Emergency-stop

Switching system

The double-break switching system can be supplied for the following switching functions:
1 Normally closed, 2 Normally closed, 1 Normally closed + 1 Normally open.
The Normally closed contacts have forced opening according to EN IEC 60947-5-1

Material

Connection cable
Polyvinylchloride (PVC), operating temperature up to +65 °C

Mushroom-head cap
Polybutylenterephthalate (PBT), as per UL 94 V0 (red items)

Actuator housing
Polyamide (PA 66), as per UL 94 V0, Flat ribbon cable-cover Polyamide (PA 6.6), as per UL 94 V0

Material of contact
Silver alloy gold plated

Mechanical characteristics

Front panel thickness
Standard 1 … 4 mm
with EMERGENCY-STOP protective shroud Part No. 84-902 1 … 3 mm

Mounting cut-outs
Ø 22.5 mm as per EN IEC 60947-5-1 with anti-twist device

Terminals
Soldering terminals 2.8 x 0.5 mm (solderable), CuSn6 tin-plated
Flat ribbon cable 2-, 4-, or 6-poles 0.35 mm² (AWG 22)

Tightening torque
Fixing nut 80 Ncm

Actuating force
22 N ±4 N

Actuating travel
approx. 4 mm to release the internal operation part

Mechanical lifetime
≥ 50 000 cycles of operations

Electrical characteristics

Standards
The devices comply with: EN IEC 60947-5-1, EN IEC 60947-5-5 (EMERGENCY-STOP), DIN EN ISO 13850, EN IEC 60204

Illumination
LED red with pole reversal, constant current source
Operation Voltage 5 VDC … 30 VDC
Current consumption 9.7 mA … 12.4 mA

Rated Operational Voltage U_e
250 VAC, as per EN IEC 60947-1

Rated Insulation Voltage U_i
250 V, as per EN IEC 60947-1

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

Contact resistance
New state ≤ 50 mΩ, as per DIN IEC 60512-2-3

Isolation resistance
> 1011 Ω between the opend contats at 500 VDC, as per DIN IEC 60512-3-1

Electrical life
≥ 50 000 cycles of operations (inductive cosφ 0.4), as per EN IEC 60947-5-1

Voltage	120 VAC	240 VAC	125 VDC	250 VDC
Current	3 A	1.5 A	0.55 A	0.27 A

Reduced load ≥ 50 000 cycles of operations (resistive)

Voltage	1 VAC/DC	42 VAC/DC
Current	100 mA	200 mA

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 (gold plated), service category AC-15, as per EN IEC 60947-5-1

Voltage	120 VAC	240 VAC
Current	3 A	1.5 A

Switch rating DC for silver contact (gold plated), service category DC-13, as per EN IEC 60947-5-1

Voltage (VDC)	12 VDC	24 VDC	48 VDC	60 VDC	125 VDC	250 VDC
Current Plug	5 A	4 A	2.1 A	1.7 A	0.55 A	0.27 A
Current Cable	3 A	3 A	2.1 A	1.7 A	0.55 A	0.27 A

Recommended minimum operational data
Silver contacts (gold plated)

Voltage	1 VAC/DC
Current	1 mA

Electric strength
500 VAC, 50 Hz, 1 min, as per DIN IEC 60512-2

Rated conditional short-circuit current
1000 A, type of short-circuit unit 6 A gG, as per EN IEC 60947-5-1

Protection class
Class II, as per EN IEC 60947-5

Emergency-stop

Overvoltage category
II, as per EN IEC 60947-1

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

Environmental conditions

Storage temperature
-25 °C … +80 °C

Operating temperature
-25 °C … +65 °C

Front protection
IP 65, as per EN IEC 60529

Shock resistance
(semi-sinusoidal)
max. 150 m/s², pulse width 11 ms, 3-axis,
as per EN IEC 60068-2-27

Vibration resistance
(sinusoidal)
max. 50 m/s² at 10 Hz … 500 Hz, 10 cycles, 3-axis,
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, steady
56 days, +40 °C/93 % relative humidity,
as per EN IEC 60068-2-78

Dry heat
96 hours, +70 °C, as per EN IEC 60068-2-2

Low temperature
96 hours, -40 °C, as per EN IEC 60068-2-1

Saline mist
96 Stunden, +35 °C in chemical solution NaCl,
as per EN IEC 60068-2-11

Approvals

Approbations
CB (IEC 60947)
UL
NFF

Declaration of conformity
CE

Switching element illuminated pushbutton

Switching system

Short-travel switching system with 2 independent contact points and tactile operation.
Guarantees reliable switching even of very light loads.
Fitted with 1 normally open contact.

Material

Connection cable
Polyvinylchloride (PVC), short-time heat-resistant up to 105 °C

Material of contact
Silver alloy gold plated

Switching element
Thermoplastic polyester (PET, PBT), as per UL 94 V0 and Polyacetale (POM), as per UL 94 HB

Mechanical characteristics

Terminals
Plug-in terminals 2.8 x 0.8 mm (solderable)
Flat ribbon cable 0.5 mm²
PCB terminal

Actuating force
4.0 N ±0.2 N (measured at the lens)

Actuating travel
~0.5 mm

Rebound time
≤ 1 ms

Resistance to heat of soldering
260 °C, 5 s (PCB assembly)
350 °C, 10 s (when using a soldering iron)
as per EN IEC 60068-2-20

Mechanical lifetime
≥ 1 million cycles of operations

Electrical characteristics

Illumination
Single-Chip LED, green, orange, red, yellow, white and blue

Operation Voltage	12 VDC	24 VDC
Current consumption	10 mA	10 mA

Contact resistance
Starting value (initial) ≤ 100 mΩ, as per DIN IEC 60512-2

Isolation resistance
≥ 1 GΩ between all terminals at 100 VDC,
as per DIN IEC 60512-3-1

Electrical life
as per EN IEC 60512-5

5 million cycles of operation	24 VAC, 50 mA at 480 Ω
5 million cycles of operation	24 VAC, 100 mA at 240 Ω
2 million cycles of operation	42 VAC, 50 mA at 840 Ω
2 million cycles of operation	42 VAC, 100 mA at 420 Ω
300 000 cycles of operation	42 VAC, 100 mA at cosφ 0.4
250 000 cycles of operation	42 VAC, 200 mA at cosφ 0.395
1 million cycles of operation	12 VDC, 250 mA at 48 Ω
1 million cycles of operation	24 VDC, 50 mA at 480 Ω
1 million cycles of operation	24 VDC, 100 mA at 240 Ω
5 million cycles of operation	42 VDC, 25 mA at 1680 Ω
1.5 million cycles of operation	42 VDC, 50 mA at 840 Ω
100 000 cycles of operation	42 VDC, 100 mA at 420 Ω
500 000 cycles of operation	24 VDC, 200 mA at L/R = 30 ms
300 000 cycles of operation	42 VDC, 100 mA at L/R = 30 ms
100 000 cycles of operation	42 VDC, 200 mA at L/R = 30 ms

Switch rating

Voltage	50 mVAC/DC … 42 VAC/DC
Current	10 uA … 100 mA
Power	max. 2 W

Electric strength
500 VAC, 50 Hz, 1 min, as per DIN IEC 60512-2

Environmental conditions

Storage temperature
-40 °C … +85 °C

Operating temperature
-25 °C … +70 °C

Protection degree
Back protection:
IP 40, standard version
IP 67, fully sealed version, with mounted actuator only.

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. 50 m/s² at 10 Hz … 500 Hz, 10 cycles, 3-axis,
as per EN IEC 60068-2-6

Actuator

Material

Lens
Polycarbonate (PC), as per UL 94 V2 or Aluminium anodised

Actuator housing
Polyetherimid (PEI), as per UL 94 V0 or Aluminium anodised

Mechanical characteristics

Mounting cut-outs
Ø 22.5 mm and Ø 30.5 mm

Tightening torque
Fixing nut max. 80 Ncm

Actuating force
4.0 N ±0.2 N (measured at the lens)

Actuating travel
Total switching travel 1.2 mm

Mechanical lifetime
≥ 1 million cycles of operations

Electrical characteristics

Electrostatic breakdown value
Plastic case ≥ 15 kV
Aluminium case ≥ 5 kV
as per IEC 61000-4-2, mounted in plastic front panel

Environmental conditions

Storage temperature
-40 °C … +85 °C

Operating temperature
-25 °C … +70 °C

Front protection
IP 67 and IP40, as per EN IEC 60529

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
EBC
NFF

Declaration of conformity
CE
TSI/PRM

Actuator

Material

Lens
Polycarbonate (PC), as per UL 94 V2 or Aluminium anodised

Actuator housing
Polyetherimid (PEI), as per UL 94 V0 or Aluminium anodised

Mechanical characteristics

Mounting cut-outs
Ø 22.5 mm and Ø 30.5 mm

Tightening torque
Fixing nut max. 80 Ncm

Actuating force
4.0 N ±0.2 N (measured at the lens)

Actuating travel
Total switching travel 1.2 mm

Mechanical lifetime
≥ 1 million cycles of operations

Electrical characteristics

Electrostatic breakdown value
Plastic case ≥ 15 kV
Aluminium case ≥ 5 kV
as per IEC 61000-4-2, mounted in plastic front panel

Environmental conditions

Storage temperature
-40 °C … +85 °C

Operating temperature
-25 °C … +70 °C

Front protection
IP 67 and IP40, as per EN IEC 60529

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
EBC
NFF

Declaration of conformity
CE
TSI/PRM

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)

EAO reserves the right to alter specifications without further notice.