## Actuator with snap-action switching element

### Switching system

Self-cleaning, double-break snap-action switching system with contact opening width 2 x 0.5 mm (switch with small contact opening width as per EN IEC 61058-1).
The switching elements are optionally equipped with the following switching functions:
One to three normally open (NO) or normally closed (NC), or any combination of NO and NC plus connections for T1 3/4 LED or lamp.
The number of switching elements cannot exceed three.
The switching elements provided for the 3-position switch actuators are equipped with max. 2 NC or 2 NO or any combination.
The number of switching elements cannot exceed two.

### Material

**Lens**
Raised mounting Polymethylmethacrylat (PMMA), as per UL 94 HB, flush mounting Polycarbonat (PC), as per UL 94 V0, or Aluminium anodized

**Front bezel**
Polyetherimid (PEI), as per UL 94 V0, or Aluminium anodized

**Front ring**
Aluminium anodized

**Material of contact**
Silver or silver with gold plating

**Switching element**
Diallylphthalate (DAP), as per UL 94 V0 and Polyamide (PA 66), as per UL 94 V0

**Actuator housing**
Polyetherimide (PEI), as per UL 94 V0, self-extinguishing

### Mechanical characteristics

**Terminals**

| Solder | rigid | flexible | superflexible |
|---|---|---|---|
| 1 wire | 0.5 … 1.5 mm² | 0.5 … 0.75 mm² | 0.5 mm² |
| 2 wires | 0.75 mm² | 0.5 mm² | |

**Tightening torque**
for fixing nut max. 50 Ncm

**Actuating torque**
Selector-/Keylock switch 2.5 … 10 Ncm

**Actuating force**
Pushbutton 2.7 … 3.6 N

**Actuating travel**
Pushbutton 3 mm

| Selector-/keylock switch | 2 positions | 3 positions |
|---|---|---|
| Momentary action | approx. 42° | approx. 2 x 42° |
| Maintained action | approx. 90° | approx. 2 x 90° |

**Rebound time**
The rebound times apply to normal manual activation
Contact making 3 ms
Contact breaking 5 ms

**Mechanical lifetime**
as per DIN IEC 60512-5-6 and EN IEC 60947-5-1

| | |
|---|---|
| Pushbutton maintained action | 1 million cycles of operation |
| Pushbutton momentary action | 2 million cycles of operation |
| Keylock switch | 50 000 cycles of operation |
| Selector switch | 100 000 cycles of operation |

### Electrical characteristics

**Standards**
The devices comply with: EN IEC 61058-1 and EN IEC 60947-5-1

**Rated Operational Voltage $U_e$**
250 VAC/DC as per EN IEC 60947-1

**Rated Insulation Voltage $U_i$**
320 VAC, as per EN IEC 60947-5-1

**Rated Impulse Withstand Voltage $U_{imp}$**
4 kV, as per EN IEC 60947-5-1

**Contact resistance**
New state with silver contact ≤ 100 mΩ
as per DIN IEC 60512-2-4, measured at 100 mA, 10 V

New state with gold plated contact ≤ 50 mΩ
as per DIN IEC 60512-2-3, measured at 20 mV, 10 mA

**Electrical life**
≥ 50 000 cycles of operation at 250 VAC, 5 A, cosφ 0.95, as per EN IEC 60947-5-1

**Electrostatic discharge (ESD)**
Keylock switch 11 kV

**Conventional free air thermal current $I_{th}$**
5 A, as per EN IEC 60947-5-1
the maximum current in continuous operation and at ambient temperature must not exceed the quoted maximum values.

**Switch rating**
Switch rating AC with silver contact or silver contact with gold plating, service category AC-15, as per EN IEC 60947-5-1

| Voltage | 125 VAC | 250 VAC |
|---|---|---|
| Current | 2.5 A | 2 A |

Switch rating DC for silver contact or silver contact with gold plating, service category DC-13, as per EN IEC 60947-5-1

| Voltage | 250 VDC |
|---|---|
| Current | 0.15 A |

**Recommended minimum operational data**

| Material of contact | Silver | Silver with gold plating |
|---|---|---|
| Voltage | 20 VAC/DC | 5 VAC/DC |
| Current | 100 mA | 10 mA |

## Actuator with snap-action switching element

**Electric strength**
2500 VAC, 50 Hz, 1 min., as per DIN IEC 60512-2-11 between all terminals and earth

**Overvoltage category**
III, as per EN IEC 60947-5-1

**Protection class**
Class II, as per EN IEC 61058-1

**Degree of pollution**
3, as per EN IEC 60947-1

### Environmental conditions

**Storage temperature**
-40 °C … +85 °C

**Operating temperature**
-25 °C … +55 °C

**Protection degree**
as per EN IEC 60529
Front side IP 65, rear side IP 40

**Shock resistance**
(semi-sinusoidal)
max. 10 m/s², pulse width 11 ms, 3-axis,
as per EN IEC 60068-2-27

**Vibration resistance**
(sinusoidal)
max. 100 m/s² at 10 Hz … 500 Hz, as per EN IEC 60068-2-6

**Climate resistance**
Damp heat, cyclic
96 hours, +25 °C/97 %, +55 °C/93 % relative humidity,
as per EN IEC 60068-2-30

Damp heat, state
56 days, +40 °C/93 % relative humidity, as per EN IEC 60068-2-78

Rapid change of temperature
100 cycles, -40 °C … +80 °C, as per EN IEC 60068-2-14

### Approvals

**Approbations**
CB (IEC 61058)
CB (IEC 60947)
CSA
ENEC (EN 61058)
CCA-NTR (EN 60947)
CCC
CENELEC (IEC 60947-5-1)
Germanischer Lloyd
GOST
UL
SEV
NFF

**Declaration of conformity**
CE

## Actuator with slow-make switching element

### Switching system

Double-break slow-make system, contact opening width 2 x 1.5 mm, with 2 x 2 contact points per switching element. NC-contact elements in the slow-make elements fulfill requirements of switches with forced opening as per EN IEC 60947-5-12.17. The slow-make elements are optionally obtainable with the following switching functions : 1 NO or 2 NO, 1 NC or 2 NC, 1 NO + 1 NC.

### Material

**Lens**
Raised mounting Polymethylmethacrylat (PMMA), as per UL 94 HB, flush mounting Polycarbonat (PC), as per UL 94 V0, or Aluminium anodized

**Front bezel**
Polyetherimid (PEI), as per UL 94 V0, or Aluminium anodized

**Front ring**
Aluminium anodized

**Material of contact**
Silver or gold (specified for operation for low level switching)

**Switching element**
Diallylphthalate (DAP), as per UL 94 V0 and Polyamide (PA 66), as per UL 94 V0

**Actuator housing**
Polyetherimide (PEI), as per UL 94 V0, self-extinguishing

### Mechanical characteristics

**Terminals**

| | | | |
|---|---|---|---|
| – Solder | rigid | flexible | superflexible |
| 1 wire | 0.5 … 1.5 mm² | 0.5 … 0.75 mm² | 0.5 mm² |
| 2 wires | 0.75 mm² | 0.5 mm² | |
| – Screw | | | |
| 1 wire | 0.5 … 1.5 mm² | 0.5 … 0.75 mm² | 0.5 mm² |
| 2 wires | 0.75 mm² | 0.5 mm² | 0.5 mm² |

**Tightening torque**
for fixing nut max. 50 Ncm

**Actuating torque**
Selector-/Keylock switch 4 … 16 Ncm

**Actuating force**
Pushbutton 3.5 … 11 N
Emergency-stop switch max. 65 N

**Actuating travel**
Pushbutton 3 mm
Emergency-stop switch 10 mm

| Selector-/keylock switch | 2 positions | 3 positions |
|---|---|---|
| Momentary action | approx. 42° | approx. 2 x 42° |
| Maintained action | approx. 90° | approx. 2 x 90° |

**Rebound time**
2 ms, contact making and contact breaking the rebound times apply to normal manual activation

**Mechanical lifetime**
as per DIN IEC 60512-5-6 and EN IEC 60947-5-1

| | |
|---|---|
| Pushbutton maintained action | 1 million cycles of operation |
| Pushbutton momentary action | 2 million cycles of operation |
| Emergency-stop switch | 6050 cycles of operation |
| Keylock switch | 50 000 cycles of operation |
| Selector switch | 100 000 cycles of operation |

### Electrical characteristics

**Standards**
The devices comply with: EN IEC 61058-1 and EN IEC 60947-5-1, EN IEC 60947-5-5 (Emergency-stop)

**Electrical life**
≥ 50 000 cycles of operation at 250 VAC, 5 A, cosφ 0.95, as per EN IEC 60947-5-1
Switching element of emergency-stop 6050 cycles of operation, as per EN IEC 60947-5-5

**Electrostatic discharge (ESD)**
Keylock switch 11 kV

**Electric strength**
4000 VAC, 50 Hz, 1 min., as per DIN IEC 60512-2 between all terminals and earth

**Overvoltage category**
III, as per EN IEC 60947-5-1

**Protection class**
Class II, as per EN IEC 61058-1

**Degree of pollution**
3, as per EN IEC 60947-1

### Electrical characteristics for silver contacts

**Rated Operational Voltage $U_e$**
250 VAC/DC as per EN IEC 60947-1

**Rated Insulation Voltage $U_i$**
320 VAC, as per EN IEC 60947-5-1

**Rated Impulse Withstand Voltage $U_{imp}$**
4 kV, as per EN IEC 60947-5-1

**Contact resistance**
New state ≤ 50 mΩ, as per DIN IEC 60512-2-4, measured at 100 mA, 10 V

**Conventional free air thermal current $I_{th}$**
5 A, as per EN IEC 60947-5-1
the maximum current in continuous operation and at ambient temperature must not exceed the quoted maximum values.

**Switch rating**
Switch rating AC with silver contact and screw terminal, service category AC-15, as per EN IEC 60947-5-1

| | | |
|---|---|---|
| Voltage | 125 VAC | 250 VAC |
| Current | 3 A | 2 A |

## Actuator with slow-make switching element

Switch rating with silver contact and screw terminal, service category DC-13, as per EN IEC 60947-5-1

Voltage 250 VDC
Current 0.2 A

**Recommended minimum operational data**
20 VAC/DC, 100 mA

### Electrical characteristics for gold contacts

**Rated Operational Voltage $U_e$**
50 VAC/DC, as per EN IEC 60947-5-1

**Rated Insulation Voltage $U_i$**
$U_i$ = 320 VAC, as per EN IEC 60947-5-1

**Rated Impulse Withstand Voltage $U_{imp}$**
0.8 kV, as per EN IEC 60947-1

**Contact resistance**
New state ≤ 50 mΩ
as per DIN IEC 60512-2-4, measured at 20 mV, 10 mA

**Conventional free air thermal current $I_{th}$**
0.3 A, as per EN IEC 60947-5-1
the maximum current in continuous operation and at ambient temperature must not exceed the quoted maximum values.

**Switch rating**
Switch rating AC with gold contact, service category AC-15, as per EN IEC 60947-5-1

Voltage 50 VAC
Current 0.5 A

Switch rating with gold contact, service category DC-13, as per EN IEC 60947-5-1

Voltage 50 VDC
Current 0.1 A

**Recommended minimum operational data**
Voltage 10 mVAC/DC
Current 2 mA

### Environmental conditions

**Storage temperature**
-40 °C … +85 °C

**Operating temperature**
-25 °C … +55 °C

**Protection degree**
as per EN IEC 60529
Frontside IP 65, rear side IP 40

**Shock resistance**
(semi-sinusoidal)
max. 100 m/s², pulse width 11 ms, 3-axis,
as per EN IEC 60068-2-27

**Vibration resistance**
(sinusoidal)
max. 100 m/s² at 10 Hz … 500 Hz, as per EN IEC 60068-2-6

**Climate resistance**
Damp heat, cyclic
96 hours, +25 °C/97 %, +55 °C/93 % relative humidity,
as per EN IEC 60068-2-30

Damp heat, state
56 days, +40 °C/93 % relative humidity,
as per EN IEC 60068-2-78

Rapid change of temperature
100 cycles, -40 °C … +80 °C, as per EN IEC 60068-2-14

### Approvals

**Approbations**
CB (IEC 61058)
CB (IEC 60947)
CSA
ENEC (EN 61058)
CCA-NTR (EN 60947)
CCC
CENELEC (IEC 60947-5-1)
Germanischer Lloyd
GOST
UL
SEV
NFF

**Declaration of conformity**
CE

## Actuator with flasher element

### Material

**Lens**
Raised mounting Polymetylmethacrylat PMMA, as per UL 94 HB, flush mounting Polycarbonat (PC), as per UL 94 V0

**Actuator housing**
Polyetherimide (PEI), as per UL 94 V0, self-extinguishing

**Flasher element**
Polyetherimide (PEI), as per UL 94 V0

### Mechanical characteristics

**Terminals**
Soldering terminal

**Tightening torque**
for fixing nut max. 50 Ncm

### Electrical characteristics

**Illumination**

| | | |
|---|---|---|
| Filament lamp | 14 VAC/DC | 28 VAC/DC |
| Power consumption | 80 mA | 44 mA |
| Single-LED | 12 VAC/DC | 28 VAC/DC |
| Power consumption | 15 mA | 18 mA |

**Flashing frequency**
1 Hz ±0.25 Hz

**Pulse duty factor**
approx. 50 %

**Operating voltage**
12 … 28 VAC/DC ±10 %

### Environmental conditions

**Operating temperature**
0 °C … +45 °C

**Protection degree**
as per EN IEC 60529
Front side IP 65, rear side IP 40

## Lens plastic with symbols

### Chemical and mechanical tests

1. Wipe resistance according to EN 61058-1 section 8.9
   (Petrol/gasoline, distilled water, diluted alcohol)
2. Graffiti-Killer Test
3. Railway cleaning agents (Walo)
4. Damp/dry heat durability
5. UV test according to EN 60068-2-5 / 56 days
6. Mechanical life time 2 Mio. Operations (abrasive test)