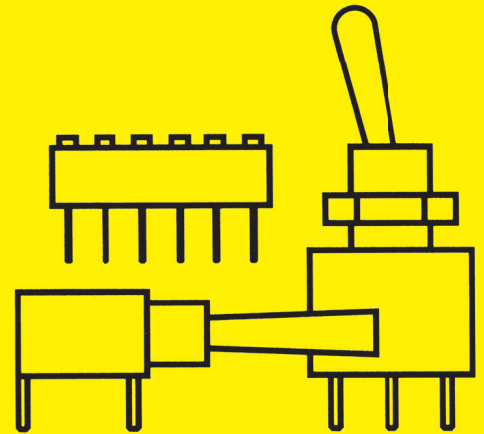
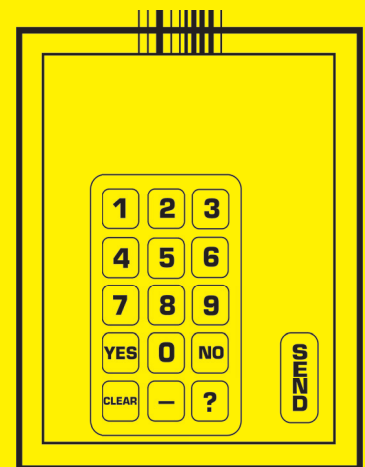


knitter switch




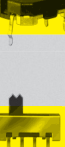













Professional Switches



Input Systems



INDEX

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	5. Tact Switches / Multi-Function	65
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	7. Dual-in-line Switches	123
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General Information

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:

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.

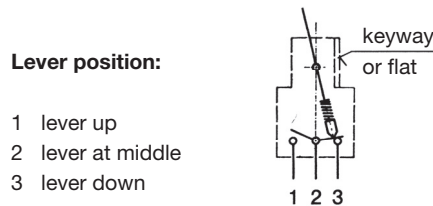
This is followed by the characteristic letters for the different switching functions (if there are):

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

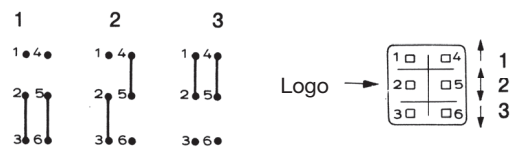
mom: momentary on
(mom): momentary off

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.

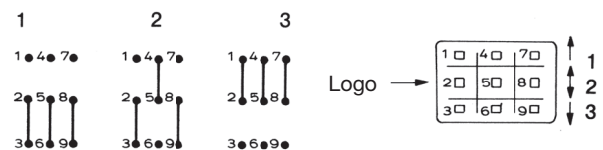
For PA, SA and TA types the poles are switched separately as shown in the diagram below:



DPDT



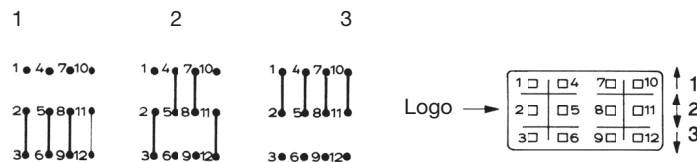
3PDT



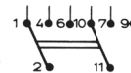
A connection between terminals 3 and 5 forms a one-pole three-position switch.



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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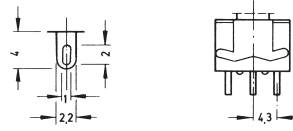
Miniature Toggle Switches

2

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

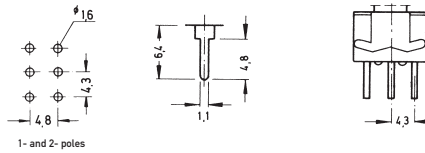
Solder tags:

Series MT./MP.



PC terminals:

- PC



horizontal actuation on PCB*

- RA



vertical actuation on PCB*

- VM



* Series ST./SP. only

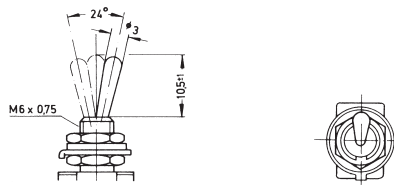
Standard switches with RA and VM are without thread. Special versions upon request.

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

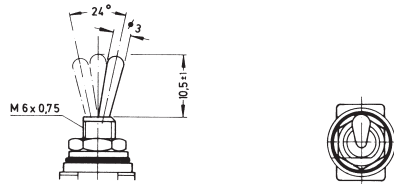
Miniature Toggle Switches

Standard levers:

Series MTA

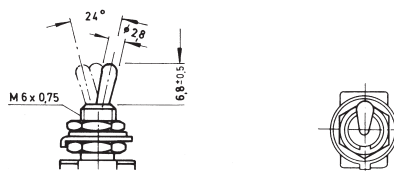


waterproof IP 67
Series MTE

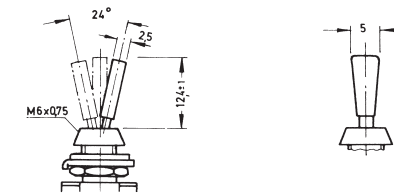


Special levers:

short
Series MTM

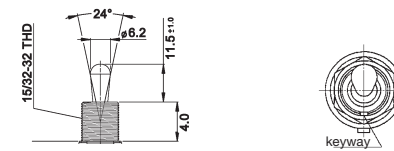


flat, with decorative nut
Series MTF

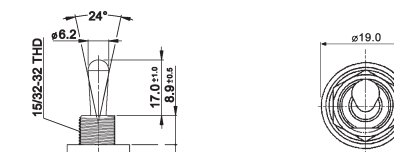


Mustang levers:

Series MTG

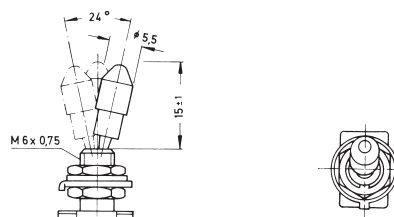


long, waterproof IP 67
Series MTW



Locking lever:

Series MTL



Miniature Toggle Switches

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:	< 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 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



Waterproof sealing caps (height 14.3 mm)

black ET 102
red ET 109



Waterproof sealing cap with mounting screw

UL recognized components on request.



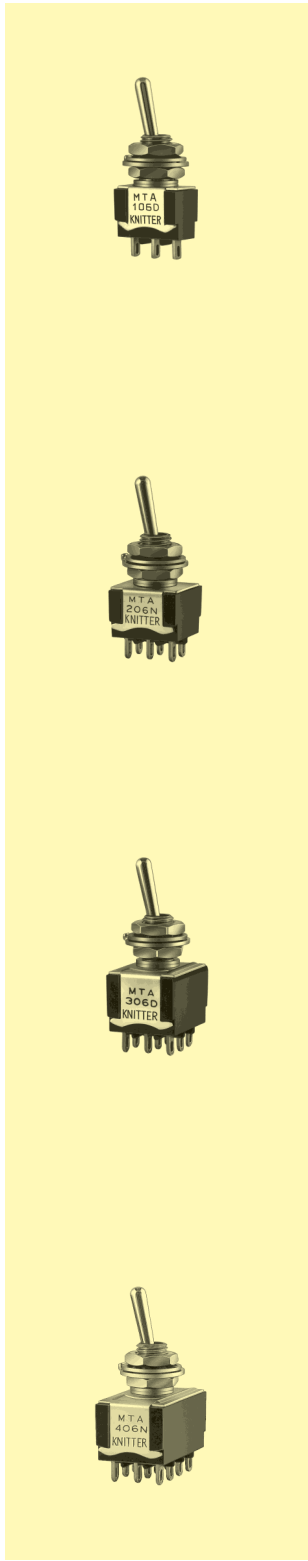
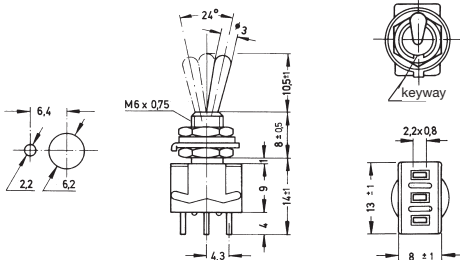
Miniature Toggle Switches

Models: Switching functions

SPDT



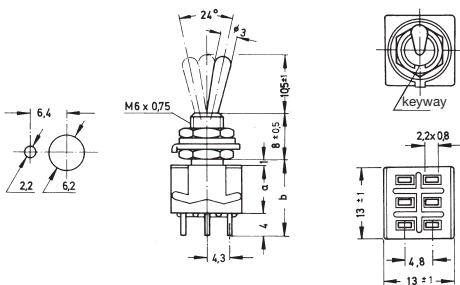
MTA 106 D	on	-	on
MTA 106 E	on	off	on
MTA 106 F	mom	-	on
MTA 106 G	mom	off	mom
MTA 106 H	mom	off	on



DPDT

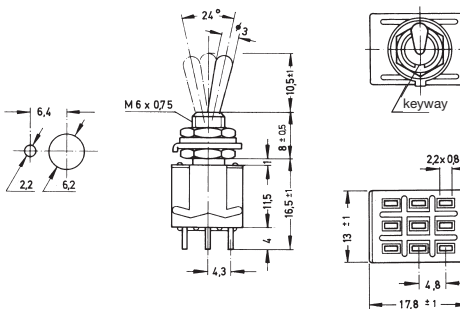
MTA 206 N	on	-	on
MTA 206 P	on	off	on
MTA 206 R	mom	-	on
MTA 206 S	mom	off	mom
MTA 206 T	mom	off	on
MTA 206 PA	on	on	on
MTA 206 SA	mom	on	mom
MTA 206 TA	mom	on	on

measures: a = 9, b = 14 ± 1



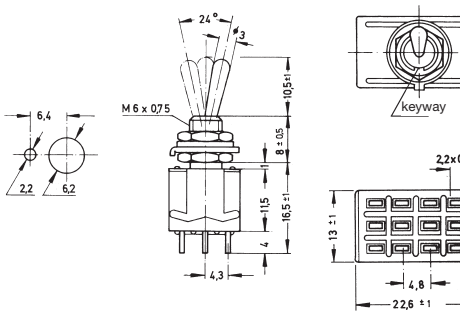
3PDT

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



UL recognized components on request.

**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 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

UL recognized components on request.

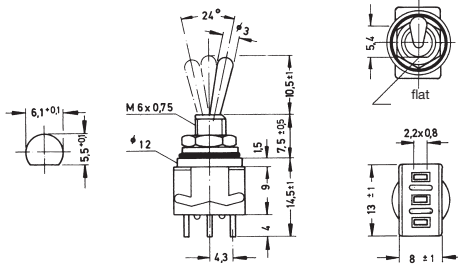


Miniature Toggle Switches waterproof

Models: Switching functions

SPDT

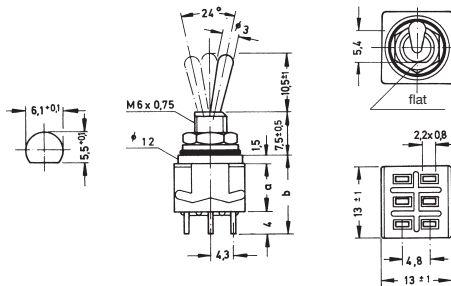
	●		
MTE 106 D	on	-	on
MTE 106 E	on	off	on
MTE 106 F	mom	-	on
MTE 106 G	mom	off	mom
MTE 106 H	mom	off	on



DPDT

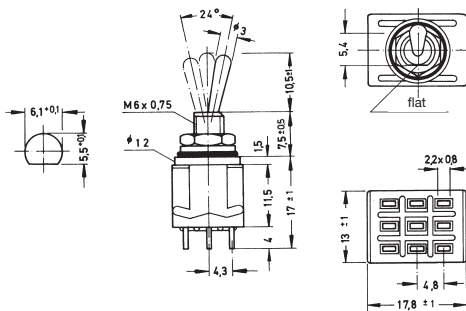
MTE 206 N	on	-	on
MTE 206 P	on	off	on
MTE 206 R	mom	-	on
MTE 206 S	mom	off	mom
MTE 206 T	mom	off	on
MTE 206 PA	on	on	on
MTE 206 SA	mom	on	mom
MTE 206 TA	mom	on	on

measures: a = 9, b = 14,5±1



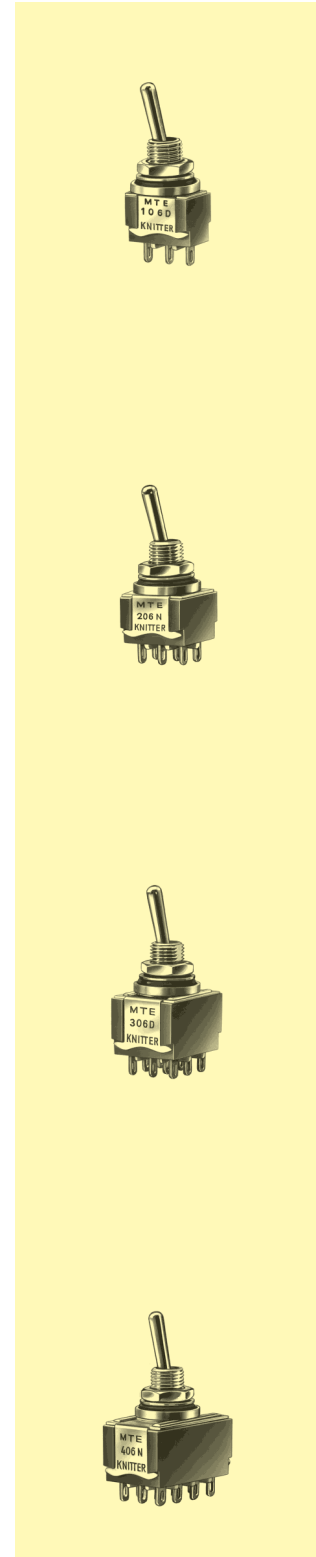
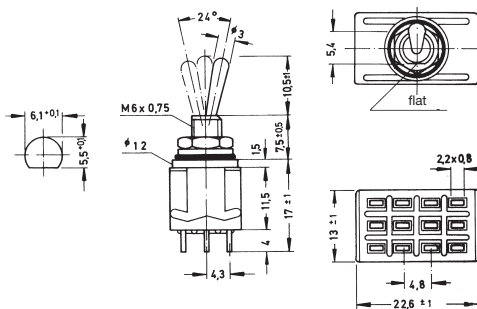
3PDT

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



4PDT

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



UL recognized components on request.

Miniature Toggle Switches with locking lever



2

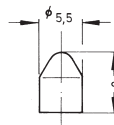
Specifications:

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:	< 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 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:

Aluminium marker caps:

black	KL 105
red	KL 109
silver	KL 110



UL recognized components on request.



Miniature Toggle Switches with locking lever

Models Switching functions

SPDT

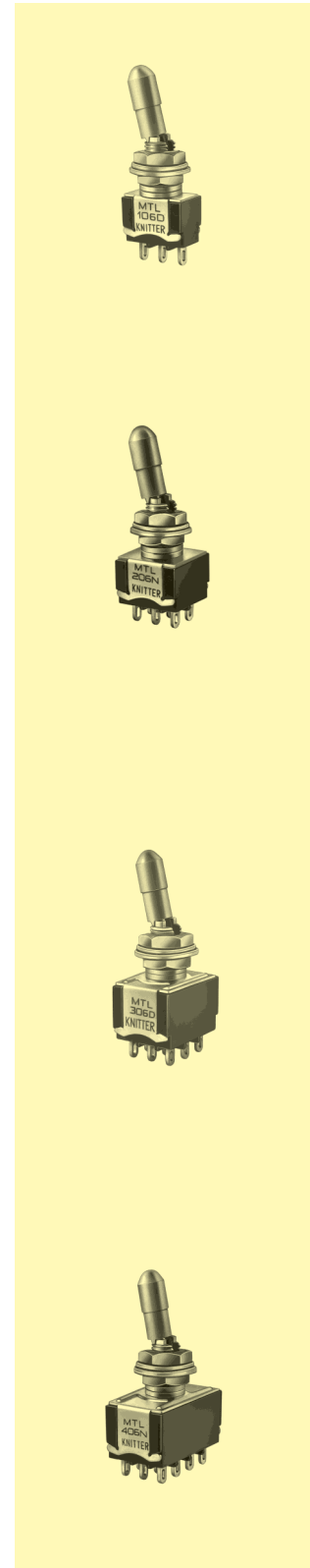
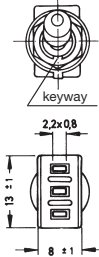
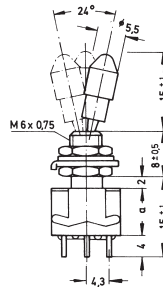


MTL 106 D

on - on

MTL 106 E

on off on



DPDT

MTL 206 N

on - on

MTL 206 P

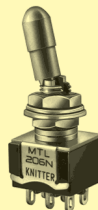
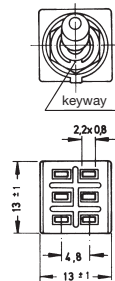
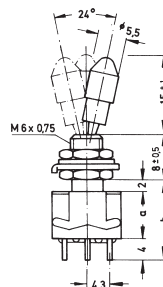
on off on

measures: a = 9, b = 15 ± 1

MTL 206 PA

on on on

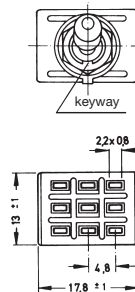
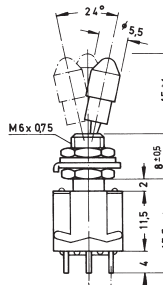
measures: a = 11,5, b = 17,5 ± 1



3PDT

MTL 306 D

on - on



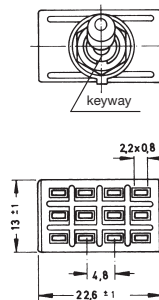
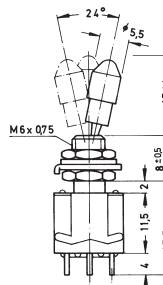
4PDT

MTL 406 N

on - on

MTL 406 P

on off on



UL recognized components on request.

Mustang Toggle Switches



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:	< 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:

Waterproof sealing cap (height 21.4 mm)

grey

ET 307



Waterproof sealing cap (height 11 mm)

grey

ET 507 Z





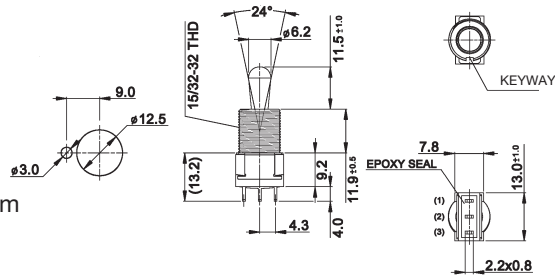
Mustang Toggle Switches

Models: Switching functions

SPDT



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



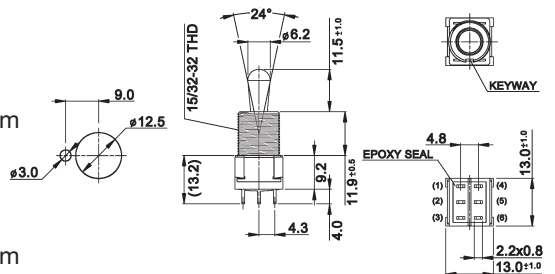
DPDT

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

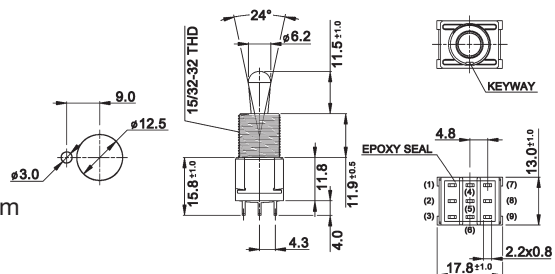
MTG 206 PA	on	on	on
MTG 206 SA	mom	on	mom
MTG 206 TA	mom	on	on

measures: a = 11,5, b = 15,5 ± 1



3PDT

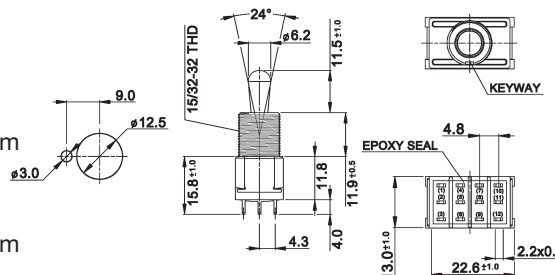
MTG 306 D	on	-	on
MTG 306 E	on	off	on
MTG 306 F	mom	-	on
MTG 306 G	mom	off	mom
MTG 306 H	mom	off	on



4PDT

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



UL recognized components on request.

Mustang Toggle Switches waterproof



2

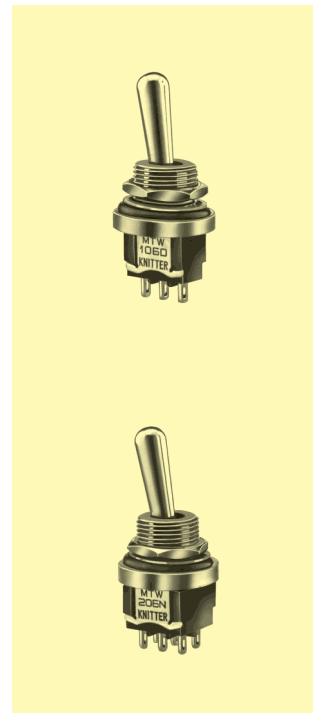
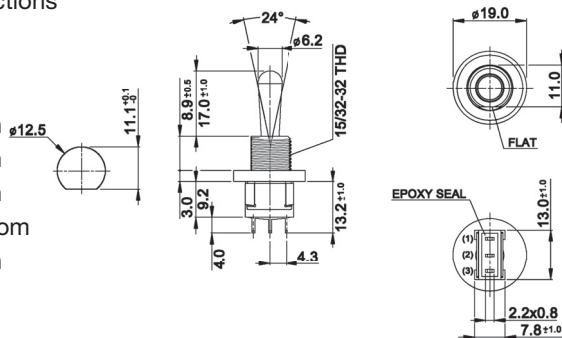
Specifications:

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:	< 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

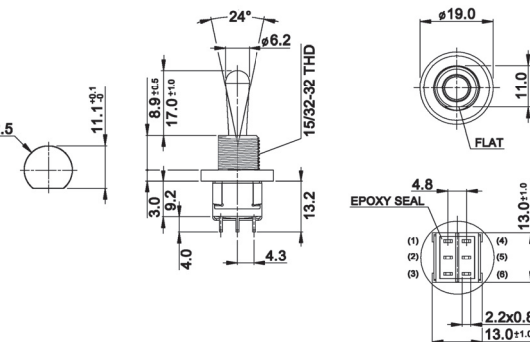
SPDT

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



Accessories:

Waterproof sealing cap (height 11 mm)
grey ET 507 Z





Miniature Toggle Switches ESD proof

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:	-40 °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:

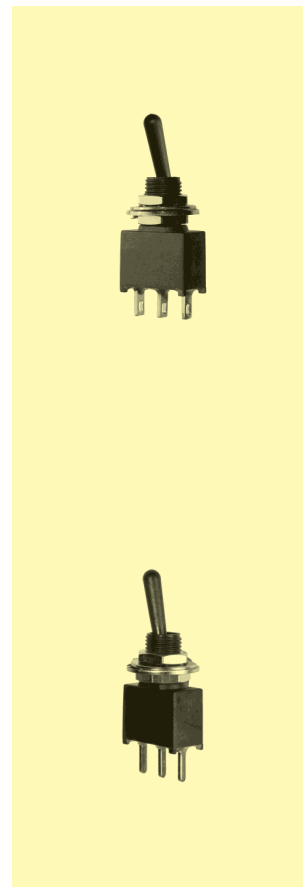
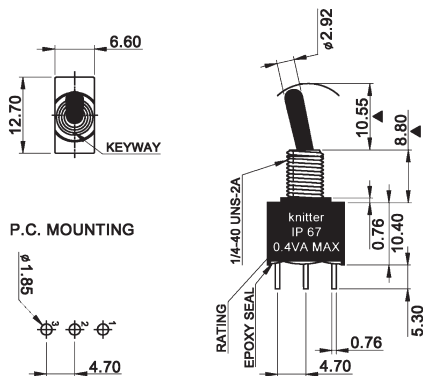
Switching positions: the closed contacts are opposite to the lever position

washable

S P D T

MZME 1 DB-ESD

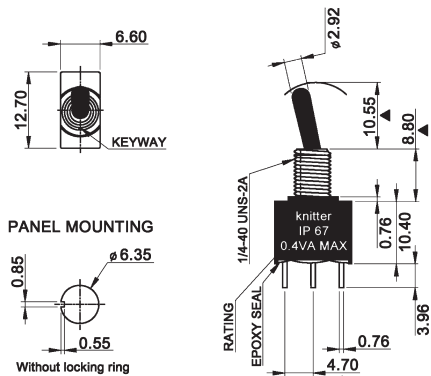
on - on



S P D T

MZME 1 DB-PC-ESD

on - on



UL recognized components on request.

Miniature Toggle Switches for horizontal mounting, without thread



2

Specifications:

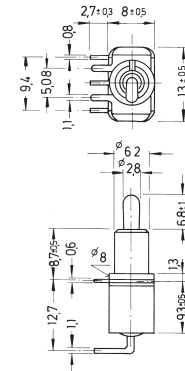
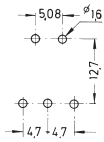
Contact rating:	250 V AC, 3 A / 125 V AC, 6 A 30 V DC, 4 A / 12 V DC, 5 A 6 V DC, 6 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 1000 MΩ at 500 V DC
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +80 °C
Mechanical life:	minimum 100 000 operations
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, black 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

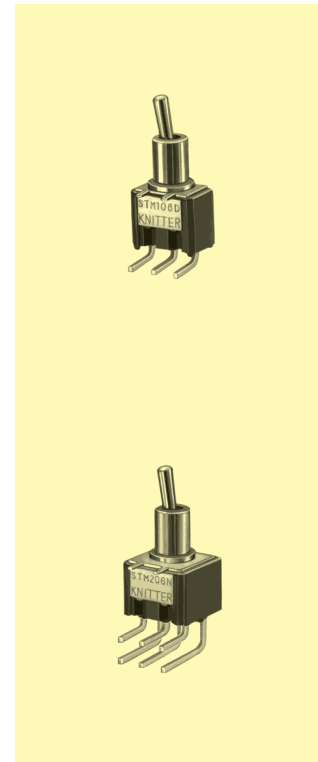
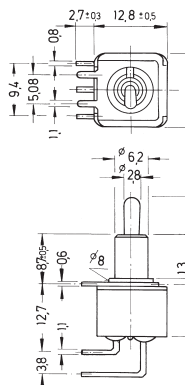
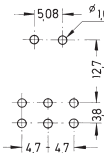
SPDT

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



DPDT

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

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, black lever: chromium-plated, metal parts: nickel-plated
Mounting:	on pc-board, vertical mounting
Soldering conditions:	wave-soldering – max.: 5 sec, 270 °C

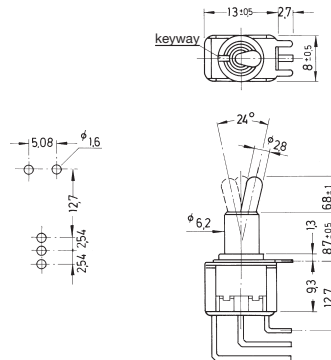
Models:

Switching functions

SPDT

- STM 106 D – VM
- STM 106 E – VM
- STM 106 F – VM
- STM 106 G – VM
- STM 106 H – VM

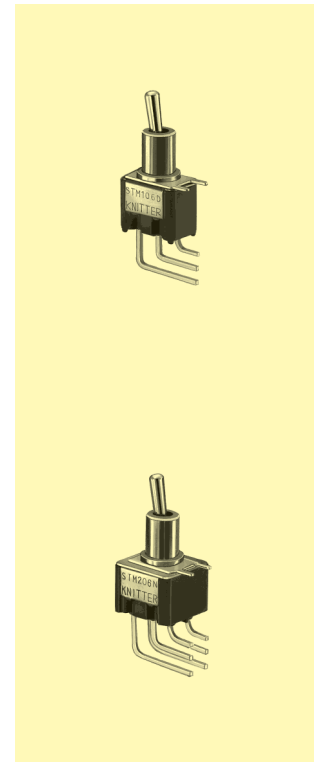
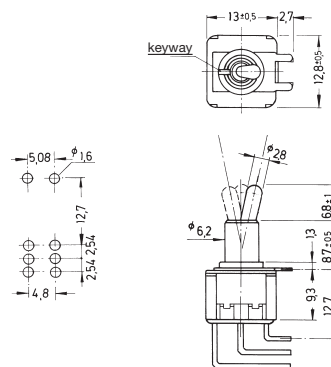
●	on	-	on
	on	off	on
	mom	-	on
	mom	off	mom
	mom	off	on



DPDT

- STM 206 N – VM
- STM 206 P – VM
- STM 206 R – VM
- STM 206 S – VM
- STM 206 T – VM

	on	-	on
	on	off	on
	mom	-	on
	mom	off	mom
	mom	off	on



Subminiature Toggle Switches



2

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:	-40 °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

UL recognized components on request.



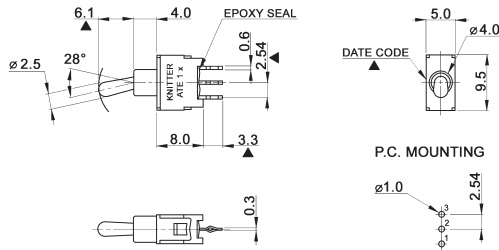
Subminiature Toggle Switches

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

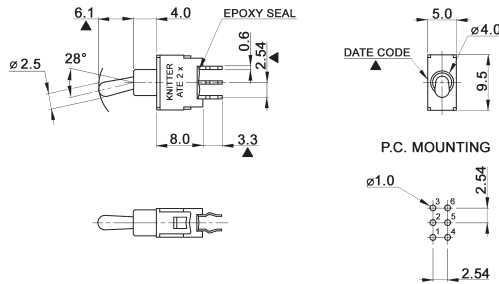
SPDT

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



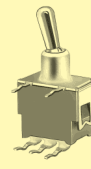
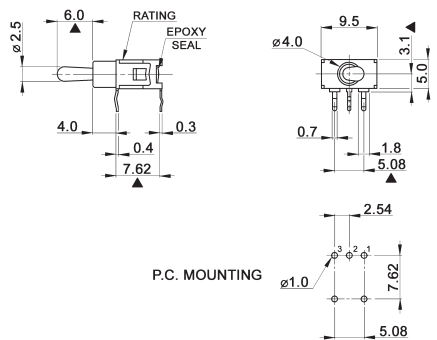
DPDT

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



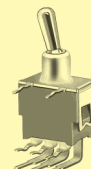
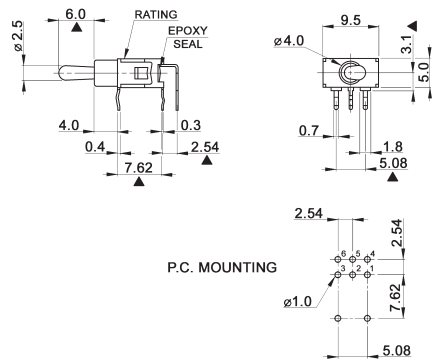
SPDT

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



UL recognized components on request.

Subminiature Toggle Switches waterproof



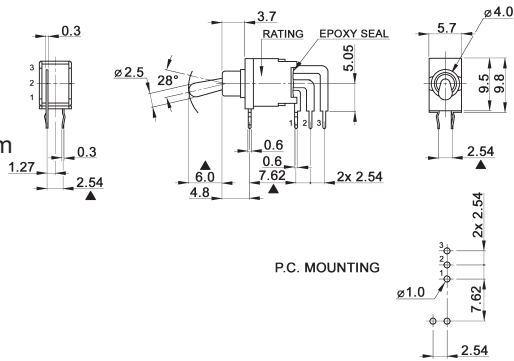
2

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.

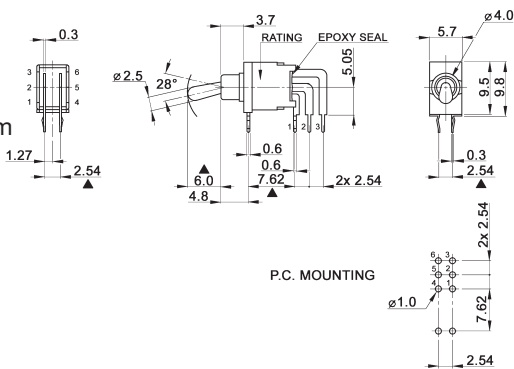
SPDT

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



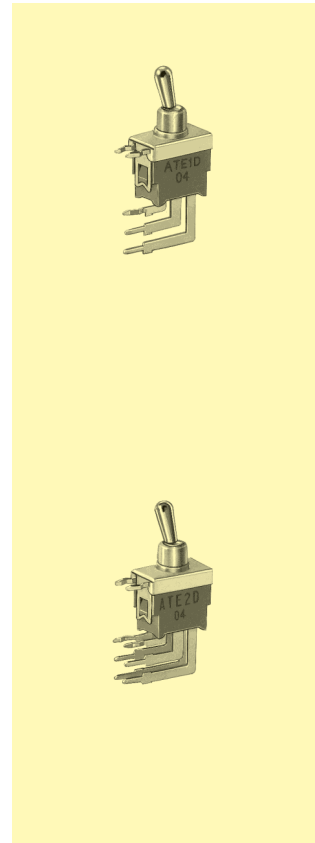
DPDT

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

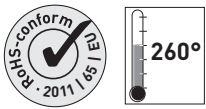


Accessories: see page 22.

washable



UL recognized components on request.



Subminiature Toggle Switches for SMT, waterproof

2

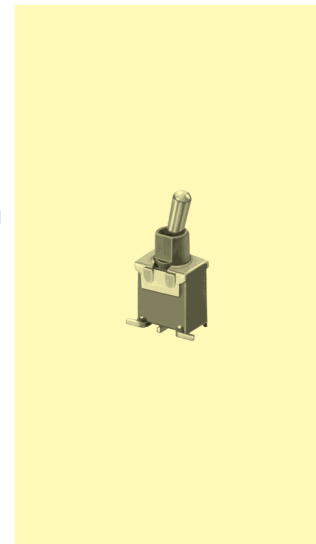
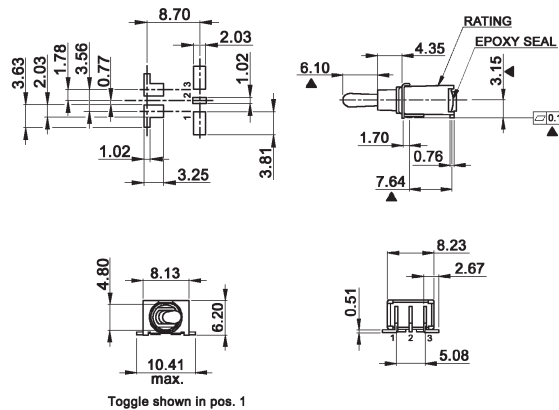
Specifications:

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

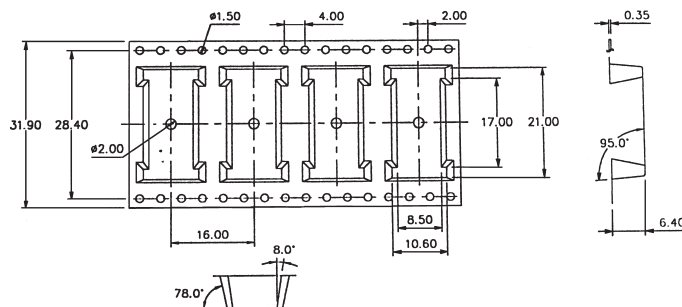
washable

Model: Switching function

SST 1 DB-R on - on



Packing: 500 pcs/reel



Subminiature Toggle Switches ESD proof, waterproof



2

Specifications:

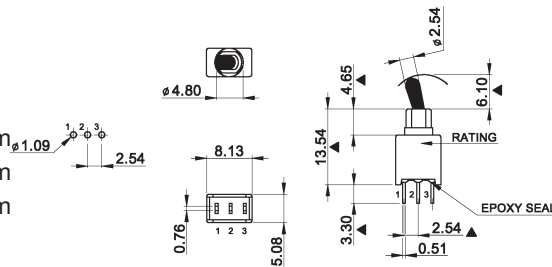
Contact rating:	max. 20 V AC / DC, 0.4 VA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-30 °C to +85 °C
Mechanical life:	minimum 30 000 operations
Contacts/Terminals:	copper alloy
Material:	case: nylon 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

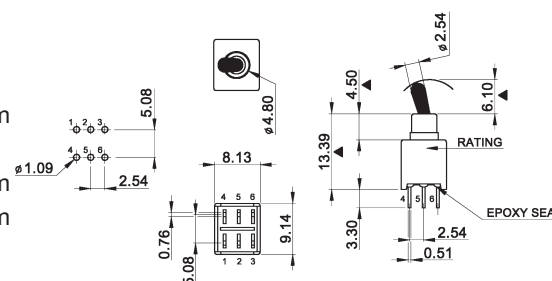
SPDT

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



DPDT

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





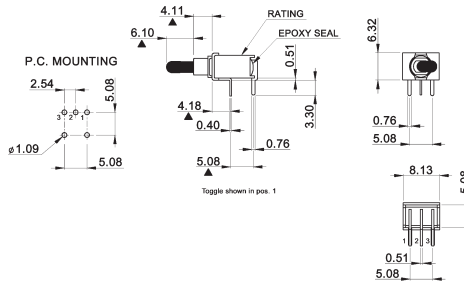
Subminiature Toggle Switches ESD proof, waterproof

2

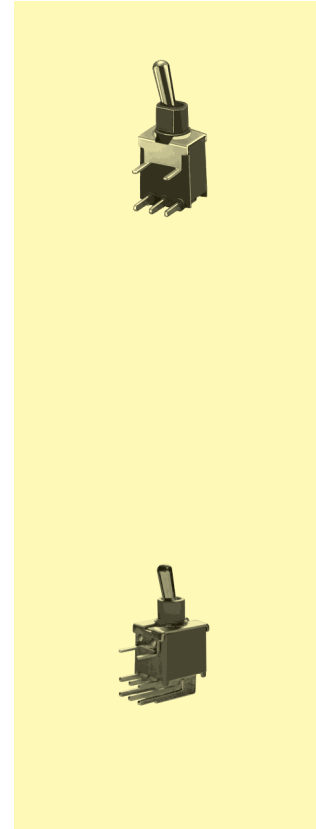
Models: Switching functions: the closed contacts are opposite to the lever position.

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

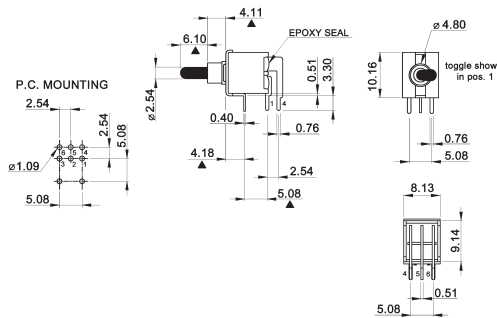


washable



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



**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)



Microminiature Toggle Switches ESD proof

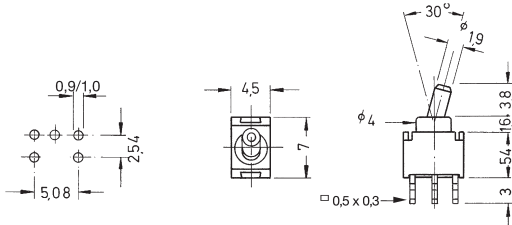
2

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

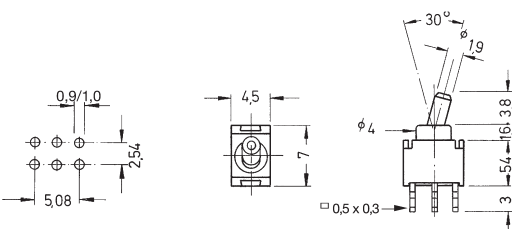
SPDT

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



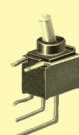
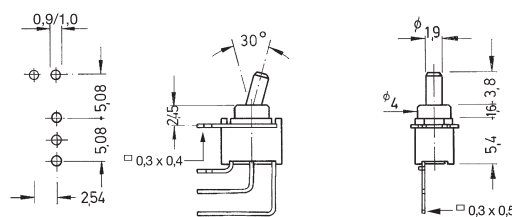
DPDT

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



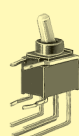
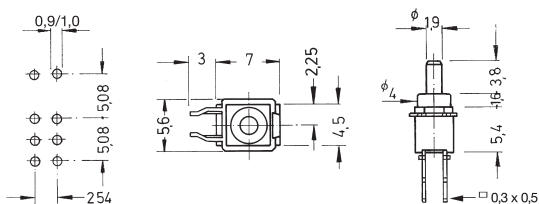
SPDT

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
Series MPM		39
Series MPS		40
Series MPBS	2–6 poles	41
Series MPSA	0.6 N – 3.5 N operating force	42

3.2 Subminiature Pushbutton Switches



Series APE	standard	43
Series MZP	low cost	44
Series TSP	waterproof IP 67	45
Series SSP	for SMT/waterproof IP 67	45

3.3 Microminiature Pushbutton Switches



Series FP	ESD proof	46–47
Series SSP	for SMT	48

Miniature Pushbutton Switches

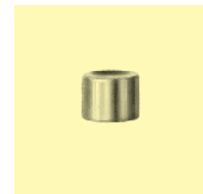


Specifications:

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:	< 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 30000 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		
blue	10 mm	KM 404		
black	10 mm	KM 405	15 mm	KM 605
green	10 mm	KM 406		
grey	10 mm	KM 407	15 mm	KM 607
yellow	10 mm	KM 408		
red	10 mm	KM 409	15 mm	KM 609
white	10 mm	KM 410	15 mm	KM 610



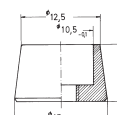
Knurled nut, nickel-plated

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





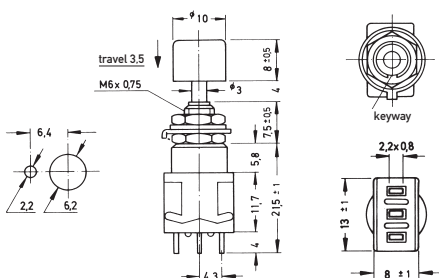
Miniature Pushbutton Switches

Models: Switching functions

SPDT

MPA 106 F
MPA 106 D

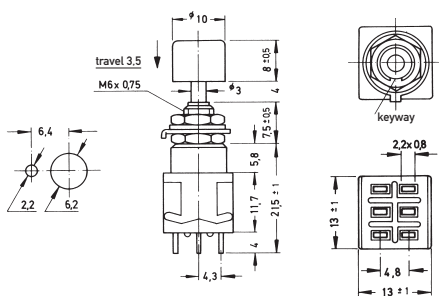
* on - mom
on - on



DPDT

MPA 206 R
MPA 206 N

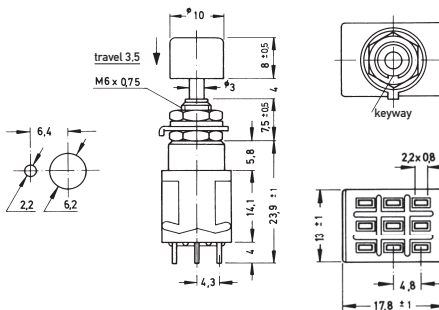
* on - mom
on - on



3PDT

MPA 306 F
MPA 306 D

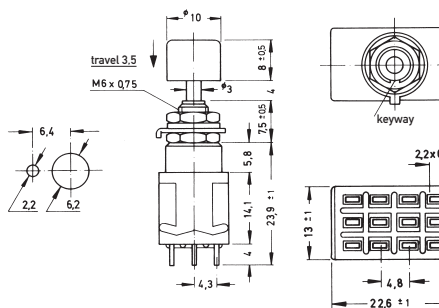
* on - mom
on - on



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.



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 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

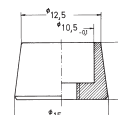
Accessories:

Buttons	Ø (height 8 mm)		Ø (height 10 mm)	
orange	10 mm	KM 403		
blue	10 mm	KM 404		
black	10 mm	KM 405	15 mm	KM 605
green	10 mm	KM 406		
grey	10 mm	KM 407	15 mm	KM 607
yellow	10 mm	KM 408		
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





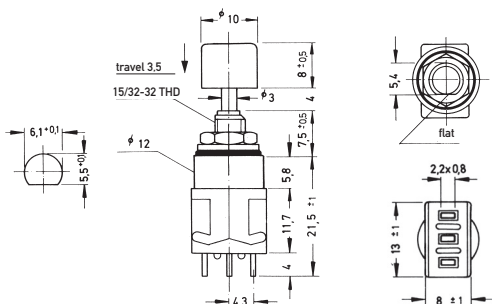
Miniature Pushbutton Switches waterproof

Models: Switching functions

SPDT

MPE 106 F
MPE 106 D

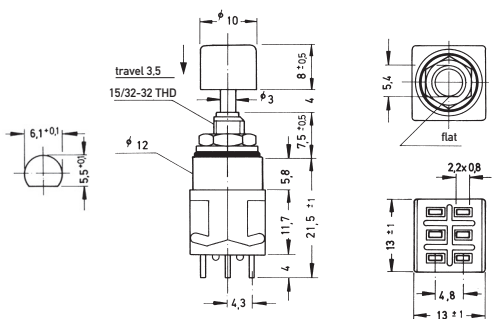
* on - mom
on - on



DPDT

MPE 206 R
MPE 206 N

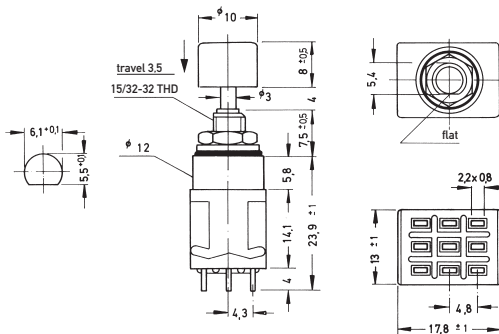
* on - mom
on - on



3PDT

MPE 306 F
MPE 306 D

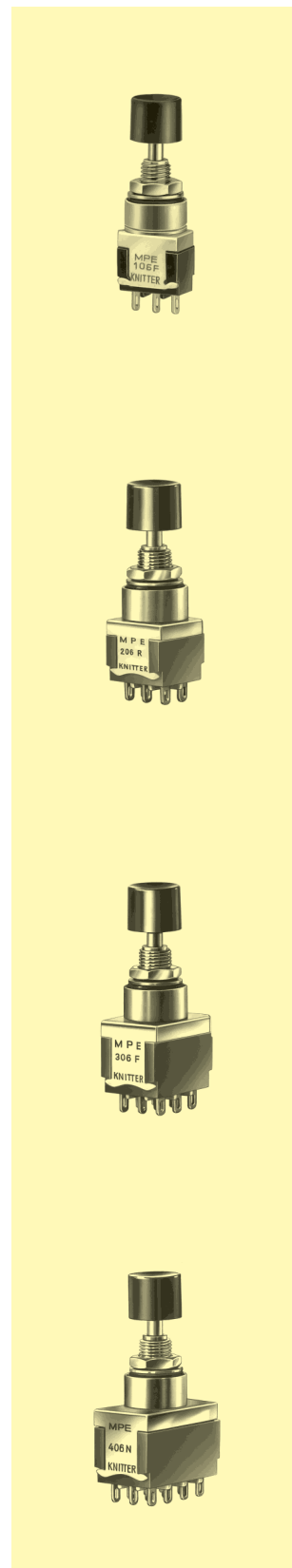
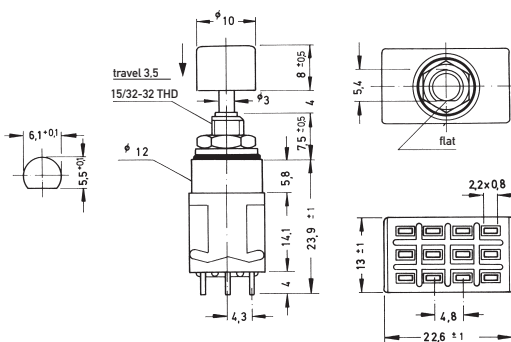
* on - mom
on - on



4PDT

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.

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 30000 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:

Waterproof sealing caps (height 14.8 mm)

grey	ET 207
red	ET 209

also available in fluoro silicone material





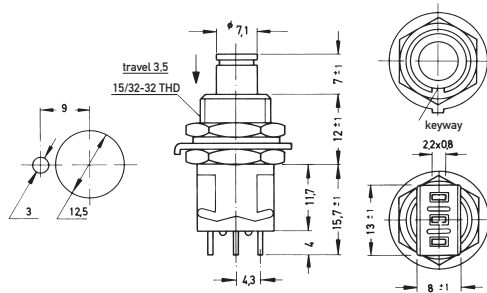
Miniature Pushbutton Switches heavy duty series

Models: Switching functions

S P D T

MPG 106 F
MPG 106 D

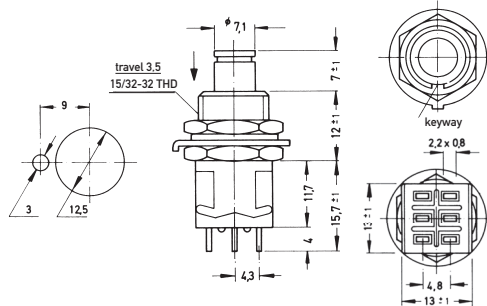
* on - mom
on - on



D P D T

MPG 206 R
MPG 206 N

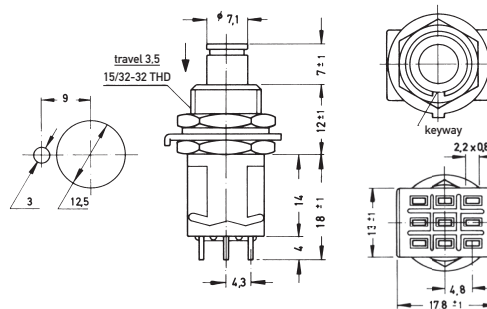
* on - mom
on - on



3 P D T

MPG 306 F
MPG 306 D

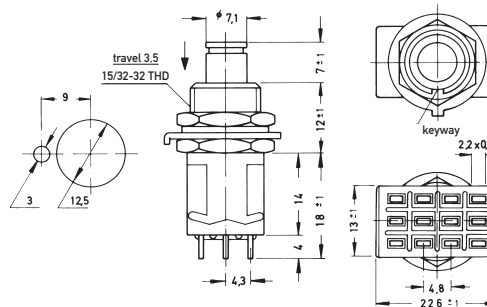
* on - mom
on - on



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.

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 100000 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

Models: Switching functions

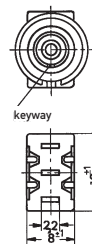
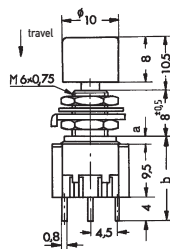
S P D T

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



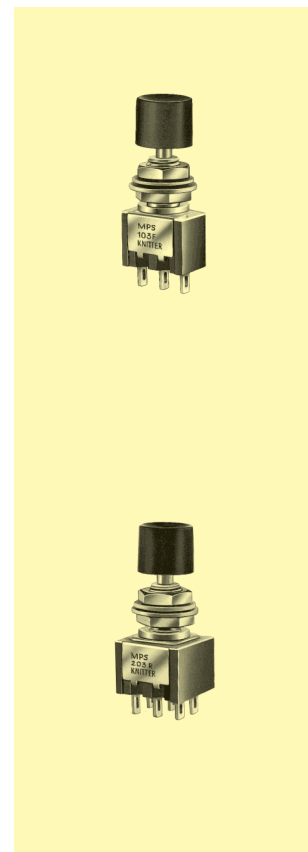
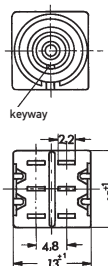
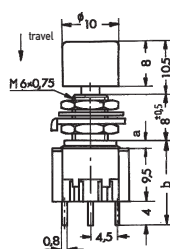
D P D T

MPS 203 R on – mom

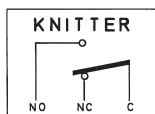
measures: a = 1.5, b = 15⁻¹
travel 1.0

MPS 203 N on – on

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



Circuit diagram:



Accessories see page 34.



Miniature Pushbutton Switches snap action

3

Specifications:

Contact rating:	250 V AC, 1 A / 120 V AC, 3 A / 28 V DC, 3 A
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 50 000 operations
Contacts, terminals:	silver plated copper alloy, solder lugs
Material:	Case: Diallyl-Phtalate meets UL 94 V-0, red Bushing: nickel-plated brass Housing: stainless steel Plunger: PA
Mounting:	bushing thread 1/4-40 UNS-2A, key 8 mm
Soldering conditions:	hand soldering, max. 5 s, 350 °C

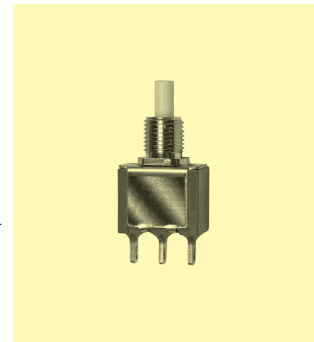
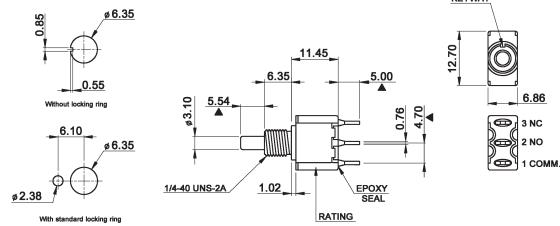
Models:

Switching functions

SPDT

MPM 1 F

on - mom



Miniature Pushbutton Switches

Specifications:

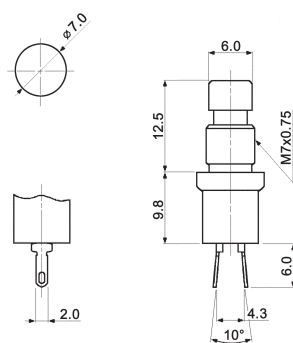
Contact rating:	30 V DC, 650 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 500 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +60 °C
Mechanical life:	minimum 20 000 operations
Contacts:	brass, silver-plated
Terminals:	solder tags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

Models:

Contact arrangement

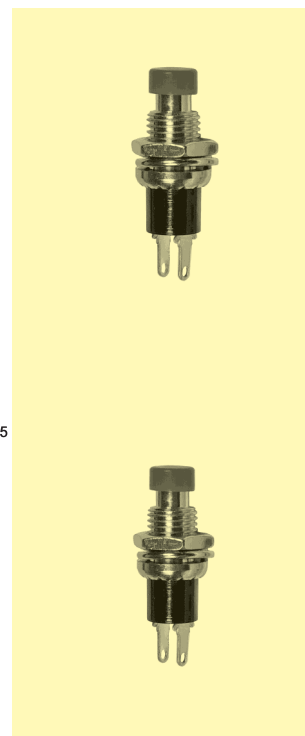
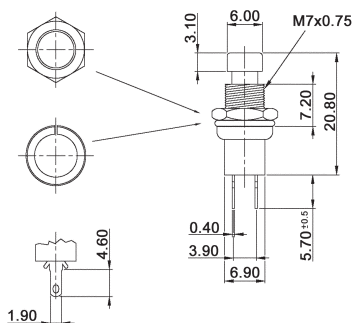
MPS 29 B
button colour: black
red

on – (mom)



MPS 29 C
button colour: black
red

off – mom





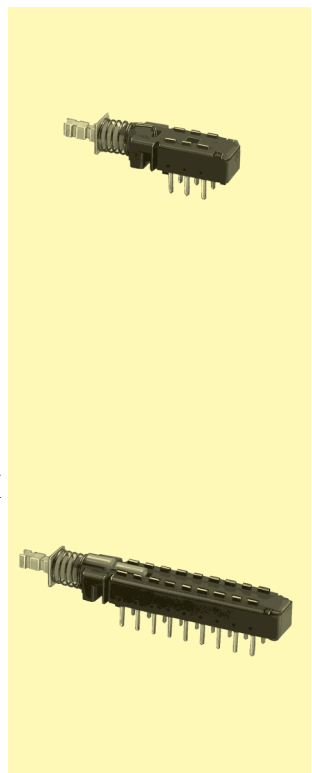
Miniature Pushbutton Switches

Specifications:

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
Operating force:	3 N ± 1 N
Mechanical life:	minimum 30 000 operations
Material:	Contacts: Phosphor-Bronze, silver-plated Terminals: Brass, silver-plated Case: ABS Actuator: POM
Mounting:	on pc-board
Timing:	non-shorting
Travel:	4.7 mm, locking travel: 3.0 mm
Soldering conditions:	wave-soldering – max. 5 s, 260 °C

Models:

	Switching function:	
MPBS 22H01L-F14	on – on	
MPBS 62H01-F14	on – mom	



Ordering Code:

MPBS - □ 2H01 □ - F14

Poles:

- 2 poles
- 4 poles
- 6 poles

Switching mode:

- on – mom
- on – on

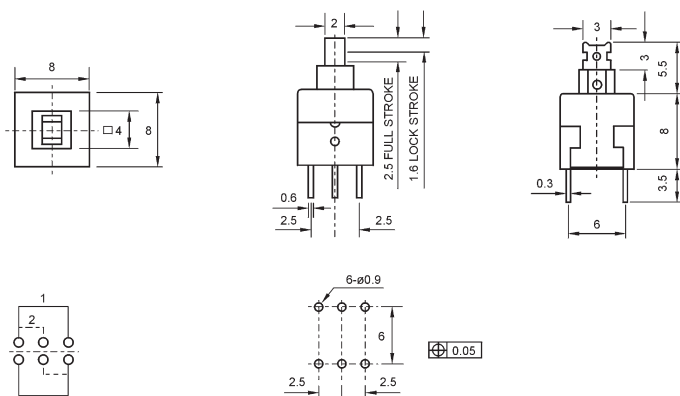
Miniature Pushbutton Switches

Specifications:

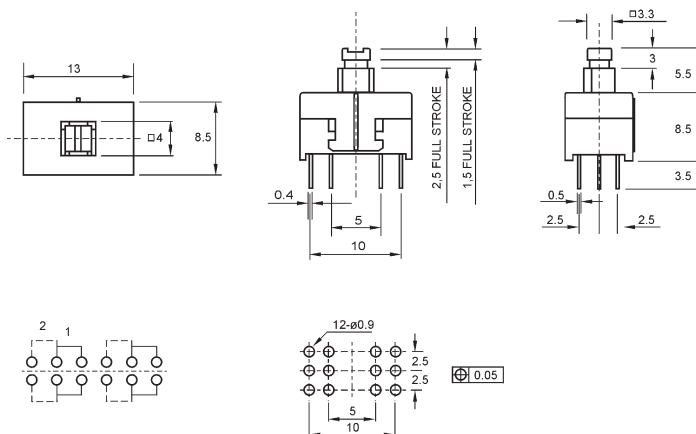
Contact rating:	30 V DC, 100 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Electrical life:	minimum 10 000 operations
Contacts:	beryllium-copper, silver-plated
Terminals:	brass, silver-plated
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-O
MPSA-22E08-O



MPSA-42E06L-O
MPSA-42E06-O



Minimum order quantity 1.000 pcs

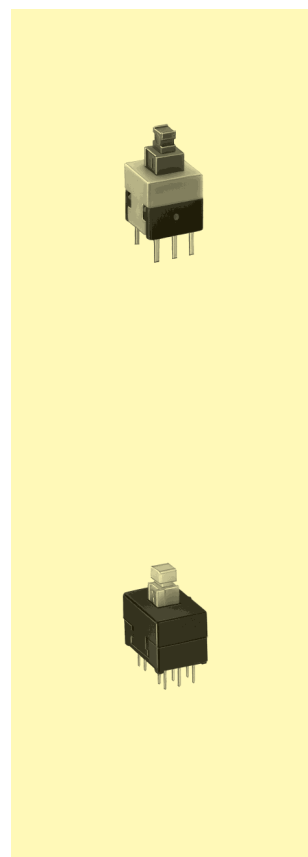
Ordering Code: **MPSA** - **O** - -

Number of poles:
 22E08 2 poles
 42E06 4 poles

Switching function:
 on - mom
 L on - on

Operating force:
for MPSA 42E06 only:
 350 3.5 N ±1.0 N
for MPSA 22E08 only:
 180 1.8 N ±0.8 N – for on-on only
 060 0.6 N +0.25 N – for on-mom only
 150 1.5 N ±0.5 N – for on-mom only
 350 3.5 N ±1.0 N – for on-on only
 500 5.0 N ±1.0 N – for on-mom only

Contact / terminal surface:
for MPSA 42E06 only:
 silver
for MPSA 22E08 only:
 silver
 AU3 0.075 µm gold





Subminiature Pushbutton Switches

Specifications:

Contact rating:	max. 48 V AC/DC, 0.4 VA / max. 50 mA min. 20 mV AC/DC, 1 µA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 500 MΩ at 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 60000 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 ± 5 °C

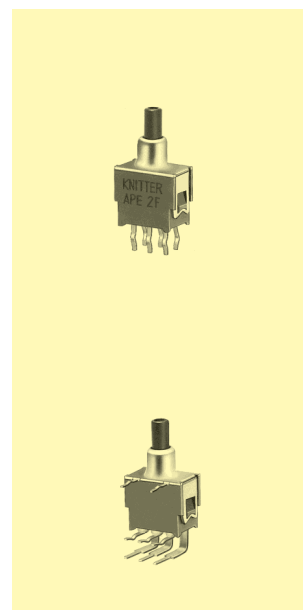
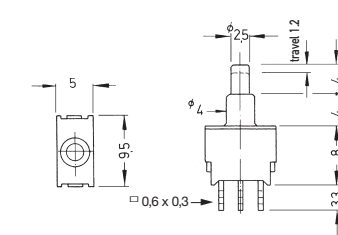
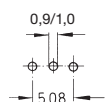
Models: Switching functions: when looking at the brand name, the normally closed contact is on the right-hand side

washable

SPDT

APE 1 F

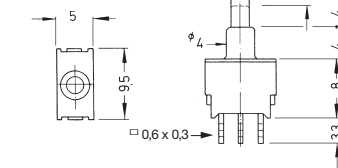
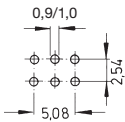
on - mom



DPDT

APE 2 F

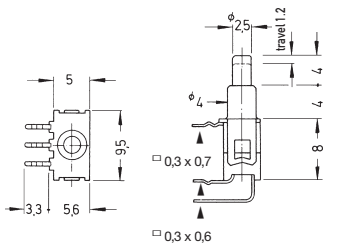
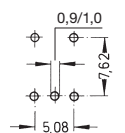
on - mom



SPDT

APE 1 F - RA

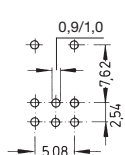
on - mom



DPDT

APE 2 F - RA

on - mom



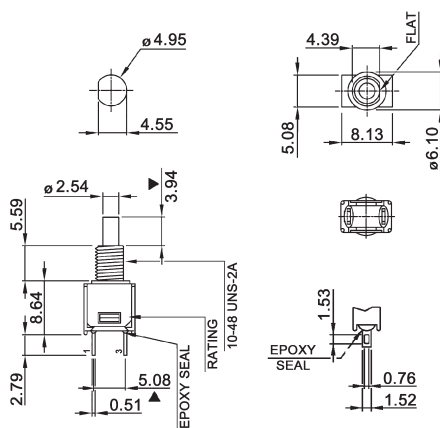
Subminiature Pushbutton Switches

Specifications:

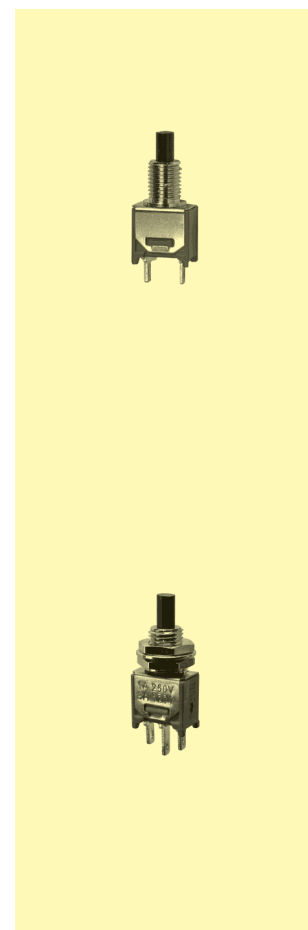
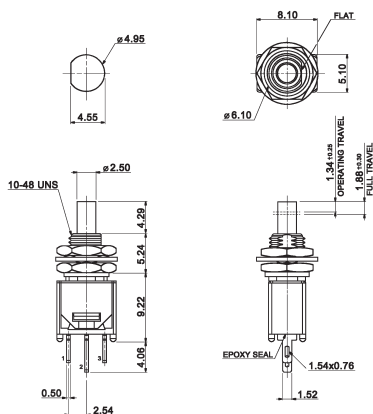
Contact rating:	250 V AC, 1 A / 120 V AC, 3 A / 28 V DC, 3 A
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-30 °C to +85 °C
Mechanical life:	minimum 50 000 operations
Contacts:	brass, silver-plated
Terminals:	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

Models: Switching functions

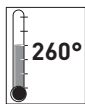
MZP 1 C off – mom



MZP 1 D on – on



Packing: 100 pcs/bag



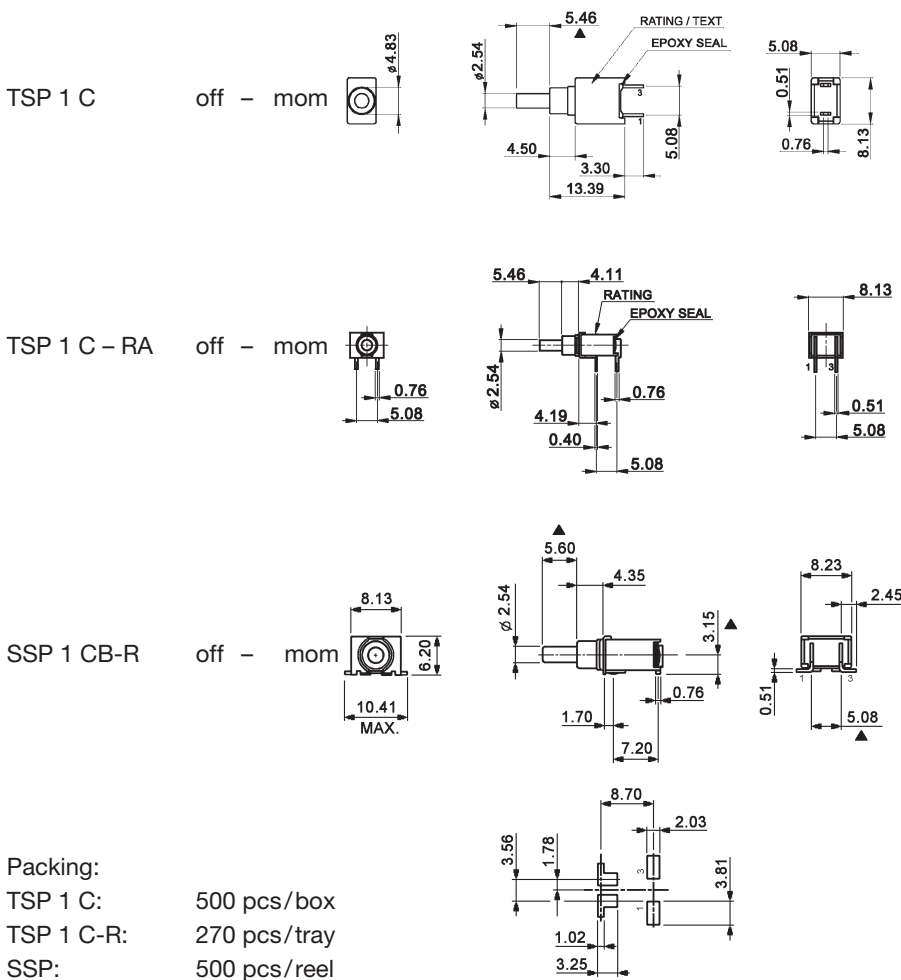
Subminiature Pushbutton Switches waterproof

Specifications:

Contact rating:	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 50 000 operations
Contacts:	copper-alloy, gold-plate over nickel plate
Terminals:	copper-alloy, gold-plate over nickel plate
Case:	PA, support: brass, tin-plated, actuator: PA
Protection:	IP 67
Mounting:	TSP: on pc-board, holes Ø 1.09 mm, SSP: SMD
Travel:	0.9 mm
Soldering conditions:	TSP: wave-soldering – max. 10 sec, max. 260 °C (pre-heat max. 120 sec, max. 150 °C), SSP: see reflow-profile manual soldering – max. 5 sec, max 350 °C

Models: Switching functions

washable



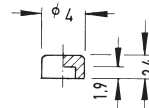
Specifications:

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:

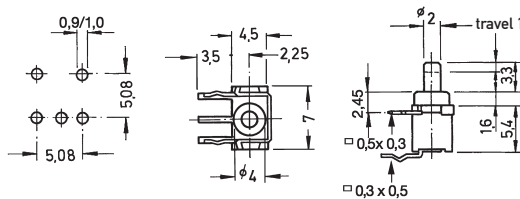
Plastic caps

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

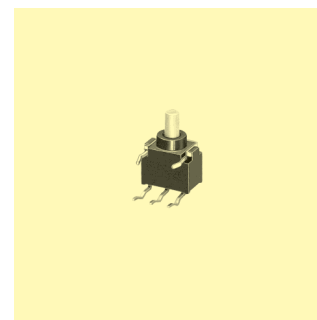


Models: Switching functions: when looking at the brand name, the normally closed contact is on the right hand side.

SPDT
FP 1 F – RA mom – on



washable





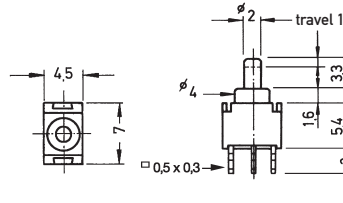
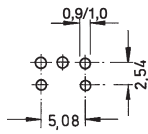
Microminiature Pushbutton Switches ESD proof

Models:

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

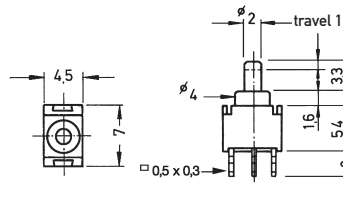
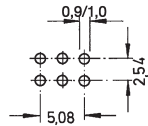
SPDT
FP 1 F

on - mom

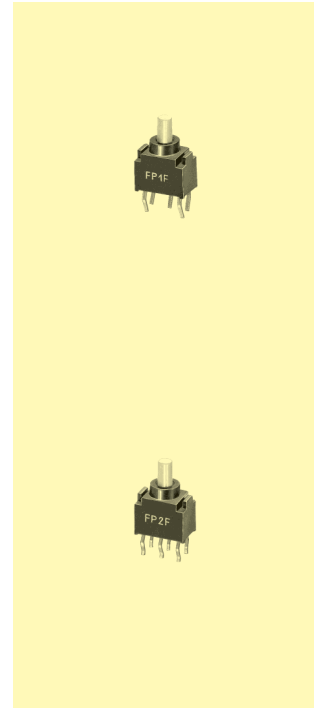


DPDT
FP 2 F

on - mom

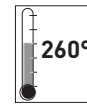


washable



3

Microminiature Pushbutton Switches for SMT



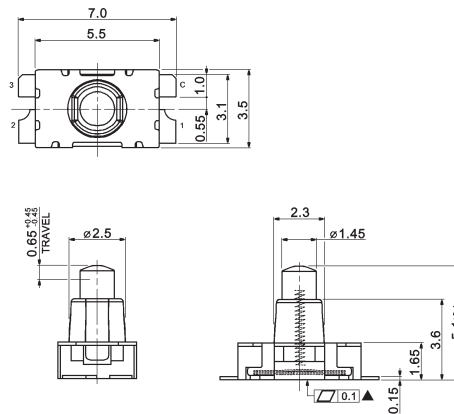
Specifications:

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

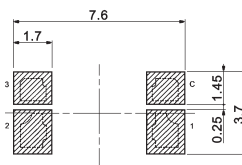
Models: Switching function

SSP 129 T

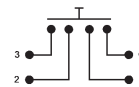
off – mom



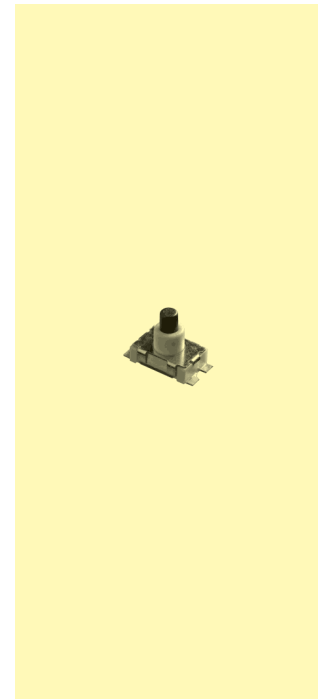
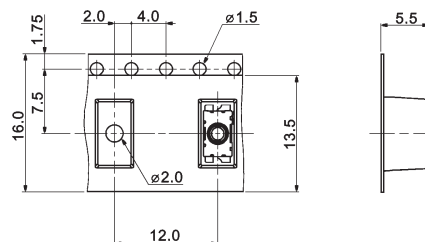
PCB Layout



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 10		•		•		2	Legend change at colour change	57
LP 14		•		•	•	6	Combination of up to 4 LEDs	58
MPLS 12	•	•	•			7	Operating at the side SMT	59
TM 81		•	•		•	8	Operating at the side	60
TSLE/TSSLE		•		•	•	64	waterproof IP 67	61-62
TSSL		•		•		25	8x4.3 mm, 2 mm flat SMT	63

Illuminated Pushbutton Switches waterproof



Specifications:

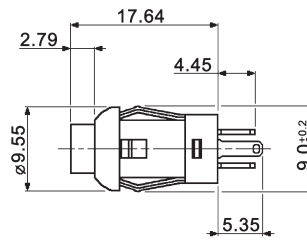
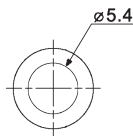
Contact rating:	30 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	2.5 N ± 1 N
Mechanical life:	minimum 50 000 operations
Material:	Surface of contacts, terminals: 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:

- W white
- R red
- Y yellow
- G green
- B blue
- BG blue/green

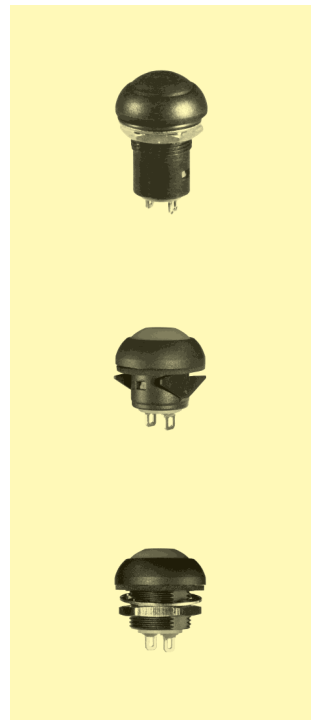
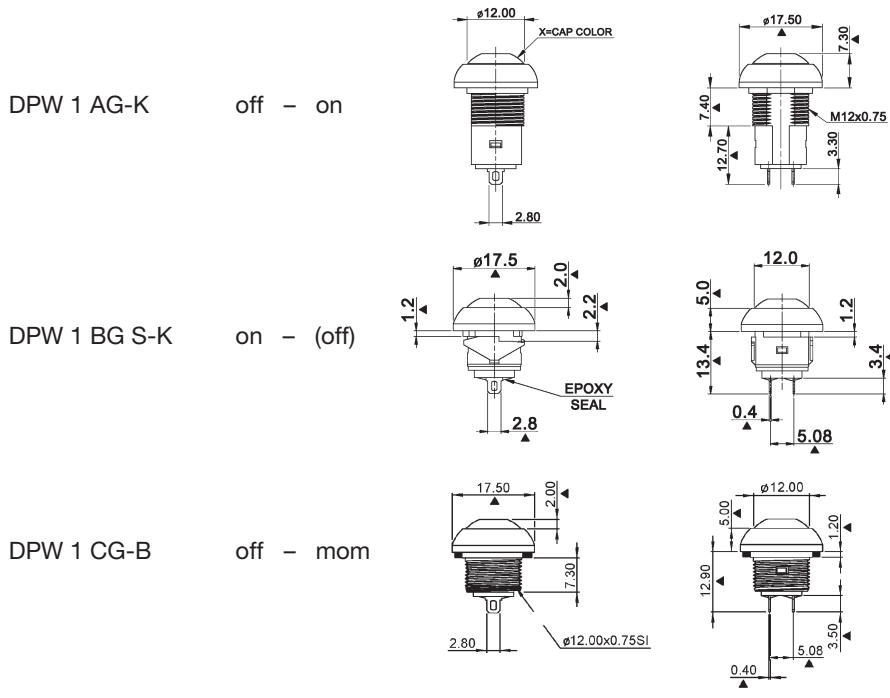


Illuminated Pushbutton Switches waterproof

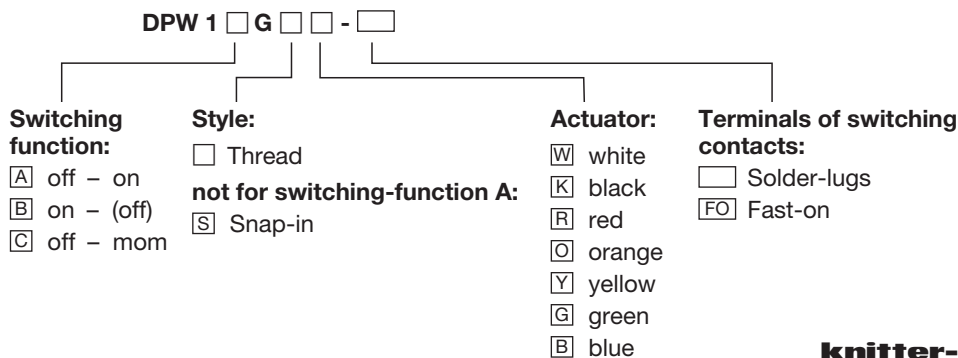
Specifications:

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



Ordering Code:



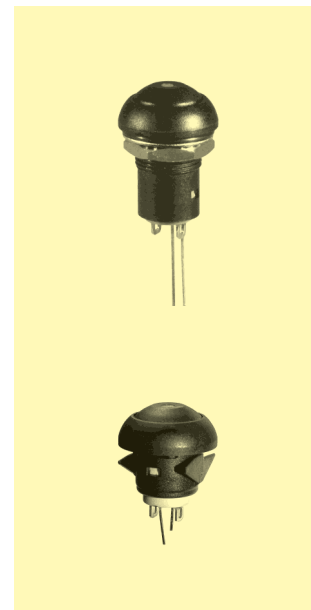
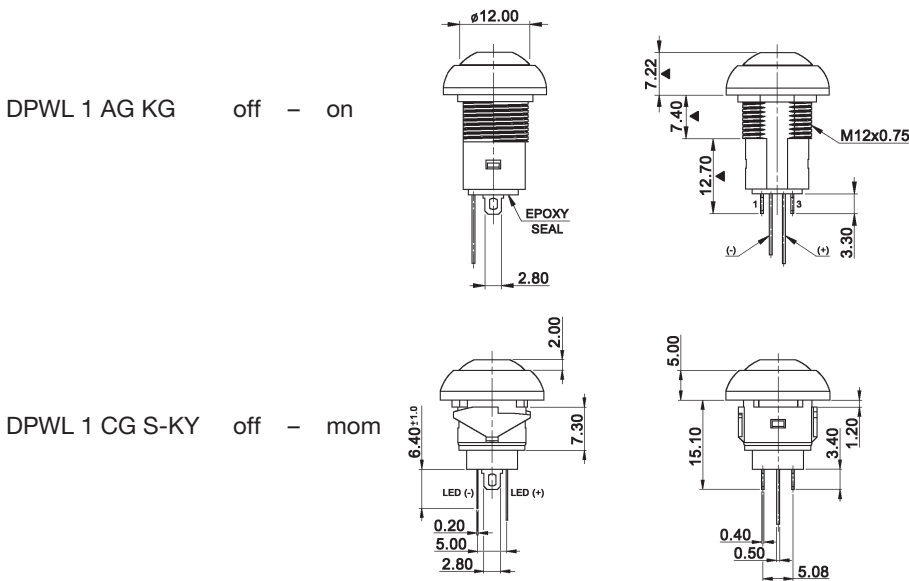
Illuminated Pushbutton Switches waterproof



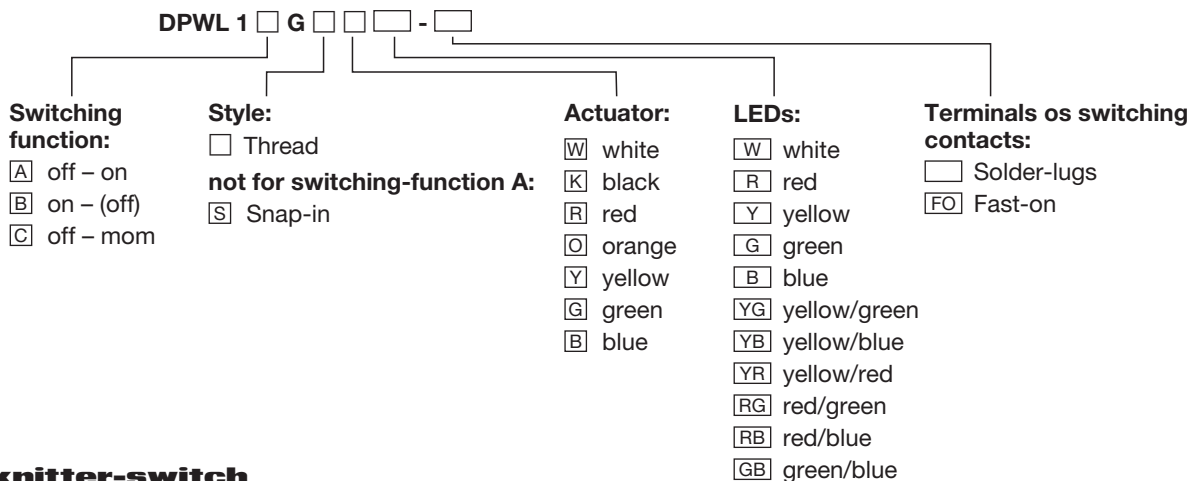
Specifications:

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



Ordering Code:



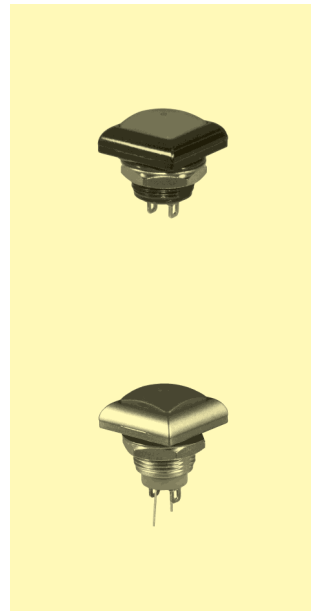
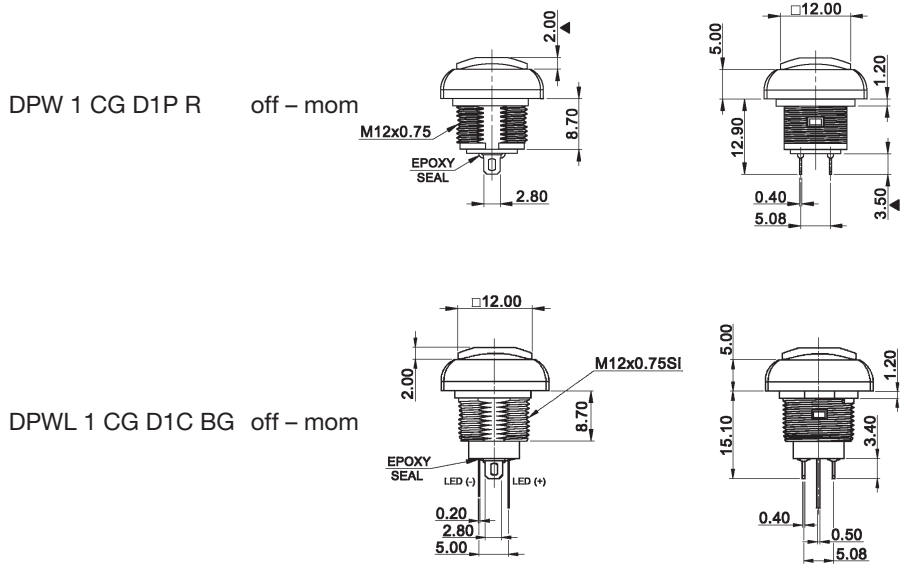


Illuminated Pushbutton Switches waterproof

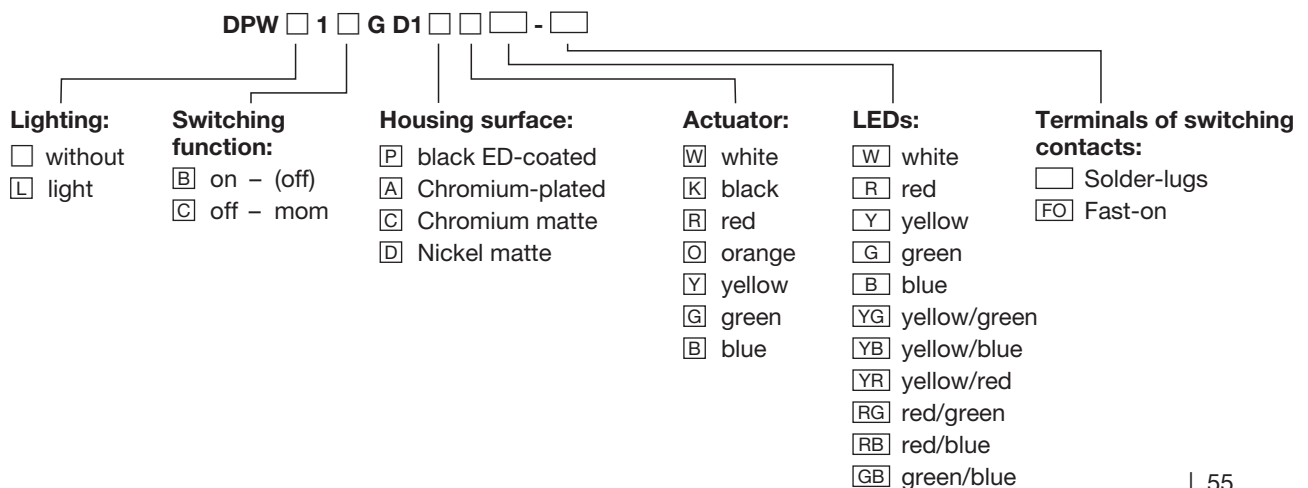
Specifications:

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 M 12 x 0.75, key 14 mm		
Soldering conditions:	hand-soldering – max. 5 sec, 350 °C		
Travel:	1.5 mm		

Models: Switching functions



Ordering Code:



Illuminated Pushbutton Switches waterproof



Specifications:

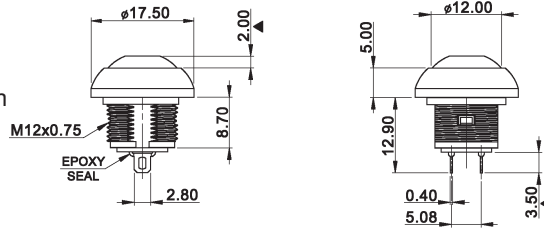
Contact rating:	250 V AC, 200 mA 48 V AC, 500 mA 50 V DC, 200 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-30 °C to +85 °C
Operating force:	3.5 N ± 1.5 N
Mechanical life:	minimum 1 000 000 operations
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 M 12 x 0.75, key 14 mm
Soldering conditions:	hand-soldering – max. 5 sec, 350 °C
Travel:	1.5 mm

Models:

Switching functions

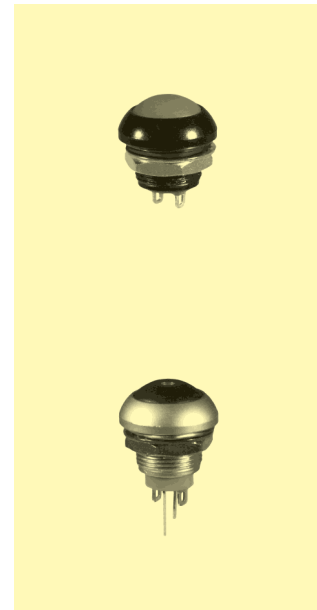
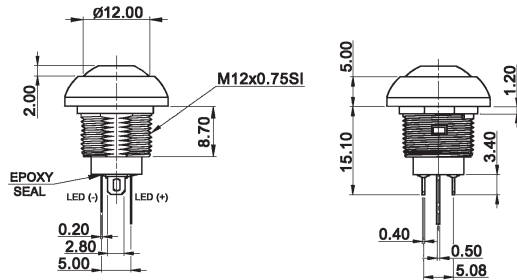
DPW 1 CG D2P R

off – mom



DPWL 1 CG D2C KG

off – mom



Ordering Code:

DPW 1 G D2 -

Lighting:

- without
- light

Switching function:

- on – (off)
- off – mom

Housing surface:

- P black ED-coated
- A Chromium-plated
- C Chromium matte
- D Nickel matte

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 of switching contacts:

- Solder-lugs
- FO Fast-on



Illuminated Pushbutton Switches

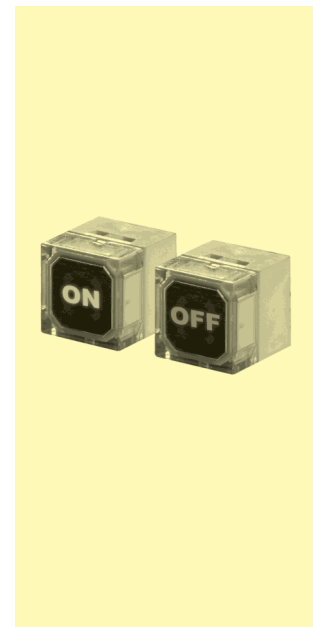
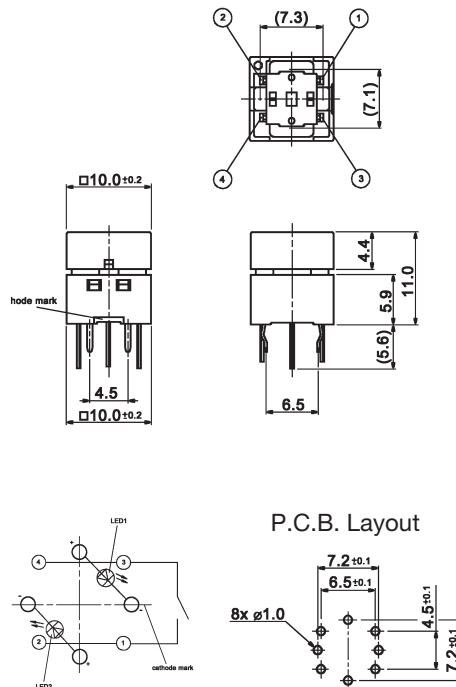
Specifications:

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

4

Models: Switching functions

LP 10 02GA11 off - mom



Ordering Code:

LP 10 2 A1

Actuator:	LEDs:	Inlay:
<input type="checkbox"/> 0 clear	<input type="checkbox"/> B red/blue	<input type="checkbox"/> 0 without inscription
<input type="checkbox"/> 1 white transparent	<input type="checkbox"/> G red/green	<input type="checkbox"/> 1 OFF (red) and ON (second colour)
		<input type="checkbox"/> 2 切 (rot) und 入 (second colour)
		<input type="checkbox"/> 3 X (red) and O (second colour)

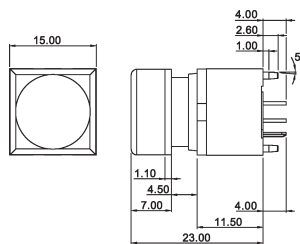
Illuminated Pushbutton Switches

Specifications:

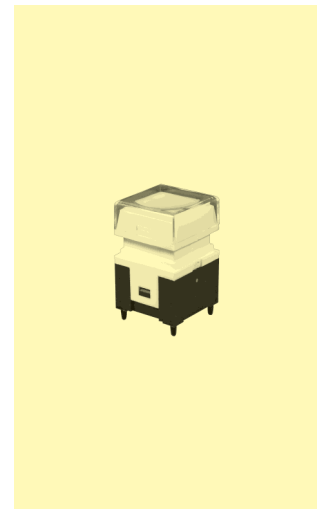
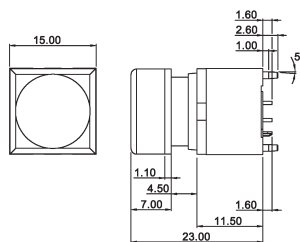
Contact rating:	12 V DC, 100 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	600 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	180 gf ± 50 gf
Mechanical life:	minimum 500 000 operations
Material:	Contacts: Brass, Gold-plated 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

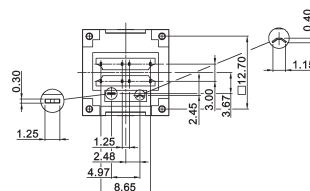
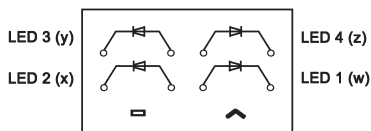
D P D T
LP 14 CG RGBW-PC off - mom



LP 14 CG RGBW off - mom



pin-assignment



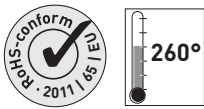
Ordering code: LP 14 CG -

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 for SMT

Specifications:

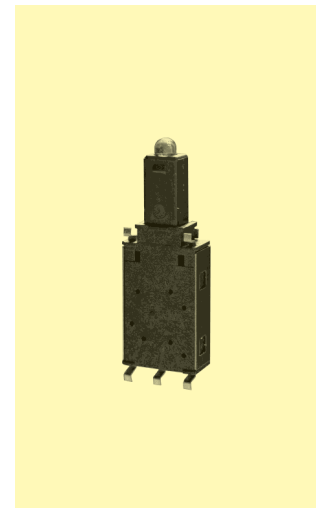
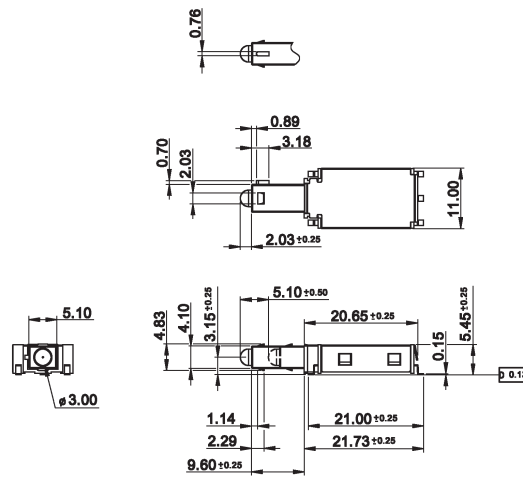
Contact rating:	50 V DC, 250 mA; max. 3,5 VA
Contact resistance:	<50 mΩ at 2–4 V DC, 100 mA
Insulation resistance:	> 1000 MΩ
Dielectric strength:	250 V AC (50–60 Hz) for 1 minute
Operating temperature:	–30 °C to +85 °C
Mechanical life:	minimum 30 000 operations
Material:	case and actuator: glass filled 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

4

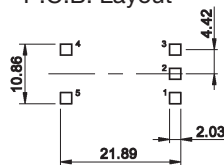
Models: Switching functions

SPDT
MPLS 12 F □ on – mom

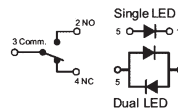
MPLS 12 D □ on – on



P.C.B. Layout



Circuit diagram



Ordering Code:

MPLS 12 F □

MPLS 12 D □

LED colour:

- W white
- Y yellow
- R red
- G green
- B blue
- 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		
TM 81 FRG-RA-THR	mom - on		
TMS 81 F-RA	mom - on		

Ordering Code: TM 81 - -

Technology:

- THT, THR
- SMT

Switching Function:

- on - mom

LED Colors:

- no LED
- A amber
- W white
- R red
- Y yellow
- G green
- B blue
- YB green/yellow
- RG green/red
- RA amber/blue

Construction:

- RA right-angled

Terminals:

- THT, SMT
- THR THR



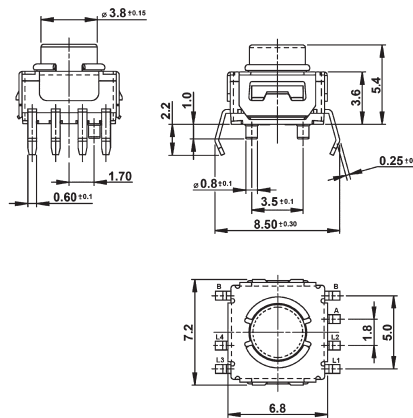
Illuminated Pushbutton Switches waterproof

Specifications:

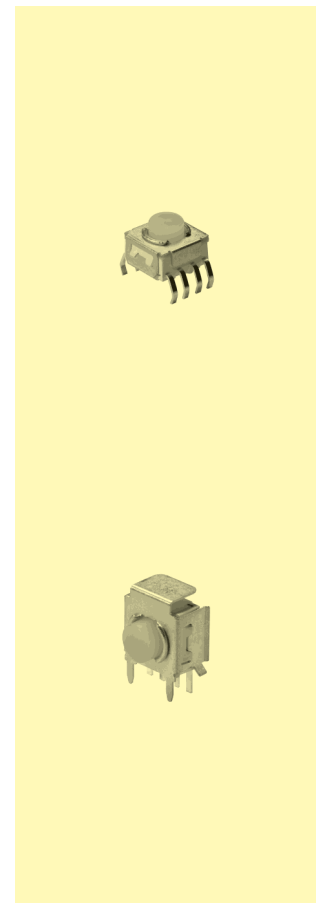
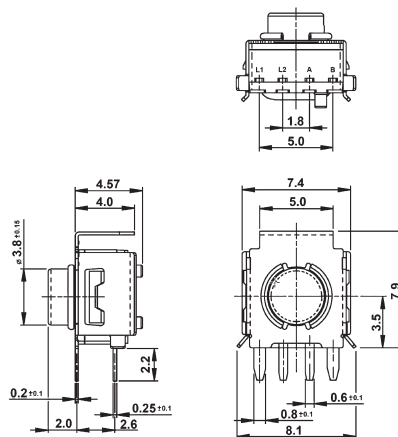
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40°C to +85°C
Operating force:	2 N ± 0.5 N
Mechanical life:	minimum 300 000 operations
Material:	Contacts: stainless steel, silver-plated, optionally gold-plated Terminals: Brass, silver plated, optionally gold-plated Case: PPA, white Actuator: silicone rubber
Protection:	IP 67
Mounting:	on pc-board

Models: Switching functions

TSLE 6868 R WNN off – mom



TSLE 6868 R RA WA off – mom



Ordering Code:

TSLE 6868 R

Contact:
 silver
 gold

Operation:
 top
 side

LED:

Operation from top

- NNN no LED
- RGB RGB
- xyN two LEDs
- xNN one LED

Side-Operation

- NN no LED
- xy two LEDs
- xN one LED

x, y	Color
R	red
Y	yellow
G	green
B	blue
P	pure-green
A	amber
W	white

Illuminated Pushbutton Switches for SMT, waterproof



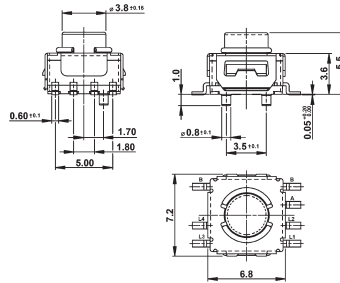
Specifications:

Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250V, 50 Hz for the duration of 1 minute
Operating temperature:	-40°C to +85°C
Operating force:	2 N ± 0.5 N
Mechanical life:	minimum 300 000 operations
Material:	Contacts: stainless steel, silver-plated, optionally gold-plated Terminals: Brass, silver plated, optionally gold-plated Case: PPA, white Actuator: silicone rubber
Protection:	IP 67
Mounting:	on pc-board – SMT

Models: Switching functions

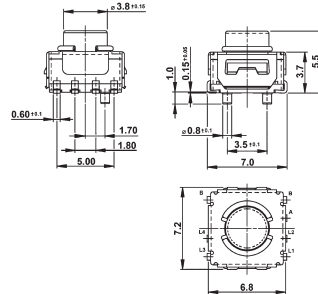
TSSLE 6868 R WNN

off – mom



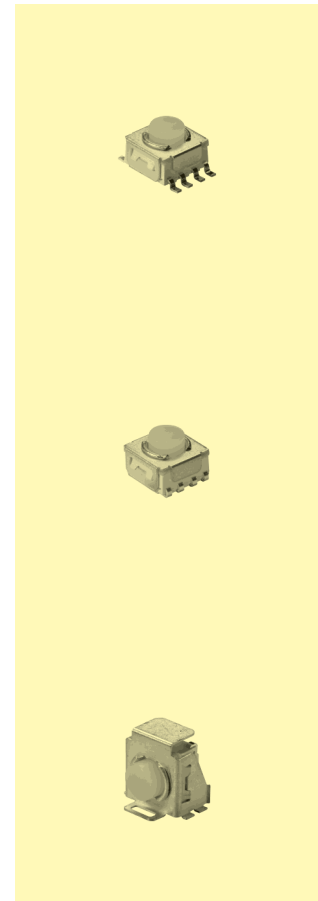
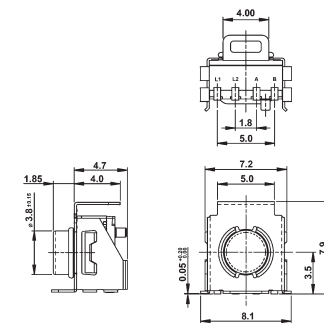
TSSLE 6868 R RGB-J

off – mom



TSSLE 6868 R RA RB

off – mom



Ordering Code:

TSSLE 6868 R

Contact:	Operation:	LED:	Terminals:
<input type="checkbox"/> silver	<input type="checkbox"/> top	Operation from top	<input type="checkbox"/> Gullwing
<input type="checkbox"/> gold	<input type="checkbox"/> RA side	<input type="checkbox"/> NNN no LED	<input type="checkbox"/> -J J-hooks (not for RA)
		<input type="checkbox"/> RGB RGB	
		<input type="checkbox"/> xyN two LEDs	
		<input type="checkbox"/> xNN one LED	
		Side-Operation	
		<input type="checkbox"/> NN no LED	
		<input type="checkbox"/> xy two LEDs	
		<input type="checkbox"/> xN one LED	

x, y	Color
R	red
Y	yellow
G	green
B	blue
P	pure-green
A	amber
W	white



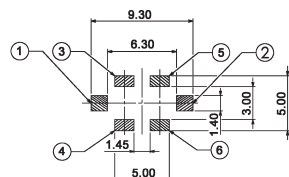
Illuminated Pushbutton Switches for SMT

Specifications:

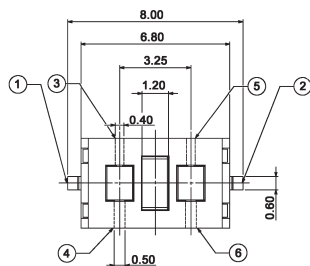
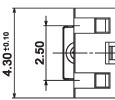
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50–60 Hz) for 1 minute
Operating temperature:	–20 °C to +70 °C
Operating force:	1.6 N +0.8/–0.3 N
Mechanical life:	minimum 50 000 operations
Stem/cover:	high-temp. PA 9T UL 94 V–0,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

Models:

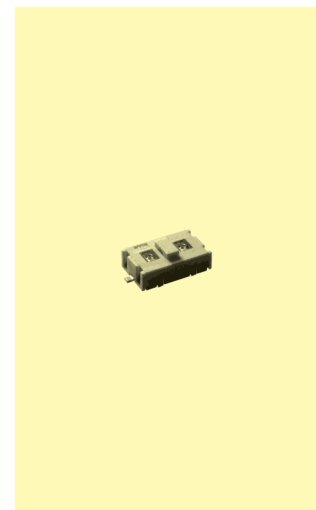
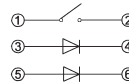
TSSL 3W □ □



PCB Layout



Circuit diagram



Ordering Code:

TSSL 3W □ □

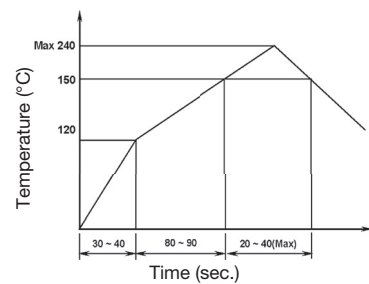
Left LED:

- 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)

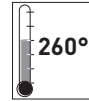


5

Tact Switches / Multi-Function

Type	Operating		Terminals		IP 67	wash-able	Size	Special feature	Page
	top	side	T/H	SMT					
Takt Switches									
TSE 21495	•		•				12x12	1 Mill. operations	66
TSSE 21495	•			•			12x12	1 Mill. operations	66
TS 2x	•		•				12x12		67
TSS 2x	•			•			12x12		68
TSE 2x	•		•		•	•	12x12	1 Mill. operations	69
TSSE 2x	•			•	•	•	12x12	1 Mill. operations	70
TSE 808	•		•				8x8	1 Mill. operations	71
TSSE 808	•			•			8x8	1 Mill. operations	71
TMP 1	•		•		•	•	7.6x7.6	1 Mill. operations	72
TMP 1-R		•	•		•	•	7.6x7.6	1 Mill. operations	72
TMPS 1	•			•	•	•	7.6x7.6	1 Mill. operations	73
TME 1	•		•			•	7.5x6.5		74
TSE 6x	•		•		•	•	6.2x6.3		76
TSSE 6x	•			•	•	•	6.2x6.3		77-78
TSSE 6x-RA		•		•		•	6.1x7.02		79
TS 6x	•		•				6.2x6.2		80
TS 6x-RA		•	•				7.4x7.2		81
TS 637-RA		•	•				7.4x4.3		82
TSS 6x	•			•			6.2x6.2		83
TSS 650-J	•			•			6.0x6.0	1.3 mm travel	84
TSS 507	•			•			4.9x4.9	extreme flat	85
TMSE 10	•			•		•	4.9x4.5	-55 °C to +125 °C	86
TMSE 10 J-RA		•		•		•	5.0x5.44	-55 °C to +125 °C	86
TSS 300	•			•			3.8x6.0	1 Mill. operations	87
TSSE 300	•			•	•		3.8x6.0	1 Mill. operations	87
TS 3x	•		•				3.5x6.0		88
TSS 3x	•			•			3.5x6.0		88
TSS 313-RA		•		•			4.0x2.0		89
TSS 4-RA		•		•			7.2x3.5	250 000 operations	90
Multi-Function Tact Switches									
PLSJ 1	•	•		•			9.3x11.3	Navigation	91
TSSJ 4	•			•			7.4x7.7	Navigation	92
TSSJ 5	•			•			7.4x7.7	Navigation	93
TSSJ 30	•			•			12.4x12.4	Navigation	94
TSJ 31	•		•				12.4x12.4	Navigation	94
TSSJ 55	•			•			9.8x9.8	Navigation	95

Tact Switches

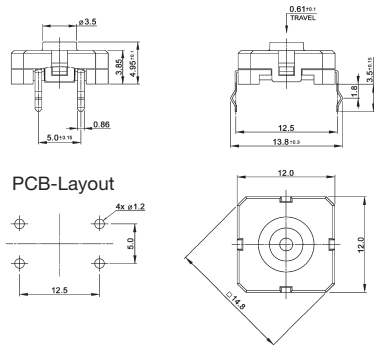


Specifications:

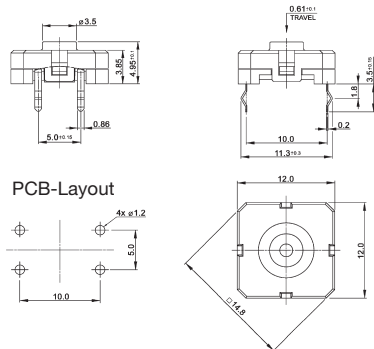
Contact rating:	42 V DC, 100 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	150 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +90 °C
Operating force:	3.6 N ± 0.7 N
Mechanical life:	> 5 000 000 operations
Material:	Contacts: stainless steel, gold-plated Terminals: brass, tin-plated Cover: PA 46, grey Base: PPS, grey Stem: natural rubber
Protection:	Contact system sealed by rubber actuator
Mounting:	on pc-board, TSSE 21495 S: SMD
Soldering conditions:	wave soldering, max. 5 s, max. 260 °C, pre-heat max. 120 s, max. 140 °C TSSE 21495 S: Jedec STD-020 D (peak 10 s, 260 °C)

Models: Switching functions

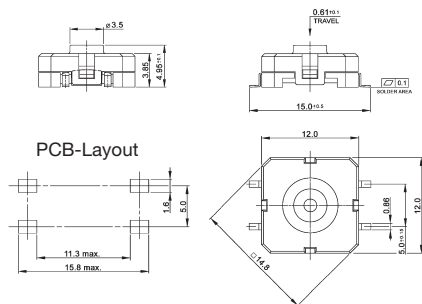
TSE 21495 S off - mom



TSE 21495 S-1 off - mom



TSSE 21495 S-T off - mom

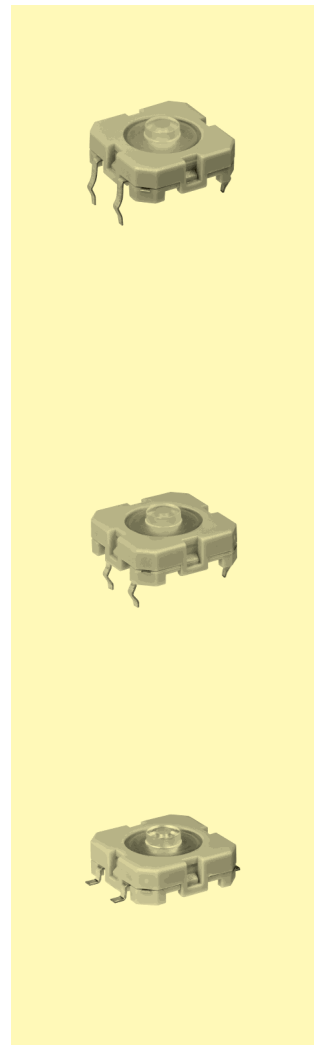
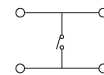


Packing:

TSE 21495 S, TSE 21495 S-1 30 pieces in stick

TSSE 21495 S-T 600 pieces/reel

Circuit diagram:





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:	-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 ± 0.1 mm

Models:

TS 21

PCB-LAYOUT

TS 24

Circuit diagram

Caps for TS 24

KTSC-21

KTSC-22

Ordering code:

Switches **TS**

Dimension: 1 4.3 mm 4 7.3 mm

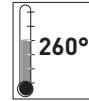
Colour of stem for operating force: N 1.6 N, brown R 2.6 N, red

Caps **KTSC-2**

Cap type: 1 square 2 round

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

Tact Switches for SMT

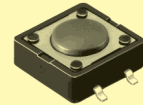
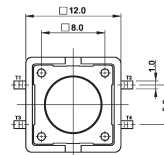
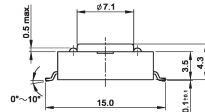
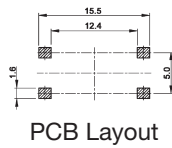


Specifications:

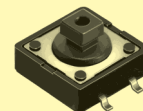
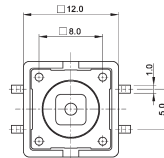
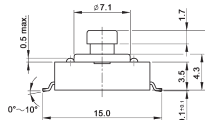
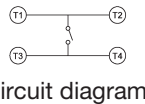
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Electrical life:	2.6 N: minimum 100 000 cycles 1.6 N: minimum 200 000 cycles
Operating force:	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 ± 0.1 mm

Models:

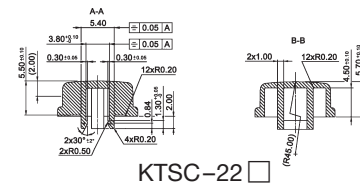
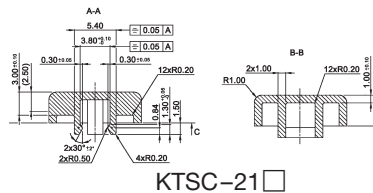
TSS 21 □



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

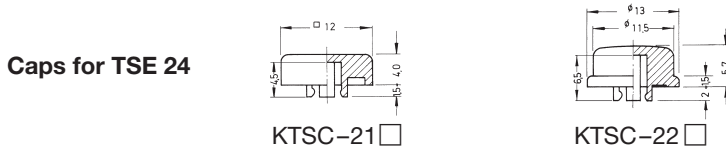
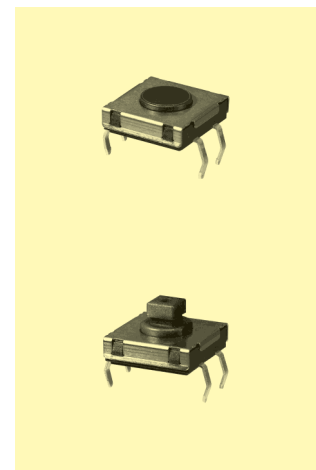
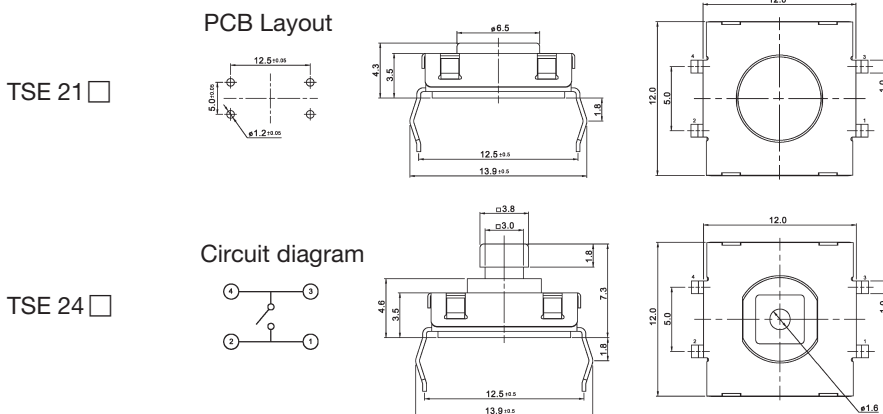


Specifications:

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:
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

washable

Models:



Ordering code:

Switches **TSE 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
		W	3.2 N, white
Y		5.2 N, yellow	

Caps **KTSC-2** □ □

Cap type:	1	square
	2	round
Cap colour:	Y	yellow
	B	blue
	R	red
	I	ivory
	K	black
	G	green

Tact Switches for SMT, waterproof

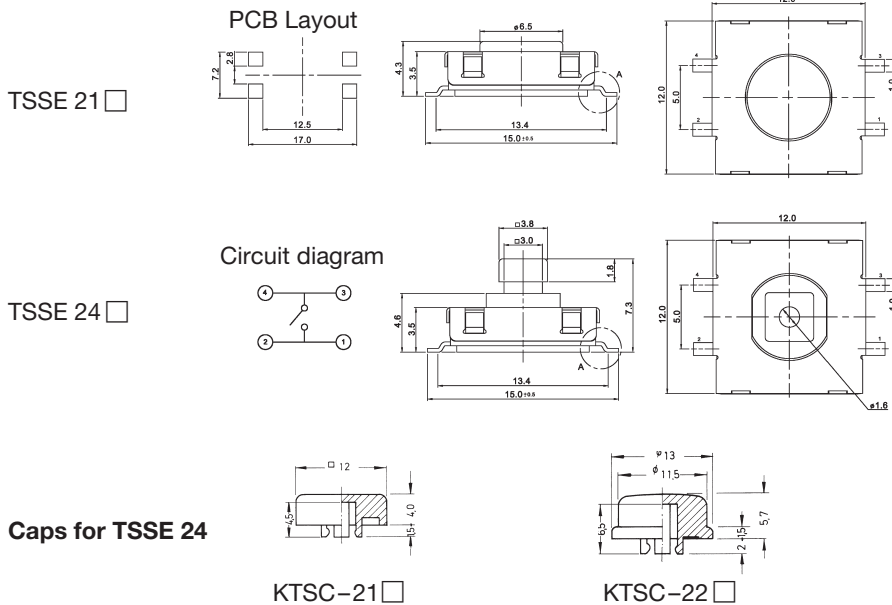


Specifications:

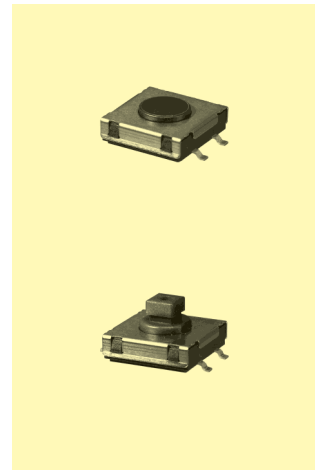
Contact rating:	50 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	N: 1.6 N ± 0.5 N R: 2.6 N ± 0.5 N W: 3.2 N ± 0.8 N Y: 5.2 N ± 1.3 N
Mechanical life:	N, R: 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

5

Models:



washable



Ordering code:

Switches **TSSE 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
- W 3.2 N, white
- Y 5.2 N, yellow

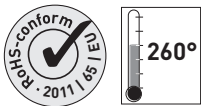
Caps **KTSC-2** □ □

Cap type:

- 1 square
- 2 round

Cap colour:

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



Tact Switches

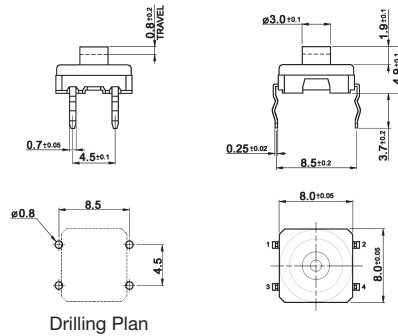
Specifications:

Contact rating:	42 V DC, 100 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 +80 °C
Operating force:	3.5 N ± 0.6 N
Mechanical life:	> 5 000 000 operations
Material:	Contacts: stainless steel, gold-plated Terminals: brass, gold-plated Case: thermoplastics, blue; TSSE 808: black Stem: silicone rubber
Protection:	IP 67
Mounting:	on pc-board, TSSE 808: SMD
Soldering conditions:	wave soldering – max. 10 s, max. 260 °C TSSE 808: Jedec STD-020 D (peak 10 s, 260 °C)

5

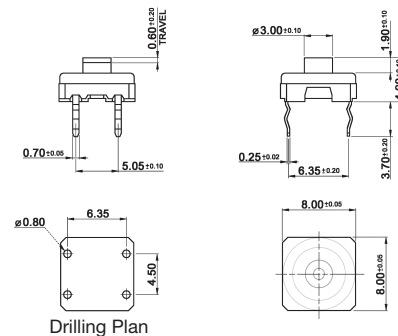
Models: Switching functions

TSE 808-350 off – mom



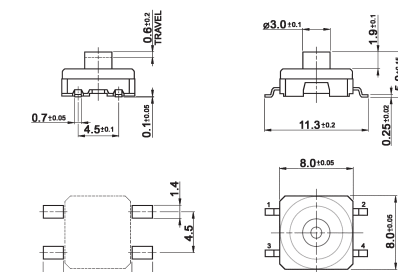
Drilling Plan

TSE 808-350-1 off – mom



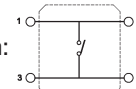
Drilling Plan

TSSE 808-350 T off – mom



Soldering Pad

Circuit diagram:



Packing:

TSE 808... 47 pieces in stick

TSSE 808... T 700 pieces/reel



Specifications:

Contact rating:	50 V DC max., 20 mA max.; 0.5 W max.
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:	0.45 ± 0.25 mm
Operating force:	4.5 ± 1.0 N
Terminals:	brass, tin-plated
Material:	case: thermoplastic UL 94 V-0, black, TMP 1-1: blue button: silicon rubber, black;
Protection:	IP 67
Mounting:	on pc-board
Soldering conditions:	wave-soldering – max.: 5 sec, 270 °C

5

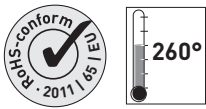
washable

Models: Switching functions

TMP 1 TMP 1-1	off - mom				
Circuit diagramm:		TMP 1 	TMP 1-1 		

Accessories and mounting dimensions:

Caps			dark grey KTT 217		
light grey KTT 107			light grey KTT 227		
			red KTT 209		
			(More colours in request, MOQ 25 K)		



Tact Switches for SMT, waterproof

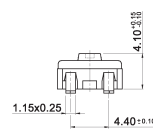
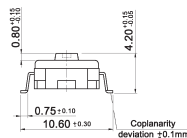
Specifications:

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

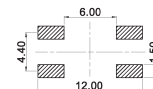
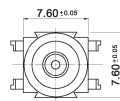
5

Models: Switching function

TMPS 1 off - mom



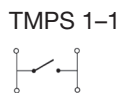
TMPS 1-1



Layout



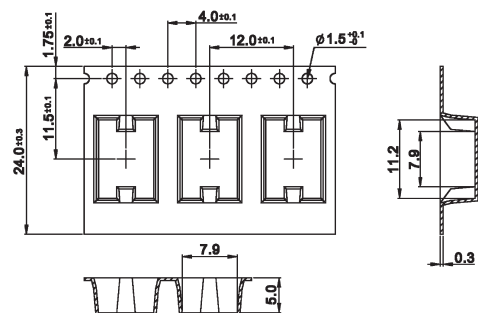
Circuit diagramm:



Packing:

TMPS 1, TMPS 1-1 50 pieces in stick

TMPS 1T, TMPS 1-1T 1 100 pieces/reel



Tact Switches

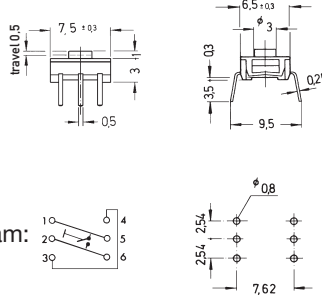
Specifications:

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

Models: Switching functions

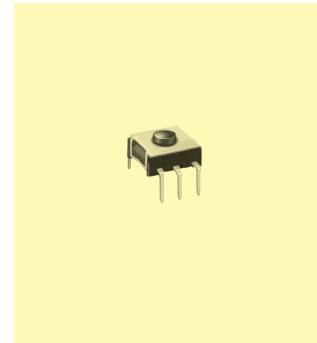
TME 1

off – mom



Circuit diagram:

washable



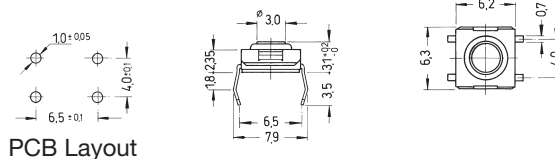
Tact Switches

Specifications:

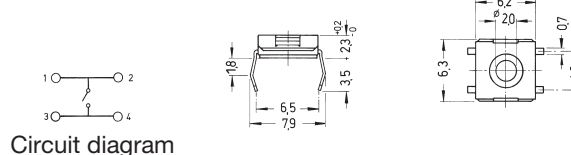
Contact rating:	32 V DC, 50 mA; max. 1 VA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +70 °C
Electrical life:	TSE 66/68 minimum 100 000 cycles TSE 69 minimum 500 000 cycles
Operating 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

Models:

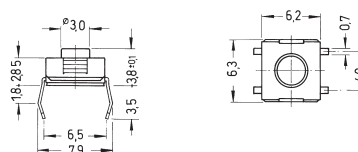
TSE 66 □



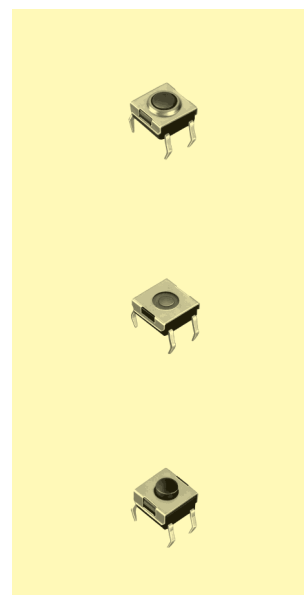
TSE 68 □



TSE 69 □



washable



Ordering code:

TSE □ □ □

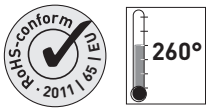
Dimension

□□	3.1 mm, travel: 0.25 + 0.2/- 0.1	brown (N)
□□	2.3 mm, travel: 0.25 + 0.2/- 0.1	silver (S)
□□	3.8 mm, travel: 0.45 ± 0.2	red (R)
□□	3.8 mm, travel: 0.45 ± 0.2	brown (N)

Colour of stem for operating force:

□	1.6 N, silver
□	1.6 N, brown
□	2.6 N, red

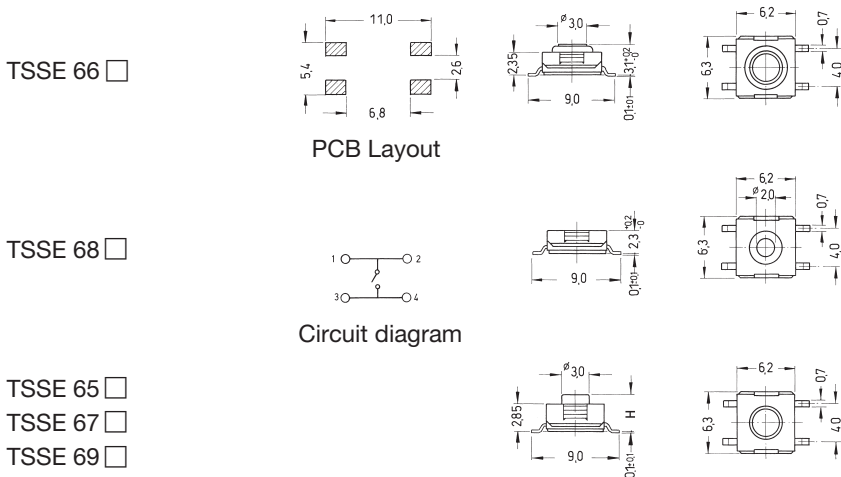
Further types on request



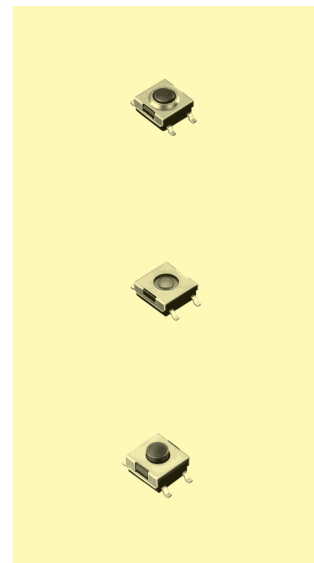
Specifications:

Contact rating:	32 V DC, 50 mA; max. 1 VA
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

Models:



washable



Ordering code:

TSSE

Dimension H

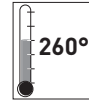
<input type="checkbox"/> 65	3.5 mm, travel: 0.45 ± 0.2	brown	(N) / 1900 pieces/reel
<input type="checkbox"/> 65	3.5 mm, travel: 0.45 ± 0.2	red	(R) / 1900 pieces/reel
<input type="checkbox"/> 65	3.5 mm, travel: 0.45 ± 0.2	transparent	(T) / 1900 pieces/reel
<input type="checkbox"/> 66	3.1 mm, travel: 0.25 + 0.2/- 0.1	brown	(N) / 2000 pieces/reel
<input type="checkbox"/> 67	5.2 mm, travel: 0.45 ± 0.2	brown	(N) / 900 pieces/reel
<input type="checkbox"/> 67	5.2 mm, travel: 0.45 ± 0.2	red	(R) / 900 pieces/reel
<input type="checkbox"/> 67	5.2 mm, travel: 0.6 ± 0.2	transparent	(T) / 900 pieces/reel
<input type="checkbox"/> 68	2.3 mm, travel: 0.25 + 0.2/- 0.1	silver	(S) / 2000 pieces/reel
<input type="checkbox"/> 69	3.8 mm, travel: 0.45 ± 0.2	red	(R) / 1900 pieces/reel
<input type="checkbox"/> 69	3.8 mm, travel: 0.45 ± 0.2	brown	(N) / 1900 pieces/reel
<input type="checkbox"/> 69	3.8 mm, travel: 0.6 ± 0.2	transparent	(T) / 1900 pieces/reel

Colour of stem

for operating force:

<input type="checkbox"/> S	1.6 N, silver
<input type="checkbox"/> N	1.6 N, brown
<input type="checkbox"/> R	2.6 N, red
<input type="checkbox"/> T	3.6 N, transparent

Further types on request

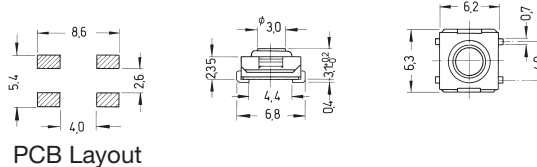


Specifications:

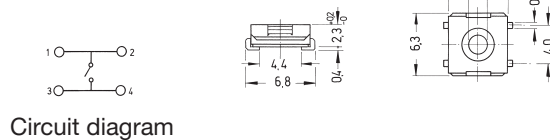
Contact rating:	32 V DC, 50 mA; max. 1 VA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Electrical life:	TSSE 66-J/68-J: minimum 100 000 cycles TSSE 65-J/67-J/69-J: minimum 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



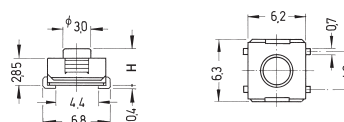
TSSE 68 □ -J



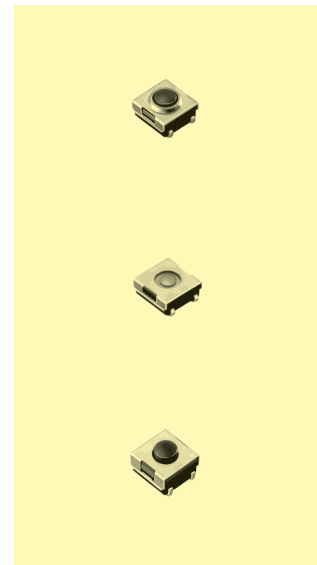
TSSE 65 □ -J

TSSE 67 □ -J

TSSE 69 □ -J



washable



Ordering code:

TSSE □ □ -J

Dimension H

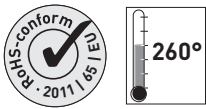
65	3.5 mm, travel: 0.45 ± 0.2	brown	(N) / 1800 pieces/reel
65	3.5 mm, travel: 0.45 ± 0.2	red	(R) / 1800 pieces/reel
65	3.5 mm, travel: 0.45 ± 0.2	transparent	(T) / 1800 pieces/reel
66	3.1 mm, travel: 0.25 + 0.2/-0.1	brown	(N) / 1900 pieces/reel
67	5.2 mm, travel: 0.45 ± 0.2	brown	(N) / 900 pieces/reel
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

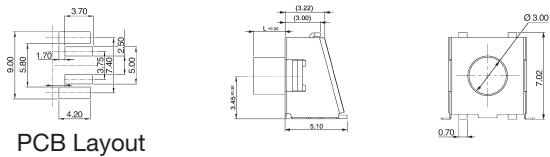


Specifications:

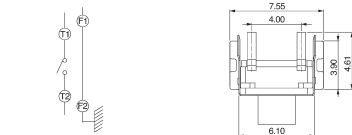
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50 Hz or 60 Hz) for 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	see ordering code
Mechanical life:	minimum 500 000 cycles
Material:	cover: nickel, silver-plated 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

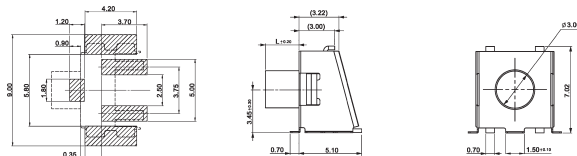


PCB Layout



Circuit diagram

TSSE 6 □ □ -RA-1



PCB Layout

washable



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

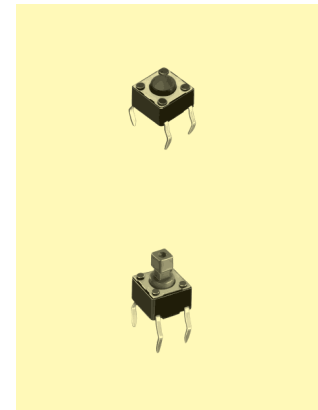
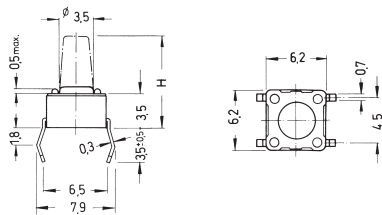
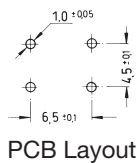
Tact Switches

Specifications:

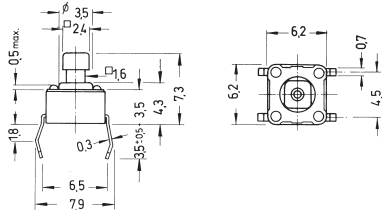
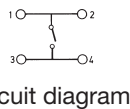
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Electrical life:	1.0 N/1.6 N: minimum 200 000 cycles 2.6 N: minimum 100 000 cycles 3.2 N/5.2 N: 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:

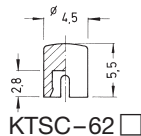
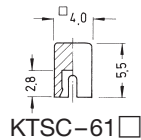
TS 6



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
- 8 11.3 mm
- 9 19.5 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

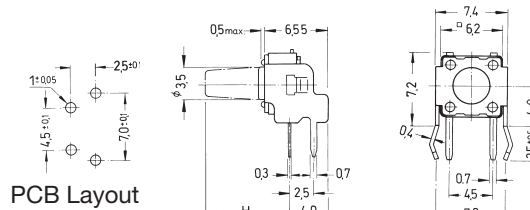


Specifications:

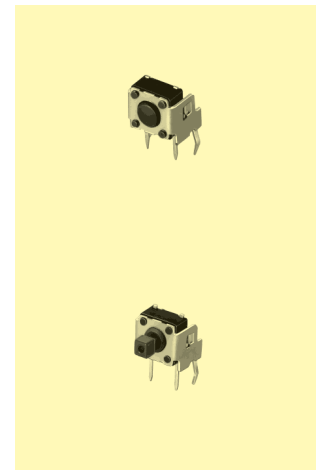
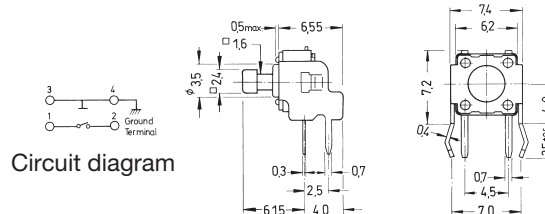
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Electrical life:	1.0 N/1.6 N: minimum 200 000 cycles 2.6 N: minimum 100 000 cycles 3.2 N/5.2 N: 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

Models:

TS 6□□-RA



TS 644□-RA



Caps for TS 644 □ - RA



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

Caps KTSC-6□□

Cap type:

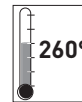
- 1 square
- 2 round

Cap colour:

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

* only with square stem

Tact Switches

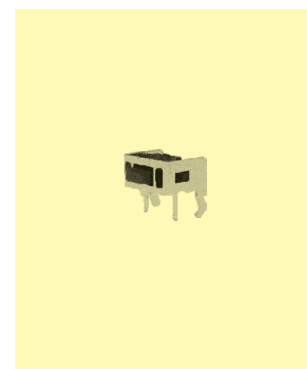
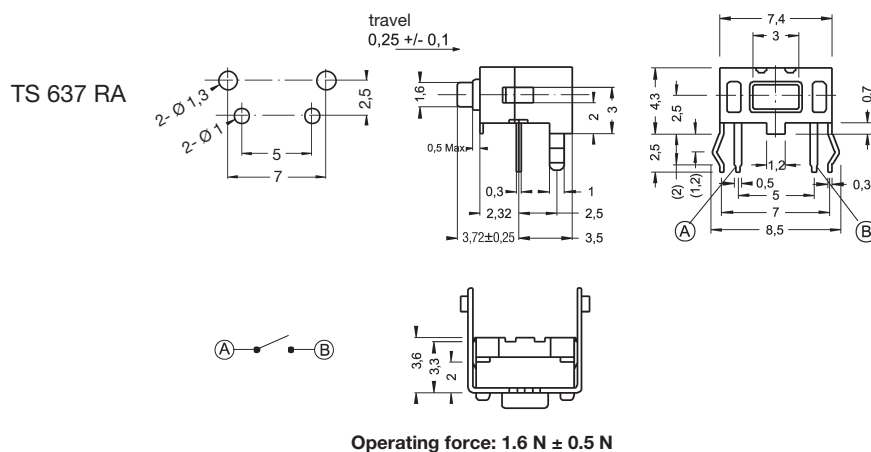


Specifications:

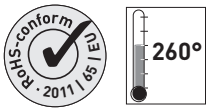
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50–60 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 50 000 cycles
Contacts:	silver-plated
Mounting:	on pc-board

5

Models:



Packing unit: 500 pieces/bag



Tact Switches for SMT

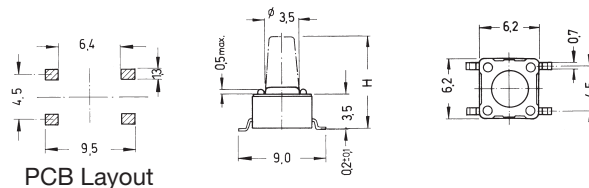
Specifications:

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

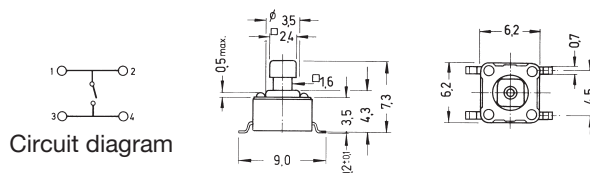
5

Models:

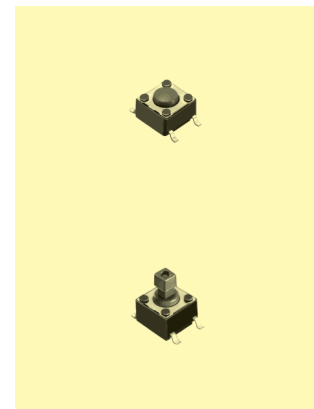
TSS 6 □ □



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		
7	11.0 mm / 77 pcs/tube, 300 pcs/reel		

* only with square stem

Caps KTSC-6 □ □

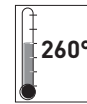
Cap type:

1	square
2	round

Cap colour:

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

Long Travel Tact switch for SMT

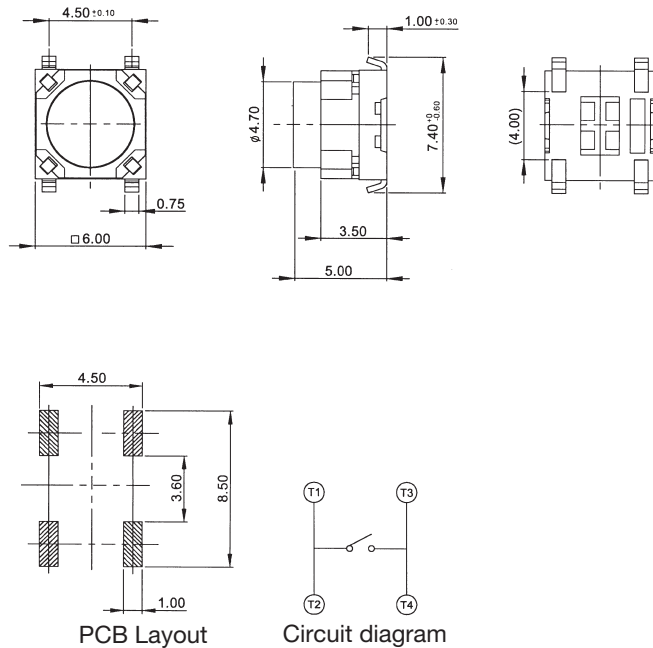


Specifications:

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

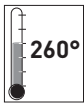
Models:

TSS 650 □-J



Ordering code: TSS 650 □-J

Operating force: R 2.0 N
S 3.5 N

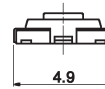
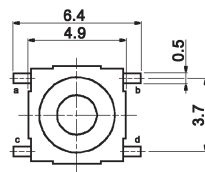
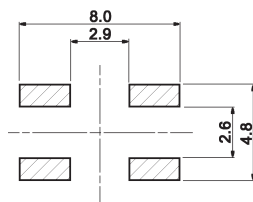


Specifications:

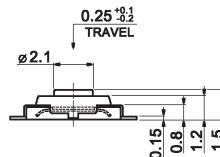
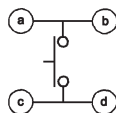
Contact rating:	42 V DC max., 50 mA max., 0.6 VA max.
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V (50/60 Hz) for the duration of 1 minute
Operating temperature:	-25 °C to +80 °C
Operating force:	2.5 N ± 0.7 N
Mechanical life:	100 000 cycles
Contacts:	silver-plated
Mounting:	on pc-board – SMD
Travel:	0.25 mm + 0.1/-0,2 mm
Packing:	4000 pcs/reel

Model:

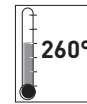
TSS 507



CIRCUIT DIAGRAM



Tact Switches for SMT



Specifications:

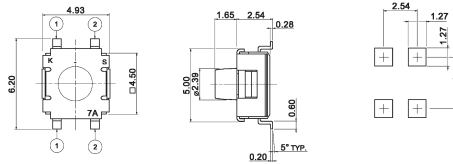
Contact rating:	24 V DC, 100 mA max.
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V AC, 50 Hz for the duration of 1 minute
Operating temperature:	-55 °C to +125 °C
Electrical life:	minimum 100 000 cycles
Operating force:	3.0 ± 1.0 N
Contacts/terminals:	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

Models:

Switching functions:

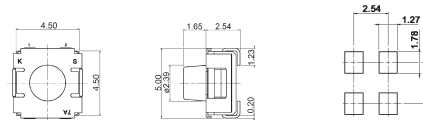
TMSE 10

off – mom



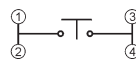
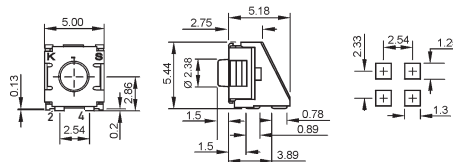
TMSE 10 J

off – mom



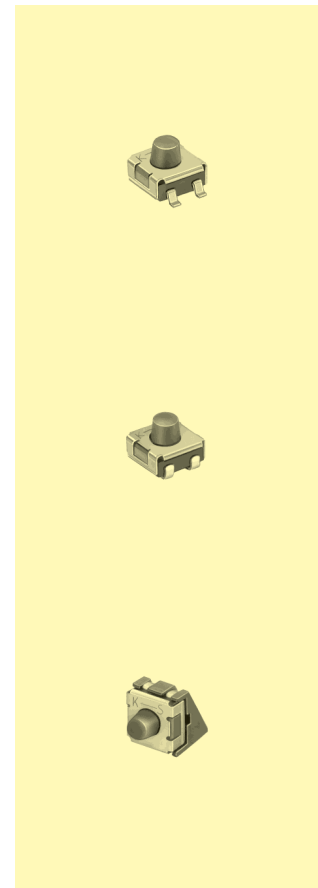
TMSE 10 J-RA

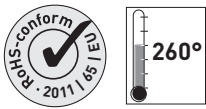
off – mom



Packing:	TMSE 10:	1000 pcs/reel
	TMSE 10 J:	1000 pcs/reel
	TMSE 10 J-RA:	900 pcs/reel

washable



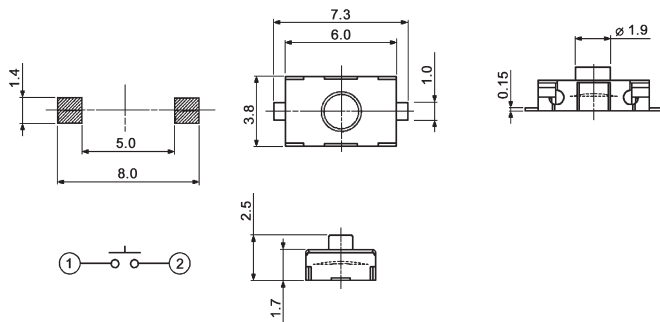


Specifications:

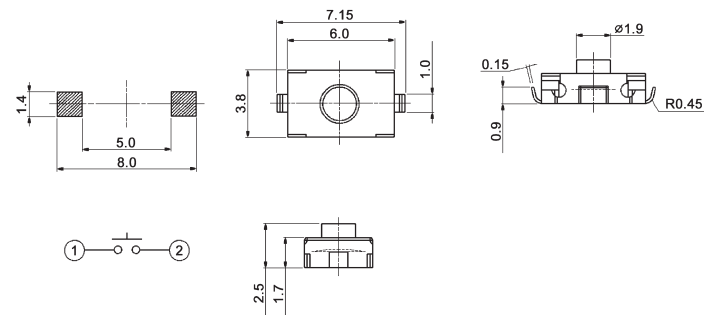
Contact rating:	32 V DC, 50 mA max.
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	TSS 309: -20 °C to +70 °C TSSE 310: -40 °C to +85 °C
Operating force:	N: 1.8 N ± 0.5 N S: 3.5 N ± 0.9 N
Mechanical life:	N: 1 000 000 operations S: 100 000 operations
Material:	contacts: stainless steel, silver-plated terminals: phosphor-bronze, silver-plated case: TSS 309: PA46, TSSE 310: PPA Actuator: TSS 309: PA46, blue, TSSE 310: silicone rubber, black
Protection:	TSSE 310: IP 67
Mounting:	on pc-board
Packing:	2500 pcs/reel

Models:

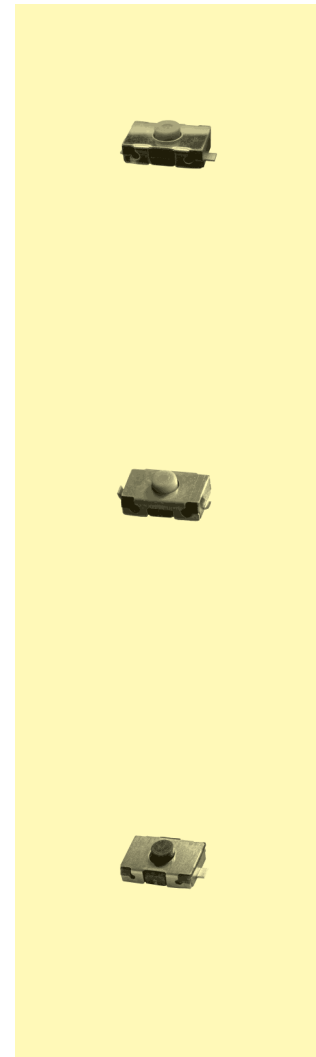
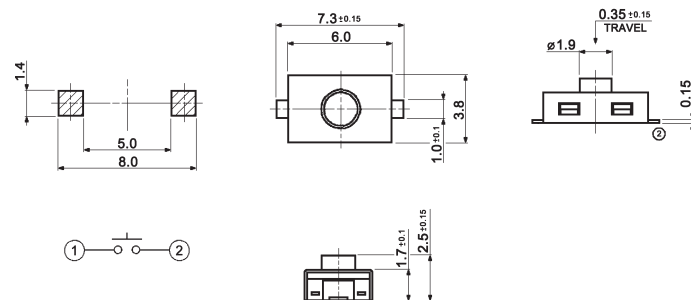
TSS 309 □



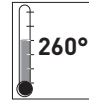
TSS 309 □-J



TSSE 310 S



Tact Switches

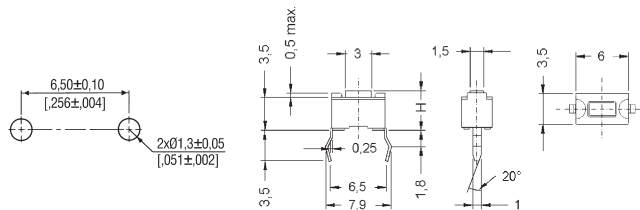


Specifications:

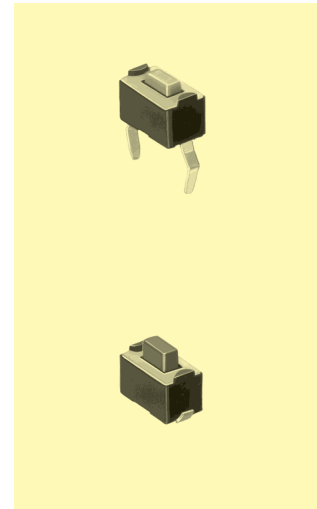
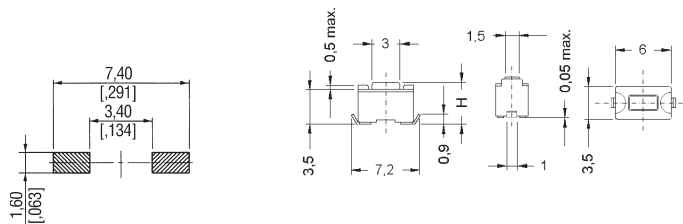
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Electrical life:	1.6 N: minimum 50 000 cycles 2.6 N / 3.2 N / 5.2 N: minimum 30 000 cycles
Operating 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 □ □



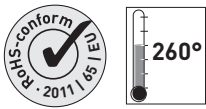
Ordering Code: TS 3 / TSS 3 □ □

- 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



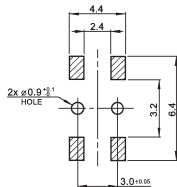
Tact Switches

Specifications:

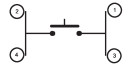
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50–60 Hz for the duration of 1 minute
Operating temperature:	–40 °C to +85 °C
Mechanical life:	minimum 50 000 cycles
Contacts:	silver-plated
Mounting:	on pc-board – SMD

Models:

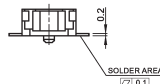
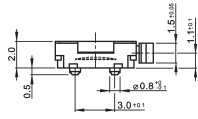
TSS 313 T-RA



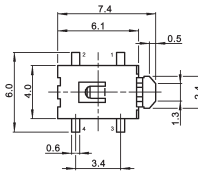
PCB Layout



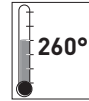
Circuit diagram



Operating force: 2.5 N ± 0.7 N



Packing unit: 1700 pieces/reel

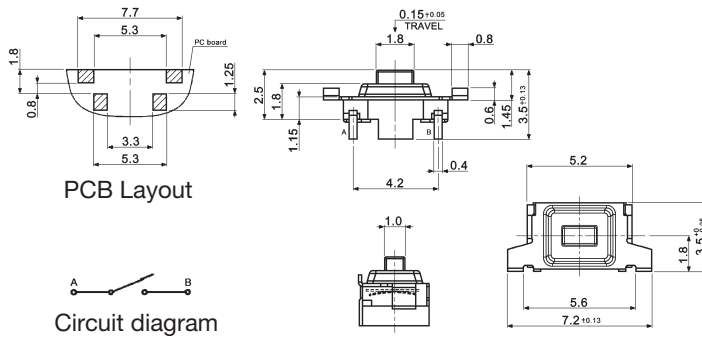


Specifications:

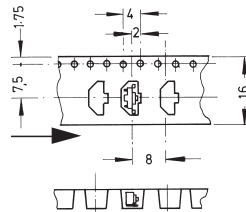
Contact rating:	12 V DC, 50 mA / 1 V DC, 0.5 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 2 GΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Electrical life:	minimum 250 000 cycles
Operating force:	2.16 N ± 0.59 N
Contacts:	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

Model:

TSS 4-RA



Packing: 2000 pcs/reel





Multi-Function Tact Switches for SMT

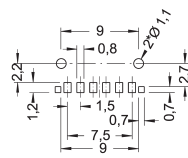
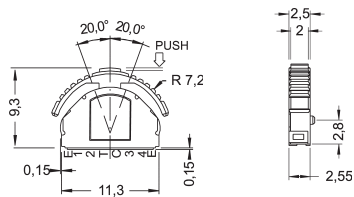
Specification:

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.

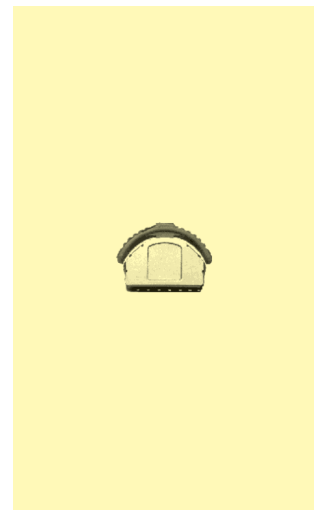
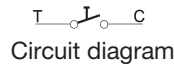
5

Models:

PLSJ 1

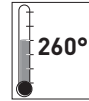


Terminal \ Angle	20°	16°	8°	0°	8°	16°	20°
1	█	█	█				
2	█	█					
3							
4						█	█
C	█	█	█	█	█	█	█



Packing unit: 1000 pieces per reel

Multi-Function Tact Switches for SMT



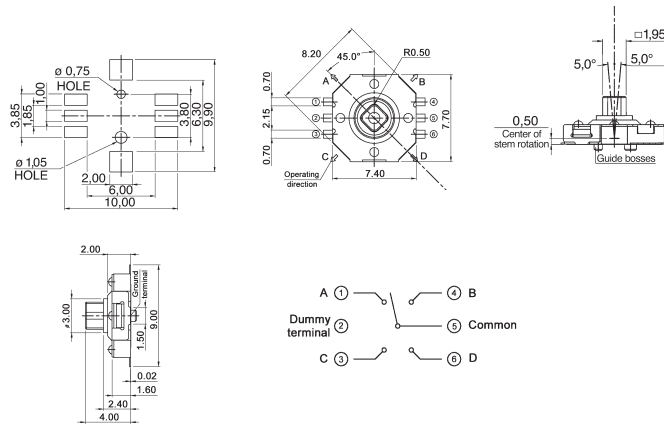
Specifications:

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:	-40 °C to +85 °C
Operating force:	4 directions: 1.6 ± 0.5 N
Mechanical life:	minimum 100 000 cycles
Material:	Cover: nickel plated Stem: high-temp. LCP Contact: stainless steel Terminal: brass, silver-plated Base: high-temp. LCP, black
Packing:	850 pcs/reel

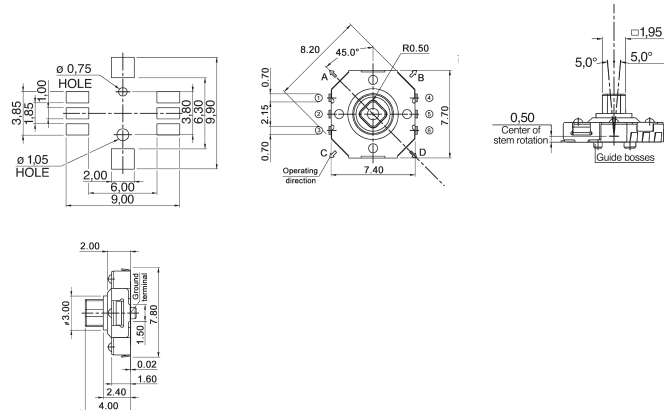
5

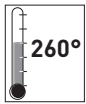
Models:

TSSJ 4



TSSJ 4-J





Miniature Tact Switches for SMT

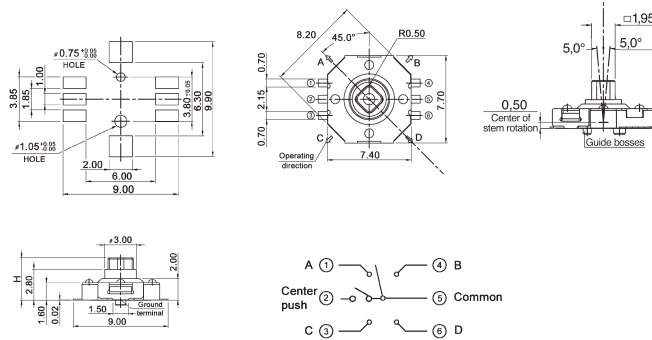
Specifications:

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:	-40 °C to +85 °C
Operating force:	center: 3.6 N ± 0.6 N; 4 directions: 1.6 N ± 0.5 N
Mechanical life:	minimum 100 000 cycles
Material:	Cover: nickel plated Stem: high-temp. LCP Contact: stainless steel Terminal: phosphor bronze, silver-plated Base: high-temp. LCP, black
Packing:	850 pcs/reel

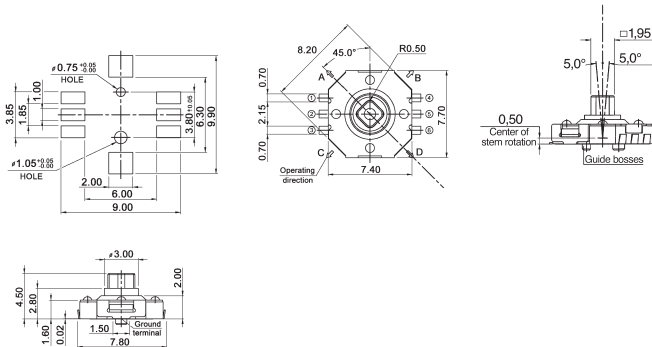
5

Models:

TSSJ 5



TSSJ 5-J



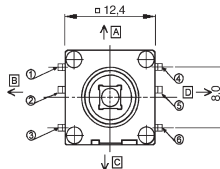
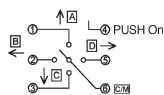
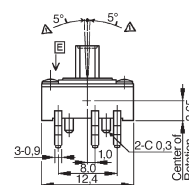
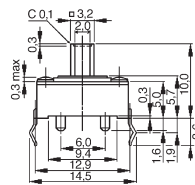
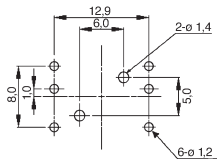
Multi-Function Tact Switches

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

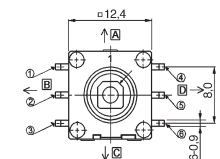
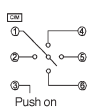
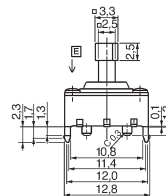
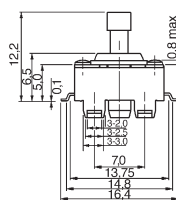
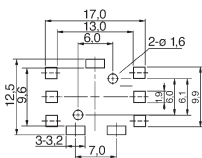
Models:

TSJ 31



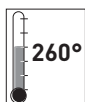
Direction	Connection
A	1 - 6
B	2 - 6
C	3 - 6
D	5 - 6
E (push)	4 - 6

TSSJ 30



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





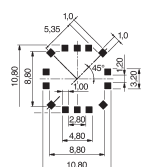
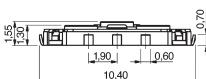
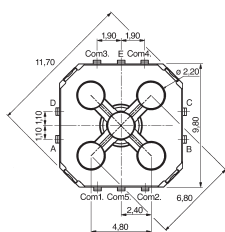
Multi-Function Tact Switches ultraflat for SMT

Specifications:

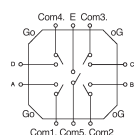
Contact rating:	12 V DC, 50 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V AC (50–60 Hz) for 1 minute
Operating temperature:	–20 °C to +70 °C
Mechanical life:	minimum 200 000 cycles
Operating force:	Center: 3.6 N ± 0.7 N, four directions: 1.8 N ± 0.6 N
Material:	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

Models:

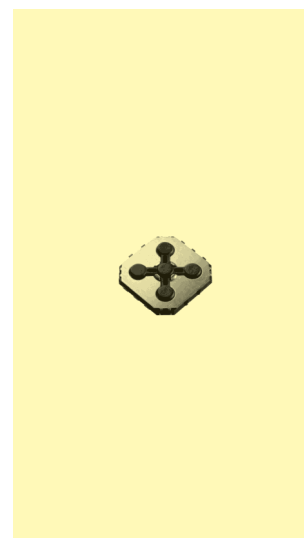
TSSJ 55



PCB Layout



Circuit diagram



6

Slide Switches

6.1 Professional Slide Switches



Type	Operating		Case		Operating positions	Poles	Page
	top	side	Plastic	Metal			
ASE	•		•		2-3	1-2	98-99
ASE-RA		•	•		2-3	1-2	98-99
MFP/MFS 106	•		•		2	1	100
MFP/MFS 126	•	•		•	2-3	1-2	101
MSS 3000	•	•	•		2	1-2	102
MFP 100	•			•	2-5	1	103
MFP 100-R		•		•	2-5	1	103
MFP 200	•			•	2-6	2	103
MFP 1000	•			•	2-6	1	104
MFP 1000-R		•		•	2-6	1	104
MFP 2000	•			•	2-6	2	105
MFP 2000-R		•		•	2-3	2	105
MFP x6x	•		•		1-3	1-6	106
MFP x6x-RA		•	•		1-3	2-4	107
other	•	•		•	1-3	1-2	108-114

6.2 Microminiature Slide Switches



Type	Operating		Terminals		Operating positions	Poles	Page
	top	side	T/H	SMD			
MMSP 100		•		•	3+ push	1	115
MMP 100	•		•		2-3	1	116
MMP 200	•		•		2-3	2	116
MMP 100-R		•	•		2-3	1	117
MMP 200-R		•	•		2-3	2	118
MMS 100/200		•		•	2-3	1-2	119
MMS 200 T	•			•	2-3	2	120
MMP 1010	•		•		2	1	121
MMP 1010-R		•	•		2	1	121
MMS 1010-R		•		•	2	1	122

Subminiature Slide Switches

Specifications:

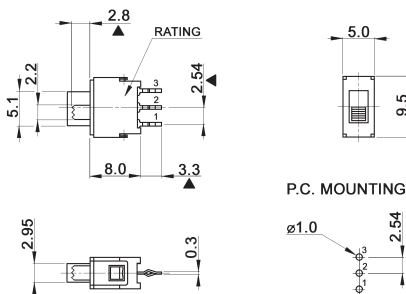
Contact rating:	max. 48 V AC/DC, 0.4 VA / max. 50 mA min. 20 mV AC/DC, 1 μ A
Contact resistance:	< 50 m Ω
Insulation resistance:	> 500 M Ω
Dielectric strength:	500V, 50Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Electrical life:	minimum 40 000 operations
Contacts:	phosphor-bronze, gold-plated over nickel barrier
Terminals:	phosphor-bronze, gold-plated over nickel barrier
Protection:	IP 67
Material:	case: PA 66 (UL 94 V-0) 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.

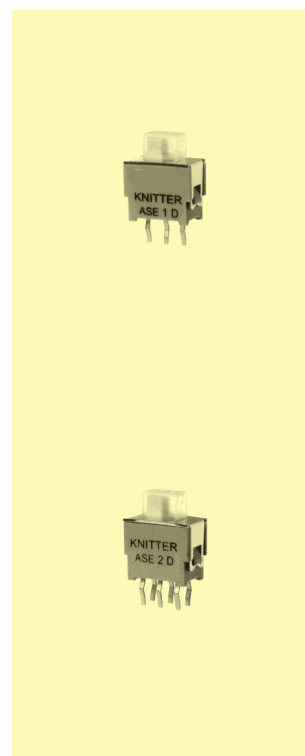
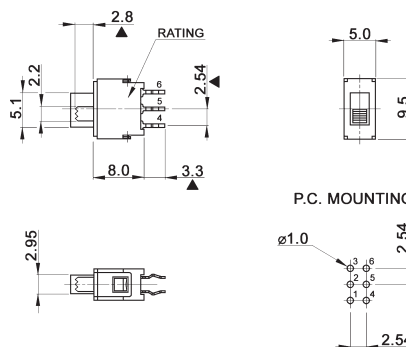
Models: Switching function – the closed contacts correspond to the slide position

washable

SPDT
ASE 1 D on – on
ASE 1 E on off on



DPDT
ASE 2 D on – on
ASE 2 E on off on



UL recognized components on request.

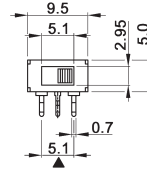
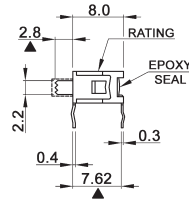
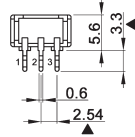


Subminiature Slide Switches

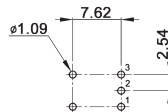
Models: Switching function – the closed contacts correspond to the slide position

S P D T

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

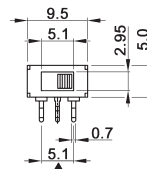
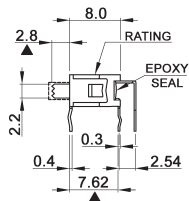
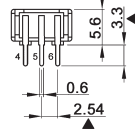


P.C. MOUNTING

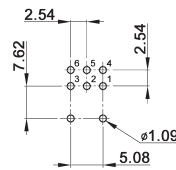


D P D T

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



P.C. MOUNTING



washable



UL recognized components on request.

Miniature Slide Switches

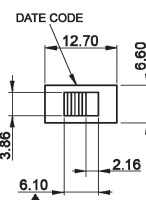
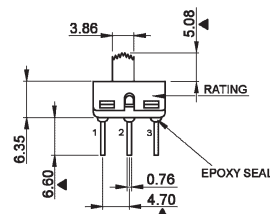
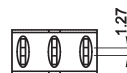
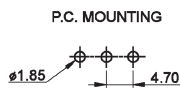
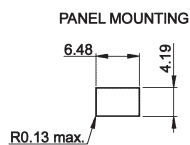
Specifications:

Contact rating:	250 V AC, 2A / 120 V AC, 5 A / 28 V DC, 4 A
Contact resistance:	< 20 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	- 10 °C to + 60 °C
Mechanical life:	min. 20 000 operations
Contacts:	copper alloy, silver plated
also available:	gold-plated, version G
Terminals:	MFP PC terminals, MFS solder tags

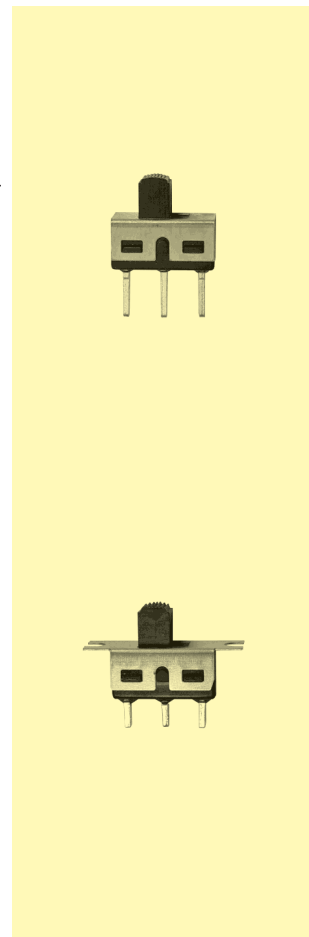
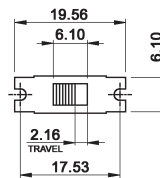
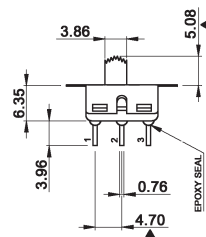
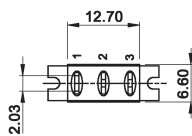
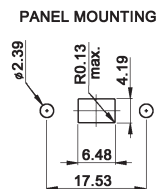
6

Models: Switching functions

SPDT
MFP 106 D on - on



SPDT
MFS 106 D on - on





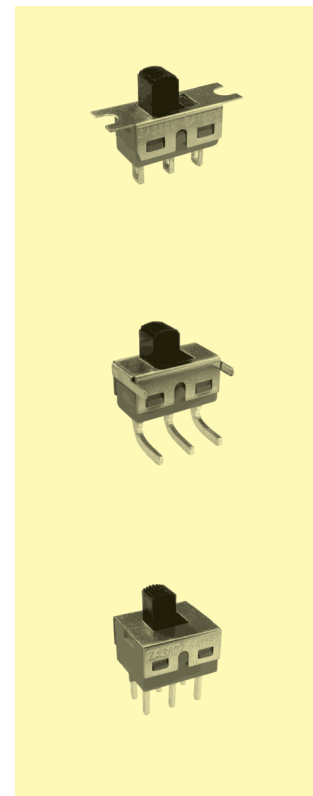
Miniature Slide Switches

Specifications:

Contact rating:	250 V AC, 2A / 120 V AC, 5 A / 28 V DC, 5 A
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:	min. 30 000 operations
Contacts:	copper alloy, silver plated or gold plated or gold over silver plated
Terminals:	MFP, MFS: solder lugs, MFP-PC: PC terminals

Models: Switching functions

MFS 126 E	on off on	
MFP 126 D-RA	on - on	
MFP 226 N-PC	on - on	



Ordering code: MF -

Housing:

- Standard
- with ears

Poles:

- 126 single
- 226 double

Function:

- on-mom, SP
- on-on, SP
- on-off-on, SP
- on-on, DP
- on-off-on, DP

Surface:

- silver
- gold
- gold over silver

Mounting:

- straight, solder-lugs
- PC straight, PCB-terminals
- right angle
- vertical mount

Miniature Slide Switches

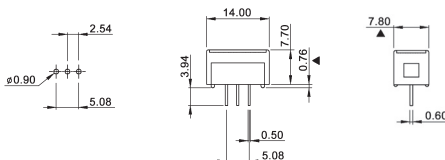
Specifications:

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

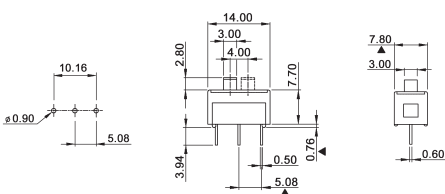
6

Models: Switching functions

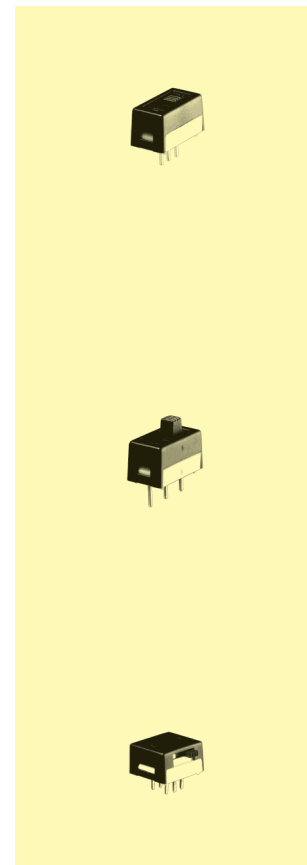
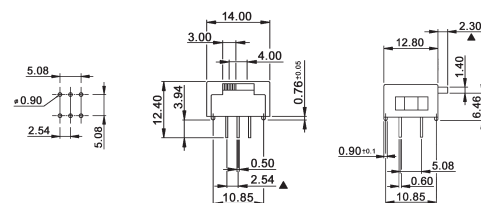
MSS 3011 D on – on



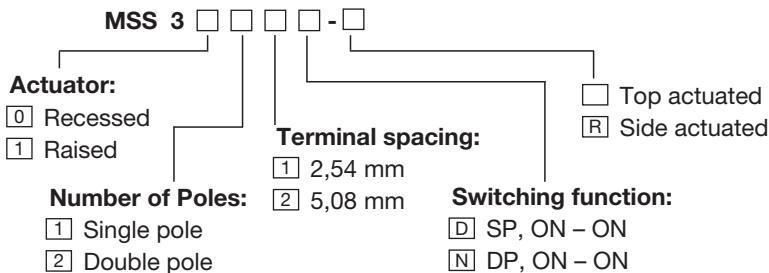
MSS 3112 D on – on



MSS 3121 N-R on – on



Ordering code:





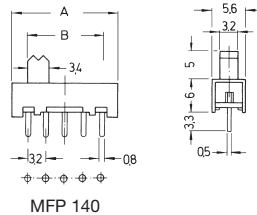
Miniature Slide Switches

Specifications:

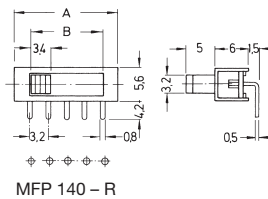
Contact rating:	30 V DC, 350 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
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

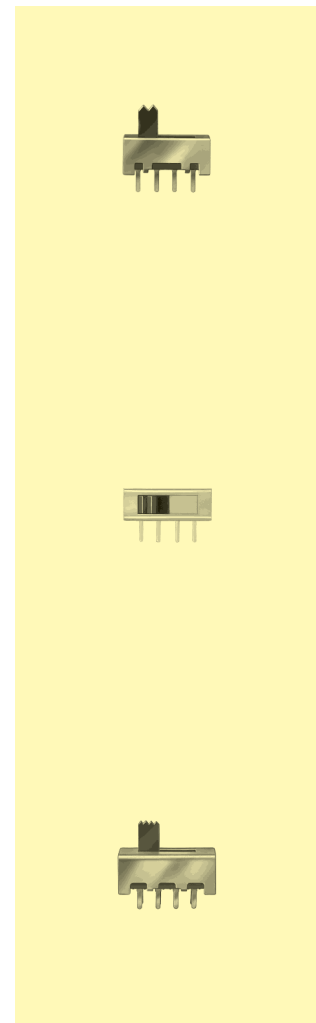
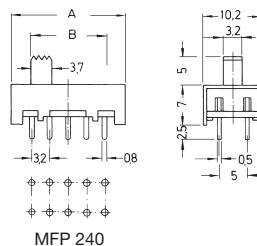
MFP 120	2	11.0	6.7
MFP 130	3	15.0	10.0
MFP 140	4	18.2	13.2
MFP 150	5	21.4	16.4



MFP 120 – R	2	11.0	6.7
MFP 130 – R	3	15.0	10.0
MFP 140 – R	4	18.2	13.2



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:	< 20 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 + 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

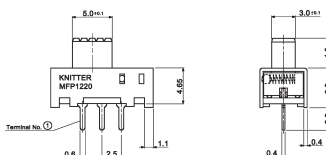
6

Models: Operating positions Length (mm)
A B

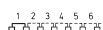
MFP 1220 2
MFP 1320 3
MFP 1620 6



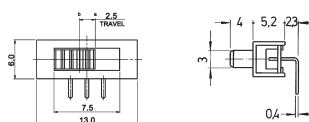
13.0 7.5
15.5 10.0
23.0 17.5



MFP 1220 – R 2
MFP 1320 – R 3



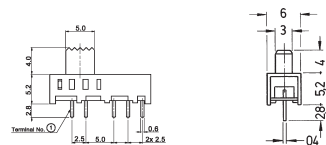
13.0 7.5
15.5 10.0



MFP 1323 3
MFP 1424 4



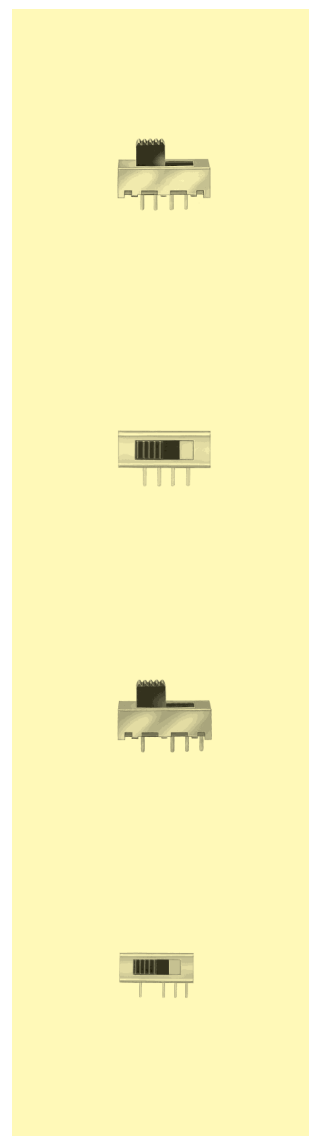
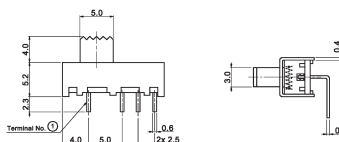
15.5 10.2
18.0 12.5



MFP 1323 – R 3



15.5 10.1





Miniature Slide Switches

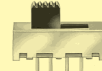
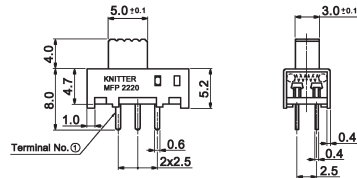
Models: Operating positions Length (mm)
 A B

MFP 2220
MFP 2320
MFP 2520

2
3
5



13.0 7.5
15.5 10.0
20.5 15.0

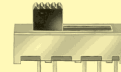
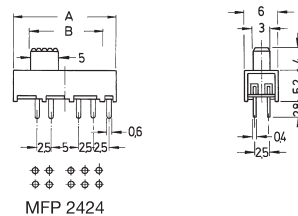


MFP 2323
MFP 2424

3
4



16.0 10.1
18.0 12.6

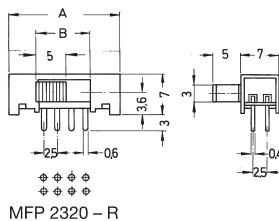


MFP 2220 - R
MFP 2320 - R

2
3



17.0 6.5
19.5 9.0

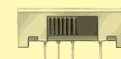
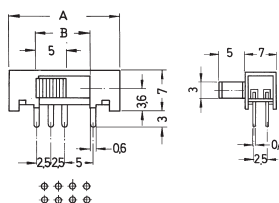


MFP 2323 - R

3



19.5 9.0



Miniature Slide Switches



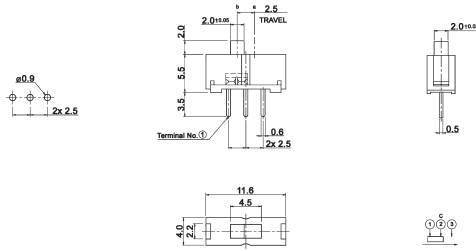
Specifications: see page 104

Material: plastic housing, terminals sealed

Models: Switching functions

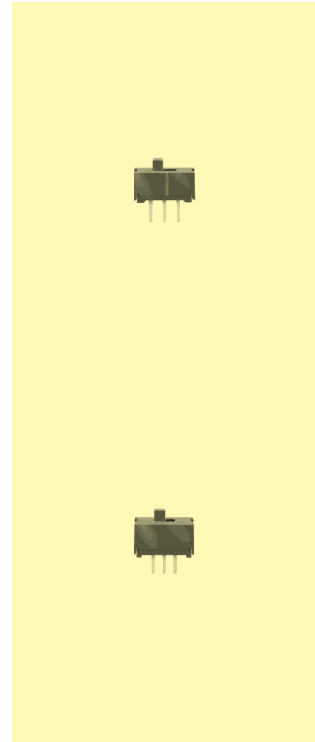
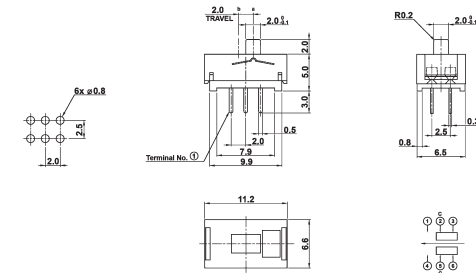
MFP 161 D
non-shorting

on on



MFP 261 N
non-shorting

on on





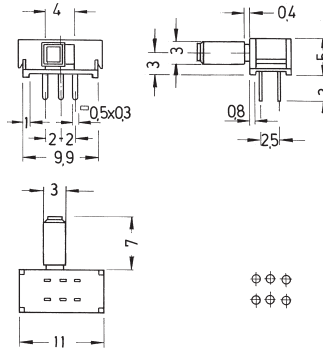
Miniature Slide Switches

Specifications: see page 104

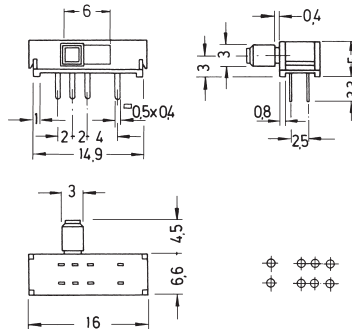
Material: plastic housing, terminals sealed

Models: Switching functions

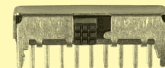
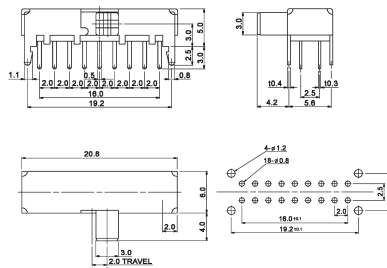
MFP 261 N – RA on on shorting



MFP 263 P – RA on on on n.n.



MFP 661 N – RA on on non-shorting minimum order quantity on request



Miniature Slide Switches

Specifications:

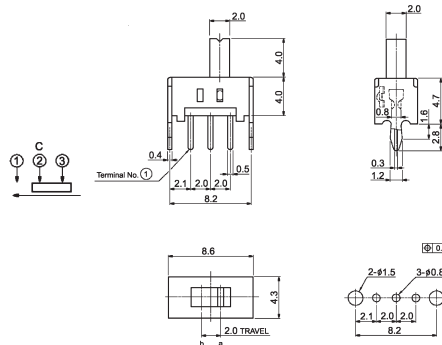
Contact rating:	12 V DC, 100 mA
Contact resistance:	< 20 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +85 °C / MFP 213x: -25 °C to +85 °C
Mechanical life:	minimum 10 000 operations
Contacts:	copper alloy, 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

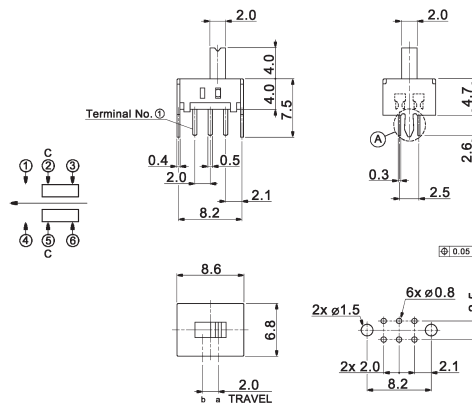
MFP 113 D
non-shorting

on on



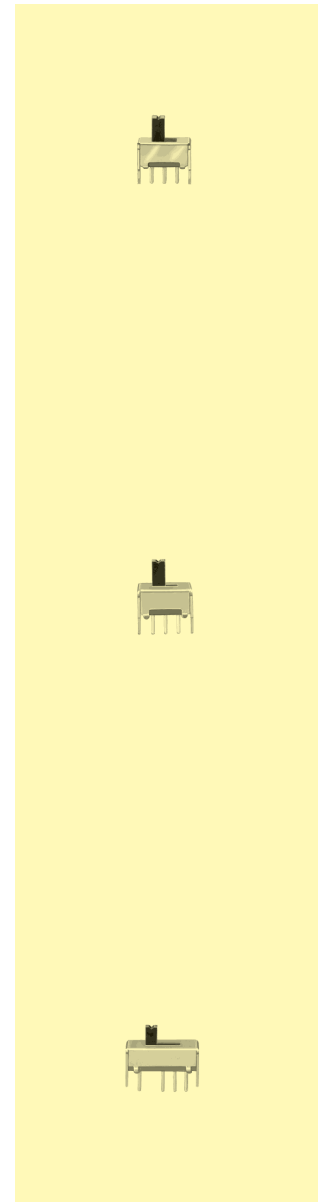
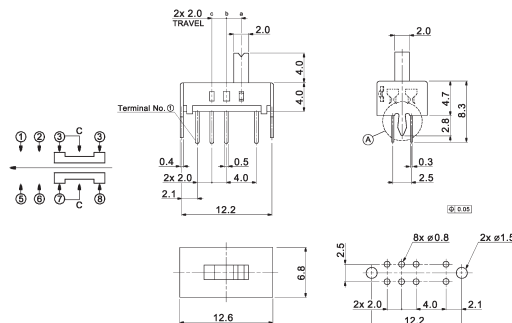
MFP 213 N
non-shorting

on on



MFP 213 P
shorting

on on on





Miniature Slide Switches

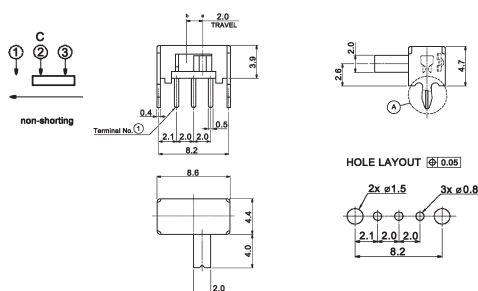
Specifications:

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

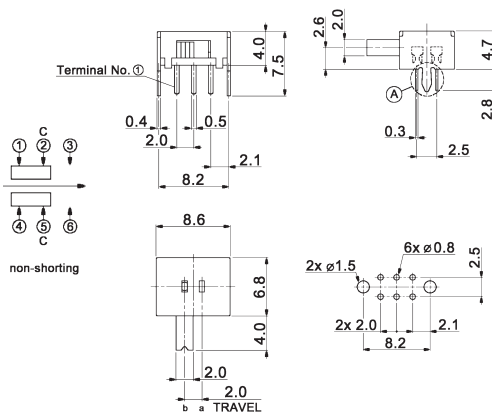
Models:

Switching functions

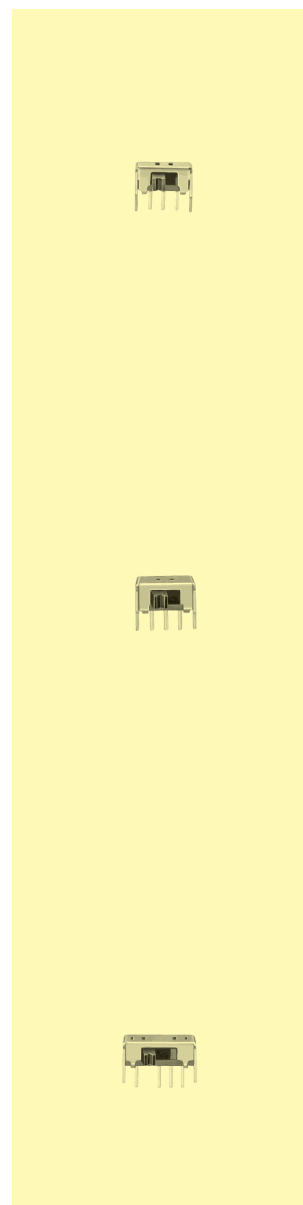
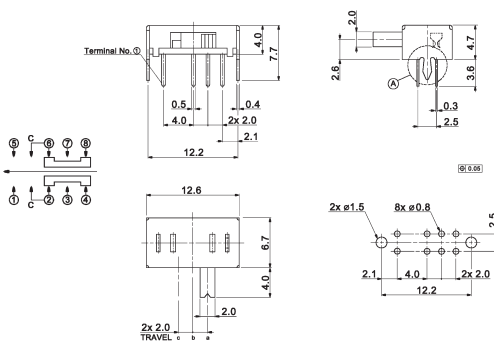
MFP 113 D – RA on on non-shorting



MFP 213 N – RA on on non-shorting



MFP 213 P – RA on on on shorting



Miniature Slide Switches

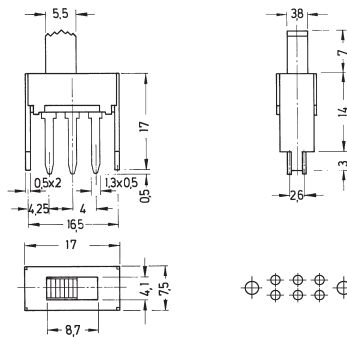
Specifications:

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

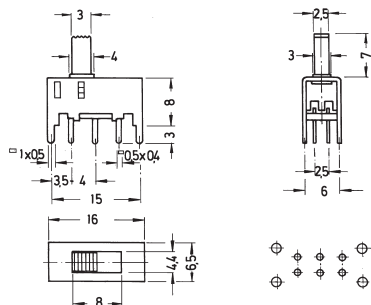
6

Models: Switching functions

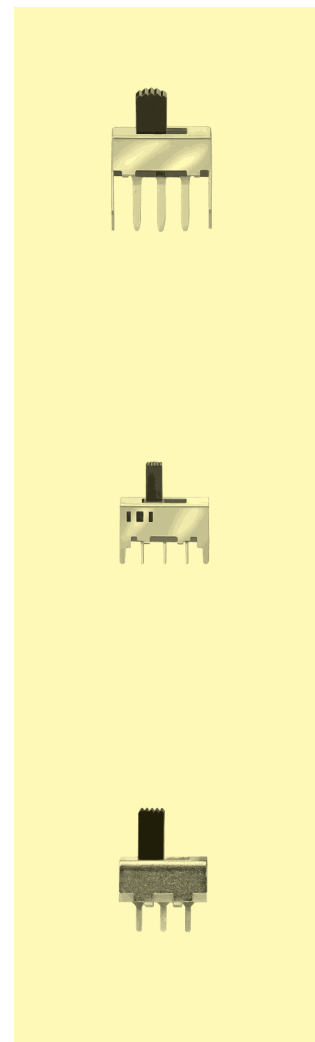
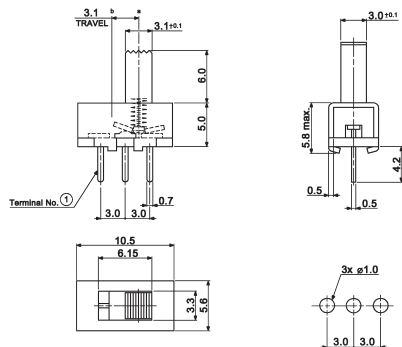
MFP 201 N on on



MFP 211 N on on



MFP 12504 on on





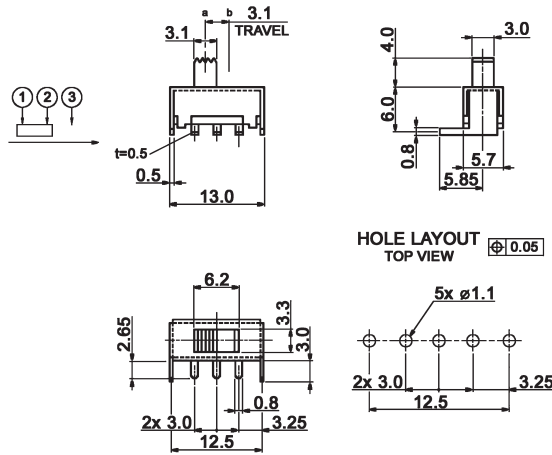
Miniature Slide Switches

Specifications:

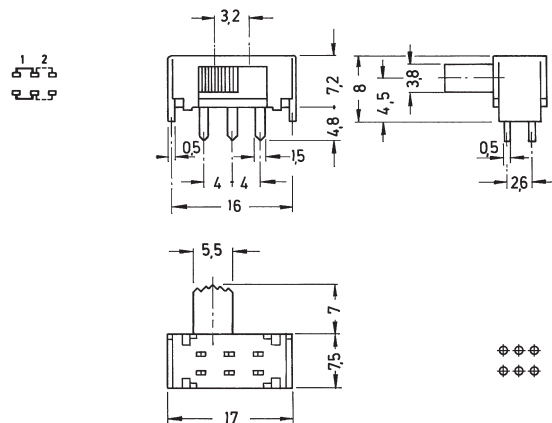
Contact rating:	30 V DC, 0.2 A
Contact resistance:	< 30 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Mechanical life:	5000 operations
Contacts:	copper alloy, silver-plated over nickel barrier
Slide 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

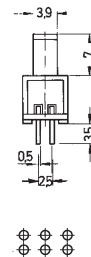
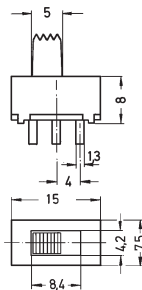
Specifications:

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

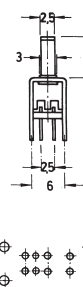
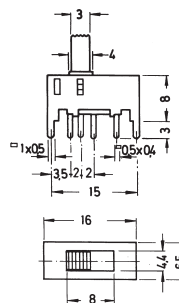
MFP 221 N
non-shorting

on on



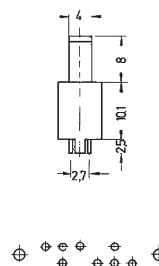
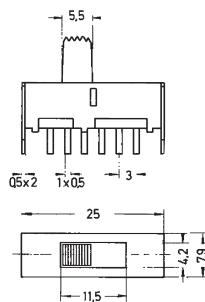
MFP 223 P
shorting

on on on



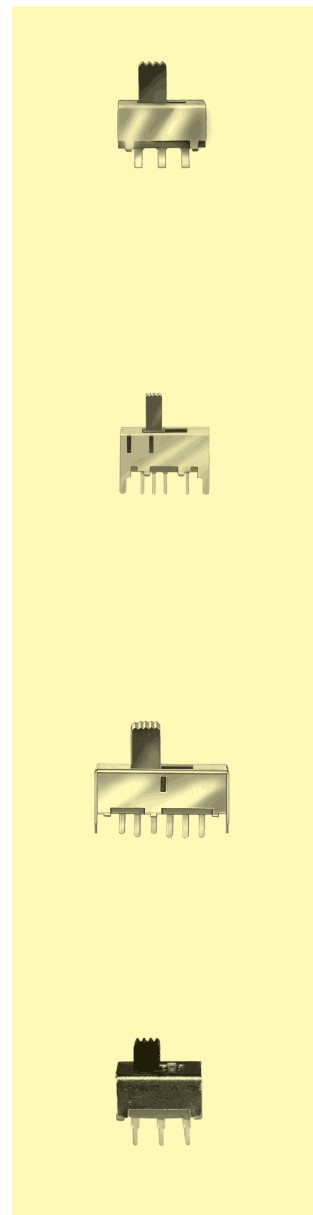
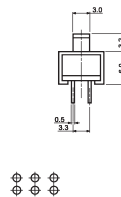
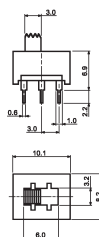
MFP 231 P
shorting

on on on



MFP 291 N
non-shorting

on on





Miniature Slide Switches

Specifications:

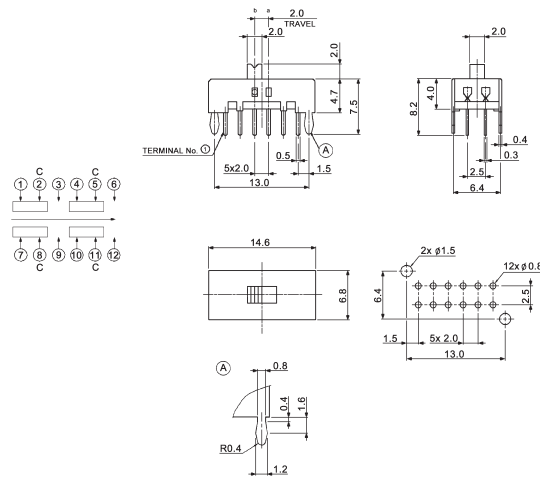
Contact rating:	MFP 421 N: 30 V DC, 0.35 A	MFP 421 N-RA: 30 V DC, 0.2 A
Contact resistance:	MFP 421 N: < 20 mΩ	MFP 421 N-RA: < 30 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC for 1 minute	
Dielectric strength:	500 V AC (50/60 Hz, 2 mA) for 1 minute	
Operating temperature:	-10 °C to +70 °C	
Mechanical 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

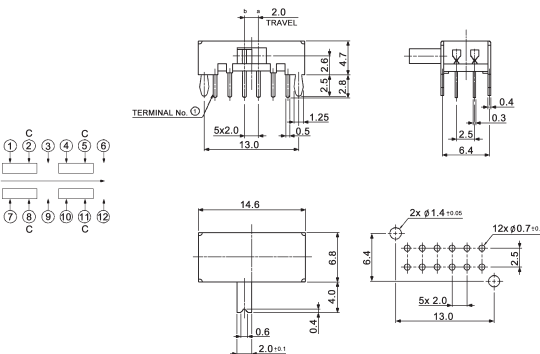
MFP 421 N
non-shorting

on on



MFP 421 N-RA
non-shorting

on on



Miniature Slide Switches

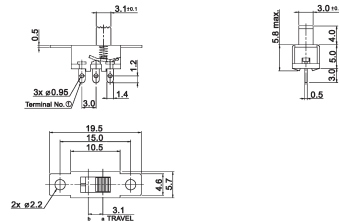
Specifications:

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:	-40 °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

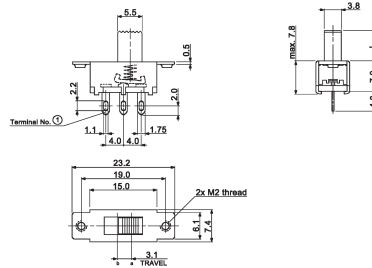
MFS 121 D – N
non-shorting

on on



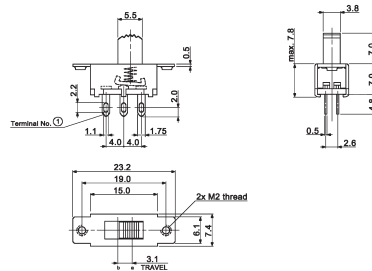
MFS 131 D
non-shorting

on on



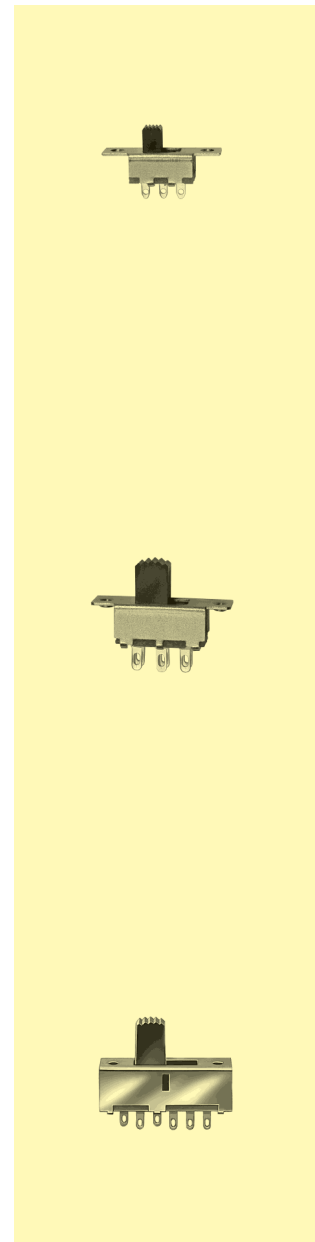
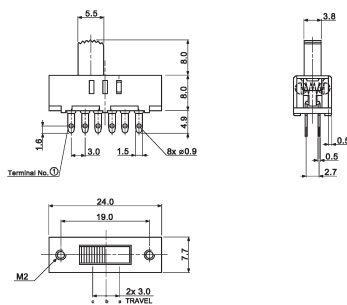
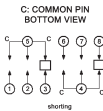
MFS 201 N SW
non-shorting

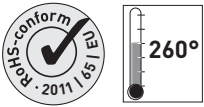
on on



MFS 231 P
shorting

on on on





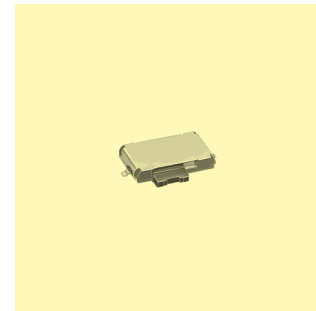
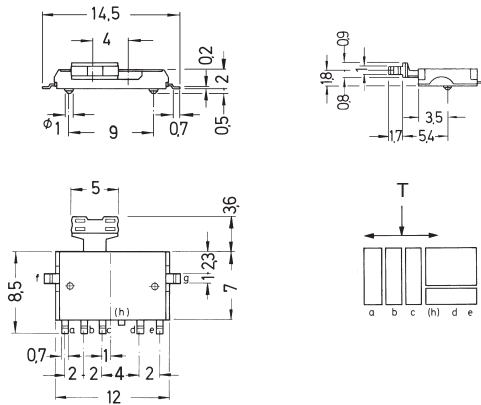
Microminiature Slide Switches for SMT

Specifications:

Contact rating:	12 V DC, 200 mA / 4 V DC, 300 mA
Contact resistance:	< 70 mΩ
Insulation resistance:	> 100 MΩ at 100 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Mechanical life:	minimum 10 000 operations
Contacts:	phosphor bronze, gold-plated
Terminals:	brass, gold-plated
Contact timing:	non-shorting

Models: Switching function

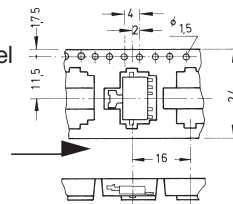
MMSP 132 on on on
with pushbutton function



Packing:

1000 pcs/reel

Ø 330 mm



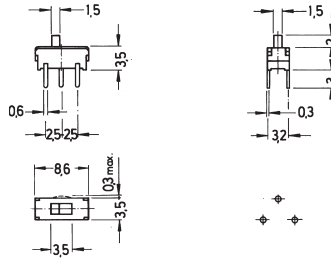
Microminiature Slide Switches

Specifications:

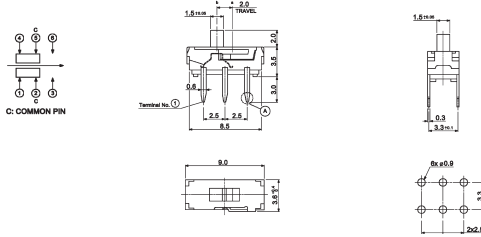
Contact rating:	12 V DC, 200 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Mechanical life:	minimum 5000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	brass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

Models: Switching functions

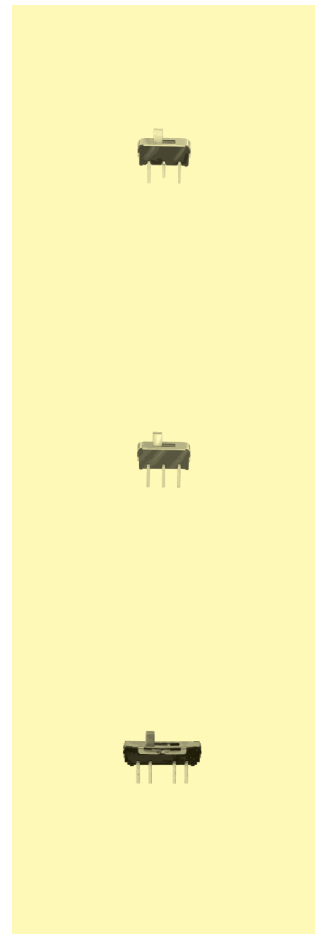
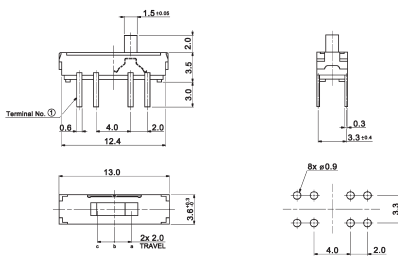
MMP 121 on on



MMP 221 on on



MMP 238 on on on





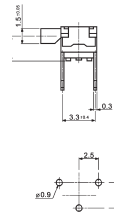
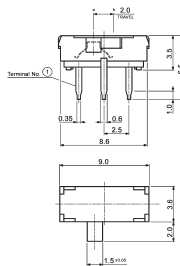
Microminiature Slide Switches

Specifications:

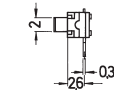
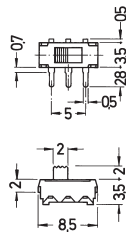
Contact rating:	12 V DC, 200 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 5000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Contact timing:	non-shorting
Slide colour:	white
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C ± 5 °C

Models: Switching functions

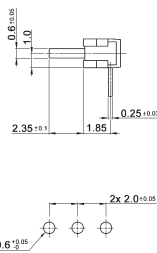
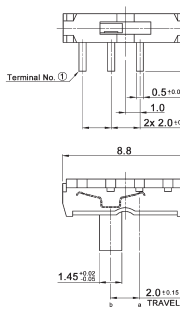
MMP 121 – R on on



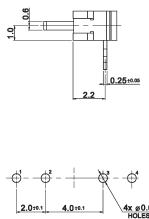
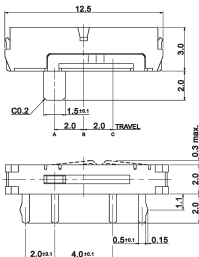
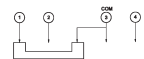
MMP 122 – R on on



MMP 124 – RN on on



MMP 134 – R on on on



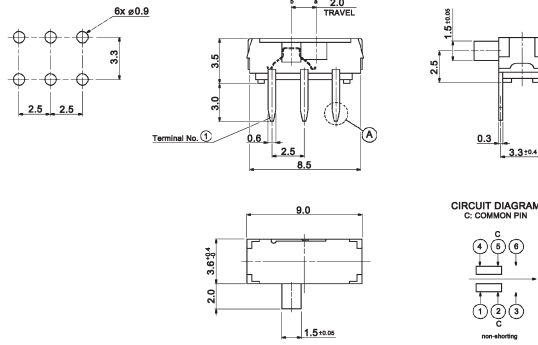
Microminiature Slide Switches



Models: Switching functions

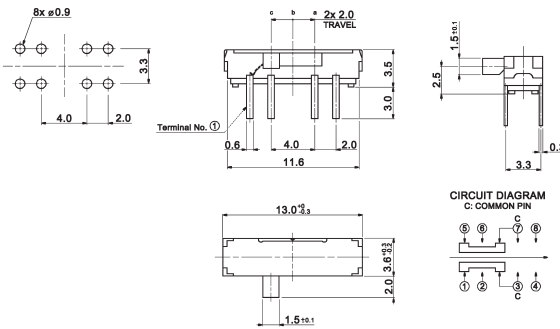
MMP 221 – R

on on



MMP 238 – R

on on on





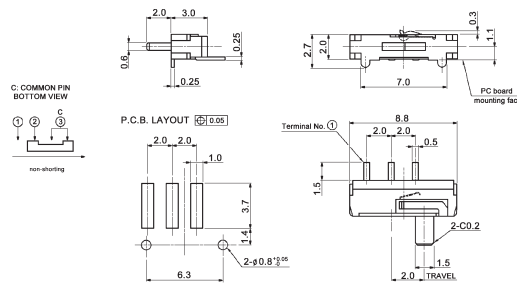
Microminiature Slide Switches for SMT

Specifications:

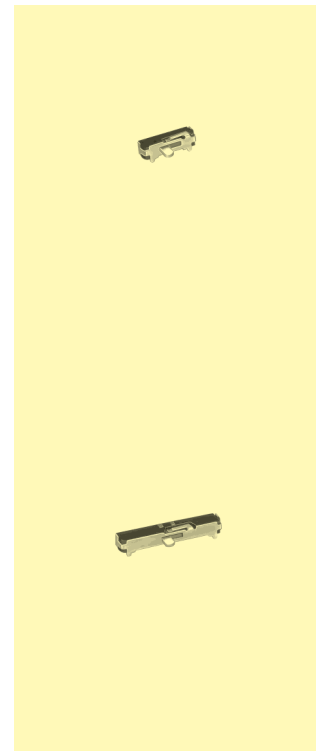
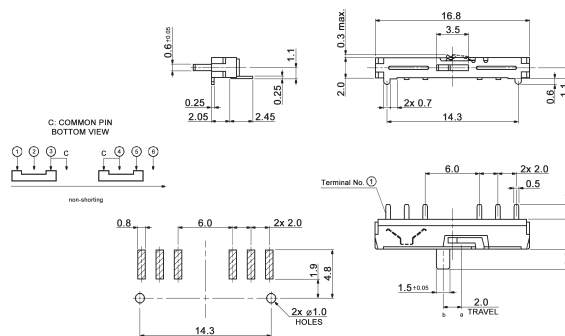
Contact rating:	12 V DC, 200 mA
Contact resistance:	< 70 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Storage temperature:	-40 °C to +85 °C
Mechanical life:	minimum 5000 operations
Contacts:	phosphor bronze, silver-plated
Terminals:	brass, silver-plated
Contact timing:	non-shorting
Slide colour:	black

Models: Switching functions

MMS 124 on on

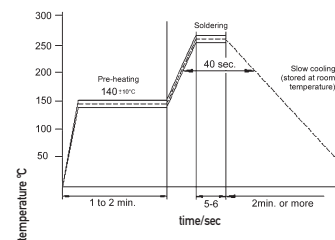


MMS 224 on on



Soldering conditions: reflow-soldering: 40 sec, 220° C
peak temperature: 5-6 sec, 260° C

Packing: cardboard boxes, on tapes on request



Microminiature Slide Switches for SMT

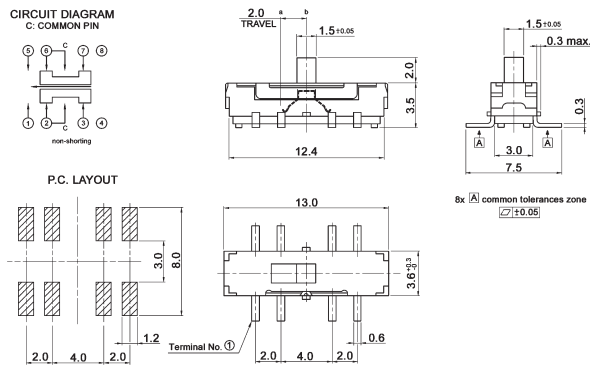
Specifications:

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:	-40 °C to +85 °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:	black
Soldering conditions:	reflow-soldering

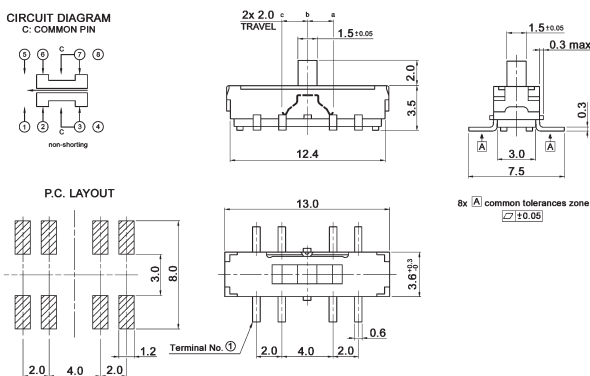
6

Models: Switching functions

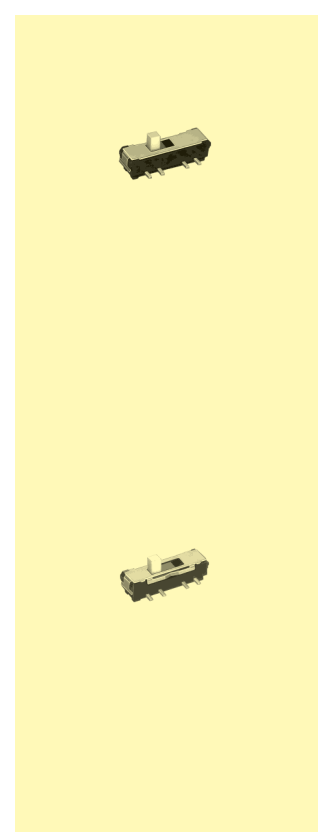
MMS 228 T on on



MMS 238 T on on on



Packing: on tapes, 900 pieces / tape





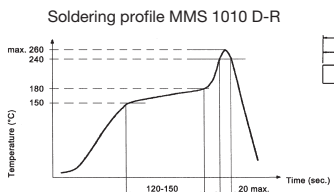
Microminiature Slide Switches

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				



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., 270 °C

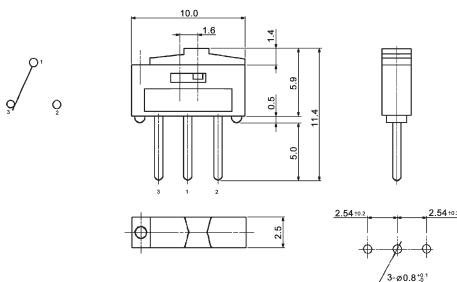
6

Models

Switching functions

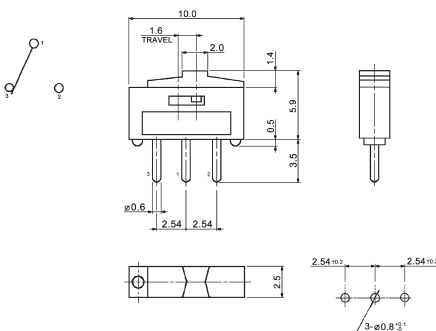
MMP 1010 D – 1

on on



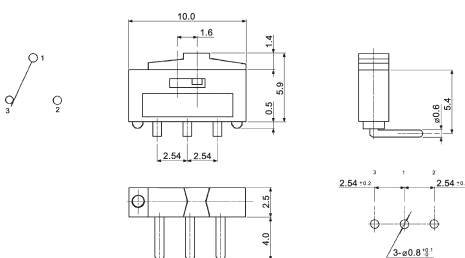
MMP 1010 D-1A

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 200 N	1 – 10 / 12	0.2 µm	raised			124
DBS 2000	1 – 10 / 12	0.1 µm	recessed		washable	125
DBS 2100	1 – 10 / 12	0.1 µm	raised			
DBS 6000	2 – 10 / 12 / 15	0.1 µm	recessed		washable	126
DBS 6100	2 – 10 / 12 / 15	0.1 µm	raised			
Piano-Type						
DBP 2000 N	2–10 / 12	0.1 µm	recessed			127
DBP 2100 N	2–10 / 12	0.1 µm	raised			
SBP 8000 T	2 / 4 / 6 / 8 / 10	0.1 µm	recessed	•	end-stackable	128
SBP 8100 T	2 / 4 / 6 / 8 / 10	0.1 µm	raised	•	end-stackable	
DBP 8000	2 / 4 / 6 / 8 / 10	0.1 µm	recessed		end-stackable	129
DBP 8100	2 / 4 / 6 / 8 / 10	0.1 µm	raised		end-stackable	
SBP 9100	2 – 8 / 10 / 12	0.025 µm	raised	•		130
SBP 61000	2 – 6 / 8 / 10	0.1 µm	raised	•		131
IC-Type						
SMS 500	2 / 4 / 6 / 8 / 10	0.3 µm	recessed	•	ultra flat, washable	132
DBS 5000 G	1 – 10 / 12	0.3 µm	recessed		end-stackable, washable	133
DBS 5100 G	1 – 10 / 12	0.3 µm	raised		end-stackable	
SBS 5000 TG	1 – 10 / 12	0.3 µm	recessed	•	end-stackable, washable	134
SBS 9000 JTK	2 – 10 / 12	0.025 µm	recessed	•		135
DBS 1000	1 – 10 / 12	0.1 µm	recessed		washable	136
DBS 1100	1 – 10 / 12	0.1 µm	raised			
SBS 1000	1 – 10 / 12	0.1 µm	recessed	•	washable	137
DBS 60000	1 – 10 / 12	0.1 µm	recessed		tin-plated terminals, washable	138
DBS 61000	1 – 10 / 12	0.1 µm	raised		tin-plated terminals	
SBS 60000	1 – 10 / 12	0.1 µm	recessed	•	tin-plated terminals, end-stackable, washable	139
SBS 60000 J	2 – 10 / 12	0.1 µm	recessed	•	J-hooks/tin-plated terminals, washable	140
DBS 5000	1 – 10 / 12	0.1 µm	recessed		end-stackable, washable	141
DBS 5100	1 – 10 / 12	0.1 µm	raised		end-stackable	
SBS 5000 T	1 – 10 / 12	0.1 µm	recessed	•	end-stackable, washable	142
SBS 5100 T	1 – 10 / 12	0.1 µm	raised	•	end-stackable	
Half-Pitch-Type						
DHP 600	2 / 4 / 6 / 8 / 10	0.1 µm	raised	•		143
DHS 100 N	4 / 6 / 8 / 10	0.025 µm	recessed	•	washable	144
DHS 600	2 / 4 / 6 / 8 / 10	0.1 µm	recessed	•	washable	145
DHS 600-J	2 / 4 / 6 / 8 / 10	0.1 µm	recessed	•	J-hooks	
DHS 900	1 – 6 / 8 / 10 / 12	0.025 µm	recessed	•	washable	146

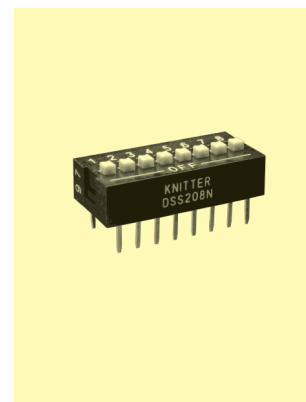
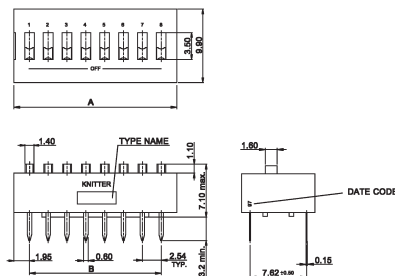
Dual-in-line Switches

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, 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:

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

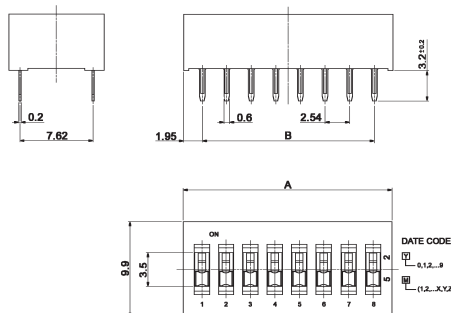
Specifications:

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:	-40 °C to +85 °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 DBS 2000 slide recessed, sealed with protective tape, washable
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

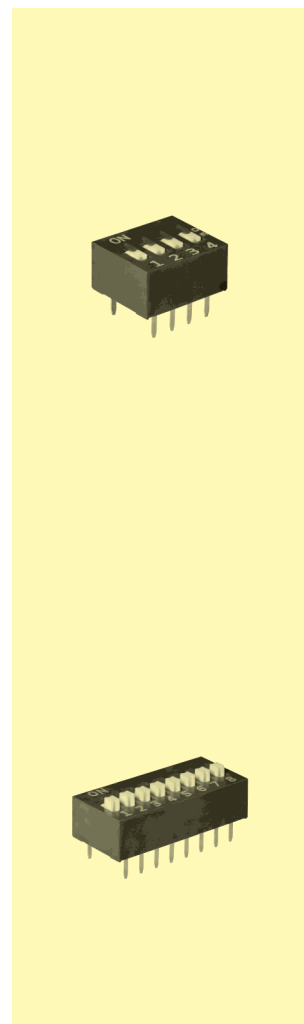
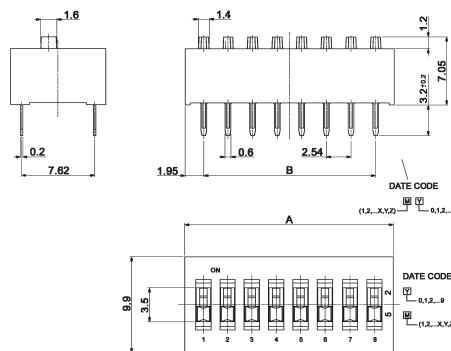
Series DBS 2000

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

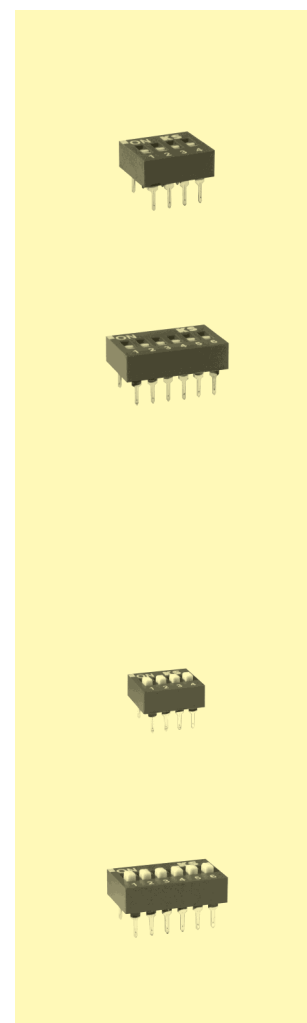
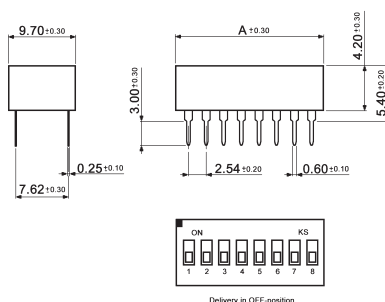
Specifications:

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; DBS 6101: gold-plated over nickel
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:

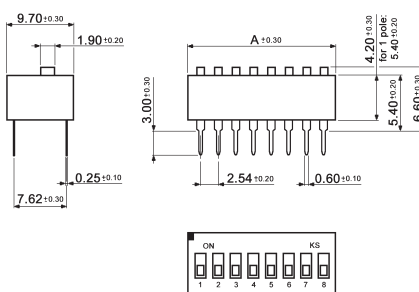
Series DBS 6000

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





Dual-in-line Switches

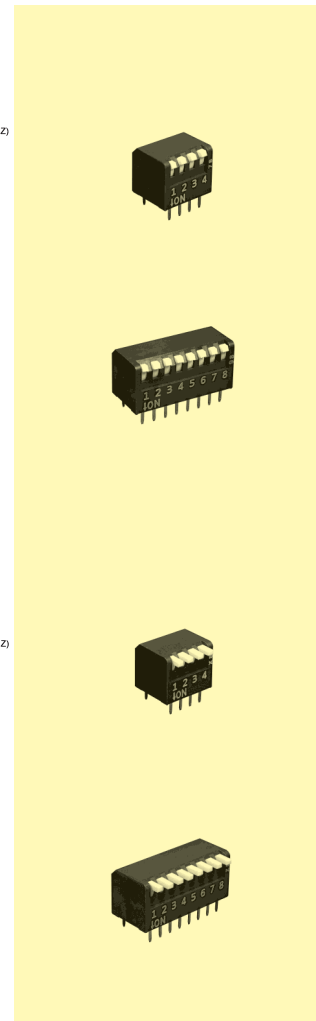
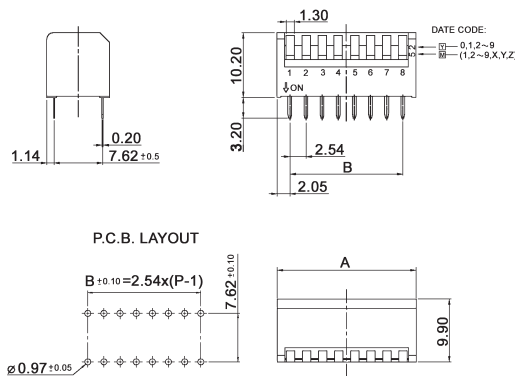
Specifications:

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:	PBT meets UL 94 V-0
Contacts:	gold-plated over nickel
Construction:	case sealed; Series DBP 2000 N lever recessed
Mounting:	on pc-board
Slide position:	OFF
Soldering conditions:	wave-soldering – max.: 5 sec, 260 °C

Models:

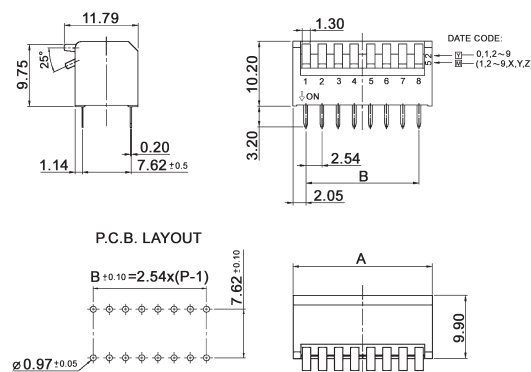
Series DBP 2000 N

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

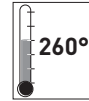


Series DBP 2100 N

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



Dual-in-line Switches end-stackable



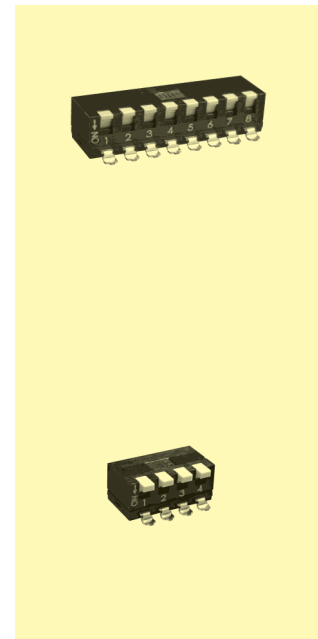
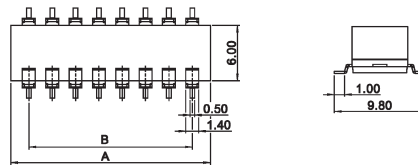
Specifications:

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:

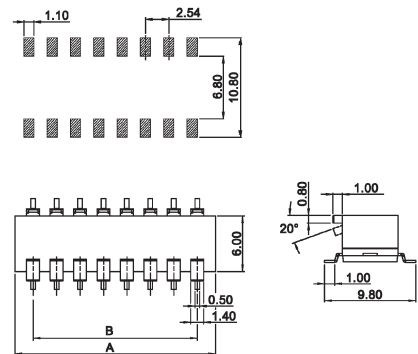
Series SBP 8000 T

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

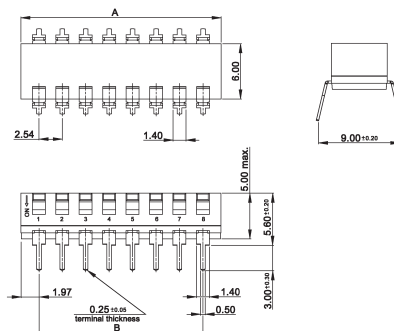
Specifications:

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:

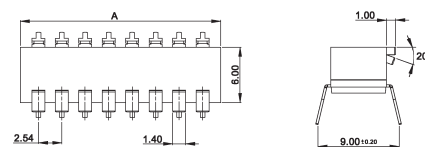
Series DBP 8000

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

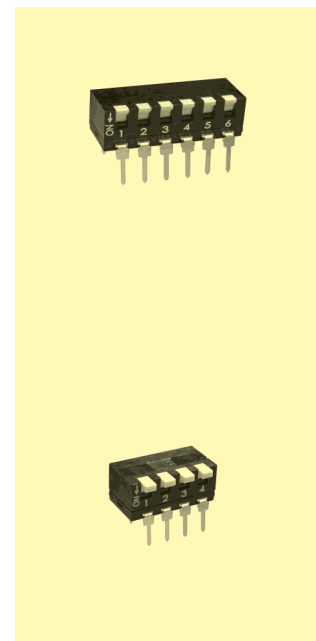


Series DBP 8100

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



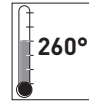
Circuit diagram



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 for SMT



Specifications:

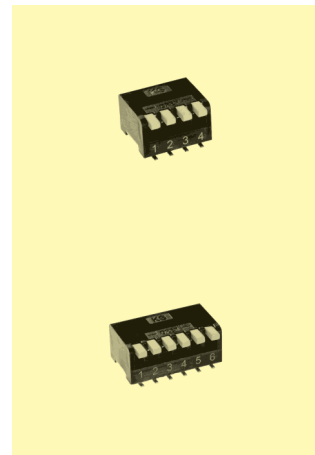
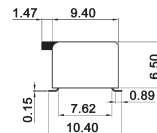
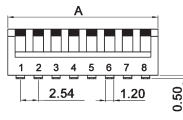
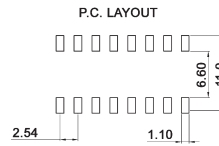
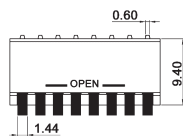
Contact rating:	24 V DC, 25 mA
Contact resistance:	100 mΩ
Insulation resistance:	1000 MΩ at 100 V DC
Dielectric strength:	500 V, 50 Hz for 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 3000 operations per pole
Material:	PA66/PBT, UL 94 V-0
Contacts:	copper alloy, gold-plated
Terminals:	copper alloy, tin-plated
Construction:	case sealed
Mounting:	on pc-board – SMD
Slide position:	OFF

7

Models:

Series SBP 9100 T

Type	Poles	Length (A)
SBP 9102 T	2	6.08 mm
SBP 9103 T	3	8.62 mm
SBP 9104 T	4	11.16 mm
SBP 9105 T	5	13.70 mm
SBP 9106 T	6	16.24 mm
SBP 9108 T	8	21.32 mm
SBP 9110 T	10	26.40 mm
SBP 9112 T	12	31.48 mm



Packing: on tapes

Models	Tape	Reel	Tape width (A)
SBP 9102 T	700 pieces;	Ø 330 mm	24.0 mm
SBP 9103 T	500 pieces;	Ø 330 mm	24.0 mm
SBP 9104 T	500 pieces;	Ø 330 mm	24.0 mm
SBP 9105 T	500 pieces;	Ø 330 mm	24.0 mm
SBP 9106 T	500 pieces;	Ø 330 mm	24.0 mm
SBP 9108 T	500 pieces;	Ø 330 mm	44.0 mm
SBP 9110 T	500 pieces;	Ø 330 mm	44.0 mm
SBP 9112 T	500 pieces;	Ø 330 mm	44.0 mm



Dual-in-line Switches for SMT

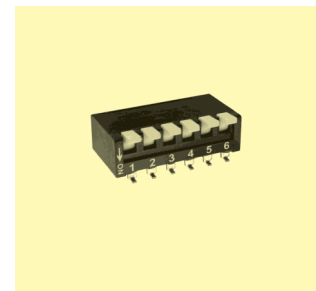
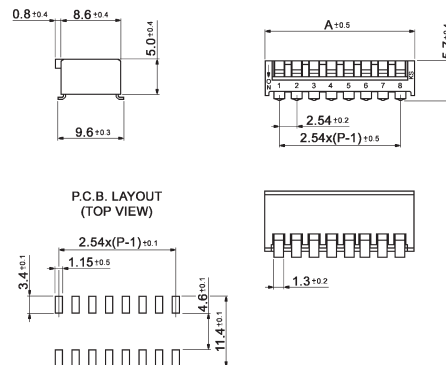
Specifications:

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 3000 operations per pole
Material:	thermoplastic, UL 94 V-0
Contacts:	gold-plated over nickel
Terminals:	tin-plated
Mounting:	on pc-board - SMD
Slide position:	OFF

Models:

Series SBP 610xx T

Type	Poles	Length (A)
SBP 61002 T	2	6.50 mm
SBP 61003 T	3	9.00 mm
SBP 61004 T	4	11.60 mm
SBP 61005 T	5	14.10 mm
SBP 61006 T	6	16.70 mm
SBP 61008 T	8	21.70 mm
SBP 61010 T	10	26.70 mm



Packing: on tapes, 550 pieces / tape

Dual-in-line Switches ultra-low profile, for SMT



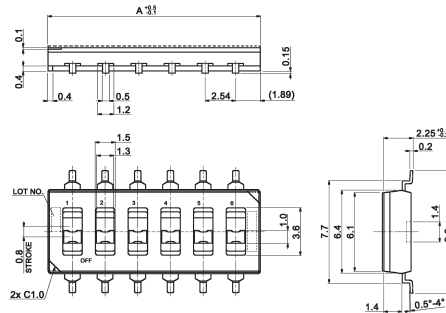
Specifications:

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 +105 °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: PPS, slided: PA
Construction:	case sealed, slide recessed, sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF
Soldering conditions:	reflow-soldering

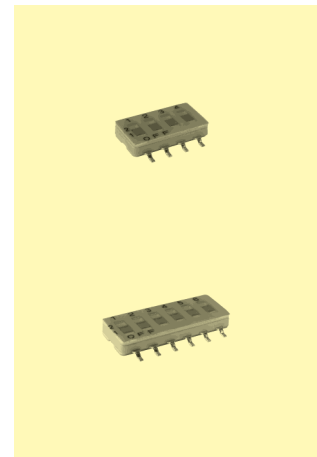
Models:

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

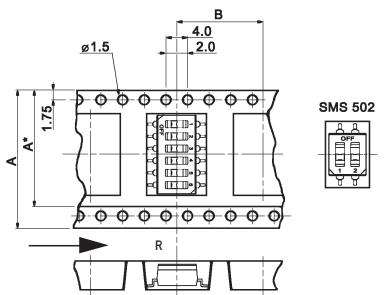


washable



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	∅ 330 mm	16.0 mm	8.0 mm
SMS 504	40 pieces; L 507 mm	1000 pieces	∅ 330 mm	24.0 mm	12.0 mm
SMS 506	28 pieces; L 507 mm	1000 pieces	∅ 330 mm	24.0 mm	12.0 mm
SMS 508	20 pieces; L 507 mm	1000 pieces	∅ 330 mm	32.0 mm	12.0 mm
SMS 510	16 pieces; L 507 mm	1000 pieces	∅ 330 mm	44.0 mm	12.0 mm





Dual-in-line Switches

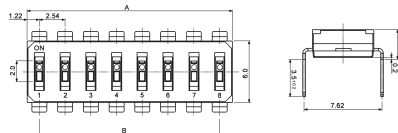
Specifications:

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:

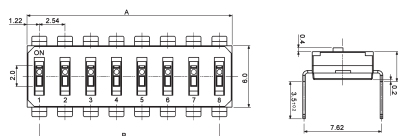
Series DBS 5000 G

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

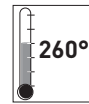
DBS 5101 G	1	2.44 mm
DBS 5102 G	2	4.98 mm
DBS 5103 G	3	7.52 mm
DBS 5104 G	4	10.06 mm
DBS 5105 G	5	12.60 mm
DBS 5106 G	6	15.14 mm
DBS 5107 G	7	17.68 mm
DBS 5108 G	8	20.22 mm
DBS 5109 G	9	22.76 mm
DBS 5110 G	10	25.30 mm
DBS 5112 G	12	30.38 mm



Packing: sticks



Dual-in-line Switches for SMT



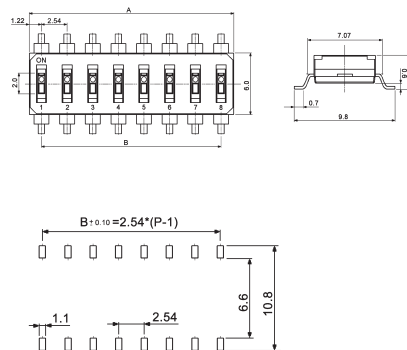
Specifications:

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, slide recessed, sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF

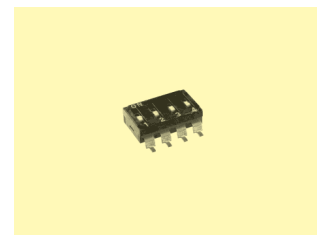
Models:

Series SBS 5000 TG

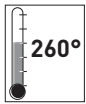
Type	Poles	Length (A)
SBS 5001 TG	1	2.44 mm
SBS 5002 TG	2	4.98 mm
SBS 5003 TG	3	7.52 mm
SBS 5004 TG	4	10.06 mm
SBS 5005 TG	5	12.60 mm
SBS 5006 TG	6	15.14 mm
SBS 5007 TG	7	17.68 mm
SBS 5008 TG	8	20.22 mm
SBS 5009 TG	9	22.76 mm
SBS 5010 TG	10	25.30 mm
SBS 5012 TG	12	30.38 mm



washable



Packing: on tapes – 900 pieces; Ø 300 mm



Dual-in-line Switches for SMT

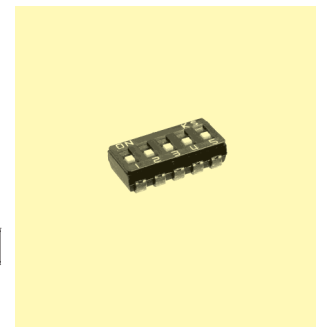
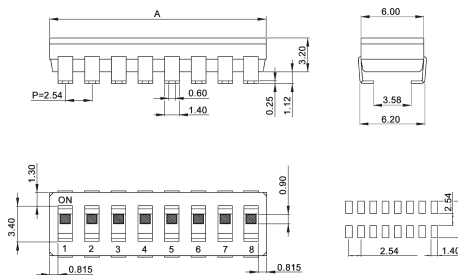
Specifications:

Contact rating:	24 V DC, 25 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 5000 operations per pole
Material:	cover/base: PPS UL 94 V-0, black; actuator: PA66 UL 94 V-0, white
Contacts/Terminals:	brass, tin-plated
Construction:	case sealed, slide recessed, front sealed with protective tape
Mounting:	on pc-board – SMD
Slide position:	OFF

Models:

Series SBS 9000 JTK

Type	Poles	Length (A)
SBS 9002 JTK	2	5.52 mm
SBS 9003 JTK	3	8.06 mm
SBS 9004 JTK	4	10.60 mm
SBS 9005 JTK	5	13.14 mm
SBS 9006 JTK	6	15.68 mm
SBS 9007 JTK	7	18.22 mm
SBS 9008 JTK	8	20.76 mm
SBS 9009 JTK	9	23.30 mm
SBS 9010 JTK	10	25.84 mm
SBS 9012 JTK	12	30.92 mm



Packing: on tapes

Models	Tape	Reel	Tape width (A)
SBS 9002 JTK	1100 pieces;	Ø 330 mm	16.0 mm
SBS 9003 JTK	1100 pieces;	Ø 330 mm	16.0 mm
SBS 9004 JTK	1100 pieces;	Ø 330 mm	24.0 mm
SBS 9005 JTK	1100 pieces;	Ø 330 mm	24.0 mm
SBS 9006 JTK	1100 pieces;	Ø 330 mm	24.0 mm
SBS 9007 JTK	1100 pieces;	Ø 330 mm	32.0 mm
SBS 9008 JTK	1100 pieces;	Ø 330 mm	32.0 mm
SBS 9009 JTK	1100 pieces;	Ø 330 mm	44.0 mm
SBS 9010 JTK	1100 pieces;	Ø 330 mm	44.0 mm
SBS 9012 JTK	1100 pieces;	Ø 330 mm	44.0 mm

Dual-in-line Switches

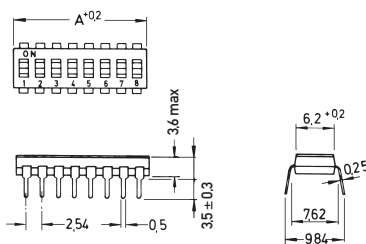
Specifications:

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:	-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
	Series DBS 1000: 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:

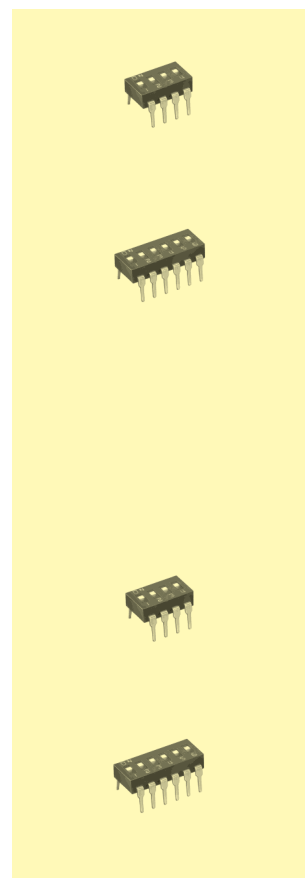
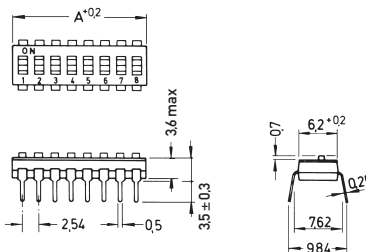
Series DBS 1000

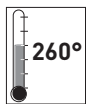
Type	Poles	Length (A)
DBS 1001	1	3.48 mm
DBS 1002	2	6.02 mm
DBS 1003	3	8.56 mm
DBS 1004	4	11.10 mm
DBS 1005	5	13.64 mm
DBS 1006	6	16.18 mm
DBS 1007	7	18.72 mm
DBS 1008	8	21.26 mm
DBS 1009	9	23.80 mm
DBS 1010	10	26.34 mm
DBS 1012	12	31.42 mm



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





Dual-in-line Switches for SMT

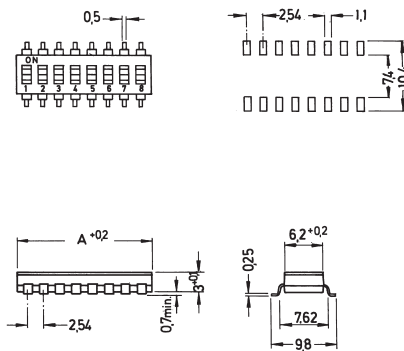
Specifications:

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

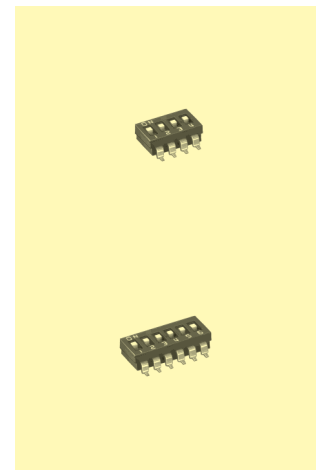
Models:

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



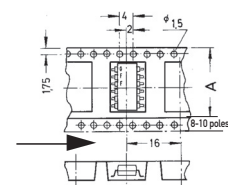
washable



7

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

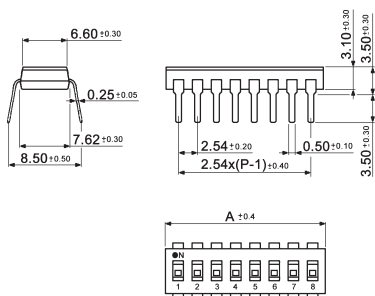
Specifications:

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:

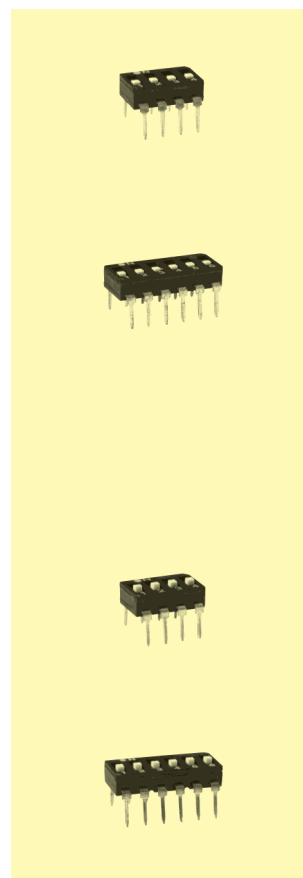
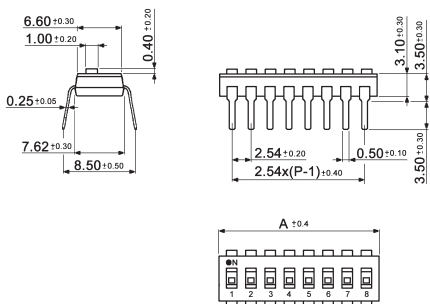
Series DBS 600xx

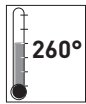
Type	Poles	Length (A)
DBS 60001	1	2.50 mm
DBS 60002	2	5.04 mm
DBS 60003	3	7.58 mm
DBS 60004	4	10.12 mm
DBS 60005	5	12.66 mm
DBS 60006	6	15.20 mm
DBS 60007	7	17.74 mm
DBS 60008	8	20.28 mm
DBS 60009	9	22.82 mm
DBS 60010	10	25.36 mm
DBS 60012	12	30.43 mm



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

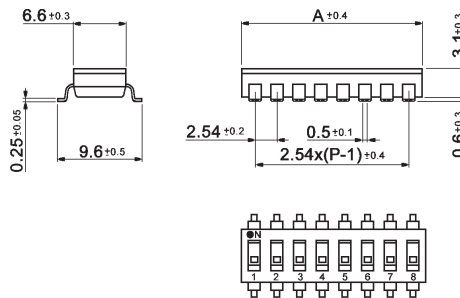
Specifications:

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

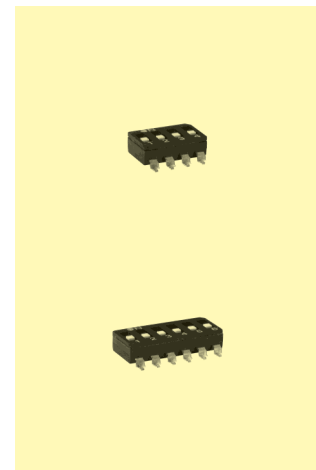
Models:

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



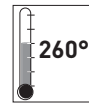
washable



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

Dual-in-line Switches for SMT



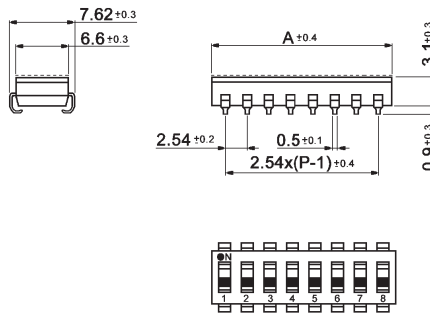
Specifications:

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

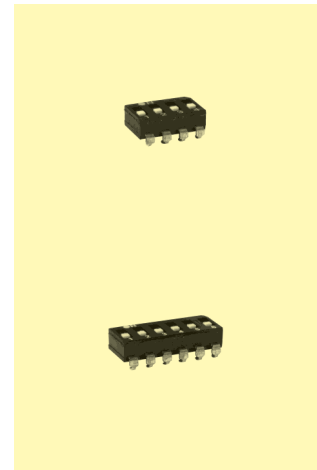
Models:

Series SBS 600xx 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 JT

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

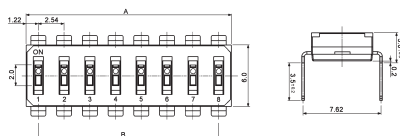
Specifications:

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 +90 °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:

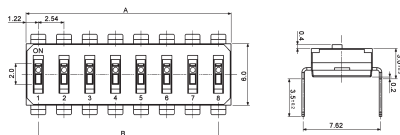
Series DBS 5000

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

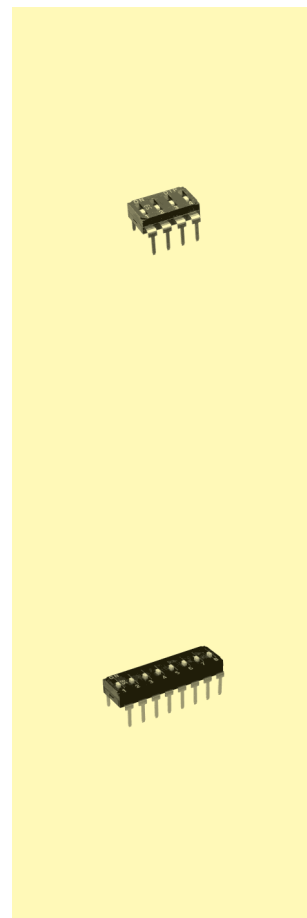


Series DBS 5100

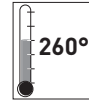
Type	Poles	Length (A)
DBS 5101	1	2.44 mm
DBS 5102	2	4.98 mm
DBS 5103	3	7.52 mm
DBS 5104	4	10.06 mm
DBS 5105	5	12.60 mm
DBS 5106	6	15.14 mm
DBS 5107	7	17.68 mm
DBS 5108	8	20.22 mm
DBS 5109	9	22.76 mm
DBS 5110	10	25.30 mm
DBS 5112	12	30.38 mm



Packing: sticks



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



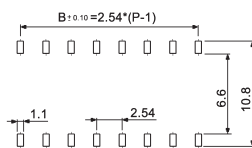
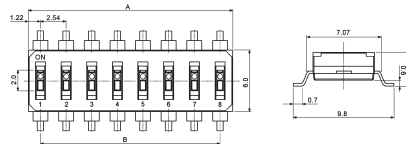
Specifications:

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 +90 °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 Series SBS 5000 T: slide recessed, front sealed with protective tape, washable
Mounting:	on pc-board – SMD
Slide position:	OFF

Models:

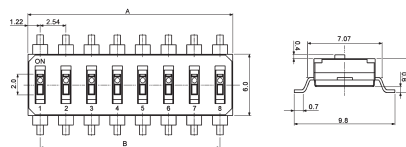
Series SBS 5000 T

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

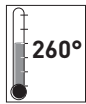


Series SBS 5100 T

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)



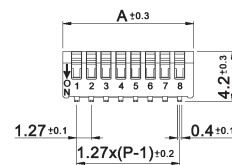
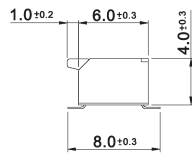
Half-pitch Dual-in-line Switches

Specifications:

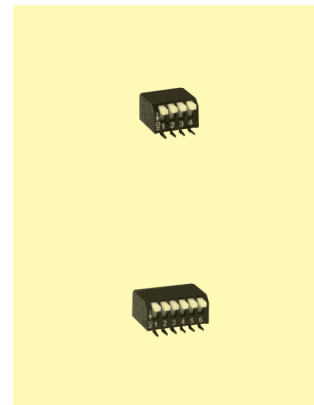
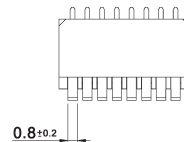
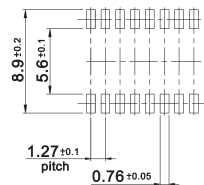
Contact rating:	24 V DC, 100 mA (non-switching), 24 V DC, 25 mA (switching)
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Mechanical life:	minimum 1000 operations per pole
Materials:	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"



Packing:

Type	Tape	Stick
DHP 602	900 pieces	146 pieces
DHP 604	900 pieces	85 pieces
DHP 606	900 pieces	60 pieces
DHP 608	900 pieces	47 pieces
DHP 610	900 pieces	39 pieces

Half-Pitch Dual-in-line Switches for SMT



Specifications:

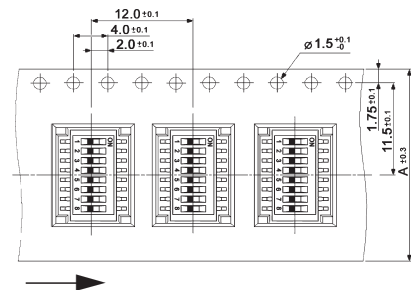
Contact rating:	24 V DC, 25 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	100 MΩ at 500 V DC
Dielectric strength:	300 V AC for of 1 minute
Operating temperature:	-40 °C to +105 °C
Mechanical life:	2000 operations per pole
Contacts/Terminals:	copper alloy, gold-plated over nickel
Material:	case: PPS, UL 94 V-0, black slide: PA46, UL 94 V-0, white
Mounting:	on pc-board – SMD – 1.27 mm
Construction:	case sealed, slide recessed, sealed with protective tape
Slide position:	OFF

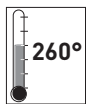
7

Models:	Poles	Length (A)			
DHS 104 N	4	6.12 mm			
DHS 106 N	6	8.66 mm			
DHS 108 N	8	11.20 mm			
DHS 110 N	10	13.74 mm			

Packing: on tapes

Models	Tape	Reel	Tape width (A)	Rapport (R)
DHS 104 N	2000 pieces	∅ 330 mm	16.0 mm	12.0 mm
DHS 106 N	2000 pieces	∅ 330 mm	16.0 mm	12.0 mm
DHS 108 N	2000 pieces	∅ 330 mm	24.0 mm	12.0 mm
DHS 110 N	2000 pieces	∅ 330 mm	24.0 mm	12.0 mm





Half-Pitch Dual-in-line Switches for SMT

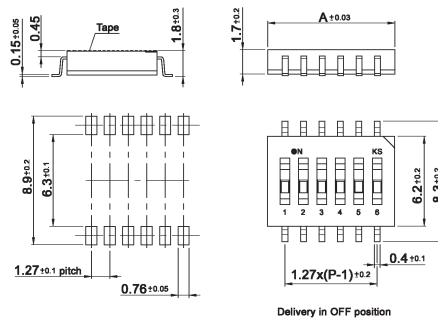
Specifications:

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

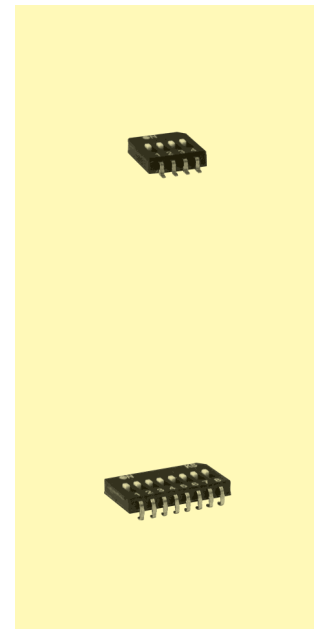
Models:

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

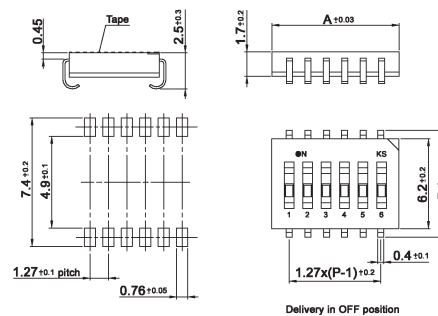


washable



Series DHS 600-J

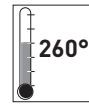
Type	Poles	Length (A)
DHS 602-J	2	3.70 mm
DHS 604-J	4	6.20 mm
DHS 606-J	6	8.75 mm
DHS 608-J	8	11.30 mm
DHS 610-J	10	13.80 mm



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

Half-Pitch Dual-in-line Switches for SMT



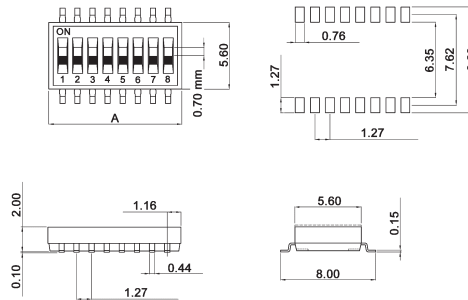
Specifications:

Contact rating:	24 V DC, 25 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	100 MΩ at 100 V DC
Dielectric strength:	300 V AC for of 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 1000 operations per pole
Contacts/Terminals:	copper alloy, gold-plated over nickel
Material:	case: thermoplastic, UL 94 V-0, black; actuator: thermoplastic, UL 94 V-0, white
Mounting:	on pc-board – SMD – 1.27 mm
Construction:	case sealed, slide recessed, sealed with protective tape
Slide position:	OFF

Models:

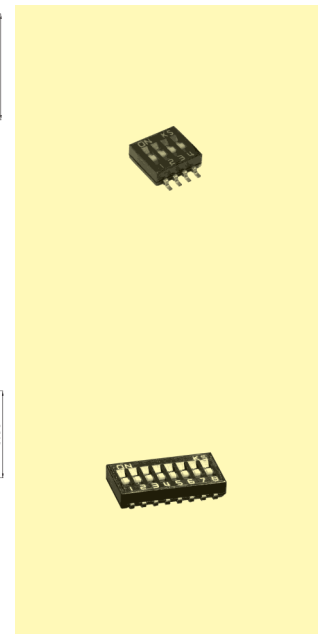
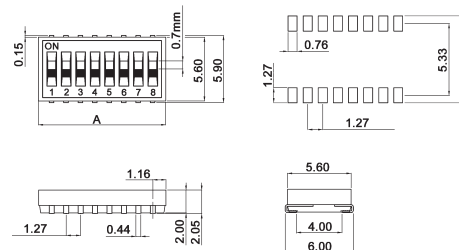
Series DHS 900

Type	Poles	Length (A)
DHS 902	2	3.58 mm
DHS 904	4	6.12 mm
DHS 906	6	8.66 mm
DHS 908	8	11.20 mm
DHS 910	10	13.74 mm
DHS 912	12	16.28 mm



Series DHS 900-J

Type	Poles	Length (A)
DHS 902-J	2	3.58 mm
DHS 904-J	4	6.12 mm
DHS 906-J	6	8.66 mm
DHS 908-J	8	11.20 mm
DHS 910-J	10	13.74 mm
DHS 912-J	12	16.28 mm



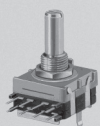
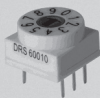
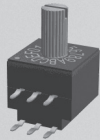
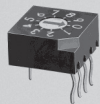
Packing: on tapes

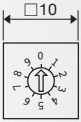
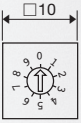
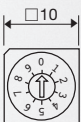
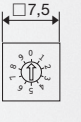
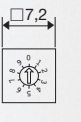
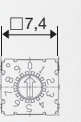

Models	Tape	Reel	Tape width (A)
DHS 902 / DHS 902-J	3000 pieces;	Ø 330 mm	16.0 mm
DHS 904 / DHS 904-J	2000 pieces;	Ø 330 mm	16.0 mm
DHS 906 / DHS 906-J	2000 pieces;	Ø 330 mm	16.0 mm
DHS 908 / DHS 908-J	2000 pieces;	Ø 330 mm	24.0 mm
DHS 910 / DHS 910-J	2000 pieces;	Ø 330 mm	24.0 mm
DHS 912 / DHS 912-J	2000 pieces;	Ø 330 mm	24.0 mm

7

8

Rotary Coded Switches



Series	Size / Foot print	Shaft		Mounting			SMT	IP 67	Page
		w	w.o.	stan- dard	right angle	front- panel			
DRS 3000/4000 DRR 3000/4000 SMR 5000		•	•	•					148 148 149
DRS 20 000/21 000 DRR 20 000/21 000 SMR 20 000		•	•	•					150 150 151
DRS/DRR/SMR 60 000/61 000		•	•	•	•		•	•	152 153
DRS 7000 DRR 7000 SMR 7000-1 SMRR 7000-1		•	•	•					154 154 155 155
DRS 13 000/14 000 SMR 13 000/14 000		•	•	•					156 157
DRS 15 000/16 000 SMR 15 000/16 000		•	•	•				•	158 159
DRS 20		•		•					160

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

Subminiature Rotary Coded Switches

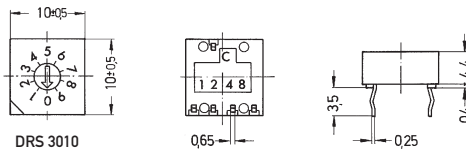


Specifications:

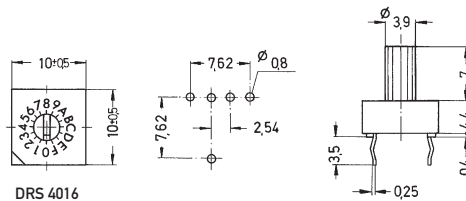
Contact rating:	50 V DC, 100 mA, non switching 15 V DC, 30 mA, switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 20 000 operations
Contacts:	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

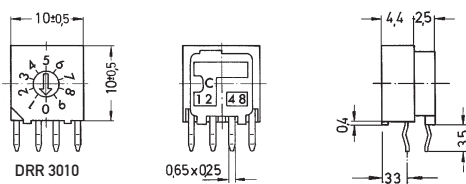
Models:	Code
DRS 3010	BCD
DRS 3110	BCD Inverse
DRS 3016	Hexadecimal
DRS 3116	Hexadecimal Inverse



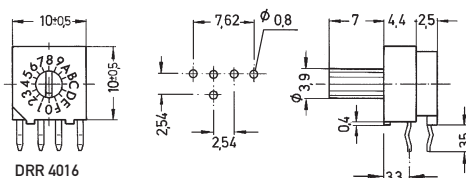
DRS 4010	BCD
DRS 4110	BCD Inverse
DRS 4016	Hexadecimal
DRS 4116	Hexadecimal Inverse



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



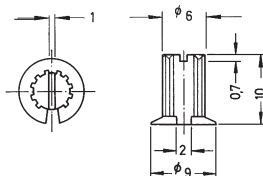
DRR 4010	BCD
DRR 4110	BCD Inverse
DRR 4016	Hexadecimal
DRR 4116	Hexadecimal Inverse



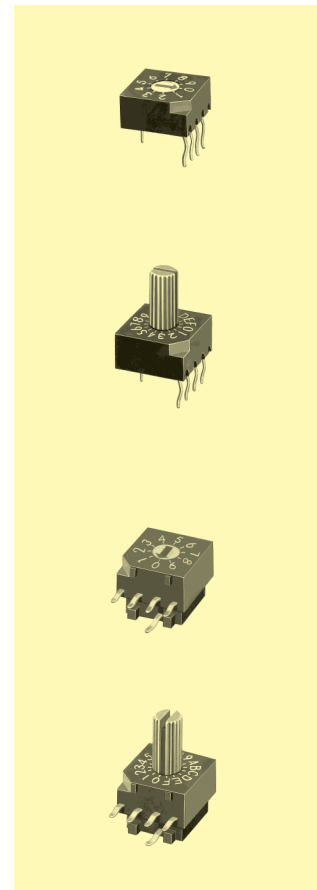
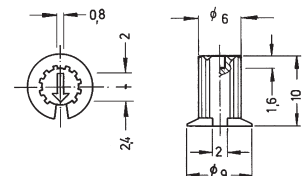
Accessories:

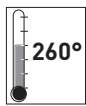
Caps

yellow	KR 108
red	KR 109



grey KR 207





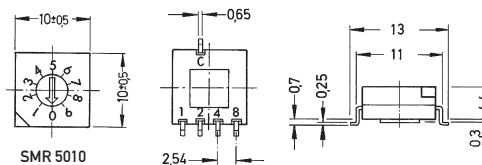
Subminiature Rotary Coded Switches for SMT

Specifications:

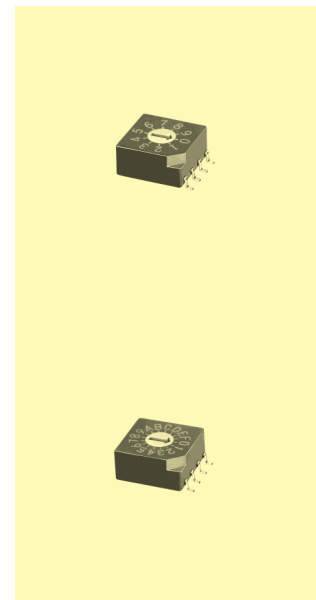
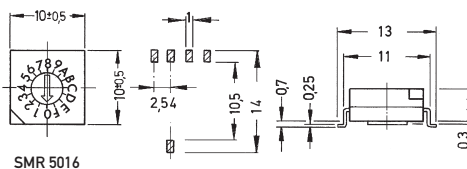
Contact rating:	50 V DC, 100 mA, non switching 15 V DC, 30 mA, switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ at 250 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 20 000 operations
Contacts:	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

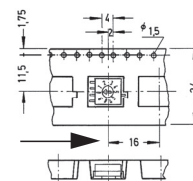


SMR 5016	Hexadecimal
SMR 5116	Hexadecimal Inverse



Packing: sticks or tapes
for order on tape: additional to type number: T
example of order: SMR 5010 T

Stick	Tape	Reel
48 pieces	500 pieces	∅ 330 mm



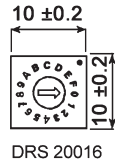
Subminiature Rotary Coded Switches



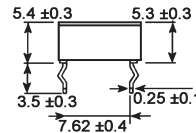
Specifications:

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

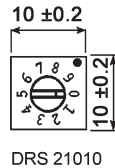
Models:	Code
DRS 20010	BCD
DRS 20110	BCD Inverse
DRS 20016	Hexadecimal
DRS 20116	Hexadecimal Inverse



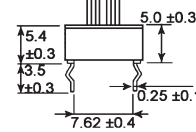
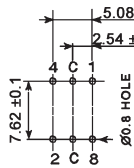
DRS 20016



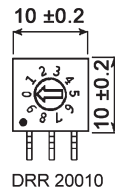
DRS 21010	BCD
DRS 21110	BCD Inverse
DRS 21016	Hexadecimal
DRS 21116	Hexadecimal Inverse



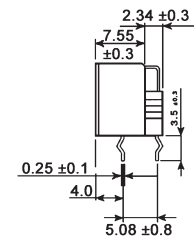
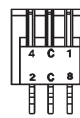
DRS 21010



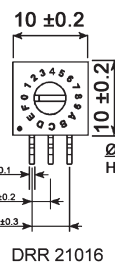
DRR 20010	BCD
DRR 20110	BCD Inverse
DRR 20016	Hexadecimal
DRR 20116	Hexadecimal Inverse



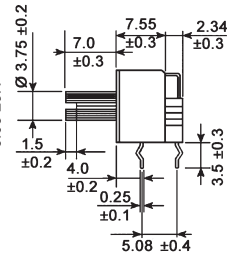
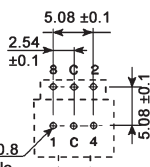
DRR 20010



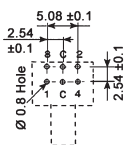
DRR 21010	BCD
DRR 21110	BCD Inverse
DRR 21016	Hexadecimal
DRR 21116	Hexadecimal Inverse



DRR 21016

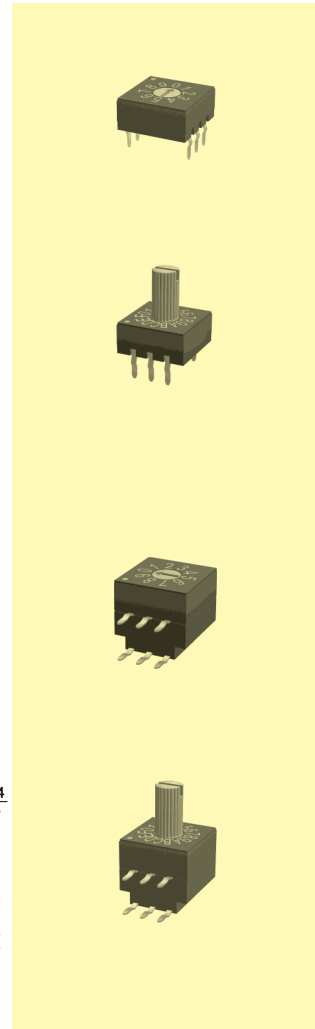


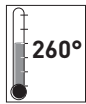
Special version:



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

washable





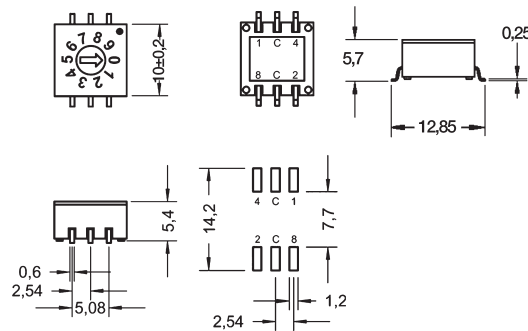
Subminiature Rotary Coded Switches for SMT

Specifications:

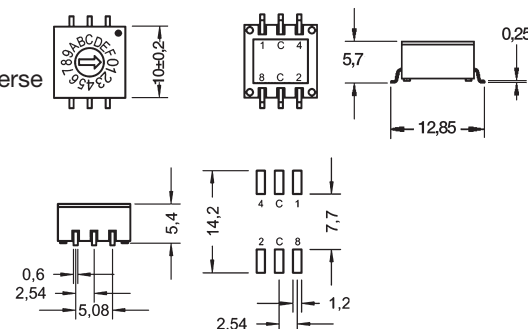
Contact rating:	24 V DC, 25 mA switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +70 °C
Mechanical life:	minimum 2000 operations
Terminals:	phosphor bronze, gold-plated over nickel barrier
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

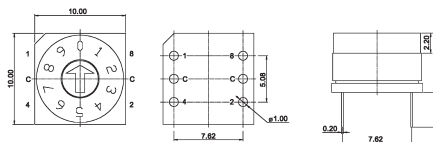


Specifications:

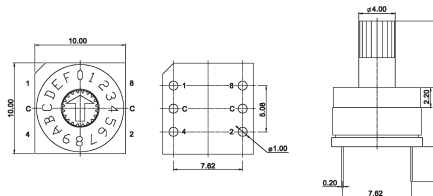
Contact rating:	switching: 150 mA, 42 V non-switching: 200 mA, 42 V
Contact resistance:	< 80 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Storage temperature:	-40 °C to +85 °C
Mechanical life:	minimum 10 000 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

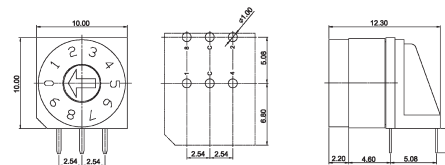
DRS 60010	BCD
DRS 60110	BCD Inverse
DRS 60016	Hexadecimal
DRS 60116	Hexadecimal Inverse



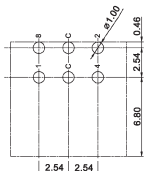
DRS 61010	BCD
DRS 61110	BCD Inverse
DRS 61016	Hexadecimal
DRS 61116	Hexadecimal Inverse



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



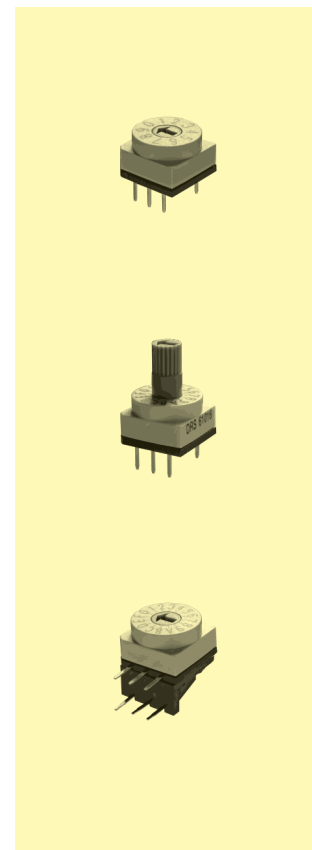
Special version:

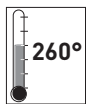


Spacing 2.54 mm

Additional to type number: -1

Example for order: DRR 60010-1





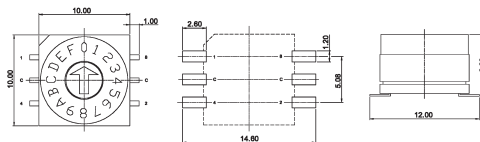
Subminiature Rotary Coded Switches for SMT, waterproof

Specifications:

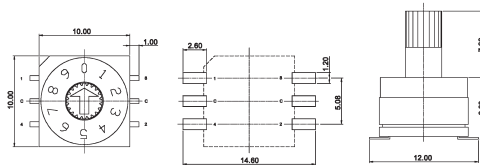
Contact rating:	switching: 150 mA, 42 V non-switching: 200 mA, 42 V
Contact resistance:	<80 mΩ
Insulation resistance:	>100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-60 °C to +125 °C
Storage temperature:	-60 °C to +125 °C
Mechanical life:	minimum 10 000 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

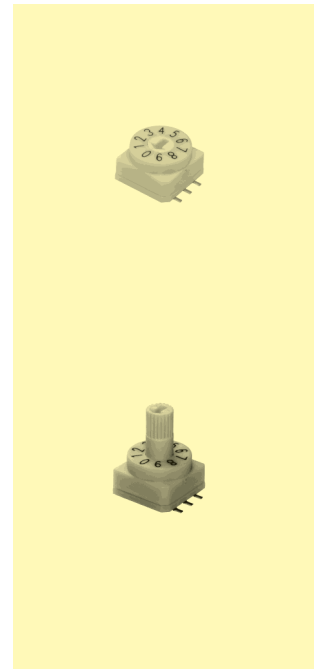
SMR 60010	BCD
SMR 60110	BCD Inverse
SMR 60016	Hexadecimal
SMR 60116	Hexadecimal Inverse



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



washable



Microminiature Rotary Coded Switches



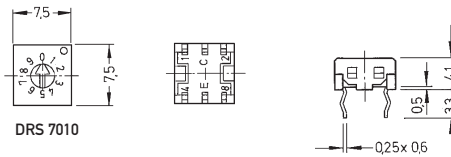
Specifications:

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

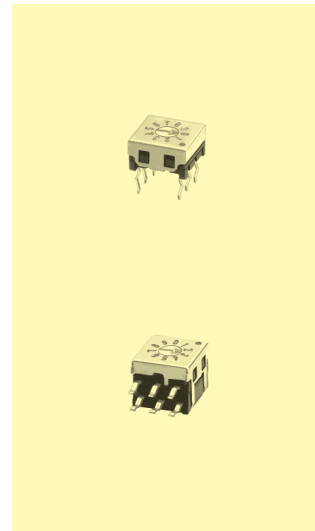
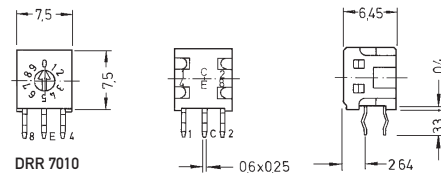
washable

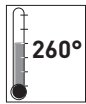
Models: Code

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



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





Microminiature Rotary Coded Switches for SMT

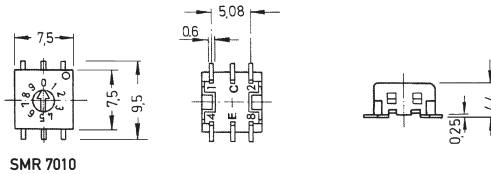
Specifications:

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

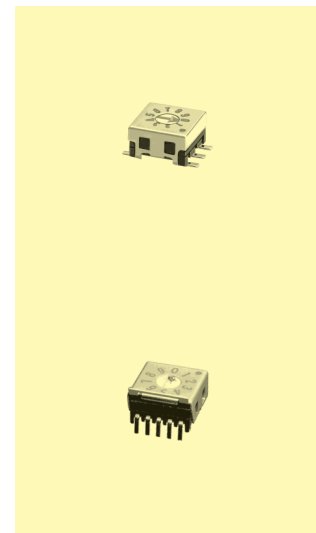
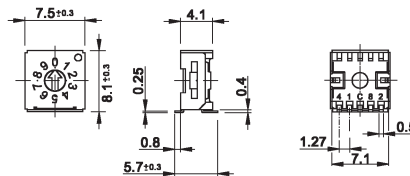
washable

Models: Code

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

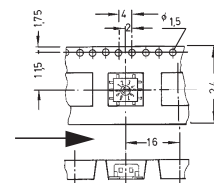


SMRR 7010-1	BCD
SMRR 7110-1	BCD Inverse
SMRR 7016-1	Hexadecimal
SMRR 7116-1	Hexadecimal Inverse



Packing: sticks or tapes
for order on tape: additional to type number: T
example of order: SMR 7010-1 T

Models	Stick	Tape	Reel
SMR	50 pieces; L 450 mm	1000 pieces	∅ 330 mm
SMRR	50 pieces; L 435 mm	500 pieces	∅ 330 mm



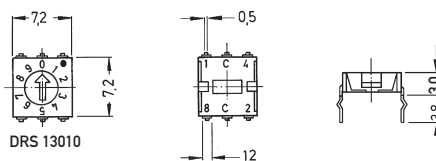
Microminiature Rotary Coded Switches

Specifications:

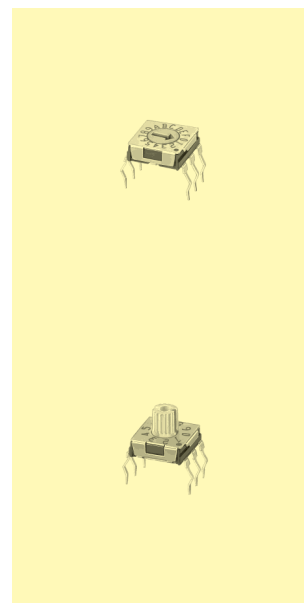
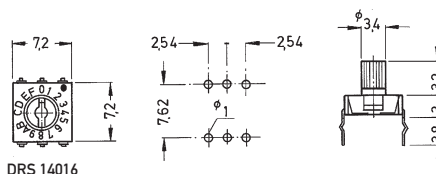
Contact rating:	50 V DC, 100 mA, non-switching 5 V DC, 100 mA, switching
Contact resistance:	< 200 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +75 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold-plated
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

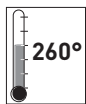
washable

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





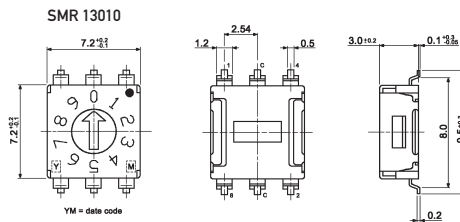
Microminiature Rotary Coded Switches for SMT

Specifications:

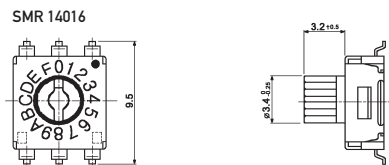
Contact rating:	50 V DC, 100 mA, non-switching 5 V DC, 100 mA, switching
Contact resistance:	< 200 mΩ
Insulation resistance:	> 1000 MΩ at 100 V DC
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 20 000 operations
Contacts:	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

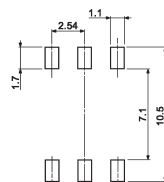
SMR 13010	BCD
SMR 13110	BCD Inverse
SMR 13016	Hexadecimal
SMR 13116	Hexadecimal Inverse



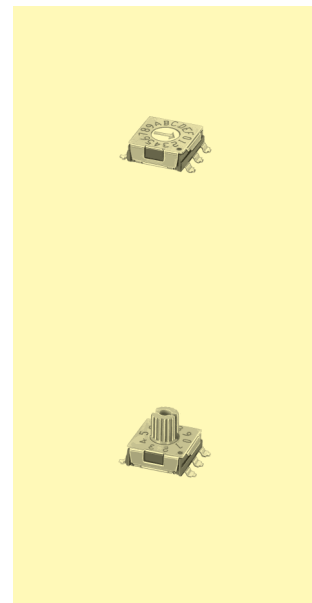
SMR 14010	BCD
SMR 14110	BCD Inverse
SMR 14016	Hexadecimal
SMR 14116	Hexadecimal Inverse



SURFACE MOUNT PAD LAYOUT



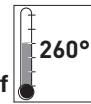
washable



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	∅ 330 mm
SMR 14 000	65 pieces; L 510 mm	500 pieces	∅ 330 mm

Microminiature Rotary Coded Switches waterproof



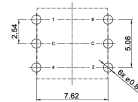
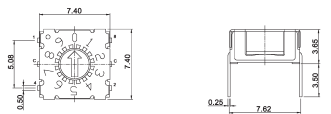
Specifications:

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

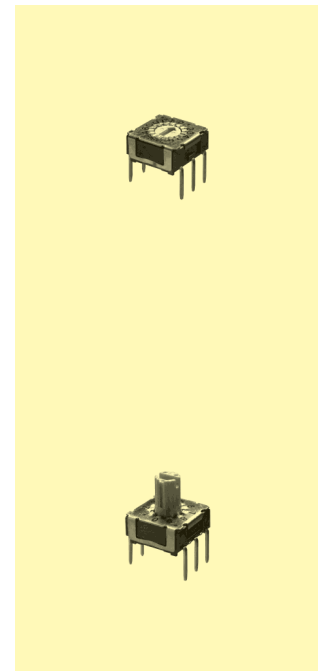
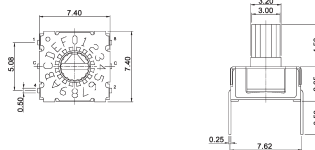
washable

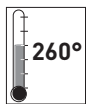
Models: Code

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





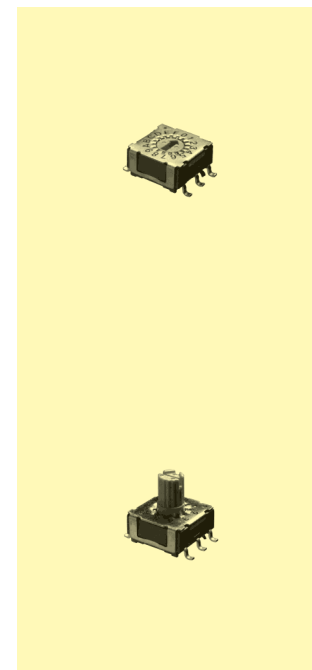
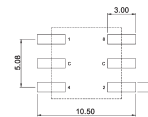
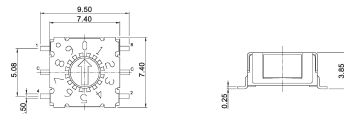
Microminiature Rotary Coded Switches for SMT

Specifications:

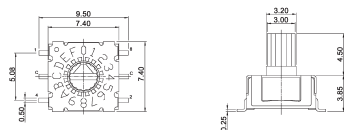
Contact rating:	42 V DC, 400 mA non-switching 42 V DC, 100 mA switching
Contact resistance:	< 80 mΩ
Insulation resistance:	> 100 MΩ at 250 V DC for 1 minute ± 5 sec.
Dielectric strength:	250 V (50/60 Hz) for 1 minute
Operating temperature:	-50 °C to +125 °C
Storage temperature:	-55 °C to +135 °C
Mechanical 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

washable

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



Packing:

SMR 15	<input type="checkbox"/>	<input type="checkbox"/>	70 pieces/stick
SMR 16	<input type="checkbox"/>	<input type="checkbox"/>	70 pieces/stick

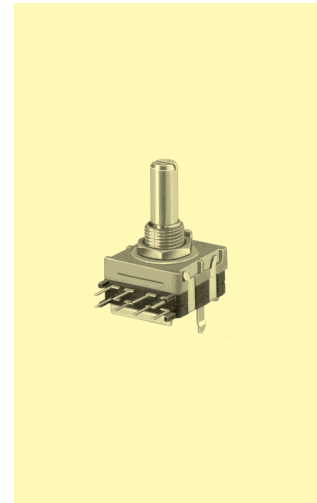
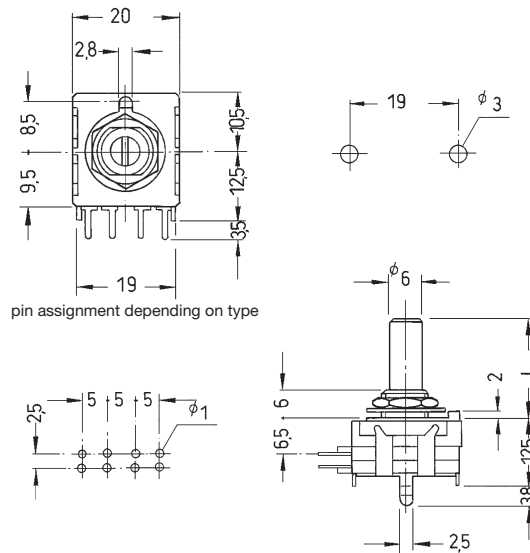
8

Miniature Rotary Coded Switches

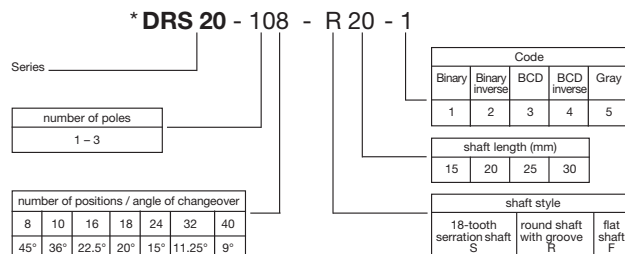
Specifications:

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:



* 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	X	X
2			X	X	X	X	X	X	X	X
1		X	X	X	X	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	X	X	X	X
2			X	X	X	X	X	X	X	X	X	X	X	X	X	X
1		X	X	X	X	X	X	X	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	X

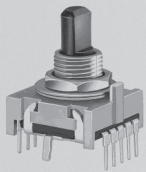
Hexadecimal Inverse

	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	X	X		
$\bar{1}$	X		X		X		X		X	X	X	X	X	X	X	

9

Rotary Switches / Key Switches

9.1 Rotary Switches



Type	Operating positions	Poles	Special feature	Page
MRS 18	2 – 8	1 – 2		164
MRS 10 H	2 – 6	1 – 6	Operating at the side	165
MRS 12	9	1	11.4 x 13 mm	166
SMR 1-30	2	1	washable, 5 x 5 mm	167

9.2 Key Switches



MRK

top- and side actuated

168–173

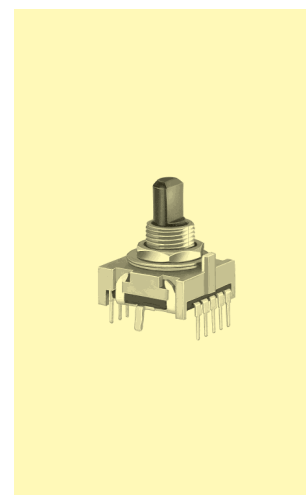
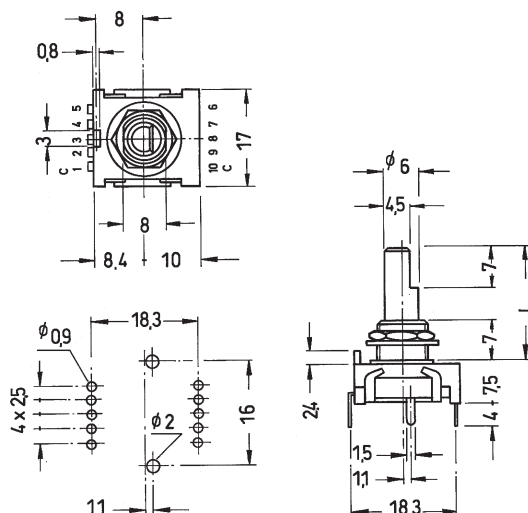
Miniature Rotary Switches

Specifications:

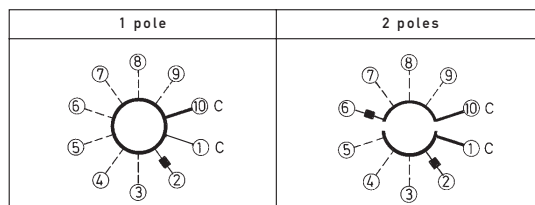
Contact rating:	16 V DC, 300 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +80 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold
Material:	case: PBT with glass fibre 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**

Series	MRS 18 V		shaft material		
number of poles	1 - 2		1	metal 2	
number of positions	2 - 8		shaft length (mm)		
			15	20	25
			shaft style		
			18-tooth serration shaft S	flat shaft F	

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



Miniature Rotary Switches

Specifications:

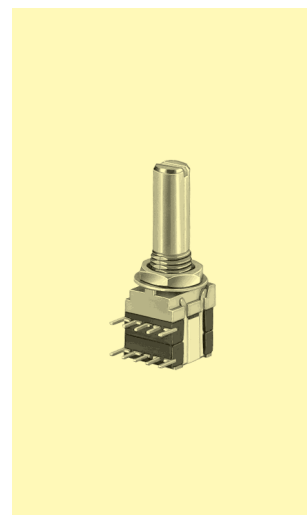
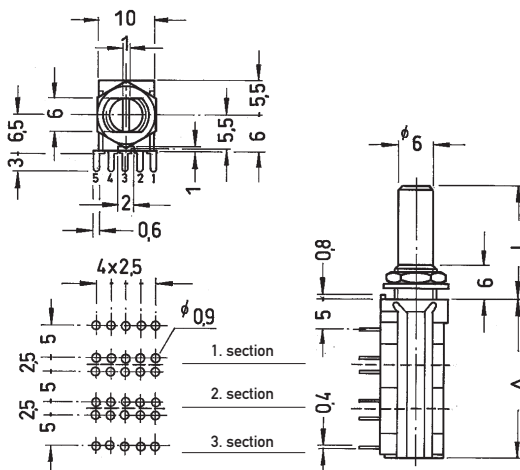
Contact rating:	16 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +80 °C
Mechanical life:	minimum 10 000 operations
Contacts:	gold-plated
Material:	case: PBT with glass 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:

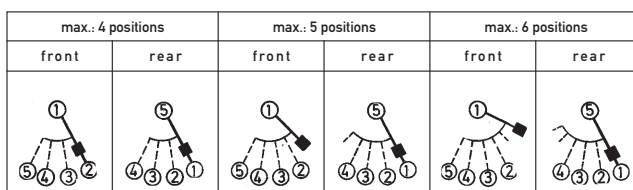
MRS 10 H

Measure A:

- 1 section 12.0 mm
- 2 sections 19.5 mm
- 3 sections 27.0 mm

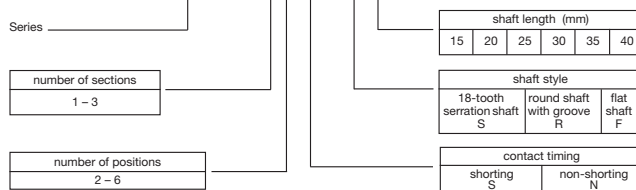


Circuit diagram:



Ordering code:

* **MRS 10 H - 15 N - R 20**



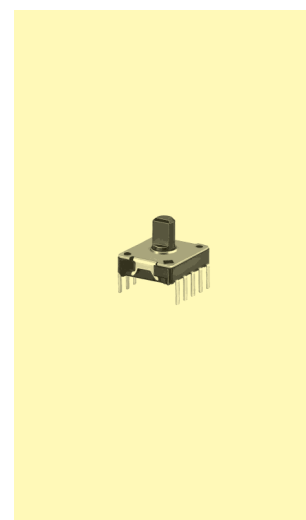
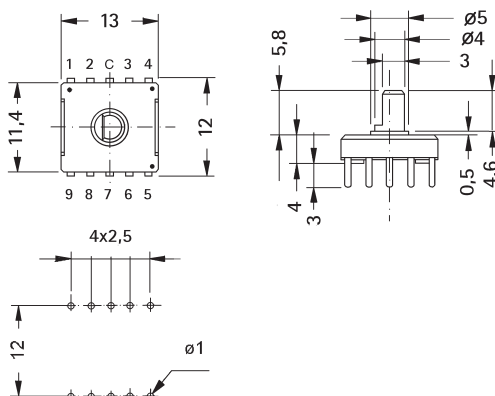
* Non-stock item; minimum quantity and delivery time on request.

Miniature Rotary Switches

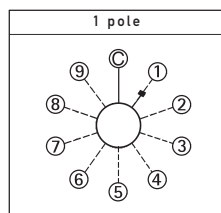
Specifications:

Contact rating:	16 V DC, 100 mA
Contact resistance:	< 50 mΩ
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	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

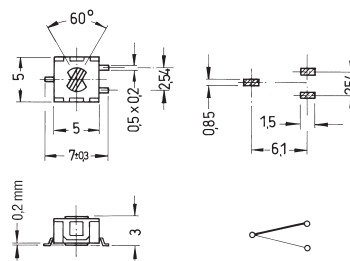
Specifications:

Contact rating:	12 V DC, 50 mA switching 60 V DC, 100 mA non-switching
Contact resistance:	< 100 mΩ
Insulation resistance:	> 500 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: LCP, washable frame: stainless steel
Mounting:	on pc-board – SMD
Soldering conditions:	reflow-soldering – max.: 10 sec ±1 sec, 260 °C ± 10 °C

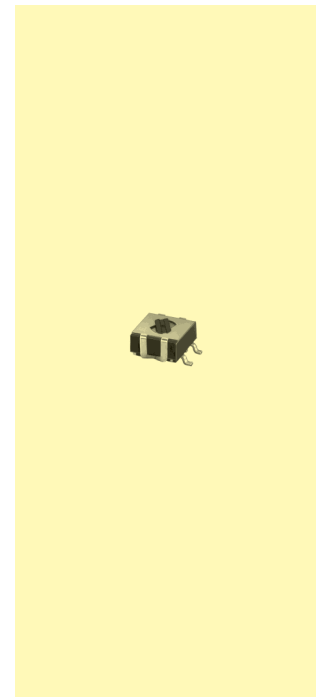
Models: Switching functions

SMR 1-30

on - on

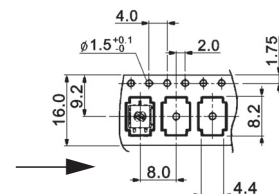


washable



Packing:

on tapes: 2000 pieces; reel Ø 330 mm

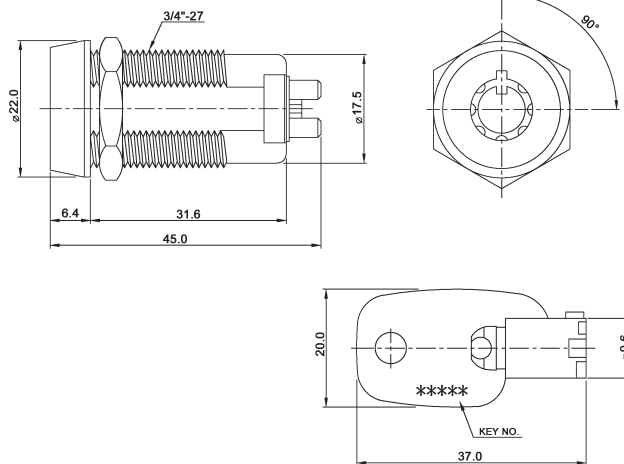


Key Switches

Specifications:

Contact rating:	250 V AC, 2 A; 125 V AC, 4 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 500 MΩ
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 10 000 steps
Material:	Case: zinc alloy, chromium-plated Contacts and Terminals: silver-plated Key: steel, nickel-plated
Angle between 2 positions:	90°
Mounting:	single-hole mounting, 19 mm diameter

Models:	Switching functions	Key removable in pos
MRK 202-1	off – on	I
MRK 202-2	off – on	I, II
MRK 202-A	off – mom	I
MRK 202-DA	on – mom	I



Switches are always supplied with 2 keys.

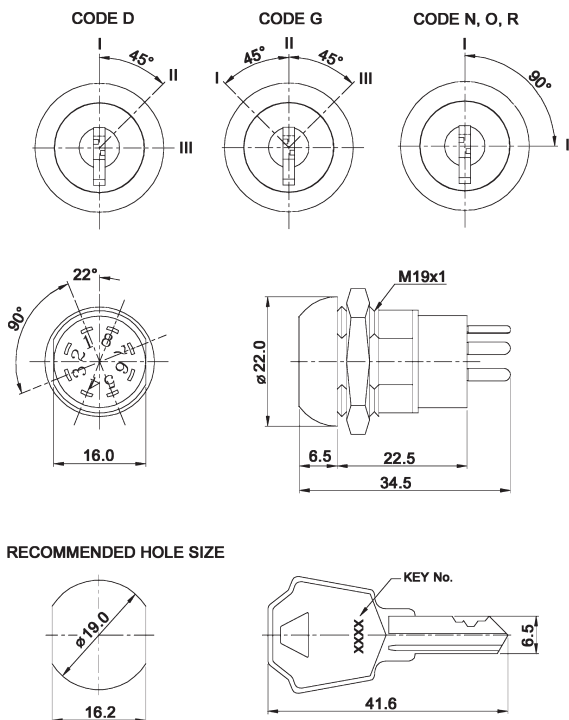


Key Switches

Specifications:

Contact rating:	250 V AC, 2 A; 125 V AC, 4 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 500 MΩ
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 10 000 steps
Material:	Case: zinc alloy, chromium-plated Contacts and Terminals: gold-plated Key: steel, nickel-plated
Mounting:	single-hole mounting, 19 mm diameter

Models:	Switching functions	Key removable in pos
MRK 216 D	double pole, on – on – on	III
MRK 216 G	single-pole, on – on – on	II
MRK 216 N	single pole, on – on	I
MRK 216 O	double pole, on – on	I
MRK 216 R	single pole, on – on	I, II
MRK 216	MRK 216 N with wires/connector	I



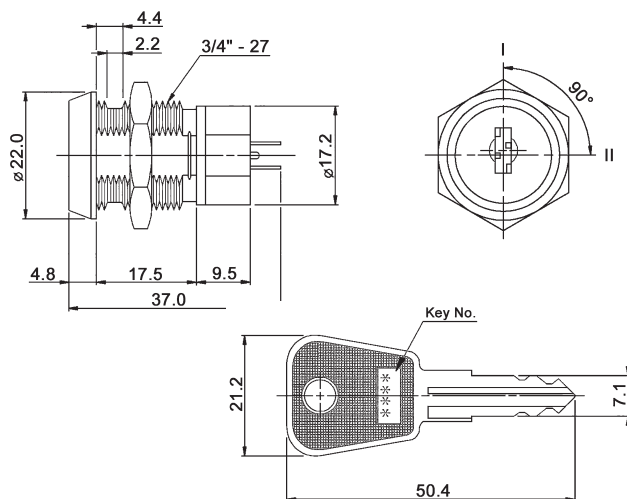
Switches are always supplied with 2 keys.

Key Switches

Specifications:

Contact rating:	250 V AC, 2 A; 125 V AC, 4 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 500 MΩ
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 10 000 steps
Material:	Case: zinc alloy, chromium-plated Contacts and Terminals: silver-plated Key: brass, nickel-plated
Angle between 2 positions:	90°
Mounting:	single-hole mounting, 3/4"-27 UNS

Models:	Switching functions	Key removable in pos
MRK 286-A1	off – on	I
MRK 286-A2	off – on	I, II
MRK 286-B1	on – on	I
MRK 286-B2	on – on	I, II



Switches are always supplied with 2 keys.



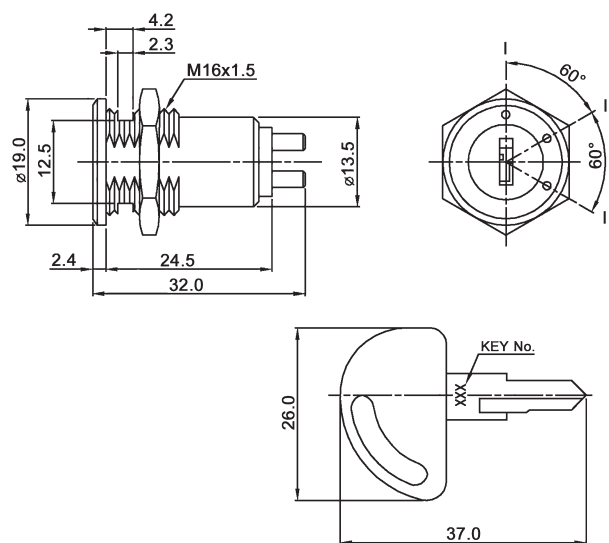
Key Switches

Specifications:

Contact rating:	125 V AC, 0.2 A
Contact resistance:	< 10 mΩ
Insulation resistance:	> 200 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 10 000 steps
Material:	Case: zinc alloy, chromium-plated Contacts and Terminals: silver-plated Key: brass, nickel-plated, POM-cover
Angle between 2 positions:	60°
Mounting:	single-hole mounting, thread M16x1 with flat

Models: Switching functions

MRK 331	on – on
MRK 332	off – on
MRK 333	off – on – on



Key removable in all positions.

Switches are always supplied with 2 keys.

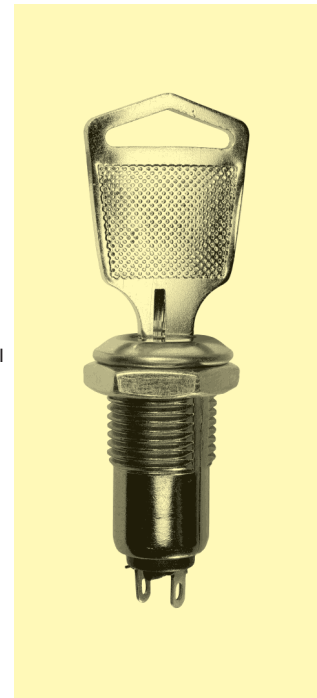
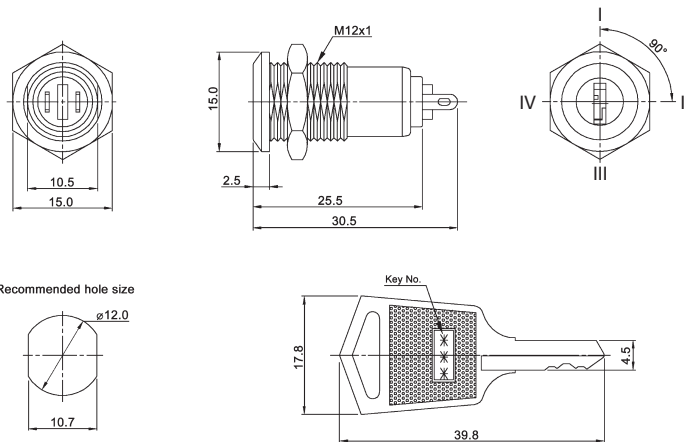
Key Switches



Specifications:

Contact rating:	125 V AC, 200 mA
Contact resistance:	< 10 mΩ
Insulation resistance:	> 200 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 6 000 steps
Material:	Case: zinc alloy, chromium-plated Contacts and Terminals: silver-plated Key: brass, nickel-plated
Angle between 2 positions:	90°
Mounting:	single-hole mounting, 12 mm diameter

Models:	Switching functions	Key removable in pos
MRK 1091 B-1	off – on	I
MRK 1091 B-2	off – on	I, II
MRK 1343 B-1	on – on – on	I, II, III
MRK 1344	on – on – on – on	I, II, III, IV



Switches are always supplied with 2 keys.



Key Switches

Specifications:

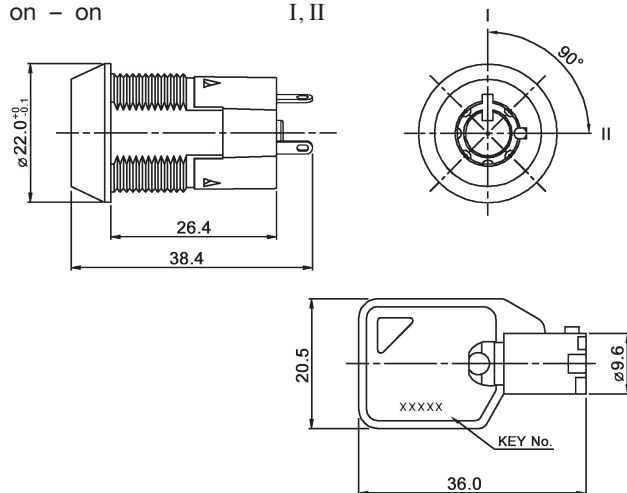
Contact rating:	250 V AC, 2 A; 125 V AC, 4 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 500 MΩ
Dielectric strength:	1500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	minimum 10 000 steps
Material:	Case: zinc alloy, chromium-plated Contacts and Terminals: gold-plated Key: steel, nickel-plated
Angle between 2 positions:	90°
Mounting:	single-hole mounting, 19 mm diameter

Models: Switching functions Key removable in pos

MRK 2021 R

on – on

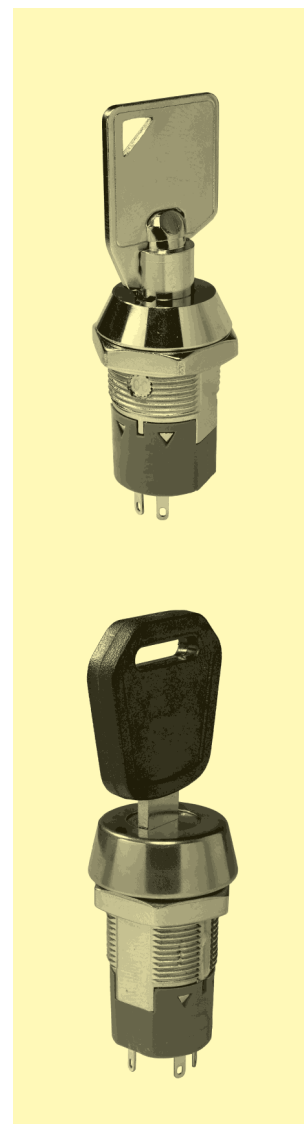
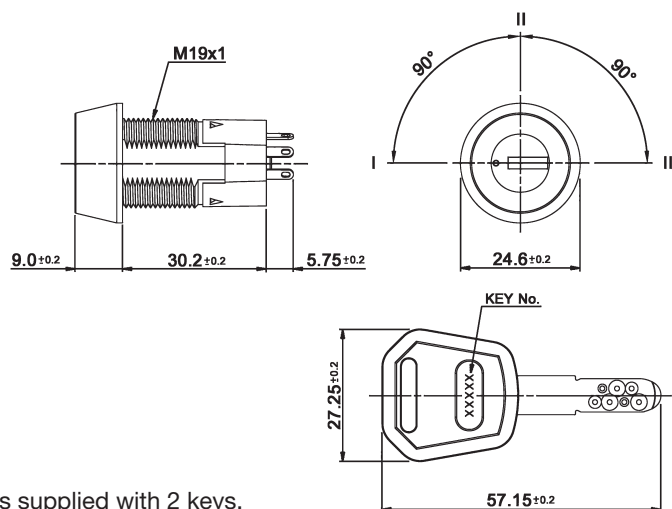
I, II



MRK 2930 N

off – on – on

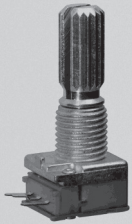
I



Switches are always supplied with 2 keys.

10 Encoder

10.1 Standard Encoder



MERPS 6	176
MER 9 / MERP 9	177 – 178
MER 11 / MERS 11 / MERP 11 / MERL 11 / MERPS 11	179 – 183
MER 16	184

10.2 Illuminated Encoder



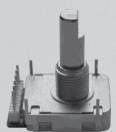
MER 12 / MERP 12	185 – 187
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10.3 Hollow Shaft Encoder



MERS 5 / 7 / 10	188
MER 10-12 R7	188
MER 23	189
MER 1045-24	190

10.4 Optical Encoder



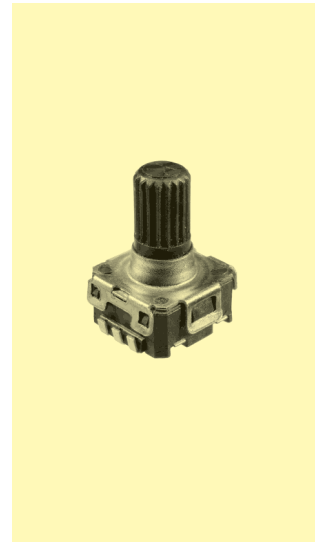
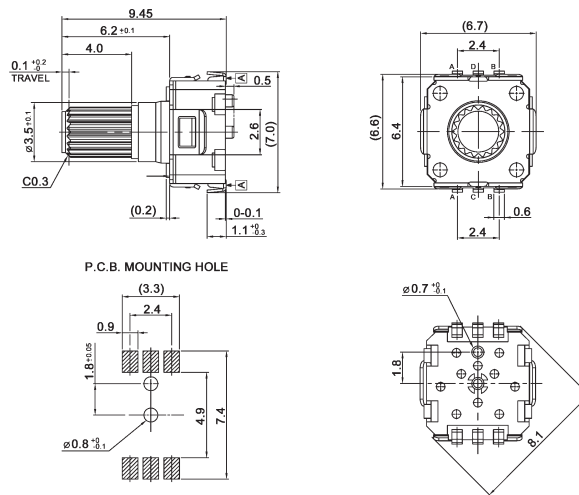
MEOP 14	191
MEOP 19	192

Specifications:

Contact rating:	5 V DC, 10 mA
Coactance resistance:	< 100mΩ
Insulation resistance:	> 50 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40°C to +85°C
Detent torque:	2.5 Ncm
Pulses/Detents per turn:	6/12
Mechanical life (cycle funtion):	minimum 50 000 turns
Pushbutton function:	Actuation Force 4 N, travel 0.1 mm, mechanical life > 50 000 operations
Contacts and terminals:	silver-plated
Mounting:	on pc-board – SMD
Soldering conditions:	reflow soldering, max. 10 s, max. 260 °C

Model:

MERPS 6-6210T



Packing: on tapes (400 pieces, Ø 330 mm)



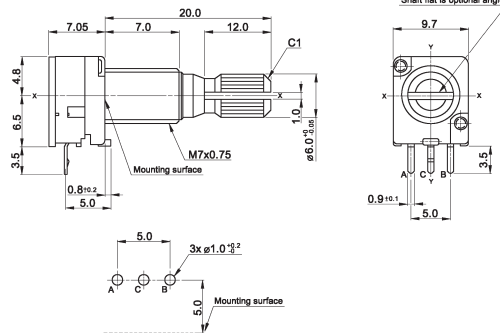
Encoder

Specifications:

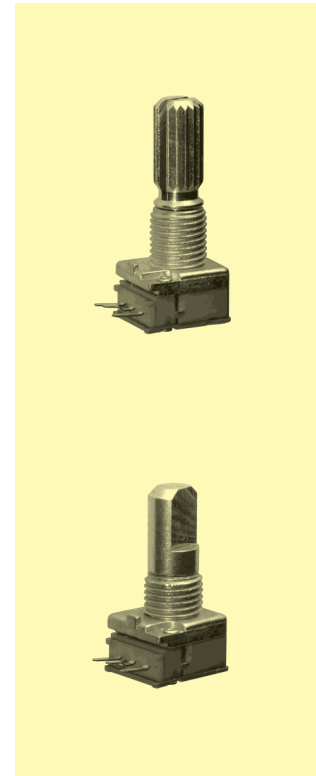
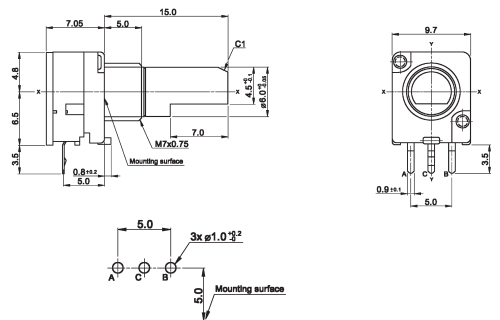
Contact rating:	5 V DC, 1 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Rotational/Detent torque:	0.5/1.0 Ncm
Pulses/Detents per turn:	15/30
Mechanical life:	> 15 000 cycles
Pushbutton (optional):	actuation force 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

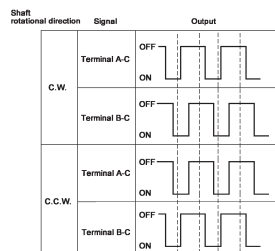


MER9-15115AM7R



10

Output signal format:

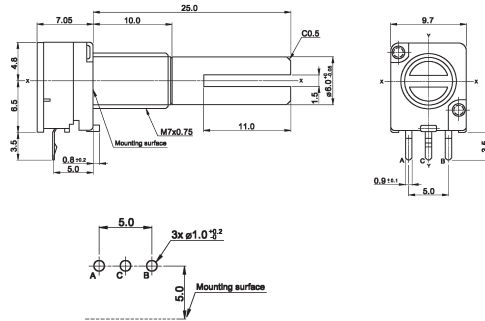


Encoder

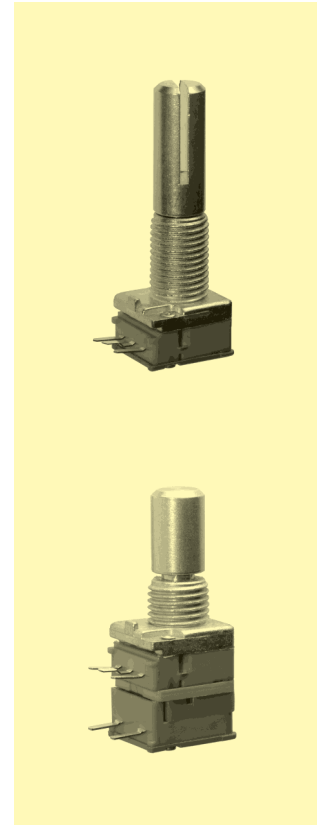
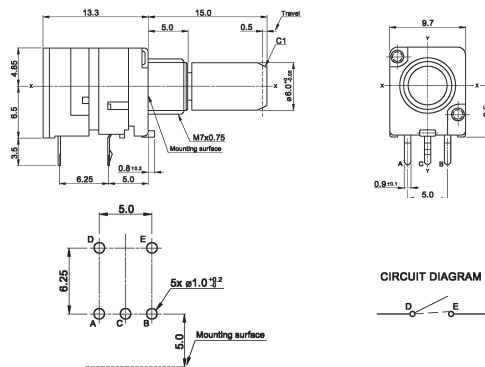


Models:

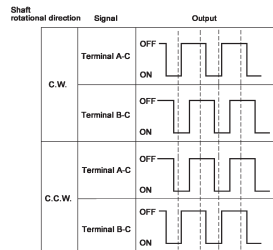
MER9-15325CM7R



MERP9-15415AM7R



Output signal format:



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:
 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

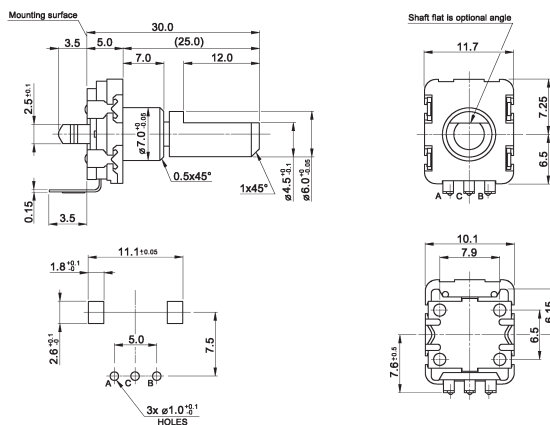


Specifications:

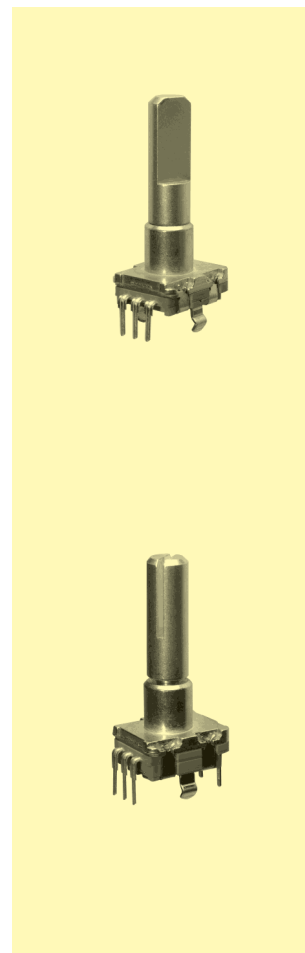
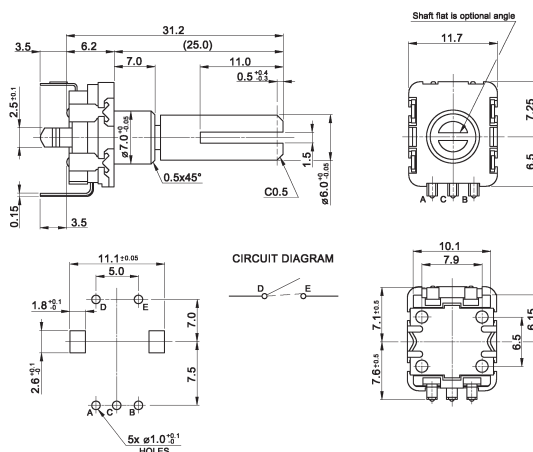
Contact rating:	5 V DC, 10 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +85°C
Rotational/Detent torque:	0.5/1.2 Ncm
Mechanical life:	> 15 000 cycles
Pushbutton (optional):	actuation force 6 N, travel 0.5 mm, life >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

Models:

MER11-15125B



MERP11-15325B

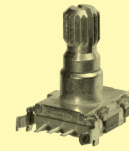
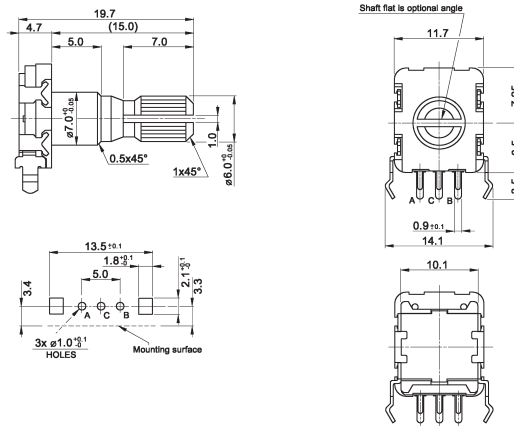


Encoder

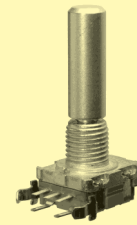
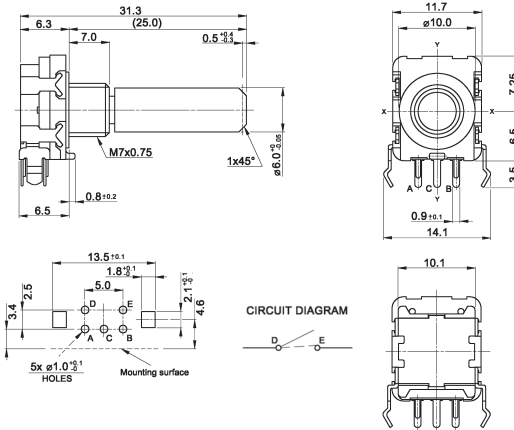


Models:

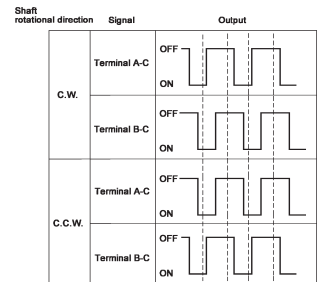
MER11-15215A-R



MERP11-20425BM7-R



Output signal format:



Ordering code 11 mm Encoder:

MER - -

Pushbutton:
 without
 with "P"

Number of pulses:
 08 8 pulses, 16 detents
 08N 8 pulses, no detents
 15 15 pulses, 30 detents
 15N 15 pulses, no detents
 16 16 pulses, 16 detents
 16N 16 pulses, no detents
 20 20 pulses, 20 detents
 20N 20 pulses, no detents

Shaft type:
 1 flat
 2 knurled
 3 cut
 4 round

Shaft length:
 15 15 mm
 17.5 17.5 mm
 20 20 mm
 25 25 mm

Bushing height:
 A 5 mm
 B 7 mm

Thread:
 M7 M7
 no thread

Shaft orientation:
 horizontal
 vertical

Travel (only for "P"):
 0.5 mm
 1.5 mm



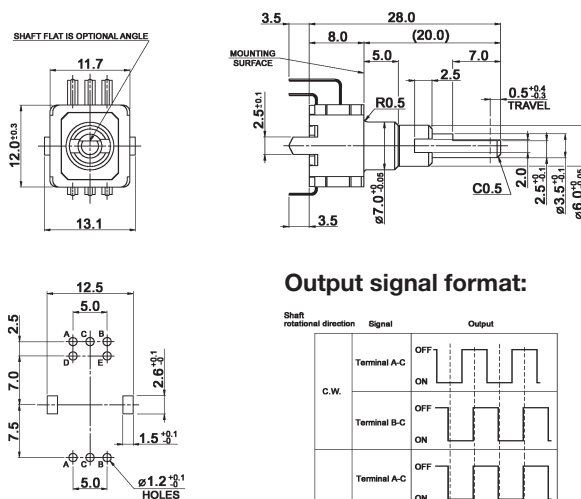
Encoder

Specifications:

Contact rating:	5 V DC, 10 mA
Cocontact resistance:	< 100mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40°C to +85°C
Detent torque:	1 Ncm
Pulses/Detents per turn:	15/30, version "N": no detent
Mechanical life (cycle funtion):	minimum 15 000 turns
Pushbutton function:	Actuation Force 3.5 N, travel 0.5 mm, mechanical life > 20 000 operations
Contacts and terminals:	silver-plated
Mounting:	on pc-board with pin-contact
Soldering conditions:	wave soldering, max. 5 s, max. 260 °C

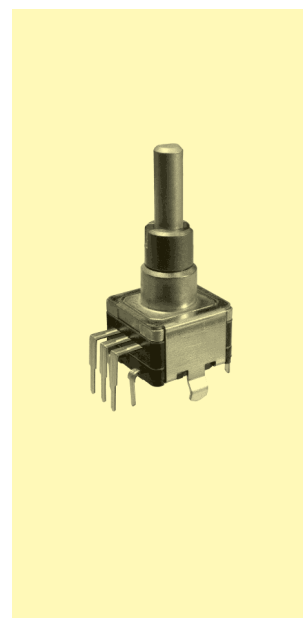
Model:

MERP11-15520A



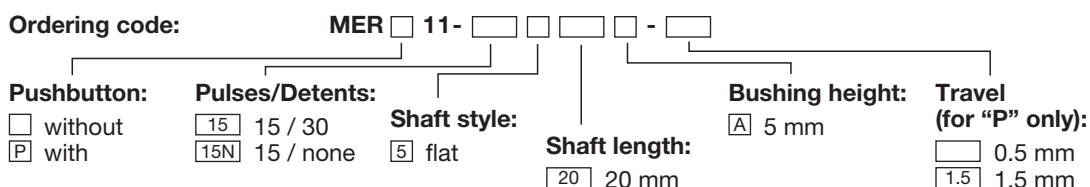
Output signal format:

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



10

Ordering code:



Encoder

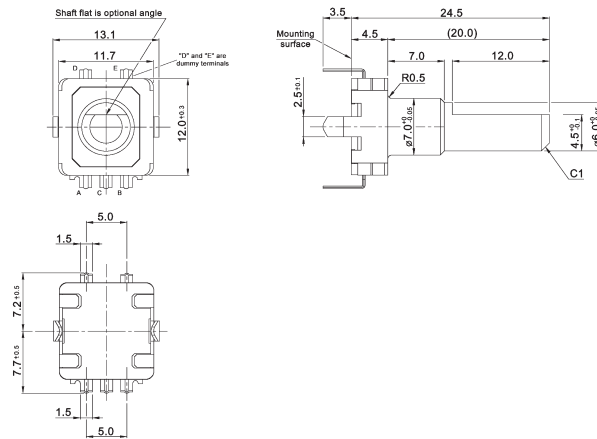


Specifications:

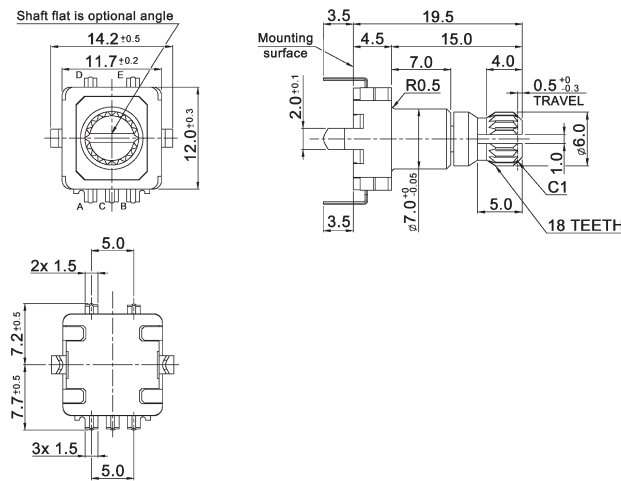
Contact rating:	5 V DC, 10 mA
Coactance resistance:	< 100mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40°C to +85°C
Detent torque:	1 Ncm
Pulses/Detents per turn:	15/30, version "N": no detent
Mechanical life (cycle funtion):	minimum 15 000 turns
Pushbutton function:	Actuation Force 3.5 N, travel 0.5 mm, mechanical life > 20 000 operations
Contacts and terminals:	silver-plated
Mounting:	on pc-board with pin-contact
Soldering conditions:	wave soldering, max. 5 s, max. 260 °C

Models:

MERL11-15120B



MERLP11-15215

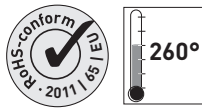


10

Ordering code:

MERL 11 - -

Pushbutton:	Pulses/Detents:	Shaft style:	Shaft length:	Bushing height:	Travel (for "P" only):
<input type="checkbox"/> without	<input type="checkbox"/> 15 15 / 30	<input type="checkbox"/> 1 flat	<input type="checkbox"/> 95 9.5 mm	<input type="checkbox"/> A 5 mm	<input type="checkbox"/> 0.5 mm
<input type="checkbox"/> P with	<input type="checkbox"/> 15N 15 / none	<input type="checkbox"/> 2 knurled	<input type="checkbox"/> 15 15 mm	<input type="checkbox"/> B 7 mm	<input type="checkbox"/> 1.5 1.5 mm
			<input type="checkbox"/> 20 20 mm	<input type="checkbox"/> 7 mm (for some types)	
			<input type="checkbox"/> 25 25 mm		



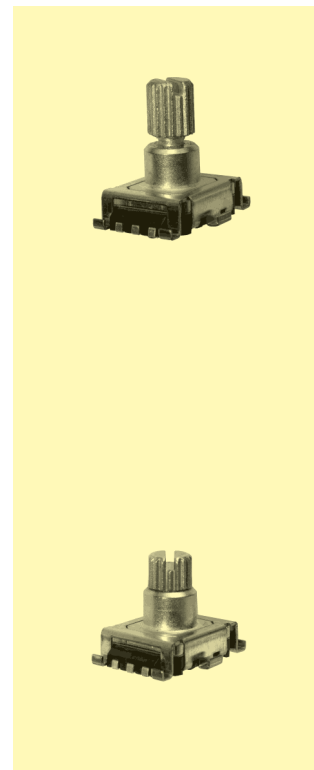
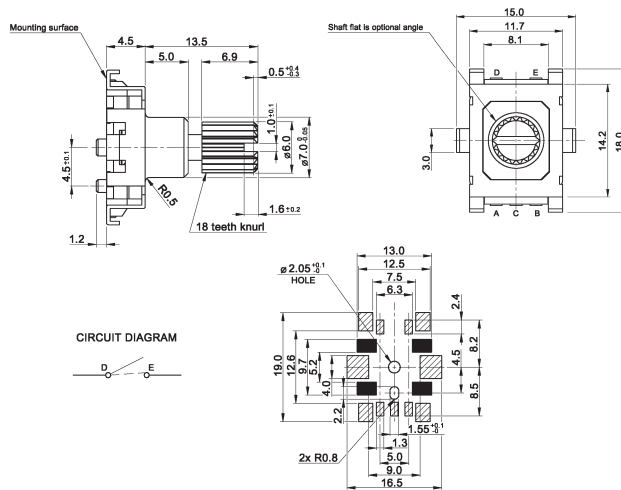
Encoder for SMD

Specifications:

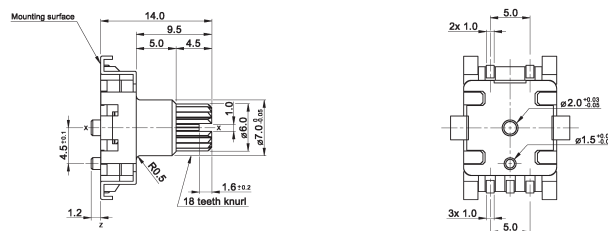
Contact rating:	5 V DC, 10 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Rotational/Detent torque:	0.5/1.0 Ncm
Pulses/Detents per turn:	15/30
Mechanical life:	> 15 000 cycles
Pushbutton (optional):	actuation force 4 N, travel 0.5 mm, life > 25 000 operations
Contacts:	silver-plated
Terminals:	silver-plated
Mounting:	on pc-board – SMD

Models:

MERPS11-15213



MERS11-15295



Ordering code 11 mm Encoder:

MER S 11 -

Pushbutton:

- without
- with

Pulses/Detents:

- 15 15 / 30
- 15N 15 / none

Shaft style:

- 1 flat
- 2 knurled
- 2 knurled – no slot

Shaft length:

- 9.5 9.5 mm
- 13 13.0 mm
- 15 15.0 mm
- 20 20.0 mm

Travel (for "P"):

- 0.5 mm
- 1.5 1.5 mm

Packing:

- bulk
- T tape & reel

Encoder

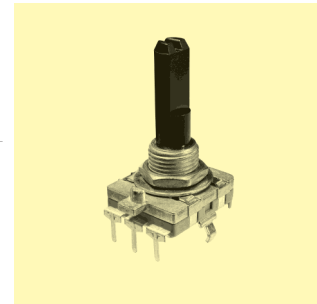
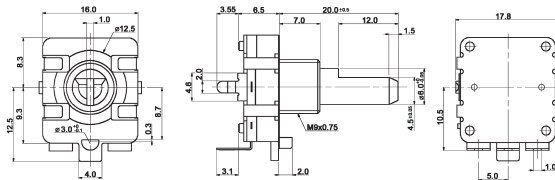


Specifications:

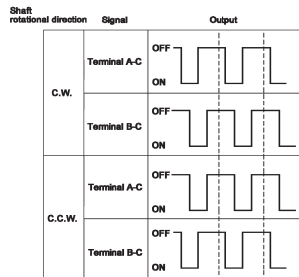
Contact rating:	5 V DC, 10 mA
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	50 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10°C to +70°C
Detent torque:	0.5 to 2.0 Ncm
Pulses/Detents per turn:	24/24
Mechanical life (cycle funtion):	minimum 50 000 turns
Material:	Contacts and terminals: copper alloy, silver-plated
Mounting:	on pc-board with pin-contact single hole mounting M9x0.75
Soldering conditions:	wave soldering, max. 5 s max. 260 °C

Model:

MER16-24120 M9-TW



Output signal format:





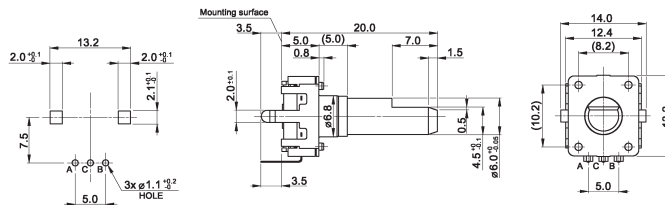
Encoder

Specifications:

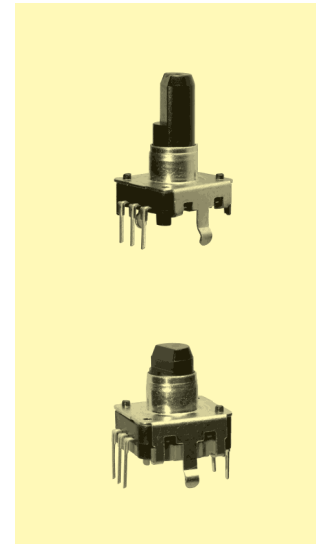
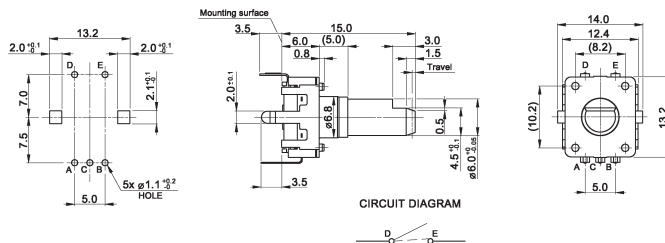
Contact rating:	5 V DC, 0.5 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +70 °C
Rotational/Detent torque:	0.5 N/2.0 Ncm
Pulses/Detents per turn:	12/24 or 24/24 (12/12, 12/0, 24/0 on demand)
Mechanical life:	>30 000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

Models:

MER12-24120

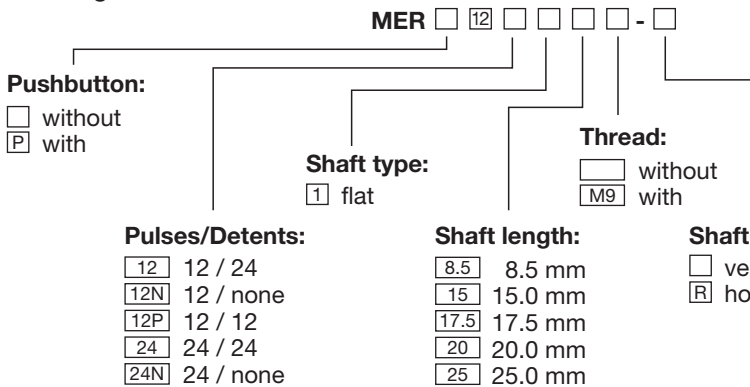


MERP12-24115



10

Ordering code 12 mm Encoder:



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



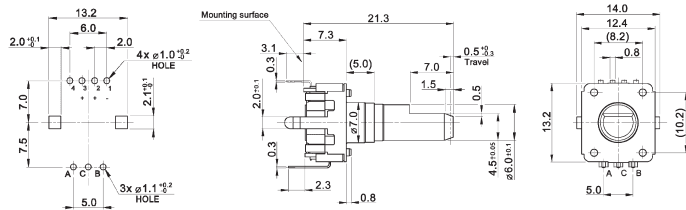
Illuminated Encoder

Specifications:

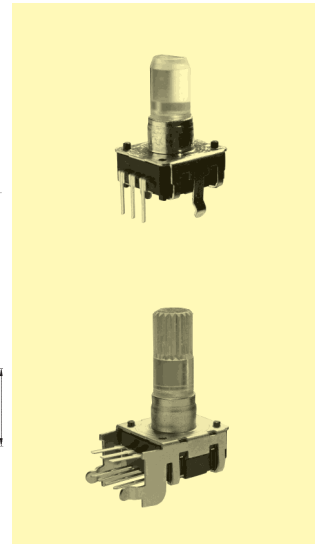
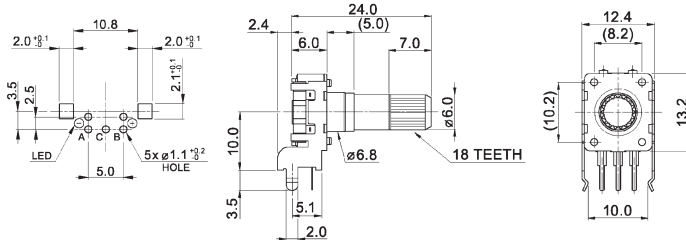
Contact rating:	5 V DC, 0.5 mA
Insulation resistance:	> 100 MΩ at 250 V DC / 1 mA
Dielectric strength:	300 V AC for 1 minute
Operating temperature:	-10 °C to +70 °C
Rotational/Detent torque:	0.5 Ncm/2.0 Ncm
Pulse/Detents per turn:	12/12 or 24/24, version "N": no detent
Mechanical life (cycle function):	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



10

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

LED colour:
 BL blue (for MER)
 RE red (for MER)
 GN green (for MER)
 OA orange (for MER)
 WH white (for MER)

Orientation:
 R horizontal
 vertical

Number of pulses:
 12 12 pulses
 24 24 pulses

Shaft length:
 on demand

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



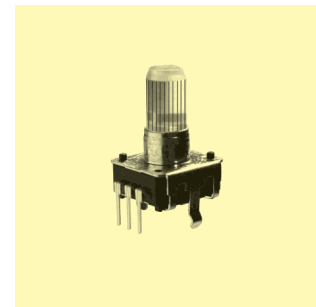
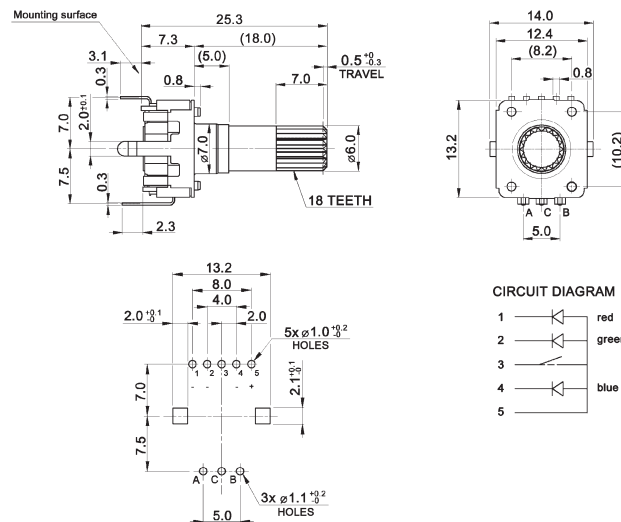
Illuminated Encoder

Specifications:

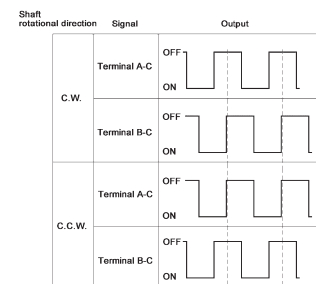
Contact rating:	5 V DC, 0.5 mA
Insulation resistance:	> 100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +70 °C
Rotational/Detent torque:	0.5 Ncm / 2.0 Ncm
Pulses/Detents per turn:	12/12 or 24/24, version "N": no detent
Mechanical life (cycle function):	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

Model:

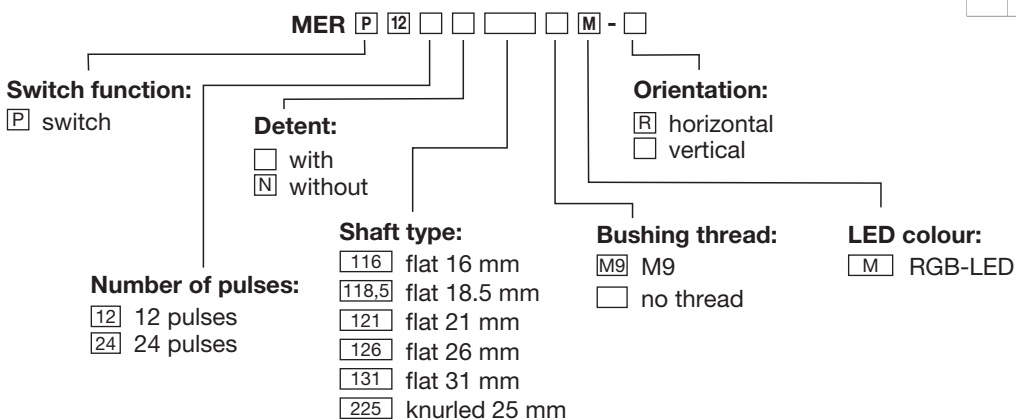
MERP12-24225M



Output signal format:



Ordering code 12 mm Encoder:



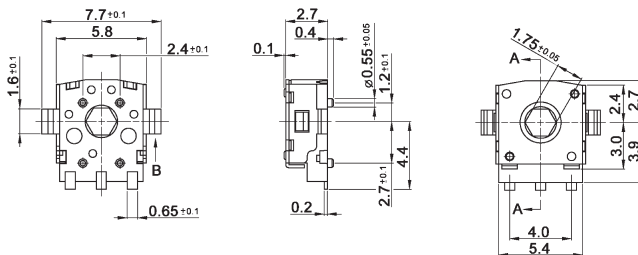
Hollow Shaft Encoder

Specifications:

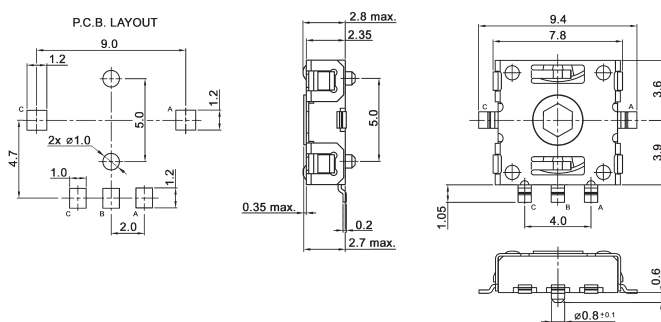
Contact rating:	5 V DC, 1 mA
Contact resistance:	< 1 Ω
Insulation resistance:	> 10 MΩ
Dielectric strength:	50 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Rotational torque:	0.5 ± 0.3 Ncm
Pulses/Detents per turn:	12/24
Mechanical life:	minimum 100 000 turns
Contacts and 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:

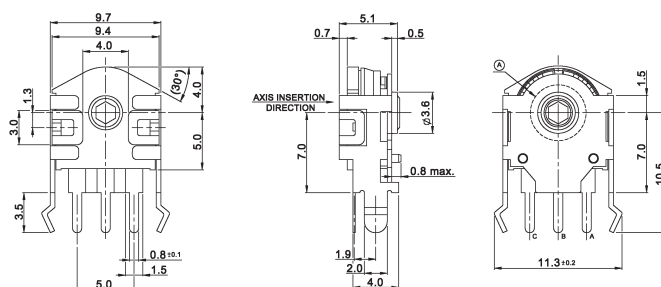
MERS5-12A-V



MERS7-12
MERS7-24

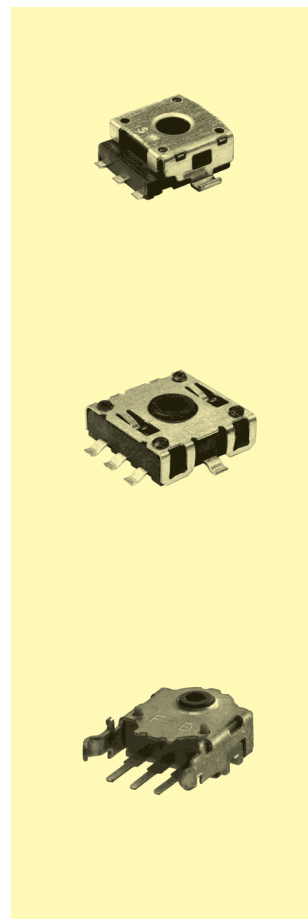


MER10-12 R7



Packing:

- MERS5-12 A-V, tape & reel 1400 pcs.
- MERS7-12, MERS7-24, bulk 500 pcs., MERS7-12 T, MERS7-24 T, tape & reel 1200 pcs.
- MER10-12 R7, bulk, 400 pcs.





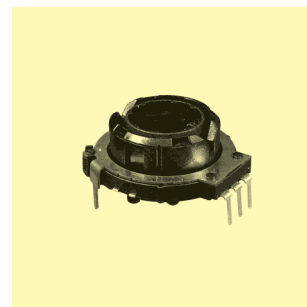
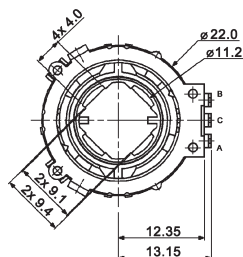
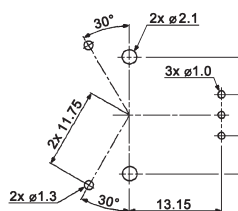
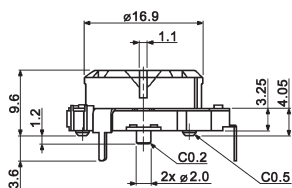
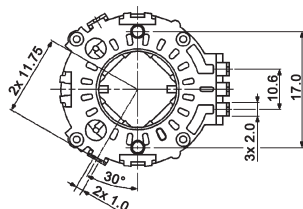
Hollow Shaft Encoder

Specifications:

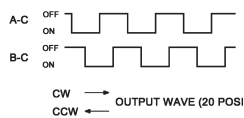
Contact rating:	5 V DC, 10 mA
Contact resistance:	<1 Ω
Insulation resistance:	>100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +70 °C
Rotational torque:	0.6 ± 0.41 Ncm
Pulses/Detents per turn:	20/20
Mechanical life:	minimum 30 000 turns
Material:	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

Model:

MER23-20



Output signal format:



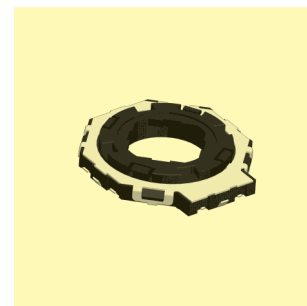
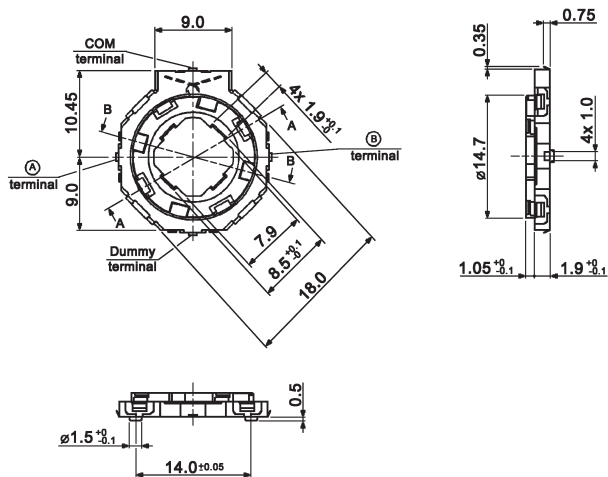
Hollow Shaft Encoder

Specifications:

Contact rating:	5 V DC, 10 mA
Contact resistance:	< 1 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Rotational torque:	0.3 ± 0.05 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

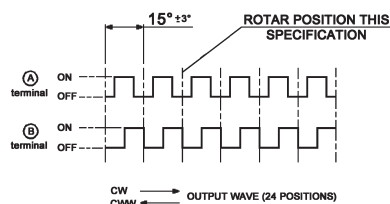
Models:

MER1045-24



10

Output signal format:





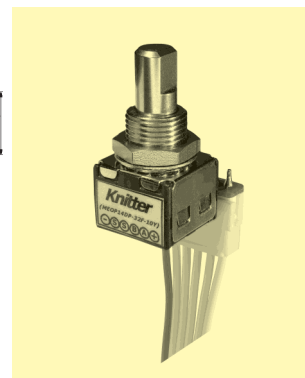
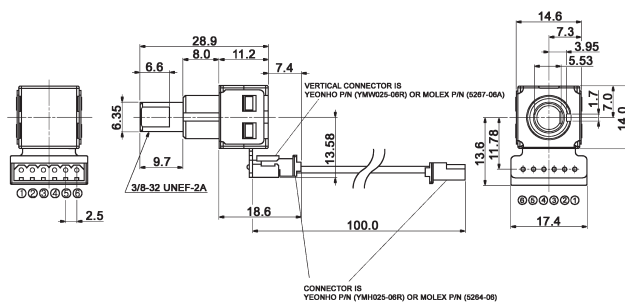
Optical Encoder

Specifications:

Power supply:	3.3 or 5 V DC, 20 mA max.
Insulation resistance:	> 100 M Ω
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +50 °C
Rotational torque:	1 or 2 Ncm
Pulses/Detents per turn:	4/16, 8/32
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: 10 N Electrical Life: > 1 000 000 cycles Travel: 0.3 mm
Mounting:	single hole mounting, thread 3/8-32 UNEF-2A

Model:

MEOP 14 DP32F10-Y



Optical Encoder

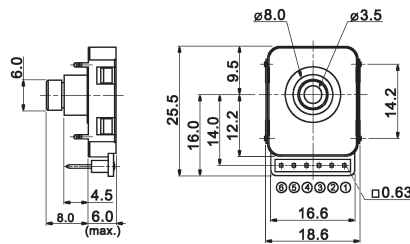


Specifications:

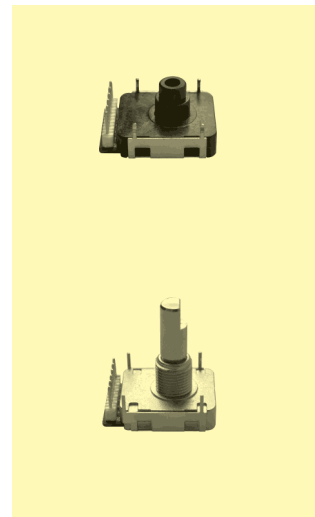
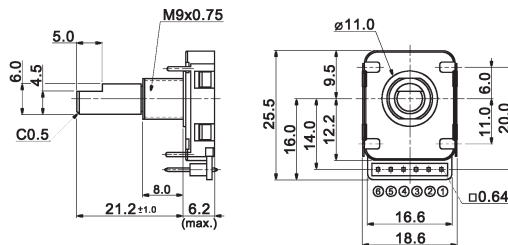
Power supply:	3.3 or 5 V DC (+/- 5%), 20 mA max.
Insulation resistance:	>100 MΩ
Dielectric strength:	300 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Rotational torque:	0.5 ± 0.2 Ncm
Pulses/Detents per turn:	6/0, 6/24, 16/0, 16/16, 24/0, 24/24
Frequency response:	100 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: 5 ± 2 N Mechanical Life: > 1 000 000 cycles Travel: 0.3 or 1 mm
Mounting:	on pc-board with pin-contact single hole mounting M 9 x 0.75
Soldering conditions:	wave soldering, max. 5 s, 260 °C, pre-heat max. 60 s, 100 °C

Models:

MEOP 19 VGP-06C-P2R08-PF-3F

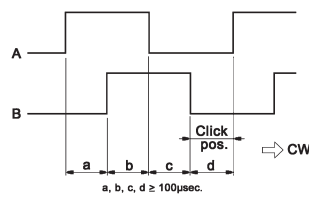


MEOP 19 VGM-24C-M2F21-PF-5F

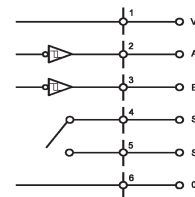


10

Output signal format:



Pin assignment:



4 location pins:

- [F] front
- [R] rear
- [N] none

Ordering code: MEOP 19

Shaft direction:

- [H] horizontal
- [V] vertical

Case material:

- [M] metal
- [P] plastic

Switch travel:

- [D] 1 ± 0.2 mm
- [G] 0.3 ± 0.05 mm

Pulse:

- [06]
- [16]
- [24]

Detents:

- [C] with
- [N] no detent

Shaft material:

- [M] metal
- [P] plastic

Shaft diameter:

- [1] 6.35 mm
- [2] 6.00 mm
- [3] 4.00 mm

Shaft typ:

- [F] flat
- [R] round

Shaft length:

- [08] 8 mm
- [17] 17 mm
- [21] 21 mm
- other on request

Connector type:

- [P] pin-header
- [Y] (*)
- [T] (**)

Voltage:

- [3] 3.3 V
- [5] 5 V

Connector direction:

- [F] front
- [R] rear

192 | knitter-switch

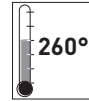
(*) Molex 5264 -06 (or compatibel) with 100 mm cable
(**) AMP 215083-6 (or compatibel) with 100 mm cable

11

Detector Switches

Type	Operating		Terminals		Size	Special feature	Pages
	top	side	T/H	SMT			
DTS 110 BBP-RT		●		●	5.55x4.0	NC, gold contacts	194
DTS 110 CBP-RT-1		●		●	5.55x4.0	gold contacts	
DTS 110 CB PRT1S-LF		●		●	5.55x4.0	contacts 0,15 µm gold	
DTS 110 CB PRT2S-LF		●		●	5.55x4.0	contacts 0,5 µm gold	
DTS 110 C P R-T		●		●	5.55x4.0		
DT 101 C-P	●		●		6.5x3.9		195
DTS 101 C P-T		●		●	6.5x3.9		
DTS 101 C P T-1	●			●	6.5x3.9		
DTS 03	●			●	5.2x3.0		196
DT 103 CP-R		●	●		6.4x3.7		
DTS 103 CP-R		●		●	6.4x4.25		
DT 106 C-P	●		●		5.0x4.0		197
DTS 06 A-T	●			●	5.0x4.0		
DTS 06 A1 C-T	●			●	5.0x4.0		
DTS 201 C P-T		●		●	3.5x2.8		198
DTS 01		●		●	3.5x2.8		
DTS 226 C-T		●		●	3.35x2.2		
DTS 204 C P-T		●		●	3.5x3.3		199
DTS 204 C-T		●		●	3.5x3.3		
DTS 205 CP-T		●		●	4.2x3.6		
DTS 205 C-T		●		●	4.2x3.6		200
DTS 205 CPJ-T		●		●	4.2x3.6		
DTS 205 CJ-T		●		●	4.2x3.6		
DTS 207 CP R T-1		●		●	5.7x4.9		201
DTS 208 CP R T-1		●		●	5.7x4.9		
DTS 209 BPR-T		●		●	3.5x3.3	NC	202
DTS 209 BR-T		●		●	3.5x3.3	NC	
DTS 209 CPR-T		●		●	3.5x3.3		
DTS 209 CR-T		●		●	3.5x3.3		
DT 220 C-P		●	●		9.0x3.5		203
DT 223 F		●	●		8.0x5.6	SPDT	204
DTS 302 C P R T-1		●		●	5.0x4.15		205
DTS 11 LCP 0.7-T	●			●	6.0x4.5	NC	
DT 316 C		●		●	7.5x5.6	3 Mio. operations	206
DTS 316 C-T		●		●	7.5x5.6		
DT 316 C-R		●	●		7.5x5.6	3 Mio. operations	207
DTS 316 CPR-T		●		●	7.5x5.6	3 Mio. operations	
DTS 309 C-T		●		●	4.7x3.8		208
DTS 309 C T-K		●		●	4.7x3.8		
DTS 312 CP-T		●		●	4.7x3.8		
DTS 312 C-T		●		●	4.7x3.8		

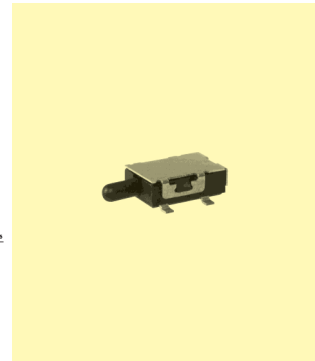
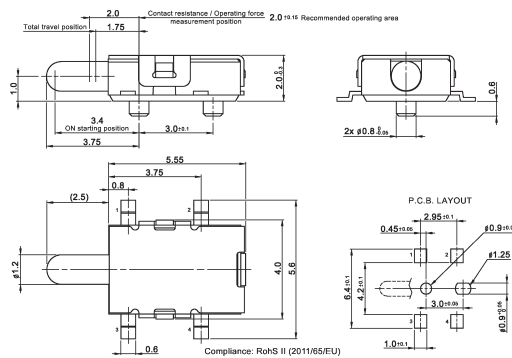
Detector Switches



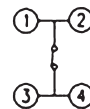
Specifications:

Contact rating:	5 V DC, 1 mA (DTS 110 CBP-RT-1: 12 V DC, 100 mA)
Contact resistance:	< 1 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C (DTS 110 CBP-RT-1: -25 °C to +85 °C)
Operating force:	< 1.2 N
Mechanical life:	minimum 100 000 operations
Material:	Contacts: copper alloy, silver- or gold-plated Terminals: brass, silver- or gold-plated Case and actuator: PA9T / PPS / HTN Cover: stainless steel

Models: Switching functions



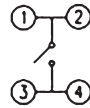
DTS 110 BBP-RT (gold-plated) on – (mom)



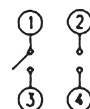
DTS 110 CBP-RT-1 (gold-plated) off – mom

DTS 110 CB PRT1S-LF (gold-plated) off – mom

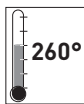
DTS 110 CB PRT2S-LF (for Smoke Detector, gold-plated 0.5 μm) off – mom



DTS 110 C P R-T off – mom



Further types on request

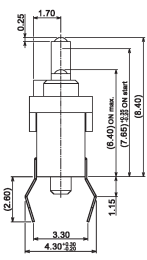
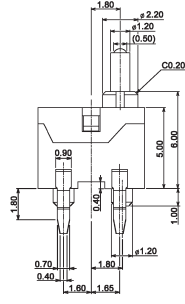
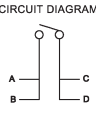
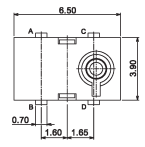
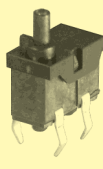
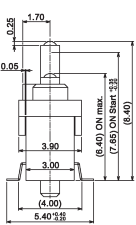
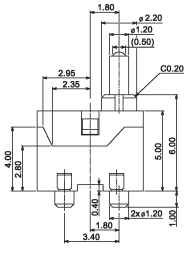
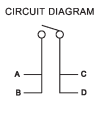
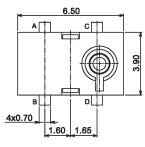
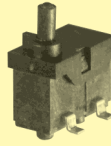
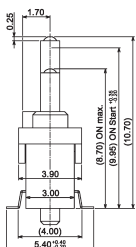


Detector Switches

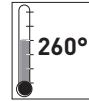
Specifications:

Contact rating:	5 V DC, 5 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Operating force:	< 0.35 N
Mechanical life:	minimum 50 000 operations
Material:	Contacts: stainless steel, silver-plated Terminals: phosphor bronze, silver-plated Case and actuator: HTN / LCP, black

Models: Switching functions

DT 101 C-P	off – mom	   		
DTS 101 C P-T	off – mom	   		
DTS 101 C P T-1	off – mom			

Detector Switches

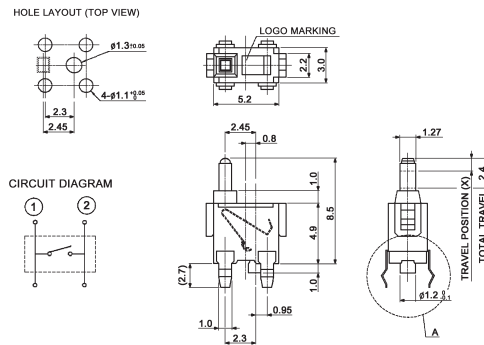


Specifications:

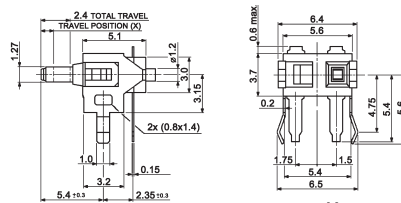
Contact rating:	5 V DC, 10 mA
Contact resistance:	< 0.5 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C (DTS 103 CP-R: -40 °C to +85 °C)
Operating force:	< 0.35 N
Mechanical life:	minimum 50 000 operations
Material:	Contacts: phosphor-bronze, silver-plated Terminals: brass, silver-plated Case and actuator: PA, LCP

Models: Switching functions

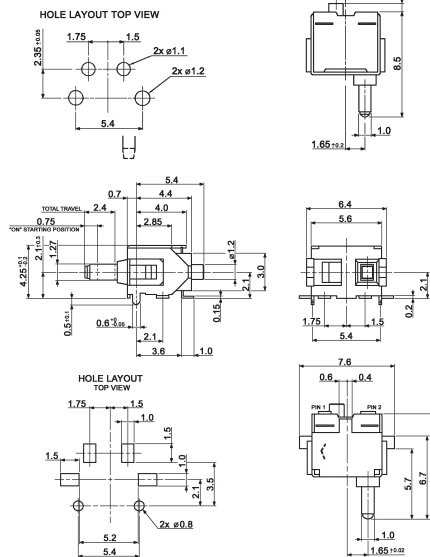
DTS 03 off – mom



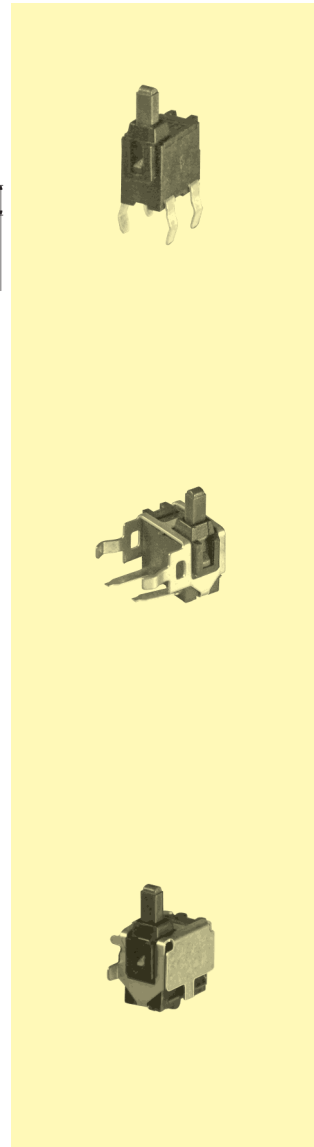
DT 103 CP-R off – mom

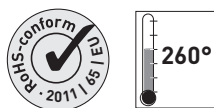


DTS 103 CP-R off – mom



Packing: 1000 pcs/bag





Detector Switches

Specifications:

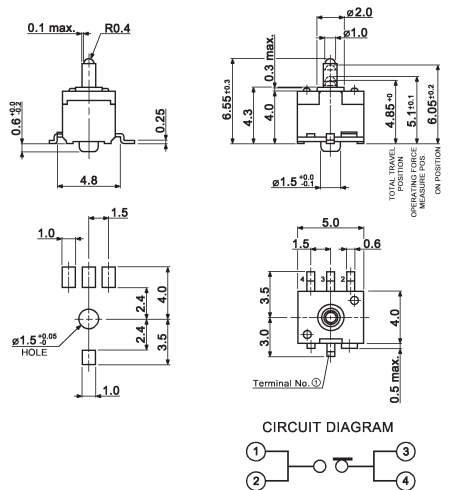
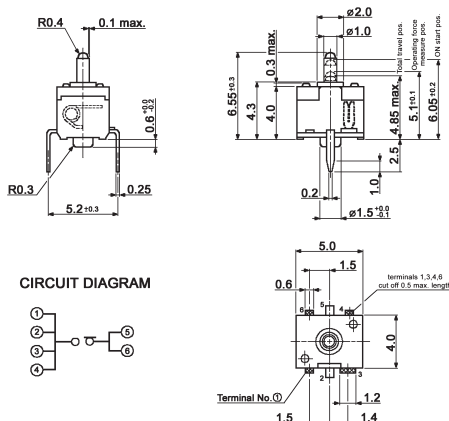
Contact rating:	30 V DC, 100 mA
Contact resistance:	< 500 mΩ, DTS 106 CBT-1: < 1 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C, DTS 06 A1 C-T and DTS 106 CBT-1: -40 °C to +85 °C
Operating force:	< 0.4 N
Mechanical life:	minimum 50 000 operations
Material:	Contacts: silver-plated, DTS 106 CBT-1: gold-plated Terminals: silver-plated, DTS 106 CBT-1: gold-plated Case, Actuator: PA

Models:

Switching functions

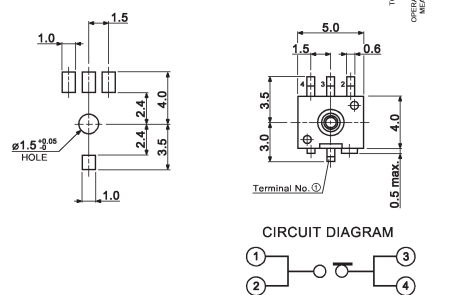
DT 106 C-P

off - mom



DTS 06 A-T

off - mom

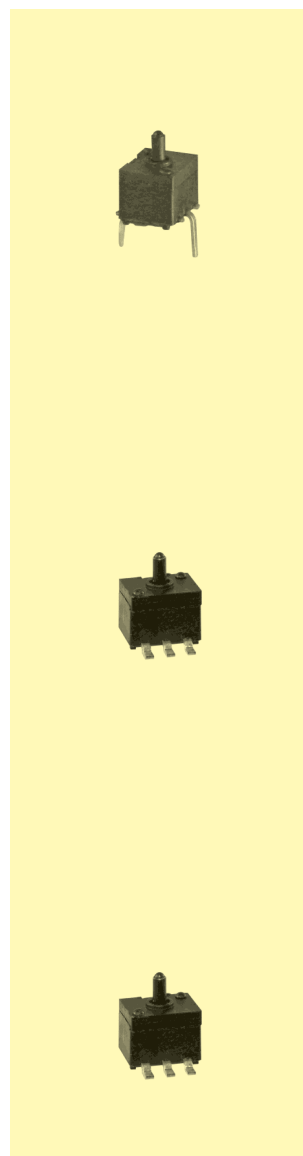


DTS 06 A1 C-T

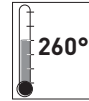
off - mom

as DTS 06 A-T, but without posts

DTS 106 CBT-1



Detector Switches



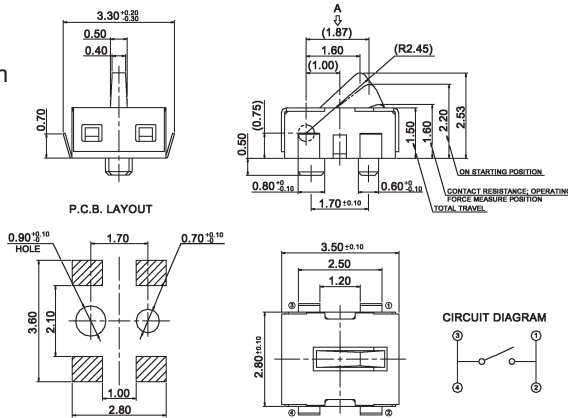
Specifications:

Contact rating:	5 V DC, 1 mA (DTS 226 C-T: 10 mA)
Contact resistance:	< 2 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	< 0.5 N
Mechanical life:	minimum 100 000 operations (DTS 226 C-T: 50 000)
Material:	Contacts: phosphor-bronze, silver-plated Terminals: brass (DTS 226 C-T: phosphor bronze), silver-plated Case and actuator: LCP

Models: Switching functions

DTS 201 C P-T

off – mom

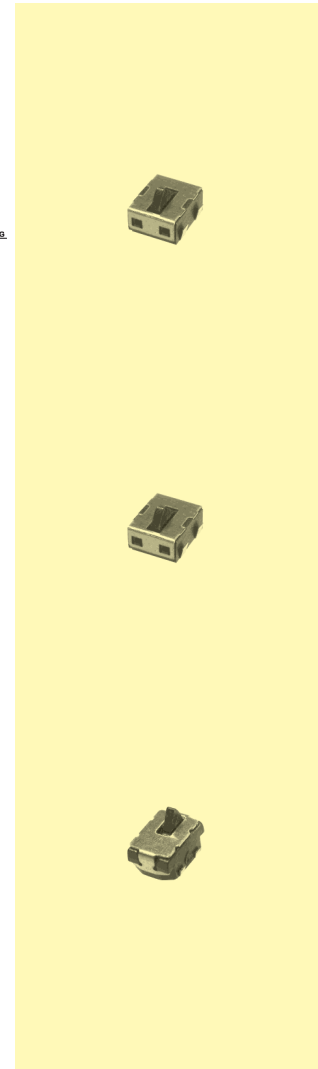
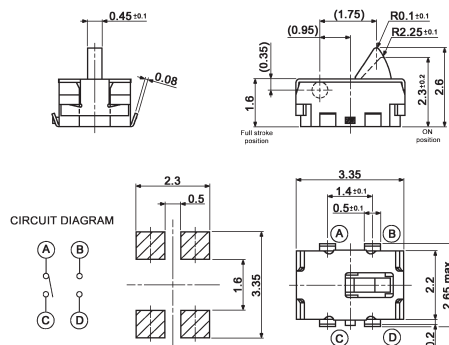


DTS 01

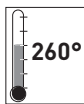
off – mom as above, but without posts

DTS 226 C-T

off – mom



Packing: 2600 pcs/reel (DTS 226 C-T: 3000 pcs/reel)



Detector Switches

Specifications:

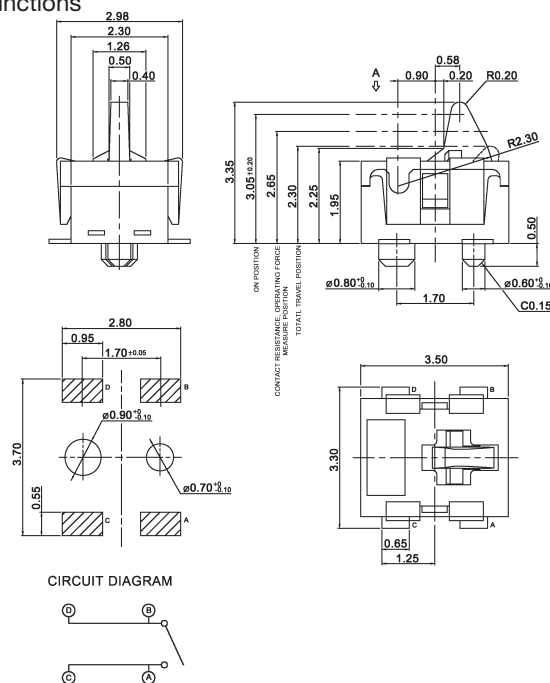
Contact rating:	5 V DC, 100 mA
Contact resistance:	< 0.5 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	250 V, 50 Hz for the duration of 1 minute
Operating temperature:	-15 °C to +70 °C
Operating force:	< 0.35 N
Mechanical life:	minimum 80 000 operations
Material:	Contacts: stainless steel, silver-plated Terminals: phosphor bronze, silver-plated Case and actuator: HTN, black

Models:

Switching functions

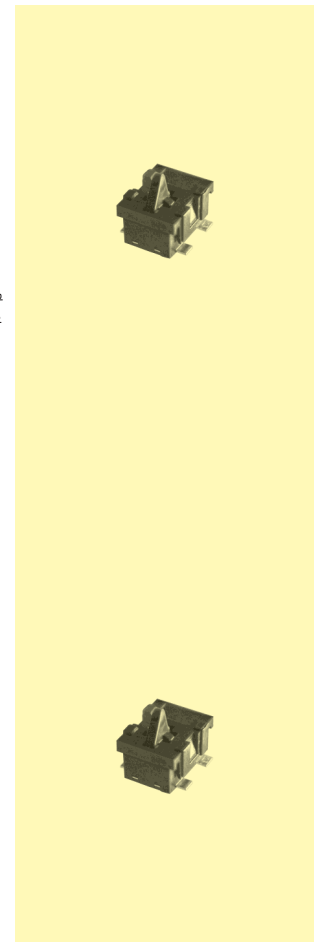
DTS 204 C P-T

off - mom



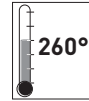
DTS 204 C-T

off - mom as above, but without posts



Packing: 1800 pcs/reel

Detector Switches



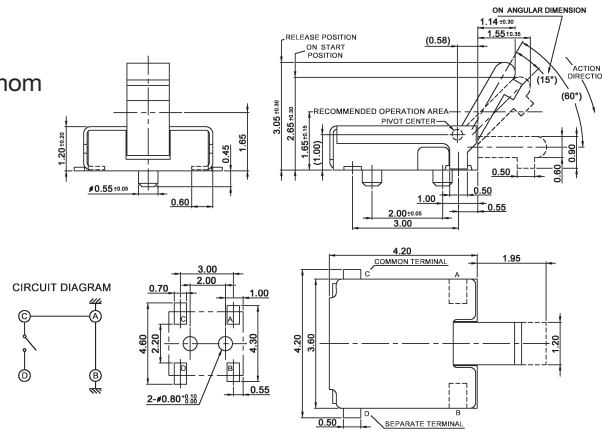
Specifications:

Contact rating:	5 V DC, 10 mA and 3.6V, 100 mA
Contact resistance:	< 1 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	≤ 0.4 N
Mechanical life:	minimum 100 000 operations
Material:	Contacts: copper-alloy, gold-plated Terminals: brass, silver-plated Case and actuator: HTN, black Cover: stainless steel

Models: Switching functions

DTS 205 CP-T

off – mom

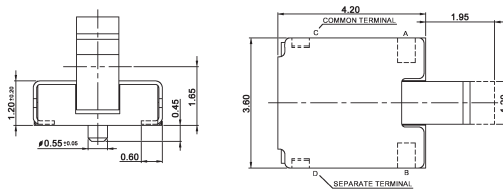


DTS 205 C- T

off – mom as above, but without posts

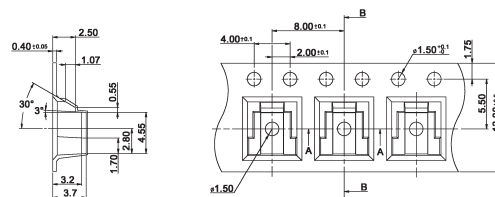
DTS 205 CPJ-T

off – mom



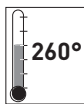
DTS 205 CJ-T

off – mom as above, but without posts



Packing: 2300 pcs/reel





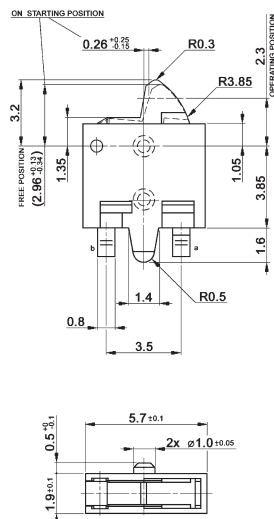
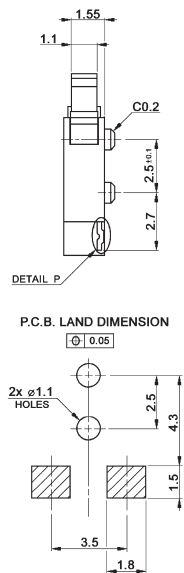
Detector Switches

Specifications:

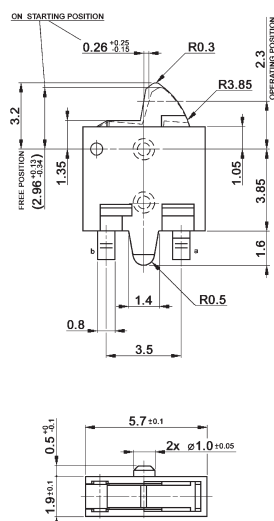
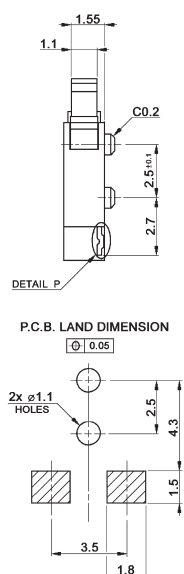
Contact rating:	5 V DC, 10 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Operating force:	< 0.28 N
Mechanical life:	minimum 100 000 operations
Material:	Contacts: stainless steel, silver-plated Terminals: brass, silver-plated Case and actuator: PA9T, black

Models: Switching functions

DTS 207 CP R T-1 off - mom

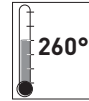


DTS 208 CP R T-1 off - mom



Packing: 2500 pcs/reel

Detector Switches

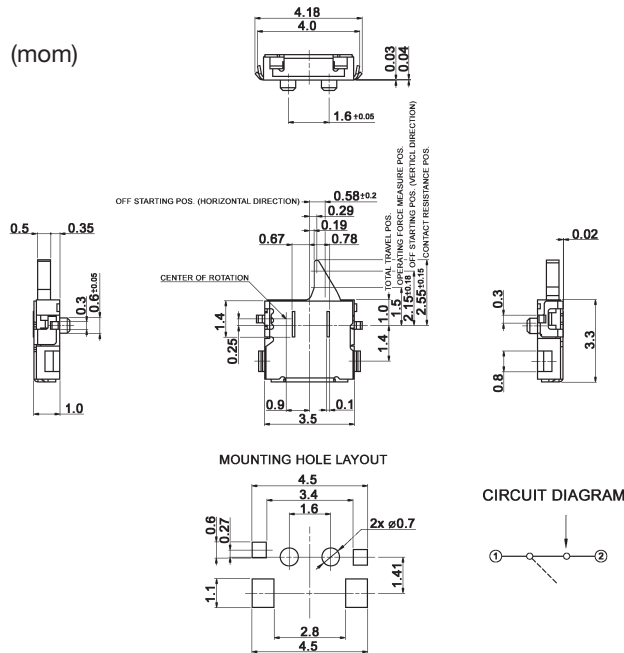


Specifications:

Contact rating:	5 V DC, 1 mA
Contact resistance:	< 2 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Operating force:	< 0.35 N
Mechanical life:	minimum 50 000 operations
Material:	Contacts: stainless steel, silver-plated Terminals: phosphor bronze, silver-plated Case and actuator: LCP, black Cover: Nickel-silver

Models: Switching functions

DTS 209 BPR-T on – (mom)



DTS 209 BR-T on – (mom) Data sheet as above, but without posts

DTS 209 CPR-T off – mom Data sheet as above

DTS 209 CR-T off – mom Data sheet as above, but without posts

Packing: 3300 pcs/reel



Detector Switches

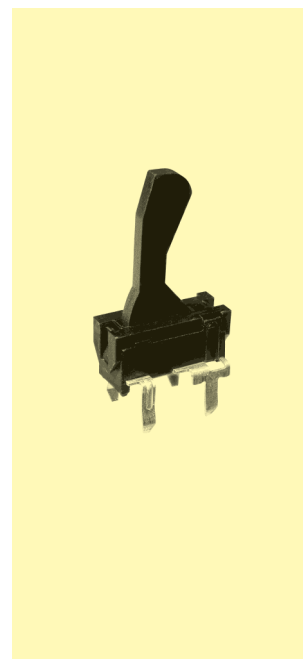
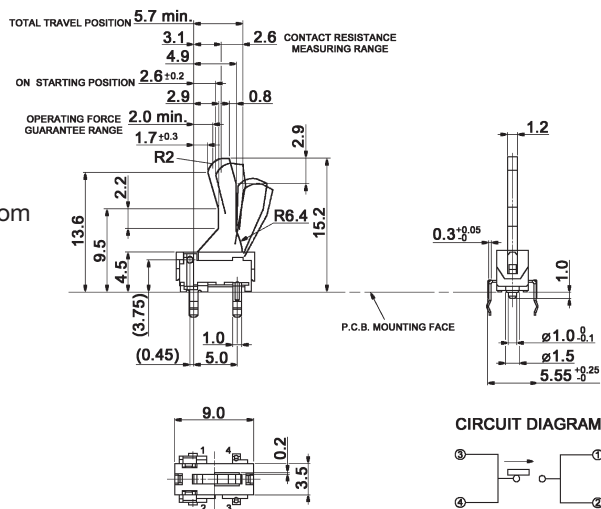
Specifications:

Contact rating:	5 V DC, 1 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Operating force:	< 0.25 N
Mechanical life:	minimum 100 000 operations
Material:	Contacts: copper-alloy, silver-plated Terminals: brass, silver-plated Case: PA Actuator: POM

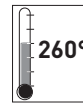
Models: Switching functions

DT 220 C-P

off - mom



Detector Switches

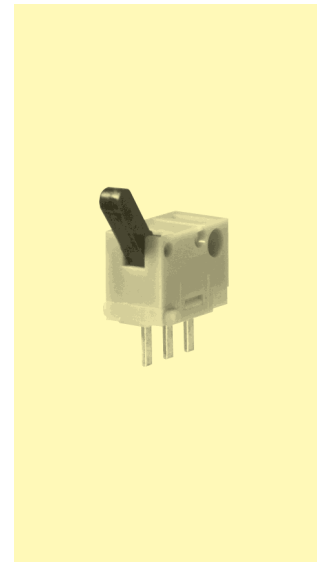
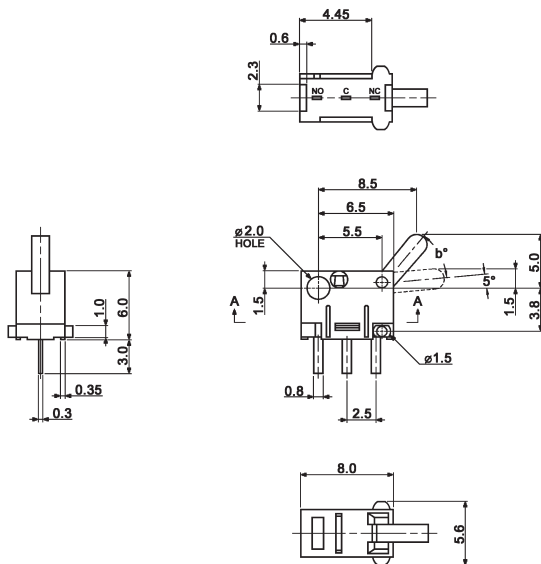


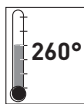
Specifications:

Contact rating:	30 V DC, 100 mA
Contact resistance:	< 30 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	500 V, 50 Hz for the duration of 1 minute
Operating temperature:	-10 °C to +60 °C
Operating force:	< 0.9 N
Mechanical life:	minimum 10 000 operations
Material:	Contacts: phosphor-bronze, silver-plated Terminals: brass, silver-plated Case and actuator: PA

Models: Switching functions

DT 223 F mom - on





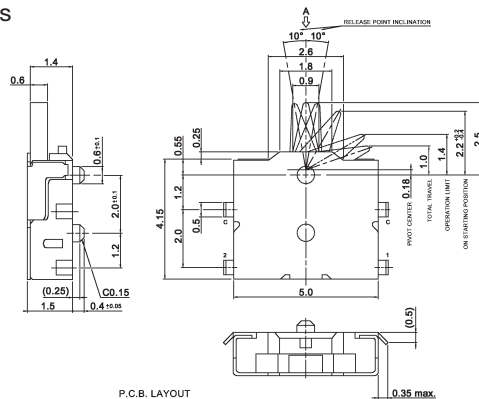
Detector Switches

Specifications:

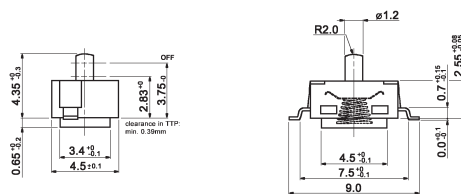
Contact rating:	5 V DC, 10 mA (DTS 11: 5 mA)
Contact resistance:	< 0.5 Ω (DTS 11: < 1 Ω)
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute (DTS 11: 250 V)
Operating temperature:	-20 °C to +60 °C (DTS 11: -40 °C to +80 °C)
Operating force:	< 0.35 N
Mechanical life:	minimum 1 000 000 operations (DTS 11: 100 000)
Material:	Contacts: phosphor-bronze, silver-plated Terminals: copper alloy, silver-plated Case and actuator: PPA, LPC (DTS 11: LCP, HTN)

Models: Switching functions

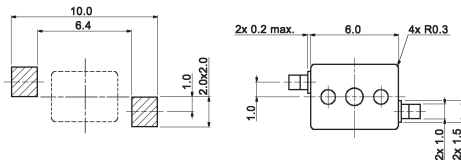
DTS 302 C P R T-1 mom – off – mom



DTS 11 LCP 0.7-T on – (mom)

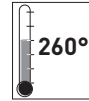


P.C.B. MOUNTING DIMENSIONS TOP VIEW



Packing: 3000 pcs/reel (DTS 11: 1500 pcs/reel)

Detector Switches

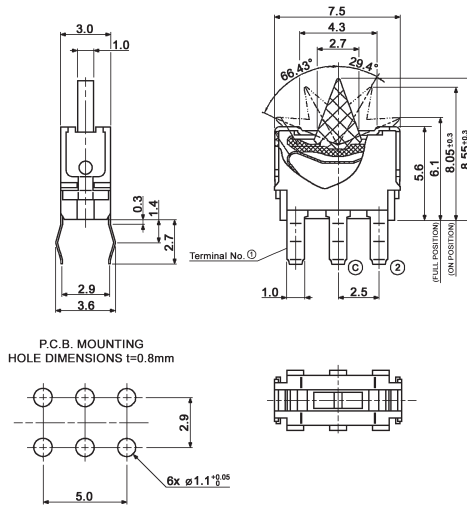


Specifications:

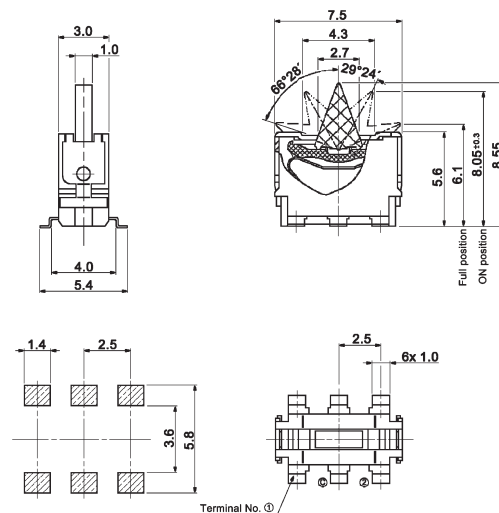
Contact rating:	5 V DC, 10 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	≤ 0.15 N
Mechanical life:	minimum 3 000 000 operations (DTS 316 C-T: 600 000)
Material:	Contacts, Terminals: phosphor-bronze, silver-plated Case and actuator: HTN, black Cover: steel, tin-plated

Models: Switching functions

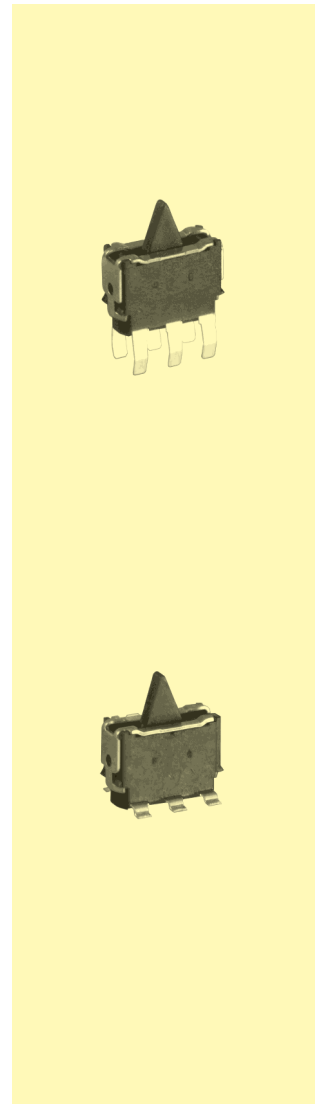
DT 316 C off – mom

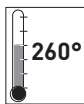


DTS 316 C T off – mom



Packing: DT 316 C: bag
DTS 316 C-T: 550 pcs/reel





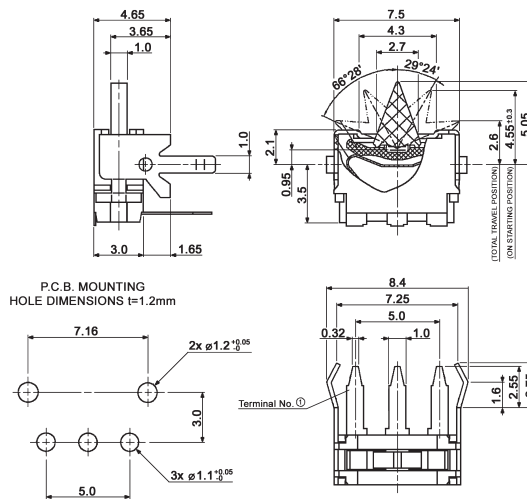
Detector Switches

Specifications:

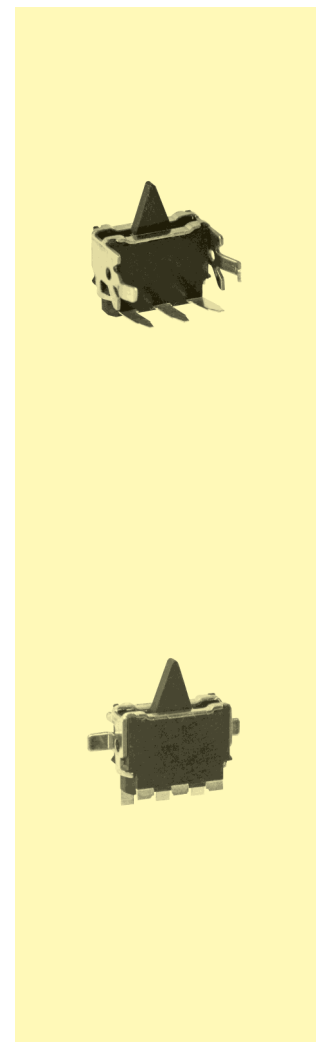
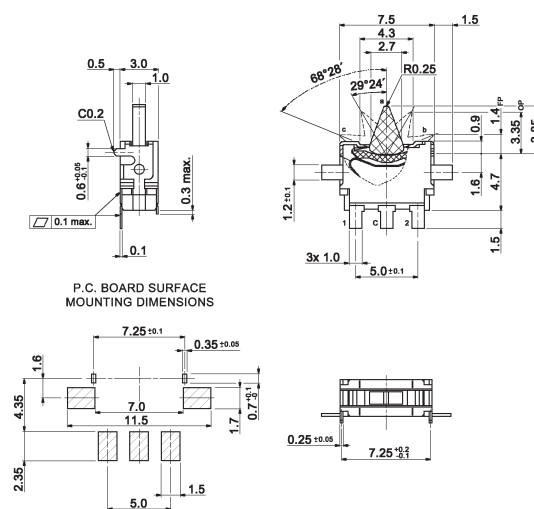
Contact rating:	5 V DC, 10 mA
Contact resistance:	< 500 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C (DT 316 C-R: -40 °C to +100 °C)
Operating force:	≤ 0.15 N
Mechanical life:	minimum 3 000 000 operations
Material:	Contacts, Terminals: phosphor-bronze, silver-plated Case and actuator: HTN, black Cover: steel, tin-plated

Models: Switching functions

DT 316 C-R off – mom

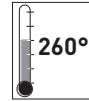


DTS 316 CPR-T off – mom



Packing: DT 316 C-R: bag
DTS 316 CPR-T: 1000 pcs/reel

Detector Switches



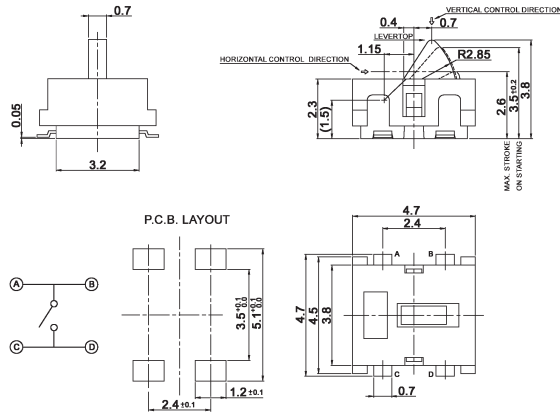
Specifications:

Contact rating:	5 V DC, 1 mA
Contact resistance:	< 1 Ω
Insulation resistance:	> 100 MΩ
Dielectric strength:	100 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Operating force:	< 0.4 N
Mechanical life:	minimum 100 000 operations
Material:	Contacts: stainless steel, silver-plated Terminals: phosphor bronze, silver-plated Case and actuator: HTN/LCP, black

Models: Switching functions

DTS 309 C-T

off – mom

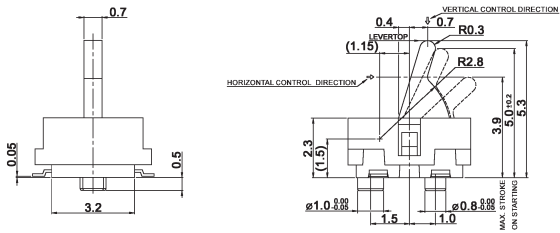


DTS 309 C T-K off – mom
as DTS 309 C-T, but with pick & place cap

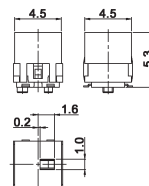
DTS 312 CP-T

off – mom

Delivery with pick & place cap



DTS 312 C-T off – mom
as DTS 312 CP-T, but without posts

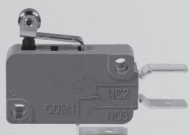


Dimensions with pick & place cap (309 and 312)



12 Micro / Snap Action Switches

12.1 Miniature Micro / Snap Action Switches



DM – VMG

210 – 212

12.2 Subminiature Micro / Snap Action Switches



DM – SMG

213 – 215

DM – SWG 3 IP 67

216 – 218

12.3 Microminiature Micro / Snap Action Switches



DM – DW IP 67

219

DM – DMG

220

DM – SSM

221

Miniature Micro / Snap Action Switches

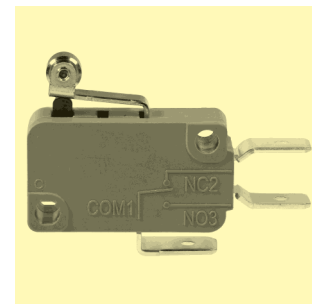
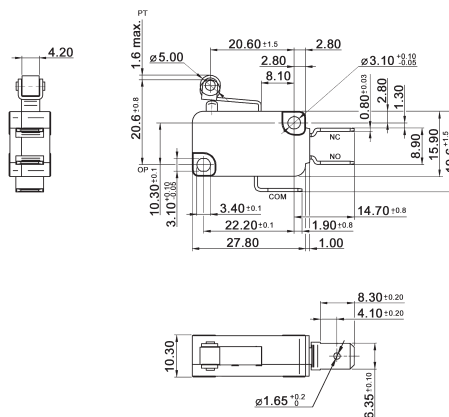


Specifications:

Contact rating:	see ordering code
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	1000V, 50Hz for the duration of 1 minute
Operating temperature:	-25 °C to +125 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	silver-alloy, gold-plating on request
Terminals:	brass, silver-plated
Case:	PBT (UL 94 V-0), Phenolic resin on request
Mounting:	on pc-board, on panel
Timing:	non-shorting
Soldering conditions:	auto-soldering – max. 5 sec, max. 260 °C manual soldering – max. 3 sec, max. 350 °C

Models: Switching function

DM-VMG 16 L05C200 on – mom



Lever	Operation force [gf]								Operation position [mm]
	15	25	50	100	200	300	400		
00	15	25	50	100	200	300	400	14.7 ± 0.5	
01	15	25	50	100	200	300	400	15.3 ± 0.5	
02	10	15	30	60	120	180	240	15.3 ± 0.5	
03	7	10	15	30	60	90	120	15.3 ± 0.3	
04	10	15	30	60	120	180	240	18.3 ± 1.5	
05	15	30	60	120	240	350	470	20.6 ± 0.8	
06	10	15	30	60	120	180	240	20.6 ± 1.6	

Ordering code:

DM-VMG -L

Rating:

- 5 5 A / 250 V AC, 0.1 A / 48 V DC
- 10 10 A / 250 V AC, 1 A / 30 V DC
- 16 16 A / 250 V AC
- 22 22 A / 250 V AC
- 26 26 A / 250 V AC

Lever:

(see following pages)

Terminals:

Operating force:

- 15 15 gf
- 25 25 gf
- 50 50 gf
- 100 100 gf
- 200 200 gf
- 300 300 gf
- 400 400 gf

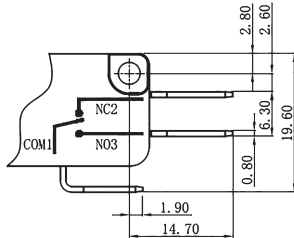
Notes: Operation force is nominal value for pin plunger (lever code 00).
Not all operation forces are available for all ratings.



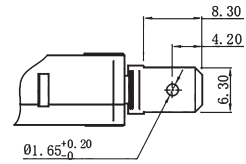
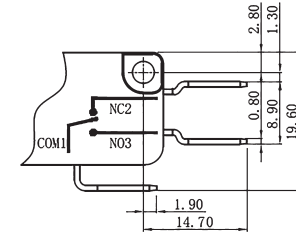
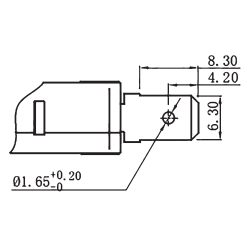
Miniature Micro / Snap Action Switches

DM-VMG Terminals:

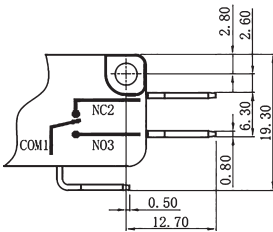
Terminal B



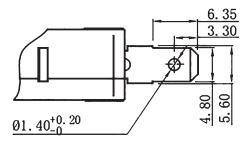
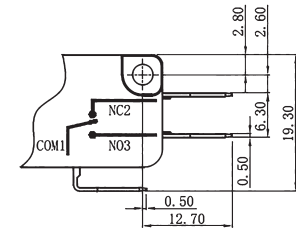
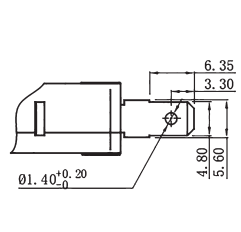
Terminal C



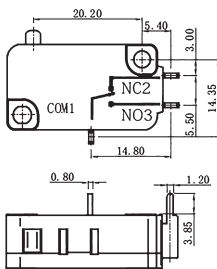
Terminal D



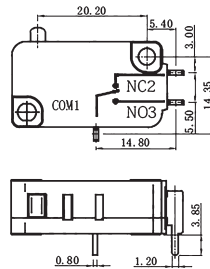
Terminal E



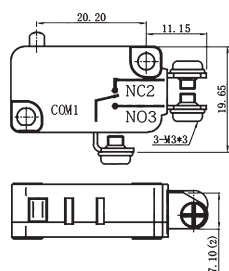
Terminal L



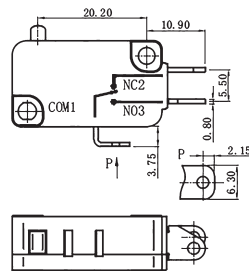
Terminal R



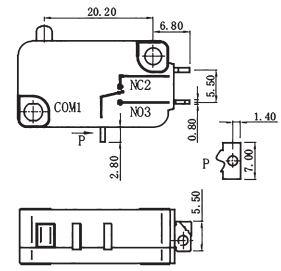
Terminal T



Terminal S



Terminal M



Miniature Micro / Snap Action Switches



DM-VMG Lever:

<p>01</p>	<p>02</p>
<p>03</p>	<p>04</p>
<p>05</p>	<p>06</p>



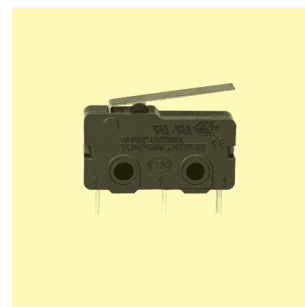
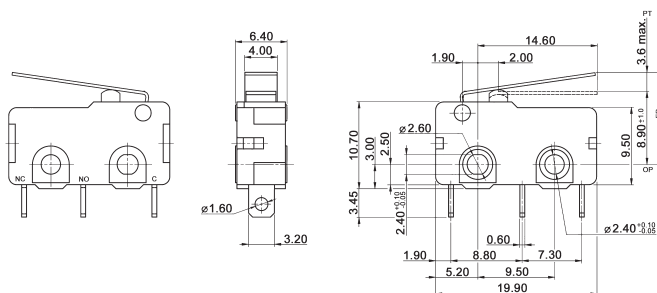
Subminiature Micro / Snap Action Switches

Specifications:

Contact rating:	see ordering code
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +125 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	silver-alloy, gold-plating on request
Terminals:	brass, silver-plated
Case:	PBT (UL 94 V-0), Phenolic resin on request
Mounting:	on pc-board, on panel
Timing:	non-shorting
Soldering conditions:	auto-soldering – max. 5 sec, max. 260 °C manual soldering – max. 3 sec, max. 350 °C

Models: Switching function

DM-SMG 5 L01S100 on - mom



Lever	Operation force [gf]					Operation position [mm]
	50	100	150	250	350	
00	50	100	150	250	350	8.5 ± 0.3
01	–	40	50	80	110	8.9 ± 1.0
02	–	35	45	75	100	8.9 ± 1.2
03	–	25	35	55	–	8.9 ± 1.8
04	–	15	30	45	–	8.9 ± 2.0
05	–	35	45	75	100	12.2 ± 1.5
06	–	40	50	80	110	14.6 ± 1.0
07	–	40	50	80	110	10.8 ± 1.2

12

Ordering code:

DM-SMG -L

Rating:

- 01 0.1 A / 250 V AC, 48 V DC
- 5 5 A / 250 V AC, 30 V DC
- 10 10 A / 250 V AC

Lever: **Terminals:**
(see following pages)

Operating force:

- 50 15 gf
- 100 100 gf
- 150 150 gf
- 250 250 gf
- 350 350 gf

Notes: Operation force is nominal value for pin plunger (lever code 00).
Not all operation forces are available for all ratings.

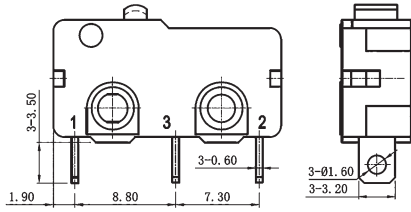
UL recognized components on request.

Subminiature Micro / Snap Action Switches

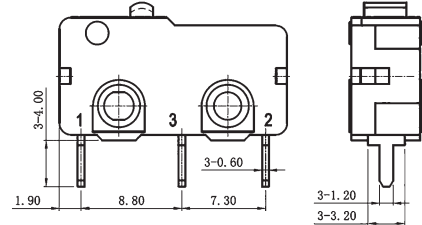


DM-SMG Terminals:

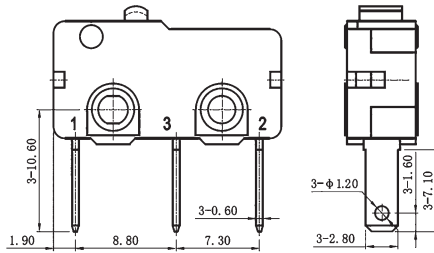
Terminal S



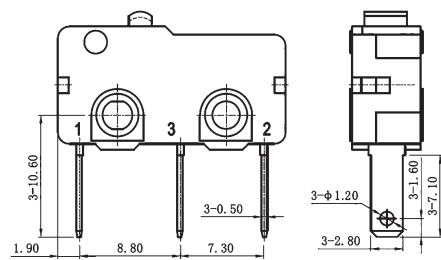
Terminal P



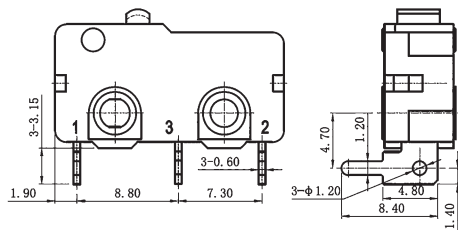
Terminal D



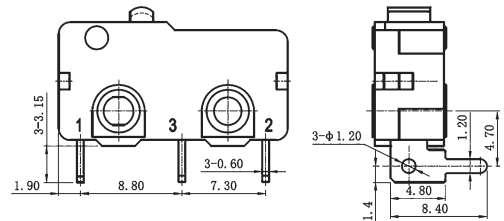
Terminal E



Terminal L



Terminal R

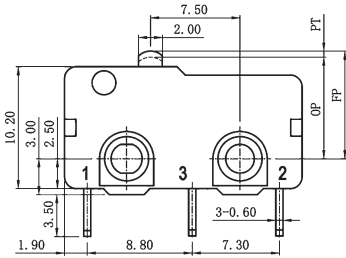




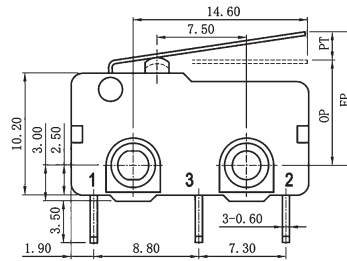
Subminiature Micro / Snap Action Switches

DM-SMG Lever:

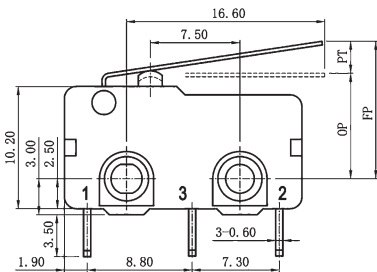
Lever 00



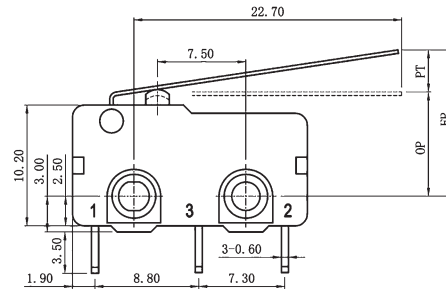
Lever 01



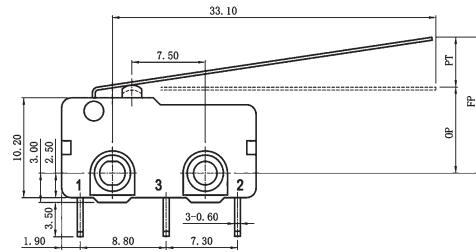
Lever 02



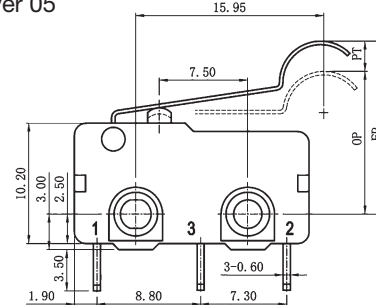
Lever 03



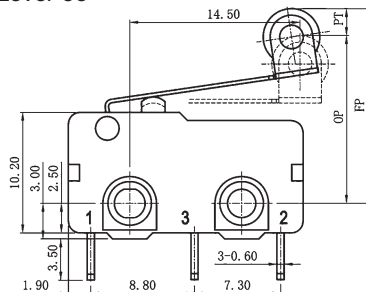
Lever 04



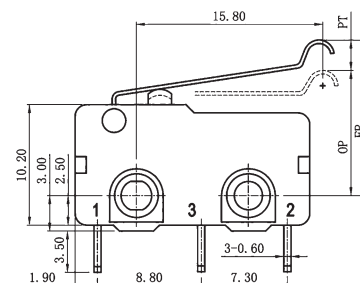
Lever 05



Lever 06



Lever 07



Subminiature Micro / Snap Action Switches

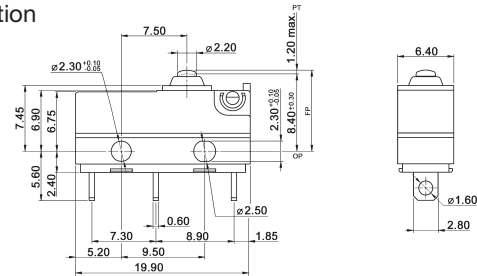


Specifications:

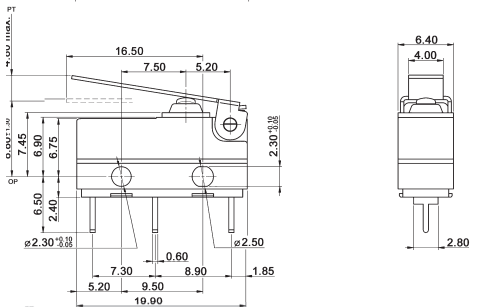
Contact rating:	see ordering code
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	1000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-25 °C to +120 °C
Mechanical life:	minimum 500 000 operations
IP rating:	IP 67 (for models w/o wires, terminals are not sealed)
Contacts:	silver-alloy, gold-plating on request
Terminals:	brass, silver-plated (or 500 mm wire length)
Case:	PBT (UL 94 V-0)
Mounting:	on pc-board, on panel
Timing:	non-shorting
Soldering conditions:	auto-soldering – max. 5 sec, max. 260 °C manual soldering – max. 3 sec, max. 350 °C

Models: Switching function

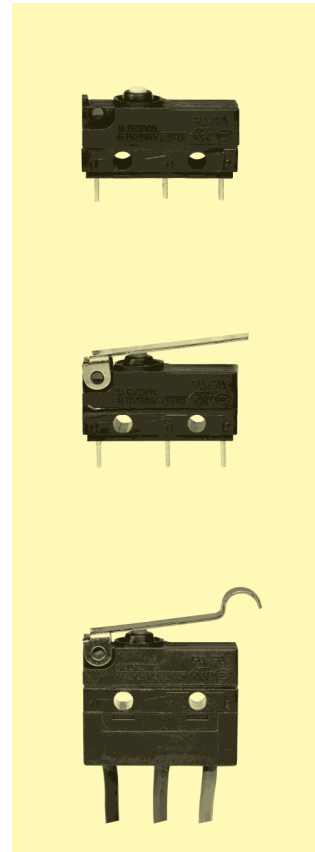
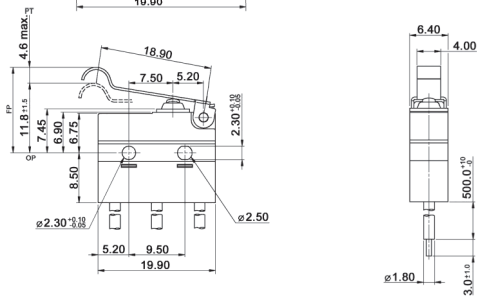
DM-SWG 5 L00S200 on – mom



DM-SWG 5 L02P200 on – mom



DM-SWG 5 L05E200-201007 on – mom



Ordering code: **DM-SWG** -L

Rating:

- 01 0.1 A / 250 V AC, 48 V DC
- 5 6 A / 250 V AC, 3 A / 30 V DC

Lever: Terminals: (see following pages)

Operating force:

- 150 150 gf max
- 200 200 gf max
- 300 300 gf max

AWG:

(for models with wires only, for referene)

- 20 0.518 mm²
- 22 0.326 mm²
- 24 0.205 mm²
- 26 0.129 mm²
- 28 0.081 mm²

UL:

- 1007 300 V, 80 °C, PVC
- 1015 600 V, 105 °C, PVC
- 1061 300 V, 80 °C, PVC semirigid
- 1330 600 V, 150 °C, FEP
- 1332 300 V, 200 °C, FEP
- 1430 300 V, 105 °C, PVC
- 1569 300 V, 105 °C, PVC
- 3266 300 V, 125 °C, XLPE
- AVSS (non UL) Automotive, Vinyl

Notes:

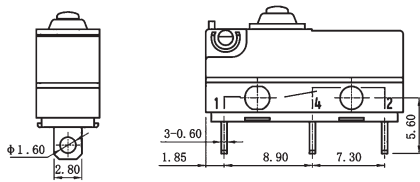
Operation force is nominal value for pin plunger (lever code 00).
Not all operation forces are available for all ratings.



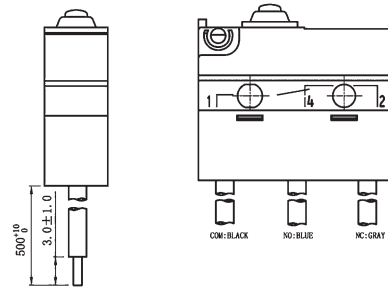
Subminiature Micro / Snap Action Switches

DM-SWG Terminals:

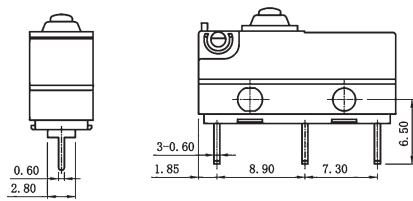
Terminal S



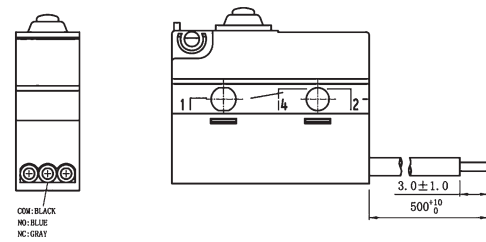
Terminal E



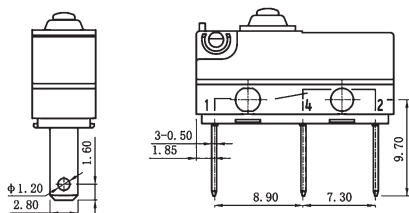
Terminal P



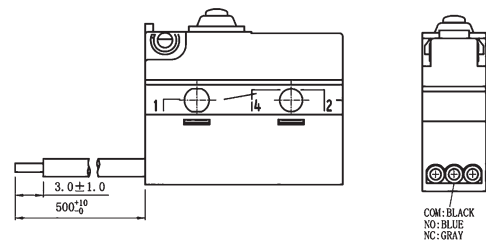
Terminal F



Terminal D



Terminal G

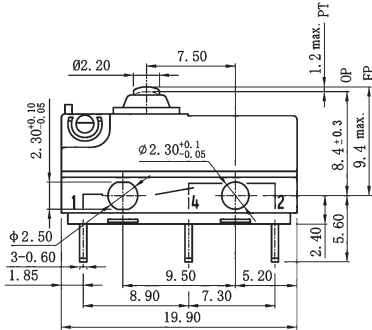


Subminiature Micro / Snap Action Switches

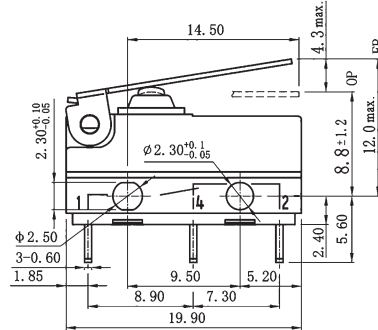


DM-SWG Lever:

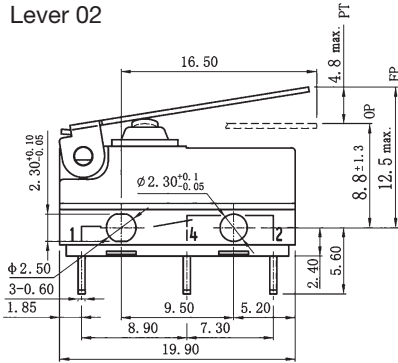
Lever 00



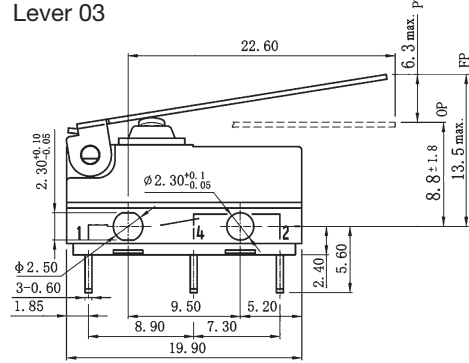
Lever 01



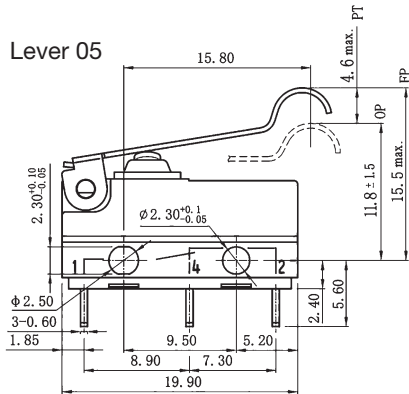
Lever 02



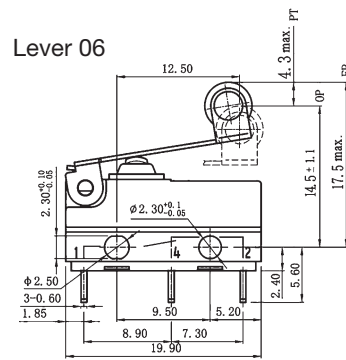
Lever 03



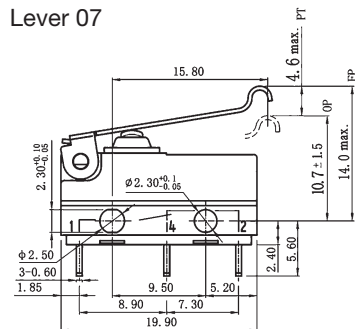
Lever 05



Lever 06



Lever 07





Subminiature Micro / Snap Action Switches

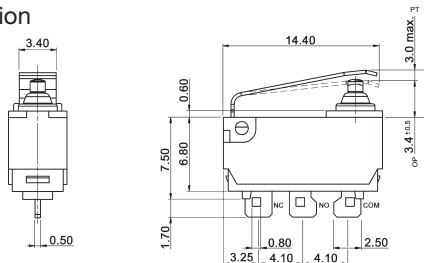
Specifications:

Contact rating:	125 V AC, 0.1 A; 48 V DC, 0.1 A; 12 V DC, 3 A
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 500 000 operations
IP rating:	IP 67
Contacts:	silver-alloy
Terminals:	brass, silver-plated
Case:	PA (UL 94 V-0)
Mounting:	on pc-board, positive in case-parts
Timing:	non-shorting
Soldering conditions:	manual soldering – max. 3 sec, max. 350 °C auto-soldering – max. 5 sec, max. 260 °C

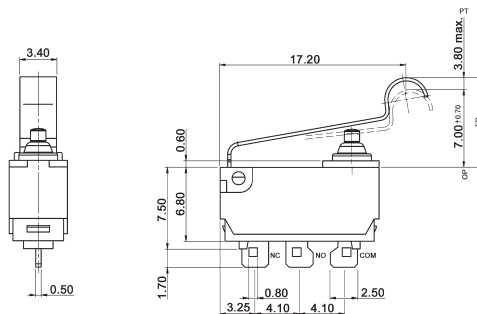
Models:

Switching function

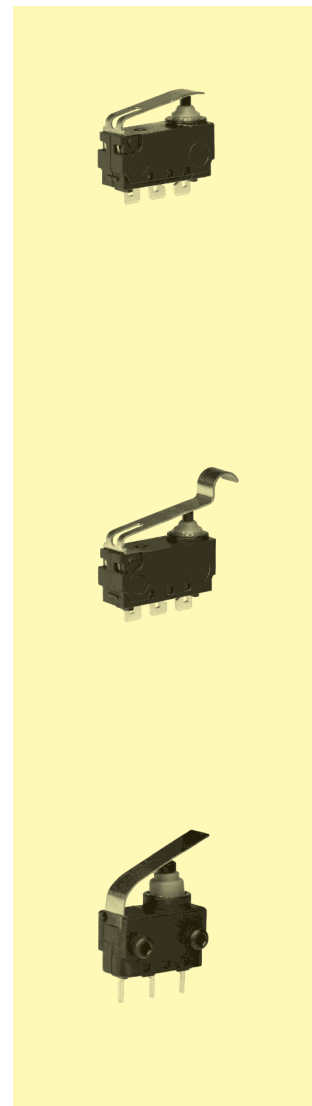
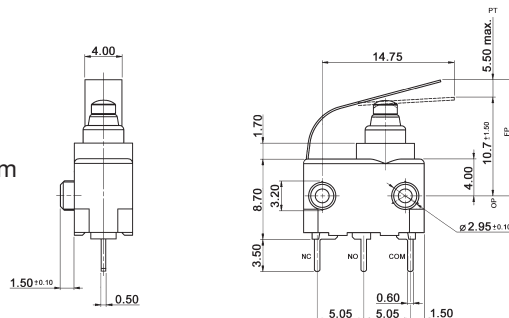
DM-DW 1 L01 S on – mom
(operation force 220 gf max)



DM-DW 1 L05 S on – mom
(operation force 180 gf max)



DM-DW 1 L03 P15 on – mom
(operation force 250 gf max)



Subminiature Micro / Snap Action Switches



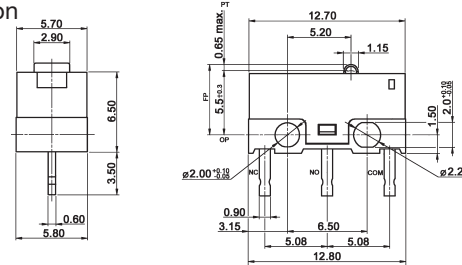
Specifications:

Contact rating:	125 V AC, 3 A
Contact resistance:	< 100 mΩ
Insulation resistance:	> 100 MΩ
Dielectric strength:	600 V, 50 Hz for the duration of 1 minute
Operating temperature:	-40 °C to +85 °C
Mechanical life:	minimum 1 000 000 operations
Contacts:	silver-alloy, gold-plating on request
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. 260 °C

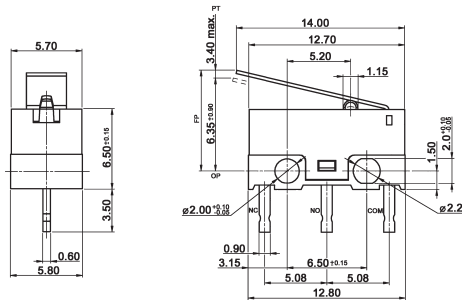
Models:

Switching function

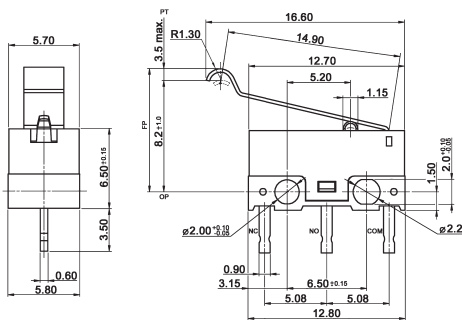
DM-DMG 3 L00P150 on – mom
(operation force 150 gf max)



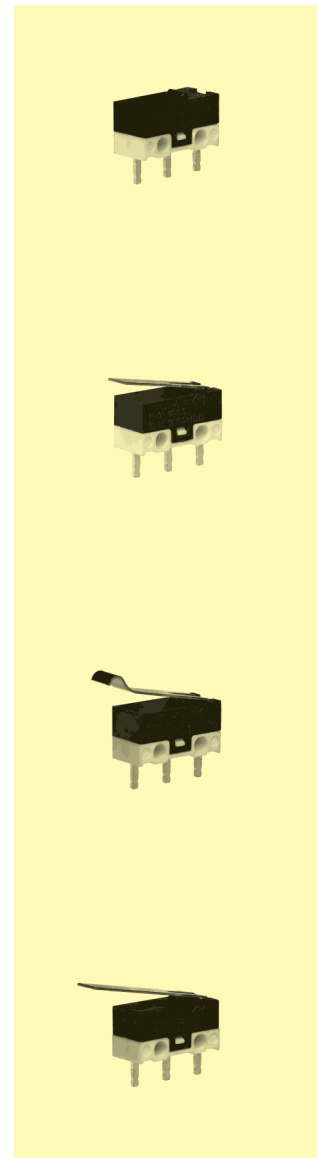
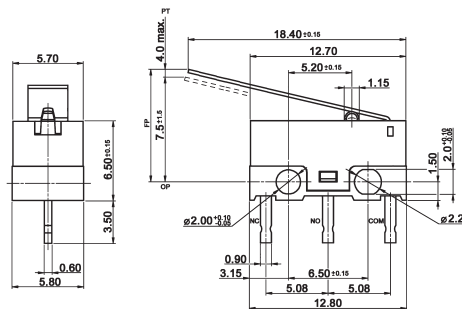
DM-DMG 3 L02P150 on – mom
(operation force 50 gf max)



DM-DMG 3 L07P150 on – mom
(operation force 50 gf max)



DM-DMG 3 L03P150 on – mom
(operation force 50 gf max)





Microminiature Micro / Snap Action Switches

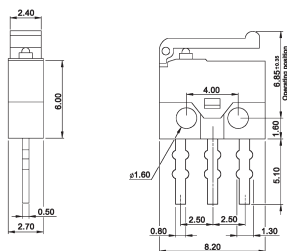
Specifications:

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

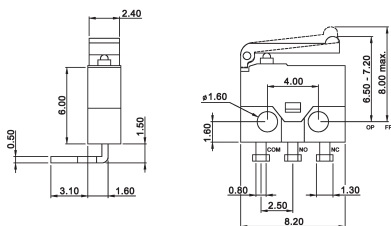
Models: Switching functions

SPDT

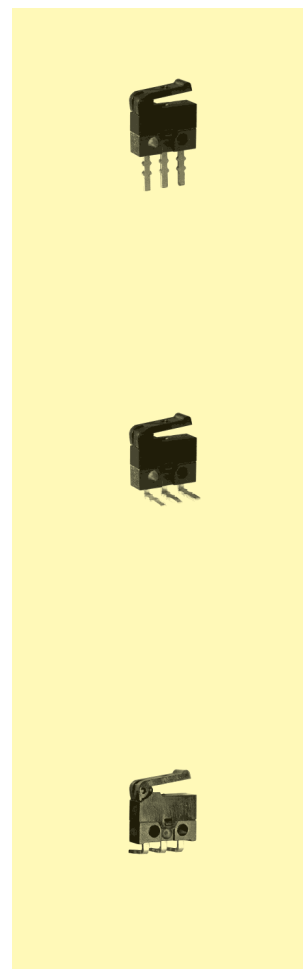
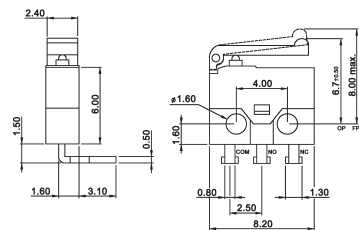
DM-SSM 01 L2 on – mom



DM-SSM 01 C L2 on – mom



DM-SSM 01 D L2 on – mom



Further types on request.

13

Anti-Vandal Pushbutton Switches



Series MAV	waterproof IP 67, IP 65, also with LEDs	224 – 228
Series CTK	capacitive, waterproof, illuminated	229 – 230
Series PBP	piezo, waterproof, illuminated	231

Anti-Vandal Pushbutton Switches

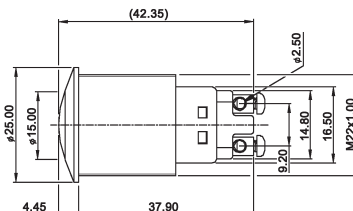
Specifications:

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:

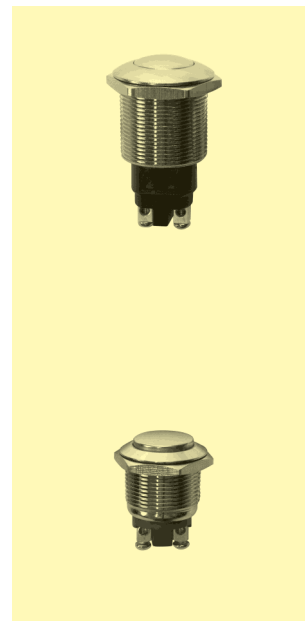
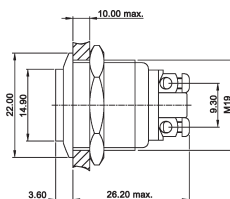
MAV 01 B1M1

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



Ordering code:

MAV 01

Bushing size:

- B1 M22
- B2 M19

Terminals:

- M1 Screw
- M3 Solder (for B2)

Button style:

- Curved
- F Flat (for B2)
- R Raised (for B2)

Material of button/case:

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



Anti-Vandal Pushbutton Switches waterproof, illuminated

Specifications:

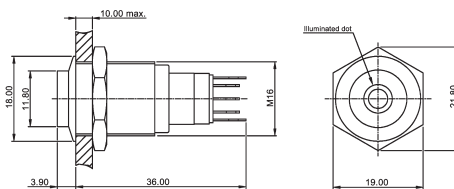
Contact rating:	250 V AC, 3 A
Contact resistance:	<50 mΩ
Insulation resistance:	>1000 MΩ
Dielectric strength:	2000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +55 °C
Electrical life:	50 000 operations
Operating force:	4 N max.
Protection:	IP 67, IK 09
Material:	Nut: nickel plated brass Base: PBT (UL 94 V-0)

Models:

Switching functions

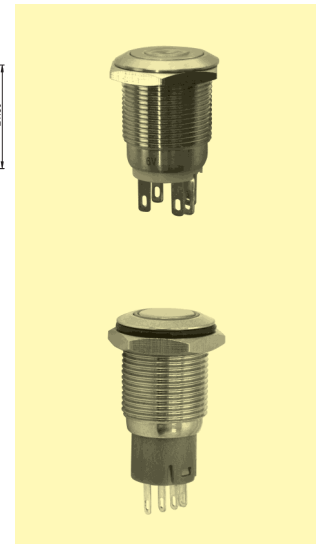
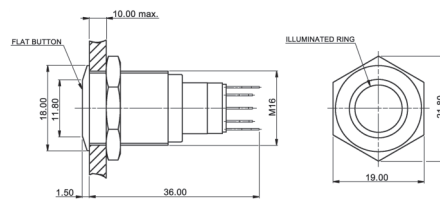
MAV 02 LB3M3RDO36V

on – mom



MAV 03 LB3M3FRG6V

on – on



Ordering code:

MAV B3 M3

Number of poles:

- 0 Single pole
- 2 Double pole

Illumination:

- Without
- L LED

Switching function:

- 2 on – mom
- 3 on – on

Button style:

- F Flat
- R Raised

Contact material:

- Silver alloy
- G Gold over silver alloy

Material of button/case:

- Brass, nickel plated
- 1 Brass, gold plated
- 2 Stainless steel
- 3 Zinc alloy, nickel plated, black

Lens style:

- Without LED
- D Dot illumination
- R Ring illumination

Resistor for LED (AC/DC):

- Without LED
- 6V 6 V, 15 mA
- 12V 12 V, 15 mA
- 24V 24 V, 15 mA
- 36V 36 V, 15 mA
- 110V 110 V, 15 mA
- 220V 220 V, 15 mA

Anti-Vandal Pushbutton Switches waterproof, illuminated



Specifications:

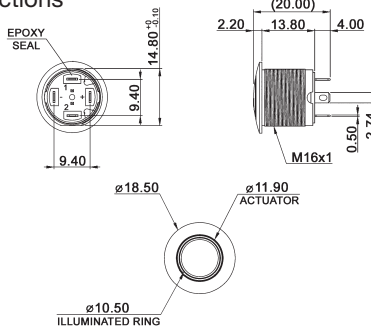
Contact rating:	36 V DC, 2 A
Contact resistance:	<50 mΩ
Insulation resistance:	>1000 MΩ
Dielectric strength:	2000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	1000 000 operations
Operating force:	4.5 N ± 1.5 N
Protection:	IP 67
Material:	Case, button: aluminum Contacts: silver alloy Nut: nickel plated brass Base: PBT (UL 94 V-0)

Models:

MAV 16 CARE-1-JR-0V

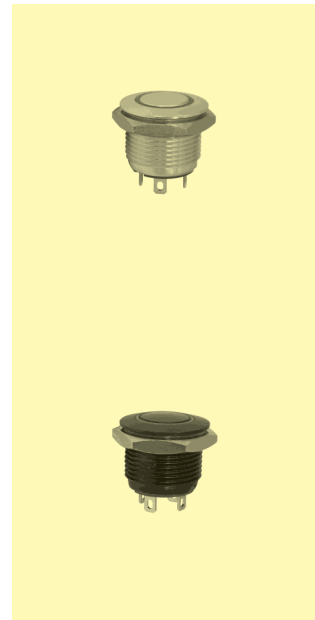
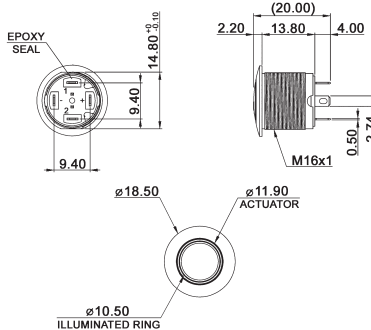
Switching functions

off – mom



MAV 16 CBRE-1-JR-0V

off – mom



Ordering code: MAV 16 [] [] - [] [] [] V

Button style:
[R] Curved

LED color:
[0] no LED
[1] White
[3] Red
[5] Yellow
[6] Green
[7] Blue

Contact:
[R] Gold flash over silver

Terminals:
[J] Solder lugs
[T1] Flying wire 500 mm

Resistor for LED:

- [0] Without resistor
- [3] 3 V DC, ca. 20 mA
- [6] 6 V DC, ca. 20 mA
- [12] 12 V DC, ca. 20 mA
- [24] 24 V DC, ca. 20 mA

The LED serial resistor is an external part, in scope of delivery.

Material of button/case:

- [CA] Aluminium
- [CB] Aluminium, black

Lens style:

- [E] Ring



Anti-Vandal Pushbutton Switches waterproof, illuminated

Specifications:

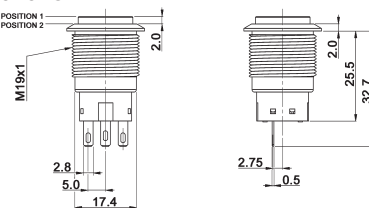
Contact rating:	250 V AC, 3 A	28 V DC, 3 A
Contact resistance:	<50 mΩ	
Insulation resistance:	>1000 MΩ	
Dielectric strength:	2000 V, 50 Hz for the duration of 1 minute	
Operating temperature:	-20 °C to +55 °C	
Mechanical life:	1000 000 operations (momentary), 500 000 operations (latching)	
Operating force:	3 N ± 1.5 N	
Protection:	IP 67	
Material:	Case, button: stainless steel	Contacts: silver plated brass
	Nut: nickel plated brass	Base: PBT (UL 94 V-0)

Models:

Switching functions

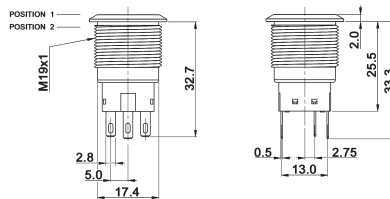
MAV 19 A0H1-00-JQ

on – mom



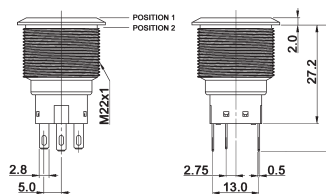
MAV 19 A0F11E-A12-JQ

on – mom



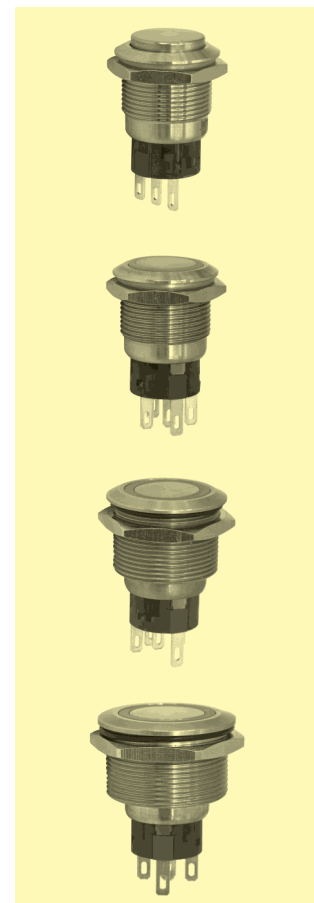
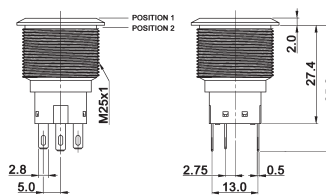
MAV 22 A0F10E-712-JQ

on – mom



MAV 25 A0F10E-312-JQ

on – mom



Ordering code:

MAV [] [] [] [] [] - [] [] - [] []

Bushing size:

- [19] M19x1
- [22] M22x1
- [25] M25x1

Button shape:

- [F] Recessed
- [H] Raised

Switching function:

- [0] on – mom
- [1] on – on

LED color:

- [0] Without LED
- [1] White
- [3] Red
- [5] Yellow
- [6] Green
- [7] Blue

Number of poles:

- [1] Single pole
- [2] Double pole

Lens style:

- [] Without LED
- [E] Ring
- [D] Dot

LED voltage (AC/DC):

- [] Without LED
- [3] 3 V, ca. 12 mA
- [6] 6 V, ca. 12 mA
- [12] 12 V, ca. 12 mA
- [24] 24 V, ca. 12 mA
- [36] 36 V, ca. 12 mA
- [110] 110 V, ca. 5 mA
- [220] 220 V, ca. 5 mA

Terminals:

- [J] Solder lugs
- [T1] Wire 500 mm
- [T2] Wire 1000 mm

Solder tab surface:

- [Q] Silver
- [R] Gold flash over silver

Material of button/case:

- [A0] Stainless steel
- [B1] Brass, chromium plated
- [B2] Brass, nickel plated
- [C3] Aluminium, nickel plated, black

knitter-switch | 227

Anti-Vandal Pushbutton Switches waterproof, illuminated



Specifications:

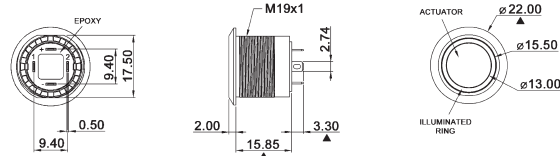
Contact rating:	36 V DC, 2 A
Contact resistance:	< 50 mΩ
Insulation resistance:	> 1000 MΩ
Dielectric strength:	2000 V, 50 Hz for the duration of 1 minute
Operating temperature:	-20 °C to +70 °C
Mechanical life:	1000 000 operations
Operating force:	4.5 N ± 1.5 N
Protection:	IP 67, IK 10
Material:	Case, button: stainless steel Contacts: silver plated brass Nut: nickel plated brass Base: PA

Models:

Switching functions

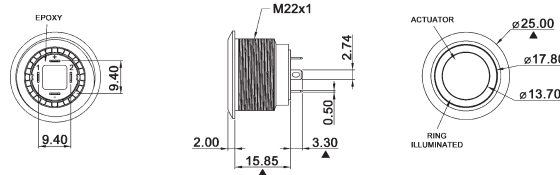
MAVS 19 A01FE-A-JR-0V

off – mom



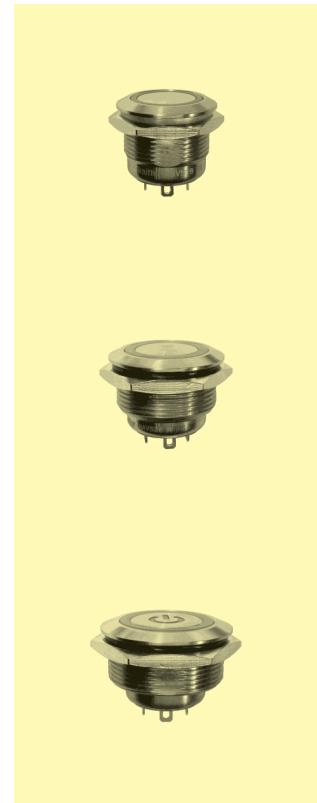
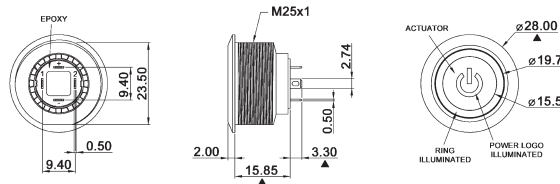
MAVS 22 A02FE-3-JR-0V

off – mom



MAVS 25 A03FP-3-JR-3V

off – mom



Ordering code:

MAV [] [] [] [] - [] [] [] [] - [] [] [] [] V - [] []

Bushing size:

- [19] M19x1
- [22] M22x1
- [25] M25x1

Button style:

- [F] Flush

Lens style:

- [N] None
- [E] Ring
- [P] Ring + Standby-Logo

Button/Case material:

- [A01] Steel, double flat
- [A02] Steel, round
- [A03] Steel, D-shape

LED color:

- [0] no LED
- [1] White
- [3] Red
- [4] Orange
- [5] Yellow
- [6] Green
- [7] Blue
- [A] Red/Green
- [B] Red/blue

Terminal:

- [J] Solder lugs

Contacts:

- [R] Gold flash over silver

Wire length:

- [] no wires
- [L0001] 500 mm

Resistor for LED:

- [0] Without resistor
- [3] 3 V DC
- [6] 6 V DC
- [12] 12 V DC
- [24] 24 V DC

The LED serial resistor is an external part, in scope of delivery. For switches with wire, it is integrated in the wiring.



Anti-Vandal Pushbuttons piezo, waterproof, illuminated

Specifications:

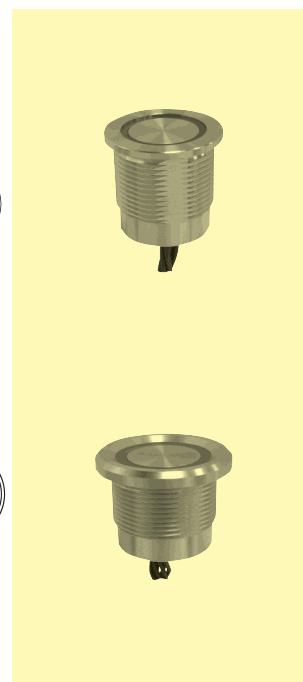
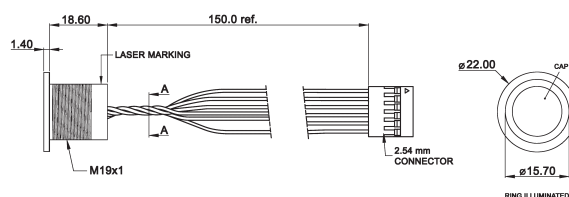
Contact rating:	5 to 24 V DC, 1 A
Contact resistance:	<1 Ω
Operating temperature:	-20 °C to +65 °C
Electrical life:	minimum 50 000 000 operations
Material:	aluminum
Terminals:	wire with female 2.54 mm pitch connector
Protection:	IP 68
Mounting:	single-hole mounting, panel thickness 10 mm max.

Models:

Switching functions

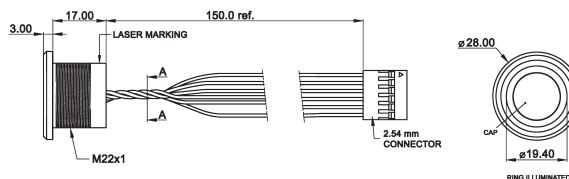
PBP 19 ANF-R-RGB-150

off – mom



PBP 22 ANM-R-RGB-150

off – mom



Ordering code:

PBP -

Bushing:

- 16 16 mm
- 19 19 mm
- 22 22 mm

Bushing Material:

AN Aluminium, natural

Button:

- F Flat
- H High-Flat
- M Concave

Illumination:

- without illumination
- R Ring illumination

LED color:

- no LED
- RGB

Leads:

- 300 mm length
- 150 mm length

For PBP 16 there is a MOQ and is only available with high flat button and without LED

14

Industrial Control Switches

Type	Function		Actuator / lens		illuminated	page
	momentary	latching	flush, short	raised, long		
Pushbutton						
ICE xxxP1x-xx00	•		•			235
ICE xxxP2x-xx10		•	•			
ICE xxxP3x-xx00	•			•		
ICE xxxE3x-xx00	•			•		
ICE xxxP4x-xx10		•		•		
ICE xxxP1x-xx20-Lxxx	•		•		•	
ICE xxxP2x-xx30-Lxxx		•	•		•	
ICE xxxP3x-xx20-Lxxx	•			•	•	
ICE xxxE3x-xx20-Lxxx	•			•	•	
ICE xxxP4x-xx30-Lxxx		•		•	•	
Selector						
ICE xxRS1x-xx00		•	•			236
ICE xxRS2x-xx00		•	•			
ICE xxRS3x-xx00	•	•	•			
ICE xxRS4x-xx00	•		•			
ICE xxRS5x-xx00	•		•			
ICE xxRSL1x-xx00		•		•		
ICE xxRSL2x-xx00		•		•		
ICE xxRSL3x-xx00	•	•		•		
ICE xxRSL4x-xx00	•			•		
ICE xxRSL5x-xx00	•			•		
ICE xxRS1x-xx20-Lxxx		•	•		•	
ICE xxRS2x-xx20-Lxxx		•	•		•	
ICE xxRS3x-xx20-Lxxx	•	•	•		•	
ICE xxRS4x-xx20-Lxxx	•		•		•	
ICE xxRS5x-xx20-Lxxx	•		•		•	
ICE xxRSL1x-xx20-Lxxx		•		•	•	
ICE xxRSL2x-xx20-Lxxx		•		•	•	
ICE xxRSL3x-xx20-Lxxx	•	•		•	•	
ICE xxRSL4x-xx20-Lxxx	•			•	•	
ICE xxRSL5x-xx20-Lxxx	•			•	•	
Keyleselector						
ICE xxRK1x-xx20-Lxxx		•			•	236
ICE xxRK2x-xx20-Lxxx		•			•	
ICE xxRK3x-xx20-Lxxx	•	•			•	
ICE xxRK4x-xx20-Lxxx	•				•	
ICE xxRK5x-xx20-Lxxx	•				•	
Emergency Switch						
ICE xxxE1R1-xx00		•		•		237
ICE xxxE1RM1-xx00		•		•		
ICE xxxE1RM2-xx00		•		•		
ICE xxxE1R-xx20-LxxR		•		•	•	
ICE xxxE1R10-xx20-LxxR		•		•	•	
ICE xxxE1G-xx20-LxxG		•		•	•	
Indicator						
ICE xxxL1x-0020-Lxxx			•		•	238
ICE xxxL3x-0020-Lxxx				•	•	
Accessory						
ICE xxxxxx						239

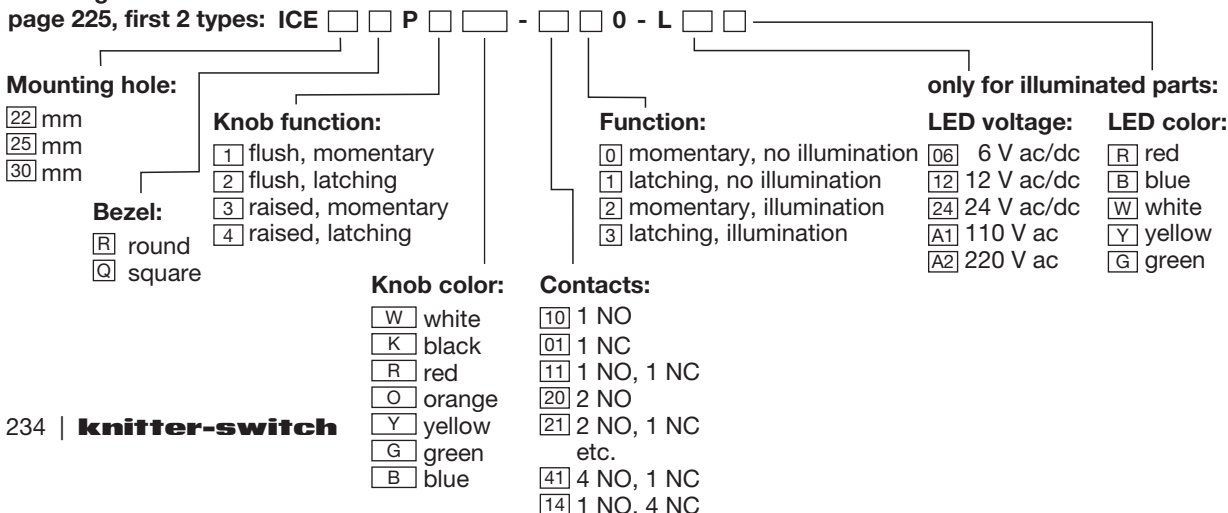


Industrial Control Switches

Global Specifications:

Utilization Category:	AC-15; A600; 3 A at 240 V; 1,9 A at 380 V DC-13; P600; 0,55 A at 250 V
Rated thermal current:	10 A
Rated insulation voltage:	650 V
Minimum load:	3 V, 5 mA
Contact resistance:	50 mOhm max.
Insulation resistance:	> 100 MΩ at 500 V DC
Dielectric strength:	2500 V, 50 Hz for the duration of 1 minute
Operating temperature:	illuminated components: -25 °C to +55 °C others: -25 °C to +70 °C
Storage temperature:	-40 °C to +85 °C
Operation/storage humidity:	45 to 85 % RH
Ingress Protection:	IP65 from front
Contamination class:	3
Vibration resistance:	10-55 Hz, 0.5 mm
Shock resistance:	10 G (Malfunction), 100 G (Destruction)
Mechanical life:	Emergency switch: 300k cycles Pushbutton (momentary): 5M cycles Pushbutton (latching): 500k cycles Pushbutton (E3 special type): 1M cycles Selector and Keyselector: 500k cycles
Electrical life:	Emergency switch: 100k cycles others: 500k cycles
Operation force (for ref. only):	Emergency switch: 30 N Momentary: 35 N Latching: 25 N E3 special type: 25 N Selector and Keyselector: 0.2 to 0.6 Nm
Contact Design:	positive break for NO contacts
Nominal diameters:	22, 25, 30 mm
Number of contact blocks per unit:	5 max.
Referenced safety standards:	UL508, CSA 22.2 No. 4, EN60947-5-1, EN60947-5-5

Ordering code for

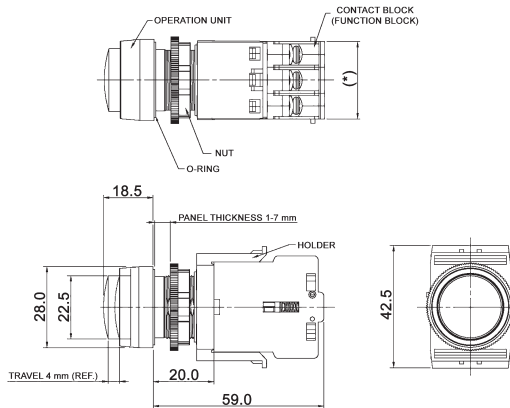




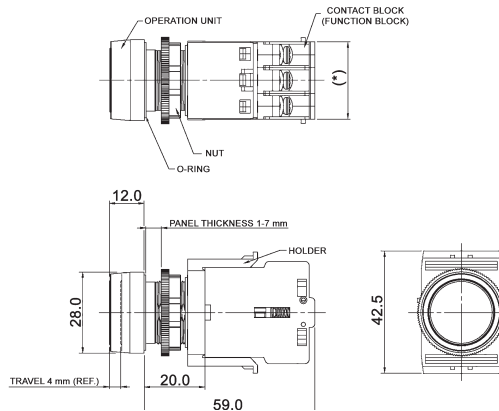
Pushbuttons for Industrial Controls

Type:

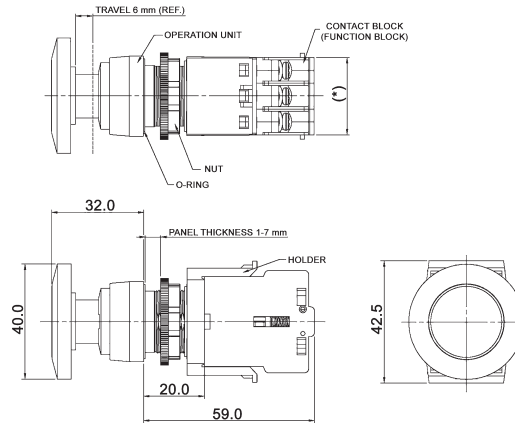
ICE 22RP3K-2100



ICE 22RP2R-0210



ICE 22RE3G-1020-LA2G



Ordering code for last type:

ICE E - 0 - L

Mounting hole:

- 22 mm
- 25 mm
- 30 mm

Actuator function:

- 3 momentary

Bezel:

- R round
- Q square

Actuator color and style:

- R red, disc illuminated
- G green, disc illuminated
- R1 red, disc
- RM1 red, flat mushroom
- YM1 yellow, flat mushroom
- BM1 blue, flat mushroom
- GM1 green, flat mushroom
- KM1 black, flat mushroom
- RM2 red, high mushroom
- YM2 yellow, high mushroom
- BM2 blue, high mushroom
- GM2 green, high mushroom
- KM2 black, high mushroom

Function:

- 0 no illumination
- 2 illumination

Contacts:

- 10 1 NO
- 01 1 NC
- 11 1 NO, 1 NC
- 20 2 NO
- 21 2 NO, 1 NC etc.
- 41 4 NO, 1 NC
- 14 1 NO, 4 NC

only for illuminated parts:

LED voltage:

- 06 6 V ac/dc
- 12 12 V ac/dc
- 24 24 V ac/dc
- A1 110 V ac
- A2 220 V ac

LED color:

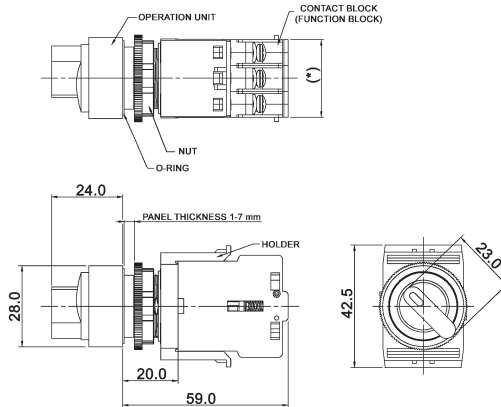
- R red
- B blue
- W white
- Y yellow
- G green

Selector/Keyselector Switches for Industrial Controls

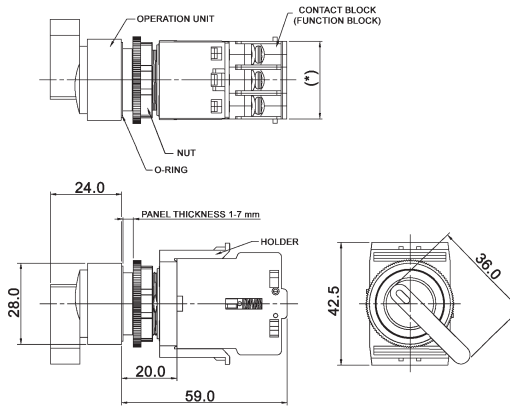


Type:

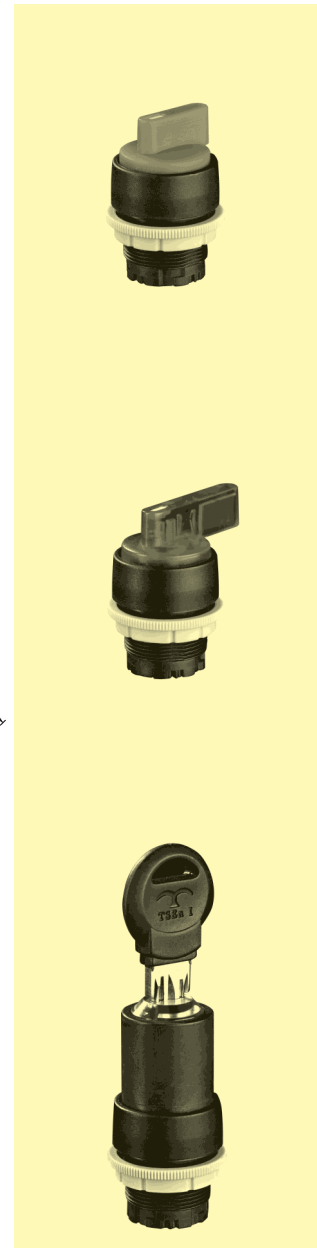
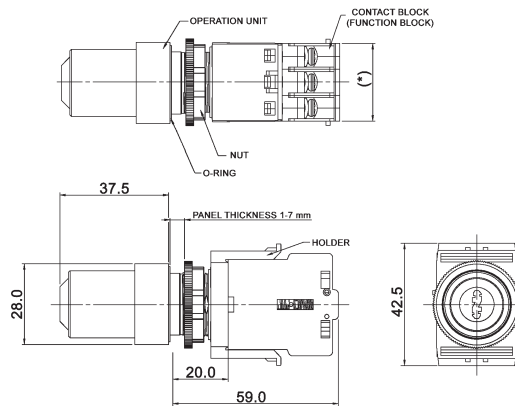
ICE 22RS5G1-1100



ICE 22RSL4R-1020-LA2R



ICE 22RK2W-1120-LA2W



Ordering code:

ICE [] [] [] [] [] - [] [] 0 - L [] []

Mounting hole:

- 22 mm
- 25 mm
- 30 mm

Bezel:
[R] round

Actuator:

- [S] handle, short
- [SL] handle, long
- [K] key operation

Positions:

- [1] two, latching
- [2] three, latching
- [3] three, auto-return from right
- [4] two, auto-return from right
- [5] three, double auto-return

Actuator color:

- [W] white, illuminated
- [R] red, illuminated
- [Y] yellow, illuminated
- [G] green, illuminated
- [B] blue, illuminated
- [W1] white
- [R1] red
- [K1] black
- [Y1] yellow
- [G1] green
- [B1] blue

Contacts:

- [10] 1 NO
- [01] 1 NC
- [11] 1 NO, 1 NC
- [20] 2 NO
- [21] 2 NO, 1 NC etc.
- [41] 4 NO, 1 NC
- [14] 1 NO, 4 NC

only for illuminated parts:

LED voltage:

- [06] 6 V ac/dc
- [12] 12 V ac/dc
- [24] 24 V ac/dc
- [A1] 110 V ac
- [A2] 220 V ac

LED color:

- [R] red
- [B] blue
- [W] white
- [Y] yellow
- [G] green

Illumination:

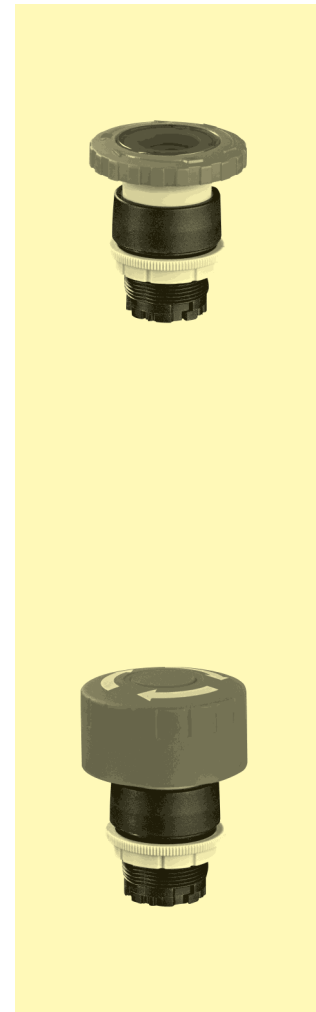
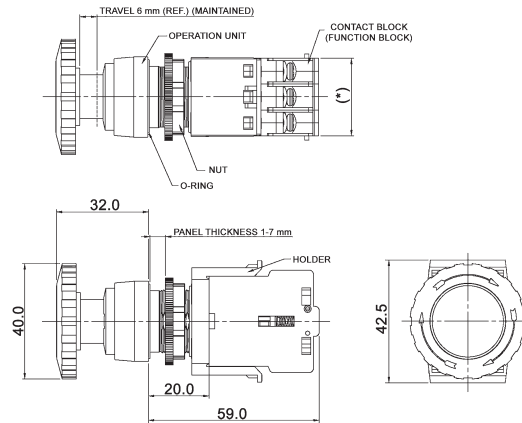
- [0] without
- [2] with



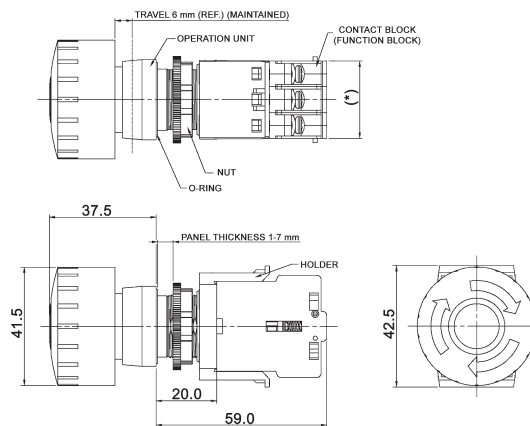
Emergency Switches for Industrial Controls

Models:

ICE 22RE1R10-0120-LA2R



ICE 22RE1RM2-0200



Ordering code: ICE E - 0 - L

Mounting hole:

- 22 mm
- 25 mm
- 30 mm

Actuator:

- 1 latching

Bezel:

- R round
- Q square

Actuator color and style:

- R red, disc illuminated
- R10 red, disc illuminated, opaque rim
- G green, disc illuminated
- R1 red, disc
- RM1 red, flat mushroom
- RM2 red, high mushroom

Function:

- 0 no illumination
- 2 illumination

Contacts:

- 10 1 NO
- 01 1 NC
- 11 1 NO, 1 NC
- 20 2 NO
- 21 2 NO, 1 NC etc.
- 41 4 NO, 1 NC
- 14 1 NO, 4 NC

only for illuminated parts:

LED voltage:

- 06 6 V ac/dc
- 12 12 V ac/dc
- 24 24 V ac/dc
- A1 110 V ac
- A2 220 V ac

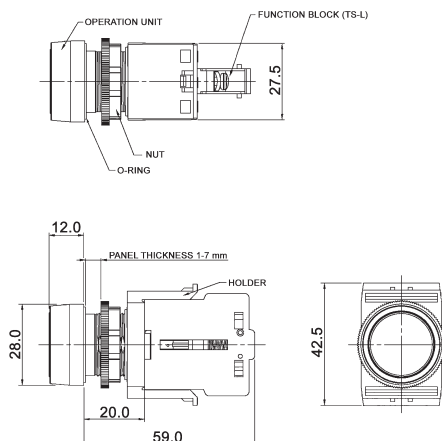
LED color:

- R red
- B blue
- W white
- Y yellow
- G green

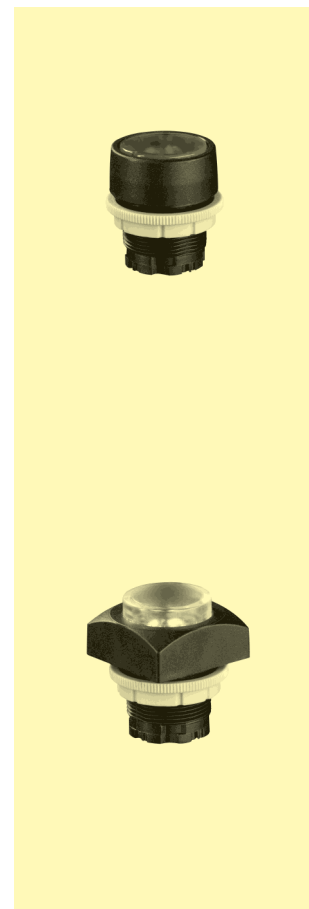
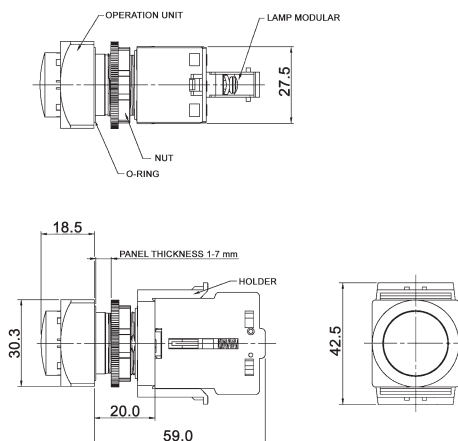
Industrial Controls Indicator Lights

Models:

ICE 22RL1R-0020-LA2R



ICE 22QL3W-0020-LA2W



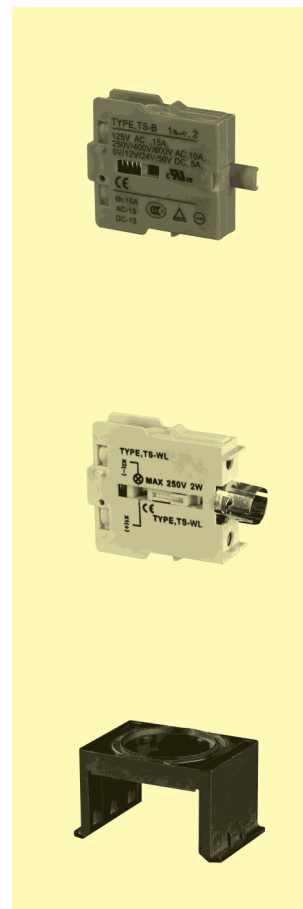
Ordering code: ICE L - 0020 - L

Mounting hole: <input type="checkbox"/> 22 mm <input type="checkbox"/> 25 mm <input type="checkbox"/> 30 mm	Bezel: <input type="checkbox"/> R round <input type="checkbox"/> Q square	Lens: <input type="checkbox"/> 1 flush <input type="checkbox"/> 3 raised	Lens color: <input type="checkbox"/> W white <input type="checkbox"/> R red <input type="checkbox"/> O orange <input type="checkbox"/> Y yellow <input type="checkbox"/> G green <input type="checkbox"/> B blue	LED voltage: <input type="checkbox"/> 06 6 V ac/dc <input type="checkbox"/> 12 12 V ac/dc <input type="checkbox"/> 24 24 V ac/dc <input type="checkbox"/> A1 110 V ac <input type="checkbox"/> A2 220 V ac	LED color: <input type="checkbox"/> R red <input type="checkbox"/> B blue <input type="checkbox"/> W white <input type="checkbox"/> Y yellow <input type="checkbox"/> G green
---	--	---	---	--	---



Accessories for Industrial Control Switches

Models:	Switching functions
ICE TS-A	contact block 1a (NO), green
ICE TS-B	contact block 1b (NC), red
ICE TS-W	latch module (needed for latching pusbuttons), grey
ICE TS-L	LED-socket, yellow
ICE TS-WL	latch module w/ LED socket, grey (needed for illuminated latching pushbuttons)
ICE AC-00-M3	holder for 3 contact blocks
ICE AC-00-M5	holder for 5 contact blocks (without picture)



Further available (examples, others on request) are:

ICE AC00-T1	socket wrench
ICE AC00-K1	spare keys (2 pcs.) for key selector
ICE AC00-R22	O-Ring, 22 mm
ICE L24B	LED-lamp, 24 V, blue

15 Membrane Keypads

15.1 Membrane Keypads

242–243

15.2 Inquiry Form

244

Membrane Keypad Structure

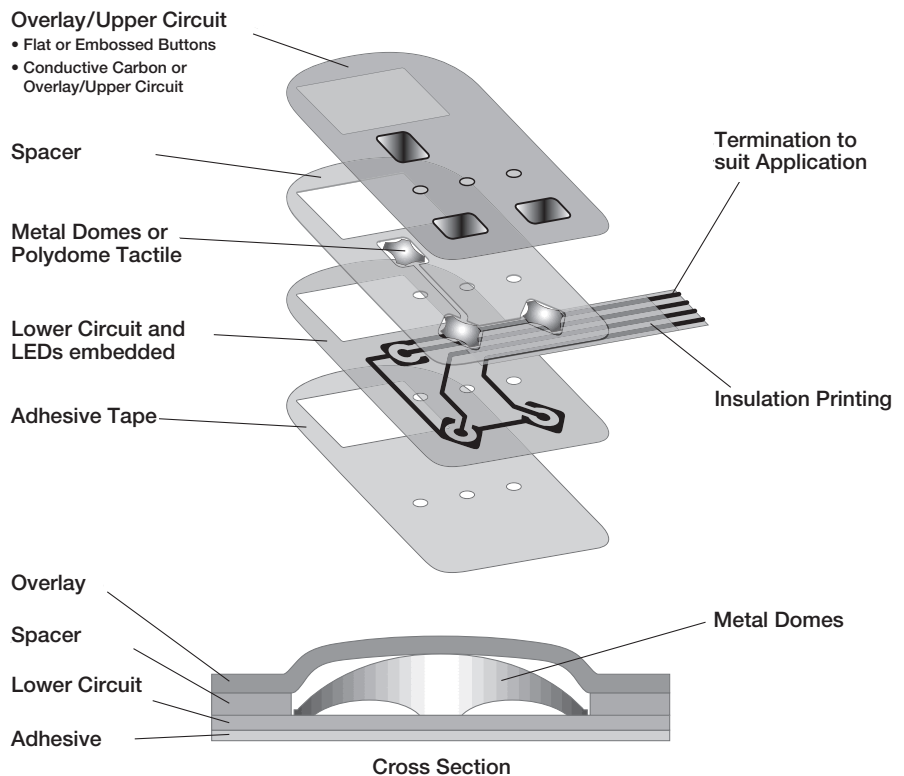


Reference Materials:

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:

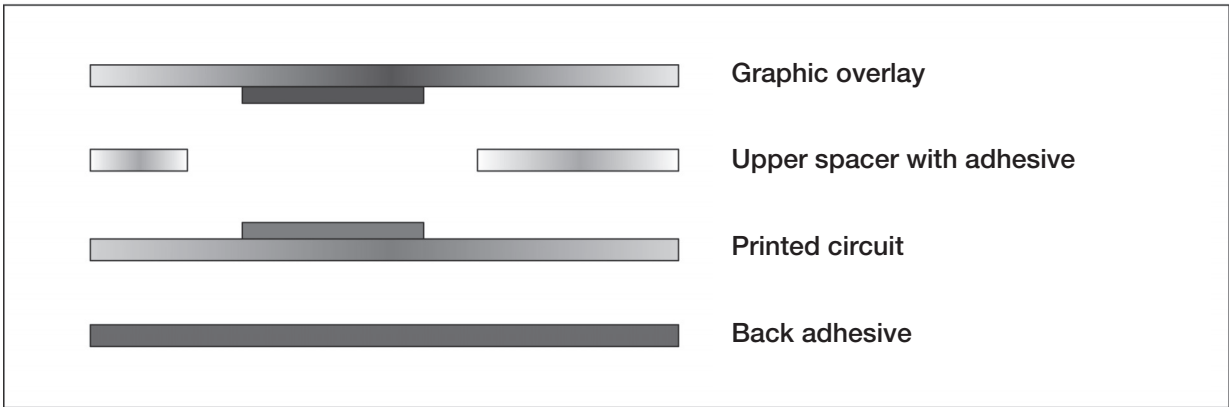
	Polydome	Metaldome
Operating voltage:	min. 100 mV AC/DC max. 25 V AC / 42 V DC	min. 100 mV AC/DC max. 25 V AC / 42 V DC
Breaking current:	100 mA	100 mA
Max. initial contact resistance:	500 Ω	500 Ω
Min. isolation resistance:	100 MΩ	100 MΩ
Operating temperature:	-5 °C ... +50 °C	-10 °C ... +80 °C
Endurance:	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



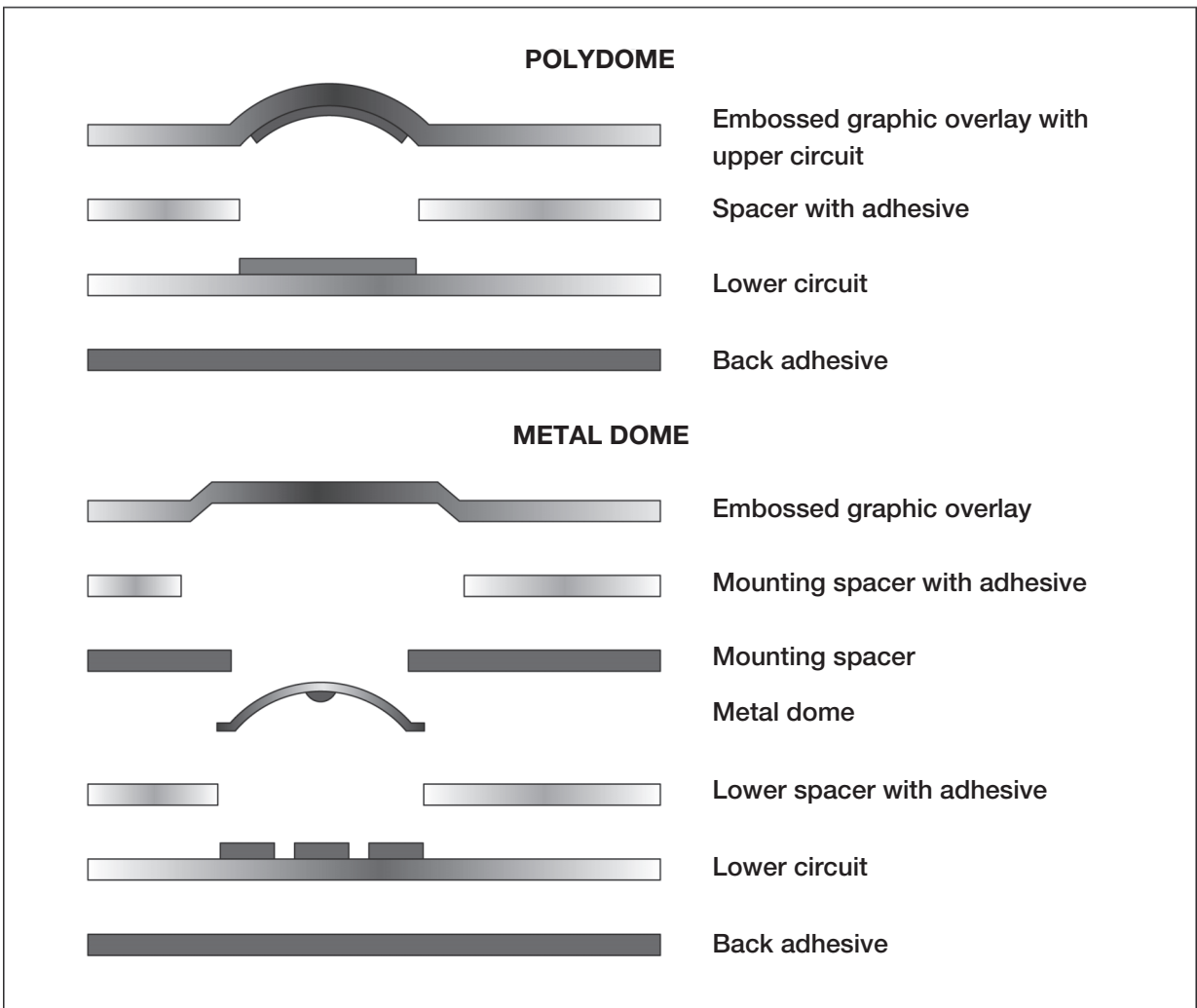


Membrane Switch Structure

Flat Type (Non-Tactile)



Tactile Type



Membrane 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 _____

Switches

Number _____

Tactile or non-tactile _____

If tactile: polydome or metal dome _____

Metal means higher unit cost, lower tool cost.

Polydome means lower unit cost, higher tool cost.

Detail of switch matrix _____

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. _____

Any special features required

Insert legends _____

Luminescent inks _____

Other _____

Estimated project volume



16 Rubber Keypads

16.1 Rubber Keypads

246–248

16.2 Inquiry Form

249–250

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 %

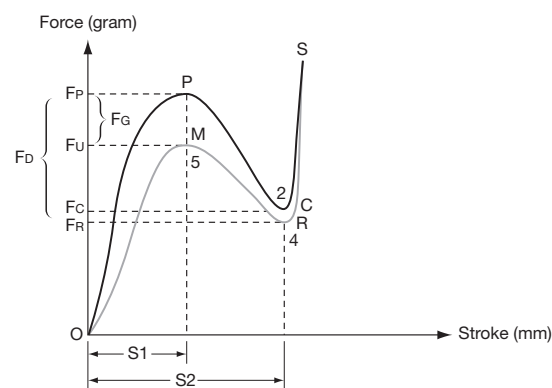
Mechanical and Electrical Properties of Silicone Rubber:

Temperature for use:	-55 °C to +250 °C
Specific Gravity:	1.15
Tensile Strength:	90 Kg/cm ²
Tear Strength:	13 Kgf/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	
F _P	Peak Force (F _{max})
F _U	Max. Return Force
F _C	Contact Force
F _R	Min. Return Force (F _{min})
F _M	Max. Return Force
F _D	Drop Force (F _D = F _P - F _C)
F _G	Gap Force (F _G = F _P - F _M)

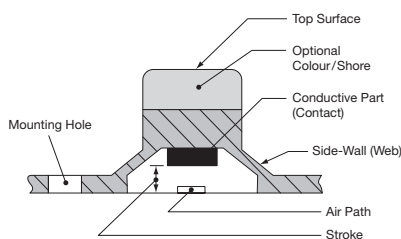
Stroke	
S ₁	Peak Stroke
S ₂	Contact Stroke

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

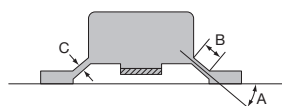
Travel	
O-P	Peak Force (F _{MAX})
P-C	Contact Force
C-S	Min. Return Force (F _{MIN})
S-R-M-O	Gap Force (F _G = F _P - F _M)

Basic Construction

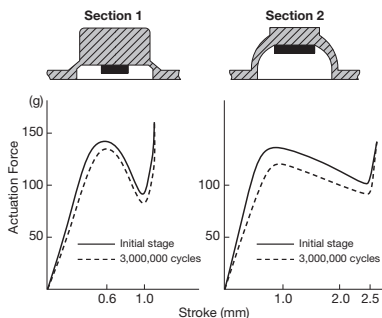
Illustration:



Life Test:

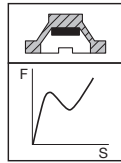


- Operating life depends on:**
- **Soft Material** ... 50 Shore is preferred.
 - **Low Stroke** ... less than 1 mm
 - **Angle** (as part A illustrated above) ... 40-degree is recommended.
 - **Length of side-wall** ... (as part B illustrated above)
 - **Thickness of side-wall** ... (as part C illustrated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

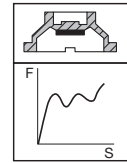


Typical Key Sections and Characteristics:

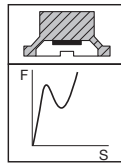
Force Range: 30 ~ 350 grams
 Stroke Range: 0.5 ~ 3.0 mm
 Cycle Life (x10³): 500 ~ 2000
 Typical uses: Telephone, Remote Control, Automotive, Radio, Toys, Calculator, etc.



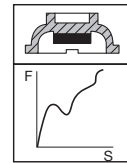
Force Range: 30 ~ 80 grams
 Stroke Range: 2.0 ~ 4.0 mm
 Cycle Life (x10³): 5000 ~ 20000
 Typical uses: Computer, Typewriter etc.



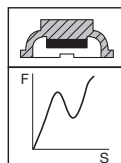
Force Range: 30 ~ 250 grams
 Stroke Range: 0.7 ~ 2.5 mm
 Cycle Life (x10³): 1000 ~ 3000
 Typical uses: Telephone, Remote Control, Toys, Games, Calculator, etc.



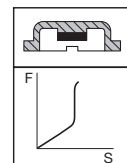
Force Range: 30 ~ 200 grams
 Stroke Range: 1.0 ~ 2.5 mm
 Cycle Life (x10³): 500 ~ 3000
 Typical uses: Telephone, Typewriter, Test Instruments, etc.



Force Range: 30 ~ 150 grams
 Stroke Range: 0.5 ~ 3.0 mm
 Cycle Life (x10³): 1000 ~ 3000
 Typical uses: Telephone, Remote Control, Toys, Measuring Instruments, Office Machine

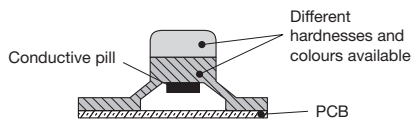


Force Range: 20 ~ 80 grams
 Stroke Range: 0.2 ~ 1.0 mm
 Cycle Life (x10³): 500 ~ 10000
 Typical uses: Typewriter, Household Appliances, Computer, etc.

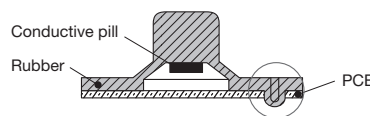


Some Special Design Illustrations:

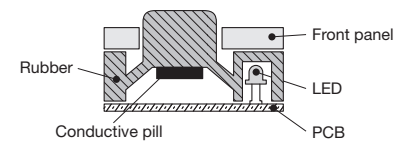
1. Different shorehardnesses in the basic keypad and key



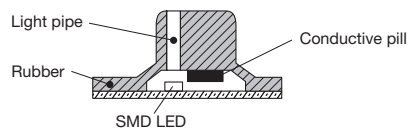
2. Push or pull thru to anchor keypad to PCB



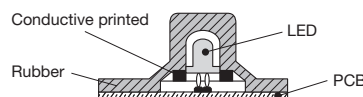
3. Back lighting – option 1



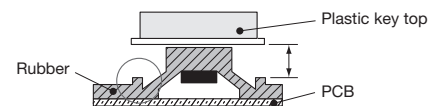
4. Squared key top design with LED light pipe



5. Back lighting – option 2

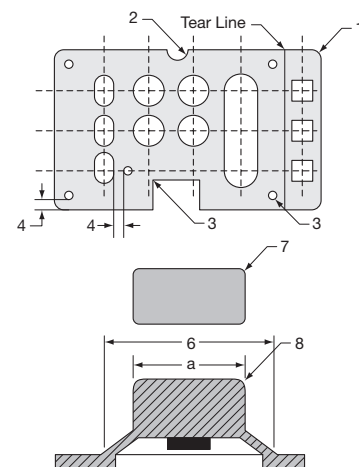


6. Control of travel distance



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.

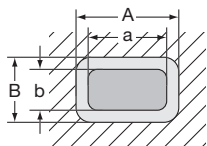


Rubber Keypad Design

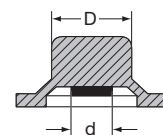
Guideline for Assembly Design:

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

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

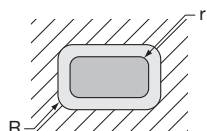


$D-d = 1.5 \text{ to } 2.0 \text{ mm}$



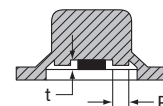
R: the corner radius of plastic
r: the corner radius of rubber

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



P: diameter of post
t: the gap between post & conductive pill

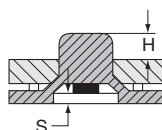
$P = 1.0 \text{ mm}$ is better
 $t = 0.1 \sim 0.15 \text{ mm}$ is better



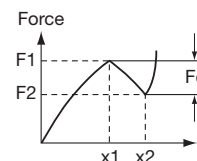
H: the dimension of key tops & plastic

S: the stroke of key pad

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

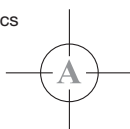


F_c : click force
 $F_1 - F_2 > 25 \text{ g}$ is better



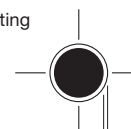
Guideline for Printing Artwork Design:

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

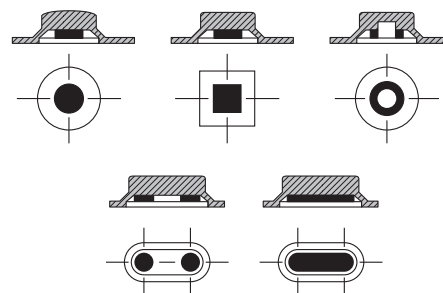
Recommended size of conductive ink printing contact is flexible.

Less than 150 ohms, with 125 grams loading

minimum 10 million operations

Less than 500 ohms, with 125 grams loading

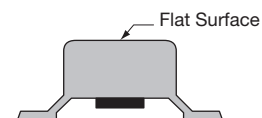
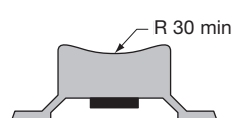
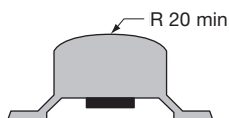
1×10^6 max. operations



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.



Rubber Keypads Inquiry Form

Company

Department

Attention

Address

Postcode

Phone

Fax

Email

Web

Requirements

Size:

Coating Type:

Number of Colours:

Numer of Buttons:

Contact Element:

Carbon Ink

Carbon Pill

Metal Dome

Quantity:

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



Layout Inquiry

A large grid of 30 columns and 30 rows, intended for sketching a keypad layout. The grid is composed of thin black lines forming small squares.

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



17

Steel Keyboards

17.1 IP-Line

252–255

17.2 MF-Line

256

17.3 SF-Line

257

Input Systems Metal Keyboards



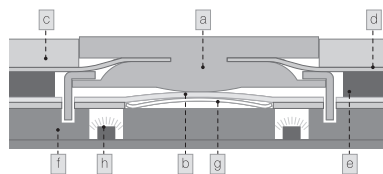
IP-Line

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 ± 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

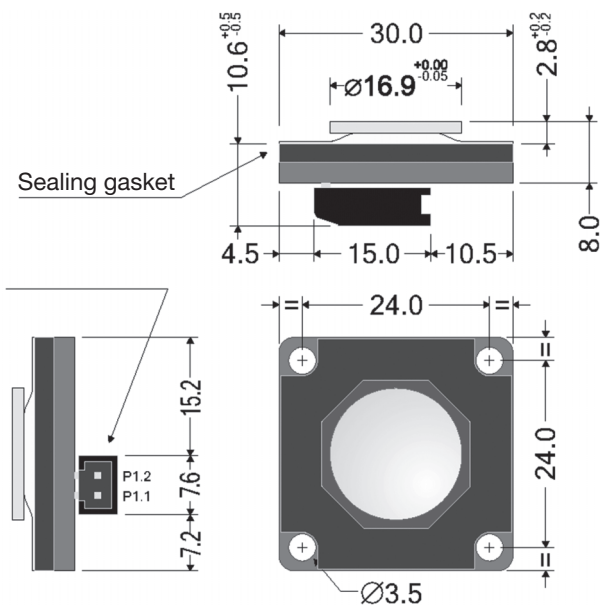


Input Systems Metal Keyboards

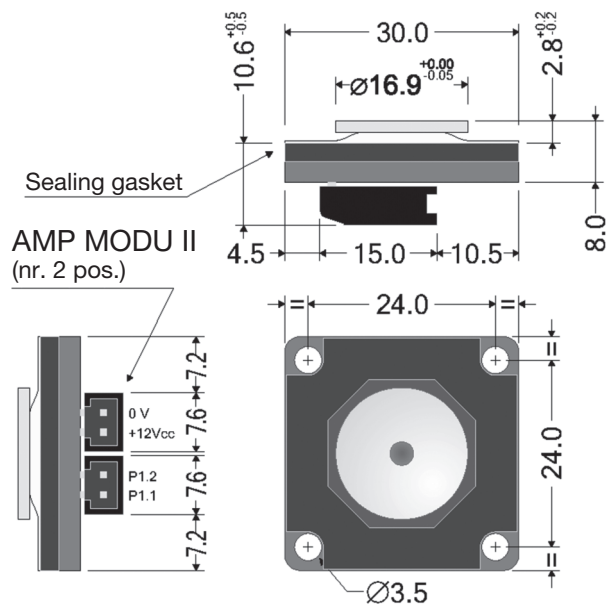
IP-Line

Models:

YME IP 01 A



YME IP 01 B

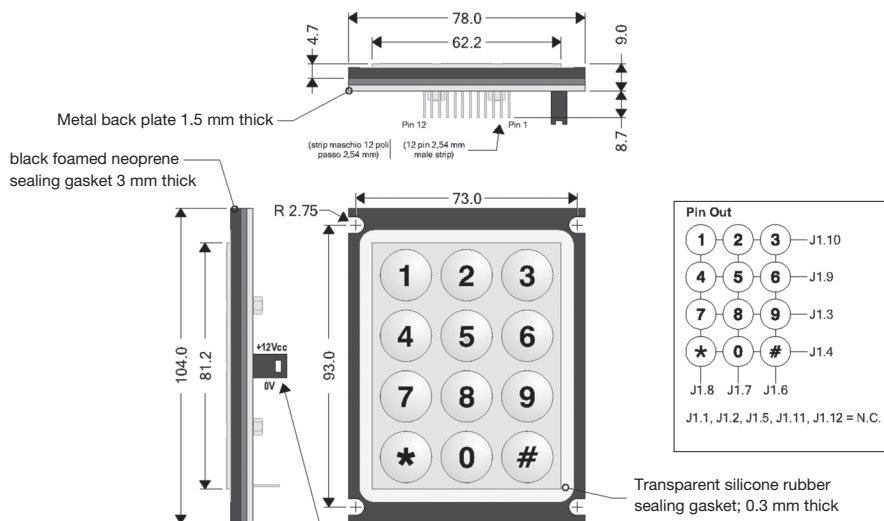


Input Systems Metal Keyboards

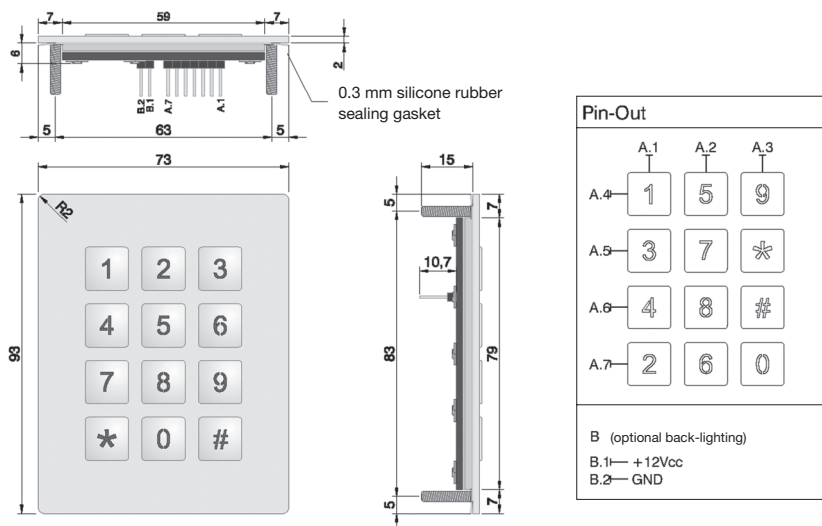
IP-Line

Models:

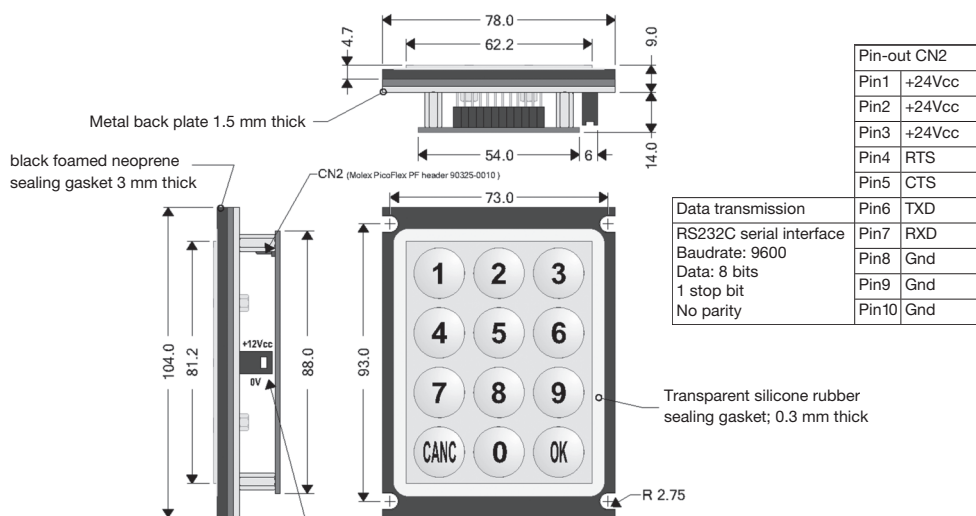
YME IP 12 D



YME IP 12 H



YME IP 12 L



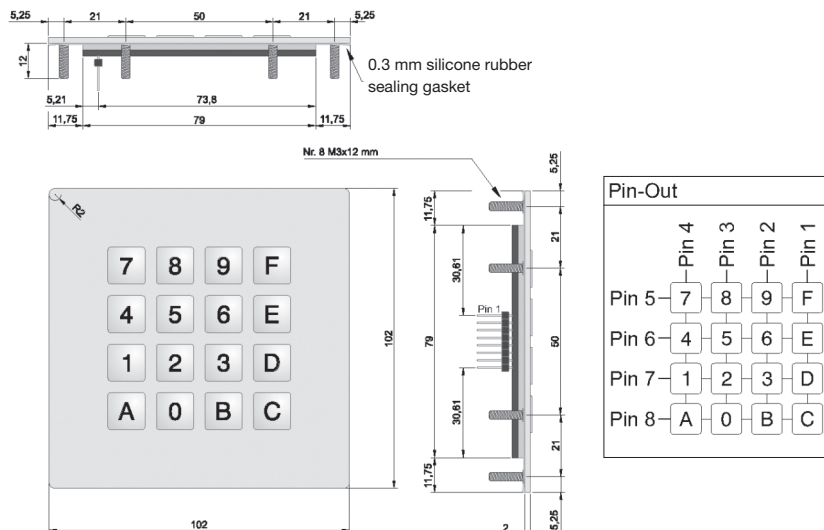


Input Systems Metal Keyboards

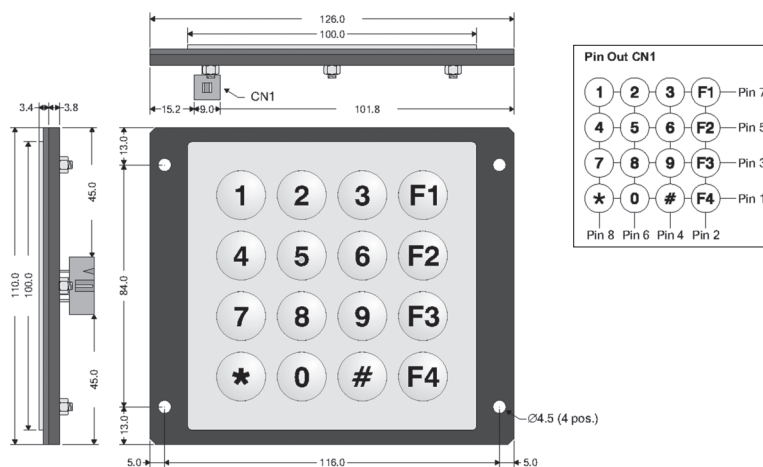
IP-Line

Models:

YME IP 16 I



YME IP 16 N

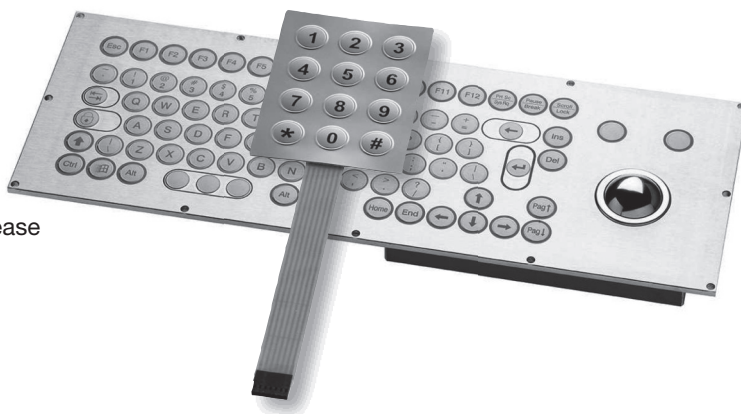


Customized products on request

Input Systems Metal Keyboards

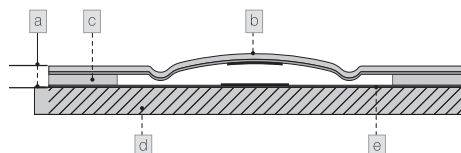
MF-Line

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:

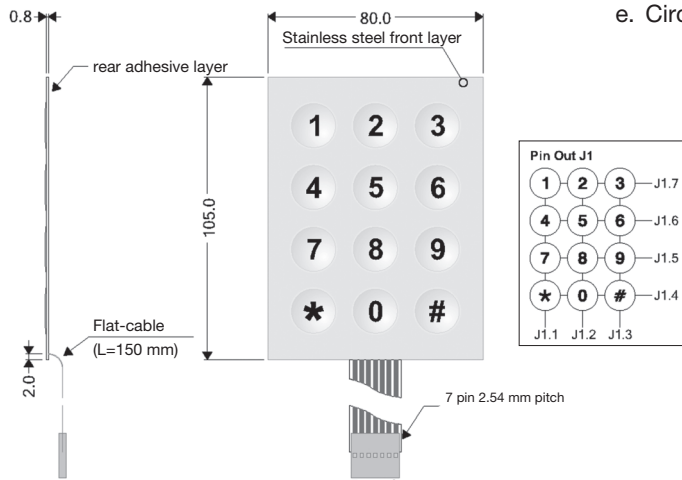
Material:	Front stainless steel 0.15 mm sheet on PET circuit or PCB FR4 circuit
Keys:	Ø 11 mm; Ø 15 mm; Ø 17 mm; chemical and/or silk screen printing marking
Switch stroke:	0.5 mm ± 0,1 mm
Connection:	PS/2, USB
Actuation force:	6 N
Life expectancy:	> 3 000 000 cycles
Protection degree:	IP 67 without 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





Input Systems Metal Keyboards

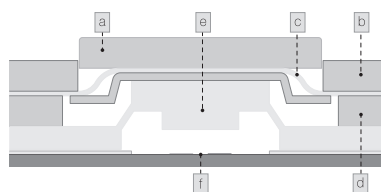
SF-Line

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 ± 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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knitter-switch

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