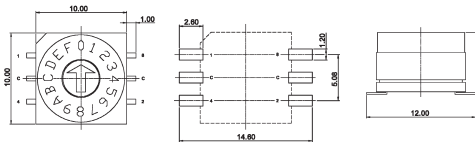
Subminiature Rotary Coded Switches for SMT, waterproof

Specifications:

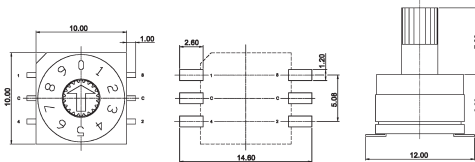
Contact rating:	switching: 150 mA, 42 V non-switching: 200 mA, 42 V
Contact resistance:	<80 mΩ
Insulation resistance:	>100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−60 °C to +125 °C
Storage temperature:	−60 °C to +125 °C
Mechanical life:	minimum 10 000 operations
Terminals:	phosphor bronze, gold-plated over nickel barrier
Material:	case: PA6T grey meets UL 94 V-0 rotor: PA 66 grey, inverse type blue
Protection:	IP 67
Mounting:	on pc-board
Packing:	600 pcs/reel

Models: Code

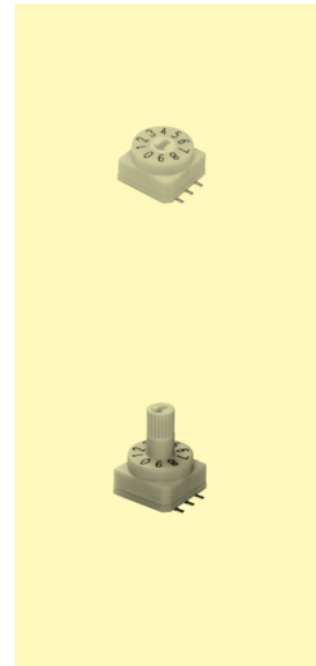
SMR 60010	BCD
SMR 60110	BCD Inverse
SMR 60016	Hexadecimal
SMR 60116	Hexadecimal Inverse



SMR 61010	BCD
SMR 61110	BCD Inverse
SMR 61016	Hexadecimal
SMR 61116	Hexadecimal Inverse



washable



Microminiature Rotary Coded Switches



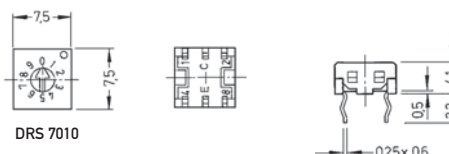
Specifications:

Contact rating:	50 V DC, 100 mA, non-switching 15 V DC, 30 mA, switching
Contact resistance:	< 200 mΩ
Insulation resistance:	> 1000 MΩ at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 25 °C to + 85 °C
Mechanical life:	minimum 20 000 operations
Contacts:	gold-plated
Terminals:	PC terminals, phosphor bronze, gold-plated
Material:	case: PPS, black frame: stainless steel rotor: PA, standard types yellow; inverse types red
Construction:	case totally sealed, suitable for washing by immersion
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 sec, 260 ±3 °C

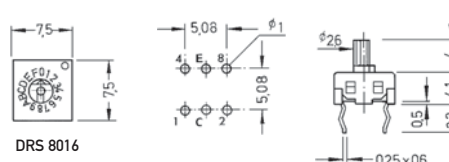
washable

Models: Code

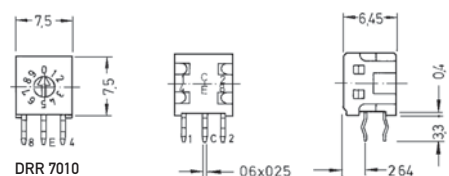
DRS 7010	BCD
DRS 7110	BCD Inverse
DRS 7016	Hexadecimal
DRS 7116	Hexadecimal Inverse



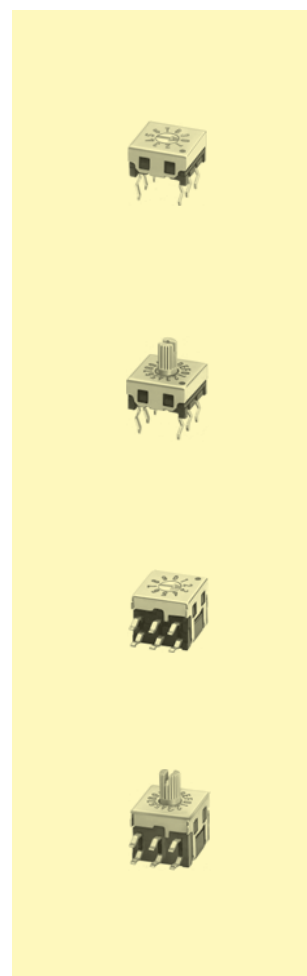
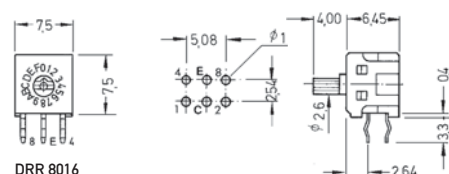
DRS 8010	BCD
DRS 8110	BCD Inverse
DRS 8016	Hexadecimal
DRS 8116	Hexadecimal Inverse

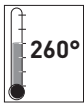


DRR 7010	BCD
DRR 7110	BCD Inverse
DRR 7016	Hexadecimal
DRR 7116	Hexadecimal Inverse



DRR 8010	BCD
DRR 8110	BCD Inverse
DRR 8016	Hexadecimal
DRR 8116	Hexadecimal Inverse





Microminiature Rotary Coded Switches for SMT

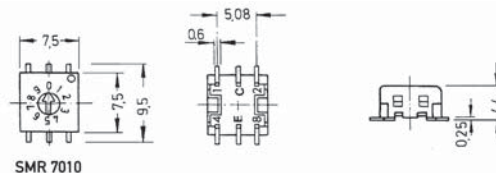
Specifications:

Contact rating:	50 V DC, 100 mA, non-switching 15 V DC, 30 mA, switching
Contact resistance:	< 200 mΩ
Insulation resistance:	> 1000 MΩ at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 25 °C to + 85 °C
Mechanical life:	minimum 20 000 operations
Contacts:	gold-plated
Terminals:	phosphor bronze, gold-plated
Material:	case: PPS, black; frame: stainless steel rotor: PA, standard types yellow; inverse types red
Construction:	case totally sealed, suitable for washing by immersion
Mounting:	on pc-board – SMD

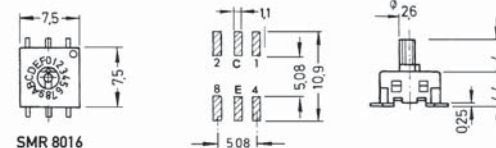
washable

Models: Code

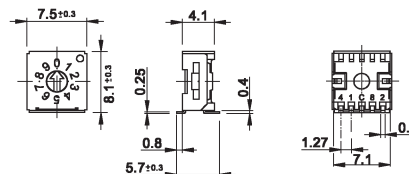
SMR 7010-1	BCD
SMR 7110-1	BCD Inverse
SMR 7016-1	Hexadecimal
SMR 7116-1	Hexadecimal Inverse



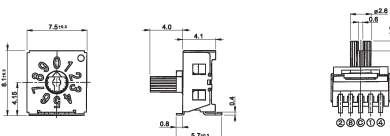
SMR 8010-1	BCD
SMR 8110-1	BCD Inverse
SMR 8016-1	Hexadecimal
SMR 8116-1	Hexadecimal Inverse



SMRR 7010-1	BCD
SMRR 7110-1	BCD Inverse
SMRR 7016-1	Hexadecimal
SMRR 7116-1	Hexadecimal Inverse

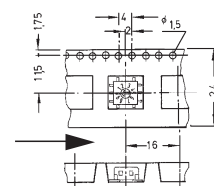


SMRR 8010-1	BCD
SMRR 8110-1	BCD Inverse
SMRR 8016-1	Hexadecimal
SMRR 8116-1	Hexadecimal Inverse



Packing:	sticks or tapes for order on tape: additional to type number: T example of order: SMR 7010-1 T
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Models	Stick	Tape	Reel
SMR	50 pieces; L 450 mm	1000 pieces	Ø 330 mm
SMRR	50 pieces; L 435 mm	500 pieces	Ø 330 mm



Microminiature Rotary Coded Switches

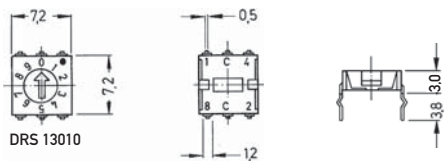


Specifications:

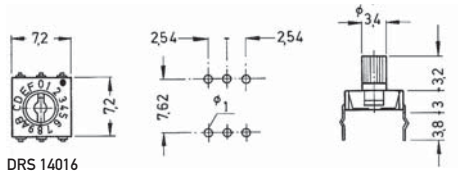
Contact rating:	50 V DC, 100 mA, non-switching 5 V DC, 100 mA, switching
Contact resistance:	< 200 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 25 °C to + 75 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold-plated
Terminals:	PC terminals, phosphor bronze, gold-plated
Case material:	thermoplastic; rotor: standard types ivory; inverse types red
Construction:	case totally sealed, suitable for washing by immersion
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 3 sec, 250 °C

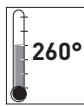
washable

Models:	Code
DRS 13010	BCD
DRS 13110	BCD Inverse
DRS 13016	Hexadecimal
DRS 13116	Hexadecimal Inverse



DRS 14010	BCD
DRS 14110	BCD Inverse
DRS 14016	Hexadecimal
DRS 14116	Hexadecimal Inverse





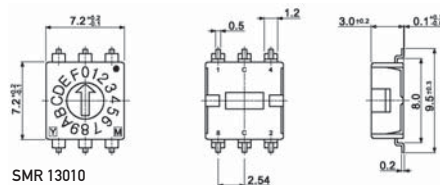
Microminiature Rotary Coded Switches for SMT

Specifications:

Contact rating:	50 V DC, 100 mA, non-switching 5 V DC, 100 mA, switching
Contact resistance:	< 200 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 25 °C to + 75 °C
Mechanical life:	minimum 20 000 operations
Contacts:	phosphor bronze, gold-plated
Material:	case: LCP; frame: stainless steel rotor: PA, standard types ivory; inverse types red
Construction:	case totally sealed, suitable for washing by immersion
Mounting:	on pc-board – SMD
Soldering conditions:	reflow-soldering

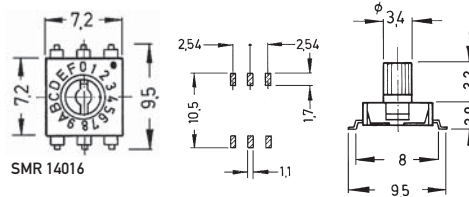
Models: Code

SMR 13010	BCD
SMR 13110	BCD Inverse
SMR 13016	Hexadecimal
SMR 13116	Hexadecimal Inverse



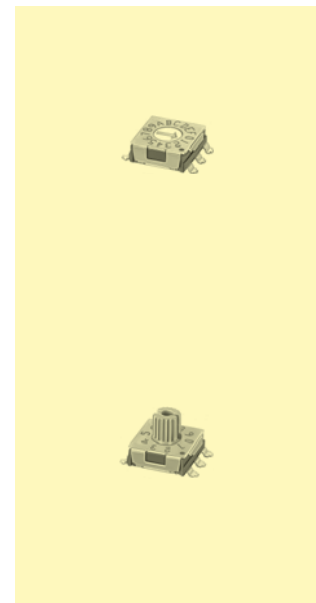
SMR 13010

SMR 14010	BCD
SMR 14110	BCD Inverse
SMR 14016	Hexadecimal
SMR 14116	Hexadecimal Inverse



SMR 14016

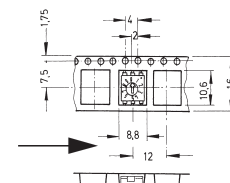
washable



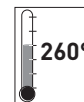
8

Packing: sticks or tapes
for order on tapes: additional to type number: T
example of order: SMR 13010 T

Models	Stick	Tape	Reel
SMR 13 000	65 pieces; L 510 mm	1000 pieces	Ø 330 mm
SMR 14 000	65 pieces; L 510 mm	–	–



Microminiature Rotary Coded Switches waterproof



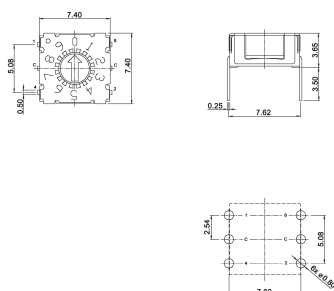
Specifications:

Contact rating:	42 V DC, 400 mA non-switching 42 V DC, 100 mA switching
Contact resistance:	< 80 mΩ
Insulation resistance:	> 100 MΩ at 250 V DC for 1 minute ± 5 sec.
Dielectric strength:	250 V (50/60 Hz) for 1 minute
Operating temperature:	–50 °C to +125 °C
Storage temperature:	–55 °C to +135 °C
Mechanical life:	minimum 25 000 cycles
Material:	Cover/spring plate/guide plate: stainless steel Contact/terminal: phosphor bronze, >0,07 µm gold-plated over >0.3 µm nickel Rotor/base: PA66 O-ring: silicone
Actuator colour:	BCD real: pink; BCD inverse: orange; Hex real: grey; Hex inverse: ivory
Protection:	IP 67
Operating force:	120 ± 30 gf/cm
Soldering conditions:	wave-soldering – max.: 260 °C ±5 °C, 5 ±1 sec., IR reflow soldering

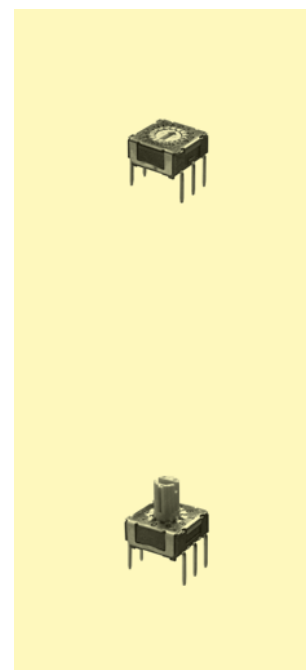
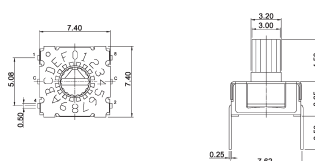
washable

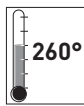
Models: Code

DRS 15010	BCD
DRS 15110	BCD Inverse
DRS 15016	Hexadecimal
DRS 15116	Hexadecimal Inverse



DRS 16010	BCD
DRS 16110	BCD Inverse
DRS 16016	Hexadecimal
DRS 16116	Hexadecimal Inverse



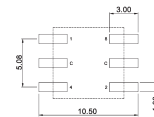
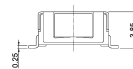
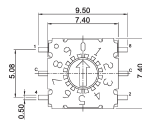


Microminiature Rotary Coded Switches for SMT

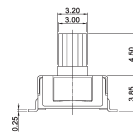
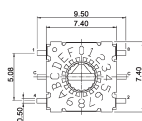
Specifications:

Contact rating:	42 V DC, 400 mA non-switching 42 V DC, 100 mA switching
Contact resistance:	< 80 mΩ
Insulation resistance:	> 100 MΩ at 250 V DC for 1 minute ± 5 sec.
Dielectric strength:	250 V (50/60 Hz) for 1 minute
Operating temperature:	–50 °C to +125 °C
Storage temperature:	–55 °C to +135 °C
Mechanical life:	minimum 25 000 cycles
Material:	Cover/spring plate/guide plate: stainless steel Contact/terminal: phosphor bronze, >0.07 µm gold-plated over >0.3 µm nickel Rotor/base: PA66 O-ring: silicone
Actuator colour:	BCD real: pink; BCD inverse: orange; Hex real: grey; Hex inverse: ivory
Protection:	IP 67
Operating force:	120 ± 30 gf/cm

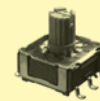
Models:	Code
SMR 15010	BCD
SMR 15110	BCD Inverse
SMR 15016	Hexadecimal
SMR 15116	Hexadecimal Inverse



SMR 16010	BCD
SMR 16110	BCD Inverse
SMR 16016	Hexadecimal
SMR 16116	Hexadecimal Inverse



washable



Packing:

SMR 15	☐ ☐	1300 pieces/reel
SMR 16	☐ ☐	600 pieces/reel

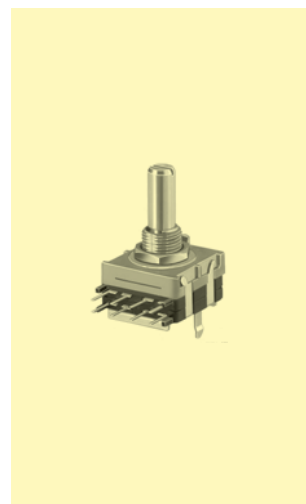
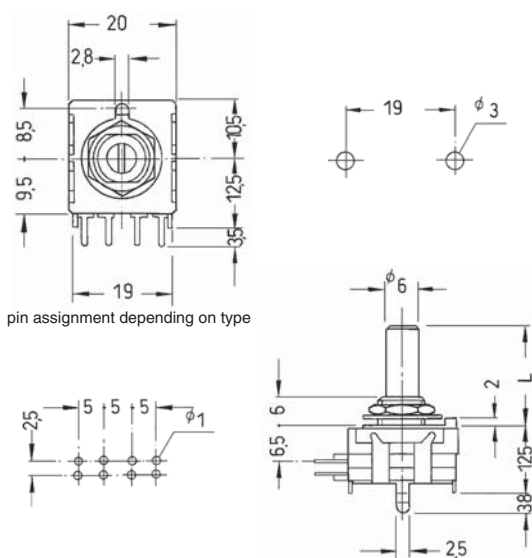
Miniature Rotary Coded Switches

Specifications:

Contact rating:	15 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 80 °C
Mechanical life:	minimum 10 000 operations
Contacts:	combination of silver- and gold-plated
Material:	case: PBT with glass fibre 30%; shaft: aluminium
Mounting:	on pc-board or front panel, bushing M 9 x 0.75, key 12 mm
Soldering conditions:	max.: 3 sec, 230 °C ± 5 °C

Models:

DRS 20



Ordering code:

* **DRS 20 - 108 - R 20 - 1**

Series	Code
number of poles	Binary
1 – 3	Binary inverse
	BCD
	BCD inverse
	Gray
number of positions / angle of changeover	1
8 10 16 18 24 32 40	2
45° 36° 22.5° 20° 15° 11.25° 9°	3
	4
	5
	shaft length (mm)
	15 20 25 30
	shaft style
	18-tooth serration shaft S
	round shaft with groove R
	flat shaft F

* Non-stock item; minimum quantity and delivery time on request

BCD

	0	1	2	3	4	5	6	7	8	9
8									X	X
4					X	X	X	X		
2			X	X			X	X		
1		X		X		X		X		X

Hexadecimal

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
8									X	X	X	X	X	X	X	X
4					X	X	X	X					X	X	X	X
2			X	X			X	X			X	X			X	X
1		X		X		X		X		X		X		X		X

BCD Inverse

	0	1	2	3	4	5	6	7	8	9
$\bar{8}$	X	X	X	X	X	X	X	X		
$\bar{4}$	X	X	X	X					X	X
$\bar{2}$	X	X			X	X			X	X
$\bar{1}$	X		X		X		X		X	

Hexadecimal Inverse

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
$\bar{8}$	X	X	X	X	X	X	X	X								
$\bar{4}$	X	X	X	X					X	X	X	X				
$\bar{2}$	X	X			X	X			X	X			X	X		
$\bar{1}$	X		X		X		X		X		X		X		X	

9

Rotary Switches



Type	Operating positions	Poles	Special feature	Page
MR	2 – 12	1 – 4		160
MRS 18	2 – 8	1 – 2		161
MRS 10 H	2 – 6	1 – 6	Operating at the side	162
MRS 12	9	1	11.4 x 13 mm	163
SMR 1-30	2	1	washable, 5 x 5 mm	164

Miniature Rotary Switches

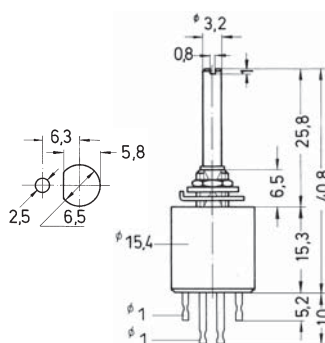
Specifications:

Contact rating:	step angle between 2 positions 30°: 125 V AC, 0.15 A 24 V DC, 0.15 A step angle between 2 positions 36°: 125 V AC, 0.5 A 24 V DC, 0.5 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Humidity resistance:	10 MΩ after 48 h at 40° C and 95 % relative humidity
Operating temperature:	– 45 °C to + 110 °C
Electrical life:	10 000 – 30 000 operations depending on load
Contacts:	coin silver
Material:	body: diallyl-phthalate, cover: aluminium shaft: brass, nickel-plated
Contact timing:	non-shorting
Mounting:	bushing $\frac{1}{4}$ " with locking plate or flat bush – 40 THD, key 8 mm axis $\frac{1}{8}$ "

Models:	Poles	Positions
MR 1 – 10*	1	10
MR 1 – 10 C	1	10
MR 2 – 5*	2	5
MR 3 – 3*	3	3
MR 4 – 2	4	2

C = without stopper

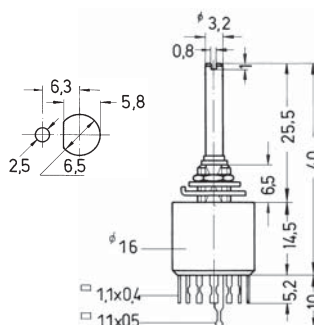
* On MR switches, the number of positions can be reduced by changing the positions of the inner ring. For using all positions, this ring has to be removed.



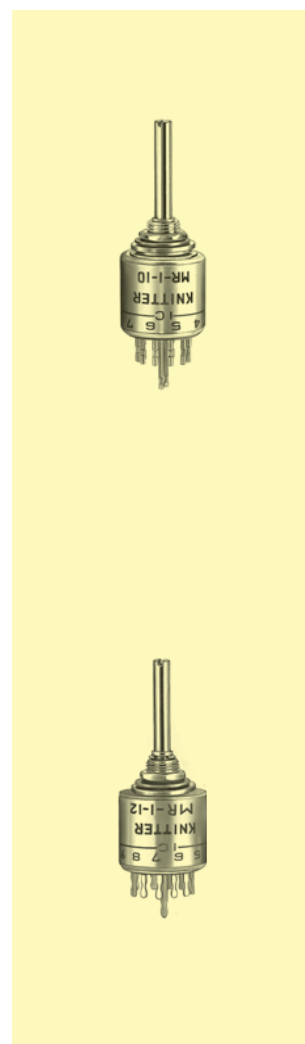
Angle between
2 positions 36°

MR 1 – 12*	1	12
MR 2 – 6	2	6
MR 3 – 4	3	4
MR 4 – 3	4	3

* without stopper



Angle between
2 positions 30°



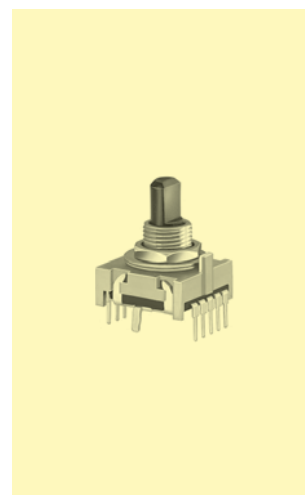
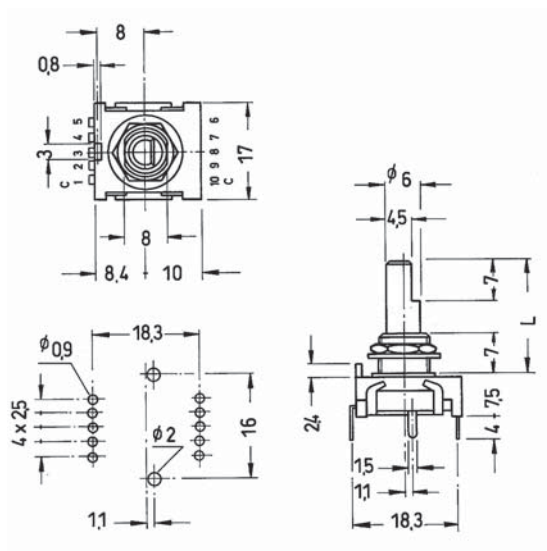
Miniature Rotary Switches

Specifications:

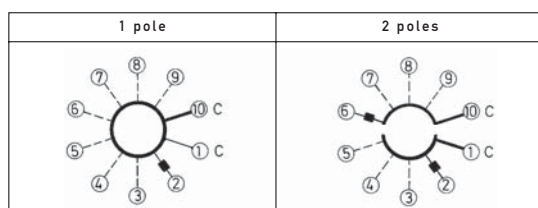
Contact rating:	16 V DC, 300 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 80 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold
Material:	case: PBT with glass fibre 30%; shaft: PA, flat
Angle between 2 positions:	30°
Mounting:	on pc-board or front panel, bushing M 9 x 0.75, key 12 mm
Contact timing:	non-shorting
Soldering conditions:	max.: 3 sec, 260 °C

Models:

MRS 18 V

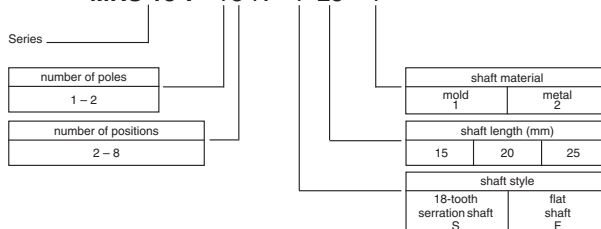


Circuit diagram:



Ordering code:

* MRS 18 V - 15 N - F 25 - 1



* Non-stock item; minimum quantity and delivery time on request

Miniature Rotary Switches

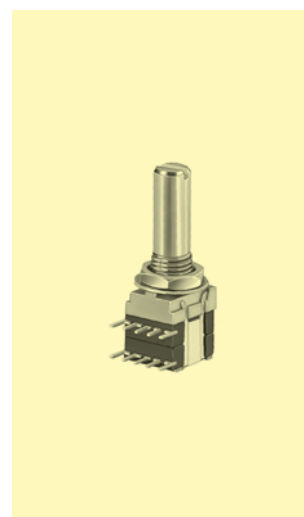
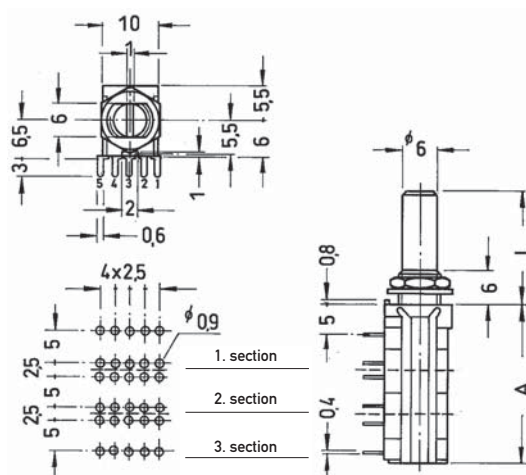
Specifications:

Contact rating:	16 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 80 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold-plated
Material:	case: PBT with glass fibre 30%; shaft: aluminium
Angle between 2 positions:	30°
Mounting:	on pc-board or front panel, bushing M 7 x 0.75, key 10 mm
Soldering conditions:	max.: 3 sec, 230 °C ± 5 °C

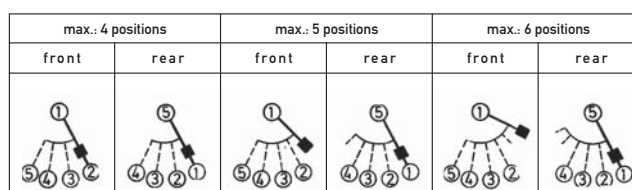
Models:

MRS 10 H

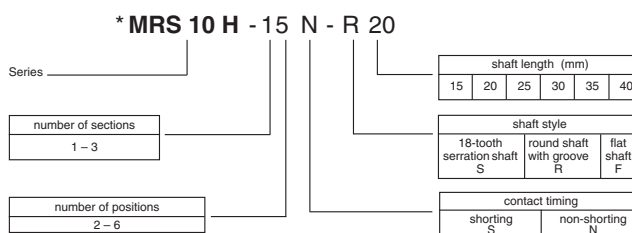
Measure A:
 1 section 12.0 mm
 2 sections 19.5 mm
 3 sections 27.0 mm



Circuit diagram:



Ordering code:

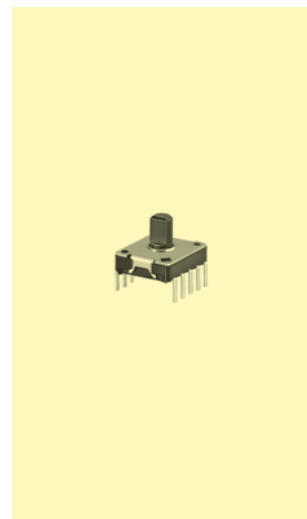
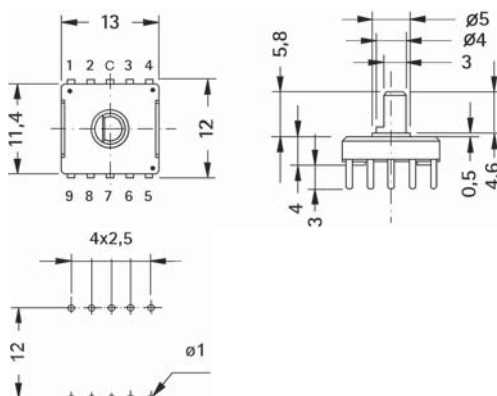


* Non-stock item; minimum quantity and delivery time on request.

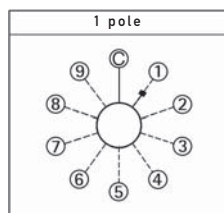
Specifications:

Contact rating:	16 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 20 °C to + 80 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold
Material:	case: PBT with glass fibre 30%; shaft: PA, flat
Angle between 2 positions:	40°, 9 positions
Mounting:	on pc-board
Contact timing:	non-shorting
Operating force:	250 ± 100 gf. cm
Soldering conditions:	max.: 3 sec, 260 °C

Models:	Poles
MRS 12 V – 19	1



Circuit diagram:



Microminiature Rotary Switches for SMT



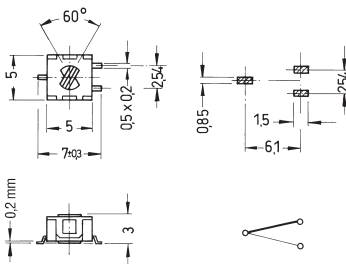
Specifications:

Contact rating:	12 V DC, 50 mA min. 20 mV DC / 5 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 50 000 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	– 30 °C to + 85 °C
Mechanical life:	minimum 800 operations
Contacts:	gold-plated over nickel barrier
Terminals:	gold-plated over nickel barrier
Material:	case: PPS thermoplastic meets UL 94 V–0, washable frame: stainless steel
Mounting:	on pc-board – SMD
Soldering conditions:	reflow-soldering – max.: 10 sec ±1 sec, 250 °C ± 10 °C

Models: Switching functions

SMR 1–30

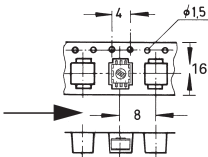
on – on



washable



Packing: on tapes: 2500 pieces; reel Ø 333 mm



10 | Encoder

10.1 Standard Encoder



MER 9 / MERP 9

166 – 167

MER 11 / MERS 11 / MERP 11 / MERPS 11

168 – 170

MRP 1

171

10.2 Illuminated Encoder



MER 12 / MERP 12

172 – 174

10.3 Hollow Shaft Encoder



MER 10-12 R7

175

MER 23

176

MER 1045-24

177

10.4 Optical Encoder



MEOP 19

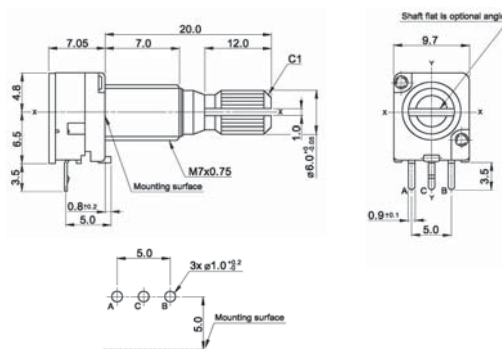
178

Specifications:

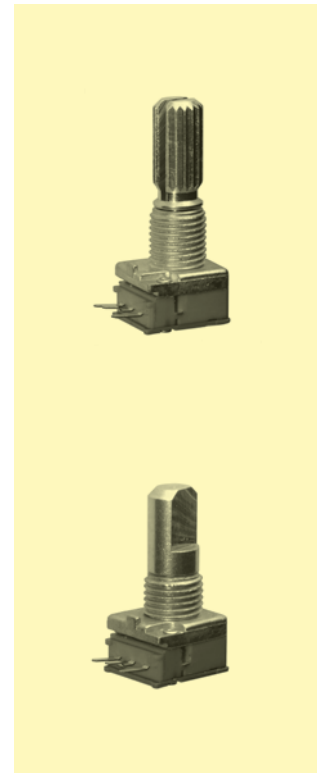
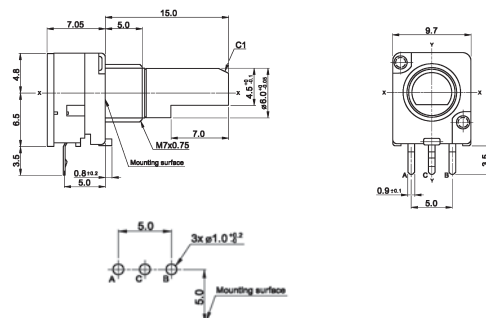
Contact rating:	5 V DC, 1 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	−40 °C to +85 °C
Rotational/Detent torque:	0.5/1.0 Ncm
Pulses/Detents per turn:	15/30
Mechanical life:	> 15 000 cycles
Pushbutton (optional):	actuation force 5 N, travel 0.5 mm, life > 10 000 operations
Contacts:	silver-plated
Terminals:	silver-plated
Mounting:	on pc-board
	single hole mounting M 7 x 0.75
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

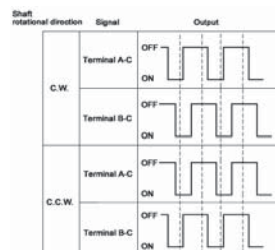
MER9-15220BM7R



MER9-15115AM7R

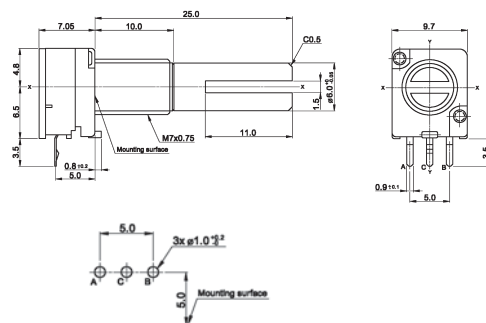


Output signal format:

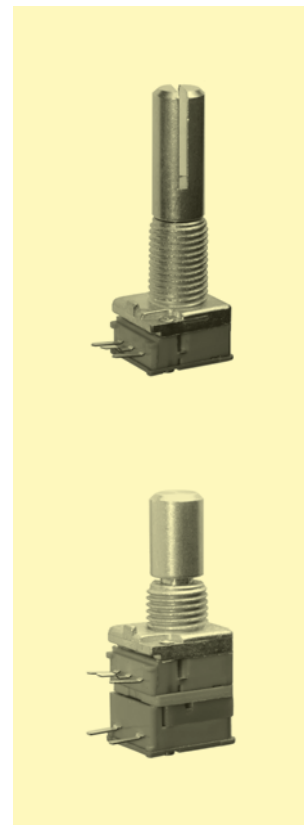
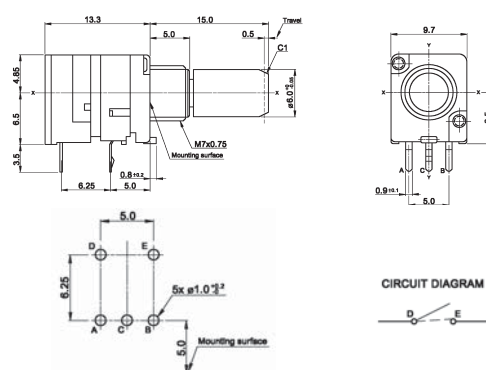


Models:

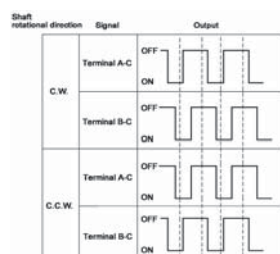
MER9-15325CM7R



MERP9-15415AM7R



Output signal format:



Ordering code 9 mm Encoder:

Ordering code 9 mm Encoder: MER 9 -

Switch function:
☐ no switch
☐ switch

Shaft type:
☐ 1 flat shaft
☐ 2 knurled shaft
☐ 3 cut shaft
☐ 4 round shaft

Bushing:
☐ A 5 mm
☐ B 7 mm
☐ C 10 mm

Orientation:
☐ R horizontal

Number of pulses:
☐ 12 12 pulses
☐ 15 15 pulses

Shaft length:
☐ 15 15 mm
☐ 20 20 mm
☐ 25 25 mm

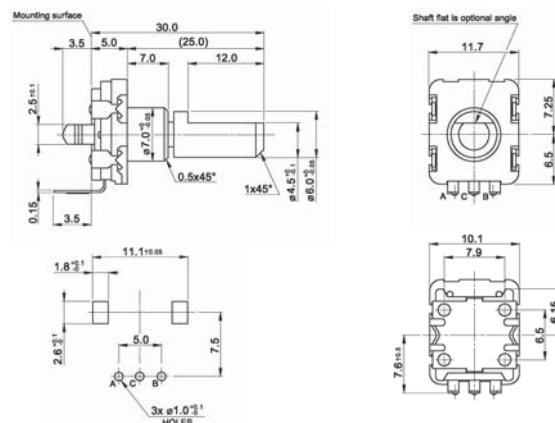
Bushing thread:
☐ M7 M7
☐ no thread

Specifications:

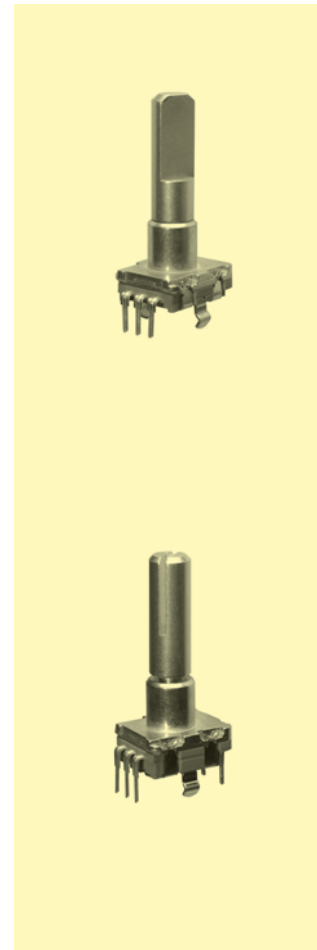
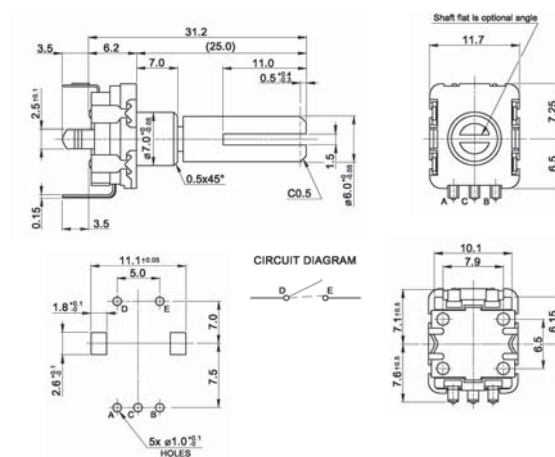
Contact rating:	5 V DC, 10 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	−10 °C to +85°C
Rotational/Detent torque:	0.5/1.2 Ncm
Pulses/Detents per turn:	15/30 or 20/20
Mechanical life:	> 15 000 cycles
Pushbutton (optional):	actuation force 6 N, travel 0.5 mm, life > 25 000 operations
Contacts:	silver-plated
Terminals:	silver-plated
Mounting:	on pc-board
	single hole mounting, bushing M 7 x 0.75
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

MER11-15125B

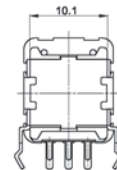
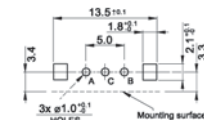
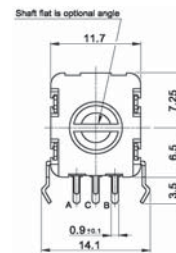
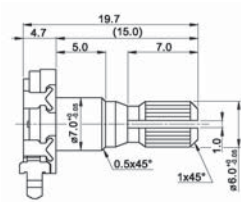


MERP11-15325B

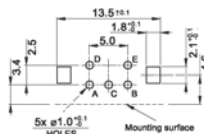
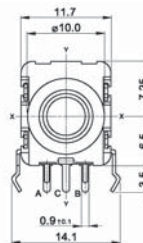
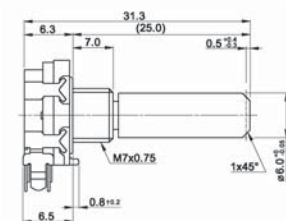


Models:

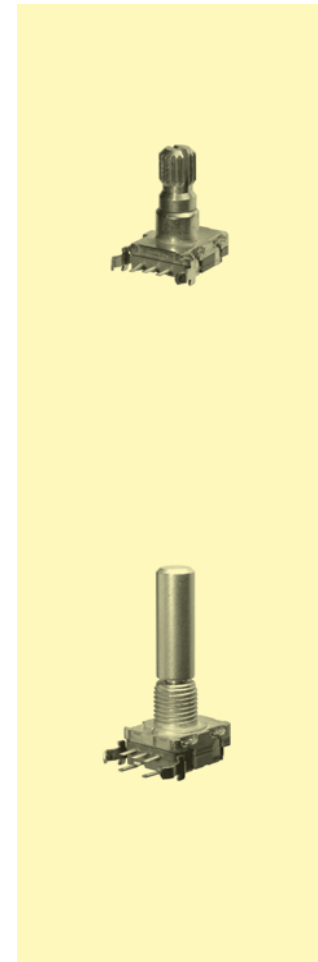
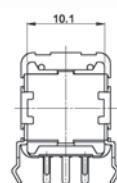
MER11-15215A-R



MERP11-20425BM7-R



CIRCUIT DIAGRAM



Output signal format:

Shaft rotational direction	Signal	Output
C.W.	Terminal A-C OFF	
	ON	
C.C.W.	Terminal B-C OFF	
	ON	

Ordering code 11 mm Encoder:

MER - -

Switch function:
☐ no switch
☐ switch

Number of pulses:
 15 pulses
 20 pulses

Shaft type:
 flat shaft
 knurled shaft
 cut shaft
 round shaft

Bushing:
 5 mm
 7 mm

Orientation:
☒ horizontal
☐ vertical

Shaft length:
 15 mm
 17.5 mm
 20 mm
 25 mm

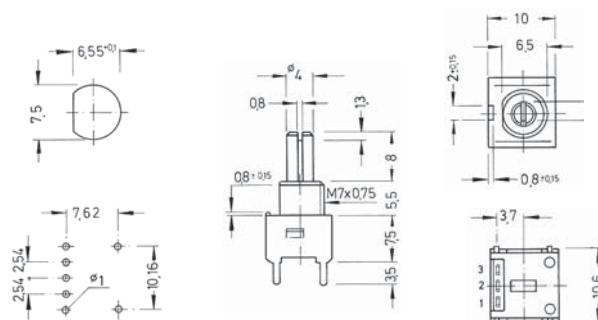
Bushing thread:
 M7
 no thread

Specifications:

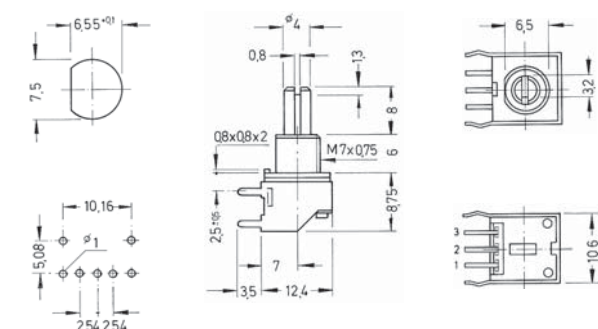
Contact rating:	5 V DC, 10 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−25 °C to +70 °C
Mechanical life:	minimum 10 000 operations
Contacts:	phosphor bronze, gold-plated
Terminals:	PC terminals
Material:	case: PBT black; frame: steel, tin-plated; rotor: PA
Mounting:	on pc-board or single hole mounting, bushing M 7 x 0.75, key 11 mm
Soldering conditions:	wave-soldering – max.: 5 sec, 250 °C ± 5 °C

Models:

MRP 1 – 20



MRP 1 – 20 – R



Mounting set for single hole mounting

1 nut M 7 x 0.75, key 11 mm

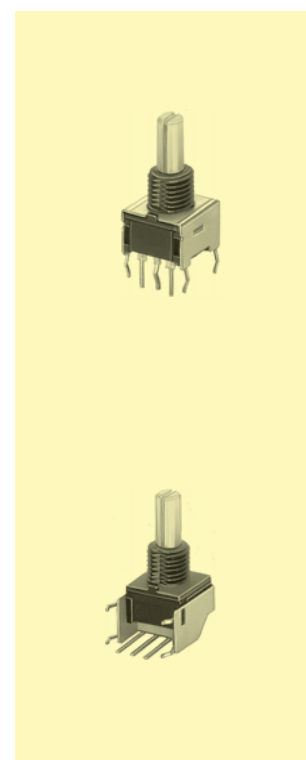
1 washer Ø 12 mm

Order number

RR 775

Circuit diagram – 20 pulses/circle ± 2 pulses

Contact behaves pulse	0	18°	36°	324°	342°	360°
2-1 on						
2-1 off						
2-3 on						
2-3 off						



Encoder

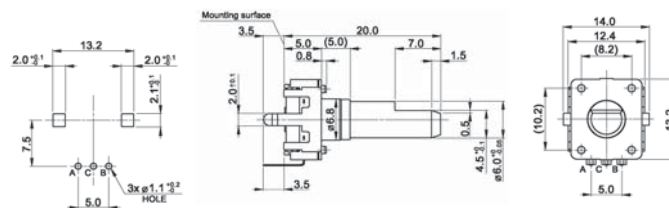


Specifications:

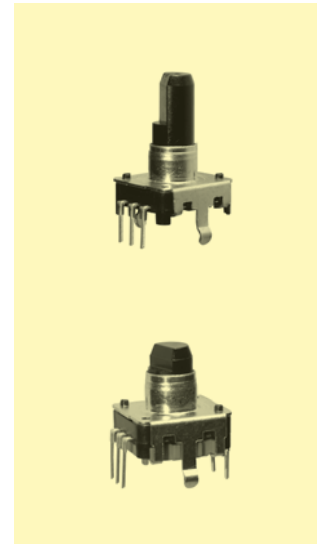
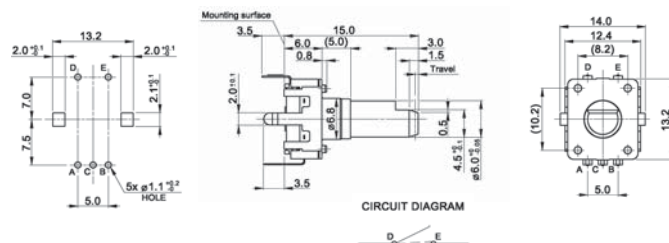
Contact rating:	5 V DC, 0.5 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	−10 °C to +70 °C
Rotational/Detent torque:	0.5 N/2.0 Ncm
Pulses/Detents per turn:	12/24 or 24/24 (12/12, 12/0, 24/0 on demand)
Mechanical life:	> 30 000 cycles
Pushbutton (optional):	actuation force 3 N, travel 0.5 mm, life > 20 000 operations
Contacts:	silver-plated
Terminals:	silver-plated
Mounting:	on pc-board
	single hole mounting, bushing M 9 x 0.75
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

MER12-24120



MERP12-24115



Output signal format:

Shaft rotational direction	Signal	Output
C.W.	Terminal A-C	OFF
	Terminal B-C	ON
C.C.W.	Terminal A-C	OFF
	Terminal B-C	ON

Ordering code 12 mm Encoder:

Switch function:
☐ no switch
☒ switch

Orientation:
☒ horizontal
☐ vertical

Detent:
☐ with
☒ without

Shaft type:
☒ flat shaft

Number of pulses:
☒ 12 pulses
☐ 24 pulses

Shaft length:
☒ 8,5 mm
☐ 15 mm
☐ 17,5 mm
☐ 20 mm
☐ 25 mm

Ordering code: MER 12 -

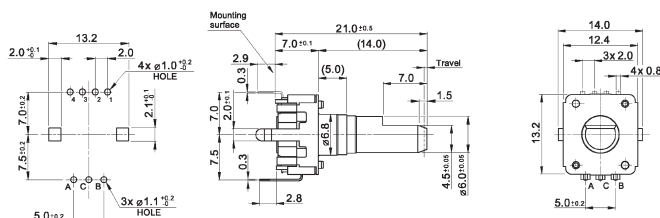
Illuminated Encoder

Specifications:

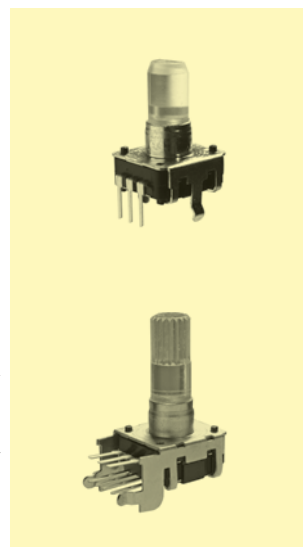
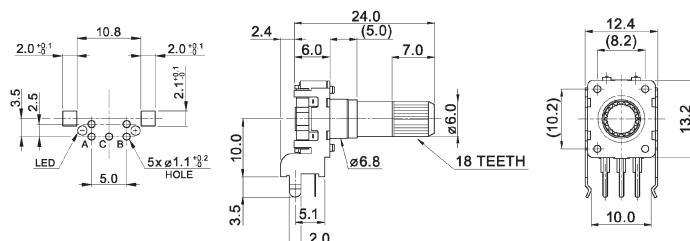
Contact rating:	5 V DC, 0.5 mA
Insulation resistance:	>100 MΩ at 250 V DC / 1 mA
Dielectric strength:	300 V AC for 1 minute
Operating temperature:	−10 °C to +70 °C
Rotational/Detent torque:	0.5 Ncm/2.0 Ncm
Pulse/Detents per turn:	12/12 or 24/24, version "N": no detent
Mechanical life (cycle function):	minimum 30 000 cycles
Pushbutton (optional):	Operating force: 4 N, travel 0.5 mm, mechanical life >20 000 operations
Contacts:	silver-plated
Terminals:	silver-plated
Mounting:	on pc-board with pin-contact optional single hole mounting, bushing M 9 x 0.75
Illuminating:	Types with push button: 2 LED; types without push button: 1 LED
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

MERP12-24121BG



MER12-12224RE-R



Ordering code 12 mm Encoder:

Switch function:

- ☐ no switch
☒ switch

Detent:

- ☐ with
☒ without

Shaft type:

- 1 flat shaft
- 2 knurled shaft

Bushing thread:

- | | |
|----|-----------|
| M9 | M9 |
| | no thread |

Shaft length:
on demand

on demand

LED colour:

- | | |
|----|------------------|
| BL | blue (for MER) |
| RE | red (for MER) |
| GN | green (for MER) |
| OA | orange (for MER) |
| WH | white (for MER) |

- | | |
|--|-------------------------|
| OB | orange, blue (for MERP) |
| BG | blue, green (for MERP) |
| GR | red, green (for MERP) |

Output signal format:

Shift rotational direction	Signal	Output	
C.W.	Terminal A-C	OFF	
		ON	
	Terminal B-C	OFF	
		ON	
C.C.W.	Terminal A-C	OFF	
		ON	
	Terminal B-C	OFF	
		ON	

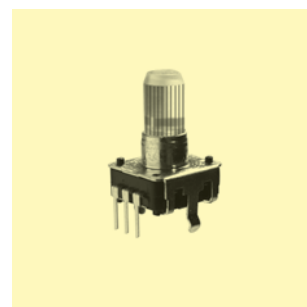
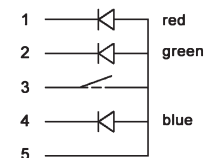
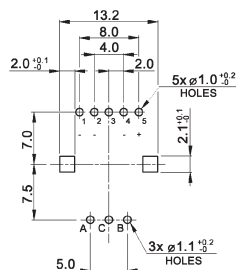
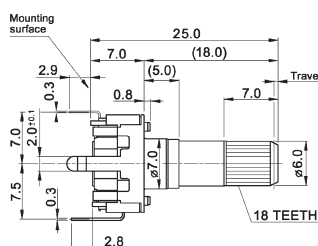
Illuminated Encoder

Specifications:

Contact rating:	5 V DC, 0.5 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +70 °C
Rotational/Detent torque:	0.5 Ncm / 2.0 Ncm
Pulses/Detents per turn:	12/12 or 24/24, version "N": no detent
Mechanical life (cycle function):	minimum 30 000 turns
Pushbutton function:	Actuation force 4.5 ± 2 N, travel 0.5 mm, mechanical life >20 000 operations
Material:	Contacts: stainless steel, silver-plated
Contacts and terminals:	silver-plated
Mounting:	on pc-board with pin-contact
Illuminating:	RGB-LED
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

MERP12-24225M



Output signal format:

Shaft rotational direction	Signal	Output
C.W.	Terminal A-C	OFF ON
	Terminal B-C	OFF ON
C.C.W.	Terminal A-C	OFF ON
	Terminal B-C	OFF ON

Ordering code 12 mm Encoder:

Switch function: ☒ switch

Detent: ☐ with ☒ without

Shaft type: ☒ 116 flat 16 mm ☐ 118.5 flat 18.5 mm ☐ 121 flat 21 mm ☐ 126 flat 26 mm ☐ 131 flat 31 mm ☐ 225 knurled 25 mm

Bushing thread: ☒ M9 ☐ no thread

LED colour: ☒ RGB-LED

Orientation: ☒ horizontal ☐ vertical

Number of pulses: ☒ 12 pulses ☐ 24 pulses

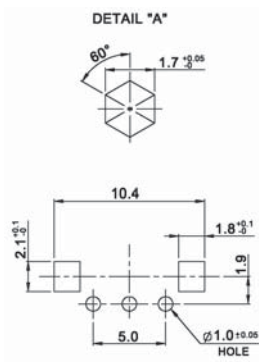
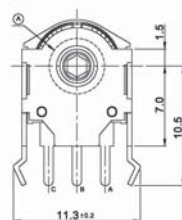
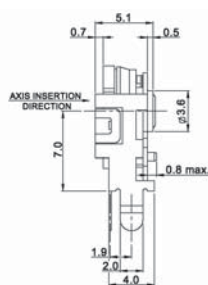
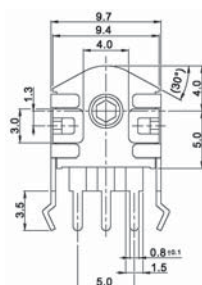
Ordering code: MER P 12 ☐ ☐ ☐ M - ☐

Specifications:

Contact rating:	5 V DC, 1 mA
Contact resistance:	< 1 Ω
Insulation resistance:	> 10 M Ω
Dielectric strength:	50 V, 50 Hz for the duration of 1 minute
Operating temperature:	-5 °C to +45 °C
Rotational torque:	0.5 $\pm$ 0.3 Ncm
Pulses/Detents per turn:	12/24
Mechanical life:	minimum 100 000 turns
Contacts and terminals:	silver-plated
Mounting:	on pc-board with pin-contact
Soldering conditions:	wave-soldering: max. 3 s, max. 260 °C; pre-heat: max. 60 s, max. 100 °C

Models:

MER10-12 R7



Output signal format:

Shaft rotational direction	Signal	Output
C.W.	Terminal A-C	OFF ON
	Terminal B-C	OFF ON
C.C.W.	Terminal A-C	OFF ON
	Terminal B-C	OFF ON

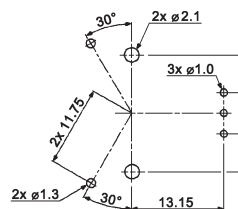
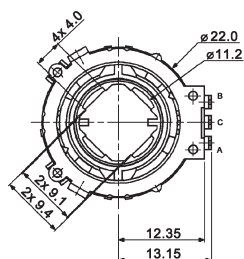
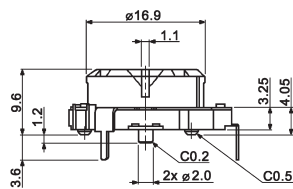
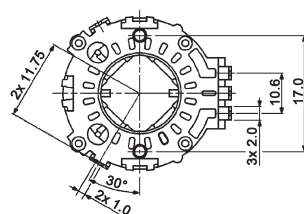
Hollow Shaft Encoder

Specifications:

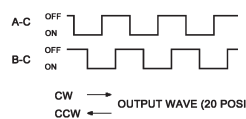
Contact rating:	5 V DC, 10 mA
Contact resistance:	<1 Ω
Insulation resistance:	>100 M Ω
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +70 °C
Rotational torque:	0.6 $\pm$ 0.41 Ncm
Pulses/Detents per turn:	20/20
Mechanical life:	minimum 30 000 turns
Material:	Contacts: stainless steel, silver-plated
Contacts and terminals:	silver-plated
Mounting:	on pc-board with pin-contact
Soldering conditions:	wave-soldering: max. 5 s max. 250 °C; pre-heat: max. 60 s max. 100 °C

Models:

MER23-20



Output signal format:

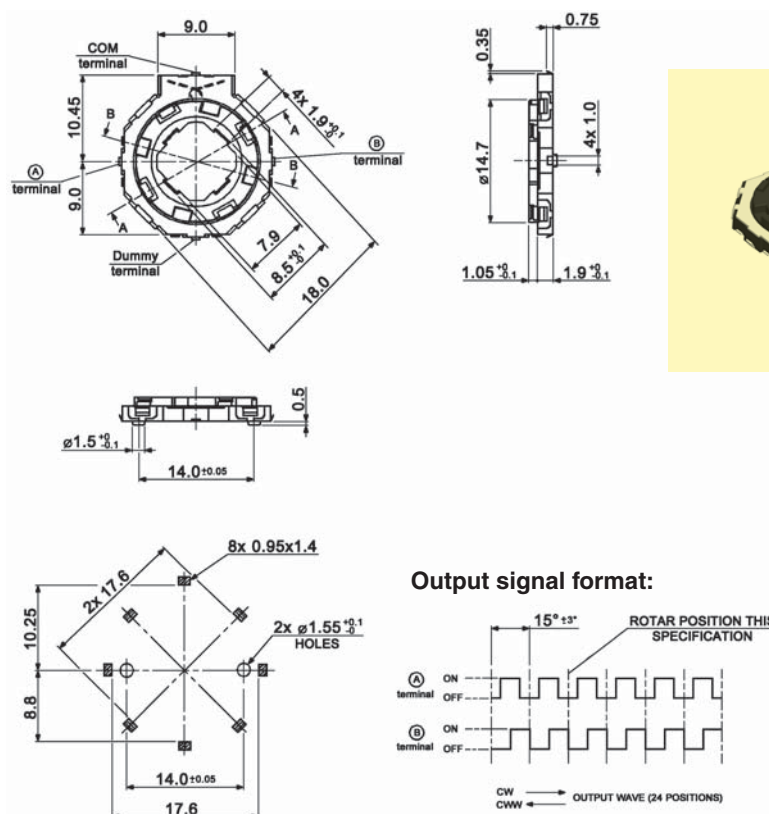


Specifications:

Contact rating:	5 V DC, 10 mA
Contact resistance:	$< 1 \Omega$
Insulation resistance:	$> 100 M\Omega$
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10°C to $+60^{\circ}\text{C}$
Rotational torque:	$0.3 \pm 0.05 \text{ Ncm}$
Pulses/Detents per turn:	24/24
Mechanical life:	minimum 50 000 turns
Contacts and terminals:	silver-plated
Mounting:	on pc-board – SMD
Soldering conditions:	reflow-soldering, max. 10 sec, max. 240°C

Models:

MER1045-24



11

Micro / Snap Action Switches

11.1 Miniature Micro / Snap Action Switches



TMV

180

DM – VMS

181 – 183

11.2 Subminiature Micro / Snap Action Switches



DM – SM

184 – 186

DM – SW IP 51

187 – 188

11.3 Microminiature Micro / Snap Action Switches



DM – DM

189

DM – SSM

190

Miniature Micro / Snap Action Switches



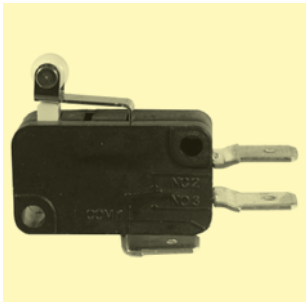
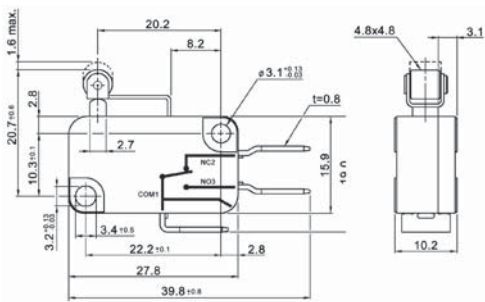
Specifications:

Contact rating:	250 V AC, 10 A
Contact resistance:	< 15 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	−25 °C to +65 °C
Mechanical life:	minimum 20 000 000 operations
Contacts:	silver-alloy
Terminals:	brass, silver-plated
Case:	PBT (UL 94 V-0)
Mounting:	on panel, hole Ø 3.1 mm
Timing:	non-shorting, positive break (force-driven)

Models: Switching function

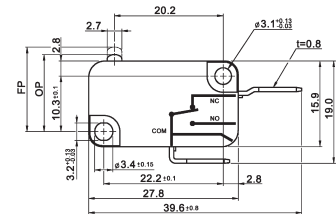
SPDT

TMV 104 C on – mom

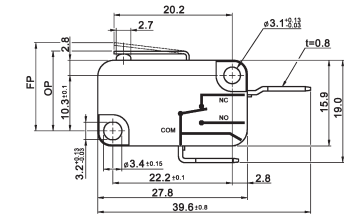


Actuator:

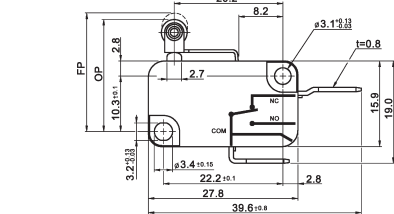
Actuator 0



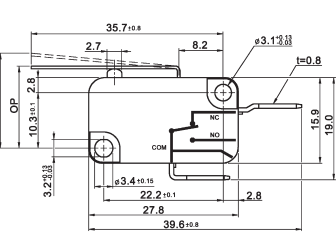
Actuator 2



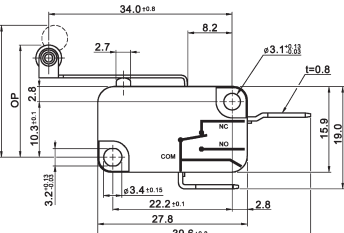
Actuator 4



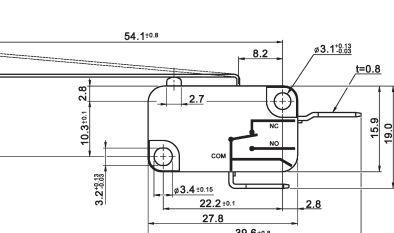
Actuator 1



Actuator 3



Actuator 5



Ordering code:

TMV 10 ☐ ☐ – C

- Terminals**
☐ change-over switch (3 terminals)
☒ normally closed (2 terminals)
Actuator

180 | knitter-switch

Actuator	Operating force [gf]	Free position [mm]	Operation position [mm]
0	200	16.1±0.5	14.7±0.5
1	125	19.2±1.2	15.2±1.2
2	200	16.8±0.5	15.2±0.5
3	125	24.7±1.2	20.7±1.2
4	240	22.3±0.6	20.7±0.6
5	70	24.2±2.5	15.2±2.5



Miniature Micro / Snap Action Switches

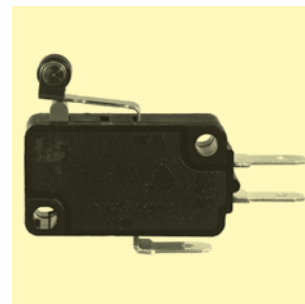
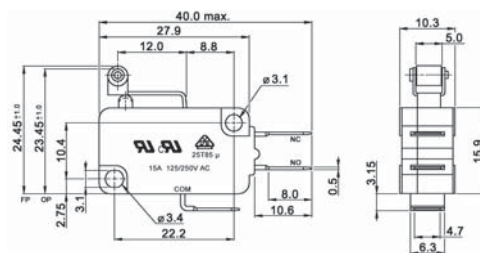
Specifications:

Contact rating:	250 V AC, 15 A
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +85 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	silver-alloy
Terminals:	brass, silver-plated
Case:	PBT (UL 94 V-0)
Mounting:	on panel
Timing:	non-shorting

Models: Switching function

S P D T

DM-VMS15-05N-250 on - mom



Actuator	Operation force [gf]						Free position [mm]	Operation position [mm]
00	60±25	80±30	110±30	160±40	200±50	250±50	18.35±0.5	17.45±0.5
01	60±25	80±30	110±30	160±40	200±50	250±50	19.05±0.5	18.05±0.5
02	30±10	40±15	50±20	75±25	100±40	120±40	20.75±0.8	18.25±0.8
03	12±5	25±10	30±10	40±15	50±25	60±25	22.55±2.0	18.05±2.0
04	35±15	45±20	55±20	85±30	110±30	140±40	23.95±1.5	21.75±1.5
05	60±25	80±30	110±30	160±40	200±50	250±50	24.45±1.0	23.45±1.0

Ordering code:

DM-VMS15 - □ □ □ - □ □ □

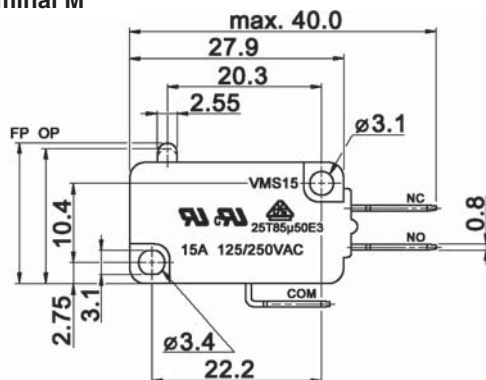
Operating force (depending upon actuator, see table)
Terminals (see following pages)
Actuator (see following pages)

Miniature Micro / Snap Action Switches

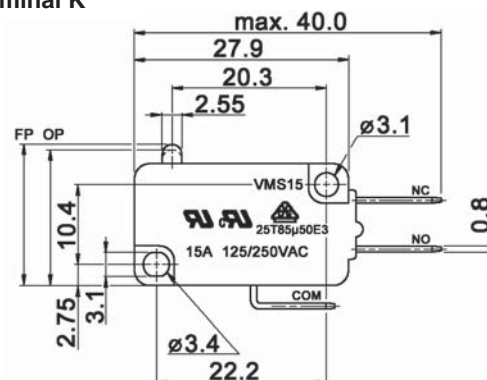


DM-VMS15 Terminals (fast-on 6.3 mm)

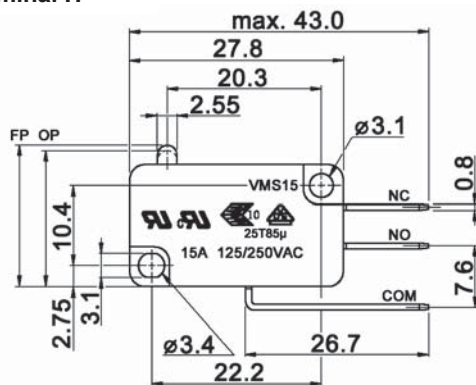
Terminal M



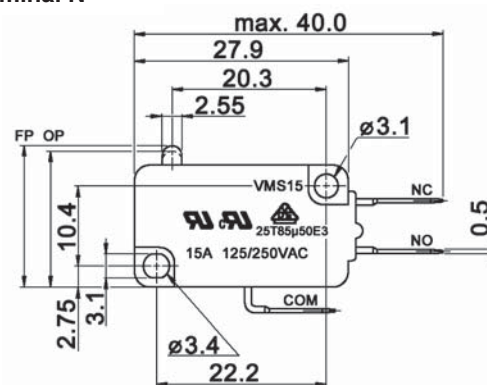
Terminal K



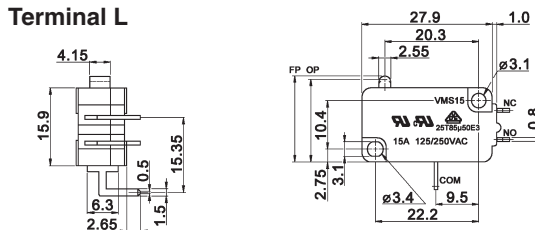
Terminal H



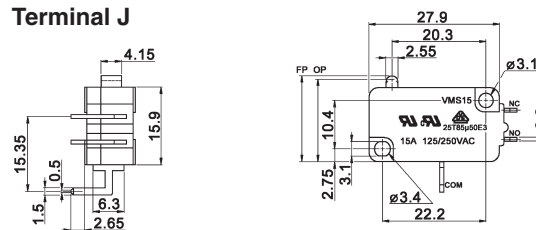
Terminal N



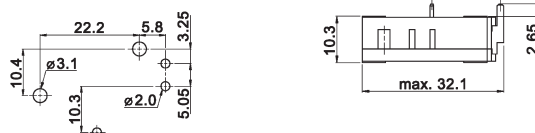
Terminal L



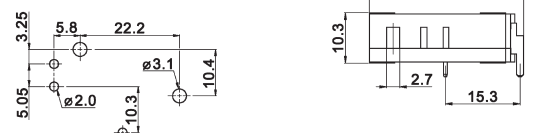
Terminal J



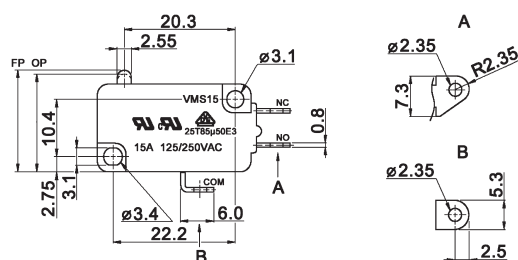
P.C. MOUNTING



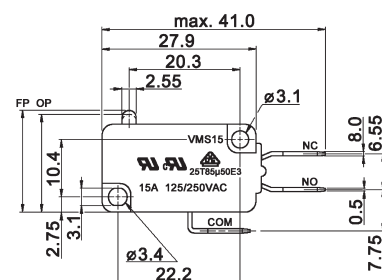
P.C. MOUNTING



Terminal A

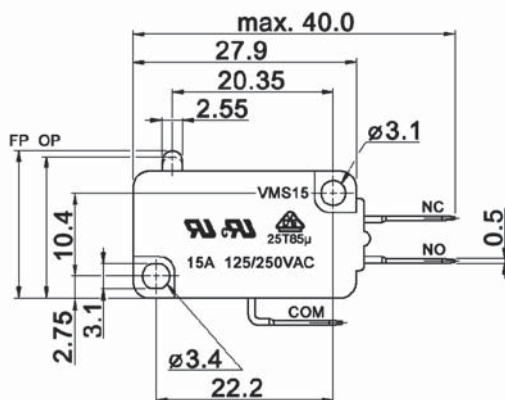


Terminal W (tab width 7.5)

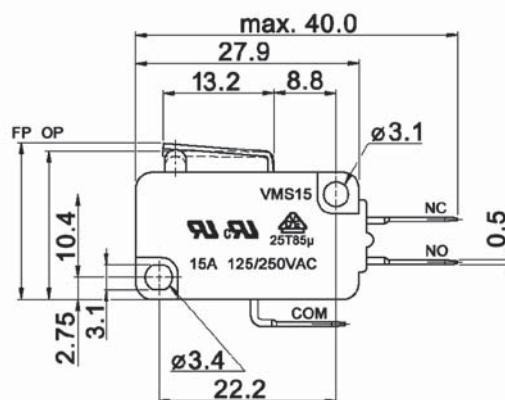


DM-VMS15 Actuator

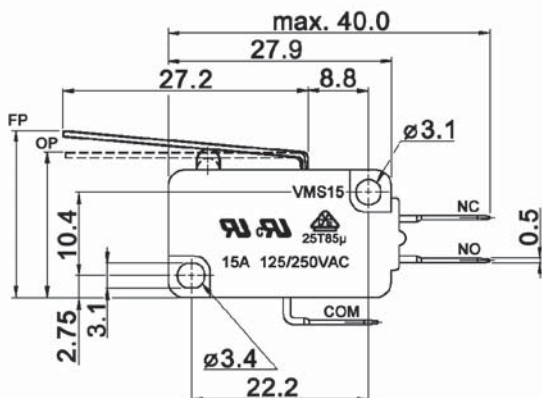
Actuator 00



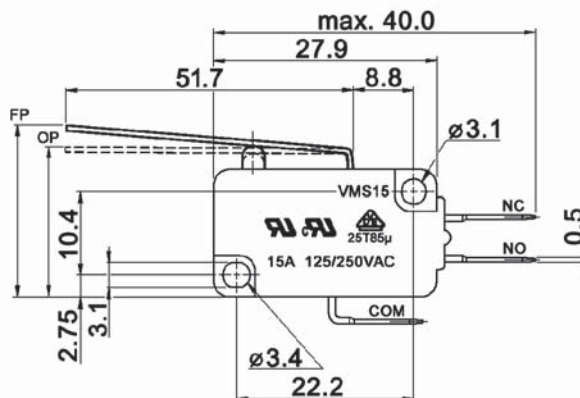
Actuator 01



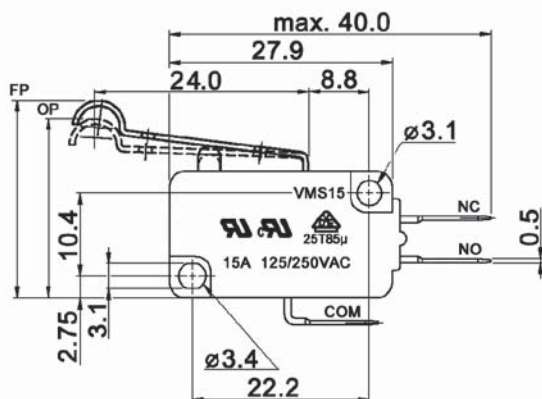
Actuator 02



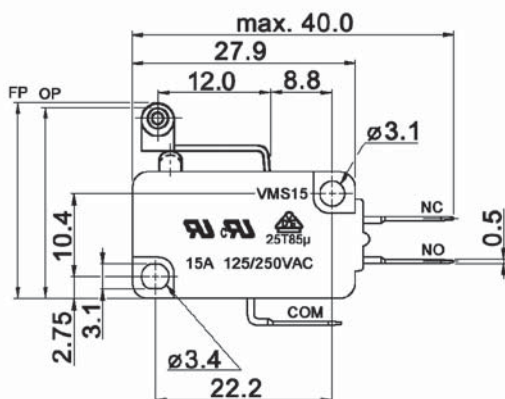
Actuator 03



Actuator 04



Actuator 05



Subminiature Micro / Snap Action Switches



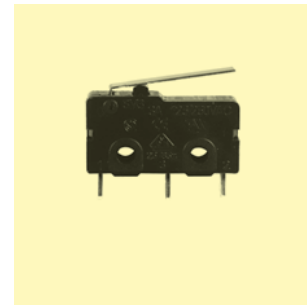
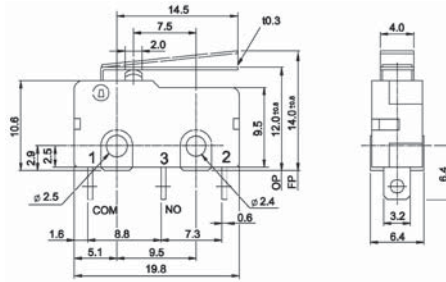
Specifications:

Contact rating:	250 V AC, 5 A / 250 V AC, 3 A / 30 V DC, 0.5 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +80 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	silver-alloy
Terminals:	brass, silver-plated
Case:	PBT (UL 94 V-0)
Mounting:	on pc-board, on panel
Timing:	non-shorting
Soldering conditions:	auto-soldering – max. 3 sec, max. 250 °C manual soldering – max. 3 sec, max. 380 °C

Models: Switching function

SPDT

DM-SM3 01 N-30S on – mom

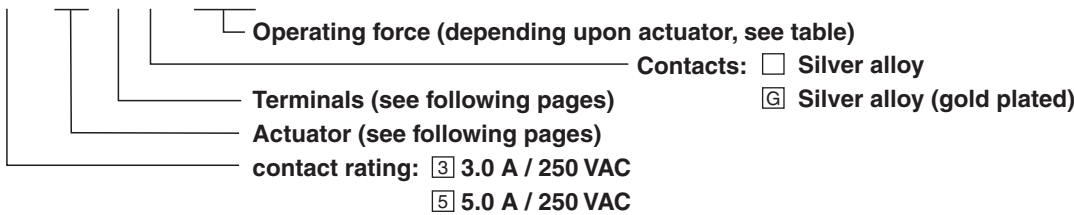


Packing: 1000 pcs/bag

Actuator	Operating force [gf]										Free position [mm]	Operation position [mm]
00	80±25	95±30	115±40	130±40	150±40	175±45	190±45	250±50	295±55		11.9±0.3	11.3±0.3
01	25±12	30±12	35±20	40±20	45±20	50±20	55±25	70±25	85±30		14.0±0.8	12.0±0.8
02	20± 8	25±12	30±12	35±20	40±20	45±20	50±20	65±25	75±25		14.2±0.8	12.1±0.8
03	15± 6	20± 6	25±12	30±12	35±20	40±20	55±25	60±25	70±25		15.0±1.0	12.4±0.8
04	20± 8	25±12	30±12	35±20	40±20	45±20	50±20	65±25	75±25		16.7±0.8	14.5±0.8
05	20± 8	25±12	30±12	35±20	40±20	45±20	50±20	65±25	75±25		19.8±1.0	17.8±1.0

Ordering code:

DM-SM ☐ - ☐ ☐ ☐ ☐ - ☐ ☐ ☐ S

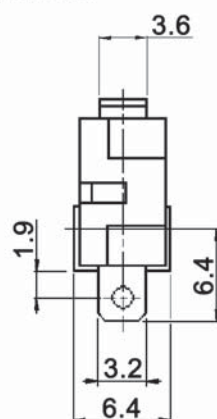




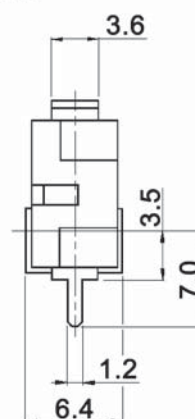
Subminiature Micro / Snap Action Switches

DM-SM Terminals

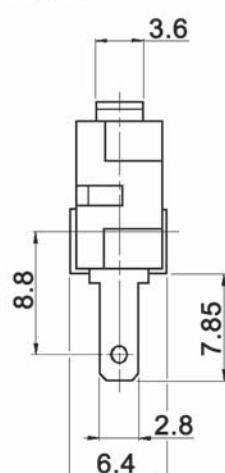
Terminal N



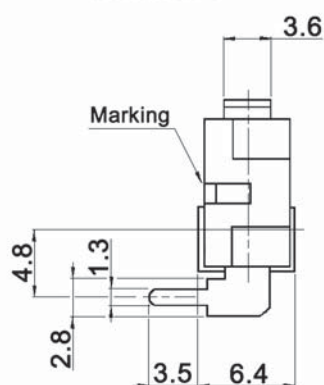
Terminal P



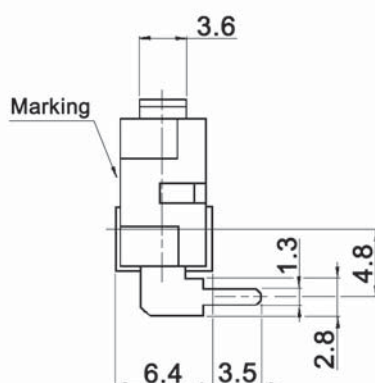
Terminal L



Terminal C

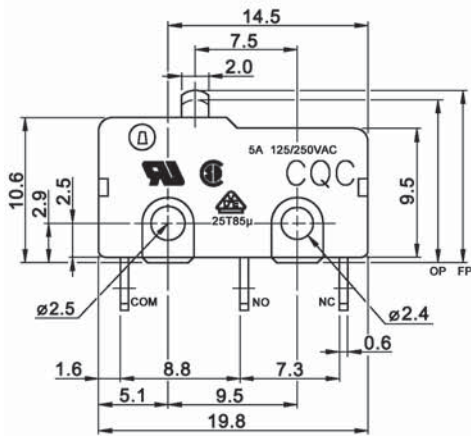


Terminal D

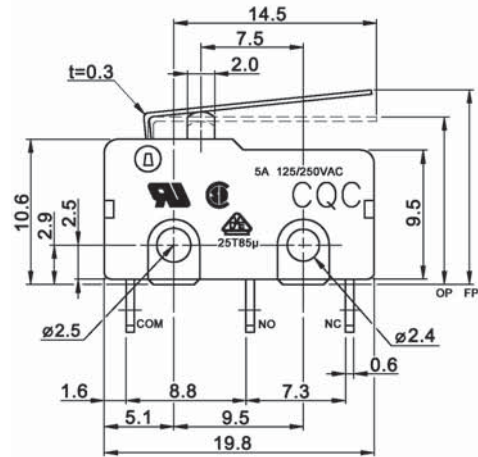


DM-SM Actuator

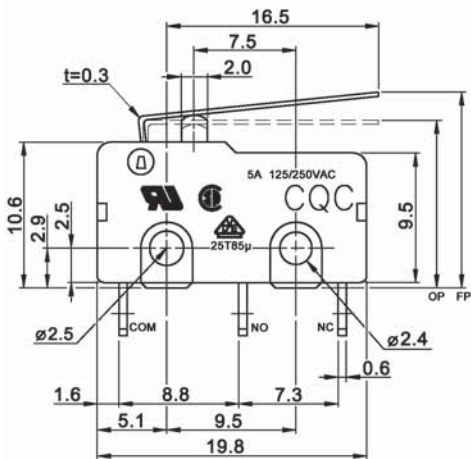
Actuator 00



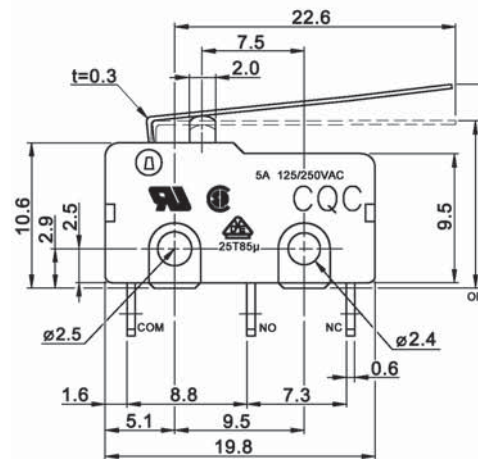
Actuator 01



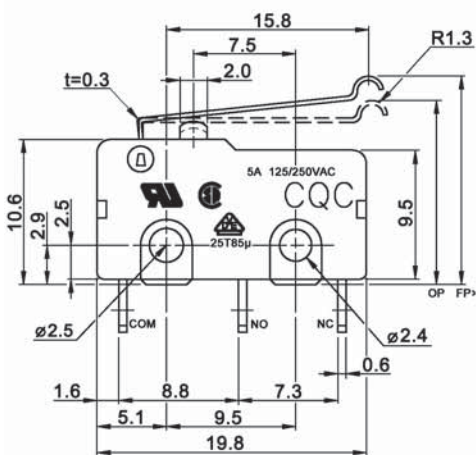
Actuator 02



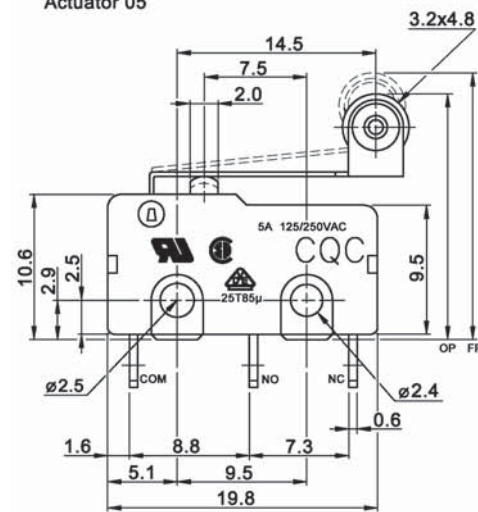
Actuator 03



Actuator 04



Actuator 05





Subminiature Micro / Snap Action Switches

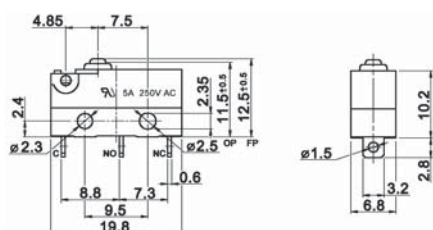
Specifications:

Contact rating:	250 V AC, 5 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-15 °C to +70 °C
Mechanical life:	minimum 100 000 operations
IP rating:	IP 51
Contacts:	silver-alloy
Terminals:	brass, silver-plated
Case:	body: PA (UL 94V-0) stem: PBT (UL 94 V-0) Sealing: rubber (UL 94 V-0)
Mounting:	P: on pc-board – hole diameter 1.65 mm N: on panel
Timing:	non-shorting
Soldering conditions:	manual soldering: iron of 30 W max., max. 360 °C, 3 s wave soldering: pre-heat – max. 100 °C, max. 6 s, soldering – max 225 °C, max 5 s

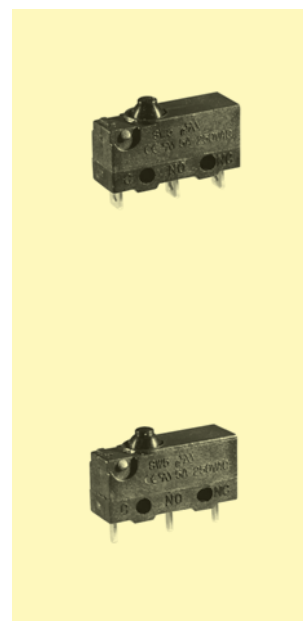
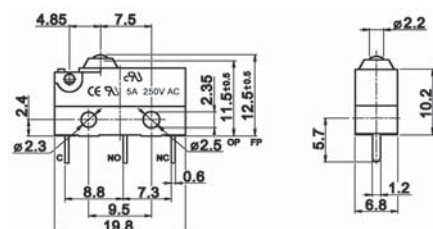
Models: Switching functions

S P D T

DM-SW5-00N-115 on – mom



DM-SW5-00P-250 on – mom



Actuator	Operating force [gf]					Free position [mm]	Operation position [mm]
00	115±40	130±40	150±40	175±40	250±50	12.5±0.5	11.5±0.5
01	45±20	50±20	55±20	60±20	100±40	12.0±1.0	15.0±1.0
04	40±20	45±20	50±20	55±20	90±30	17.5±1.0	14.2±1.2
05	40±20	45±20	50±20	55±20	90±30	19.0±1.5	16.5±1.0

Ordering code:

DM-SW5 - ☐ ☐ - ☐ ☐

Operating force (depending upon actuator, see table)

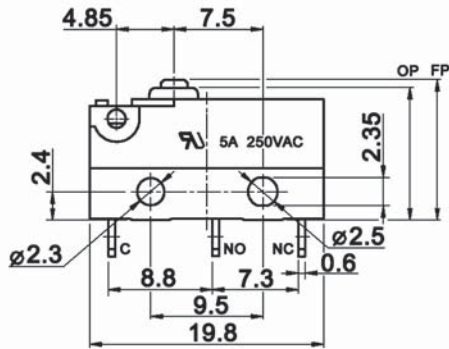
Terminals: ☐ soldering tags

☐ pc-board

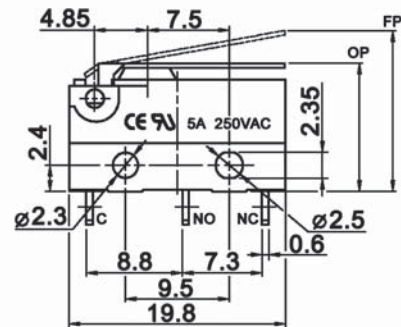
Actuator (see following pages)

DM-SW5 Actuator

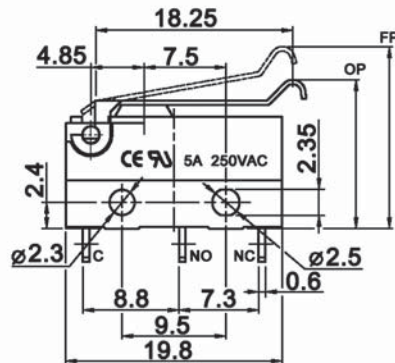
Actuator 00



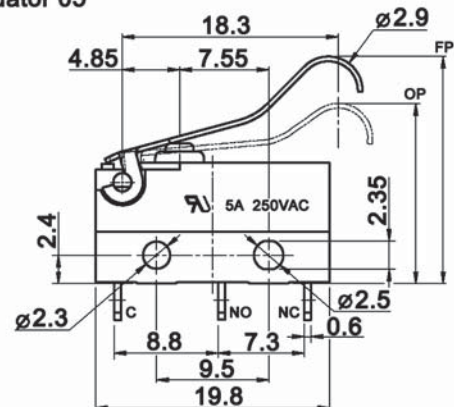
Actuator 01



Actuator 04



Actuator 05





Microminiature Micro / Snap Action Switches

Specifications:

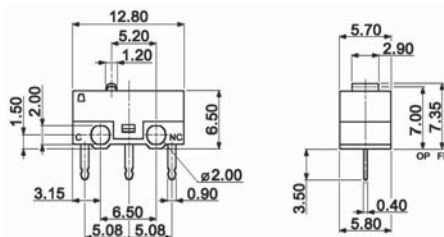
Contact rating:	125 V AC, 1 A
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +75 °C
Mechanical life:	minimum 500 000 operations
Contacts:	silver-alloy
Terminals:	brass, silver-plated
Case:	PBT (UL 94 V-0)
Mounting:	on pc-board – hole diameter 1.2 mm, on panel – hole diameter 2.1 mm
Timing:	non-shorting
Soldering conditions:	auto-soldering – max. 3 sec, max. 250 °C (pre-heat max. 60 sec, max 100 °C) manual soldering – max. 3 sec, max. 350 °C

Models: Switching functions

S P D T

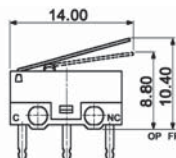
DM-DM 00 P
Operating force 110 gf

on – mom



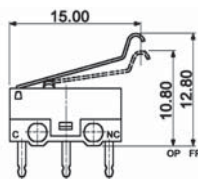
DM-DM 01 P
Operating force 40 gf

on – mom



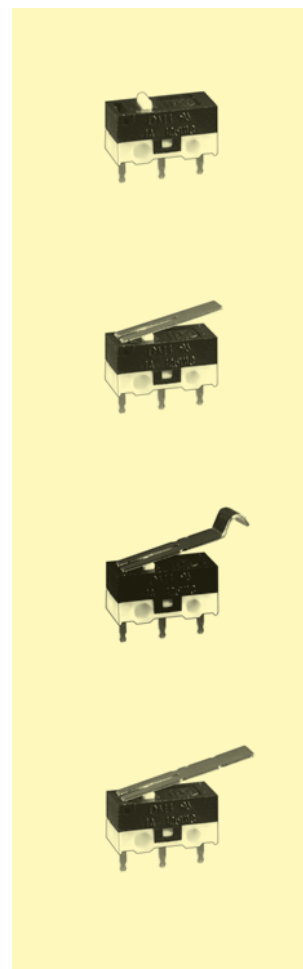
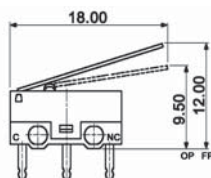
DM-DM 02 P
Operating force 30 gf

on – mom



DM-DM 03 P
Operating force 35 gf

on – mom



Further types on request

Microminiature Micro / Snap Action Switches



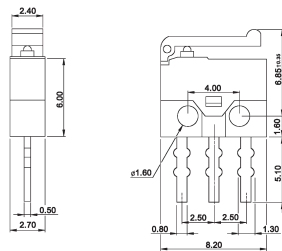
Specifications:

Contact rating:	30 V AC, 0.5 A
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	−20 °C to +70 °C
Mechanical life:	minimum 300 000 operations
Operating force:	< 50 gf
Contacts:	copper alloy, silver-plated
Terminals:	brass, silver-plated
Case:	base: PBT cover, stem, lever: POM
Mounting:	on pc-board – hole diameter 1.5 mm, on panel – hole diameter 1.6 mm
Timing:	non-shorting
Soldering conditions:	auto-soldering – max. 3 sec, max. 260 °C

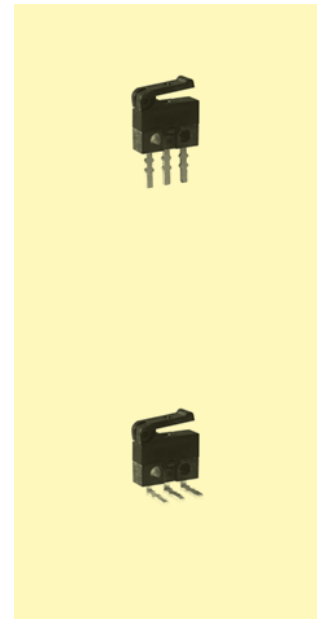
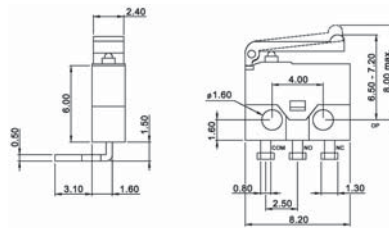
Models: Switching functions

SPDT

DM-SSM 01 L2 on – mom



DM-SSM 01 C L2 on – mom



Further types on request

12

Special Switches

12.1 Anti-Vandal Pushbutton Switches



Series MAV

waterproof IP 67, IP 65,
also with LEDs

192–193

12.2 Key Switches



MRK

top- and side actuated

194–195

12.3 Optical Encoder



MEOP 19

1 mill. turns

196

12.4 Multi-Function Tact Switches



PLSJ

Mini-joysticks

197

TSJ/TSSJ

Mini-joysticks

198–201

12.5 Microminiature Slide Switches



MMSP

ultra thin

202

Anti-Vandal Pushbutton Switches

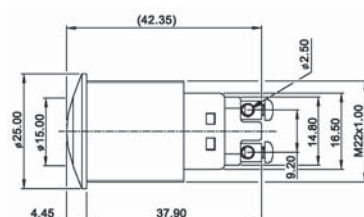
Specifications:

Insulation resistance:	> 1000 MΩ at 500 V DC
Operating temperature:	−20 °C to +55 °C
Switching force:	off – mom
Material:	Contact: silver plated alloy Nut: nickel plated brass

Models:

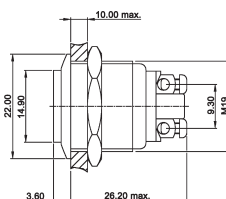
MAV 01 B1M1

Rating:	125 V AC, 2 A / 48 V DC, 2 A
Contact resistance:	<10 mΩ
Dielectric strength:	3000 V, 50 Hz (1 min.)
Electrical life:	10 000 cycles



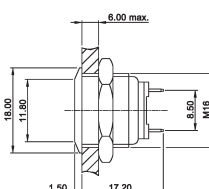
MAV 01 B2M1R

Rating:	36 V DC, 2 A
Contact resistance:	< 50 mΩ
Dielectric strength:	2000 V, 50 Hz (1 min.)
Electrical life:	200 000 cycles
Protection:	IP 65



MAV 01 B32M3F

Rating:	36 V DC, 2 A
Contact resistance:	< 50 mΩ
Dielectric strength:	2000 V, 50 Hz (1 min.)
Electrical life:	200 000 cycles
Protection:	IP 65



Ordering code:

MAV 01 ☐ ☐ ☐ ☐

Bushing size:

- ☐ B1 M22x1
- ☐ B2 M19
- ☐ B3 M16

Terminals:

- ☐ M1 Screw
- ☐ M3 Solder (for B2, B3)

Button shape:

- ☐ Curved
- ☐ F Plane recessed (for B2, B3)
- ☐ R Plane raised (for B2, B3)

Material of button/case:

- ☐ Brass, nickel plated
- ☐ 1 Brass, gold plated (for B2, B3)
- ☐ 2 Stainless steel (for B2, B3)
- ☐ 3 Zinc alloy, nickel plated black (for B2, B3)



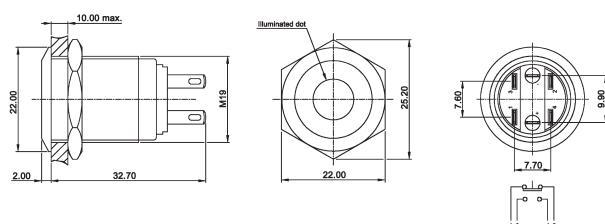
Anti-Vandal Pushbutton Switches waterproof, illuminated

Specifications:

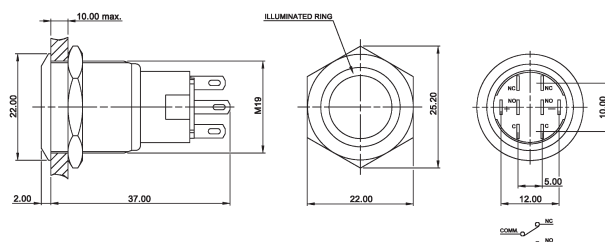
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	2000 V RMS (50/60 Hz)
Operating temperature:	-20 °C to +55 °C
Electrical life:	50 000 cycles
Operating force:	5.5 N max.
Protection:	IP 67
Material:	Nut: nickel plated brass Base: PBT

Models:

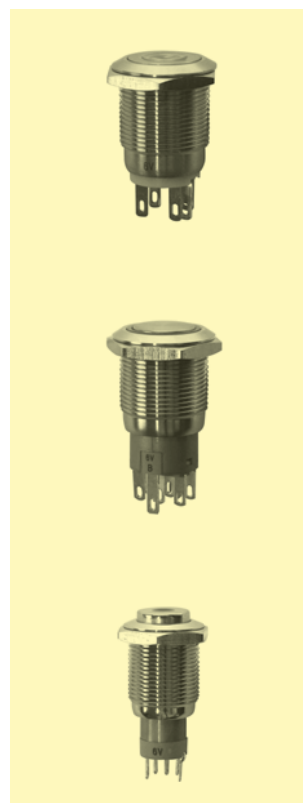
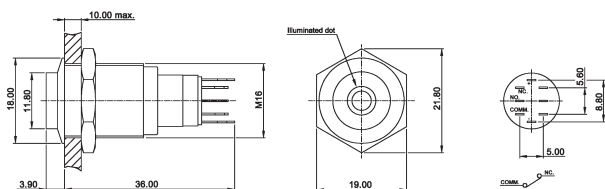
MAV 02 LB22M3FDY6V
Rating: 250 V AC, 5 A



MAV 22 LB2M3FRBLO12V
Rating: 250 V AC, 5 A



MAV 02 LB3M3RDO36V
Rating: 250 V AC, 3 A



Ordering code:

MAV		M3			
Number of poles:		Illumination:		Button shape:	
☐ 0 Single pole		☐ Without		☐ F Recessed	
☐ 2 Double pole		☐ L LED		☐ R Raised	
Switching function:		Bushing size:		Contact material:	
☐ 2 on - mom		☐ B2 M19		☐ Silver alloy	
☐ 3 on - on		☐ B3 M16		☐ G Gold over silver alloy	
Material of button/case:		LED voltage (AC/DC):		Contact arrangement:	
☐ Brass, nickel plated (for B3)		☐ Without LED		☐ Separate NO and NC contacts, short body (for B2, single pole)	
☐ 1 Brass, gold plated (for B3)		☐ 6V 6 V, 15 mA		☐ Changeover contact (for B3)	
☐ 2 Stainless steel		☐ 12V 12 V, 15 mA		☐ LO Changeover contact, long body (for B2)	
☐ 3 Zinc alloy, nickel plated, black		☐ 24V 24 V, 15 mA			
		☐ 36V 36 V, 15 mA			
		☐ 110V 110 V, 5 mA			
		☐ 220V 220 V, 5 mA			
		LED color:		knitter-switch 193	
		☐ Without LED			
		☐ R Red			
		☐ G Green			
		☐ Y Yellow			
		☐ O Orange			
		☐ B Blue			
		☐ W White			
		Lens style:			
		☐ Without LED			
		☐ D Dot illumination			
		☐ R Ring illumination			

Key Switches

Specifications:

Contact rating:	max. 20 V DC, 0,4 W
Contact resistance:	< 200 mΩ
Insulation resistance:	> 100 MΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	–25 °C to +70 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold-plated
Terminals:	PC terminals, brass, silver-plated
Material:	case: PBT, black key: brass, nickel-plated; grip: plastic
Mounting:	on pc-board
Soldering conditions:	auto-soldering – max.: 3 sec, 245 °C ±10 °C

Models:

Switching functions

Key positions

I II III

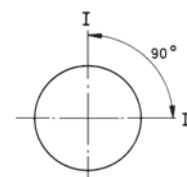
O = Key removable

X = Key not removable

S P D T

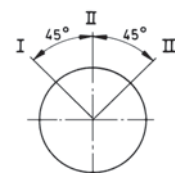
Step angle 90°

MRK 1012 A	on	–	on	O	O
MRK 1012 B	on	–	on	O	X
MRK 1022 B	on	–	mom	O	X
MRK 1012 A – R	on	–	on	O	O
MRK 1012 B – R	on	–	on	O	X
MRK 1022 B – R	on	–	mom	O	X



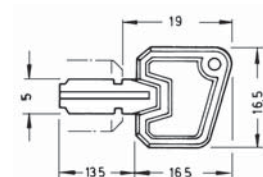
Step angle 45°

MRK 1031 D	on	on	on	O	O	O
MRK 1031 L	on	on	on	X	O	X
MRK 1041 L	mom	on	mom	X	O	X
MRK 1031 D – R	on	on	on	O	O	O
MRK 1031 L – R	on	on	on	X	O	X
MRK 1041 L – R	mom	on	mom	X	O	X



2-pole switches and further key positions on request.

Switches are always supplied with 2 keys.

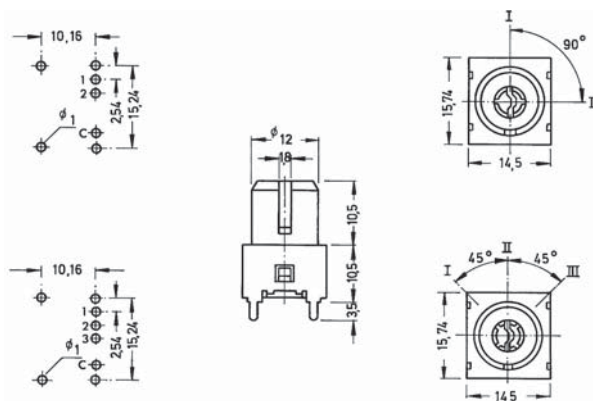


Models:

S P D T

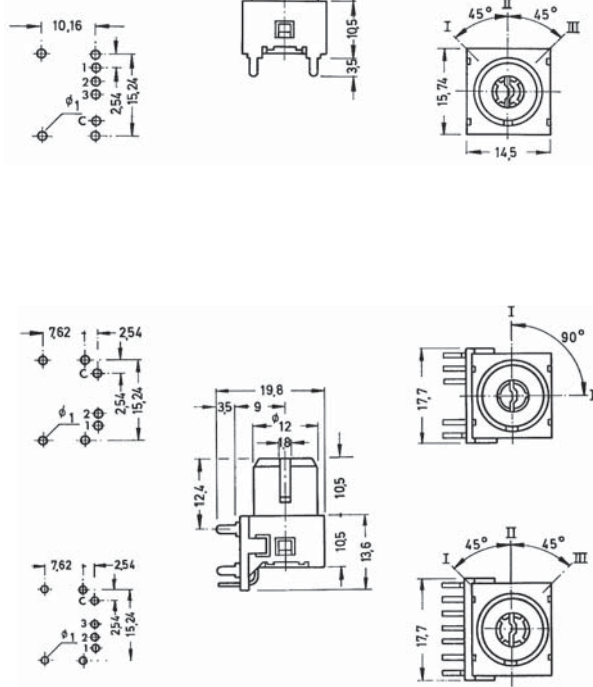
Step angle 90°

MRK 1012 A
MRK 1012 B
MRK 1022 B



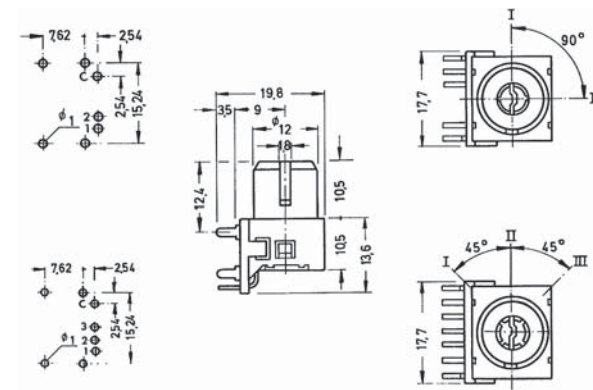
Step angle 45°

MRK 1031 D
MRK 1031 L
MRK 1041 L



Step angle 90°

MRK 1012 A – R
MRK 1012 B – R
MRK 1022 B – R



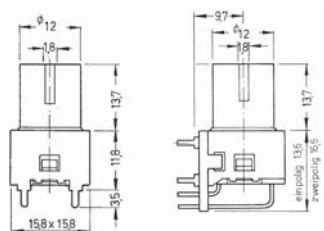
Step angle 45°

MRK 1031 D – R
MRK 1031 L – R
MRK 1041 L – R

Special versions:*

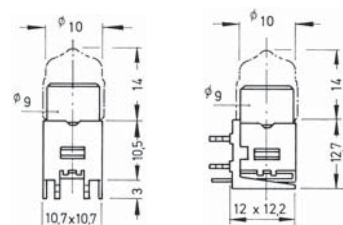
Key switch with security casing:

Type:
MRKC



Key switch with plastic case
and plastic key

Type:
MRKS



* Minimum quantity and delivery time on request

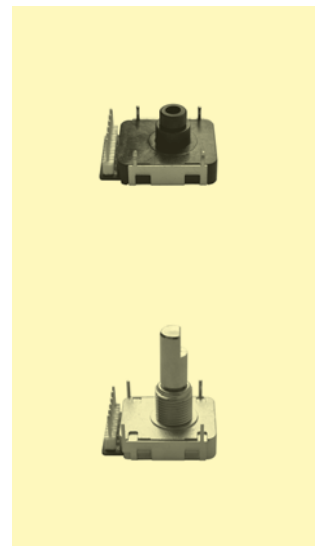
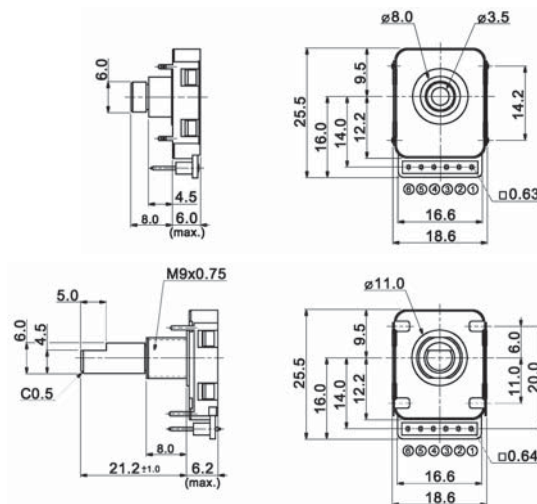
Specifications:

Power supply:	3.3 to 5 V DC, 10 mA max.
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +50 °C
Rotational torque:	0.45 ± 0.2 Ncm
Pulses/Detents per turn:	6/0, 6/6, 24/0, 24/24
Frequency response:	100 Hz max.
Electrical life:	> 1 000 000 turns
Pushbutton:	Contact rating: 12 V DC, 10 mA, min. 0.1 mA Contact resistance: < 10 Ω Operating force: 4 ± 2 N Electrical Life: > 1 000 000 cycles Travel: 0.3 ± 0.05 mm, 1 ± 0.2 mm
Mounting:	on pc-board with pin-contact single hole mounting M 9 x 0.75
Soldering conditions:	wave soldering – max. 3 sec, 280 °C; pre-heat – max. 60 sec, 100 °C

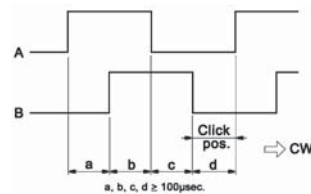
Models:

MEOP 19 VG06CR08MTFM1

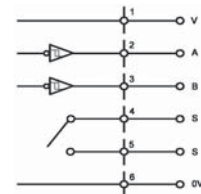
MEOP 19 VG24CF21MTFM2



Output signal format:



Pin assignment:



Ordering code: MEOP 19 T M Internal number

Shaft direction:
☐ H horizontal
☐ V vertical

Pulses:
☐ 06
☐ 24

Switch travel:
☐ D 1 ± 0.2 mm
☐ G 0.3 ± 0.05 mm

Detents:
☐ C with detent
☐ N no detent

Connector type:
☐ F female
☐ M male

Connector direction:
☐ F front
☐ R rear

Shaft type:
☐ F flat
☐ R round

Shaft Length:
☐ 08 8 mm
☐ 17 17 mm
☐ 21 21 mm



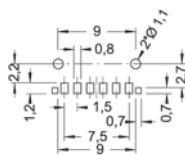
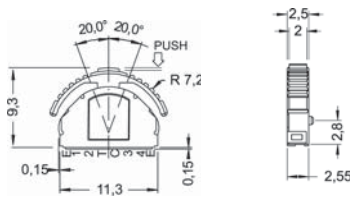
Multi-Function Tact Switches for SMT

Specification:

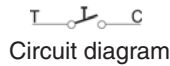
Contact rating:	5 V DC, 10 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	−10 °C to +70 °C
Storage temperature:	−25 °C to +85 °C
Mechanical life:	minimum 100 000 cycles
Contacts:	phosphor bronze silver-plated
Mounting:	on pc-board – SMD
Soldering conditions:	reflow-soldering – max.: 260 °C, 10 sec max.

Models:

PLSJ 1

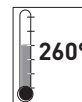


Angle	20°	16°	8°	0°	8°	16°	20°
Terminal							
1							
2							
3							
4							
C							



Packing unit: 1000 pieces per reel

Multi-Function Tact Switches for SMT

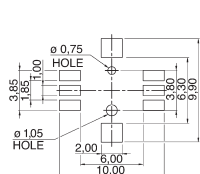


Specifications:

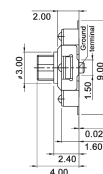
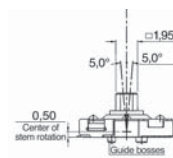
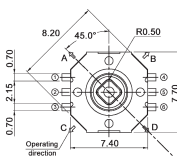
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	−20 °C to +70 °C
Operating force:	4 directions: 1.6 ± 0.5 N
Mechanical life:	minimum 100 000 cycles
Material:	Cover: Nickel, silver-plated Stem: high-temp. LCP Contact: stainless steel with silver cladding Terminal: brass, silver-plated Base: high-temp. LCP, black
Packing:	850 pcs/reel

Models:

TSSJ 4

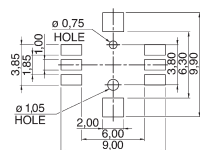


PCB Layout

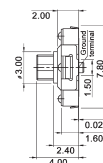
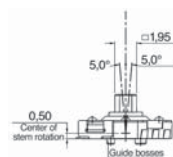
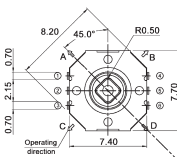


Circuit diagram

TSSJ 4-J



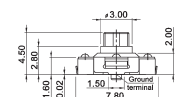
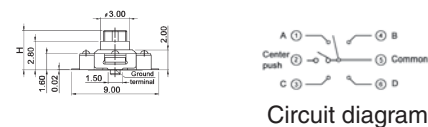
PCB Layout





Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	−20 °C to +70 °C
Operating force:	center: 3.2 N ± 0.5 N; 4 directions: 1.6 N ± 0.5 N
Mechanical life:	minimum 100 000 cycles
Material:	Cover: nickel silver Stem: high-temp. LCP Contact: stainless steel with silver cladding Terminal: phosphor bronze, silver-plated Base: high-temp. LCP, black
Packing:	850 pcs/reel

TSSJ 5



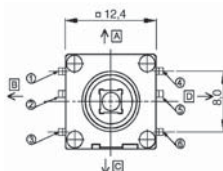
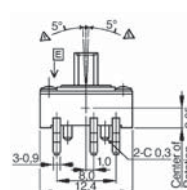
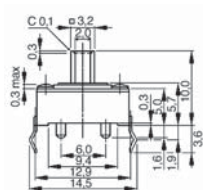
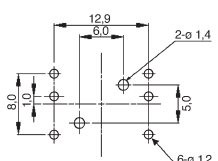
Multi-Function Tact Switches

Specification:

Contact rating:	15 V DC, 20 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Mechanical life:	minimum 50 000 cycles per direction
Contacts:	phosphor bronze silver-plated
Mounting:	TSJ 31: on pc-board TSSJ 30: on pc-board – SMD
Soldering conditions:	TSJ 31: auto-soldering: 255 °C, 5 sec max. TSSJ 30: reflow-soldering: 245 °C, 2.5 sec max.
Packing:	300 pcs/tray

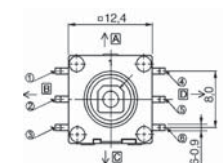
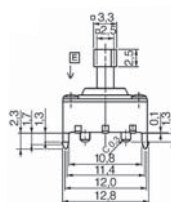
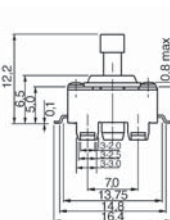
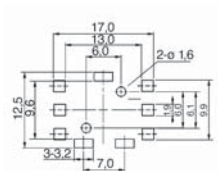
Models:

TSJ 31

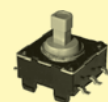


Direction	Connection
A	1 - 6
B	2 - 6
C	3 - 6
D	5 - 6
E (push)	4 - 6

TSSJ 30



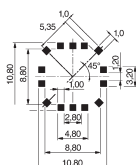
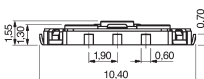
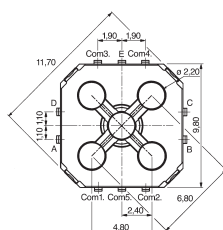
Direction	Connection
A	1 = 4
B	1 = 2
C	1 = 6
D	1 = 5
E (push)	1 = 3



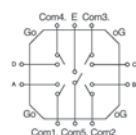


Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50–60 Hz) for 1 minute
Operating temperature:	–20 °C to +70 °C
Mechanical life:	minimum 200 000 cycles
Operating force:	Center: 3.6 N ± 0.7 N, four directions: 1.8 N ± 0.6 N
Material:	Case and stem: Nylon UL 94 V–0, black Cover: nickel, silver-plated Contacts: stainless steel, silver-plated Terminals: brass, silver-plated
Travel:	0.25 + 0.15/– 0.1 mm
Packing:	2500 pcs/reel

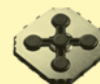
TSSJ 55



PCB Layout



Circuit diagram



13

LEDs

LED Indicators

204–207



LED-Indicators



LED-INDICATORS – red section

We offer a complete range of high-quality bracket indicators. Diodes are carefully selected for constant colour and brightness, housings are solid brass and chromium-plated.

LED-Indicators

Ø 7 mm



Ø 7 mm



Ø 10.5 mm



Ø 9 mm
superbright



Ø 12.2 mm
waterproof



Ø 7 mm
tricoloured



Ø 9 mm
tricoloured



Ø 9 mm
flashing



Ø 12.2 mm
waterproof



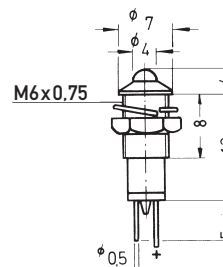
with lead and
connector

Specifications:

Models	P Power dissipation (mW)	V _F Forward voltage (V) ¹	I _F Forward current (mA)	I _V Luminous intensity (mcd) at I _F = 10 mA	λ _P Peak emission wavelength (nm) ¹	V _R Reverse voltage (V)	I _R Reverse current (μA) at V _R = 3 V	T _{OP} Operating temperature (°C)
LD 30 LD 32	85	min. typ. max. 2.1 3.0	20 25	1.8	700	5.0	100	- 40 + 85
LD 34	110	min. typ. max. 2.0 2.2	20 40	20 ⁴	630	4.0	10	- 30 + 70
LD 36 LDE 36 ³	100	min. typ. max. 1.7 2.0	20 50	20 30	660	4.0	100	- 30 + 85
LD 40 LD 42	85	min. typ. max. 2.1 3.0	20 25	3.2	555	5.0	100	- 40 + 85
LD 44	110	min. typ. max. 2.0 2.1	25 45	8 ⁴	565	4.0	10	- 30 + 70
LD 46 LDE 46 ³	125	min. typ. max. 2.1 2.5	20 50	8 12	555	4.0	100	- 30 + 85
LD 60 LD 62	85	min. typ. max. 2.1 3.0	20 25	2.7	600	5.0	100	- 40 + 85
LD 64	110	min. typ. max. 2.1 2.2	35 50	10 ⁴	585	4.0	10	- 30 + 70
LD 66 LDE 66 ³	125	min. typ. max. 2.2 2.5	20 50	16 24	580	4.0	100	- 30 + 85
LD 70 LD 72	62	min. typ. max. 2.7 3.0 3.3	20 50	0.9 ⁴	470	5.0	30	- 20 + 80
LD 56 red green yellow	45 60	min. typ. max. 2.1 3.0 2.1 3.0	10 20 10 25	2.2 3.9	700 555	5.0 5.0	100 100	- 40 + 85 - 40 + 85
Combination red / green								
LD 96 flashing	200			0.5 ² 1.6 ²	660	0.4		- 40 + 70
¹ with typical forward current ² at V _S = 5 V ³ Water proofing at 30 minutes at 1 m water column = IP 67. ⁴ at I _F = 20 mA								

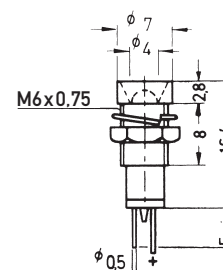
Models:

	Light colour	Housing	Dimensions
LD 30	red		
LD 40	green	brass	
LD 60	yellow	chromium-plated	
LD 70	blue		
LD 30 S	red		
LD 40 S	green	brass	
LD 60 S	yellow	black, matt finish	
LD 70 S	blue		



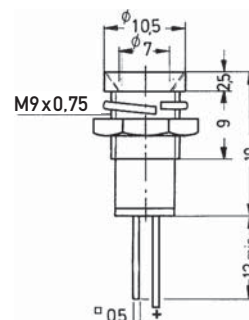
Also available with integrated resistor for 24 V operation.
Additional to type number: – 24

LD 32	red		
LD 42	green	brass	
LD 62	yellow	chromium-plated	
LD 72	blue		
LD 32 S	red		
LD 42 S	green	brass	
LD 62 S	yellow	black, matt finish	
LD 72 S	blue		

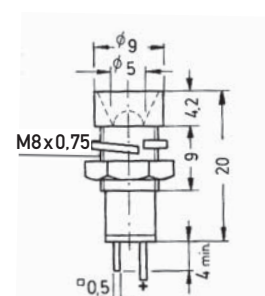


Also available with integrated resistor for 24 V operation.
Additional to type number: – 24

LD 34	red		
LD 44	green	brass	
LD 64	yellow	chromium-plated	
LD 34 S	red		
LD 44 S	green	brass	
LD 64 S	yellow	black, matt finish	



LD 36	red		
LD 46	green	brass	superbright
LD 66	yellow	chromium-plated	
LD 36 S	red		
LD 46 S	green	brass	superbright
LD 66 S	yellow	black, matt finish	

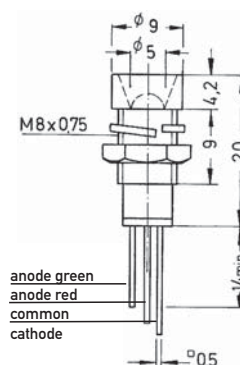


Also available with integrated resistor for 24 V operation.
Additional to type number: – 24

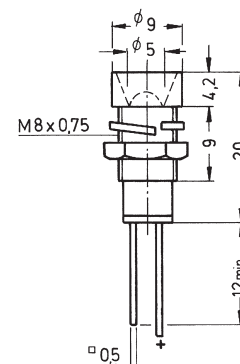
Models:

	Light colour	Housing	
LD 56	red/green/yellow	brass chromium-plated	tricoloured
LD 56 S	red/green/yellow	brass black, matt finish	tricoloured

Dimensions

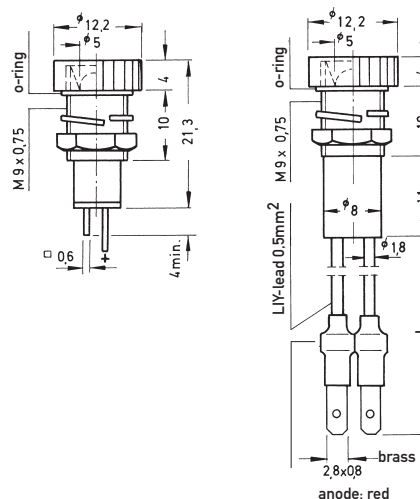


LD 96 R	red/red/red		
LD 96 G	green/green/green	brass	flashing
LD 96 Y	yellow/yellow/yellow	chromium-plated	
LD 96 SR	red/red/red	brass	
LD 96 SG	green/green/green	black, matt finish	flashing
LD 96 SY	yellow/yellow/yellow		



Flashing frequency = 3 Hz
Supply voltage = 4.75 V – 7 V

LDE 36	red	brass	
LDE 46	green	chromium-plated	waterproof
LDE 66	yellow		
LDE 36 S	red	brass	waterproof
LDE 46 S	green	black, matt finish	
LDE 66 S	yellow		



Special version: with lead and connector

Additional to type number: W

L = 50 mm; other length: minimum quantity and delivery time on request.

Also available with integrated resistor for 24 V operation.

Additional to type number: – 24

14 | Membrane Keypads and Rubber Keypads

14.1 Membrane Keypads 210–211

14.2 Rubber Keypads 212–214

14.3 Inquiry Form 215–216

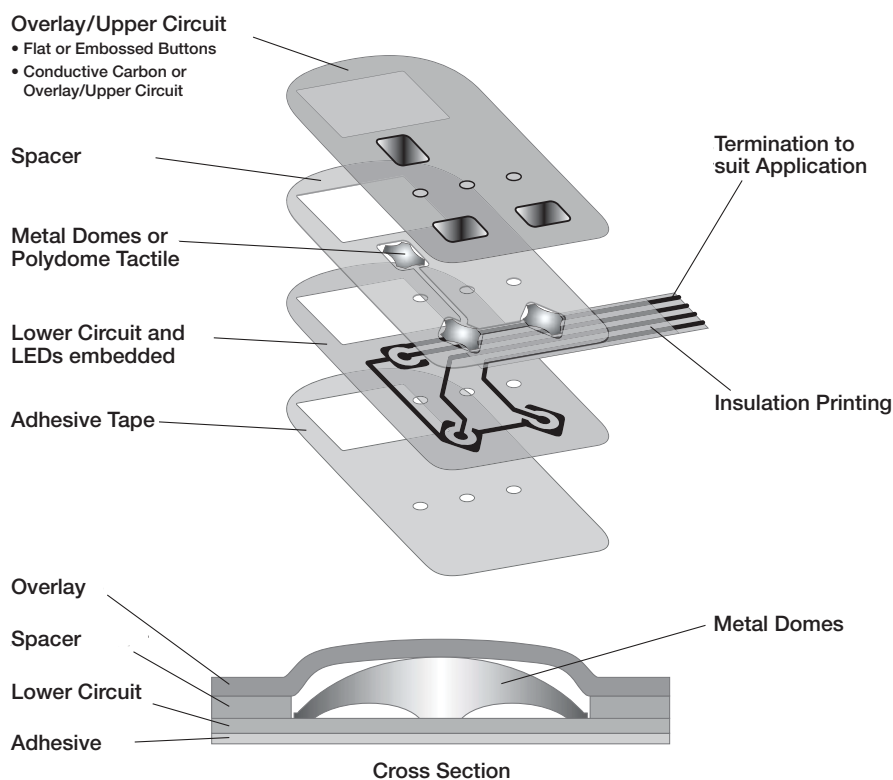
Membrane Keypad Structure

Reference Materials:

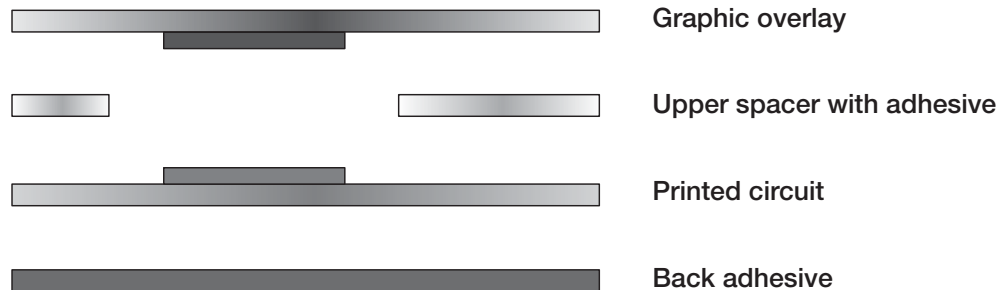
Overlay:	Polycarbonate Film (PC) – Matt or Glossy surface Thickness (mm): 0.075, 0.125, 0.175, 0.250, 0.375, 0.500 Polyester Film (PET) with UV-cured texture coating – Matt or Glossy surface Thickness (mm): 0.15, 0.20, 0.25
Circuit Layer:	Polyester Film (PET) – Thickness (mm): 0.075, 0.100, 0.125
Conductive:	Carbon Ink, Conductive Silver Paste or Metal Domes
Spacer:	Polyester Film (PET)
Adhesive:	Adhesive Double Tape

Typical specification:

	Polydome	Metaldome
Operating voltage:	min. 100 mV AC/DC max. 25 V AC / 42 V DC	min. 100 mV AC/DC max. 25 V AC / 42 V DC
Breaking current:	100 mA	100 mA
Max. initial contact resistance:	500 Ω	500 Ω
Min. isolation resistance:	100 M Ω	100 M Ω
Operating temperature:	-5 °C ... +50 °C	-10 °C ... +80 °C
Endurance:	500 000 operations	200 000 operations
Actuation force:	0.3 N ... 5 N	0.3 N ... 5 N
Typ. Travel:	0.3 mm...0.6 mm	0.25 mm ... 0.4 mm
Typ. Bounce:	3 ms	5 ms



Flat Type (Non-Tactile)

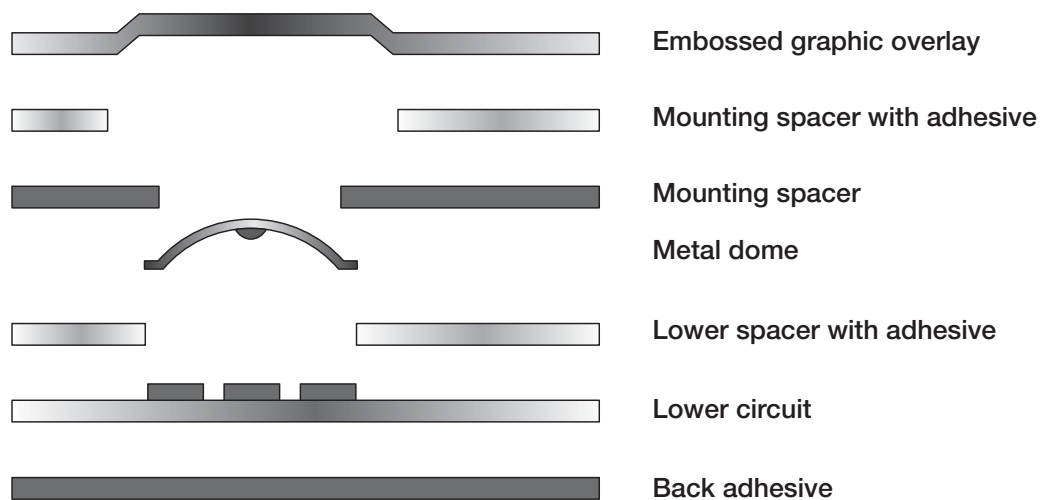


Tactile Type

POLYDOME



METAL DOME



Rubber Keypad Design



Tolerance Requirement of Silicone Rubber Key:

Dimensions:

0 – 9 mm	± 0.10 mm
10 – 19 mm	± 0.15 mm
20 – 29 mm	± 0.20 mm
30 – 39 mm	± 0.25 mm
40 – 49 mm	± 0.30 mm
50 – 59 mm	± 0.35 mm
60 and above	± 0.6 %

Actuation Force:

50 – 60 grams	± 15 grams
61 – 80 grams	± 20 grams
81 – 100 grams	± 25 grams
101 – 120 grams	± 30 grams
121 – 150 grams	± 35 grams
151 – 200 grams	± 40 grams
201 and above	± 25 %

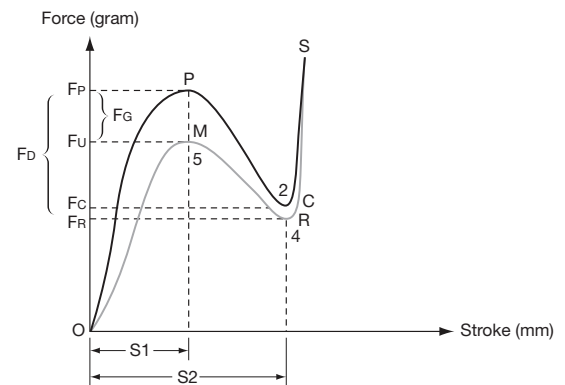
Mechanical and Electrical Properties of Silicone Rubber:

Temperature for use:	–55 °C to +250 °C
Specific Gravity:	1.15
Tensile Strength:	90 Kg/cm ²
Tear Strength:	13 Kg/cm
Compression Set:	10% (180 °C x 22 hrs.)
Elongation at Break:	350%
Volume Resistivity:	8 x 10 ¹⁴ Ω cm
Insulation Breakdown:	24 Kv/mm
Colour:	Colouring possible
Dielectric Constant:	4.2 (50 Hz)
Dielectric Tangent:	13% (50 Hz)

Depending on the size of contacts and keyboard layout.

Non-Conductive Silicone

Force-Stroke Curve of Rubber Keypad



Force

Fp	Peak Force (Fmax)
Fu	Max. Return Force
Fc	Contact Force
FR	Min. Return Force (Fmin)
FM	Max. Return Force
FD	Drop Force (FD = FP – FC)
FG	Gap Force (FG = FP – FM)

Stroke

S1	Peak Stroke
S2	Contact Stroke

Location:

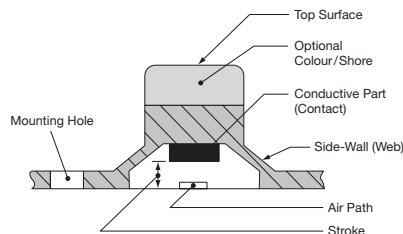
O	Original Point
P	Peak Point
C	Contact Point
R	Return Point
M	Max. Return Point

Travel

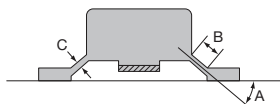
O–P	Peak Force (FMAX)
P–C	Contact Force
C–S	Min. Return Force (FMIN)
S–R–M–O	Gap Force (FG = FP – FM)

Basic Construction

Illustration:

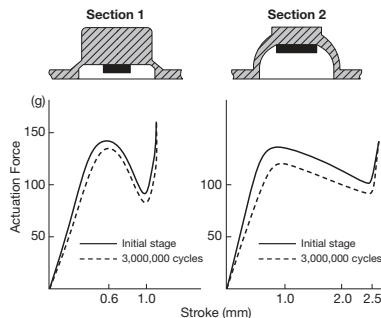


Life Test:



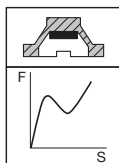
Operating life depends on:

- **Soft Material** ... 50 Shore is preferred.
- **Low Stroke** ... less than 1 mm
- **Angle** (as part A illustrated above) ... 40-degree is recommended.
- **Length of side-wall** ... (as part B illustrated above)
- **Thickness of side-wall** ... (as part C illustrated above) ... determined by key structure. The thicker the web, the higher the operating force.

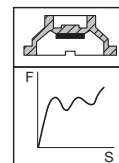


Typical Key Sections and Characteristics:

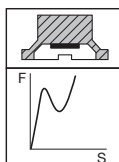
Force Range: 30 ~ 350 grams
Stroke Range: 0.5 ~ 3.0 mm
Cycle Life ($\times 10^3$): 500 ~ 2000
Typical uses: Telephone, Remote Control, Automotive, Radio, Toys, Calculator, etc.



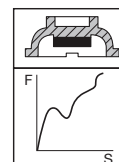
Force Range: 30 ~ 80 grams
Stroke Range: 2.0 ~ 4.0 mm
Cycle Life ($\times 10^3$): 5000 ~ 20000
Typical uses: Computer, Typewriter etc.



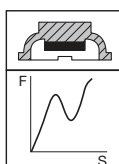
Force Range: 30 ~ 250 grams
Stroke Range: 0.7 ~ 2.5 mm
Cycle Life ($\times 10^3$): 1000 ~ 3000
Typical uses: Telephone, Remote Control, Toys, Games, Calculator, etc.



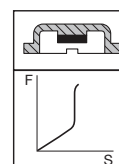
Force Range: 30 ~ 200 grams
Stroke Range: 1.0 ~ 2.5 mm
Cycle Life ($\times 10^3$): 500 ~ 3000
Typical uses: Telephone, Typewriter, Test Instruments, etc.



Force Range: 30 ~ 150 grams
Stroke Range: 0.5 ~ 3.0 mm
Cycle Life ($\times 10^3$): 1000 ~ 3000
Typical uses: Telephone, Remote Control, Toys, Measuring Instruments, Office Machine

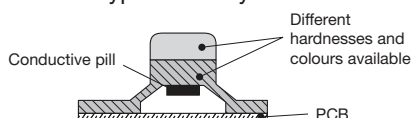


Force Range: 20 ~ 80 grams
Stroke Range: 0.2 ~ 1.0 mm
Cycle Life ($\times 10^3$): 500 ~ 10000
Typical uses: Typewriter, Household Appliances, Computer, etc.

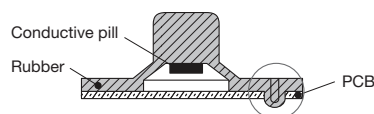


Some Special Design Illustrations:

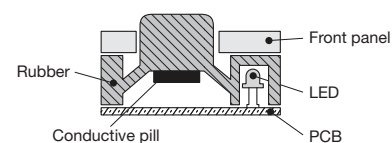
1. Different shorehardnesses in the basic keypad and key



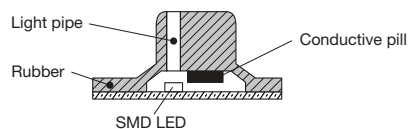
2. Push or pull thru to anchor keypad to PCB



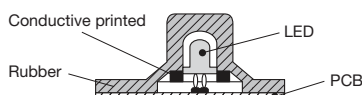
3. Back lighting – option 1



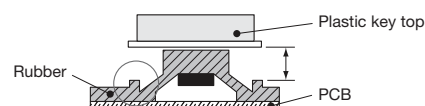
4. Squared key top design with LED light pipe



5. Back lighting – option 2

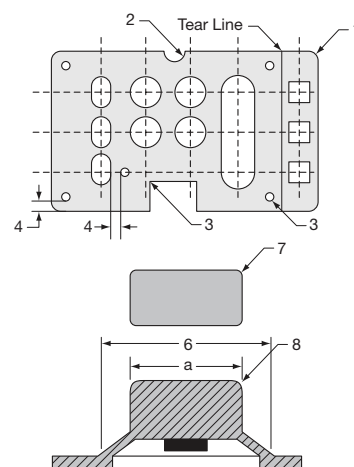


6. Control of travel distance



Special Design for Construction Ideas:

1. Typical outside radius is 1.0 mm to 1.5 mm.
2. Minimum radius is 0.3 mm.
3. Minimum inside radius is 0.2 mm.
4. Spacing between the edges of a rubber dome and a guide hole is 1.0 mm or more.
5. Guide holes are min. 1.0 mm in diameter.
6. The width of a rubber dome base is typically 2.0 mm more than a.
7. The minimum radius for the side edges of key top is 0.25 mm.
8. The minimum radius for the top edges of key top is 0.2 mm.

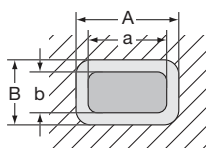


Rubber Keypad Design

Guideline for Assembly Design:

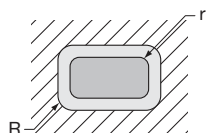
A & B: dimensions of plastic
a & b: dimensions rubber

$A-a \geq 0.5 \text{ mm}$, $B-b > 0.5 \text{ mm}$



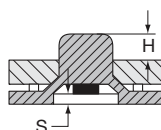
R: the corner radius of plastic
r: the corner radius of rubber

$1 \text{ mm} \leq R \leq 1.25 \text{ mm}$, $0.75 \text{ mm} \leq r \leq 1 \text{ mm}$ is better

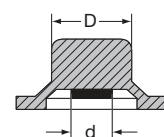


H: the dimension of key tops & plastic
S: the stroke of key pad

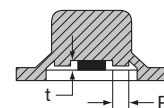
$H-S \leq 1.5 \text{ mm}$



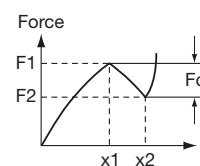
$D-d = 1.5 \text{ to } 2.0 \text{ mm}$



P: diameter of post
t: the gap between post & conductive pill
 $P = 1.0 \text{ mm}$ is better
 $t = 0.1 \sim 0.15 \text{ mm}$ is better

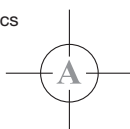


Fc: click force
Fc: $F1-F2 > 25 \text{ g}$ is better



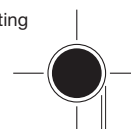
Guideline for Printing Artwork Design:

Button Graphics



Graphics Off Centre $\pm 0.3 \text{ mm}$

Full Surface Printing



$\pm 0.5 \text{ mm}$
0.5 mm

Patterns of Conductive Designs:

Items:

Circle:

Square/Ellipse:

Conductive Pill Resistance:

Mechanical Life:

Print type Resistance:

Mechanical Life:

Standard Sizes of Conductive Pill

1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 6, 7, 8, 9, 10

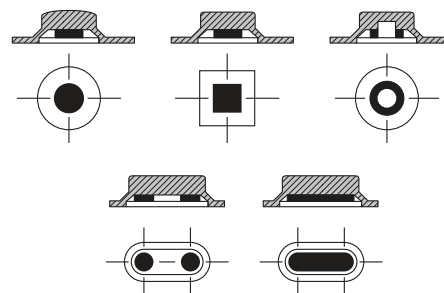
Recommended size of conductive ink printing contact is flexible.

Less than 150 ohms, with 125 grams loading

minimum 10 million operations

Less than 500 ohms, with 125 grams loading

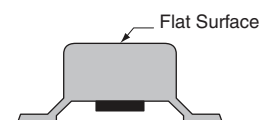
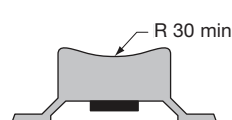
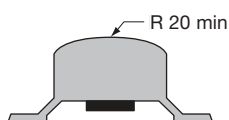
1×10^6 max. operations



Colour/Printing:

Suitable Key Surface for Legend Printing:

The commonly used colour for the underlay is medium-grey. Customers should provide us with the Pantone code or a colour specimen for both the key button and the legend.



Keypads Inquiry Form

Company	
Department	
Attention	
Address	
Postcode	
Phone	Fax
Email	Web

Membrane Requirements

Graphic Layer

Overall size
What finish is required (matt, gloss or selective texture)
Are windows required
Size
Position
Do they need to be tinted
Is embossing required
Pillow or rim
Number of colours

LEDs

Are embedded LEDs required
Number and colour
Will a separate tail be required

Tail position and length

Position of tail – exit from side and rear
Type of connector (if required)
If ZIF connector being used, get type for ref.

Switches

Number
Tactile or non-tactile
If tactile: polydome or metal dome
<i>Metal means higher unit cost, lower tool cost. Polydome means lower unit cost, higher tool cost.</i>
Detail of switch matrix

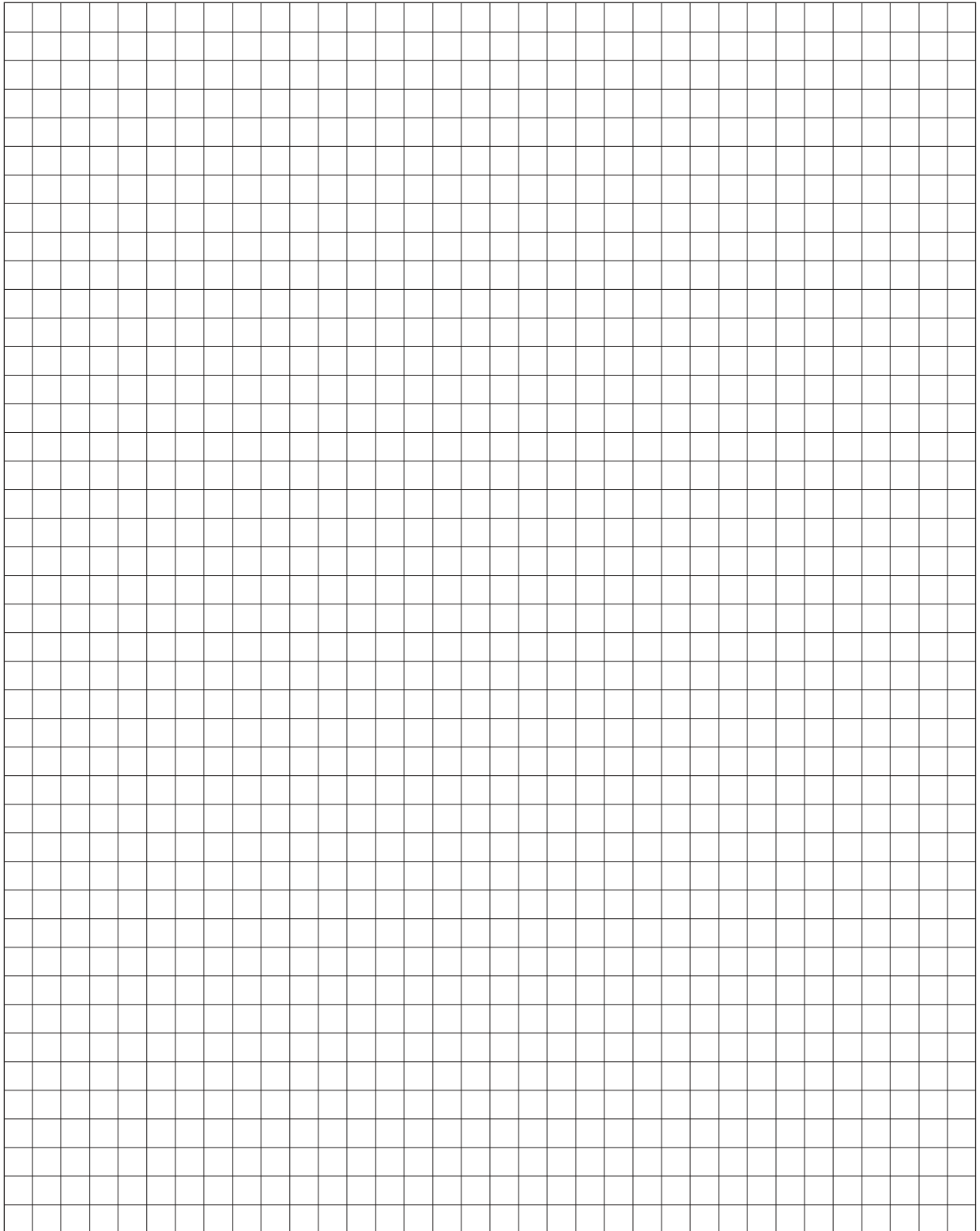
Any special features required

Insert legends
Luminescent inks
Other
Estimated project volume

Please complete this questionnaire and return to us with your sketch overleaf
(See back page for address details)



Layout Inquiry



Please sketch out your keypad layout and return to us
(See back page for address details)



15

Steel Keyboards

15.1 IP-Line 218 – 221

15.2 MF-Line 222

15.3 SF-Line 223

Input Systems Metal Keyboards

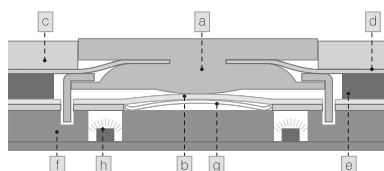
IP-Line

IP-Line is a full range of standard stainless steel keyboards that can be purchased in small quantities without the expense of engineering costs. This special line with front panel and keys with thick stainless steel, is ideally used in hard circumstances or public places (cash-point machines, access codes, petrol stations, etc.); high IP protection (IP 65, on demand up to max. IP 69K) and impact strength (up to IK 08).



Standard Specification:

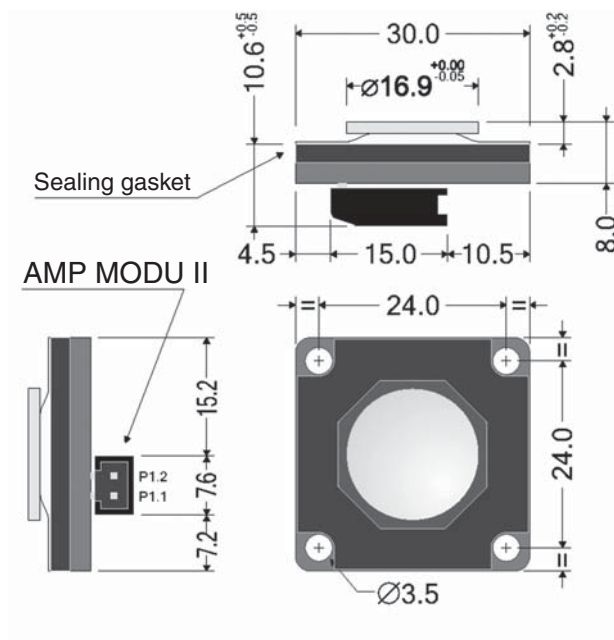
Material:	Stainless steel keybody 316L, silicon rubber seal
Switch stroke:	0.6 mm $\pm$ 0.1 mm
Connection:	PS/2, USB, RS-232
Actuation force:	4.5 N
Life expectancy:	> 3 000 000 cycles
Protection degree:	IP 65 without trackball – IP 54 with trackball
Protection degree against vandal-acts:	IK 08
Contact resistance:	< 30 Ohm
Power input:	I _{max} = 50 mA – V _{max} = 25 V AC/DC
Insulation resistance:	> 500 K Ohm
Operation temperature:	–10 °C to +70 °C (0 °C to +50 °C with trackball)



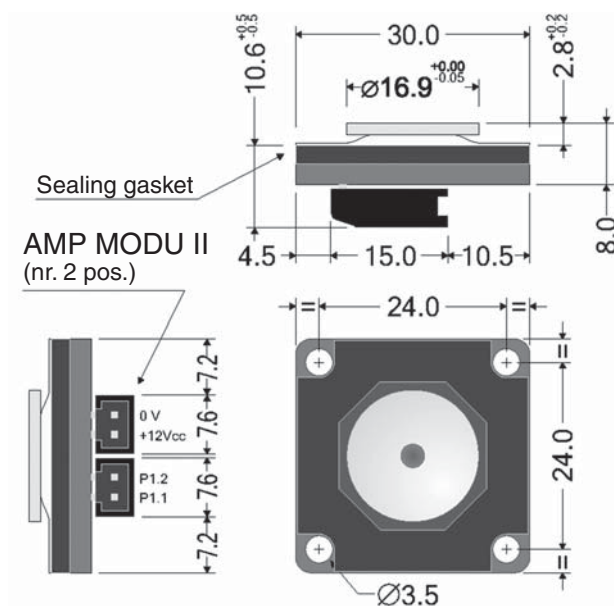
- a. IP-Line Module
- b. Protection layer PET
- c. Stainless steel frontpanel
- d. Silicon seal
- e. Eventual neoprene seal
- f. PCB
- g. Metal dome
- h. Eventual LED lights

Models:

YME IP 01 A



YME IP 01 B

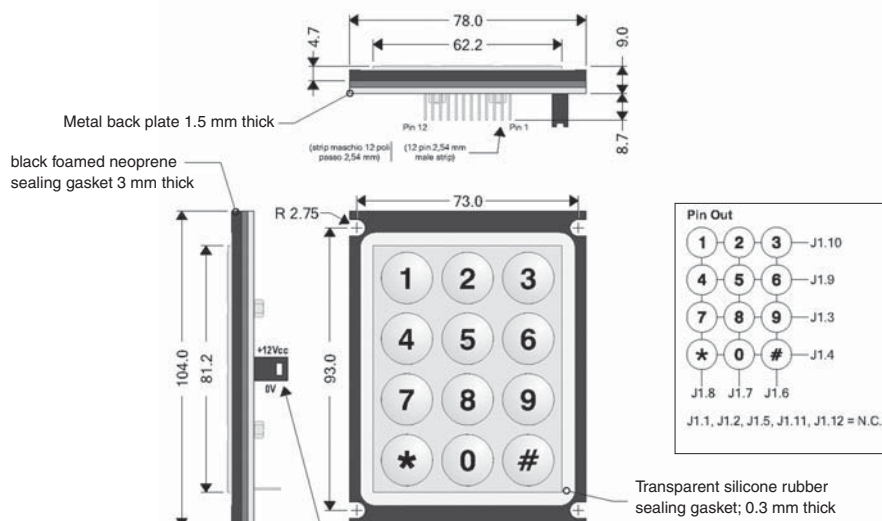


Input Systems Metal Keyboards

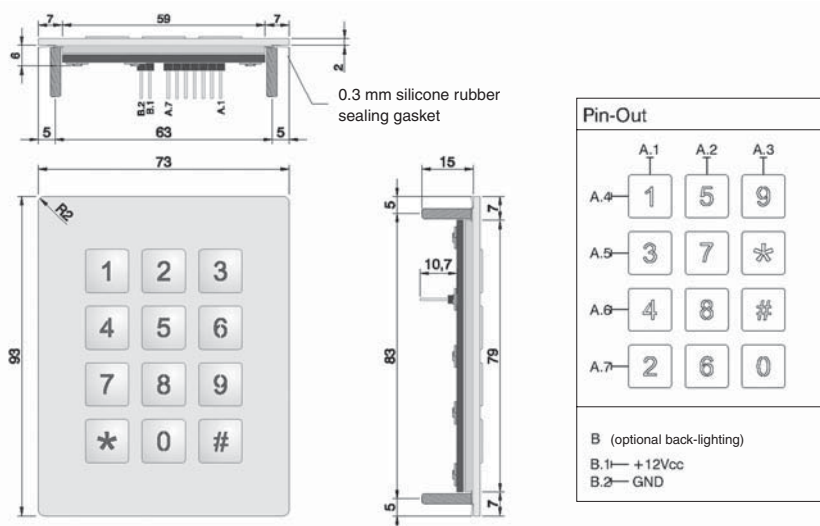
IP-Line

Models:

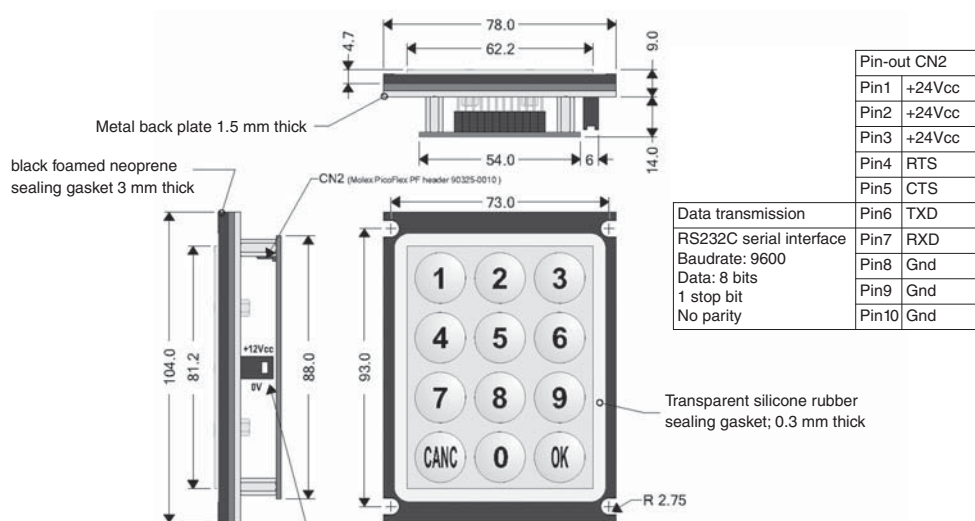
YME IP 12 D



YME IP 12 H

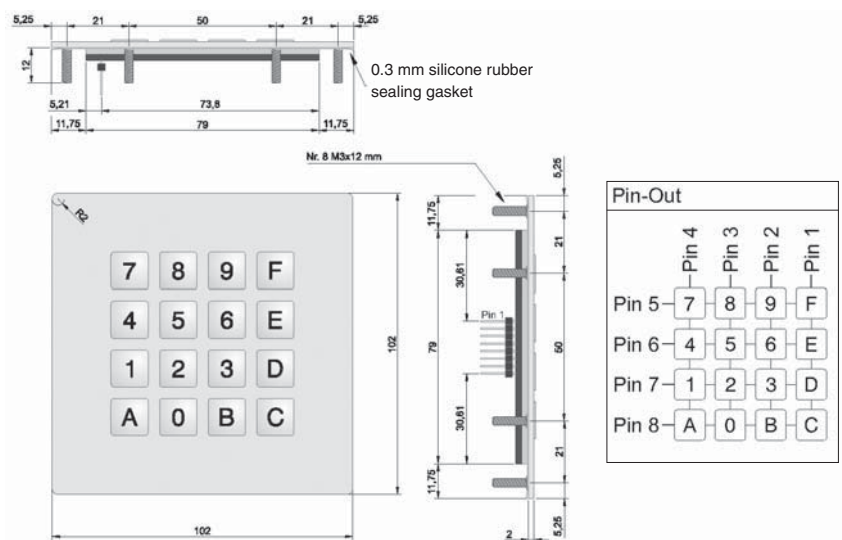


YME IP 12 L

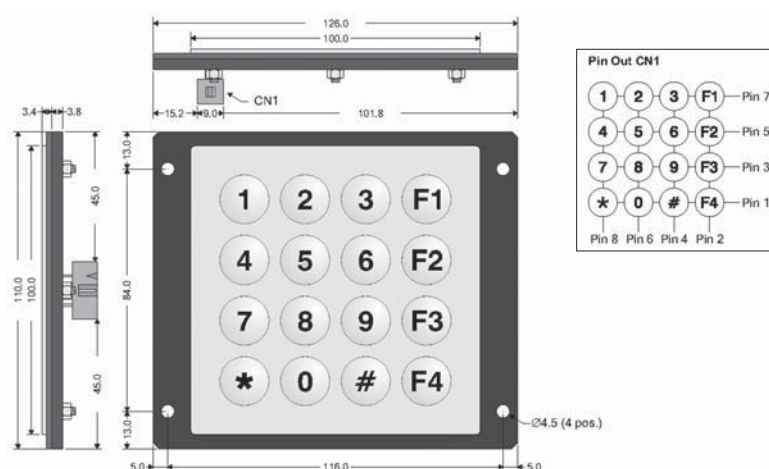


Models:

YME IP 16 I



YME IP 16 N



Customized products on request

Input Systems Metal Keyboards

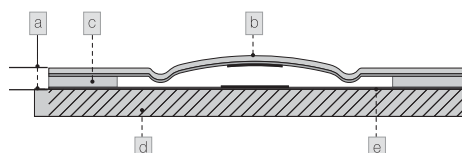
MF-Line

MF-Line feature an exclusive front panel produced with just one single stainless steel plate without gaps between the keys. They are ideally used in situations where priorities are the IP seal level and ease of cleaning (foodstuff, chemical industries, etc.)



Standard Specification:

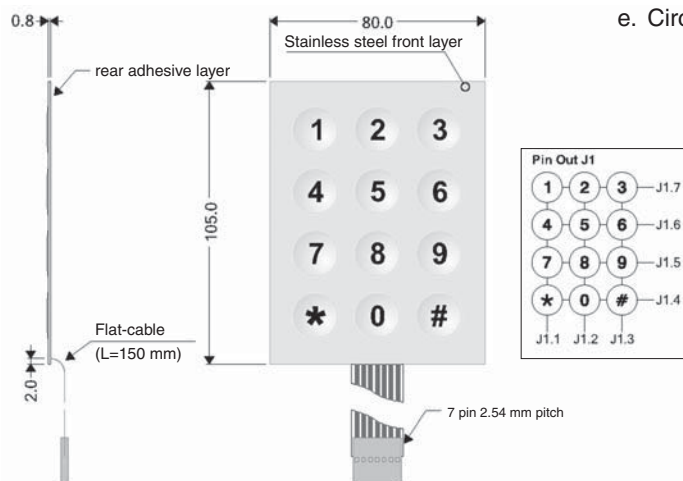
Material:	Front stainless steel 0.15 mm sheet on PET circuit or PCB FR4 circuit
Keys:	Ø 11 mm; Ø 15 mm; Ø 17 mm; chemical and/or silk screen printing marking
Switch stroke:	0.5 mm ± 0,1 mm
Connection:	PS/2, USB
Actuation force:	6 N
Life expectancy:	> 3 000 000 cycles
Protection degree:	IP 67 without trackball – IP 54 with trackball
Protection degree against vandal-acts:	IK 10
Contact resistance:	< 100 Ohm
Power input:	I _{max} = 50 mA – V _{max} = 25 V AC/DC
Insulation resistance:	> 500 K Ohm
Operating temperature:	-10 °C to +70 °C (0 °C zo +50 °C with trackball)



- a. 0.6 mm (typical)
- b. Stainless steel sheet
- c. Inside adhesive layers
- d. Eventual rigid support
- e. Circuit

Model:

YME MF 12 A

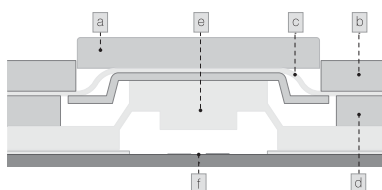


The line of SF-Line products is suited in particular for frequent usage and in situations where greater type-in comfort is required (i.e. information desk). The SF-Line model also belongs to our series of standard keyboards in stainless steel that can again be purchased in small quantities and without the expense of engineering costs.



Standard Specification:

Material:	Stainless steel housing 316L, silicone rubber seal
Switch stroke:	1.5 mm $\pm$ 0.1 mm
Connection:	PS/2, USB
Actuation force:	1.5 N
Life expectancy:	> 2 000 000 cycles
Protection degree:	IP 65 without trackball – IP 54 with trackball
Protection degree against vandal-acts:	IK 08
Contact resistance:	< 100 Ohm
Power input:	I _{max} = 50 mA – V _{max} = 25 V AC/DC
Insulation resistance:	> 500 K Ohm
Operating temperature:	–10 °C to +70 °C (0 °C to +50 °C with trackball)



- a. 2 mm stainless steel key body
- b. 2 mm stainless steel frontal frame
- c. Silicon rubber sealing gasket
- d. Aluminium inner frame
- e. Silicone rubber inner pad
- f. Silk screen printed silver contact in polyester foil
- g. Chemical Au contacts on FR4 PCB

Customized products on request

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