

Slow-make switching element**Switching system**

The double-break, slow-make switching element is equipped with one or two independent contact systems, acting as normally open or normally closed contact. The normally closed contact has forced opening.

Slow-make contacts with forced action are ideal for high switch ratings.

Up to three switching elements can be snapped to each actuator. For the emergency-stop pushbutton use the slow-make switching element (max. 3).

Material**Material of contact**

Hardsilver, gold-silver, silver-palladium (for aggressive atmospheres)

Switch housing

Polycarbonate (PC)

Mechanical characteristics**Terminals**

Screw terminals

Plug-in terminals 6.3 x 0.8 mm

max. wire cross-section 2 x 2.5 mm²

max. wire cross-section of stranded cable 2 x 1.5 mm²

For switches with plug-in terminals it is necessary to provide insulation sleeves and to maintain a spacing of 65 mm between rows (mounting cut-outs)

Tightening torque

Screws at the mounting flange max. 25–30 Ncm

Screws at switching element max. 50 Ncm

Actuating force

1 Normally closed 2 N

1 Normally open 3.1 N

Actuating travel

5.8 mm ± 0.2 mm

Rebound time

≤ 1 ms

Mechanical lifetime

(with 1 switching element)

Pushbutton maintained action 1.5 million Cycles of operation

Pushbutton momentary action 3 million Cycles of operation

Selector switch maintained action 1.25 million Cycles of operation

Selector switch momentary action 2.5 million Cycles of operation

Emergency-stop switch 50 000 Cycles of operation

Keylock switch maintained action 25 000 Cycles of operation

Keylock switch momentary action 50 000 Cycles of operation

Electrical characteristics**Standards**

The switches comply with the “Standards for low-voltage switching devices” EN IEC 60947-5-1

Rated Insulation Voltage U_i

500 VAC/600 VDC, as per EN IEC 60947-5-1

Contact resistance

New state ≤ 50 mΩ as per DIN IEC 60512-2-4

Isolation resistance

≥ 10 MΩ between open contacts at 500 VDC, as per DIN IEC 60512-3-1

Electrical life

6050 cycles of operations

Conventional free air thermal current I_{th}

As per EN IEC 60947-5-1

6 A for plug-in terminals

10 A for screw terminals

the maximum current in continuous operation and at ambient temperature must not exceed the quoted maximum values.

Switch rating

At switch rating AC for gold-silver, silver-palladium and hardsilver contacts, service category AC-15, as per EN IEC 60947-5-1 (cos φ 0.3)

Voltage	230 VAC	400 VAC	500 VAC
Current	7 A	5 A	4 A

At switch rating DC for gold-silver and hardsilver contacts, service category DC-13, as per EN IEC 60947-5-1

Voltage	24 VDC	60 VDC	110 VDC	250 VDC
Current	10 A	5 A	2.5 A	0.6 A

Recommended minimum operational data

Gold-silver contacts:

Voltage	24 VDC	110 VDC
Current	5 mA	2 mA

Hardsilver contacts:

Voltage	24 VDC	110 VDC
Current	50 mA	10 mA

Protection class

Indicators and switches, fit for mounting into devices with protection class II

Slow-make switching element**Environmental conditions****Storage temperature**

-40 °C ... +85 °C

Operating temperature

-40 °C ... +55 °C

(other temperatures on request)

Protection degree

IP 00

Shock resistance

(single impacts, semi-sinusoidal)

300 m/s² puls width 11 ms, as per EN IEC 60068-2-27

Vibration resistance

(sinusoidal)

100 m/s² at 10 Hz ... 500 Hz, amplitude 0.75 mm, as per EN IEC 60068-2-6

Approvals**Approbations**

CB (IEC 60947)

CCC

CSA

Germanischer Lloyd

GOST

NFF 16-102

UL

Declaration of conformity

CE

Snap-action switching element**Switching system**

The double-break, snap-action switching element is equipped with one or two independent contact systems, acting as normally open or normally closed contact. The snap-action switching element is fitted with self-cleaning contacts.

Up to three switching elements can be snapped to each actuator. Snap-action switching elements are not permissible for emergency-stop pushbuttons!

Material**Material of contact**

Hardsilver, gold-silver, silver-palladium (for aggressive atmospheres)

Switch housing

Polycarbonate (PC)

Mechanical characteristics**Terminals**

Screw terminals

Plug-in terminals 6.3 x 0.8 mm

max. wire cross-section 2 x 2.5 mm²

max. wire cross-section of stranded cable 2 x 1.5 mm²

For switches with plug-in terminals it is necessary to provide insulation sleeves and to maintain a spacing of 65 mm between rows (mounting cut-outs)

Tightening torque

Screws at the mounting flange max. 25–30 Ncm

Screws at switching element max. 50 Ncm

Actuating force

1 Normally closed 1.9 N

1 Normally open 2 N

Actuating travel

5.8 mm ± 0.2 mm

Rebound time

≤ 3 ms

Mechanical lifetime

(with 1 switching element)

Pushbutton maintained action 1.5 million Cycles of operation

Pushbutton momentary action 3 million Cycles of operation

Selector switch maintained action 1.25 million Cycles of operation

Selector switch momentary action 2.5 million Cycles of operation

Keylock switch maintained action 25 000 Cycles of operation

Keylock switch momentary action 50 000 Cycles of operation

Electrical characteristics**Standards**

The switches comply with the "Standards for low-voltage switching devices" EN IEC 60947-5-1

Rated Insulation Voltage U_i

500 VAC/600 VDC, as per EN IEC 60947-5-1

Contact resistance

New state ≤ 50 mΩ as per DIN IEC 60512-2-4

Isolation resistance

≥ 10 MΩ between open contacts at 500 VDC, as per DIN IEC 60512-3-1

Electrical life

50 000 cycles of operations

Conventional free air thermal current I_{th}

As per EN IEC 60947-5-1

6 A for plug-in terminals

10 A for screw terminals

the maximum current in continuous operation and at ambient temperature must not exceed the quoted maximum values.

Switch rating

At switch rating AC for gold-silver, silver-palladium and hardsilver contacts, service category AC-15, as per EN IEC 60947-5-1 (cos φ 0.3)

Voltage	230 VAC	400 VAC	500 VAC
Current	6 A	4 A	2.5 A

At switch rating DC for gold-silver and hardsilver contacts, service category DC-13, as per EN IEC 60947-5-1

Voltage	24 VDC	60 VDC	110 VDC
Current	10 A	3 A	1 A

Recommended minimum operational data

Gold-silver contacts:

Voltage	5 VDC	24 VDC	110 VDC
Current	15 mA	5 mA	2 mA

Hardsilver contacts:

Voltage	24 VDC	110 VDC
Current	50 mA	10 mA

Protection class

Indicators and switches, fit for mounting into devices with protection class II

Environmental conditions**Storage temperature**

-40 °C ... +85 °C

Operating temperature

-40 °C ... +55 °C

(other temperatures on request)

Protection degree

IP 00

Shock resistance

(single impacts, semi-sinusoidal)

300 m/s² puls width 11 ms, as per EN IEC 60068-2-27

Vibration resistance

(sinusoidal)

100 m/s² at 10 Hz ... 500 Hz, amplitude 0.75 mm, as per EN IEC 60068-2-6

Snap-action switching element

Approvals

Approbations

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Slow-make switching element PIT**Switching system**

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Slow-make contacts with forced action are ideal for high switch ratings.

Up to three switching elements can be snapped to each actuator. For the emergency-stop pushbutton use the slow-make switching element (max. 3).

Material**Material of contact**

Hardsilver and gold-silver

Switch housing

Polycarbonate (PC)

Mechanical characteristics**Terminals**

PIT push-in terminal

Skinning 8mm

Wire cross-section:

Wire 0.2 to 1.0mm²

Stranded wire 0.2 to 1.0mm² without core and sleeve

Stranded wire 0.2 to 0.75mm² with core and sleeve

Tightening torque

Screws at the mounting flange max. 25 Ncm

Actuating force

1 Normally closed 2N

1 Normally open 3.1N

Actuating travel

5.8mm ± 0.2mm

Rebound time

≤ 1 ms

Mechanical lifetime

(with 1 switching element)

Pushbutton maintained action 1.5 million Cycles of operation

Pushbutton momentary action 3 million Cycles of operation

Selector switch maintained action 1.25 million Cycles of operation

Selector switch momentary action 2.5 million Cycles of operation

Emergency-stop switch 50 000 Cycles of operation

Keylock switch maintained action 25 000 Cycles of operation

Keylock switch momentary action 50 000 Cycles of operation

Electrical characteristics**Standards**

The switches comply with EN IEC 60947-1/EN IEC 60947-5-1

Rated Insulation Voltage U_i

500VAC/600VDC, as per EN IEC 60947-5-1

Contact resistance

New state ≤ 50 mΩ as per DIN IEC 60512-2-4

Isolation resistance

≥ 10 MΩ between open contacts at 500VDC, as per DIN IEC 60512-3-1

Electrical life

6050 cycles of operations

Conventional free air thermal current I_{th}

6 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

At switch rating AC for gold-silver and hardsilver contacts, service category AC-15, as per EN IEC 60947-5-1 (cosφ 0.3)

Voltage 250VAC

Current 6A

At switch rating DC for gold-silver and hardsilver contacts, service category DC-13, as per EN IEC 60947-5-1

Voltage 24VDC 110VDC

Current 6A 1.0A

Recommended minimum operational data

Gold-silver contacts:

Voltage 24VDC

Current 5mA

Hardsilver contacts:

Voltage 24VDC

Current 50mA

Protection class

Indicators and switches, fit for mounting into devices with protection class II

Environmental conditions**Storage temperature**

-40°C ... +85°C

Operating temperature

-40°C ... +55°C

(other temperatures on request)

Protection degree

IP 20

Shock resistance

(single impacts, semi-sinusoidal)

300m/s² puls width 11 ms, as per EN IEC 60068-2-27

Slow-make switching element PIT

Approvals

Approbations

CB (IEC 60947)

CSA

Germanischer Lloyd

GOST

NFF 16-102

UL

Declaration of conformity

CE

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Up to three switching elements can be snapped to each actuator. Snap-action switching elements are not permissible for emergency stop pushbuttons!

Material**Material of contact**

Hardsilver and gold-silver

Switch housing

Polycarbonate (PC)

Mechanical characteristics**Terminals**

PIT push-in terminal

Skimming 8 mm

Wire cross-section:

Wire 0.2 to 1.0 mm²

Stranded wire 0.2 to 1.0 mm² without core and sleeve

Stranded wire 0.2 to 0.75 mm² with core and sleeve

Tightening torque

Screws at the mounting flange max. 25 Ncm

Actuating force

1 Normally closed 1.9 N

1 Normally open 2 N

Actuating travel

5.8 mm ± 0.2 mm

Rebound time

≤ 3 ms

Mechanical lifetime

(with 1 switching element)

Pushbutton maintained action 1.5 million Cycles of operation

Pushbutton momentary action 3 million Cycles of operation

Selector switch maintained action 1.25 million Cycles of operation

Selector switch momentary action 2.5 million Cycles of operation

Emergency-stop switch 50 000 Cycles of operation

Keylock switch maintained action 25 000 Cycles of operation

Keylock switch momentary action 50 000 Cycles of operation

Electrical characteristics**Standards**

The switches comply with EN IEC 60947-1/EN IEC 60947-5-1

Rated Insulation Voltage U_i

500 VAC/600 VDC, as per EN IEC 60947-5-1

Contact resistance

New state ≤ 50 mΩ as per DIN IEC 60512-2-4

Isolation resistance

≥ 10 MΩ between open contacts at 500 VDC, as per DIN IEC 60512-3-1

Electrical life

50 000 cycles of operations

Conventional free air thermal current I_{th}

6 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

At switch rating AC for gold-silver and hardsilver contacts, service category AC-15, as per EN IEC 60947-5-1 (cos φ 0.3)

Voltage 250 VAC

Current 6 A

At switch rating DC for gold-silver and hardsilver contacts, service category DC-13, as per EN IEC 60947-5-1

Voltage 24 VDC 110 VDC

Current 6 A 1.0 A

Recommended minimum operational data

Gold-silver contacts:

Voltage 24 VDC

Current 5 mA

Hardsilver contacts:

Voltage 24 VDC

Current 50 mA

Protection class

Indicators and switches, fit for mounting into devices with protection class II

Environmental conditions**Storage temperature**

-40 °C ... +85 °C

Operating temperature

-40 °C ... +55 °C

(other temperatures on request)

Protection degree

IP 20

Shock resistance

(single impacts, semi-sinusoidal)

300 m/s² puls width 11 ms, as per EN IEC 60068-2-27

Vibration resistance

(sinusoidal)

100 m/s² at 10 Hz ... 500 Hz, as per EN IEC 60068-2-6 and

EN 61373 Increased broad band noise, class 1B

Snap-action switching element PIT

Approvals

Approbations

CB (IEC 60947)

CSA

Germanischer Lloyd

GOST

NFF 16-102

UL

Declaration of conformity

CE

Lamp block**Material****Housing**

Polycarbonate (PC)

Mechanical characteristics**Terminals**

Screw terminals

Plug-in terminals 6.3 x 0.8 mm

max. wire cross-section 2 x 2.5 mm²

max. wire cross-section of stranded cable 2 x 1.5 mm²

For switches with plug-in terminals it is necessary to provide insulation sleeves and to maintain a spacing of 65 mm between rows (mounting cut-outs)

Electrical characteristics**Standards**

The switches comply with EN IEC 60947-1/EN IEC 60947-5-1

Illumination

Voltage 250V max.

Power 2.6W max.

BA9s standard adaptable.

Environmental conditions**Storage temperature**

-40 °C ... +85 °C

Operating temperature

-40 °C ... +55 °C

(other temperatures on request)

Protection degree

IP 00

Shock resistance

(single impacts, semi-sinusoidal)

300 m/s² puls width 11 ms, as per EN IEC 60068-2-27

Vibration resistance

(sinusoidal)

100 m/s² at 10 Hz ... 500 Hz, as per EN IEC 60068-2-6 and

EN 61373 Increased broad band noise, class 1B

Lamp block PIT**Material****Housing**

Polycarbonate (PC)

Mechanical characteristics**Terminals**

PIT push-in terminal

Skinning 8 mm

Wire cross-section:

Wire 0.2 to 1.0 mm²

Stranded wire 0.2 to 1.0 mm² without core and sleeve

Stranded wire 0.2 to 0.75 mm² with core and sleeve

Electrical characteristics**Standards**

The switches comply with EN IEC 60947-1/EN IEC 60947-5-1

Illumination

Voltage 250V max.

Power 2.6W max.

BA9s standard adaptable.

Environmental conditions**Storage temperature**

-40 °C ... +85 °C

Operating temperature

-40 °C ... +55 °C

(other temperatures on request)

Protection degree

IP 20

Shock resistance

(single impacts, semi-sinusoidal)

300 m/s² puls width 11 ms, as per EN IEC 60068-2-27

Vibration resistance

(sinusoidal)

100 m/s² at 10 Hz ... 500 Hz, as per EN IEC 60068-2-6 and

EN 61373 Increased broad band noise, class 1B

Buzzer**Buzzer system****System**

Piezo disc

Material**Buzzer case**

Polyamide

Front cap

Plastic Polyamide

Metal Nickel-plated brass (sea-water proof)

Mechanical characteristics**Terminals**

Plug-in terminal 2.8 x 0.5mm

Tightening torque

for fixing nut max. 25Ncm

Electrical characteristics**Frequency (tone)**

approx. 2.8kHz continuous tone only

Sound pressure95 db (A) ± 8 dB at a distance of 0.1 m**Operation Voltage/Current**Operation Voltage 24VDC ± 10 %Operation Current ≤ 25 mA**Environmental conditions****Storage temperature**

-40 °C ... +85 °C

Operating temperature

-40 °C ... +55 °C

(other temperatures on request)

Protection degree

as per EN IEC 60529, frontside

IP 40, devices flush design

IP 65, devices raised design

Approvals**Declaration of conformity**

CE

Actuator**Material****Front ring**

Polyamide, Aluminium or Stainless steel

Mounting flange

Polyethylene terephthalate

Actuator housing

Polycarbonate, Polyamide

Mechanical characteristics**Actuating force**

Mounting style square flush 6.2N
other mounting styles 8N

Actuating travel

5.8mm ± 0.2mm

Mechanical lifetime

(with 1 switching element)

Pushbutton

≤ 3 million Cycles of operation

Selector switch

≤ 2.5 million Cycles of operation

Stop switch

≤ 50 000 Cycles of operation

Fool proofed E-stop

≥ 50 000 Cycles of operation

Keylock switch

≤ 50 000 Cycles of operation

Key insert switches

≤ 250 000 Cycles of operation

Keylock switch

The standard lock number is 251, the last digit of the device Part No. = 0 (example: 704.335.0).

Additional lock numbers are available:

252 last digit = 1; 253 last digit = 2; 254 last digit = 3

255 last digit = 4; 256 last digit = 5; 257 last digit = 6

258 last digit = 7; 259 last digit = 8; 260 last digit = 9

Electrical characteristics**Standards**

The switches comply with the "Rules for low-voltage switching devices" EN IEC 60947-5-1

Environmental conditions**Storage temperature**

-40°C ... +85°C

Operating temperature

-40°C ... +55°C

(other temperatures on request)

Protection degree

As per EN IEC 60529

frontside IP 65 (IP 67 Key insert switch)

Rotary selector switching element**Mechanical characteristics****Terminals**

Screw terminals
Terminal lead material copper wires only
max. permissible wire gage:
Single-core or stranded wire 2 x 1.5 mm² (2 x AWG 14)
flexible wire 2 x 1.5 mm² (2 x AWG 16)

Tightening torque

for fixing nut max. 25 Ncm

Number of stages

1 to 8 positions max.

Number of contacts

1 to 16 max. normally open contacts
(contact positioning according circuit drawing)

Switching angle

Basic position of switching position "A" is 9 o'clock

Maintained action	Switching angle
12 max.	30°
8 max.	45°
6 max.	60°
4 max.	90°

Momentary action with release 24°
(provide at the beginning or at the end)

Standard type of Kraus & Naimer

CG4 Hard Silver contacts with 1 µm Gold layer
CG4-1 Hard Silver contacts with 35 µm Gold layer

Electrical characteristics**Minimum Voltage**

20V

Rated Impulse Withstand Voltage U_{imp}

4 kV

Short Circuit Protection

Max. fuse size (gL-characteristic) 10A
Rated short-time withstand current (1s-current) 90A

Electrical characteristics for AC**Standards**

The devices comply with: EN IEC 60947-3, VDE 0660 part 107

Rated Operational Voltage U_e

440V

Rated Insulation Voltage U_i

440V

Rated Thermal Current I_u / I_{th}

10A

Rated Operational Current I_e

AC-15 Switching of control devices, contactors, valves etc.

110V–120V	2.5A
220V–240V	2.5A
380V–440V	1.5A

No load operation
10A

AC-21A Switching of resistive loads, including moderate overloads
For switchin of power > 1 kW
10A

AC-22A Switching of combined resistive or low inductive loads
including moderate overloads
220V–240V 10A

Rated Utilization Category

AC-2 Slip ring motor starting, reversing and plugging, star-delta starting 3 phase, 3 pole

220V–240V	2.5kW
380V–440V	4.5kW

AC-3 Direct-on-line starting, star-delta starting

3 phase, 3 pole	220V–240V	2.50kW
	380V–440V	2.20kW
1 phase, 2 pole	110V–120V	0.30kW
	220V–240V	0.55kW
	380V–440V	0.75kW

AC-Direct-on-line starting, reversing, plugging and inching

3 phase, 3 pole	220V–240V	0.37kW
	380V–440V	0.55kW
1 phase, 2 pole	110V–120V	0.15kW
	220V–240V	0.25kW
	380V–440V	0.50kW

AC-23A Frequent switching of motors or other high inductive loads

3 phase, 3 pole	220V–240V	1.80kW
	380V–440V	3.00kW
1 phase, 2 pole	110V–120V	0.37kW
	220V–240V	0.75kW
	380V–440V	1.10kW

Overvoltage category

III, valid for lines with grounded common neutral termination

Degree of pollution

3, valid for lines with grounded common neutral termination

Rotary selector switching element**Electrical characteristics for AC (UL/Canada)****Rated operational voltage**

300V

Rated Insulation Voltage U_i

300V

Rated Thermal Current

10A

Ampere Rating

Resistive or low inductive loads, for switching of power > 1kW, 10A

Ratings

Standard motor load, DOL Rating (similar AC-3)

3 phase, 3 pole	110V–120V	0.75 HP
	220V–240V	1.00 HP
1 phase, 2 pole	110V–120V	0.33 HP
	220V–240V	0.75 HP
	277V–277V	0.75 HP

Pilot Duty, Heavy

300VAC

Electrical characteristics for DC**Switch Rating DC**Resistive loads $T \leq 1$ ms

Number of series contact(s)								Switch Capacity
1	2	3	4	5	6	8		
24V	48V	70V	95V	120V	145V	190V	10.0A	
48V	95V	140V	190V	240V	290V	350V	6.0A	
60V	120V	180V	240V	300V	360V	450V	2.5A	
110V	220V	330V	440V	550V	660V		0.7A	
220V	440V	660V					0.3A	
440V	660V						0.2A	

Inductive loads $T = 50$ ms

Number of series contact(s)								Switch Capacity
1	2	3	4	5	6	8		
24V	48V	70V	95V	120V	145V	190V	6.0A	
30V	60V	90V	120V	150V	180V	240V	3.0A	
48V	95V	140V	190V	240V	290V	350V	1.0A	
60V	120V	180V	240V	300V	360V	450V	0.7A	
110V	220V	330V	440V	550V	660V		0.3A	

Environment conditions**Operating temperature**

Ambient Temperatures of Stages

open at 100% I_u / I_{th} 55°C during 24h with peaks up to 60°C
 enclosed at 100% I_{th} 35°C during 24h with peaks up to 40°C



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