Snap Action Switches
Subminiature Switches Series 83 132 / 83 133 / 83 134

General specifications

Layout

- The NO and NC circuits must both be of the same polarity.

Components

Material
- Case : glass filled polyamide
- Contacts : silver
- Terminals: copper-nickel

Actuator
- Plain : stainless steel
- roller: nylon

Accessories : stainless steel

Operating curve

<table>
<thead>
<tr>
<th>Number of operations</th>
<th>Resistive circuit</th>
<th>Inductive circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10^3</td>
<td>10^6</td>
<td>10^9</td>
</tr>
<tr>
<td>10^4</td>
<td>10^7</td>
<td>10^10</td>
</tr>
<tr>
<td>10^5</td>
<td>10^8</td>
<td>10^11</td>
</tr>
<tr>
<td>10^6</td>
<td>10^9</td>
<td>10^12</td>
</tr>
</tbody>
</table>

Electrical characteristics

Current rating at 125-250 V
Nominal A
Thermal A

Mechanical characteristics

<table>
<thead>
<tr>
<th>Operating force - max.</th>
<th>N (oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release force min.</td>
<td>N (oz)</td>
</tr>
<tr>
<td>Overtake max. - force</td>
<td>N (oz)</td>
</tr>
<tr>
<td>Maximum rest position</td>
<td>mm (in)</td>
</tr>
<tr>
<td>Tripping point</td>
<td>mm (in)</td>
</tr>
<tr>
<td>Movement differential</td>
<td>mm (in)</td>
</tr>
<tr>
<td>Overtravel - min.</td>
<td>mm (in)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>°C (°F)</td>
</tr>
<tr>
<td>Mechanical life</td>
<td>Operations</td>
</tr>
<tr>
<td>Contact gap</td>
<td>mm (in)</td>
</tr>
<tr>
<td>Weight</td>
<td>g (oz)</td>
</tr>
</tbody>
</table>

Contact Type

C (Form C) SPDT-DB

Connections

83 132 : solder connection -1- only
83 133 : solder connection -1- only
83 134 : printed circuit board -2- only

Actuators and mounting positions-Factory Mounted Only

Part numbers for standard actuators

<table>
<thead>
<tr>
<th>Actuators-Length</th>
<th>mm (in)</th>
</tr>
</thead>
</table>

Tripping point
Operating force max.
Release force min.
Pre-travel - max.
Movement differential
Total travel max.

Part numbers for standard actuators

<table>
<thead>
<tr>
<th>Actuators-Length</th>
<th>mm (in)</th>
</tr>
</thead>
</table>

Tripping point
Operating force - max.
Release force - min.
Pre-travel - max.
Movement differential
Total travel max.

Other information

Also available: 1) Bi-stable operation
2) NC or NO contacts
3) Custom Actuators

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
<table>
<thead>
<tr>
<th>83 132 0</th>
<th>83 133 0</th>
<th>83 134 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side terminals</td>
<td>Base terminals</td>
<td>Face terminals</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>1.6 (5.6)</td>
<td>1.6 (5.6)</td>
<td>1.6 (5.6)</td>
</tr>
<tr>
<td>0.4 (1.4)</td>
<td>0.4 (1.4)</td>
<td>0.4 (1.4)</td>
</tr>
<tr>
<td>10 (35.3)</td>
<td>10 (35.3)</td>
<td>10 (35.3)</td>
</tr>
<tr>
<td>8.45 (.33)</td>
<td>8.45 (.33)</td>
<td>8.10 (.32)</td>
</tr>
<tr>
<td>7.7 ±0.2 (mm)</td>
<td>7.7 ±0.2 (mm)</td>
<td>7.35 ±0.29 (mm)</td>
</tr>
<tr>
<td>0.45 (.018)</td>
<td>0.45 (.018)</td>
<td>0.45 (.018)</td>
</tr>
<tr>
<td>0.3 (0.12)</td>
<td>0.3 (0.12)</td>
<td>0.3 (0.12)</td>
</tr>
<tr>
<td>-20 +125 (-4 to +257)</td>
<td>-20 +125 (-4 to +257)</td>
<td>-20 +125 (-4 to +257)</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>0.3 x 2 (.012 x 2)</td>
<td>0.3 x 2 (.012 x 2)</td>
<td>0.3 x 2 (.012 x 2)</td>
</tr>
<tr>
<td>1.8 (.06)</td>
<td>1.8 (.06)</td>
<td>1.8 (.06)</td>
</tr>
</tbody>
</table>

1 solder tags can accept quick connects .11” x .02”

2 for printed circuit boards

---

To order please specify:

1 Switch Type
2 Contact Type
3 Connection
4 Actuator
5 Actuator Position

Example P/N is 831330, SPDT-DB, solder terminals, A actuator mounted on the left.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Subminiature Switches

Dimensions

<table>
<thead>
<tr>
<th>Code</th>
<th>Dimensions</th>
<th>Connections</th>
<th>Actuators</th>
</tr>
</thead>
<tbody>
<tr>
<td>83 132 0</td>
<td><img src="image" alt="Dimensions" /></td>
<td>1</td>
<td>Standard mounting</td>
</tr>
<tr>
<td>83 133 0</td>
<td><img src="image" alt="Dimensions" /></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>83 134 0</td>
<td><img src="image" alt="Dimensions" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Connections

<table>
<thead>
<tr>
<th>Code</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image" alt="Connections" /></td>
</tr>
<tr>
<td>2</td>
<td><img src="image" alt="Connections" /></td>
</tr>
</tbody>
</table>

Actuators

<table>
<thead>
<tr>
<th>Standard mounting</th>
<th>E 70514181</th>
<th>R=7.5 (.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 70514131</td>
<td>F 70514182</td>
<td>R=14.1 (.56)</td>
</tr>
<tr>
<td>L 70514175</td>
<td>G 70514183</td>
<td>R=34.4 (1.35)</td>
</tr>
<tr>
<td>C 70514194</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Subminiature Switches

Actuators and mounting positions – Factory Mounted Only – for Gang Operation

Part numbers for standard actuators – Consult factory for part number

<table>
<thead>
<tr>
<th>Actuators-Length</th>
<th>mm (in)</th>
<th>2 pole 54A2 R30 (1.18)</th>
<th>3 pole 54A3 R30 (1.18)</th>
<th>Side mounting plate (0.4 mm) 54Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tripping Point</td>
<td>mm (in)</td>
<td>83 132 0</td>
<td>83 133 0</td>
<td>83 134 0</td>
</tr>
<tr>
<td>Operating Force max N (oz)</td>
<td>8.8 (0.2)</td>
<td>0.8 (0.2)</td>
<td>0.8 (0.2)</td>
<td>1.2 (0.2)</td>
</tr>
<tr>
<td>Release Force min N (oz)</td>
<td>0.16 (.6)</td>
<td>0.24 (.8)</td>
<td>4.3 (.17)</td>
<td></td>
</tr>
<tr>
<td>Pre-travel min mm (in)</td>
<td>4.3 (.17)</td>
<td>4.3 (.17)</td>
<td>4.3 (.17)</td>
<td></td>
</tr>
<tr>
<td>Movement differential mm (in)</td>
<td>2 (0.08)</td>
<td>2 (0.08)</td>
<td>2 (0.08)</td>
<td></td>
</tr>
<tr>
<td>Total travel max mm (in)</td>
<td>5.75 (.23)</td>
<td>5.75 (.23)</td>
<td>5.75 (.23)</td>
<td></td>
</tr>
</tbody>
</table>

Delivered separately

*For gang operation with 83 132 0 or 83 133 0.

Actuators – For Gang Operation

54A2

54A3

Mounting accessories

83 132 0 - 83 133 0

83 134 0

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Subminiature Switches Series 83 170 DIN 41 635 B

General specifications

- **Material**
  - Case: polyester UL 94 VO
  - Button: glass-filled polyamide
  - Contacts: AgNi, gold-plated AgNi (dual-current)
  - Terminals: copper-nickel

- **Actuators**
  - flat: stainless steel
  - roller: stainless steel with polyamide roller

- **Approvals:** NF - UL - cUL

Operating curve

For Type 83 170 0

- **Resistive circuit**
  - Number of operations: 10^6 to 10^8
  - Rating in Amps: 0.1 to 5

- **Inductive circuit**
  - Number of operations: 10^5 to 10^6
  - Rating in Amps: 0.1 to 5

For Type 83 170 4

- **Resistive circuit**
  - Number of operations: 10^6 to 10^8
  - Rating in Amps: 0.1 to 5

- **Inductive circuit**
  - Number of operations: 10^5 to 10^6
  - Rating in Amps: 0.1 to 5

For Type 83 170 9

- **Resistive circuit**
  - Number of operations: 10^6 to 10^8
  - Rating in Amps: 0.1 to 5

- **Inductive circuit**
  - Number of operations: 10^5 to 10^6
  - Rating in Amps: 0.1 to 5

Model 83 170 9 is designed to operate equally well on dual-current (1 mA 4 V minimum) or medium-current (5 A maximum) circuits. However, a given product should only be used to switch one type of circuit during its working life.

Types

- **Part numbers for standard products (no lever) terminal type**
  - 1
  - 2
  - 3

Features

**Electrical characteristics**

- Current rating at 250 V
  - Nominal: A
  - Thermal: A

**Mechanical characteristics**

- Operating force - max.: N (oz.)
- Release force - min.: N (oz.)
- Total travel force - max.: N (oz.)
- Permitted overtravel force - max.: N (oz.)
- Maximum rest position: mm (in.)
- Tripping point: mm (in.)
- Differential travel: mm (in.)
- Overtravel - min.: mm (in.)
- Ambient operating temperature: °C
- Mechanical endurance: Operations
- Contact gap: mm (in.)
- Weight: g (oz.)

**Contact type**

- C (Form C) SPDT
- B (Form B) SPNC not available in PC terminals
- A (Form A) SPNO not available in PC terminals

**Connections**

- Actuators and mounting positions

**Part numbers for standard actuators**

- Actuators – Length: mm (in.)

- Mounting positions
  - Coefficient: mm (in.)

**Mounting positions**

Except where otherwise indicated, actuators are supplied unmounted. For factory mounting, specify mounting position L or R.

- **To calculate force**: take the force quoted for the switch and divide by the coefficient given in the table.
- **To calculate travel**: take the travel quoted for the switch and multiply by the same coefficient.

**Mounting accessories for PCB mounting: 5 / 6 / 7 / 8**


Other information

For other forces, actuators, connections and temperatures, please consult us.

<table>
<thead>
<tr>
<th>Normally stocked items</th>
<th>Catalog products produced to order</th>
</tr>
</thead>
</table>

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
<table>
<thead>
<tr>
<th>P/N</th>
<th>Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Connection</th>
<th>Actuator Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>83170.0</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83170C1.0</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83170C2.0</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83170C3.0</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To order please specify:

- **Switch Type**: 831700, 831704, 831709
- **Contact Type**: A, B, C
- **Connection**: 1, 2, 3, 4, 5
- **Actuators**: A, B, C, L
- **Actuator Position**: L - Left (Standard), R - Right

Example: P/N is 831700 SPDT solder terminals “C” actuator mounted on the left.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Subminiature Switches DIN 41635 B

### Dimensions

<table>
<thead>
<tr>
<th>83 170 Asymmetric</th>
<th>83 170 Symmetric</th>
<th>83 170 with MB Button</th>
</tr>
</thead>
</table>

#### Connections

<table>
<thead>
<tr>
<th>2</th>
<th>1</th>
<th>3-4</th>
<th>5-6</th>
<th>7-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solder</td>
<td>.11x.02 Quick Connects</td>
<td>Straight PCB</td>
<td>Side Output PCB Rear</td>
<td>Side Output PCB Front</td>
</tr>
</tbody>
</table>

#### Printed circuit board mounting

<table>
<thead>
<tr>
<th>Asymmetric</th>
<th>Symmetric</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 5 7</td>
<td>4 6 8</td>
</tr>
</tbody>
</table>

Mounting by M2 screws
Torque: 2 cm daN

mm (in)
Subminiature Switches DIN 41 635 B

**Actuators**

**Actuator mounting positions**

<table>
<thead>
<tr>
<th>L</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.9 (0.23)</td>
<td>11.1 (0.44)</td>
</tr>
<tr>
<td>3.6 (0.14)</td>
<td></td>
</tr>
</tbody>
</table>

**Mounting accessories**

**Mounting pins**

- Output on unit side: 5
- Output on cover side: 7

---

TP (Tripping Point)
Refer to pages 3/6 & 3/7.
Sealed Subminiature Switches Series 83 180 DIN 41 635 B

For other forces, actuators, connections and temperatures, please consult us.

Other information

<table>
<thead>
<tr>
<th>Normally stocked items</th>
<th>Catalog products produced to order</th>
</tr>
</thead>
</table>

3/10
### Products and Specifications

- **High Current**
- **Dual Current**
- **Medium Current**
- **Standard**

<table>
<thead>
<tr>
<th>Switch Type</th>
<th>Contact Type</th>
<th>Connection</th>
<th>Actuators</th>
</tr>
</thead>
<tbody>
<tr>
<td>83180</td>
<td>83181</td>
<td>83183</td>
<td>83186</td>
</tr>
<tr>
<td>83180C1.0</td>
<td>83181C1.0</td>
<td>83183C1.0</td>
<td>83186C1.0</td>
</tr>
<tr>
<td>83180C2.0</td>
<td>83181C2.0</td>
<td>83183C2.0</td>
<td>83186C2.0</td>
</tr>
<tr>
<td>83180CFD0.0</td>
<td>83181CFD0.0</td>
<td>83183CFD0.0</td>
<td>83186CFD0.0</td>
</tr>
</tbody>
</table>

### Switch Type

- **83180**
- **83180C1.0**
- **83180C2.0**
- **83180CFD0.0**

### Contact Type

- **A**
- **B**
- **C**
- **D**
- **E**

### Connection

- **1**: 6
- **2**: 7
- **3**: 8
- **4**: FDØ, CDØ
- **5**: FGØ, CBØ

### Actuators

- **A**
- **B**
- **C**
- **D**
- **E**

### Actuator Position

- **L**: Left (Standard)
- **R**: Right

### To Order Please Specify:

- **Switch Type**: 831810
- **Contact Type**: A, B, C
- **Connection**: 6
- **Actuators**: F, L

---

*Special order, contact us for part number

**Cable version for types 83181, 83183, and 83186

---

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Sealed Subminiature Switches DIN 41635 B

### Dimensions

<table>
<thead>
<tr>
<th>Symmetric</th>
<th>Asymmetric</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Symmetric Dimensions Diagram]</td>
<td>![Asymmetric Dimensions Diagram]</td>
</tr>
<tr>
<td>mm (in)</td>
<td>mm (in)</td>
</tr>
</tbody>
</table>

Fixed by 2 x M2 screws
Torque for 
- screw alone: 0.2 Nm (1.75 in. lbs.)
- screw + washer: 0.3 Nm (2.65 in. lbs.)

### Connections

#### Terminals

<table>
<thead>
<tr>
<th>2</th>
<th>Solder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 - 4</th>
<th>Straight PCB output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5 - 6</th>
<th>Side output, PCB rear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7 - 8</th>
<th>Side output, PCB front</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Printed circuit board mounting

<table>
<thead>
<tr>
<th>Asymmetric</th>
<th>Symmetric</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 5, 7</td>
<td>4, 6, 8</td>
</tr>
</tbody>
</table>

#### Lead output

- **FG0 lead output on left**
  - **FD0 lead output on right**
  - **FB0 lead output on bottom**

- **Conductor cross-section:**
  - 83181 / 83183 / 83186 / 83180
  - 3 x 0.5 mm² (.12 x .02 in²)
  - 3 x 0.75 mm² (.12 x .03 in²)

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Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Cable output

CG0 cable output on left

CD0 cable output on right

CB0 cable output on bottom

Conductor cross-section:
83181 / 83183 / 83186 = 3 x 0.5 mm²
(.12 x .02 in²)

Common = black
NC = brown
NO = blue

mm (in.)

Actuators

Mounting positions

A, B, C
Flat

E
Roller

F
Dummy roller

mm (in.)

Recommendations for operation from the side

Products and specifications subject to change without notice.

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Miniature Switches Series 83 161 DIN 41635 A

General specifications

Components

Material
- Case: glass-filled polyamide (self-extinguishing version to UL 94 VO and IEC 695-2-1 850° C - available on request)
- Button: polyamide
- Contacts: nickel silver or gold alloy (dual-current)

Actuators
- flat: stainless steel
- roller: stainless steel, glass-filled polyamide roller
- other types of polyamide

Approvals: NF - UL/cUL

Operating curve

For type 83 161 1 3

For type 83 161 5 - 5 SP 4136

For type 83 161 8

For type 83 161 9 SP 4136

For types 83 161 8 - 9 SP 4136 dual-current

Models 83 161 8 and 83 161 9 SP 4136 are designed to operate equally well on dual-current (1 mA 4 V minimum) or medium-current (5 A maximum) circuits.

However, a given product should only be used to switch one type of circuit during its working life.

Types

Part numbers for standard actuators with connections of type

Features

Electrical characteristics

Current rating at 125/250 V
Current A
Horsepower HP

Mechanical characteristics

Operating force - max. N (oz.)
Release force - min. N (oz.)
Total travel force - max. N (oz.)
Permitted overtravel force - max. N (oz.)
Rest position - max. mm (in.)
Tripping point mm (in.)
Differential travel mm (in.)
Overtravel - min. (OT) mm (in.)
Ambient operating temperature °C (°F)
Mechanical durability (for 2/3 OT) Operations
Contact gap mm (in.)
Weight g (oz.)

Contact type

C (Form C) SPDT
B (Form B) SPNC
A (Form A) SPNO

Connections

2 solder
3 for 1/4˝ Quick Connects

Actuators and mounting positions

Part numbers for standard actuators

Actuators-Length mm (in.)
Flat 161A R14.2 (.56)

Mounting positions

A B
Coefficient 2 1
Tripping point (except 83 161 6) 15.2 (6.065) 15.2 (6.065)
Tripping point 83 161 6 14.8 (5.85) 15 (5.915)

Part numbers for standard actuators

Actuators-Length mm (in.)
Dummy roller 161G R21.8 (.86)

Mounting positions

A B
Coefficient 3 1.8
Tripping point (except 83 161 6) 21.7 (8.585) 21.7 (8.585)
Tripping point 83 161 6 21.5 (8.5) 21.5 (8.5)

Other information

For other forces, actuators, connections and temperatures, please consult us.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
For factory mounting, specify fixing position A, B or C. ** For 83161.1, 83161.2, 83161.3, 83161.6, 83161.8, mounted in factory (supplied without nut)
Miniature Switches DIN 41635 A

**Dimensions**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>83 161</td>
<td></td>
</tr>
</tbody>
</table>

**Connections**

1. **2 Solder**
2. **3 (6.3x0.8 (1/4x.03)) Quick Connects**
3. **5 Screw**
4. **6 (4.8x0.5 (.3/16x.02)) Quick Connects**
5. **7 (2.5x0.5 (.11x.02)) Quick Connects**

**Actuators**

**Force calculation**: divide the switch forces by the coefficient in the table.

**Travel calculation**: multiply the switch travel by the same coefficient.

**Example**:

83 161 3 with B Flat 161A actuator R 25.4 (1) position A (coef. 4)

**Operating force**: 0.8 \( \times 4 = 3.2 \) N

**Pre-travel**: 1.4 \( \times 4 = 5.6 \) mm (.055 \( \times 4 = .22 \) in)
Miniature Switches DIN 41635 A

Actuator Mounting Positions

Nuts 70 602 118 for L type actuator

Accessories

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Miniature Positive Break Switches Series 83 160 DIN 41635 A

General specifications

Layout

The contact conforms to NFC 63 143 and IEC 947.5.1

*The SPDT version conforms to standard IEC 947.5.1 if only the normally closed contact is used.

The switch operating principle forces the contacts open even in the event of welding (positive break operation).

Components

Material
- Case : glass-filled polyamide
- Cover : transparent polycarbonate
- Contacts : nickel silver
- Positive rocker : high temperature thermoplastic

Actuators
- stainless steel
- polyamide roller

Electrical characteristics

Short-circuit test
(from IEC 947-5-1 § 8.34)
- Current peak 1000 A at 250 V ~ 0.5 cos ϕ < 0.7
- Short-circuit protection (SCPD) : fuse 10 A gG (IEC 60) (1.2/50 µs) : 2500 V

Electrical life
Max. operations : 20 cycles/min
Resistive load at 250 V ~ 16 A : 10 cycles
Inductive load (IEC 947.5.1) :
AC 15 : 250 V ~ 6 A : 0.3 x 10^5 operations
DC 13 : 24 V : 20 W L/R = 40 ms : 3 x 10^5 operations
120 V ~ 20 W L/R = 40 ms : 5 x 10^5 operations

Definitions

P.O.F. Minimum Positive Opening Force.
The operating force that has to be applied to the operating device to produce the positive opening action.

P.O.P. Maximum Positive Opening Position.
The position of the operating device at the moment when positive opening of the contacts occurs.

For other definitions, see "Basic concepts".

Types

83 160 7

Features
With positive break operation

Electrical characteristics

<table>
<thead>
<tr>
<th>Assigned working voltage (Ue)</th>
<th>V</th>
<th>250</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigned working current (Ie)</td>
<td>A</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Thermal current rating (Ith)</td>
<td>A</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Assigned circuit voltage (Ui)</td>
<td>V</td>
<td>250</td>
<td>250</td>
</tr>
</tbody>
</table>

Mechanical characteristics

<table>
<thead>
<tr>
<th>Operating force - max.</th>
<th>N (oz.)</th>
<th>4 (14.1)</th>
<th>4 (14.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release force - min.</td>
<td>N (oz.)</td>
<td>1.5 (3.5)</td>
<td>1.5 (3.5)</td>
</tr>
<tr>
<td>Min. positive opening force</td>
<td>N (oz.)</td>
<td>18 (63.5)</td>
<td>18 (63.5)</td>
</tr>
<tr>
<td>Permitted overtravel force - max.</td>
<td>mm (in.)</td>
<td>200 (70.5)</td>
<td>200 (70.5)</td>
</tr>
<tr>
<td>Maximum rest position</td>
<td>mm (in.)</td>
<td>15.7 (0.62)</td>
<td>15.7 (0.62)</td>
</tr>
<tr>
<td>Tripping point</td>
<td>mm (in.)</td>
<td>14.8 (0.58)</td>
<td>14.8 (0.58)</td>
</tr>
<tr>
<td>Maximum positive opening position</td>
<td>mm (in.)</td>
<td>13.5 (0.53)</td>
<td>13.5 (0.53)</td>
</tr>
<tr>
<td>Overtravel - min.</td>
<td>mm (in.)</td>
<td>1.3 (0.047)</td>
<td>1.3 (0.047)</td>
</tr>
<tr>
<td>Operating speed max.</td>
<td>m/s (ft/sec)</td>
<td>0.5 (1.64)</td>
<td>0.5 (1.64)</td>
</tr>
<tr>
<td>Operating rate max.</td>
<td>(operation/s)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>°C (°F)</td>
<td>-40(+85 (-40+185)</td>
<td>-40(+85 (-40+185)</td>
</tr>
<tr>
<td>Mechanical durability</td>
<td>Operations</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Contact gap</td>
<td>g (oz.)</td>
<td>7 (0.25)</td>
<td>7 (0.25)</td>
</tr>
</tbody>
</table>

Contact Type

B (NC)

C (SPDT)*

Connections

2 solder 3 for 1/4˝ Quick Connects 6 for 3/16˝ Quick Connects X1 for printed circuit board

Actuators and mounting positions

Dimensions

Actuators**

<table>
<thead>
<tr>
<th>Ø = no Actuator</th>
<th>A (Flat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E (Roller)</td>
<td></td>
</tr>
<tr>
<td>L (Pushbutton)</td>
<td></td>
</tr>
</tbody>
</table>

Other information

For other accessories, connections : please consult us

*NO – contact is not positive break

** Consult us for actuator length, forces and positions

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Miniature Side Rotary (High Sensitivity) Switches Series 83 137

To order, please specify:

1. Switch Type
   - 831370
   - Example switch is: 831370, SPDT, 1/4" Q.C.

2. Contact Type
   - A
   - B
   - C

3. Connection
   - 2
   - 3

Examples:
- 831370 C 3 W
- 831370 A 2 B

General specifications

- Layout

Components

- Material: glass filled polyamide
- Contacts: silver
- Actuators: stainless steel wire

Operating curve

<table>
<thead>
<tr>
<th>Components</th>
<th>Dimensions connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator setting in ( \alpha )</td>
<td>mm (in)</td>
</tr>
<tr>
<td>With special gears, ( \alpha ) can be varied Min 0 to 350°</td>
<td>5.65 (.222)</td>
</tr>
<tr>
<td>Datum point for special lever setting</td>
<td>5.5 (.22)</td>
</tr>
<tr>
<td>Pre travel angle max.</td>
<td>4.3 (.17)</td>
</tr>
<tr>
<td>Movement differential angle</td>
<td>0.8 (.03)</td>
</tr>
<tr>
<td>Overtravel angle min.</td>
<td>15.5 (.61)</td>
</tr>
<tr>
<td>Overtravel - min.</td>
<td>15.4 (.61)</td>
</tr>
</tbody>
</table>

Mechanical characteristics

- Maximum operating force: 5 N cm (in. oz)
- Minimum release torque: 1.12 (.17) N cm (in. oz)
- Overtravel torque: 0.03 (.042) N cm (in. oz)
- Movement differential angle: 10°
- Overtravel - min.: 12°
- Operating temperature: -20 to 125 (°C°F)
- Mechanical life: 10^7 operations
- Contact gap: 0.8 (.031) mm (in)
- Weight: 7.2 (.25) g (oz)

Approvals

- CSA (LR-20418), ASE, Semko, UTE & VDE

For other connections, actuators, approvals, accessories... Please consult factory.

Electrical characteristics

- Nominal A
- Thermal A
- Resistive circuit:
  - Number of operations = 5 ms
  - \( \cos \phi = 0.8 \)
  - \( L \)
  - \( R \)
- Inductive circuit:
  - \( 0.12 (.17) \)
  - \( 0.03 (.042) \)
  - \( 0.5 (.71) \)
  - \( 10 \)

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Standard Switches (Double Break) Series 83 106 / 83 109 / 83 112 / 83 154

General specifications

- The NO and NC circuits must both be of the same polarity.

Components

- Material: polyamide (83 106 to 83 112)
- Case: Diallyl-Phthalate (83 154)
- Contacts: nickel silver
- Actuators:
  - passivated mild steel
  - roller: nylon
  - adjustable screws: self-retaining
  - plates: passivated mild steel (zinc)
- Note: Fixing holes for these switches have metal ferrules.
- Approvals: UL - cUL

Operating curve

Number of operations

- Resistive circuit: 
- Inductive circuit: 
- Mechanical life: 

83 154

Types

83 106 0

Features

- Standard

Electrical characteristics

Current rating at 250 V

<table>
<thead>
<tr>
<th>Nominal</th>
<th>Thermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
</tr>
<tr>
<td>A</td>
<td>17.5</td>
</tr>
</tbody>
</table>

Mechanical characteristics

- Operating force - max. N (oz.): 4 (14.1)
- Release force - min. N (oz.): 1 (3.5)
- Permitted overtravel force - max. N (oz.): 20 (70.5)
- Maximum rest position mm (in.): 12.75 (.5)
- Tripping point mm (in.): 11.45 ±0.13 (.45 ±.005)
- Differential travel mm (in.): 0.5 (-0.02 .02)
- Overtravel - min. mm (in.): 0.7 (28)
- Ambient operating temperature °C (°F): -20 +85 (-4 +185)
- Mechanical durability Operations: 10
- Contact gap mm (in.): 0.4 x 2
- Weight g (oz.): 8

Contact type

- (Form C) SPDT
- (Form B) SPNC
- (Form A) SPNO

Connections

Actuators and mounting positions

Part numbers for standard actuators

<table>
<thead>
<tr>
<th>Part numbers for standard actuators</th>
<th>Actuator-Length</th>
<th>Flat R49 (1.92)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 70 500 888</td>
<td>Operating force - max. N (oz.): 1.2 (4.2)</td>
<td></td>
</tr>
<tr>
<td>A 70 500 888</td>
<td>Release force - min. N (oz.): 0.25 (.9)</td>
<td></td>
</tr>
<tr>
<td>B 70 500 888</td>
<td>Pre-travel - max. mm (in.): 6.2 (.24)</td>
<td></td>
</tr>
<tr>
<td>A 70 500 888</td>
<td>Differential travel mm (in.): 2.1 ±0.6 (0.08 ±.025)</td>
<td></td>
</tr>
<tr>
<td>B 70 500 888</td>
<td>Total travel max. mm (in.): 7.5 (.3)</td>
<td></td>
</tr>
</tbody>
</table>

Except where otherwise indicated, the flat and roller actuators are mounted as shown in the dimensional drawings (mounted on the left).

Assemblies

Other information

For other forces, actuators, connections and temperatures, please consult us.

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com

3/20
<table>
<thead>
<tr>
<th>Face terminals</th>
<th>Enclosed screws</th>
<th>Bistable, 2 actuator positions</th>
<th>Bistable, 2 push button positions</th>
<th>Base mounting by screws</th>
<th>Base mounting by clips</th>
<th>Magnetic blow-out switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
</tr>
<tr>
<td>4 (14.1)</td>
<td>4 (14.1)</td>
<td>0.45 (1.62)</td>
<td>2 (7.19)</td>
<td>4 (14.1)</td>
<td>4 (14.1)</td>
<td>4 (14.1)</td>
</tr>
<tr>
<td>1 (3.5)</td>
<td>1 (3.5)</td>
<td>0.5 (2.41)</td>
<td>1 (3.5)</td>
<td>1 (3.5)</td>
<td>1 (3.5)</td>
<td>1 (3.5)</td>
</tr>
<tr>
<td>20 (70.5)</td>
<td>20 (70.5)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
</tr>
<tr>
<td>12.75 (5)</td>
<td>12.75 (5)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
<td>11.45 (.455) (.455)</td>
</tr>
<tr>
<td>0.5 (.02)</td>
<td>0.5 (.02)</td>
<td>0.5 (.02) (.02)</td>
<td>0.5 (.02) (.02)</td>
<td>0.5 (.02) (.02)</td>
<td>0.5 (.02) (.02)</td>
<td>0.5 (.02) (.02)</td>
</tr>
<tr>
<td>0.7 (.29)</td>
<td>0.7 (.29)</td>
<td>0.7 (.29)</td>
<td>0.7 (.29)</td>
<td>0.7 (.29)</td>
<td>0.7 (.29)</td>
<td>0.7 (.29)</td>
</tr>
<tr>
<td>-20 +85 (-4 +185)</td>
<td>-20 +85 (-4 +185)</td>
<td>-20 +85 (-4 +185)</td>
<td>-20 +85 (-4 +185)</td>
<td>-20 +85 (-4 +185)</td>
<td>-20 +85 (-4 +185)</td>
<td>-20 +85 (-4 +185)</td>
</tr>
<tr>
<td>0.4 x 2 (.016 x .08)</td>
<td>0.4 x 2 (.016 x .08)</td>
<td>0.4 x 2 (.016 x .08)</td>
<td>0.4 x 2 (.016 x .08)</td>
<td>0.4 x 2 (.016 x .08)</td>
<td>0.4 x 2 (.016 x .08)</td>
<td>0.4 x 2 (.016 x .08)</td>
</tr>
<tr>
<td>14.5 (.3)</td>
<td>9 (.32)</td>
<td>8 (.3)</td>
<td>8 (.3)</td>
<td>8 (.3)</td>
<td>8 (.3)</td>
<td>8 (.3)</td>
</tr>
</tbody>
</table>

**Contact type**

<table>
<thead>
<tr>
<th>C</th>
<th>C</th>
<th>C</th>
<th>C</th>
<th>C</th>
<th>C</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

2 solder for 1/4" Quick Connects

1 screw

<table>
<thead>
<tr>
<th>B</th>
<th>70500 828</th>
<th>E</th>
<th>70500 813</th>
<th>Q</th>
<th>70500 840</th>
<th>T</th>
<th>70500 870</th>
<th>B9</th>
<th>21416 364</th>
</tr>
</thead>
<tbody>
<tr>
<td>R49 (1.92)</td>
<td>Flat R47 (1.85)</td>
<td>Lever R26 (1.02)</td>
<td>R15.5 (.61)</td>
<td>Operation B9</td>
<td>Plate Mounting Screw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2 (4.2)</td>
<td>1.2 (4.2)</td>
<td>2.8 (9.9)</td>
<td>4 (14.1)</td>
<td>4 (14.1)</td>
<td>1 (3.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.25 (9)</td>
<td>0.25 (9)</td>
<td>0.45 (1.6)</td>
<td>0.8 (2.8)</td>
<td>1.5 (0.99)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2 (24)</td>
<td>6.2 (24)</td>
<td>3.2 (125)</td>
<td>1.45 (.057)</td>
<td>0.5 (.02) (.02)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 x 0.083 (.083)</td>
<td>2.1 x 0.083 (.083)</td>
<td>105.0 x 0.041 (.041)</td>
<td>0.5 (.02) (.02)</td>
<td>0.5 (.02) (.02)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.4 (.33)</td>
<td>7.5 (.31)</td>
<td>4.5 (.18)</td>
<td>1.9 (.075)</td>
<td>1.9 (.075)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Y</th>
<th>70500 206</th>
<th>H</th>
<th>70500 208</th>
<th>O2</th>
<th>70500 218</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y Side plate</td>
<td>Horizontal single-pole mounting plate</td>
<td>O2 2-pole side mounting plate</td>
<td>K2 2-pole vertical mounting plate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**To order, specify:**

1. **Switch Type**
   - 831060
   - 831090
   - 831120
   - 831540
2. **Contact Type**
   - C
   - B
   - A
3. **Connection**
   - Example: 831810
4. **Actuators**
   - A
   - T
   - B
   - B9
   - E
   - Q
   - Y
5. **Actuator Position**
   - L - Left (Standard)
   - R - Right

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Standard Switches

Dimensions

<table>
<thead>
<tr>
<th>Products</th>
<th>L</th>
<th>83 106 / 109 / 111</th>
<th>83 154</th>
<th>83 154</th>
</tr>
</thead>
<tbody>
<tr>
<td>83 106 1</td>
<td>32 (1.26)</td>
<td>32 (1.26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83 106 7</td>
<td>40 (1.57)</td>
<td>40 (1.57)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Connections

<table>
<thead>
<tr>
<th>mm (in)</th>
<th>1</th>
<th>2 (83 106)</th>
<th>2 (83 109)</th>
<th>3</th>
</tr>
</thead>
</table>

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Standard Switches

Actuators

Cross-section of actuators 1 x 6.4 mm (.039 x .252 in.)

A

B

E

Q

B9

T

mm (in.)

Assemblies

Y

02

K2

Unless indicated, the thickness of plates is 1.5 mm (.059 in.).

mm (in.)

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
Sealed Double Break Switches Series 83 139 - IP 67 - Explosion Proof  EEX d IIC T6

General specifications

Layout

Components

Material
- Case : polyester
- Contacts : silver
- Membrane : nitrile on 83 139 0
- silicone on 83 139 1 - 2 - 5

Actuators :
- stainless steel
- rollers : polyamide

- The NO and NC circuits must both be of the same polarity.

Characteristics specific to 83 139 1
- Conform to standards EN 50 014 and 50 018
- Group II classified for explosive atmospheres other than mines subject to firedamp
- Temperature class T6, max. surface temperature 85°C
- LCIE certificate 880022U
- These switches can be enclosed in an envelope of a certified material, particularly to provide mechanical protection
- Degree of protection IP 67.

Operating curve

Types

Electrical characteristics

Current rating at 125-250 V
Nominal A

Mechanical characteristics

Operating force - max. N (oz)
Release force - min. N (oz)
Max. total travel force N (oz)
Overtravel max. - force mm (in)
Maximum rest position mm (in)
Tripping point mm (in)
Movement differential mm (in)
Overtravel - min. mm (in)
Operating temperature °C (F°)
Mechanical life Operations
Contact gap mm (in)
Weight g (oz)

Contact Type
C (Form C) SPDT

Mounting Holes
4 holes = A standard
2 holes = B

Connections

Lead position bottom - standard
Lead position right
Lead position left

Actuators

Part numbers for standard actuators
Actuator-Length mm (in)

Operating force - max. N (oz)
Release force - min. N (oz)
Movement differential mm (in)

Part numbers for standard actuators
Actuator-Length mm (in)

Operating force - max. N (oz)
Release force - min. N (oz)
Movement differential mm (in)

Other information

For other forces, actuators, connections and temperatures, lead lengths, please consult factory.

Products and specifications subject to change without notice.

Order/Technical Support – Tel: (800) 677-5311 / FAX: (800) 677-3865 / www.crouzet-usa.com
<table>
<thead>
<tr>
<th>Contact Type</th>
<th>Mounting Holes</th>
<th>Switch Type</th>
<th>Lead Length</th>
<th>Actuators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>1.5 (5.3)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>A</td>
<td>C</td>
<td>0.2 (7.1)</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>R</td>
<td>B</td>
<td>1.1 (.043)</td>
<td></td>
</tr>
</tbody>
</table>

**Factory mounted only**

**Note**: When mounting actuators, a light greasing of the switch push-button is recommended.

For more actuators, see 83161

To order, please specify:

- Switch Type
- Contact Type
- Mounting Holes
- Lead Length
- Actuators

Example: 831390 C A B : A

Example switch is: 831390, DDBT, 4 mounting holes, leads exit bottom, .5 meter cable with A actuator. To order actuators separately, use 8 digit P/N.
**Sealed Switches - IP 67**

**Dimensions**

<table>
<thead>
<tr>
<th>Code</th>
<th>Mounting</th>
<th>Holes</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>83 139 0 - 5</td>
<td>Mounting A</td>
<td>4</td>
<td>R: 1.5 (.06) spherical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R: 1.5 (.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 x Ø3.1 (Ø.125)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 x Ø2.2 (Ø.087)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.7 (.22)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25 (.98)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø2 (.079) R:1.5 (.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R: 1.5 (.06) spherical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 x Ø3.1 (Ø.125)</td>
</tr>
<tr>
<td>83 139 0 - 1 - 5</td>
<td>Mounting B</td>
<td>2</td>
<td>R: 1.5 (.06) spherical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R: 1.5 (.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 x Ø3.1 (Ø.125)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 (.94)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø2 (.079) R:1.5 (.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R: 1.5 (.06) spherical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 x Ø3.1 (Ø.125)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>34 (1.34)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cable 3 x 0.75 mm², length 0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 = black lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 = brown lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 = blue lead</td>
</tr>
</tbody>
</table>

**Actuators Factory Mounted Only**

**Actuators mounting position (type 139)**

<table>
<thead>
<tr>
<th>Position</th>
<th>Lead Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>Standard lead position colour black</td>
</tr>
<tr>
<td>Right</td>
<td>Standard lead position colour black</td>
</tr>
</tbody>
</table>

**Lead position**

- **Left:**
  - Numbering: 1 = black lead, 2 = brown lead, 3 = grey lead, 4 = blue lead
- **Right:**
  - Numbering: 1 = black lead, 2 = brown lead, 3 = grey lead, 4 = blue lead

**mm (in)**

- Ø 4.8 x 4.8 (Ø .19 x .18)
- 0.5 x 0.8 (0.02 x 0.03)
- 0.5 x 0.8 (0.02 x 0.03)
- 0.5 x 0.8 (0.02 x 0.03)
Sealed Switches - IP 67

Actuators User or Factory Mounted

Actuators mounting position (type 161)

<table>
<thead>
<tr>
<th>A - B</th>
<th>E - G</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram A-B" /></td>
<td><img src="image2.png" alt="Diagram E-G" /></td>
<td><img src="image3.png" alt="Diagram F" /></td>
</tr>
</tbody>
</table>

| H |
| ![Diagram H](image4.png) |

mm (in)
Sealed Miniature Switches Series 83 169 - IP67 - DIN 41 635 A

Components
Material
- Case : polyester UL 94 VO
- Contacts : nickel silver gold alloy
  (low current)
- Membrane : Fluoro - silicone

Actuators
- stainless steel
- rollers : polyamide
- Plunger : stainless steel

For other forces, actuators, connections and temperatures, please contact factory.

Other information

For other forces, actuators, connections and temperatures, please contact factory.

Types

Features

Electrical characteristics
Current rating at 125-250 V
Nominal A

Mechanical characteristics
Operating force - max. N (oz)
Release force - min. N (oz)
Maximum overtravel force N (oz)
Overtime max. - force N (oz)
Maximum rest position mm (in)
Tripping point mm (in)
Movement differential mm (in)
Overtime - min. mm (in)
Temperature °C (°F)
Endurance Operations
Contact gap mm (in)
Weight g (oz)

Contact Type
C (Form C) SPDT

Connections
Flexible leads ø 3 x 1 mm² long 0.50 m
Lead position - right
Lead position - left
3 lead cable - 3 x 0.75 mm² length 0.50 m, left output only

Part numbers for standard actuators

Actuator-Length mm (in.) ** Flat 139 AX R29.7 (1.17)

Mounting positions
D
Operating force - max. N (oz) 2.5 (8.8)
Release force - min. N (oz) 0.4 (1.4)
Movement differential mm (in) 1.2-0.5 (.047-.02)

Part numbers for standard actuators

Mounting positions N (oz)
Operating force - max. N (oz)
Release force - min. mm (in)
Movement differential
Unless indicated, flat actuators and roller actuators are delivered unmounted
** Factory Mounted Only

Note: When mounting actuators a light greasing of the switch push-button is recommended.

Degrees of protection IP 67

Approvals: UL, cUL (CSA Equivalent)

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### Table 1: Specification Options

<table>
<thead>
<tr>
<th>Standard Movement</th>
<th>Reduced Differential Movement</th>
<th>Low Current</th>
<th>Low Current, Reduced Differential Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>4 (14.1)</td>
<td>4 (14.1)</td>
<td>4 (14.1)</td>
<td>4 (14.1)</td>
</tr>
<tr>
<td>1 (3.5)</td>
<td>1 (3.5)</td>
<td>1 (3.5)</td>
<td>1 (3.5)</td>
</tr>
<tr>
<td>8 (28.2)</td>
<td>8 (28.2)</td>
<td>8 (28.2)</td>
<td>8 (28.2)</td>
</tr>
<tr>
<td>20 (70.5)</td>
<td>20 (70.5)</td>
<td>20 (70.5)</td>
<td>20 (70.5)</td>
</tr>
<tr>
<td>15.9 (.63)</td>
<td>15.9 (.63)</td>
<td>15.9 (.63)</td>
<td>15.9 (.63)</td>
</tr>
<tr>
<td>14.7 (.58)</td>
<td>14.7 (.58)</td>
<td>14.7 (.58)</td>
<td>14.7 (.58)</td>
</tr>
<tr>
<td>0.35 (.014)</td>
<td>0.35 (.014)</td>
<td>0.35 (.014)</td>
<td>0.07 (.003)</td>
</tr>
<tr>
<td>1 (.04)</td>
<td>1 (.04)</td>
<td>1 (.04)</td>
<td>0.4 (.016)</td>
</tr>
<tr>
<td>-20 to 85 (-4 to 185)</td>
<td>-20 to 85 (-4 to 185)</td>
<td>-20 to 85</td>
<td>-20 to 85 (-4 to 185)</td>
</tr>
<tr>
<td>5 x 10^5</td>
<td>5 x 10^5</td>
<td>5 x 10^5</td>
<td>5 x 10^5</td>
</tr>
<tr>
<td>0.4 (.016)</td>
<td>0.4 (.016)</td>
<td>0.4 (.016)</td>
<td>0.4 (.016)</td>
</tr>
<tr>
<td>30 (1.06)</td>
<td>30 (1.06)</td>
<td>30 (1.06)</td>
<td>30 (1.06)</td>
</tr>
</tbody>
</table>

### Table 2: Connections

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
</tbody>
</table>

### Table 3: Actuator Options

- **Standard**
- **Reduced differential movement**
- **Low current**
- **Low current, reduced differential movement**

### Table 4: Order Details

To order, please specify:

1. **Switch Type**
2. **Contact Type**
3. **Connections**
4. **Length of Leads**
5. **Actuator**
6. **Actuator Position**

Example switch is: 831690, SPDT, leads exit right, .5 meter leads, with no actuator. To order actuators separately, use the 8 digit P/N.

- **Example 831690**: 
  - C: 
  - R: 
  - L: 
  - 5 - 1/2 meter (std) 
  - 0: 
  - 8: 
  - 2: 
  - A: 
  - E: 
  - G: 
  - H: 
  - P: 
  - R: 

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Sealed Miniature Switches

Dimensions

Output wires

Output cable

mm (in)

Actuators

Mounting position for factory mounted actuators

Mounting position for factory or customer mounted actuators

mm (in)
Sealed Flat Pack Switches Series 83 123 IP 66

---

**General specifications**

**Layout**

![Layout Diagram]

**Components**

**Material**
- Casing: nitrile
- Contacts: silver
- Contact holder: polyamide
- Mounting plate: passivated mild steel (zinc)

**Degrees of protection**

IP 66

**Mounting - Operation**

In order to comply with basic safety requirements, an insulator must be used if the device is being operated manually. One of the fixing holes must be used as a protective earth.

---

**Types**

**Features**

<table>
<thead>
<tr>
<th></th>
<th>83 123 0</th>
<th>83 123 0 Raised Button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating at 250 V</td>
<td>Nominal A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Thermal A</td>
<td>12</td>
</tr>
</tbody>
</table>

**Electrical characteristics**

- **Nominal A**
  - 83 123 0: 5 A
  - 83 123 0 Raised Button: 5 A

**Mechanical characteristics**

- **Operating force - max.**
  - 83 123 0: 5.3 N (18.7 oz)
  - 83 123 0 Raised Button: 5.3 N (18.7 oz)

---

**Contact Type**

<table>
<thead>
<tr>
<th></th>
<th>C (Form C SPDT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
</tr>
</tbody>
</table>

**Connections**

- **Output by A05 VVF cable**: 3 x 0.75 mm² cores in sheath of 7.6 mm ext. Ø.
- **Standard length 0.50 m**
  - Common (1): black
  - Normally closed (2): brown
  - Normally open (4): blue

**Dimensions**

- **Standard 83 123**

- **Raised button 83 123**

---

**Other information**

For other cable lengths and temperatures, please consult us.

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Raised Button</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5m</td>
<td>83 123 018</td>
<td>83 123 018 RB</td>
</tr>
<tr>
<td>1.0m</td>
<td>83 123 015</td>
<td>83 123 015 RB</td>
</tr>
<tr>
<td>2.0m</td>
<td>83 123 005</td>
<td>83 123 005 RB</td>
</tr>
</tbody>
</table>

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---

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Low Force Position Detectors Series 81 290

- Conforms to standard DIN 43365 Form A
- Low activation force < 1.7 oz. (50 g @ at 6 bars) at 90 psi
- No continuous consumption of compressed air

### Part numbers

<table>
<thead>
<tr>
<th>Contact type</th>
<th>Symbol</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Form B) SPNC</td>
<td>81 290</td>
<td>81 290 501</td>
<td></td>
</tr>
<tr>
<td>(Form A) SPNO</td>
<td></td>
<td>81 290 001</td>
<td></td>
</tr>
</tbody>
</table>

### Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orifice diameter</td>
<td>5/64&quot; (2)</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>30 - 120 psi (2 &gt; 8)</td>
</tr>
<tr>
<td>Flow at 60 psi (4 bars)</td>
<td>4.5 cfm (130 L/min)</td>
</tr>
<tr>
<td>Activation force at 90 psi (6 bars)</td>
<td>&lt; 1.7 ounces (50 g)</td>
</tr>
<tr>
<td>Permissible fluid: air, inert gases</td>
<td>No continuous consumption of compressed air</td>
</tr>
<tr>
<td>Max/min. temperatures</td>
<td>+20° &gt; +120 °F (-10 &gt; +50 °C)</td>
</tr>
<tr>
<td>Operating pressures</td>
<td>+20° &gt; +140 °F (-10 &gt; +60 °C)</td>
</tr>
<tr>
<td>Storage pressures</td>
<td>+20° &gt; +160 °F (-40 &gt; +70 °C)</td>
</tr>
<tr>
<td>Mechanical life at 90 psi (6 bars)</td>
<td>10 million cycles</td>
</tr>
<tr>
<td>Response time on activation</td>
<td>≤ 15 ms</td>
</tr>
<tr>
<td>Response time on release</td>
<td>≤ 15 ms</td>
</tr>
<tr>
<td>Barb connection for semi-rigid tubing</td>
<td>0.106 I.D. x 5/32 O.D. (2.7 x 4)</td>
</tr>
<tr>
<td>Weight</td>
<td>8.5 grams</td>
</tr>
</tbody>
</table>

### Operation accessories

- Unless otherwise requested, flat and roller-ended actuators are supplied loose.

<table>
<thead>
<tr>
<th>Operation accessories</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>161 A flat</td>
<td>79 215 741</td>
</tr>
<tr>
<td>161 E roller</td>
<td>79 215 743</td>
</tr>
</tbody>
</table>

### Dimensions

- Use (metric) dimensions for critical data

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>161 A</th>
<th>161 E</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.169 +0.08 (4.3 +0.2)</td>
<td>0.31 (8)</td>
<td>0.125 (6.3)</td>
</tr>
<tr>
<td>0.198 (5.1)</td>
<td>0.134 (3.4)</td>
<td>0.14 (3.6)</td>
</tr>
<tr>
<td>0.23 (5.8)</td>
<td>0.51 (13)</td>
<td>0.608 (15.4)</td>
</tr>
<tr>
<td>0.098 (2.5)</td>
<td>0.874 (22.2)</td>
<td>0.154 (3.9)</td>
</tr>
</tbody>
</table>

### Other information

- Standard products
  - On request: Wide range of actuators
  - Connectable exhaust

- Part number
  - Example: Low force position detector 81 290 501
  - Flat actuator 79 215 741

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Technical References
These basic principles apply to all our precision switches. The specific characteristics of each model are given in more detail in the relevant production sections.

**Introduction**

Our switches are high-precision, snap-action switches and these are a few of the key features which distinguish our switches:
- High ratings with small dimensions
- Very short travels
- Low operating forces
- Highly dependable force and travel values
- Long life
- Large range of actuators for easy adaptation to the most varied applications

### Switch construction

**Single-pole changeover switch (i.e. 83 161)**

![Single-pole changeover switch diagram]

**Double-pole changeover switch (i.e. 83 132 0)**

![Double-pole changeover switch diagram]

**Electrical function**

<table>
<thead>
<tr>
<th>SPDT (C)</th>
<th>Normally closed (NC)</th>
<th>Normally open (NO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2</td>
<td>1 - 2</td>
<td>1 - 4</td>
</tr>
</tbody>
</table>

The NO and NC circuits must both be of the same polarity.
### Mechanical characteristics

#### Terminology - Forces - Positions - Travel

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP</td>
<td>Rest position: Position of the operating device when no external mechanical force is applied. Also described as &quot;height at rest&quot;.</td>
</tr>
<tr>
<td>TP</td>
<td>Tripping point: Position of the operating device relative to the fixing point (hole, face) at the moment when the microswitch trips.</td>
</tr>
<tr>
<td>OL</td>
<td>Overtravel limit: Position of the operating device when an extreme force has moved it to the effective end of the available travel.</td>
</tr>
<tr>
<td>RLP</td>
<td>Release position: Position of the operating device at the moment when the snap-action mechanism trips on its return to its original position.</td>
</tr>
</tbody>
</table>

#### Forces

<table>
<thead>
<tr>
<th>Force</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OF</td>
<td>Operating Force: Maximum force which must be applied to the operating device to displace the rest position RP to the tripping point TP.</td>
</tr>
<tr>
<td>TTF</td>
<td>Total travel force: Force required to displace the operating device from its rest position RP to its overtravel limit position. (We only specify this value if it is higher than the operating force. When not quoted, it is equal to or less than the operating force).</td>
</tr>
<tr>
<td>MOF</td>
<td>Maximum overtravel force: The maximum force which can be applied to the operating device, without damaging it, in the end of travel position where it is in abutment internally or against the face of the case.</td>
</tr>
<tr>
<td>RF</td>
<td>Release force: Force to which the operating force must be reduced to allow the snap-action mechanism to return to its release position RLP.</td>
</tr>
<tr>
<td>TTF</td>
<td>Total travel force: Force required to displace the operating device from its rest position RP to its overtravel limit position. (We only specify this value if it is higher than the operating force. When not quoted, it is equal to or less than the operating force).</td>
</tr>
</tbody>
</table>

The reference point for the figures given for travel and forces is a point F situated on the button in the case of a plain microswitch, or, generally, 3 mm in from the end of a plain actuator. The reference point for the positions is one of the fixing holes, unless otherwise indicated.

#### Graphs of forces vs. travel

**Operating force (external) applied to the operating device**

- **OF**: Operating Force
- **TTF**: Total travel force
- **RF**: Release force

**Contact force**

- **NC**: Normally Closed
- **NO**: Normally Open

**Force after depression**

- **Return**: Force to return the operating device to its original position.
- **Outward**: Force to move the operating device outward.

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### Mechanical characteristics

#### Changeover time
This is the time taken by the mobile contact when moving from one fixed contact to another until it becomes fully stable (contact bounce included). This time is a function of the contact gap, the mechanical characteristics of the snap action and the mass of the mobile element. However, thanks to the snap-action mechanisms employed, the time is largely independent of the speed of operation. It is normally less that 20 milliseconds (including bounce times of less than 5 ms).

<table>
<thead>
<tr>
<th>NC</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 5 ms</td>
<td>Bounce time</td>
</tr>
<tr>
<td>about 20 ms</td>
<td>Changeover time</td>
</tr>
</tbody>
</table>

#### Mechanical durability
This is an average value indicating the purely mechanical performance of a switch when not subject to any electrical load. It may be useful for evaluation purposes in cases where the power levels involved are very low and the electrical life is thus close to the mechanical life.

#### Maximum speed and rate of operation
Our switches will work at speeds of operation varying over a very wide range: normally from 1 mm/min to 1 ms. The maximum rate of operation with a low electrical load may be as high as 10 operations/second.

#### Mounting - Operation
- To conform to the leakage paths and air gaps in the standard EEC24 - EN/IEC 61058 - EN/IEC 60947:
  - An insulation pad must be inserted between the switch and the fixing surface if the latter is metal.
  - Manual operation of a metal actuator must only be carried out with the help of a secondary actuator made of insulating materials.
- The installer must ensure adequate protection against direct contact with the output terminals.

#### Fixing - Screw torque
- Unless otherwise indicated in the mechanical characteristics table, the torque required for the fixing screws must conform to the following values:

<table>
<thead>
<tr>
<th>Ø of fixing screw</th>
<th>2</th>
<th>2.5</th>
<th>3</th>
<th>3.5</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw torque (in cm.N)</td>
<td>maximum</td>
<td>25</td>
<td>25</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>minimum</td>
<td>15</td>
<td>25</td>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>

### Environmental conditions

#### Resistance to shocks and vibrations
Resistance to impact and vibration depends on the mass of the moving parts and on the forces holding the contacts together. Generally speaking, for a switch without an actuator:
- Vibration: >10 G, 10 at 500 Hz
- Impact: >50 G, 11 ms, 1/2 sine-wave
Further information on request.

#### Ambient operating temperature
The maximum and minimum temperatures at which the mechanical and electrical characteristics of the switch will remain substantially unaltered.

#### Degree of protection
Under the IEC 529 or NFC 20010 classification scheme, standards employ an IP code to define the degree or class of protection which electrical equipment provides against access to live components, the entry of solid foreign bodies and ingress of water.

<table>
<thead>
<tr>
<th>1st numeral</th>
<th>Protection equipment provides against the entry of solid foreign bodies</th>
<th>Protection for persons against access to dangerous parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(not protected)</td>
<td>(not protected)</td>
</tr>
<tr>
<td>4</td>
<td>diameter ≥ 1 mm</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>5</td>
<td>protected against dust</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>6</td>
<td>sealed against dust</td>
<td>1 mm Ø wire</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd numeral</th>
<th>Protection equipment provides against ingress of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(not protected)</td>
</tr>
<tr>
<td>1</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>2</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>3</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>4</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>5</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>6</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>7</td>
<td>1 mm Ø wire</td>
</tr>
<tr>
<td>8</td>
<td>1 mm Ø wire</td>
</tr>
</tbody>
</table>

Under this classification, our switches come within the following categories:
- Plain switches = IP 00
- Protected switches = IP 40 with isolated connection
- Sealed switches = IP 66 or IP 67
### Dielectric characteristics

<table>
<thead>
<tr>
<th>Current rating</th>
<th><strong>Resistive circuit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>This is the current the switch is capable of making and breaking which forms the basis for the life tests.</td>
<td>For a circuit with alternating voltage, this is in phase with the current : ( \cos \varphi = 1 ).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Thermal rating</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>This is the current the switch will withstand when not being operated, for a temperature rise of not more than 60 °C.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Switch rating</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>AC voltages: see the current rating. With DC voltages the switch rating is very much dependent on the voltage, the contact gap (CG) and the nature of the load being switched. There is a risk of prolonged or indeed permanent arcing if the following limits are exceeded:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Circuit types</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resistive circuit</strong></td>
</tr>
<tr>
<td>For a circuit with alternating voltage, this is in phase with the current : ( \cos \varphi = 1 ).</td>
</tr>
</tbody>
</table>

| **Inductive circuit** |
| A circuit of this type with direct current is characterised by a time constant. An inductive circuit, with alternating voltage, for example, incorporating a motor (cos \( \varphi < 1 \)) can cause current surges up to 6 times the normal current. For certain switches, we give electrical endurance curves with \( L = 5 \text{ ms} \) in DC and \( \cos \varphi = 0.8 \) in AC. |

| **Lamp and capacitance circuit** |
| The currents at the time when the circuit is closed are very high in this case, being up to 10 times the nominal figure. |

| Internal resistance |
| This consists of the intrinsic resistance (fixed) of the parts carrying current and the contact resistance (variable). Close to the tripping point and release position, the force holding the contacts together drops considerably and this may cause a rise in internal resistance. |

| Insulation resistance |
| The insulation resistance of the switches is generally greater than 50,000 MΩ measured at 500 V DC. |

| Dielectric strength |
| The dielectric strength of our switches is generally better than: |
| - 1500 volts between live parts and earth |
| - 1000 volts between contacts |
| - 600 volts between contacts for switches whose contact gap is less than 0.3 mm. |
### Contact materials

<table>
<thead>
<tr>
<th>Choice of contact material</th>
</tr>
</thead>
<tbody>
<tr>
<td>To choose the best material for the contacts there are various factors to be considered:</td>
</tr>
<tr>
<td>- the current and voltages levels</td>
</tr>
<tr>
<td>- the type of load</td>
</tr>
<tr>
<td>- the number of operations</td>
</tr>
<tr>
<td>- the switching frequency</td>
</tr>
<tr>
<td>- the environmental conditions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inductive circuits</td>
</tr>
<tr>
<td>To increase the life of contacts and their DC rating, arcing on opening can be cut down by using the following circuits:</td>
</tr>
<tr>
<td>- for DC</td>
</tr>
<tr>
<td>Fast diode $V_R &gt; 5 \times V_{\text{nominal}}$</td>
</tr>
<tr>
<td>$I_{\text{nominal}} &gt; 10 \times I_{\text{winding}}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inductive circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - RC circuit across inductor</td>
</tr>
<tr>
<td>B - RC circuit across switch</td>
</tr>
<tr>
<td>C ($\mu$F) $\approx 100 \times I_{\text{nominal}}$ (A)</td>
</tr>
<tr>
<td>$V_{\text{insulation}} &gt; V_{\text{peak}}$</td>
</tr>
<tr>
<td>$R(\Omega) \approx \text{load resistance (\Omega)}$</td>
</tr>
<tr>
<td>D - Varistor circuit across switch</td>
</tr>
<tr>
<td>E (J) $\geq \frac{P (\text{V} \cdot \text{A})}{100}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inductive circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low power circuits</td>
</tr>
<tr>
<td>In very low power circuits ($I &gt; 1 \text{ mA}, V \leq 5 \text{ V}$), switching is highly sensitive to environmental conditions (the atmosphere, pollution).</td>
</tr>
<tr>
<td>If the supply is powerful enough, adding a passive resistor to increase the current broken by the switch to a few milliamps will substantially improve reliability of operation.</td>
</tr>
<tr>
<td>R - Load resistance</td>
</tr>
<tr>
<td>C - Very low current load</td>
</tr>
</tbody>
</table>

### Contacts for general-purpose use

Our switches are normally fitted with silver contacts. These are suitable for the majority of applications and provide the best compromise between electrical performance, thermal performance and life.

### Contacts for low-power circuits

E $< 20 \text{ V and/or } I < 100 \text{ mA}$

The contacts used in this case are plated with gold (or a gold alloy) for good reliability even in corrosive atmospheres.

### Contacts for special applications

We can supply special contacts suitable for particular applications, such as:
- Ag CdO contacts for very high drawn currents,
- Cross Bar gold-plated Ag Ni contacts which allow a very wide range of applications to be covered by a single type of switch.
Methods of actuation

Direct operation
Preferably, force should be directly applied to the device – the plunger – along its axis for operation. However, the majority of our microswitches will accept skewed operation provided the angle of application is not more than 45°.

The device used to apply the force must never hamper the travel of the plunger to the tripping point (TP). It must under all circumstances move the plunger through at least 0.5 times the overtravel (OT) quoted. Steps must also be taken to see that it does not cause the overtravel limit (OL) or maximum overtravel force (MOF) quoted to be overrun or exceeded.

Operation by actuator
When operation is by a roller lever, force should preferably be applied in the direction shown on the left.

Where the movements involved are fast, the ramp should be so designed as to ensure that the operating device is not subjected to any violent impact or abrupt release.

Quality

Quality is built into our switches from the initial design stage right through to the point where they are put into action at the customer’s premises. All departments of the company are guided by the Quality Manual and the stipulations of the ISO 9000 international standard.

The location where the switches are manufactured (the La Plaine works at Valence) holds ISO 9001 certification, guaranteeing a high standard of quality.

Control procedures
Manufacturing quality of our switches is controlled systematically during assembly operations and on final completion. All our products are subjected to a final inspection, either at 100% or important characteristics, or according to the statistical sampling rules of French standards X 06-222 and X 06-023. The quality levels applied, for normal use such as defined in previous paragraphs are for the following defects, according to the standards:
- critical fault : NQA : 0.40
- major fault : NQA : 1
- minor fault : NQA : 2.5

At the customer’s request, and for certain ranges of our products which must meet specific needs expressed in the specifications, it is always possible to adapt or create an inspection specification of a standard product.

Standards - Approvals

Our switches are designed according to international recommendations (IEC), American standards (UL) and/or European standards (EN).

Proof of compliance with these standards and recommendations is demonstrated by:
- the manufacturer’s declaration of conformity (drafted in accordance with the ISO/IEC 22 guidelines), or
- approval granted directly by an accredited body, or by application of the CCA (Cenelec Certification Agreement).

More detailed information on the approval for a particular type of microswitch can be obtained on request.

The 83170 switch as an example
An 83 170 4 switch marked with the symbols for the European (according to CCA/MC12) and American approvals it holds.

Rules and regulations

EC directives
Our switches are compatible with European Community technical directive (Low Voltage) 73/23 and can be used within the framework of Machinery directive 83/392.

Environmental protection
The modern concept of protection of the environment is an integral part of the manufacture of our switches, from product design through to packaging.