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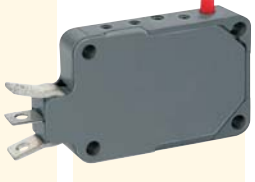






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# Product Selection Guide

## Industrial Applications

### Microswitches

#### Protected (unsealed)

Products	General use				Miniature	
						
<b>Types</b>	<b>C</b>	<b>AM</b>	<b>KM</b>	<b>M and CM</b>	<b>HP and HL</b>	<b>H</b>
<b>Operating temperature</b>	-25 ... +85 °C	-15 ... +55 °C	-35 ... +70 °C	-25 ... +85 °C	-40 ... +85 °C	-55 ... +85 °C -55 ... +150 °C
<b>Degree of protection</b> (Protective class)	IP40	IP40	IP40	IP40	IP40	IP40
<b>Casing dimensions</b> (L x H x P) mm	49 x 21 x 17.4	28 x 16.5 x 10.3	32 x 13 x 14	41 x 21 x 7.1	20.5 x 10 x 6.35	19.5 x 10 x 6.3
<b>Fixing centres distance</b> <b>Fixing holes diameter</b>	25 mm ø 4.2 mm	22.2 x 10.3 ø 3.1 mm	13 x 8 mm ø 2.2 mm	25.5 x 16 mm ø 2.4 mm	9.5 mm ø 2.2 mm	9.5 mm ø 2.2 mm
<b>Operating force</b>	≤ 4 N	≤ 3.6 N	≤ 4.5 N	≤ 1.9 N	≤ 1.5 or ≤ 0.6 N	≤ 2.5 N
<b>Pretravel</b>	≤ 1.3 mm	≤ 1.3 mm	≤ 1.5 mm	≤ 1.2 mm	–	≤ 0.55 mm
<b>Differential movement</b>	≤ 0.33 mm	≤ 0.5 mm	≤ 1.2 mm	≤ 0.6 mm	≤ 0.15 mm	≤ 0.1 mm
<b>Rated breaking capacity</b> (Resistive load)	up to 10 A	up to 6 A	up to 15 A	up to 10 A	50 mA ... 5 A	0.2 A or 4 A
<b>Mechanical life</b>	5 x 10 <sup>6</sup> cycles	2 x 10 <sup>6</sup> cycles	1 x 10 <sup>6</sup> cycles	1 x 10 <sup>6</sup> cycles	1 x 10 <sup>7</sup> cycles	1 x 10 <sup>6</sup> cycles
<b>Connection type</b>	Solder terminals Screw terminals	Solder terminals Screw terminals, Quick connect terminals	Solder terminals	Solder terminals	Solder terminals PCB terminals, Quick connect terminals	Solder terminals PCB terminals, Fork terminals
<b>Casing material</b>	Plastic material	Plastic material	Plastic material	Plastic material	Plastic material	Plastic material
<b>For further information:</b> 	page 40	page 46	page 48	page 50	page 34	page 30
<b>Other products:</b> 	<b>CF6165 Switch for rabbets</b>  page 74				<b>Manual control switches</b>  page 76	

# Harsh Environment Applications

## Limit Switches

### Watertight

### Hermetically Sealed

### Watertight

### Subminiature



**Z3**

-55 ... +150 °C  
-40 ... +85 °C

IP40  
IP54 except terminals

13 x 5 x 9.6

4.75 mm  
ø 2.1 mm

≤ 2.5 N

≤ 0.42 mm

≤ 0.06 mm

10 mA ... 4 A

5 x 10<sup>5</sup> cycles

Solder terminals

Plastic material

page 26



**Z3\_E**

-55 ... +150 °C  
-40 ... +85 °C

IP65 / IP67

14 x 6 x 14.4

4.75 mm  
ø 2.1 mm

≤ 3.3 N

≤ 0.42 mm

≤ 0.06 mm

10 mA ... 4 A

5 x 10<sup>5</sup> cycles

Leadwire terminals

Plastic material

page 58



**IE**

-20 ... +85 °C

IP66 / IP67

25 x 30 x 11.2  
25 x 43 x 11.2

14 or 19 mm  
ø 3.1 mm

≤ 2 N

≤ 1 mm

≤ 0.45 mm

50 mA ... 5 A

1 x 10<sup>6</sup> cycles

Leadwire terminals  
Cable terminals

Plastic material

page 56



**T3**

-55 ... +150 °C

IP68

21.5 x 6.8 x 15

9.5 mm  
ø 2.2 mm

≤ 6 N

≤ 0.55 mm

≤ 0.35 mm

10 mA ... 5 A

2 x 10<sup>5</sup> cycles

Leadwire terminals  
Solder terminals

Stainless steel

page 14



**G3**

-55 ... +150 °C

IP68

ø11 x 15.7

–

≤ 10 N

≤ 0.25 mm

≤ 0.05 mm

10 mA ... 5 A

2 x 10<sup>5</sup> cycles

Leadwire terminals  
Solder terminals

Stainless steel

page 16



**R**

-25 ... +85 °C  
-30 ... +120 °C  
-55 ... +155 °C

IP68

41.8 x 31 x 13

25.4 mm  
ø 3.1 mm

≤ 9 N

≤ 1.5 mm

≤ 0.5 mm

2.5 or 5 A

1 x 10<sup>5</sup> cycles

Leadwire terminals  
Screw terminals

Tinned brass

page 20



**F2**

-30 ... +65 °C  
-30 ... +85 °C  
-30 ... +120 °C

IP66 / IP67

94 x 70 x 50

44 - 69 mm  
M5

≤ 11 N

≤ 15°

≤ 3.5 mm

2.5 or 5 A

1 x 10<sup>5</sup> cycles

Cable terminal  
Connector  
Terminal box

Aluminium alloy

page 64

**F3**

-25 ... +85 °C

IP66 / IP67

94 x 70 x 50

44 - 69 mm  
M6

400 Nmm

≤ 25°

≤ 6°

2.5 A

1 x 10<sup>5</sup> cycles

Cable terminal  
Connector

Bronze

page 68

### F4 and FCE Limit switches

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# Technical Information

## Definition

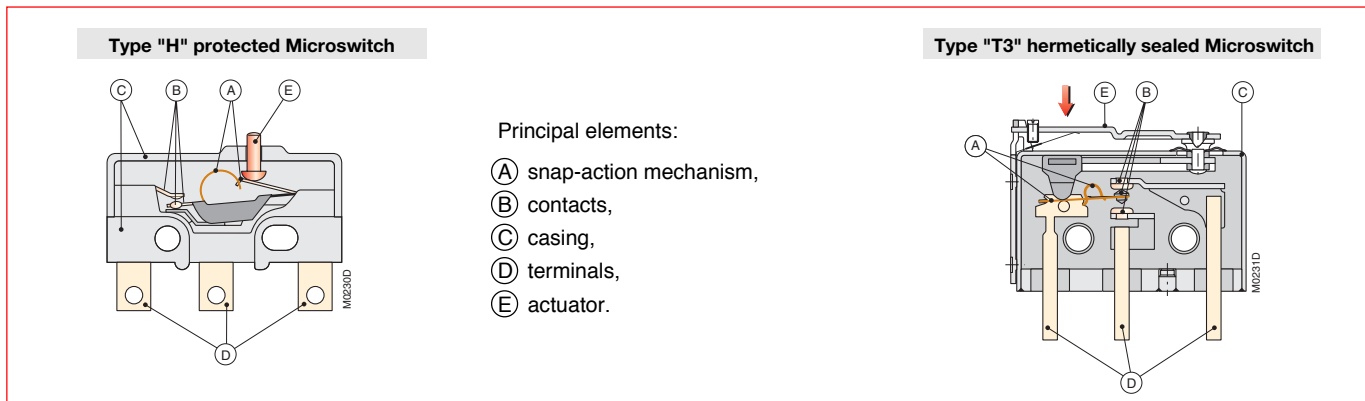
A **MICROSWITCH** is a snap-action precision changeover switch.

The snap-action defines a changeover switch whereby contact making and breaking speed is independent of the operating speed of the actuator.

Compared to conventional switches, microswitches have the following distinctive characteristics:

- reduced size,
- reduced operating travel: tenths of a millimetre,
- increased electrical properties,
- increased service life,
- reduced sensitivity to vibrations and high accelerations.

## Construction of a Microswitch



## Snap-action Mechanism

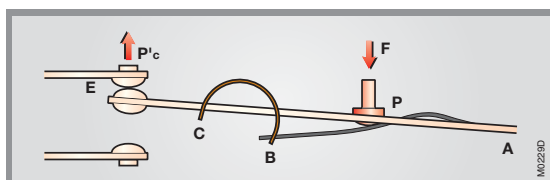
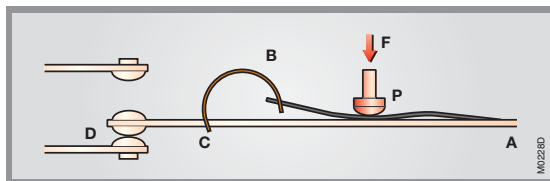
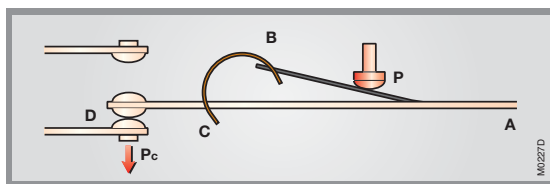
The purpose of this element is to press the moving contact mounted on it onto the fixed contacts and to maintain it there by exerting a maximum of "pressure" onto these fixed contacts. The stabilized changeover time obtained, taking into account contact bounce, is very short. When the circuit is opened, this mechanism must also separate the moving contact from the fixed contact instantly and decisively.

Moreover, these functions must be ensured for precise and variable operating travels according to the setting of the mechanism concerned. Being able to set operating travel during factory assembly is one of the key factors for choosing a snap-action mechanism.

**Other factors to be considered are:**

- the "operating force / pressure force" ratio on the contacts (contact pressure),
- the profile of the elastic elements which make up the mechanism in order to reduce the rate of wear.

The diagrams below illustrate the operating principle of the elastic rotating-spring mechanism used in ABB Microswitches.



# Technical Information

## Stabilized Changeover Time

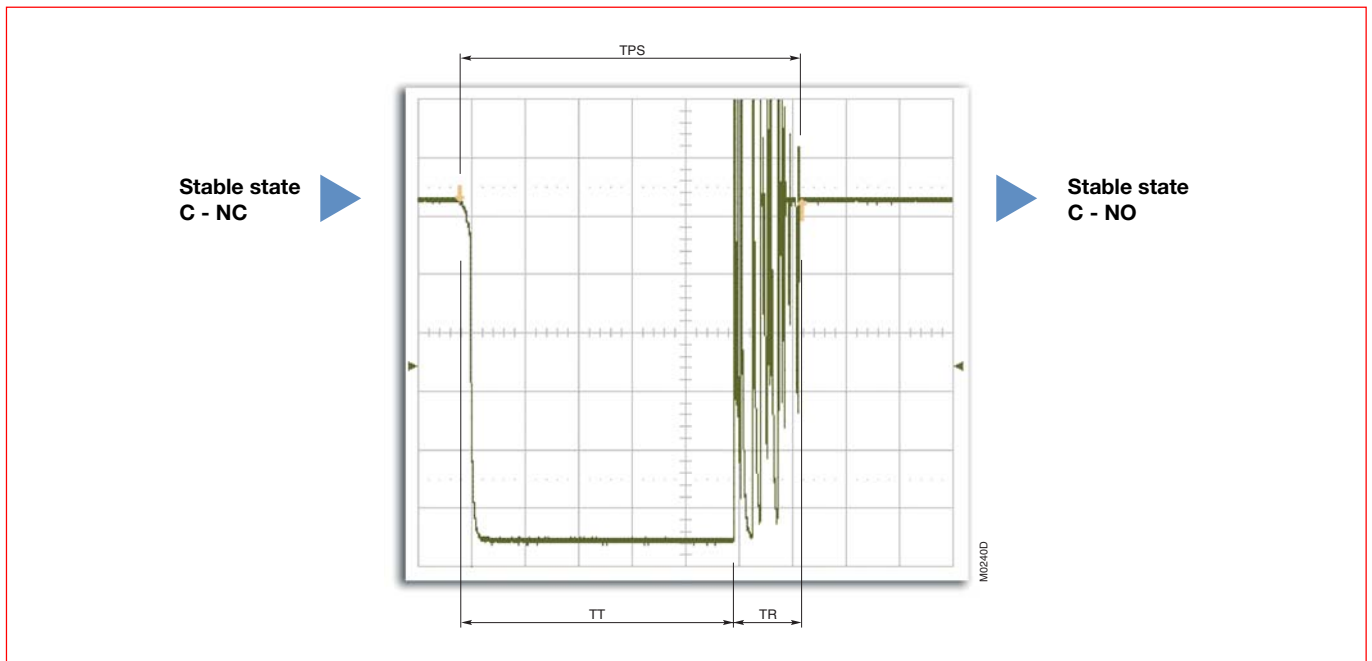
The total time taken by the moving contact to switch from one fixed contact to the other, taking into account contact bounce, is referred to as the **Stabilized changeover time "TPS"**.

It is the sum of:

- the **Transit Time "TT"** taken by the moving contact to leave one fixed contact and touch the other. This property is generally dependant on product design (geometry, component shapes, elasticity of material used, etc.);
- the **Bounce Time "TR"** : due to its speed and in spite of its low mass, the moving contact can, under certain conditions, bounce on the fixed contact, resulting in very short spurious breaks in the electrical circuit.

A low value is the sign of a "healthy" switching mechanism. We guarantee a stabilized changeover time of < 10 ms or < 15 ms for our products, depending on the model. Typically, 5 ms < TPS < 10 ms.

The timing diagram below illustrates these different times.



## Product Service Life

### Mechanical endurance

This is the number of switching operations a microswitch or limit switch can perform without an electrical load. Product failure is characterized by mechanical wear leading to a deviance of one or more performance levels outside the allowed tolerance limits, or of the incapacity to ensure the product's basic function, i.e. switching.

This performance level depends on the environmental conditions in which the product is used: vibrations, type and frequency of operation, temperature, harshness of the environment, etc.

The performance levels published in this catalogue were obtained in normal pressure and temperature atmospheric conditions, with an over-travel set at 80% of the maximum allowable and an operating cadence of 10 to 30 cycles per minute.

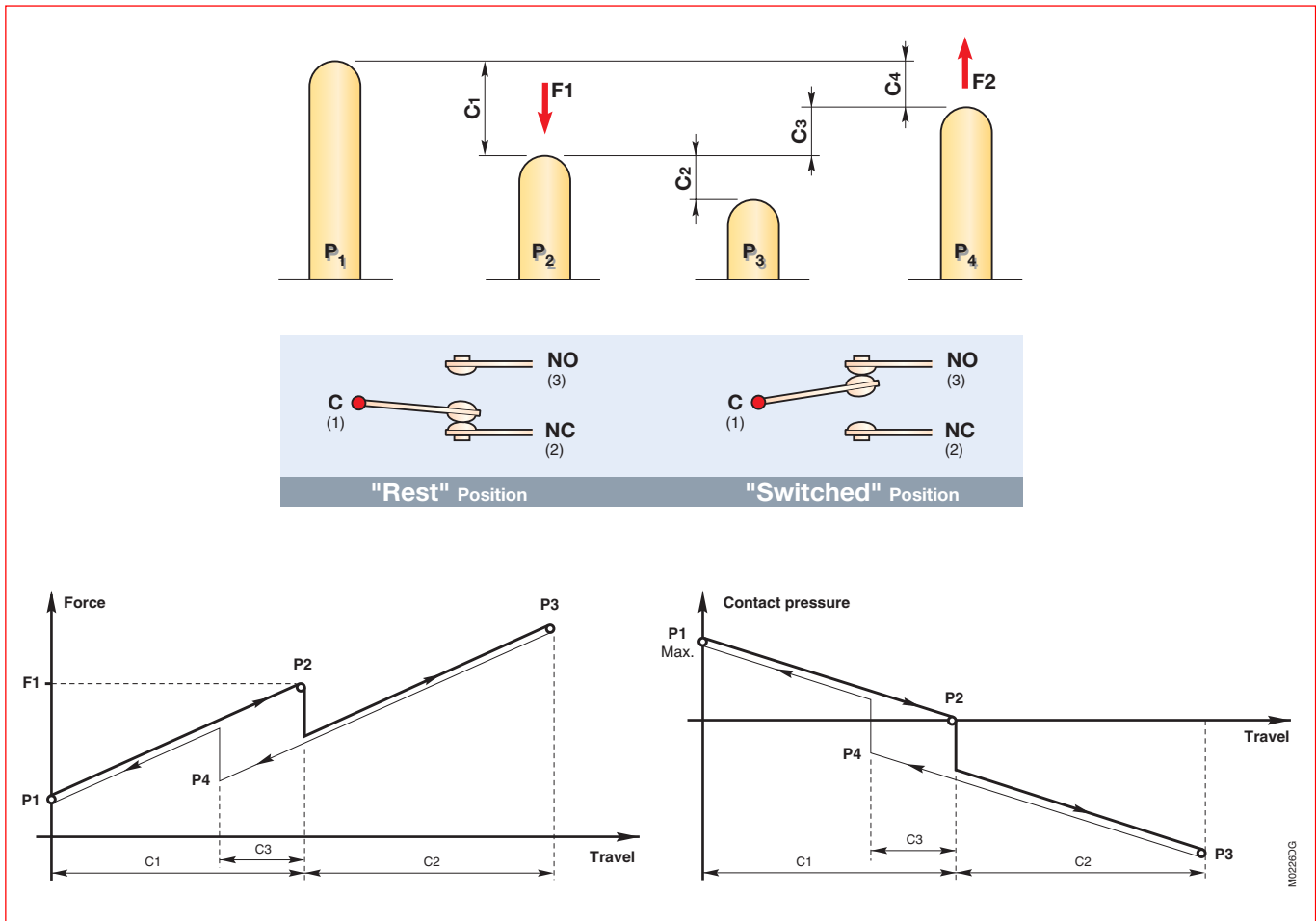
### Electrical endurance

The material used for the contact elements and, more importantly, the type of electrical load are key factors for a product's electrical service life.

- **Resistive load:** this is the ideal situation for a Microswitch ( $\cos \varphi = 1$  for alternating current).
- **Inductive load:** overcurrents appear due to the presence of a coil, thus causing the contacts to deteriorate more quickly than for the previous case. The performance levels of our products are those when subjected to the following conditions:
  - $\cos \varphi \geq 0.3, 0.5$  or  $0.8$  for alternating current,
  - $L/R \leq 5$  ms or 40 ms for direct current.
- **"Low level" load:** this is characterised by a current of a few milliamperes generally combined with a voltage of a few volts. In this case, the electrical service life of the product approaches its mechanical service life. This type of load, due to the levels present, is very sensitive to environmental conditions: potential contact pollution, etc.  
In such cases, we recommend the use of hermetically sealed Microswitches, or even the insertion of a load resistance (dummy load) in parallel with the "real" load to increase the switched current.

For product validation or during qualification, we carry out electrical endurance testing at operating temperature in order to cover the extremities of the potential operating range of the equipment, by using the customer's specific specification and/or reference standards. Example: for an objective of 100,000 switching cycles: 10,000 cycles at ambient temperature, 10,000 cycles at the minimum temperature and 80,000 cycles at maximum temperature.

# Technical Information



## Terminology - Operating Diagram

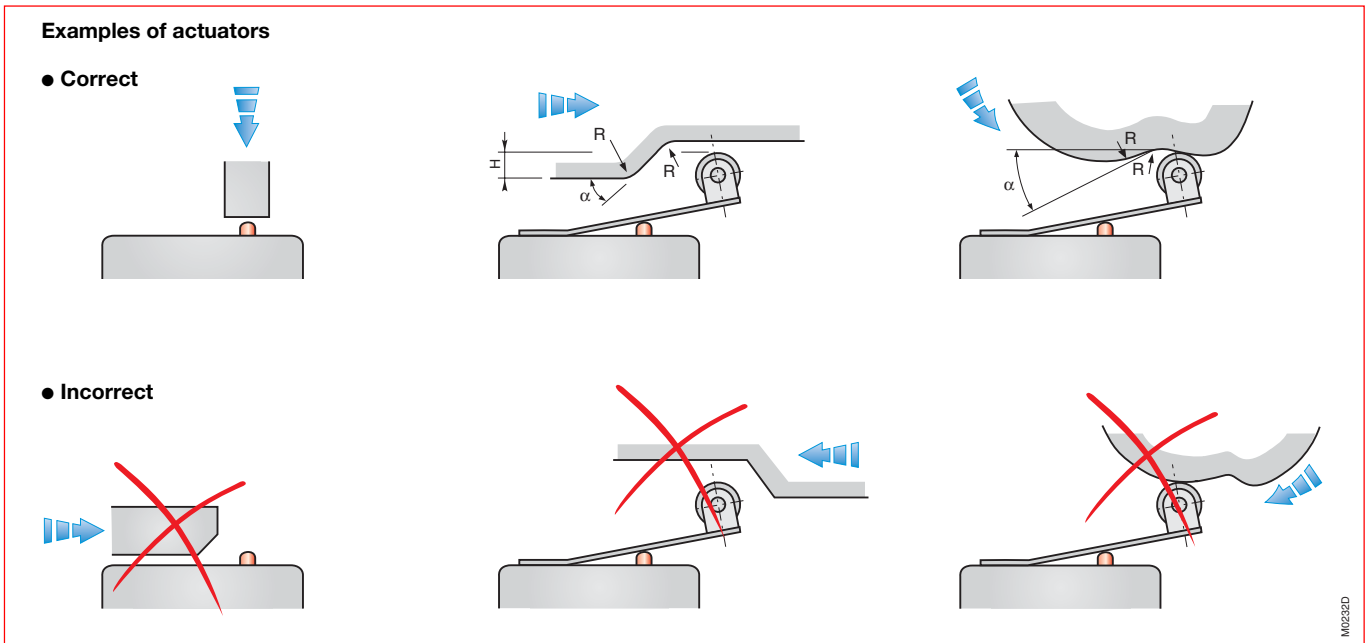
Extracts from NF C 93-415

- P1 Rest position:** "position of the actuator or auxiliary actuator when no external mechanical force is applied to it".
- P2 Switching position:** "position of the actuator or auxiliary actuator at the moment when an increasing force causes the snap-action mechanism to operate".
- **Switched position:** "intermediate position between the switching position (P2) and the travel limit position (P3) which uses at least 50% of the over-travel (C2) beyond the switching position (P2)".
- P3 Total travel position:** "position of the actuator or auxiliary actuator when an increasing applied force displaces it to the effective limits of the allowable travel". (Overtravel limit position)
- P4 Release position:** "position of the actuator or auxiliary actuator at the moment when a decreasing force enables the snap-action mechanism to return to its initial electrical state".
- F1 Operating force:** "force to be applied to the actuator or auxiliary actuator to displace the latter from the rest position (P1) to the switching position (P2)".
- F2 Release force:** "value to which the operating force (F1) must be reduced to allow the actuator to return to its release position (P4)".

- C1 Pretravel:** "distance between the rest position (P1) and the switching position (P2)".
- C2 Overtravel** beyond the switching position: "distance between the switching position (P2) and the total travel position (P3)".  
Note: this is the maximum allowable value which must not be exceeded otherwise the inner mechanism of the Microswitch will be subject to abnormal wear.
- **Total travel:** "sum of the pretravel (C1) and the overtravel beyond the switching position (C2)".
- C3 Differential movement:** "distance between the switching position (P2) and the release position (P4)".
- C4 Overtravel** beyond the release position: "distance between the release position (P4) and the rest position (P1)".



# Technical Information



## Actuator Accessories

Definition extracts from NF C 93-415

**Actuator:** "element forming an integral part of the switch upon which an external mechanical force is applied. The movement of the actuator causes the snap-action switching mechanism to operate".

**Auxiliary actuator:** "adapter designed to be fitted to a switch or a group of precision switches enabling it/them to be operated by means not adapted to its/their direct operation".

The table below gives typical uses.

	Rotary cam	Ramp: 2 movement directions	Ramp: 1 movement direction	Lever	Telescopic plunger	Coin
<b>Simple pin plunger</b>					x	
<b>Telescopic plunger</b>	Without roller				x	
	With roller	x	x	x		
<b>Flexible lever</b>	Without roller				x	
	With roller	x	x	x		
<b>Direct-action articulated lever without roller</b>	Long			x	x	x
	Short			x		
<b>Inverted-action articulated lever with roller</b>	Long	x	x	x		
	Short	x	x	x		
<b>Wire rod actuator</b>				x		x

### Recommended design elements for definition of cams and ramps:

		General case	Limit switch
<b>Connection radii</b>	mm	$R = \text{roller radius} / 2$	$R = \text{roller radius} / 2$
<b>Incline</b>	°	$\alpha = 20^\circ \text{ max.}$	$35^\circ < \alpha < 60^\circ$
<b>Cam lift</b>	mm	$H \text{ minimum} = \text{pretravel} + \text{overtravel}$	$5 < H < 30 \text{ mm}$
<b>Operating speed</b>	m.s <sup>-1</sup>	$0.02 \text{ m.s}^{-1} < V < 0.10 \text{ m.s}^{-1}$	$\alpha = 35^\circ, V = 0.20 \text{ m.s}^{-1}$
			$\alpha = 60^\circ, V = 0.35 \text{ m.s}^{-1}$

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# Technical Information

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## Order Reference

Indicate either the **Order code** or the **Type** when ordering.

Further details are added to this reference in certain cases: position and form of the control lever if it is to be factory fitted. This is the reason why this Order code and the types in the "Ordering details" tables contain boxes  to be filled out.

## Packaging

Depending on the size and quantities ordered, our products may be individually or group packaged. A label fixed to the packaging specifies the reference and quantity of its contents.

Group packaging is used for delivery purposes.

**The mass and identification number always correspond to a single part unless otherwise stated.**

Unless specified, screws are not included with the accessories.

## Recommendations for Use

### Assembly and operation

- Never stress the plunger in the rest position since at that point the operating blade is already flexed and the contact pressure reduced.
- Never work near the switching point (at the pretravel limit). Contact pressure is low and, in the event of vibrations or shocks to the system to which the microswitch is fitted, there would be a risk of spurious separations between the moving and fixed contacts, and hence fleeting breaks in the electrical circuit.
- Do not use the release force to return the actuator.
- Respect the 80% of overtravel value specified in the technical documents in order to obtain good contact pressure and to avoid abnormal wear of the elastic mechanism.
- Although the system consists of a snap-action mechanism, a slow operating speed is not recommended as the elastic system could in spite of everything reach a point of equilibrium, resulting in the separation of the moving contact from the two fixed contacts, thereby interrupting the electrical circuit.
- The actuators must remain in contact with the transmission elements (plunger, lever, roller, etc.) throughout the full operating travel period, as well as when in the "rest" position.
- When fitting the devices, respect the recommended screw tightening torque and use a flat washer and a serrated locking washer.
- The use of an insulating plate is recommended if the microswitch is to be fitted against a metal face.
- For devices with non-compounded outputs (solder terminals, etc.), the terminals should be protected against direct contact.

### Electrical recommendations

Never use the same device simultaneously on two different circuits: auxiliary current and power current.

Indeed:

- the switching of power currents erodes the contacts and tends to increase contact resistance.
- the switching of auxiliary currents requires clean, non-oxidised contacts and high contact pressure (avoid using devices with a low operating force). Likewise, the switching of low voltages does not allow the electric arc to perforate insulating impurity layers that may have formed on the surface of the fixed contacts.

### Cabling

- For microswitches with solder terminals, use a soldering iron with a maximum power rating of 30W and a solder alloy (tin based) with a non-corrosive flux if possible. Be sure to clean any excess flux and, for products that are not hermetically sealed, to avoid the flux spreading up the terminals so as not to pollute the contacts.
- Avoid excessive bending of cables. Consult us if necessary.

### Other elements

Certain products, particularly limit switches, have specific fitting and setting instructions. These documents are available on request.

"F..." limit switches are factory adjusted and require no adjustment or intervention during installation. Opening the casing is forbidden and cancels all guarantees.

## Storage Conditions

### General conditions

- The devices must be stored in a sheltered place and in their original primary packaging.
- The relative humidity level must not exceed 80%.
- The maximum storage period is two (2) years.
- The storage temperature must be within the limits specified in the table on next page, according to product type.

# Technical Information

Product type	Family including all derived products	Storage temperature limits
Hermetically sealed Microswitch	<b>T3, G3, R</b>	-5 °C ... +55 °C
Protected Microswitch	<b>Z, H and manual control switches</b>	-5 °C ... +40 °C
Protected Microswitch	<b>C, HL, HP, M, CM, AM, KM</b>	-5 °C ... +40 °C
Watertight Microswitch	<b>Z3_E, IE</b>	-5 °C ... +40 °C
Limit switch	<b>F2, F3</b>	-5 °C ... +55 °C
Limit switch	<b>FCE</b>	-20 °C ... +70 °C

**For "fitted" devices**

If subassemblies or equipment in which microswitches or limit switches have been integrated must be stored, **the protection and packaging must be at least equivalent to that of the original.**

**Testing before use**

After a long storage period, and before use, it is recommended that a cursory operating test be carried out as described below:

- manually action the actuator (lever, telescopic plunger, etc.) until switching occurs, then release it,
- check that the actuator returns freely to its original position.



Lined area for notes or additional information, framed by a red border. It contains a pencil icon and approximately 23 horizontal lines for writing.

# Microswitches and Limit Switches

## Product Catalogue Consultation Form

### Identification:

Company: ..... Correspondent: .....  
Division: ..... Department: .....  
Street: ..... Telephone: .....  
..... Fax: .....  
Post code / Town: ..... E-mail: .....  
Country: .....  
Field of activity: .....

### 1. Identified Product Type:

Product and/or accessory type: .....  
 If a variant of the above product, specify the differences: .....  
.....  
 If a replacement for a competitor's product, specify:  
Manufacturer's name ..... Reference .....

### 2. Your Requirements:

Involved application: .....  
Potential quantities: ..... Delivery rate: .....  
Required delivery date: .....

**In order to get to know you better and advise you**

### 3. Electrical Characteristics:

Load:  Resistive .....  Inductive: L / R = .....  
Circuit to be broken: Voltage: ..... V Current: ..... A Required service life: ..... Cycles  
Operation:  On opening .....  On closing .....  Off load .....

### 4. Mechanical Characteristics:

Specify specific product travel / force for the involved application:  
.....

### 5. Environment:

For each case, specify the reference standard(s), severity or test parameters, etc.  
 Vibration: .....  Shock: .....  
 Temperature range: - ..... °C to + ..... °C  Humidity: .....  
 Salt spray: .....  Other: .....

### 6. Attached Documents:

Dimensional drawing: .....  Specification: .....  
 Catalogue extract: .....

Return this document to:

**ABB Entelec**  
10, Rue Ampère - Z.I. - B.P. 114 - F-69685 Chassieu Cedex - Fax: +33 (0) 4 72 22 19 65

# Microswitches and Limit Switches

## Preliminary Specification / Product Adaptation Form

### Identification:

Company: ..... Correspondent: .....  
Division: ..... Department: .....  
Street: ..... Telephone: .....  
..... Fax: .....  
Post code / Town: ..... E-mail: .....  
Country: .....  
Field of activity: .....

### 1. Physical Characteristics:

#### Fixing method:

Casing, threaded bushing or screw, specify the thread: ..... Nuts + washers: .....  
 Other, specify: .....

#### Auxiliary actuator type:

Lever:  simple  with roller  Added overtravel  special  
 Telescopic plunger:  domed  with ball bearing  with roller  special  
Watertight telescopic mechanism  yes  no  
 Other, specify: .....

#### Connection method:

Wire or cable, cross-section of conductor(s): ..... Number (cable): .....  
Specific specification / standard: ..... Length: .....  
 Connector, specify: .....  
 Other, specify: .....

### 2. Electrical Characteristics:

Load:  Resistive .....  Inductive: L / R = .....  
Circuit to be broken: Voltage: ..... V Current: ..... A Required service life: ..... Cycles

### 3. Mechanical Characteristics:

Specify specific product travel / force for the involved application:  
.....

### 4. Environment:

For each case, specify the reference standard(s), severity or test parameters, etc.

Vibration: .....  Shock: .....  
 Temperature range: - ..... °C to + ..... °C  Humidity: .....  
 Salt spray: .....  Other: .....

### 5. Attached Documents:

Dimensional drawing: .....  Specification: .....

### 6. Your Market:

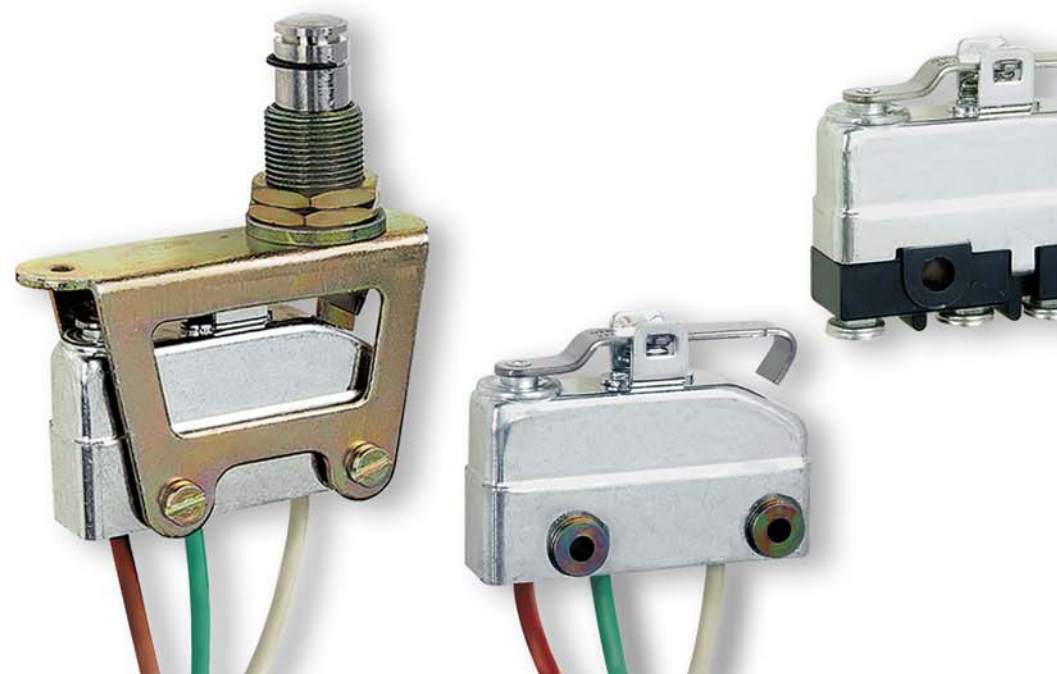
Involved application: .....  
Annual volume: ..... Recurrent market? .....  
1<sup>st</sup> order forecast: ..... Parts deadline: .....

Return this document to:

**ABB Entelec**  
10, Rue Ampère - Z.I. - B.P. 114 - 69685 F-Chassieu Cedex - Fax: +33 (0) 4 72 22 19 65

+1

# Hermetically Sealed





## Hermetically Sealed Microswitches

### Contents

T3 Microswitch .....	14
G3 Microswitch .....	16
R Microswitch .....	20

# T3 Hermetically Sealed Microswitch



T3LDS



T3LGDS



T3LD60FL



T3LGDFL



T3LDF

## Application

Microswitch for harsh environment: humidity, corrosion, shocks and vibrations, temperature requirements...

- Operating temperature: -55 °C ... +150 °C.
- Rated breaking capacity: from few mA up to 5 A (depending on voltage and electrical load type).
- Mechanical life: 200 000 cycles (except Microswitches with added overtravel lever actuator. See table at the bottom of the page).

## Description

Hermetically sealed snap-action switch.

- Stainless steel casing.
  - Inert gas filled switching chamber.
  - Gold plated silver contacts.
  - Mounting holes for M2 screws.
  - Terminals: – solder terminals,  
– 0.38 mm<sup>2</sup> (AWG 22) leadwires\*, FEP insulation, axial or side outputs.
- \* Compliant to AIR 4524 specification ; NF L 52-125A Category B of 1971 - lightweight cables. Interchangeability: AICMA No 5116 recommendation of February 1961.

## Ordering Details

Standard leadwire length = 0.5 m ; other length on request.

Terminals	Type	Order code	Weight 1 piece kg
-----------	------	------------	-------------------------

### Microswitch with straight lever actuator

Solder terminals	T3LDS	1SBU 11 0000 R4000	0.005
Wired terminals	T3LDF	1SBU 11 1000 R4000	0.017
Wired terminals side outputs	T3LDLFL	1SBU 11 1000 R4006	0.017

### Microswitch with roller lever actuator

Solder terminals	T3LGDS	1SBU 11 0000 R4001	0.006
Wired terminals	T3LGDF	1SBU 11 1000 R4001	0.018
Wired terminals side outputs	T3LGDFL	1SBU 11 1000 R4007	0.018

### Microswitch with added overtravel lever actuator

Solder terminals	T3LD60S	1SBU 11 0000 R4002	0.006
Wired terminals	T3LD60F	1SBU 11 1000 R4002	0.018
Wired terminals side outputs	T3LD60FL	1SBU 11 1000 R4008	0.018

## Approvals and Compliance to Standards

French Air Ministry Approval as per letter 44.759/STPA/CIN1 dated 26 October 1987.

Approval according to standards: AIR 8459, NF C 93-415.

AIR equipment sheets No: 6.552.221 - 6.552.222 - 6.552.223 - 6.552.224.

Main compliance or performance equivalences with MIL-S-8805 standard requirements.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Hermetically sealed Microswitches		T3LD...	T3LGD...	T3LD60...
Max. operating force	N	6	5	6
Min. release force	N	1	1	1
Pretravel	mm	0.30 ... 0.55	0.35 ... 0.70	0.50 ... 0.70
Differential movement	mm	0.05 ... 0.35	0.05 ... 0.45	0.05 ... 0.40
Min. overtravel (1)	mm	0.20	0.20	0.60
Max. full overtravel authorised force	N	13	8.5	13

(1) Do not exceed this value in use.

Interaction between overtravel and mechanical life for T3LD60... types

Overtravel	mm	0.60	0.90	1.20
Mechanical life	cycles	5 000	2 500	1 000



# T3 Hermetically Sealed Microswitch

## Electrical Data

Ratings (electrical load on one throw only)		30 ... 48 V d.c.	6 V d.c.	220 V a.c. - 50 Hz
- resistive load	<b>A</b>	5 A	10 mA	2 A
- inductive load	<b>A</b>	1.5 A (L/R ≤ 5 ms)	-	1 A (Cos φ ≥ 0.5)
<b>Electrical life</b>	<b>cycles</b>	200 000	200 000	100 000
		U = 28 V d.c. for "AIR" approval	-	out of "AIR" approval
<b>Min. switched current</b>	<b>mA</b>	5		
<b>Changeover time</b>	<b>ms</b>	≤ 10		
<b>Contact resistance</b>	<b>mΩ</b>	≤ 25 mΩ under 6 V d.c. - 100 mA according to MIL-S-8805 (As new, wires or cable not included)		
<b>Dielectric strength</b> (50 Hz - 1 mn)				
- between terminals	<b>V a.c.</b>	500		
- between all terminals and earth (ground)	<b>V a.c.</b>	1200		
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 1000 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)		

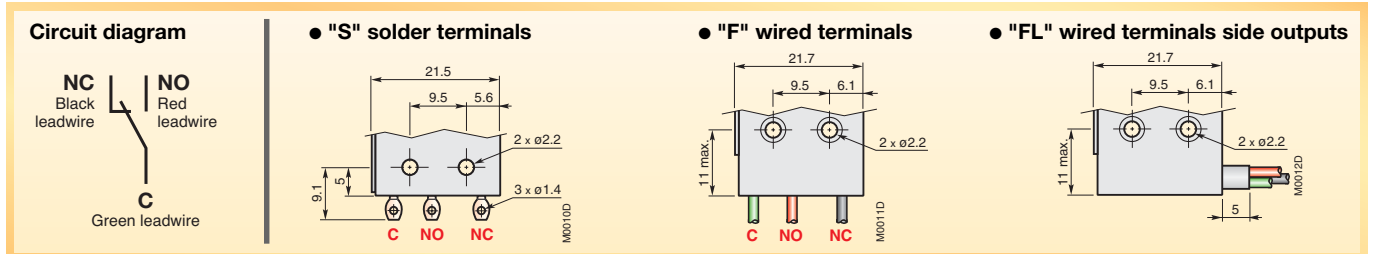
## Environmental Conditions - For other test results, please contact us.

<b>Salt spray</b>	96 hours
<b>Humidity</b>	93 % relative humidity, +40 °C duration 1000 hours
<b>Mechanical shocks</b>	100 g - duration 6 ms (pulse shape = 1/2 sine) 18 shocks (3 / direction, both of 3 orthogonal axis)
<b>Sinusoidal vibrations</b>	10 - 2000 Hz, 50 g in each of 3 orthogonal axis
<b>Random vibrations</b>	10 - 2000 Hz, 0.15 g <sup>2</sup> / Hz in each of 3 orthogonal axis

## Specific Products - Contact us for more information ; data sheet on request.

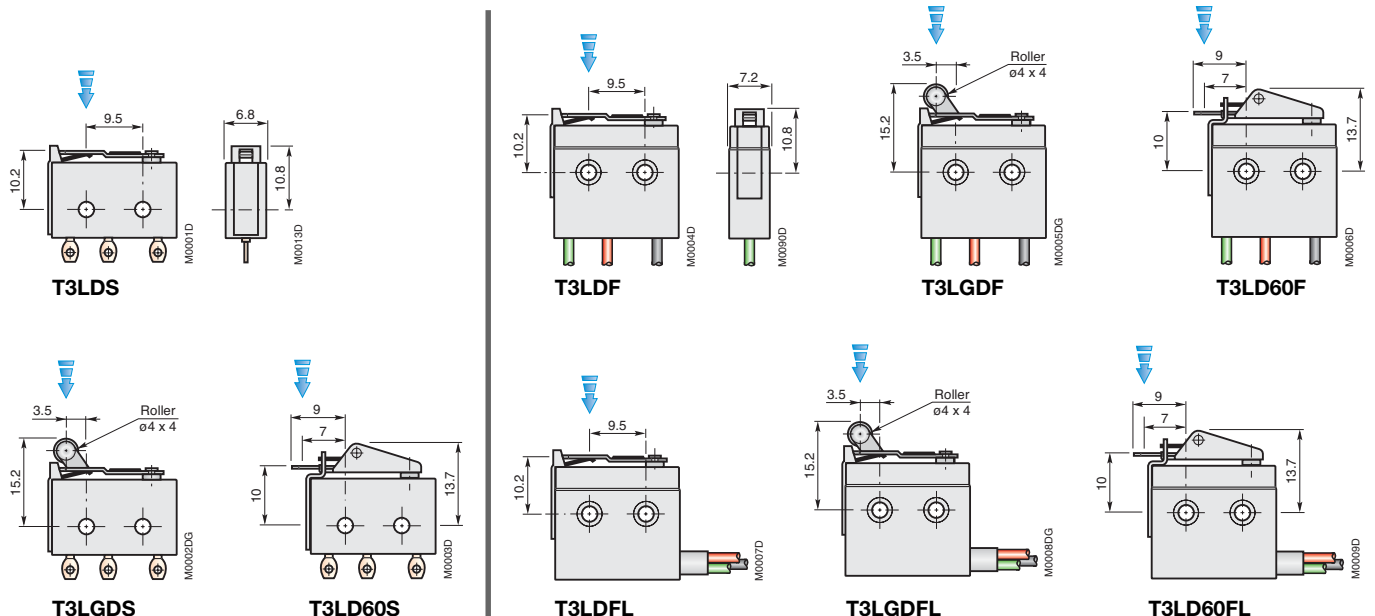
- **T3LDSH** Microswitch for operating temperatures up to +260 °C.
- **T3LDF-R9** Microswitch with 0.8 mm<sup>2</sup> (≈ AWG 18) leadwires "EPR" insulation is designed for use in irradiated areas. Some Limit switches for nuclear power plant use include this variant.
- **T6931, T6932, T6933** and **T6934** Microswitches are European Space Agency (ESA) approved. (No 191 Certificate) according to ESA/SCC Generic Specification 3701 and associated Detail Specification 3701/003.

## Connection Type



## Dimensions (in mm)

M2 screws recommended tightening torque: 0.25 to 0.30 Nm. Warning: do not insert fan-type washer in contact with the Microswitch.



# G3 Hermetically Sealed Microswitch

## Application

Microswitch for harsh environment: humidity, corrosion, shocks and vibrations, temperature requirements...

- Operating temperature: -55 °C ... +150 °C.
- Rated breaking capacity: from few mA up to 5 A (depending on voltage and electrical load type).
- Mechanical life: 200 000 cycles.

## Description

Hermetically sealed snap-action switch.

- Stainless steel casing.
  - Inert gas filled switching chamber.
  - Gold plated silver contacts.
  - Mounting according to product design.
  - Terminals: – solder terminals,
    - 0.38 mm<sup>2</sup> (AWG 22) leadwires\*, FEP insulation, axial or side outputs. (2 options in this case).
- \* Compliant to AIR 4524 specification ; NF L 52-125A Category B of 1971 - lightweight cables. Interchangeability: AICMA No 5116 recommendation of February 1961.

## Ordering Details

Standard leadwire length = 0.5 m ; other length on request.

For wired terminals side outputs "FL" and "FLL", specify, if necessary, required leadwires orientation. See data sheets.

Terminals	Type	Order code	Weight 1 piece kg
-----------	------	------------	-------------------------

### Microswitch with pin actuator, without mounting interface

Solder terminals	G3A1S	1SBU 10 0000 R4000	0.005
Wired terminals	G3A1F	1SBU 10 1000 R4000	0.017
Wired terminals side outputs (standard potting)	G3A1FL	1SBU 10 1000 R4001	0.017
Wired terminals side outputs (longest potting)	G3A1FLL	1SBU 10 1000 R4041	0.018

### Microswitch with pin actuator, side flange mounting

Solder terminals	G3A1CS	1SBU 10 0000 R4002	0.006
Wired terminals	G3A1CF	1SBU 10 1000 R4005	0.018
Wired terminals side outputs (standard potting)	G3A1CFL	1SBU 10 1000 R4006	0.018
Wired terminals side outputs (longest potting)	G3A1CFLFLL	1SBU 10 1000 R4010	0.019

### Microswitch with flexible lever actuator, side flange mounting

Solder terminals	G3L11CS	1SBU 10 0000 R4004	0.007
Wired terminals	G3L11CF	1SBU 10 1000 R4023	0.019
Wired terminals side outputs (standard potting)	G3L11CFL	1SBU 10 1000 R4024	0.019
Wired terminals side outputs (longest potting)	G3L11CFLL	1SBU 10 1000 R4028	0.020

### Microswitch with flexible roller lever actuator, side flange mounting

Solder terminals	G3L11GCS	1SBU 10 0000 R4005	0.007
Wired terminals	G3L11GCF	1SBU 10 1000 R4032	0.019
Wired terminals side outputs (standard potting)	G3L11GCFL	1SBU 10 1000 R4033	0.019
Wired terminals side outputs (longest potting)	G3L11GCFLFLL	1SBU 10 1000 R4037	0.020

### Microswitch with pin actuator, front flange mounting

Solder terminals	G3A1PS	1SBU 10 0000 R4001	0.006
Wired terminals	G3A1PF	1SBU 10 1000 R4002	0.018
Wired terminals side outputs (standard potting)	G3A1PFL	1SBU 10 1000 R4003	0.018
Wired terminals side outputs (longest potting)	G3A1PFLFLL	1SBU 10 1000 R4004	0.019

### Microswitch with pin actuator, M14 threaded body

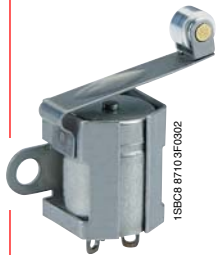
Solder terminals	G3A1VS	1SBU 10 0000 R4003	0.014
Wired terminals	G3A1VF	1SBU 10 1000 R4014	0.026
Wired terminals side outputs (standard potting)	G3A1VFL	1SBU 10 1000 R4015	0.026
Wired terminals side outputs (longest potting)	G3A1VFLFLL	1SBU 10 1000 R4019	0.027

### Microswitch with telescopic plunger actuator ; M8 threaded body

Solder terminals	G3P30S	1SBU 10 0000 R4007	0.014
Wired terminals	G3P30F	1SBU 10 1000 R4051	0.026
Wired terminals side outputs (standard potting)	G3P30FL	1SBU 10 1000 R4052	0.026
Wired terminals side outputs (longest potting)	G3P30FLFLL	1SBU 10 1000 R4056	0.027



G3A1S



G3L11GCS



G3A1VS



G3P30F



G3BS

# G3 Hermetically Sealed Microswitch



## Ordering Details (continued)

Terminals	Type	Order code	Weight 1 piece kg
<b>Microswitch with telescopic ball bearing plunger actuator ; M8 threaded body</b>			
Solder terminals	G3BS	1SBU 10 0000 R4006	0.015
Wired terminals	G3BF	1SBU 10 1000 R4042	0.027
Wired terminals side outputs (standard potting)	G3BFL	1SBU 10 1000 R4043	0.027
Wired terminals side outputs (longest potting)	G3BFLL	1SBU 10 1000 R4047	0.028
<b>Microswitch with telescopic roller plunger actuator ; M12 threaded body</b>			
Solder terminals	G3P30GS	1SBU 10 0000 R4008	0.028
Wired terminals	G3P30GF	1SBU 10 1000 R4060	0.040
Wired terminals side outputs (standard potting)	G3P30GFL	1SBU 10 1000 R4061	0.040
Wired terminals side outputs (longest potting)	G3P30GFLL	1SBU 10 1000 R4065	0.041

## Approvals and Compliance to Standards

French Air Ministry Approval as per letter 44.047/STPA/CIN.1/6 dated 7 October 1983.

Approval according to standards: AIR 8459, NF C 93-415.

AIR equipment sheets No: 6.552.206.

Main compliance or performance equivalences with MIL-S-8805 standard requirements.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Hermetically sealed Microswitches		G3A1 ...	G3L11 ...	G3BS ...	G3P30 ...
Max. operating force	N	10	15	12	12
Min. release force	N	1.5	2.0	1.5	1.5
Pretravel	mm	0.12 ... 0.25	6.0 max.	0.12 ... 0.50	0.12 ... 0.50
Max. differential movement	mm	0.05	0.08	0.05	0.05
Min. overtravel (1)	mm	0.08	0.40	3.0	3.0
Max. full overtravel authorised force	N	25	25	60	60

(1) Do not exceed this value in use.

## Electrical Data

Ratings (electrical load on one throw only)		30 ... 48 V d.c.	6 V d.c.	220 V a.c. - 50 Hz
- resistive load	A	5 A	10 mA	2 A
- inductive load	A	1.5 A (L/R ≤ 5 ms)	-	1 A (Cos φ ≥ 0.5)
Electrical life	cycles	200 000	200 000	100 000
		U = 30 V d.c. for "AIR" approval	out of "AIR" approval	out of "AIR" approval
Min. switched current	mA	5		
Changeover time	ms	≤ 10		
Contact resistance	mΩ	≤ 25 mΩ under 6 V d.c. - 100 mA according to MIL-S-8805 (As new, wires or cable not included)		
Dielectric strength (50 Hz - 1 mn)				
- between terminals	V a.c.	500		
- between all terminals and earth (ground)	V a.c.	1500		
Insulation resistance	MΩ	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)		

## Environmental Conditions - For other test results, please contact us.

Salt spray	96 hours
Humidity	93 % relative humidity, +40 °C duration 1000 hours
Mechanical shocks	50 g - duration 11 ms (pulse shape = saw tooth) 18 shocks (3 / direction, both of 3 orthogonal axis)
Sinusoidal vibrations	10 _ 2000 Hz, 50 g in each of 3 orthogonal axis
Random vibrations	10 _ 2000 Hz, 0.30 g <sup>2</sup> / Hz in each of 3 orthogonal axis

# G3 Hermetically Sealed Microswitch

**Specific Products** - Contact us for more information ; data sheet on request.

- **G3A1SH** Microswitch for operating temperatures up to +250 °C.

## Connection Type

**Circuit diagram**

**Available terminals**

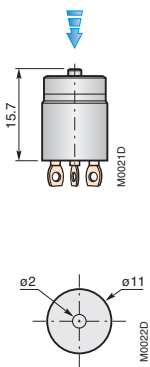
- **"S" solder terminals**
- **"F" wired terminals**
- **"FL" wired terminals side outputs (standard potting)**
- **"FLL" wired terminals side outputs (longest potting)**

Leadwires are right oriented in standard configuration. Consult us for other orientations.

## Dimensions (in mm)

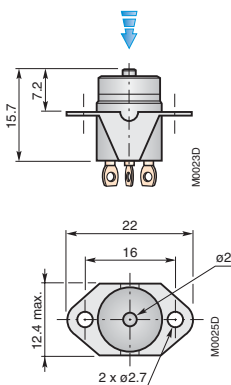
Solder terminal devices are shown on below drawings.

### G3A1...



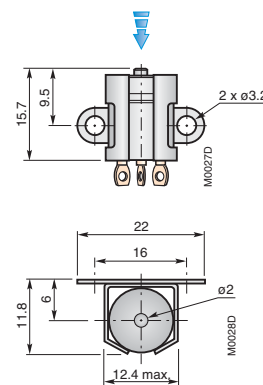
### G3A1P...

Mounting holes for M2.5 screws.



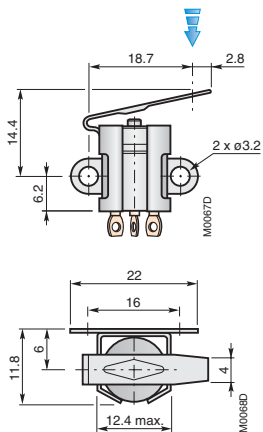
### G3A1C...

Mounting holes for M3 screws.



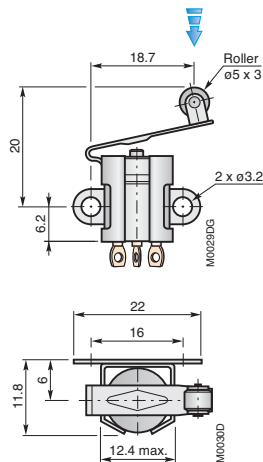
### G3L11C...

Mounting holes for M3 screws.



### G3L11GC...

Mounting holes for M3 screws.

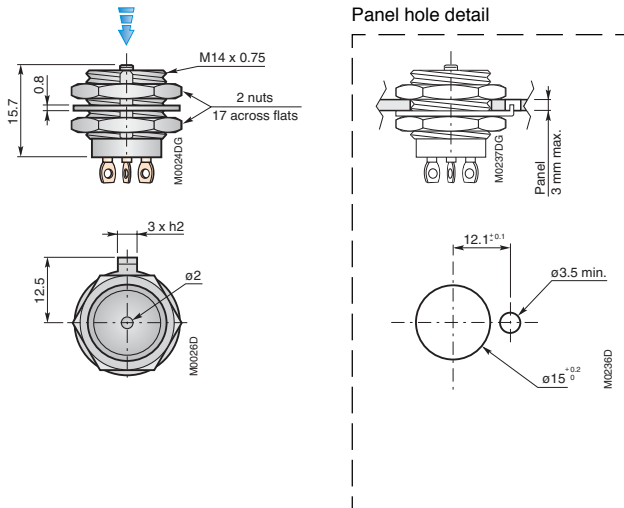


# G3 Hermetically Sealed Microswitch

## Dimensions (continued)

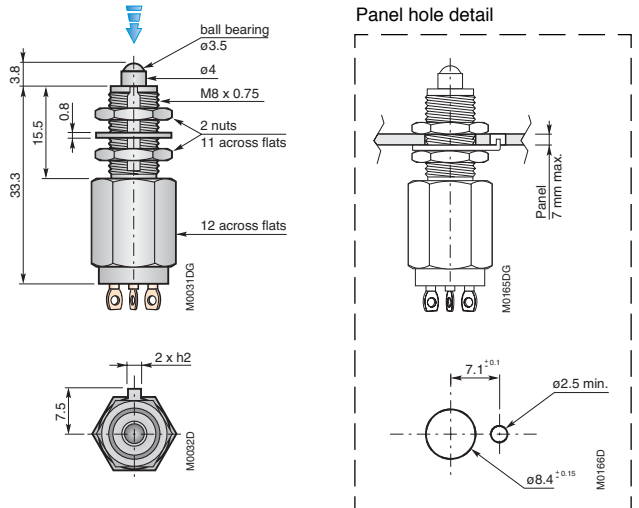
### G3A1V...

Panel mounting by threaded bushing and nuts.  
Recommended tightening torque: 10 Nm.



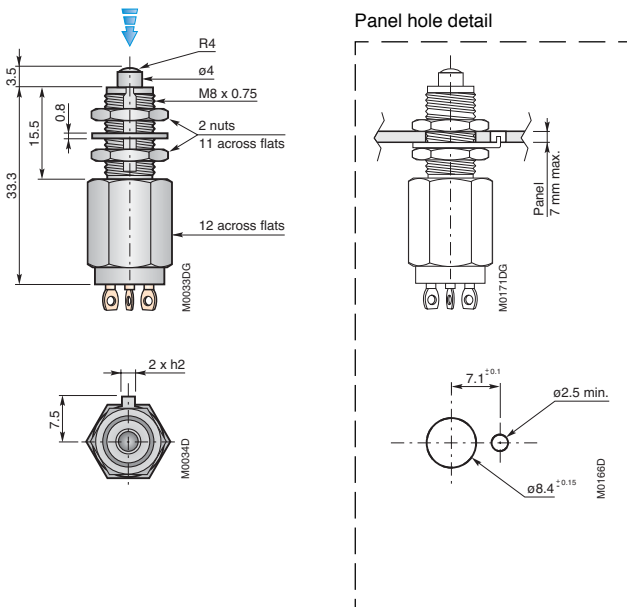
### G3B...

Panel mounting by threaded bushing and nuts.  
Recommended tightening torque: 4 Nm.



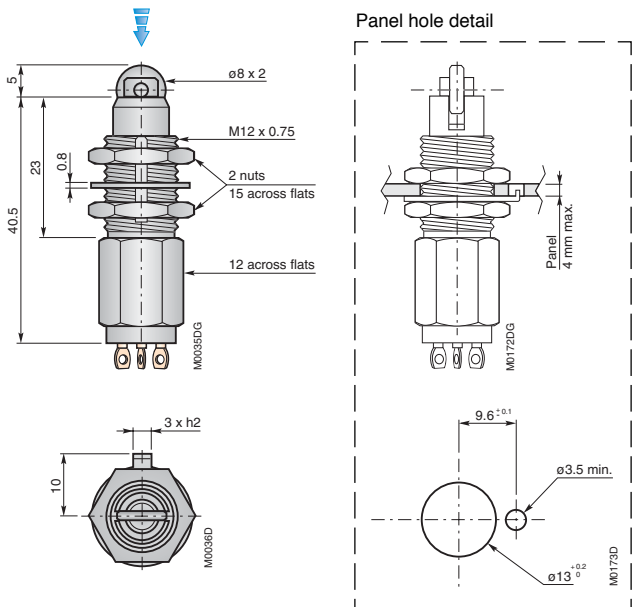
### G3P30...

Panel mounting by threaded bushing and nuts.  
Recommended tightening torque: 4 Nm.



### G3P30G...

Panel mounting by threaded bushing and nuts.  
Recommended tightening torque: 9 Nm.



Panel cutout and keying according to 1SBC14800M1700 document on request.

# R Hermetically Sealed Microswitch



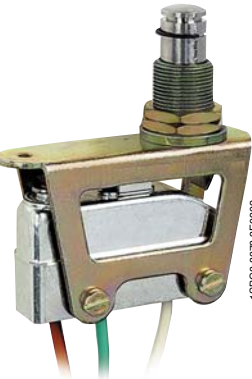
RLDV50



RLDGF50



RLDV



RP32F50



RP32GF50-1

## Application

Microswitch for severe industrial environment: humidity, corrosion, temperature...

- Operating temperature:
  - screw terminals: -25 ... +85 °C general use
  - 55 ... +155 °C extended temperature range design (R...V-1 types)
  - wired terminals: -30 ... +120 °C general use
  - 55 ... +155 °C extended temperature range design (R...F50-1 types)
- Ratings (220 V a.c. – 50 Hz voltage): 2.5 A (standard version) or 5 A.
- Mechanical life: 100 000 cycles.

## Description

Hermetically sealed snap-action switch.

- Brass tinned casing.
  - Inert gas filled switching chamber.
  - Gold plated silver contacts.
  - Mounting by way of screws or threaded bushing according to product design.
  - Terminals:
    - screw terminals,
    - 1 mm<sup>2</sup> (AWG 17) leadwires, Reticulated synthetic rubber insulation - general use
    - 0.93 mm<sup>2</sup> (AWG 18) leadwires\*, FEP insulation - extended temperature range design "-1" series
- \* Compliant to AIR 4524 ; NF L 52-125A Category B of 1971 - lightweight cables ; Interchangeability: AICMA No 5116 recommendation of February 1961.

## Ordering Details

Standard leadwire length = 0.5 m ; other length on request.

Rated breaking capacity (220 V - 50 Hz)	Terminals	Type	Order code	Weight 1 piece
A				kg

### Microswitch with lever actuator

2.5	Screw terminals	RLDV	1SBU 12 0010 R4000	0.035
		RLDV-1	1SBU 12 0010 R4001	0.035
	Wired terminals	RLDF50	1SBU 12 1000 R4000	0.065
		RLDF50-1	1SBU 12 1000 R4015	0.065
5	Screw terminals	R5LDV	1SBU 12 0010 R4007	0.035
		R5LDV-1	1SBU 12 0010 R4008	0.035
	Wired terminals	R5LDF50	1SBU 12 1000 R4002	0.065
		R5LDF50-1	1SBU 12 1000 R4003	0.065

### Microswitch with roller lever actuator

2.5	Screw terminals	RLDGV	1SBU 12 0010 R4004	0.040
		RLDGV-1	1SBU 12 0010 R4005	0.040
	Wired terminals	RLDGF50	1SBU 12 1000 R4021	0.070
		RLDGF50-1	1SBU 12 1000 R4022	0.070
5	Wired terminals	R5LDGF50	1SBU 12 1000 R4005	0.070
		R5LDGF50-1	1SBU 12 1000 R4001	0.070

### Microswitch with telescopic plunger actuator ; M12 threaded bushing

2.5	Wired terminals	RP32F50	1SBU 12 1000 R4039	0.110
		RP32F50-1	1SBU 12 1000 R4032	0.110
5	Wired terminals	R5P32F50	1SBU 12 1000 R4006	0.110
		R5P32F50-1	1SBU 12 1000 R4007	0.110

### Microswitch with telescopic roller plunger actuator ; M12 threaded bushing

2.5	Wired terminals	RP32GF50	1SBU 12 1000 R4035	0.120
		RP32GF50-1	1SBU 12 1000 R4036	0.120
5	Wired terminals	R5P32GF50	1SBU 12 1000 R4008	0.120
		R5P32GF50-1	1SBU 12 1000 R4009	0.120

Reminder: On above table, R...-1 product codes refer to extended temperature range devices.

# R Hermetically Sealed Microswitch

## Approvals and Compliance to Standards

French Air Ministry Approval based on standard: AIR 8459.

AIR equipment sheets No: 6.552.200, 6.552.201, 6.552.202, 6.552.203, 6.552.210.

Main compliance or performance equivalences with MIL-S-8805 standard requirements.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Hermetically sealed Microswitches		RLDV... / RLDF50... R5LDV... / R5LDF50...	RLDGV... / RLDGF50... R5LDGF50...	RP32F50... R5P32F50...	RP32GF... R5P32GF...
Max. operating force	N	8.75	7.50	9.0	9.0
Min. release force	N	0.6 x Operating force	0.6 x Operating force	0.5 x Operating force	0.5 x Operating force
Pretravel max.	mm	1.50	1.70	1.70	1.70
Max. differential movement	mm	0.50	0.60	0.60	0.60
Min. overtravel (1)	mm	0.40	0.50	2.5	3.0
Max. full overtravel authorised force	N	18	15	–	–

(1) Do not exceed this value in use.

## Electrical Data

Ratings (electrical load on one throw only)		30 ... 48 V d.c.	115 V d.c.	220 V a.c. - 50 Hz
Version 2.5 A	– resistive load	A 3	1	2.5
	– inductive load	A 1.8 A (L/R ≤ 40 ms)	0.5 A (L/R ≤ 40 ms)	1.5 A (Cos φ ≥ 0.3)
Version 5 A	– resistive load	A –	3	5
	– inductive load	A –	0.5 A (L/R ≤ 40 ms)	2.5 A (Cos φ ≥ 0.3)
Electrical life	cycles	100 000		
Min. switched current	mA	5		
Changeover time	ms	≤ 15		
Contact resistance	mΩ	≤ 50 mΩ under 6 V d.c. – 100 mA according to MIL-S-8805 (As new, wires or cable not included)		
Dielectric strength (50 Hz - 1 mn)				
– between terminals	V a.c.	500		
– between all terminals and earth (ground)	V a.c.	1500		
Insulation resistance	MΩ	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)		

## Environmental Conditions - For other test results, please contact us.

Salt spray	96 hours
Humidity	93% relative humidity, +40 °C duration 168 hours (7 days)
Mechanical shocks	50 g - duration 11 ms (pulse shape = 1/2 sinus) 18 shocks (3 / direction, both of 3 orthogonal axis)
Sinusoidal vibrations	10 _ 2000 Hz, 10 g in each of 3 orthogonal axis
Pressure stress	5 bars absolute

## Specific Products - Contact us for more information ; data sheet on request.

Many standard products (with "-R6", "-R8" or "-R9" termination) are compliant with nuclear environment use. Insulating material of used leadwires accept 2.10<sup>6</sup> Gy (2.10<sup>8</sup> rad) irradiation integrated dose.

In most cases, these devices are included in EDF (French Electricity Supply Board) certified limit switches. They have passed number of specific and severe tests.

# R Hermetically Sealed Microswitch

## Connection Type

**Circuit diagram**

**Available terminals**

- **M3 Screw terminals** - Recommended tightening torque: 0.6 to 1 Nm
- **Wired terminals**

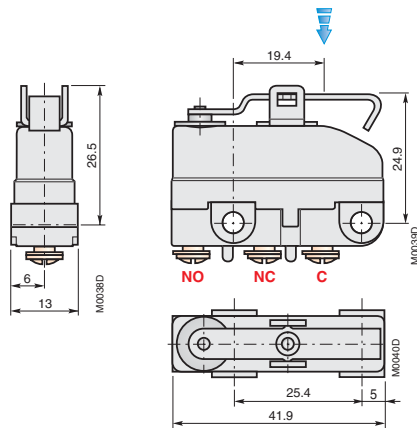
M0064D  
M0111D

M0065DG

## Dimensions (in mm)

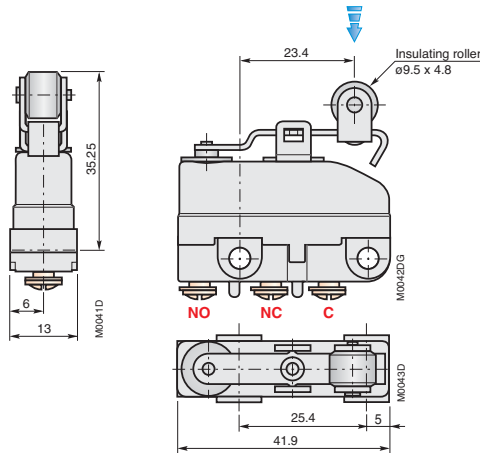
### RLDV, RLDV-1, R5LDV, R5LDV-1

Mounting holes for M4 screws.  
Recommended tightening torque: 1.6 to 2 Nm.



### RLDGV, RLDGV-1

Mounting holes for M4 screws.  
Recommended tightening torque: 1.6 to 2 Nm.

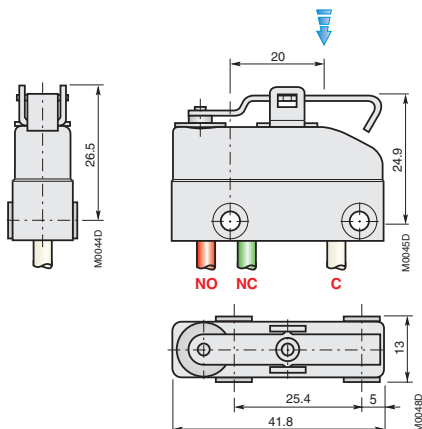


### RLDF50, R5LDF50

Mounting holes for M3 screws.  
Recommended tightening torque: 2 Nm.

### RLDF50-1, R5LDF50-1

Mounting holes for M4 screws.  
Recommended tightening torque: 4 Nm.

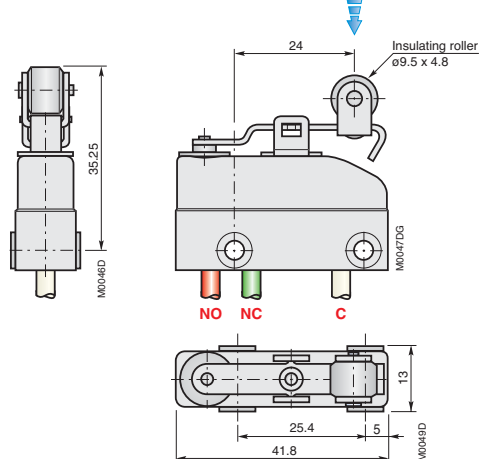


### RLDGF50, R5LDGF50

Mounting holes for M3 screws.  
Recommended tightening torque: 2 Nm.

### RLDGF50-1, R5LDGF50-1

Mounting holes for M4 screws.  
Recommended tightening torque: 4 Nm.



General mounting instruction FPTM 88017 on request.

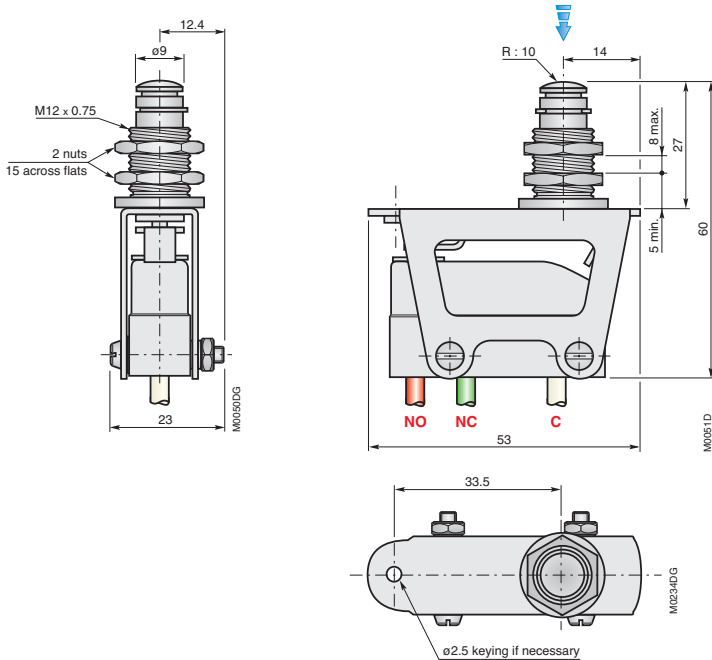


# R Hermetically Sealed Microswitch

## Dimensions (continued)

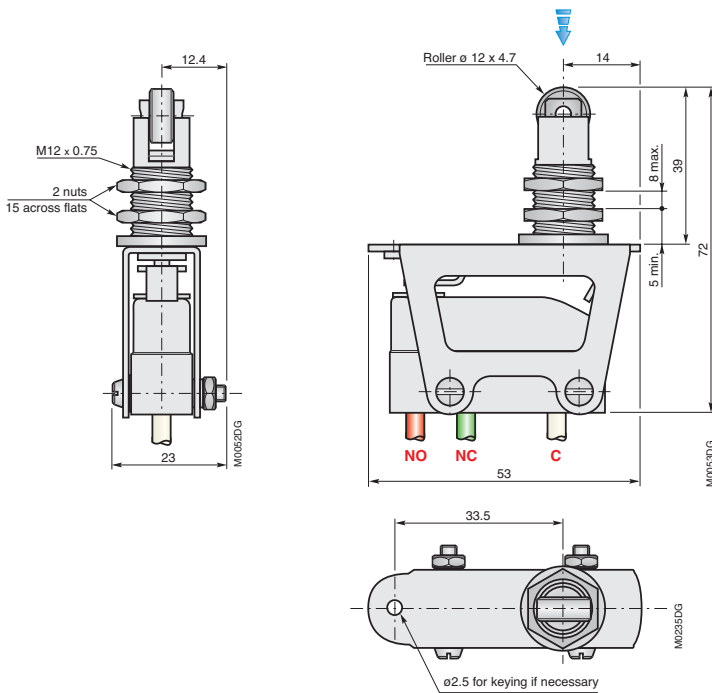
### RP32F50, RP32F50-1, R5P32F50, R5P32F50-1

Panel mounting by threaded bushing and nuts. Panel hole (recommended)  $\text{Ø } 13 + 0.2/0$   
M12 nuts recommended tightening torque: 5 Nm.



### RP32GF50, RP32GF50-1, R5P32GF50, R5P32GF50-1

Panel mounting by threaded bushing and nuts. Panel hole (recommended)  $\text{Ø } 13 + 0.2/0$   
M12 nuts recommended tightening torque: 5 Nm.



General mounting instruction FPTM 88017 on request.

+1

# Protected





## Protected Microswitches (unsealed)

### Contents

Z3 Subminiature Microswitch .....	26
H Miniature Microswitch .....	30
HP and HL Miniature Microswitches .....	34
C Microswitch .....	40
AM Microswitch .....	46
KM Microswitch .....	48
M and CM Microswitches .....	50

# Z3 Subminiature Microswitch



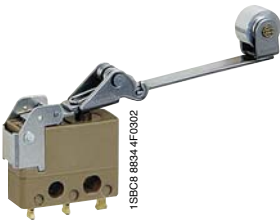
Z3INS



Z3ANS

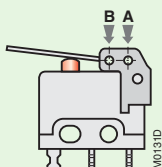


Z3INS-L20A



Z3ANS-L60GB

Actuating lever pivot point : **A** or **B**.  
 Due to factory mounting, actuating lever pivot point must be defined for Microswitches with integral levers.  
 See Mechanical characteristics tables for required travel and/or force.



## Application

Subminiature Microswitch for severe environment: shocks and vibrations, temperature...

- Operating temperature: Up to +150 °C according to casing material:
  - 40 °C ... +85 °C Industrial design (**Z3INS** types)
  - 55 °C ... +150 °C Standard design (**Z3ANS** types)
- Rated breaking capacity: from few mA up to 4 A.
- Degree of protection: IP40 ; IP54 (except terminals).
- Mechanical life: 500 000 cycles.

## Description

Snap action switch - unsealed.

- Plastic casing: Polyamide (Z3INS types) or PPS Ryton (Z3ANS types).
- Gold plated contacts.
- Mounting holes for M2 screws.
- Dimensions compliant with DIN 41635 standard – size "D".
- Terminals: solder terminals.
- Pin actuator, integral actuator (factory assembled) or auxiliary actuator (accessory).

## Ordering Details

Version	Temp. °C	Lever length mm	Actuating lever pivot point	Type	Order code	Weight 1 piece kg
<b>Microswitch with pin actuator</b>						
Industrial use	+85°	–	–	Z3INS	1SBU 21 0001 R4001	0.001
Standard	+150°	–	–	Z3ANS	1SBU 21 0000 R4001	0.001
<b>Microswitch with integral lever actuator</b>						
Industrial use	+85°	20	A	Z3INS-L20A	1SBU 21 0001 R4051	0.002
			B	Z3INS-L20B	1SBU 21 0001 R4052	0.002
Standard	+150°	20	A	Z3ANS-L20A	1SBU 21 0000 R4051	0.002
			B	Z3ANS-L20B	1SBU 21 0000 R4052	0.002
<b>Microswitch with integral roller lever actuator</b>						
Industrial use	+85°	20	A	Z3INS-L20GA	1SBU 21 0001 R4053	0.002
			B	Z3INS-L20GB	1SBU 21 0001 R4054	0.002
Standard	+150°	20	A	Z3ANS-L20GA	1SBU 21 0000 R4053	0.002
			B	Z3ANS-L20GB	1SBU 21 0000 R4054	0.002
<b>Microswitch with added overtravel lever actuator</b>						
Industrial use	+85°	30	A	Z3INS-L60A	1SBU 21 0001 R4055	0.002
			B	Z3INS-L60B	1SBU 21 0001 R4056	0.002
Standard	+150°	30	A	Z3ANS-L60A	1SBU 21 0000 R4055	0.002
			B	Z3ANS-L60B	1SBU 21 0000 R4056	0.002
Industrial use	+85°	20	A	Z3INS-L61A	1SBU 21 0001 R4057	0.002
			B	Z3INS-L61B	1SBU 21 0001 R4058	0.002
Standard	+150°	20	A	Z3ANS-L61A	1SBU 21 0000 R4057	0.002
			B	Z3ANS-L61B	1SBU 21 0000 R4058	0.002
<b>Microswitch with added overtravel roller lever actuator</b>						
Industrial use	+85°	30	A	Z3INS-L60GA	1SBU 21 0001 R4059	0.003
			B	Z3INS-L60GB	1SBU 21 0001 R4060	0.003
Standard	+150°	30	A	Z3ANS-L60GA	1SBU 21 0000 R4059	0.003
			B	Z3ANS-L60GB	1SBU 21 0000 R4060	0.003
Industrial use	+85°	20	A	Z3INS-L61GA	1SBU 21 0001 R4061	0.002
			B	Z3INS-L61GB	1SBU 21 0001 R4062	0.002
Standard	+150°	20	A	Z3ANS-L61GA	1SBU 21 0000 R4061	0.002
			B	Z3ANS-L61GB	1SBU 21 0000 R4062	0.002
<b>Microswitch with adjustable lever actuator</b>						
Industrial use	+85°	20	A	Z3INS-L20VA	1SBU 21 0001 R4063	0.002
			B	Z3INS-L20VB	1SBU 21 0001 R4064	0.002
Standard	+150°	20	A	Z3ANS-L20VA	1SBU 21 0000 R4063	0.002
			B	Z3ANS-L20VB	1SBU 21 0000 R4064	0.002

# Z3 Subminiature Microswitch

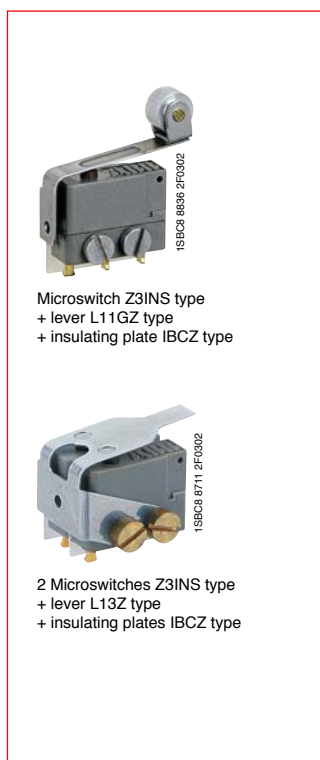
## Ordering Details - Accessories

Screws are not included with the accessories.

Accessories	Type	Order code	Weight 1 piece kg
<b>Flexible levers</b>			
Simple lever (for 1 microswitch)	L11Z	1SBU 53 3110 T4001	0.001
Tandem lever (for 2 microswitches)	L13Z	1SBU 53 3110 T4003	0.002
<b>Flexible roller levers</b>			
Simple lever (for 1 microswitch)	L11GZ	1SBU 53 3110 T4002	0.002
Tandem lever (for 2 microswitches)	L13GZ	1SBU 53 3110 T4004	0.003
<b>Insulating plate</b> - The use of an insulating plate is recommended if the microswitch is to be fitted against a metallic face.			
12.75 x 9 x 0.2	IBCZ	1SBU 53 3440 T4001	NS

Note: Accessories in packs of 10.

NS: not significant.



### Lever mounting position

According to required performance, 2 mounting positions of the actuator lever are offered.



## Approvals and Compliance to Standards

Z3ANS Microswitches are designed to replace Z5661-1 and Z5667 Microswitches approved by French Air Ministry as per letters 39.974/STAE/EQ2 dated July 24, 1975 and 42.893/STAE/EQ2 dated December 28, 1970 (AIR equipment sheets No 6.551.225 and 6.551.220).

The continuation of these approvals is in progress at present time.

Main compliance or performance equivalences with MIL-S-8805 standard requirements.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Microswitches	Types	Without accessory	With flexible levers (accessories)			
		Z3INS / Z3ANS	Z3...NS + L11Z Z3...NS + L11GZ		Z3...NS + L13Z Z3...NS + L13GZ	
Actuating lever pivot point			I	II	I	II
Max. operating force	N	2.50	2.00	2.50	2.50	3.60
Min. release force	N	0.70	0.60	0.80	0.70	1.0
Pretravel	mm	0.17 ... 0.42	–	–	–	–
Max. differential movement	mm	0.06	–	–	–	–
Min. overtravel (1)	mm	0.10	–	–	–	–

(1) Do not exceed this value in use.

Microswitches	Types	Microswitches with integral lever (factory assembled)					
		Z3...NS-L20 Z3...NS-L20G Z3...NS-L20V		Z3...NS-L60 Z3...NS-L60G		Z3...NS-L61 Z3...NS-L61G	
Actuating lever pivot point		A	B	A	B	A	B
Max. operating force	N	0.90	0.60	0.70	0.45	0.90	0.60
Min. release force	N	0.27	0.19	0.18	0.12	0.27	0.19
Pretravel	mm	1.35	1.85	2.20	2.90	1.35	1.85
Max. differential movement	mm	0.30	0.40	0.50	0.75	0.30	0.40
Min. overtravel (1)	mm	0.35	0.65	2.60	3.20	1.30	1.60

(1) Do not exceed this value in use.

# Z3 Subminiature Microswitch

## Electrical Data

Ratings (electrical load on one throw only)		30 mV ... 5 V d.c.	30 V d.c.	115 V a.c. - 400 Hz	220 V a.c. - 50 Hz
- resistive load	<b>A</b>	10 mA	4 A	1 A	1 A
- inductive load	<b>A</b>	0.025 (L/R ≤ 5 ms)	0.5 (L/R ≤ 5 ms)	-	0.5 (Cos φ ≥ 0.5)
<b>Electrical life</b>	<b>cycles</b>	100 000			
<b>Changeover time</b>	<b>ms</b>	≤ 10			
<b>Contact resistance</b>	<b>mΩ</b>	≤ 25 mΩ under 6 V d.c. - 100 mA according to MIL-S-8805 (As new, wires or cable not included)			
<b>Dielectric strength</b> (50 Hz - 1 mn)					
- between terminals	<b>V a.c.</b>	500			
- between all terminals and earth (ground)	<b>V a.c.</b>	1500			
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)			

## Environmental Conditions - For other test results, please contact us.

<b>Salt spray</b>	48 hours
<b>Humidity</b>	93 % relative humidity, +40 °C duration 168 hours (7 days)
<b>Mechanical shocks</b>	40 g - duration 11 ms (pulse shape = saw tooth) 18 shocks (3 / direction, both of 3 orthogonal axis)
<b>Sinusoidal vibrations</b>	5 _ 2000 Hz, 50 g in each of 3 orthogonal axis
<b>Random vibrations</b>	10 _ 2000 Hz, 0.30g <sup>2</sup> / Hz in each of 3 orthogonal axis

## Connection Type

**Circuit diagram**

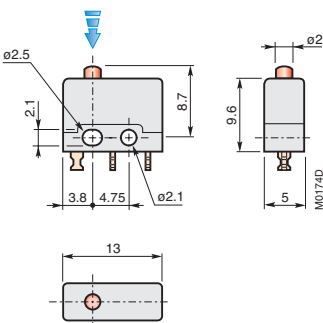
**Available terminals**

- Solder terminals

## Dimensions (in mm)

M2 screws recommended tightening torque: 0.18 to 0.2 Nm.

### Microswitches without accessory

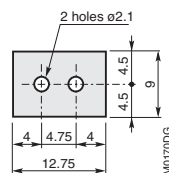


**Z3INS, Z3ANS**

### Insulating plate

(Thickness 0.2 mm)

The use of an insulating plate is recommended if the Microswitch is to be fitted against a metallic face.

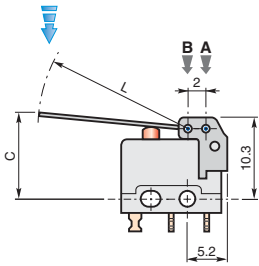


**IBCZ**

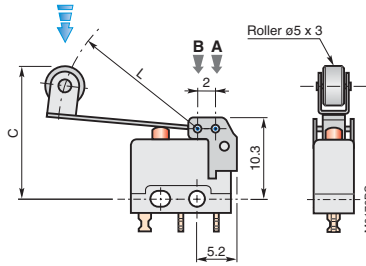
# Z3 Subminiature Microswitch

## Dimensions (continued)

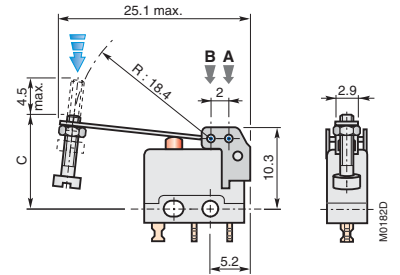
### Microswitches with integral lever (factory assembled)



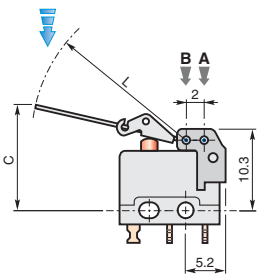
Z3INS-L20..., Z3ANS-L20...



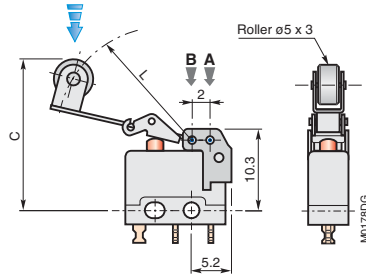
Z3INS-L20G..., Z3ANS-L20G...



Z3INS-L20V..., Z3ANS-L20V...



Z3INS-L60..., Z3ANS-L60...  
Z3INS-L61..., Z3ANS-L61...

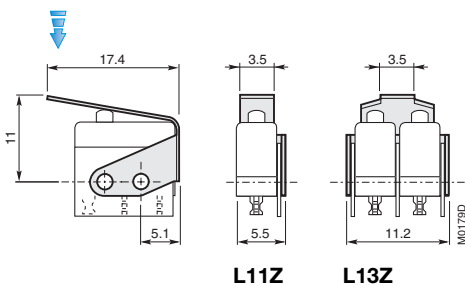


Z3INS-L60G..., Z3ANS-L60G...  
Z3INS-L61G..., Z3ANS-L61G...

Levers	Dimension mm - L	Actuating lever pivot point	Dimension mm - C
L20	20	A	10.6
		B	10.9
L20G	18.5	A	16.4
		B	16.7
L61	20	A	11.4
		B	11.7
L60	30	A	12.7
		B	12.9
L61G	18.55	A	17.2
		B	17.4
L60G	28.65	A	18.5
		B	18.7
L20V	18.4	A	12.5
		B	13.0

### Accessories

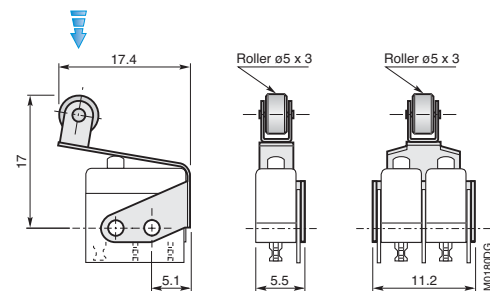
#### Flexible levers



L11Z

L13Z

#### Flexible roller levers



L11GZ

L13GZ

# H Miniature Microswitch



H5467S

1SBC8 8716 2F0302



H5463R

1SBC8 8838 3F0302



H5467R + L14GH

1SBC8 8839 3F0302



H5461R + L20H

1SBC8 8840 3F0302



H5459J + L20GH

1SBC8 8841 3F0302

## Application

Microswitch for aerospace or industrial use where an hermetically sealed Microswitch is not required.

- Operating temperature: -55 °C ... +85 °C for **H5459** and **H5463** types  
-55 °C ... +150 °C for **H5461** and **H5467** types
- 2 available contact configurations: up to 200 mA for low level applications or 4 A.
- Mechanical life: 1 000 000 cycles.

## Description

Snap action switch - unsealed.

- Plastic casing.
- Gold plated silver contacts or gold contacts.
- Mounting holes for M2 screws.
- Dimensions compliant with DIN 41635 standard – size "B".
- Pin actuator or auxiliary actuator.
- Terminals : 4 options available
  - solder terminals ..... : "**S**" termination product types
  - "Radio" terminals ..... : "**R**" termination product types
  - fork terminals ..... : "**F**" termination product types
  - PCB terminals ..... : "**J**" termination product types

## Ordering Details

Rated breaking capacity (220 V - 50 Hz)	Terminals	Type	Order code	Weight 1 piece
<b>A</b>				<b>kg</b>

### Microswitch with pin actuator - Operating temperature +85 °C

0.2 Low currents	Solder terminals	H5459S	1SBU 22 0001 R4098	0.003
	Fork terminals	H5459F	1SBU 22 0021 R4098	0.003
	"Radio" terminals	H5459R	1SBU 22 0011 R4098	0.003
	PCB terminals	H5459J	1SBU 22 0031 R4098	0.003
4 Higher currents	Solder terminals	H5463S	1SBU 22 0001 R4099	0.003
	Fork terminals	H5463F	1SBU 22 0021 R4099	0.003
	"Radio" terminals	H5463R	1SBU 22 0011 R4099	0.003
	PCB terminals	H5463J	1SBU 22 0031 R4099	0.003

### Microswitch with pin actuator - Operating temperature +150 °C

0.2 Low currents	Solder terminals	H5461S	1SBU 22 0000 R4098	0.003
	Fork terminals	H5461F	1SBU 22 0020 R4098	0.003
	"Radio" terminals	H5461R	1SBU 22 0010 R4098	0.003
4 Higher currents	Solder terminals	H5467S	1SBU 22 0000 R4099	0.003
	Fork terminals	H5467F	1SBU 22 0020 R4099	0.003
	"Radio" terminals	H5467R	1SBU 22 0010 R4099	0.003

## Ordering Details - Accessories

	Lever length mm	Type	Order code	Weight 1 piece kg
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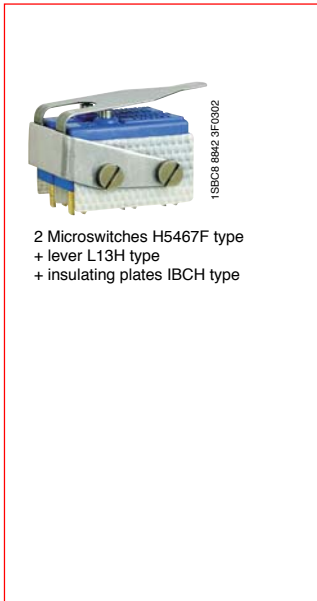
### Flexible levers

Simple lever	24	L11H	1SBU 53 3110 T4011	0.001
Tandem lever (for 2 microswitches)	24	L13H	1SBU 53 3110 T4013	0.002
Simple lever	34	L14H	1SBU 53 3110 T4015	0.001

>> Toggle switches or pushbutton switches ..... page 76



# H Miniature Microswitch



## Ordering Details - Accessories

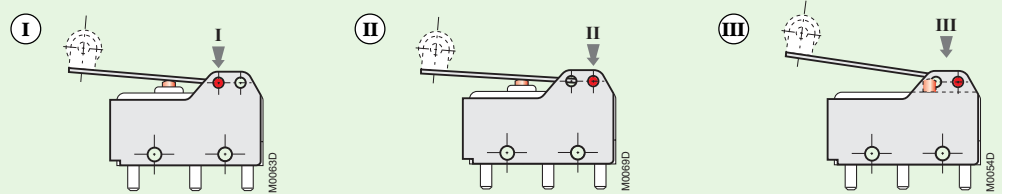
	Lever length mm	Type	Order code	Weight 1 piece kg
<b>Flexible roller levers</b>				
Simple lever	23	L11GH	1SBU 53 3110 T4012	0.002
Tandem lever	23	L13GH	1SBU 53 3110 T4014	0.003
Simple lever	33	L14GH	1SBU 53 3110 T4016	0.002
<b>Articulated lever auxiliary actuator</b>				
Simple lever		L20H	1SBU 53 3110 T4017	0.002
Roller lever actuator		L20GH	1SBU 53 3110 T4018	0.003
<b>Insulating plates</b> - The use of an insulating plate is recommended if the microswitch is to be fitted against a metallic face.				
19 x 10 x 0.4		IACH	1SBU 53 3440 T4010	NS
19 x 10 x 0.5		IBCH	1SBU 53 3440 T4011	NS
20 x 18 x 0.4		IALH	1SBU 53 3440 T4012	NS

Note: Accessories in packs of 10.

NS: not significant.

### Lever mounting position

According to required performance, 3 mounting positions of the actuator lever are offered.



## Approvals and Compliance to Standards

French Air Ministry Approval based on standard : AIR 8459 according to below.

AIR reference: 300-1A ..... for microswitches **H5463S**, 350-1 ..... for microswitches **H5467F**,  
300-2 ..... for microswitches **H5469F**, 350-2 ..... for microswitches **H5461F**.

AIR equipment sheets No 6.552.200, 6.552.201, 6.552.202, 6.552.203, 6.552.210.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Microswitches		Without accessory	With flexible levers (accessories)		
Types		H5459... / H5461... H5463... / H5467...	H54... + L11H H54... + L11GH	H54... + L13H H54... + L13GH	H54... + L14H H54... + L14GH
Max. operating force	N	2.50	3.50	6.40	1.80
Min. release force	N	–	1.00	2.50	0.60
Pretravel	mm	0.15 ... 0.55	–	–	–
Differential movement	mm	0.04 ... 0.10	–	–	–
Min. overtravel (1)	mm	0.15	–	–	–

(1) Do not exceed this value in use.

Microswitches		Articulated lever auxiliary actuator		
Types		H54... + L20H lever H54... + L20GH lever		
Actuating lever pivot point		I	II	III
Max. operating force	N	0.70	1.70	0.40
Min. release force	N	–	–	–
Pretravel	mm	0.40 ... 2.0	0.30 ... 1.3	0.80 ... 4.0
Differential movement	mm	0.10 ... 0.40	0.10 ... 0.30	0.30 ... 0.80
Min. overtravel (1)	mm	0.60	0.40	1.20

(1) Do not exceed this value in use.

# H Miniature Microswitch

## Electrical Data

Ratings (electrical load on one throw only)		5 mV ... 30 V d.c.	30 V d.c.	220 V a.c. - 50 Hz
<b>Product type 0.2 A</b>	- resistive load	<b>A</b> 0.2	-	0.2
	- inductive load	<b>A</b> 0.1 (L/R < 5 ms)	-	0.1 (Cos φ ≥ 0.5)
<b>Product type 4 A</b>	- resistive load	<b>A</b> -	4	4
	- inductive load	<b>A</b> -	2 (L/R ≤ 5 ms)	2 (Cos φ ≥ 0.5)
<b>Electrical life</b>	<b>cycles</b>	100 000		
<b>Changeover time</b>	<b>ms</b>	≤ 10		
<b>Contact resistance</b>	<b>mΩ</b>	≤ 50 mΩ under 6 V d.c. - 100 mA according to MIL-S-8805 (As new, wires or cable not included)		
<b>Dielectric strength</b> (50 Hz - 1 mn)				
- between terminals	<b>V a.c.</b>	500		
- between all terminals and earth (ground)	<b>V a.c.</b>	1500		
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)		

## Environmental Conditions - For other test results, please contact us.

<b>Salt spray</b>	48 hours
<b>Humidity</b>	93 % relative humidity, +40 °C duration 168 hours (7 days)
<b>Sinusoidal vibrations</b>	5 _ 500 Hz, 10 g in each of 3 orthogonal axis

## Connection Type

**Circuit diagram**

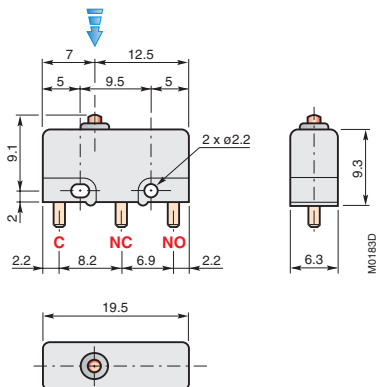
**Available terminals**

- "S" solder terminals
- "R" "Radio" terminals
- "F" fork terminals
- "J" for PCB terminals

## Dimensions (in mm)

PCB terminal devices are shown on below drawings.  
M2 screws recommended tightening torque: 0.25 to 0.30 Nm.

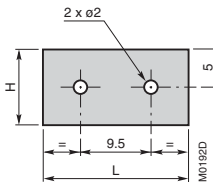
### Microswitches without accessory



H54...

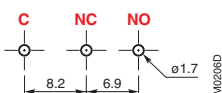
### Insulating plates

The use of an insulating plate is recommended if the Microswitch is to be fitted against a metallic face.



Types	L mm	H mm	Th. mm
IACH	19	10	0.4
IBCH	19	10	0.5
IALH	20	18	0.4

### Printed Circuit Board drilling plan for "J" terminals

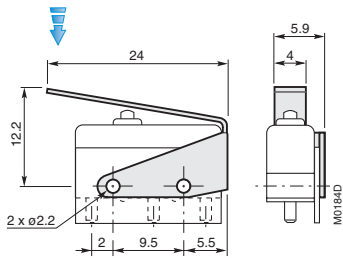


# H Miniature Microswitch

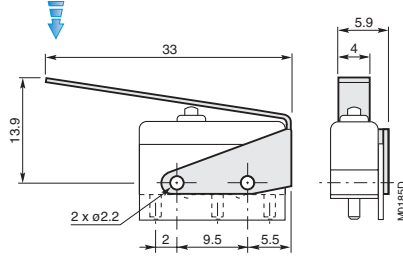
## Dimensions (continued)

### Accessories

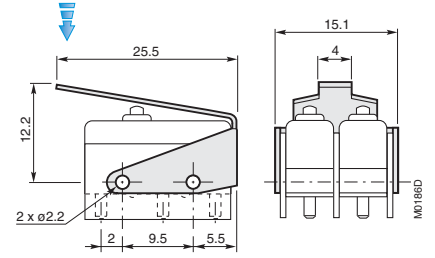
#### Flexible levers



**L11H**

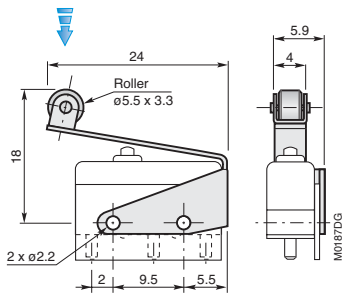


**L14H**

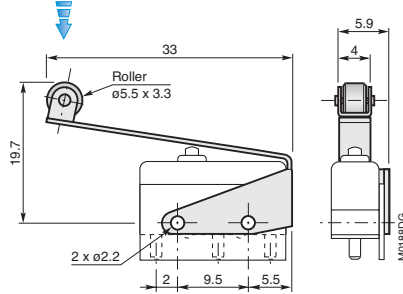


**L13H**

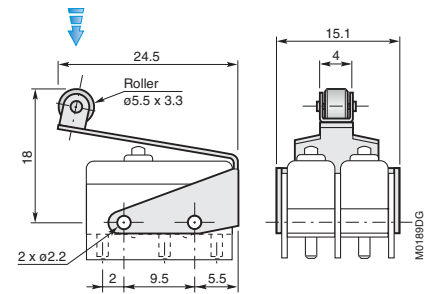
#### Flexible roller levers



**L11GH**

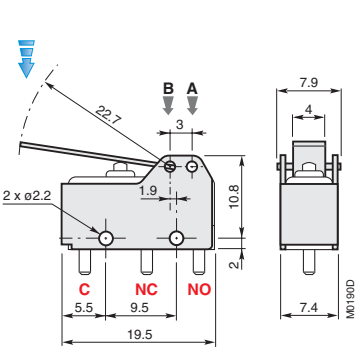


**L14GH**



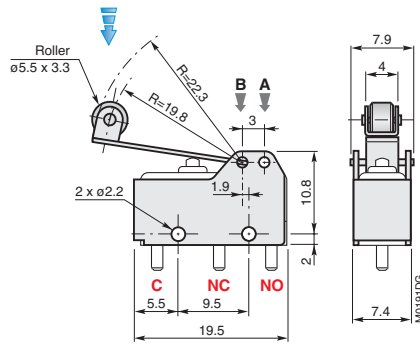
**L13GH**

#### Articulated lever auxiliary actuator



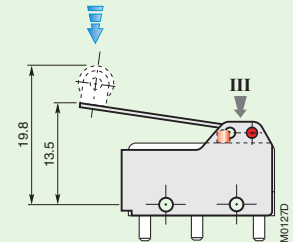
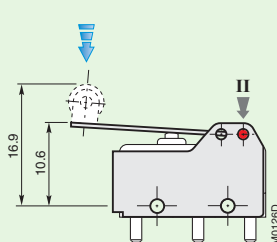
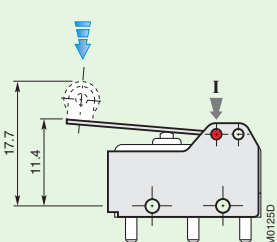
**L20H**

#### Articulated roller lever auxiliary actuator



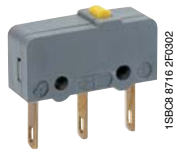
**L20GH**

**Lever mounting position:** according to required performance, 3 mounting positions of the actuator lever are offered.

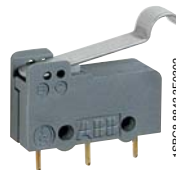


# HP and HL Miniature Microswitches

## Pin Actuator for HP Types ; Integral Actuator (factory assembled) for HL Types



HPE12



HLJ32-LC24-B



HLS12-L27-C

### Coding: HPS32 (example)

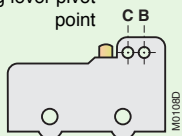
**HPS32**  
H ..... Miniature Microswitch

**HPS32**  
P ..... Pin actuator  
L ..... Integral lever actuator

**HPS32**  
S ..... Solder terminals  
E ..... Quick connect terminals  
J ..... PCB terminals  
See Description section

**HPS32**  
1 ..... Mechanism 1.5 N  
3 ..... Mechanism 0.6 N

Actuating lever pivot point



### Application

Microswitch for industrial applications.

- Operating temperature: -40 °C ... +85 °C
- Rated breaking capacity: From few mA up to 5 A.
- 2 available mechanisms allowing 2 operating forces:
  - standard operating force: 1.5 N,
  - low operating force: 0.6 N.
- Mechanical life: 10 000 000 cycles.

### Description

Snap action switch - unsealed.

- 6 Polyamide casing.
- Gold plated silver contacts.
- Mounting holes for M2 screws.
- **HP** type Microswitches dimensions compliant with DIN 41635 standard – size "B".
- Pin actuator or auxiliary actuator (accessory) for **HP** types ; integral actuator (factory assembled) for **HL** types.
- Terminals: 3 options available
  - solder terminals ..... "S" code
  - quick connect terminals, 2.8 mm ..... "E" code
  - PCB terminals ..... "J" code

### Ordering Details

Operating force	Terminals	Type	Order code	Weight 1 piece kg
N				

#### Microswitch with pin actuator

1.5 Standard	Solder terminals	HPS12	1SBU 23 0000 R4001	0.002
	Quick connect terminals	HPE12	1SBU 23 0020 R4001	0.002
	PCB terminals	HPJ12	1SBU 23 0030 R4001	0.002
0.6 Low force	Solder terminals	HPS32	1SBU 23 0000 R4003	0.002
	Quick connect terminals	HPE32	1SBU 23 0020 R4003	0.002
	PCB terminals	HPJ32	1SBU 23 0030 R4003	0.002

#### Microswitch with integral lever actuator

1.5 Standard	Solder terminals	HLS12-L...	1SBU 23 0000 R4□□1	0.002
	Quick connect terminals	HLE12-L...	1SBU 23 0020 R4□□1	0.002
	PCB terminals	HLJ12-L...	1SBU 23 0030 R4□□1	0.002
0.6 Low force	Solder terminals	HLS32-L...	1SBU 23 0000 R4□□3	0.002
	Quick connect terminals	HLE32-L...	1SBU 23 0020 R4□□3	0.002
	PCB terminals	HLJ32-L...	1SBU 23 0030 R4□□3	0.002

Note: □ to be filled in by our sales department according to actuating lever type and it's pivot point.

### Attention:

Due to factory mounting, **HL** type product codes must be followed by an actuating lever type and it's pivot point.

HLJ32 - LC27 - B accessories tables next page

Actuating lever pivot point, (B or C)

Lever code

Basic product type code

# HP and HL Miniature Microswitches

Pin Actuator for HP Types ;  
Integral Actuator (factory assembled) for HL Types

## Ordering Details - Accessories

### Accessories for HL type Microswitches (factory assembled)

	Lever length			Type	Order code	Weight 1 piece kg
	L = 22.5 mm	L = 24.5 mm	L = 27.5 mm			
Simple lever	L22	L24	L27	Due to numerous possibilities, available products code are not listed in this table.		0.001
Roller lever actuator	LG22	LG24	LG27			0.002
Simulated roller lever	LC22	LC24	LC27			0.001

### Accessories for HP type Microswitches

	Lever length mm	Type	Order code	Weight 1 piece kg
--	--------------------	------	------------	-------------------------

#### Flexible levers

Simple lever	25	L110	1SBU 53 3110 T4021	0.001
Tandem lever	24	L13H	1SBU 53 3110 T4013	0.002
Simple lever	35	L140	1SBU 53 3110 T4025	0.001

#### Flexible roller levers

Simple lever	24	LG110	1SBU 53 3110 T4022	0.002
Tandem lever	23	L13GH	1SBU 53 3110 T4014	0.003
Simple lever	34	LG140	1SBU 53 3110 T4026	0.002

#### Flexible simulated roller lever auxiliary actuator

Simple lever	23	LC110	1SBU 53 3110 T4023	0.001
Simple lever	33	LC140	1SBU 53 3110 T4027	0.001

#### Insulating plates - The use of an insulating plate is recommended if the microswitch is to be fitted against a metallic face.

19 x 10 x 0.4	IACH	1SBU 53 3440 T4010	NS
19 x 10 x 0.5	IBCH	1SBU 53 3440 T4011	NS
20 x 18 x 0.4	IALH	1SBU 53 3440 T4012	NS

Note: Accessories in packs of 10.

NS: not significant.



Microcontact HPS32 type  
+ lever LC110 type  
+ insulating plate IBCH type



L110, L140



LG110, LG140



LC110, LC140



L13H



L13GH

# HP and HL Miniature Microswitches

## Pin Actuator for HP Types ; Integral Actuator (factory assembled) for HL Types

### HP Microswitches Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

#### HP type Microswitch with pin actuator - Without accessory

		HP...12	HP...32
Max. operating force	N	1.50	0.60
Min. release force	N	0.35	0.12
Operating point (1)	mm	8.4 ± 0.3	8.4 ± 0.3
Max. differential movement	mm	0.15	0.15
Min. overtravel (2)	mm	0.15	0.15

#### HP type Microswitch with flexible lever auxiliary actuator

		HPS12 } HPE12 } + L110 lever HPJ12 }		HPS12 } HPE12 } + L140 lever HPJ12 }		HPS12 } HLE12 } + L13H lever HPJ12 }	
		I	II	I	II	I	II
Standard mechanism							
Actuating lever pivot point							
Max. operating force	N	2.45	2.10	1.75	1.50	3.50	2.50
Min. release force	N	0.45	0.40	0.30	0.25	1.20	1.0
Max. pretravel	mm	6.50	6.50	13.0	13.0	5.50	5.50
Max. differential movement	mm	0.60	1.20	1.20	2.40	0.60	1.20
Min. overtravel (2)	mm	0.40	0.50	0.60	0.70	0.40	0.50

#### HP type Microswitch with flexible roller lever auxiliary actuator or with flexible simulated roller lever auxiliary actuator

		HPS12 } HPE12 } + LG110 lever HPJ12 } + LC110 lever		HPS12 } HPE12 } or HPJ12 } + LG140 lever + LC140 lever		HPS12 } HPE12 } + L13GH lever HPJ12 }	
		I	II	I	II	I	II
Standard mechanism							
Actuating lever pivot point							
Max. operating force	N	2.90	2.50	1.95	1.70	4.00	3.00
Min. release force	N	0.55	0.45	0.40	0.30	1.30	1.10
Max. pretravel	mm	5.50	5.50	11.0	11.0	5.50	5.50
Max. differential movement	mm	0.50	1.00	1.00	1.00	0.50	1.00
Min. overtravel (2)	mm	0.30	0.40	0.50	0.60	0.30	0.40

#### HP type Microswitch with flexible lever auxiliary actuator

		HPS32 } HPE32 } + L110 lever HPJ32 }		HPS32 } HPE32 } + L140 lever HPJ32 }		HPS32 } HPE32 } + L13H lever HPJ32 }	
		I	II	I	II	I	II
Low operating force mechanism							
Actuating lever pivot point							
Max. operating force	N	1.95	1.80	1.40	1.30	2.80	2.30
Min. release force	N	0.35	0.30	0.20	0.20	1.10	0.90
Max. pretravel	mm	6.50	6.50	13.0	13.0	5.50	5.50
Max. differential movement	mm	0.50	1.00	0.90	1.80	0.50	1.20
Min. overtravel (2)	mm	0.40	0.50	0.60	0.70	0.40	0.40

#### HP type Microswitch with flexible roller lever auxiliary actuator or with flexible simulated roller lever auxiliary actuator

		HPS32 } HPE32 } + LG110 lever HPJ32 } or + LC110 lever		HPS32 } HPE32 } + LG140 lever HPJ32 } or + LC140 lever		HPS32 } HPE32 } + L13GH lever HPJ32 }	
		I	II	I	II	I	II
Low operating force mechanism							
Actuating lever pivot point							
Max. operating force	N	2.30	2.15	1.55	1.45	3.30	2.70
Min. release force	N	0.40	0.35	0.30	0.25	1.20	1.00
Max. pretravel	mm	5.50	5.50	11.0	11.0	5.50	5.50
Max. differential movement	mm	0.40	0.80	0.70	1.00	0.40	1.00
Min. overtravel (2)	mm	0.30	0.40	0.50	0.60	0.30	0.40

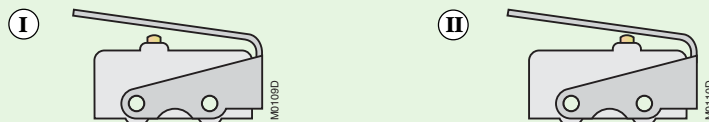
(1) Dimension regarding mounting holes axis.

(2) Do not exceed this value in use.

The force at full overtravel should not be greater than twice the maximum operating force.

#### Lever mounting position

according to required performance,  
2 mounting positions of the actuator  
lever are offered.



# HP and HL Miniature Microswitches

Pin Actuator for HP Types ;  
Integral Actuator (factory assembled) for HL Types

## HL Microswitches Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

### Microswitch with straight lever actuator

Standard mechanism	HL...12-L22		HL...12-L24		HL...12-L27		
	C	B	C	B	C	B	
Actuating lever pivot point							
Max. operating force	N	0.23	0.37	0.21	0.34	0.19	0.31
Min. release force	N	0.03	0.06	0.03	0.06	0.02	0.05
Operating point (1)	mm	11.9 ± 4.0	10.6 ± 2.2	12.2 ± 4.4	10.7 ± 2.4	12.6 ± 5.0	10.9 ± 2.7
Max. differential movement	mm	1.60	0.85	1.75	0.90	1.95	1.00
Min. overtravel (2)	mm	0.90	0.55	1.0	0.60	1.15	0.70

### Microswitch with roller lever actuator

Standard mechanism	HL...12-LG22		HL...12-LG24		HL...12-LG27		
	C	B	C	B	C	B	
Actuating lever pivot point							
Max. operating force	N	0.26	0.44	0.25	0.40	0.22	0.35
Min. release force	N	0.03	0.07	0.03	0.06	0.02	0.05
Operating point (1)	mm	17.7 ± 3.5	16.6 ± 2.1	18.0 ± 3.9	16.7 ± 2.3	18.4 ± 4.4	16.9 ± 2.6
Max. differential movement	mm	1.40	0.75	1.55	0.80	1.75	0.90
Min. overtravel (2)	mm	0.80	0.45	0.85	0.50	1.00	0.60

### Microswitch with simulated roller lever actuator

Standard mechanism	HL...12-LC22		HL...12-LC24		HL...12-LC27		
	C	B	C	B	C	B	
Actuating lever pivot point							
Max. operating force	N	0.31	0.49	0.28	0.44	0.24	0.38
Min. release force	N	0.04	0.08	0.03	0.07	0.03	0.06
Operating point (1)	mm	14.3 ± 3.3	13.3 ± 1.9	14.6 ± 3.7	13.4 ± 2.1	15.0 ± 4.2	13.6 ± 2.4
Max. differential movement	mm	1.25	0.65	1.40	0.75	1.60	0.85
Min. overtravel (2)	mm	0.70	0.40	0.80	0.45	0.90	0.55

### Microswitch with straight lever actuator

Low operating force mechanism	HL...32-L22		HL...32-L24		HL...32-L27		
	C	B	C	B	C	B	
Actuating lever pivot point							
Max. operating force	N	0.10	0.15	0.09	0.14	0.08	0.13
Min. release force	N	0.01	0.02	0.01	0.02	0.01	0.01
Operating point (1)	mm	11.9 ± 4.0	10.6 ± 2.2	12.2 ± 4.4	10.7 ± 2.4	12.6 ± 5.0	10.9 ± 2.7
Max. differential movement	mm	1.60	0.85	1.75	0.90	1.95	1.00
Min. overtravel (2)	mm	0.90	0.55	1.00	0.60	1.15	0.70

### Microswitch with roller lever actuator

Low operating force mechanism	HL...32-LG22		HL...32-LG24		HL...32-LG27		
	C	B	C	B	C	B	
Actuating lever pivot point							
Max. operating force	N	0.11	0.18	0.10	0.16	0.09	0.14
Min. release force	N	0.01	0.02	0.01	0.02	0.01	0.02
Operating point (1)	mm	17.7 ± 3.5	16.6 ± 2.1	18.0 ± 3.9	16.7 ± 2.3	18.4 ± 4.4	16.9 ± 2.6
Max. differential movement	mm	1.40	0.75	1.55	0.80	1.75	0.90
Min. overtravel (2)	mm	0.80	0.45	0.85	0.50	1.00	0.60

### Microswitch with simulated roller lever actuator

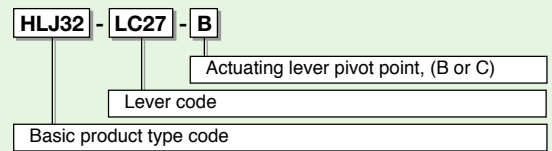
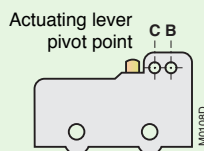
Low operating force mechanism	HL...32-LC22		HL...32-LC24		HL...32-LC27		
	C	B	C	B	C	B	
Actuating lever pivot point							
Max. operating force	N	0.12	0.20	0.11	0.18	0.10	0.15
Min. release force	N	0.01	0.02	0.01	0.02	0.01	0.02
Operating point (1)	mm	14.3 ± 3.3	13.3 ± 1.9	14.6 ± 3.7	13.4 ± 2.1	15.0 ± 4.2	13.6 ± 2.4
Max. differential movement	mm	1.25	0.65	1.40	0.75	1.60	0.85
Min. overtravel (2)	mm	0.70	0.40	0.80	0.45	0.90	0.55

(1) Dimension regarding mounting holes axis. (2) Do not exceed this value in use.

The force at full overtravel should not be greater than twice the maximum operating force.

#### Attention:

Due to factory mounting, HL type product codes must be followed by an actuating lever type and it's pivot point.



# HP and HL Miniature Microswitches

Pin Actuator for HP Types ;  
Integral Actuator (factory assembled) for HL Types

## Electrical Data

Ratings (electrical load on one throw only)			30 V d.c. (see Note)	125 V a.c. - 50 Hz	220 V a.c. - 50 Hz
Mechanism	- resistive load	<b>A</b>	50 mA ... 2 A	5 A	2 A
1.5 N	- inductive load	<b>A</b>	25 mA ... 1 A (L/R ≤ 5 ms)	2.5 A (cos φ ≥ 0.5)	1 A (cos φ ≥ 0.5)
Mechanism	- resistive load	<b>A</b>	50 mA ... 1.5 A	3 A	1.5 A
0.6 N	- inductive load	<b>A</b>	25 mA ... 0.75 A (L/R ≤ 5 ms)	1.5 A (cos φ ≥ 0.5)	1 A (cos φ ≥ 0.5)
<b>Electrical life</b>	<b>cycles</b>		100 000		
<b>Dielectric strength</b> (50 Hz - 1 mn)					
- between terminals			<b>V a.c.</b>	500	
- between all terminals and earth (ground)			<b>V a.c.</b>	1500	
<b>Insulation resistance</b>			<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)	

Note: Ratings = 50 mA resistive load and 25 mA inductive load (30 V d.c.) for PCB terminal Microswitches ("J" termination)

## Environmental Conditions - For other test results, please contact us.

<b>Salt spray</b>	24 hours
<b>Humidity</b>	93 % relative humidity, +40 °C duration 240 hours (10 days)
<b>Sinusoidal vibrations</b>	5 _ 500 Hz, 10 g in each of 3 orthogonal axis

## Connection Type

**Circuit diagram**

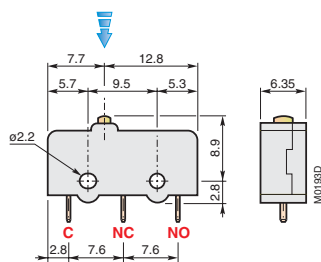
**Available terminals**

- "S" solder terminals
- "E" quick connect 2.8 mm
- "J" PCB terminal

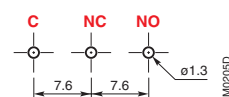
## Dimensions (in mm)

"J" PCB terminal devices are shown on below drawings.  
M2 screws recommended tightening torque: 0.25 to 0.30 Nm.

### HP type Microswitch



### Printed Circuit Board drilling plan for "J" terminals

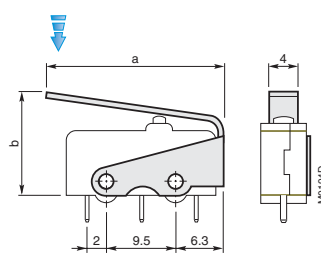


### Insulating plates

Types	L mm	H mm	th. mm
IACH	19	10	0.4
IBCH	19	10	0.5
IACL	20	18	0.4

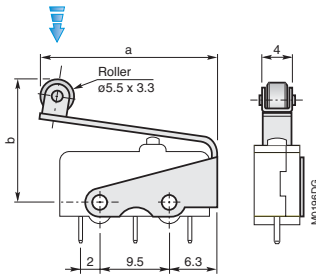
## Accessories

### Flexible levers



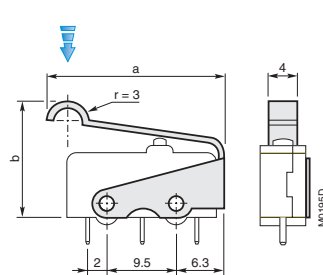
Types	Dimensions in mm	
	a	b
L110	25	13.5
L140	35	16.2

### Flexible roller levers



Types	Dimensions in mm	
	a	b
LG110	24	19
LG140	34	21.7

### Flexible simulated roller levers



Types	Dimensions in mm	
	a	b
LC110	23	14.5
LC140	33	17.2

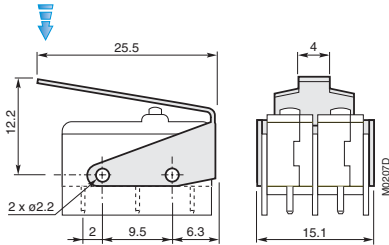


# HP and HL Miniature Microswitches

Pin Actuator for HP Types ;  
Integral Actuator (factory assembled) for HL Types

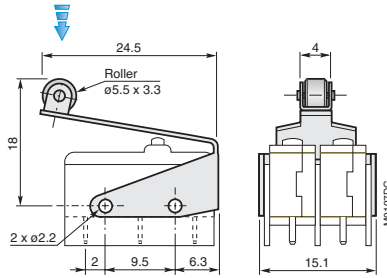
## Dimensions (continued)

Flexible levers



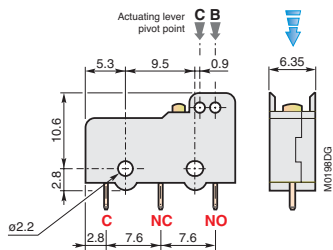
L13H

Flexible roller levers

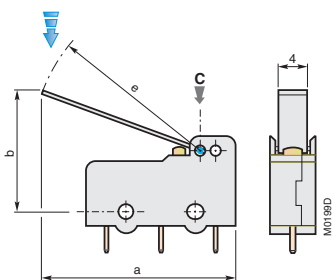
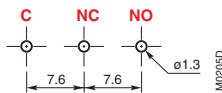


L13GH

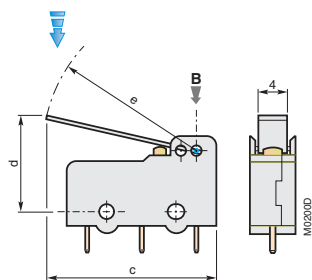
HL type Microswitch (Lever not shown)



Printed Circuit Board  
drilling plan for "J" terminals

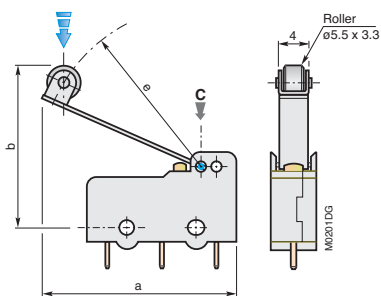


HL...-L...

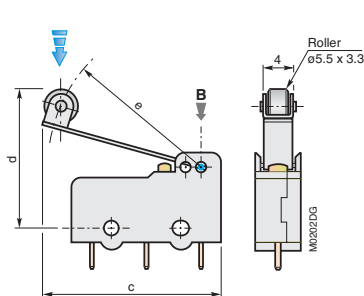


### Straight levers

Types	Dimensions in mm				
	a	b	c	d	e
L22	27.2	17.2	25.2	13.5	22.4
L24	29.2	17.9	27.2	13.9	24.4
L27	32.2	19	30.2	14.5	27.4
position	C		B		

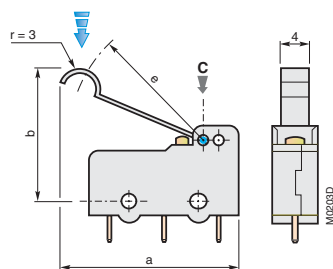


HL...-LG...

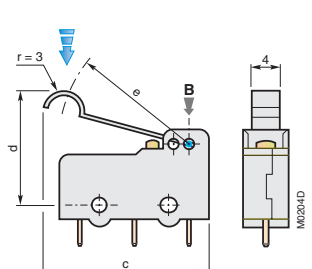


### Roller levers

Types	Dimensions in mm				
	a	b	c	d	e
LG22	26.75	22.5	24.75	19.1	19.2
LG24	28.75	23.2	26.75	19.5	21.2
LG27	31.72	24.3	29.75	20.1	24.2
position	C		B		



HL...-LC...



### Simulated roller levers

Types	Dimensions in mm				
	a	b	c	d	e
LC22	25	18.6	23	15.7	17.2
LC24	27	19.3	25	16.1	19.2
LC27	30	20.4	28	16.7	22.2
position	C		B		

# C Microswitch



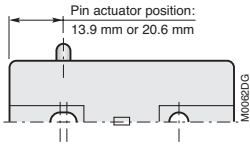
X4A1

1SBC88846 3FC032



R4NP30

1SBC88805 3FC034



## Application

Microswitch for industrial applications.

- Operating temperature: -25 °C ... +85 °C.
- 2 available pin actuator positions allowing 2 travel/force ranges.
- Several contact gaps available depending on terminals arrangement.
- Mechanical life: 5 000 000 cycles.

## Description

Snap action switch - unsealed.

- Plastic casing.
- Silver contacts.
- Mounting holes for M4 screws.
- Dimensions compliant with DIN 41635 standard – size "E".
- Several operating actuators available : pin actuator, flexible lever, telescopic plunger...
- Terminals:
  - triangular arrangement solder terminals ..... Standard configuration,
  - in line screw terminals ..... Product type including "N".

## Ordering Details

Contact gap mm	Pin position mm	Mechanism	Terminals	Type	Order code	Weight 1 piece kg
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### Microswitch with pin actuator

0.2 ... 0.4	20.6	standard	solder	X1A1	1SBU 20 0000 R4010	0.024
		low force	solder	T1A1	1SBU 20 0000 R4011	0.024
1.1 ... 1.2	13.9	standard	solder	R1A1	1SBU 20 0000 R4012	0.024
		standard	solder	X4A1	1SBU 20 0000 R4014	0.024
	20.6	standard	screw	X4NA1	1SBU 20 0010 R4014	0.028
		standard	solder	R4A1	1SBU 20 0000 R4015	0.024
	13.9	standard	screw	R4NA1	1SBU 20 0010 R4015	0.028

### Microswitch with telescopic plunger actuator

0.2 à 0.4	13.9	standard	solder	R1P10	1SBU 20 0000 R4021	0.030
				R1P20	1SBU 20 0000 R4022	0.028

### Microswitch with telescopic plunger actuator ; M12 threaded bushing

1.1 à 1.2	13.9	standard	solder	R4P30	1SBU 20 0000 R4020	0.044
			screw	R4NP30	1SBU 20 0010 R4020	0.048

### Microswitch with telescopic roller plunger actuator ; M12 threaded bushing

1.1 à 1.2	13.9	standard	solder	R4P30G	1SBU 20 0000 R4023	0.044
			screw	R4NP30G	1SBU 20 0010 R4023	0.048

### Microswitch with flexible lever actuator

0.2 ... 0.4	13.9	standard	solder	R1L10	1SBU 20 0000 R4050	0.026
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### Microswitch with flexible roller lever actuator

0.2 ... 0.4	13.9	standard	solder	R1L10G	1SBU 20 0000 R4002	0.028
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### Microswitch with integral lever actuator

0.2 ... 0.4	20.6	standard	solder	X1L20	1SBU 20 0000 R4052	0.028
				X1L21	1SBU 20 0000 R4054	0.028
				X1L24	1SBU 20 0000 R4058	0.030
1.1 ... 1.2	20.6	standard	screw	X4NL20	1SBU 20 0010 R4056	0.032

Note: Only above listed product types are available.

Coding: X4NA1 (example)

X4NA1

**X** ..... pin actuator 20.6 mm  
 Standard mechanism  
**T** ..... "low force" mechanism  
**R** ..... pin actuator 13.9 mm  
 Standard mechanism

**X4NA1** Contact gap  
**1** ..... 0.2 ... 0.4 mm  
**4** ..... 1.1 ... 1.2 mm

**X4NA1** Terminals  
 - ..... Solder terminals  
**N** ..... Screw terminals

**X4NA1** Actuator type  
**A** ..... Pin actuator  
**L** ..... Lever  
**P** ..... plunger actuator

# C Microswitch



## Ordering Details (continued)

Contact gap mm	Plunger position mm	Mechanism	Terminals	Type	Order code	Weight 1 piece kg
<b>Microswitch with integral roller lever actuator</b>						
0.2 ... 0.4	20.6	standard	solder	X1L20G	1SBU 20 0000 R4053	0.030
				X1L21G	1SBU 20 0000 R4055	0.030
1.1 ... 1.2	20.6	standard	screw	X4NL20G	1SBU 20 0010 R4057	0.034
<b>Microswitch with integral lever actuator - inverted-action (1)</b>						
1.1 ... 1.2	20.6	standard	solder	X4L31	1SBU 20 0000 R4060	0.028
<b>Microswitch with integral roller lever actuator - inverted-action (1)</b>						
1.1 ... 1.2	20.6	standard	solder	X4L30G	1SBU 20 0000 R4062	0.033
				X4L31G	1SBU 20 0000 R4061	0.030
				X4L35G	1SBU 20 0000 R4063	0.031
<b>Microswitch with integral adjustable lever actuator - inverted-action (1)</b>						
1.1 ... 1.2	20.6	standard	solder	X4L35V	1SBU 20 0000 R4064	0.032

## Microswitch with wire rod actuator

0.2 ... 0.4	20.6	standard	solder	X1L41	1SBU 20 0000 R4065	0.030
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Note: Only above listed product types are available. (1) Microswitches with L3... types inverted-action actuators are actuated in rest position.

## Ordering Details - Accessories

Specific Products	Type	Order code	Weight packaging (2) kg
<b>Terminals</b>			
Screw terminals with Insulating plate	–	FPTN 30 4954 R0003	0.040
90° quick connect 6.35 x 0.8 mm terminals	–	FPTN 30 4954 R0001	0.025
180° quick connect 6.35 x 0.8 mm terminals	–	FPTN 30 4954 R0002	0.025
<b>Other accessories</b>			
Terminal enclosure	K	–	0.020
Sealing part for "P20" plunger actuator	P21	FPTN 30 4954 R0004	0.005

(2) Packaging:

- screw terminals and insulating plate ..... 30 screws + 30 terminals + 10 insulating plates (to fit out 10 microswitches),
- quick connect 6.35 x 0.8 terminals ..... x 30 (to fit out 10 microswitches),
- terminal enclosure ..... x 1,
- sealing part for "P20" plunger actuator ..... x 10.

# C Microswitch

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

### Microswitch with pin actuator

Microswitches		X1A1	T1A1	R1A1	X4A1	X4NA1	R4A1	R4NA1
Max. operating force	N	1.10	0.50	3.50	1.20	1.20	3.70	3.70
Min. release force	N	–	–	–	–	–	–	–
Max. pretravel	mm	1.30	1.30	0.60	1.30	1.30	0.60	0.60
Max. differential movement	mm	0.10	0.10	0.07	0.33	0.33	0.17	0.17
Min. overtravel <sup>(1)</sup>	mm	0.50	0.50	0.20	0.50	0.50	0.20	0.20
Pin actuator position: "A" dimension	mm	20.6	20.6	13.9	20.6	20.6	13.9	13.9

### Microswitch with telescopic plunger actuator

Microswitches		R1P10	R1P20	R4P30	R4NP30	R4P30G	R4NP30G	
Max. operating force	N	3.50	3.50	4.00	4.00	4.00	4.00	
Min. release force	N	–	–	–	–	–	–	
Max. pretravel	mm	0.60	0.60	0.60	0.60	0.60	0.60	
Max. differential movement	mm	0.07	0.07	0.17	0.17	0.17	0.17	
Min. overtravel <sup>(1)</sup>	mm	0.60	0.60	4.00	4.00	4.50	4.50	
Pin actuator position: "A" dimension	mm	13.9	13.9	13.9	13.9	13.9	13.9	

### Microswitch with lever actuator

Microswitch		R1L10	R1L10G			with wire rod actuator X1L41		
Max. operating force	N	3.00	3.00			0.07		
Min. release force	N	–	–			–		
Max. pretravel	mm	6.50	6.50			25.0		
Max. differential movement	mm	0.70	0.70			3.50		
Min. overtravel <sup>(1)</sup>	mm	0.60	0.60			5.00		
Pin actuator position: "A" dimension	mm	13.9	13.9			20.6		

### Microswitch with integral lever actuator

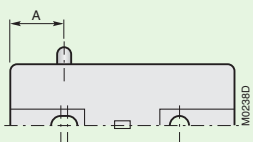
Microswitches		X1L20	X4NL20	X1L21	X1L24	X1L20G	X4NL20G	X1L21G
Max. operating force	N	0.18	0.20	0.21	0.08	0.18	0.20	0.21
Min. release force	N	–	–	–	–	–	–	–
Max. pretravel	mm	10.0	10.0	6.50	25.0	10.0	10.0	6.50
Max. differential movement	mm	1.00	3.30	0.60	2.00	1.00	3.30	0.60
Min. overtravel <sup>(1)</sup>	mm	3.00	3.00	2.50	2.00	3.00	3.00	2.50
Pin actuator position: "A" dimension	mm	20.6	20.6	20.6	20.6	20.6	20.6	20.6

### Microswitch with integral lever actuator - inverted-action

Microswitches		X4L31	X4L30G	X4L31G	X4L35G	X4L35V		
Max. operating force	N	5.50	2.50	5.50	3.50	3.50		
Min. release force	N	–	–	–	–	–		
Max. pretravel	mm	3.50	6.50	3.50	4.00	4.00		
Max. differential movement	mm	0.55	1.00	0.55	1.00	0.90		
Min. overtravel <sup>(1)</sup>	mm	4.0	6.00	4.0	3.5	2.00		
Pin actuator position: "A" dimension	mm	20.6	20.6	20.6	20.6	20.6		

(1) Do not exceed this value in use.

Pin actuator position  
dimension A: 13.9 mm or 20.6 mm



# C Microswitch

## Electrical Data

### d.c. circuit

Ratings (electrical load on one throw only)		48 V d.c.	115 V d.c.	250 V d.c.
Solder terminals	- resistive load A	8	-	-
	- inductive load A	4 (L/R ≤ 5 ms)	0.5 (L/R ≤ 5 ms)	0.25 (L/R ≤ 5 ms)
Screw terminals	- resistive load A	8	-	-
	- inductive load A	4 (L/R ≤ 5 ms)	0.5 (L/R ≤ 5 ms)	0.25 (L/R ≤ 5 ms)
Electrical life	<b>cycles</b>	1 000 000 cycles with resistive load		
	<b>cycles</b>	500 000 cycles with inductive load		
Dielectric strength (50 Hz - 1 mn)				
- between terminals ; according to contacts gap V a.c.		500 ... 1000		
- between all terminals and earth (ground) V a.c.		2000 for triangular arrangement solder terminal devices - Standard configuration		
		2500 for in line screw terminal devices - Product types including "N"		
Insulation resistance	MΩ	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)		

### a.c. circuit

Ratings (electrical load on one throw only)		125 V a.c. - 50 Hz	250 V a.c. - 50 Hz	380 V a.c. - 50 Hz	460 V a.c. - 50 Hz
Solder terminals	- resistive load A	10	7	-	-
	- inductive load A	8 (cos φ ≥ 0.3)	5 (cos φ ≥ 0.3)	-	-
Screw terminals	- resistive load A	10	10	5	3
	- inductive load A	5 (cos φ ≥ 0.3)	5 (cos φ ≥ 0.3)	2.5 (cos φ ≥ 0.3)	-
Electrical life	<b>cycles</b>	500 000			
Dielectric strength (50 Hz - 1 mn)					
- between terminals ; according to contacts gap V a.c.		500 ... 1000			
- between all terminals and earth (ground) V a.c.		2000 for triangular arrangement solder terminal devices - Standard configuration			
		2500 for in line screw terminal devices - Product types including "N"			
Insulation resistance	MΩ	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)			

## Connection Type

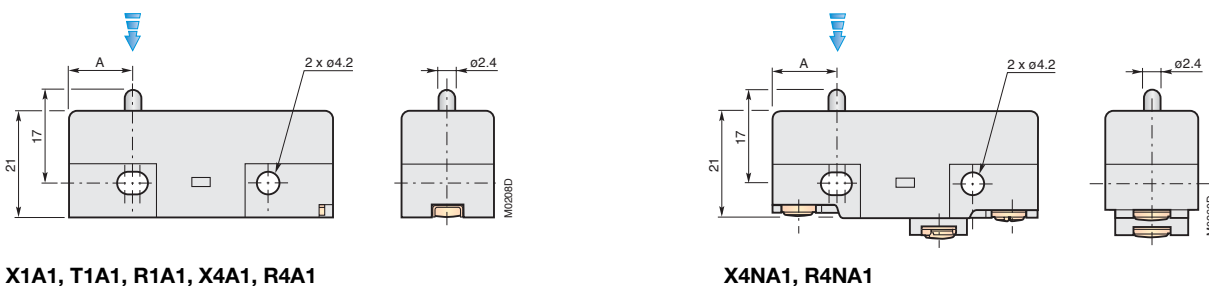
**Circuit diagram**

**Available terminals**

- **Triangular arrangement solder terminals - standard**
- **In line M3 screw with cup washer terminals**  
Recommended tightening torque: 0.6 to 1 Nm

## Dimensions (in mm)

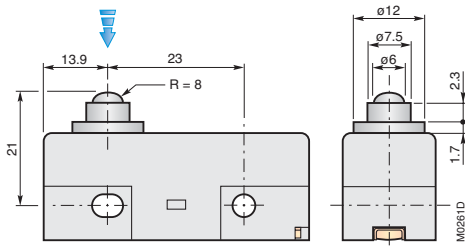
Mounting holes for M4 screws - Recommended tightening torque: 1.5 Nm.



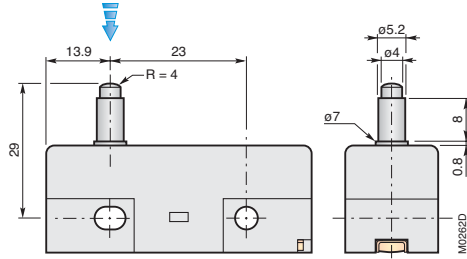
# C Microswitch

## Dimensions (continued)

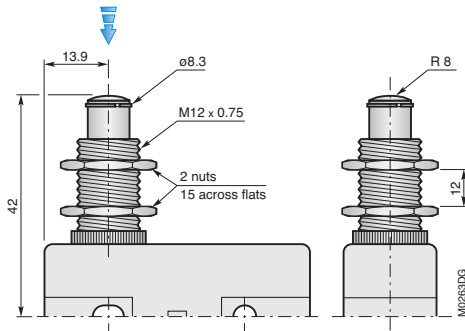
Mounting holes for M4 screws - Recommended tightening torque: 1.5 Nm.



**R1P10**

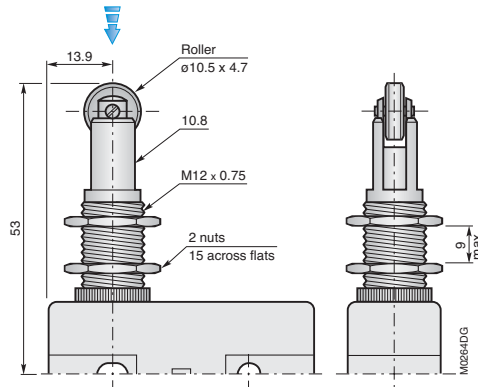


**R1P20**



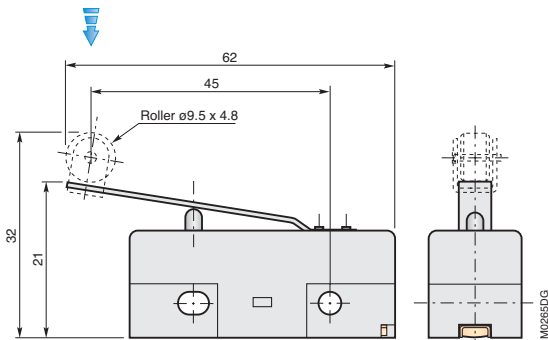
**R4P30, R4NP30**

Panel mounting by threaded bushing and nuts.  
Panel hole (recommended)  $\text{Ø } 13^{+0.2/0}$   
M12 nuts recommended tightening torque: 5 Nm.

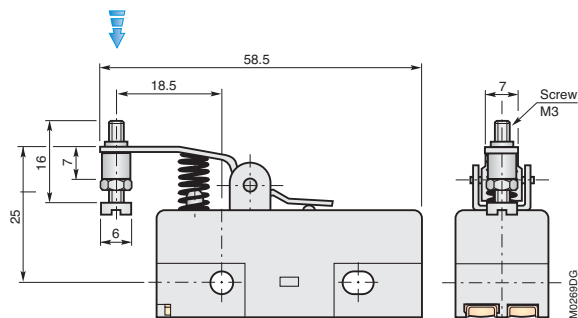


**R4P30G, R4NP30G**

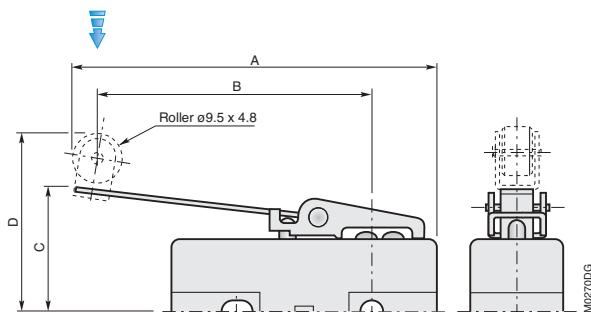
Panel mounting by threaded bushing and nuts.  
Panel hole (recommended)  $\text{Ø } 13^{+0.2/0}$   
M12 nuts recommended tightening torque: 5 Nm.



**R1L10, R1L10G**



**X4L35V**



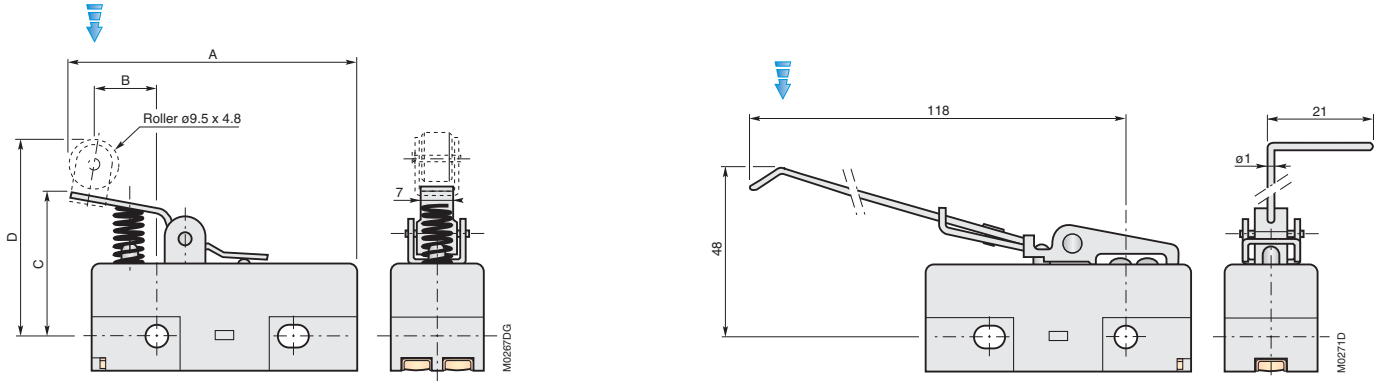
**X1L20, X1L21, X1L24, X4NL20, X1L20G, X1L21G, X4NL20G**

Types		Dimensions in mm			
		A	B	C	D
Microswitches with integral lever actuator	<b>X1L20</b>	64	—	26	—
	<b>X1L21</b>	55	—	24	—
	<b>X1L24</b>	110	—	42	—
	<b>X4NL20</b>	64	—	26	—
Microswitches with integral roller lever actuator	<b>X1L20G</b>	64	47	—	35
	<b>X1L21G</b>	55	38	—	35
	<b>X4NL20G</b>	64	47	—	35

# C Microswitch

## Dimensions (continued)

Mounting holes for M4 screws - Recommended tightening torque: 1.5 Nm.



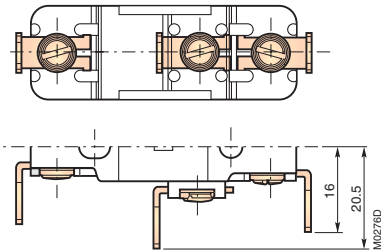
**X4L31, X4L30G, X4L31G, X4L35G**

**X1L41**

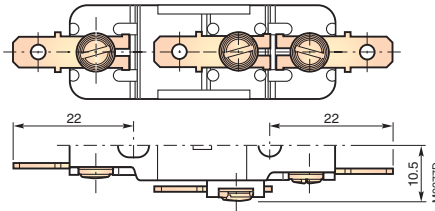
Microswitches		Dimensions in mm			
		A	B	C	D
Integral lever actuator	<b>X4L31</b>	50	–	26.5	–
Integral roller lever actuator	<b>X4L30G</b>	62	20	–	38
	<b>X4L31G</b>	50	8	–	36.5
	<b>X4L35G</b>	60	18	–	35

## Accessories

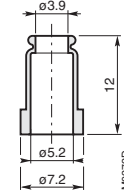
**90° Quick connect**  
6.35 x 0.8 mm terminals



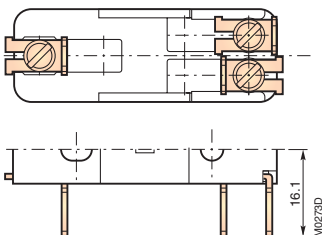
**180° Quick connect**  
6.35 x 0.8 mm terminals



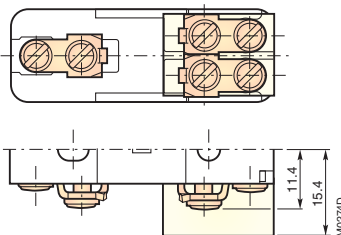
**Sealing part for "P20" plunger actuator**



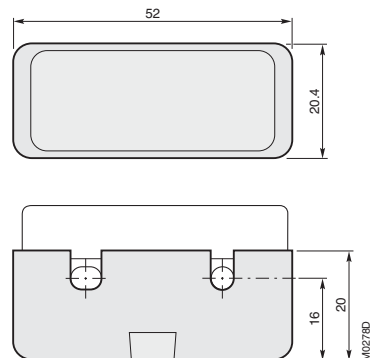
**90° Quick connect**  
6.35 x 0.8 mm terminals



**Screw terminals with insulating plate**



**Terminal enclosure**





AMS11



AMV11



AME51-L

**Coding: AMS11** (example)

- AMS11**  
**AM** ..... Microswitch  
**AMS11**  
**S** ..... Solder terminals  
**V** ..... Screw terminals  
**E** ..... Quick connect terminals  
**AMS11**  
**1** .... Standard mechanism  
**3** .... Low operating force mechanism  
(option) **5** .... High operating force mechanism  
**AMS11**  
**1** ... Standard contacts

## Application

Microswitch for industrial applications.

- Operating temperature: -15 °C ... +55 °C.
- 3 operating forces available.
- Mechanical life: 2 000 000 cycles.

## Description

Snap action switch - unsealed.

- Plastic casing.
- Silver contacts.
- Mounting holes for M3 screws.
- Dimensions compliant with DIN 41635 standard – size "A".
- Pin actuator or auxiliary actuator (accessory).
- Terminals: 3 options available:
  - solder terminals ..... "S" code
  - screw terminals ..... "V" code
  - quick connect 4.8 x 0.8 mm terminals ..... "E" code

## Ordering Details

Terminals	Type	Order code	Weight 1 piece kg
<b>Microswitch with standard mechanism, 3.6 N max.</b>			
Solder terminals	AMS11	1SBU 20 0000 R3001	0.008
Screw terminals	AMV11	1SBU 20 0010 R3001	0.010
<b>Microswitch with low operating force mechanism, 1.7 N max.</b>			
Solder terminals	AMS31	1SBU 20 0000 R3002	0.008
Screw terminals	AMV31	1SBU 20 0010 R3002	0.010
<b>Microswitch with high operating force mechanism, 4 N</b>			
Quick connect terminals	AME51	1SBU 20 0020 R3010	0.008
<b>Microswitch with lever actuator</b>			
Quick connect terminals	AME51-L	1SBU 20 0020 R3050	0.010

Note: Only above listed product types are available.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Microswitches		AMS11, AMV11	AMS31, AMV31	AME51	AME51-L
<b>Max. operating force</b>	<b>N</b>	3.60	1.70	4.0	3.50
<b>Min. release force</b>	<b>N</b>	1.10	0.25	0.50	0.40
<b>Max. pretravel</b>	<b>mm</b>	1.30	1.30	1.80	2.10
<b>Differential movement</b>	<b>mm</b>	0.05 ... 0.50	0.05 ... 0.50	0.05 ... 0.50	0.05 ... 0.50
<b>Min. overtravel (1)</b>	<b>mm</b>	0.50	0.50	0.50	0.50

(1) Do not exceed this value in use.



# AM Microswitch



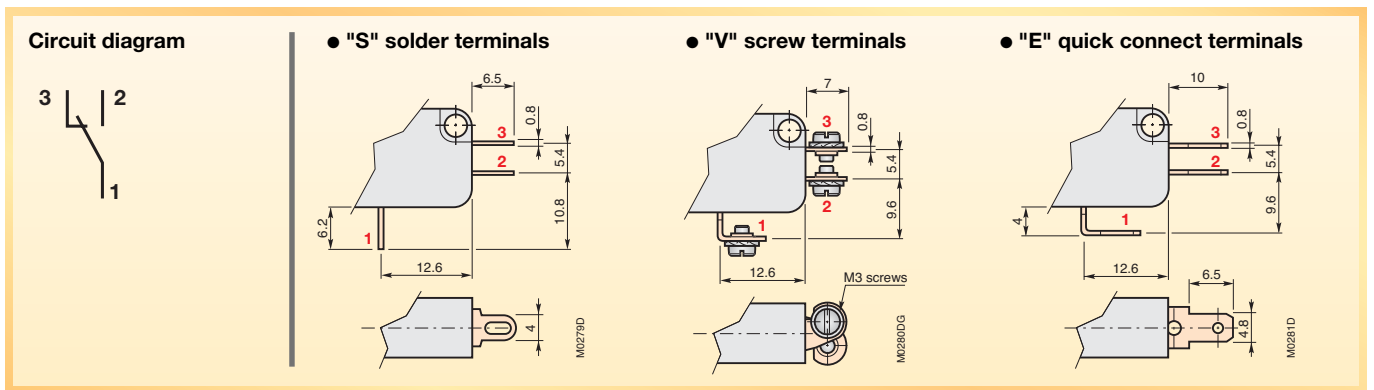
## Electrical Data

Microswitches	AM...11	AM...31	AME51...
<b>Ratings</b> (electrical load on one throw only)	<b>24 V d.c.</b>	<b>250 ... 380 V a.c.</b>	<b>5 V d.c.</b> <b>20 V d.c.</b>
– resistive load	<b>A</b>	6	0.10      0.25
– inductive load	<b>A</b>	6 (L/R ≤ 5 ms)	–      –
<b>Electrical life</b>	<b>cycles</b>	100 000      200 000	400 000      400 000
<b>Dielectric strength</b> (50 Hz - 1 mn)			
– between terminals	<b>V a.c.</b>	500	
– between all terminals and earth (ground)	<b>V a.c.</b>	1500	
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)	

## Environmental Conditions

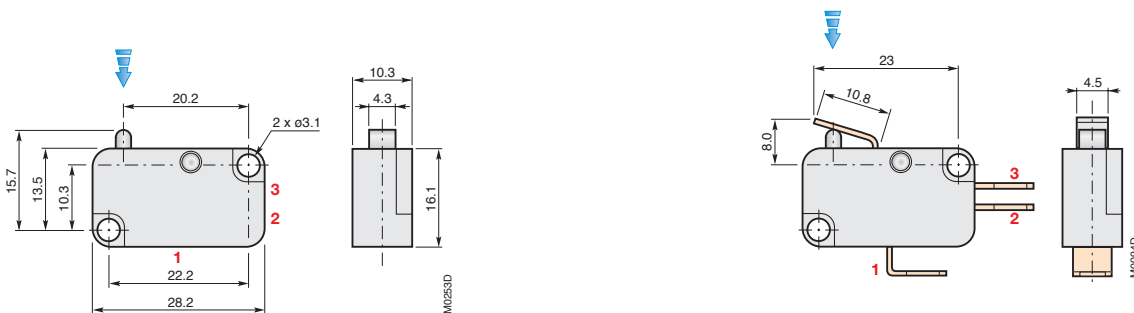
<b>Salt spray</b>	48 hours
<b>Humidity</b>	93 % relative humidity, +40 °C duration 168 hours (7 days)
<b>Sinusoidal vibrations</b>	5 _ 500 Hz, 10 g in each of 3 orthogonal axis

## Connection Type



## Dimensions (in mm)

Mounting holes for M3 screws - Recommended tightening torque: 0.5 Nm.



# KM Microswitch



KM11SL

1SBC8 8857 3F0302



KM11SL-B

1SBC8 8858 3F0302



KM11SF-LG

1SBC8 8859 3F0302

## Application

Double-break Microswitch for industrial applications.

- Operating temperature: -35 °C ... +70 °C.
- Mechanical life: 1 000 000 cycles.

## Description

Snap action switch - unsealed.

- Plastic casing.
- Silver contacts.
- Mounting holes for M2 screws.
- Pin actuator or auxiliary actuator (accessory).
- Solder terminals:
  - side output ..... "SL" code
  - front output ..... "SF" code

## Ordering Details

Terminals	Type	Order code	Weight 1 piece kg
<b>Double break Microswitch, pin actuator</b>			
Side terminals	KM11SL	1SBU 20 0000 R3100	0.010
Front terminals	KM11SF	1SBU 20 0000 R3101	0.010
<b>Double break Microswitch, ball bearing actuator</b>			
Side terminals	KM11SL-B	1SBU 20 0000 R3110	0.014
Front terminals	KM11SF-B	1SBU 20 0000 R3111	0.014
<b>Double break Microswitch, roller lever actuator</b>			
Side terminals	KM11SL-LG	1SBU 20 0000 R3150	0.014
Front terminals	KM11SF-LG	1SBU 20 0000 R3151	0.014

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Microswitches		KM11S...	KM11S...-B	KM11S...-LG
<b>Max. operating force</b>	<b>N</b>	4.50	4.50	3.50
<b>Min. release force</b>	<b>N</b>	1.0	0.80	0.60
<b>Max. pretravel</b>	<b>mm</b>	1.50	1.50	1.50
<b>Differential movement</b>	<b>mm</b>	0.70 ... 1.20	0.70 ... 1.20	0.60 ... 1.10
<b>Min. overtravel (1)</b>	<b>mm</b>	0.40	0.40	0.40

(1) Do not exceed this value in use.

## Electrical Data

Microswitches		KM...			
<b>Ratings</b> (electrical load on one throw only)		<b>24 V d.c.</b>	<b>220 V a.c. - 50 Hz</b>	<b>250 V a.c. - 50 Hz</b>	<b>380 V a.c. - 50 Hz</b>
– resistive load	<b>A</b>	–	15	–	–
– inductive load	<b>A</b>	0.6 (L/R ≤ 15 ms)	–	6 (cos φ ≥ 0.8)	4 (cos φ ≥ 0.8)
<b>Electrical life</b>	<b>cycles</b>	500 000	50 000	300 000	500 000
<b>Dielectric strength</b> (50 Hz - 1 mn)					
– between terminals	<b>V a.c.</b>	500			
– between all terminals and earth (ground)	<b>V a.c.</b>	1500			
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)			

# KM Microswitch



## Environmental Conditions

Salt spray	48 hours
Humidity	93 % relative humidity, +40 °C duration 168 hours (7 days)
Sinusoidal vibrations	5 _ 500 Hz, 10 g in each of 3 orthogonal axis for Microswitches KM11SL or KM11SF without accessory

## Connection Type

**Circuit diagram**

**Available terminals**

- "SL" side solder terminals
- "SF" front solder terminals

## Dimensions (in mm)

Mounting holes for M2 screws - Recommended tightening torque: 0.3 Nm.

**KM11S...**

**KM11S...-B**

**KM11S...-LG**

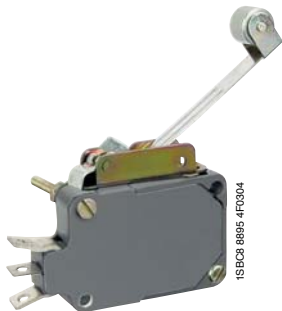
— "SL" side output terminals  
— "SF" front output terminals

# M and CM Microswitches

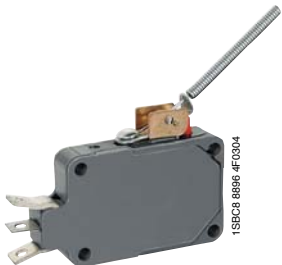
## Low Travel M Types, Low Operating Force CM Types



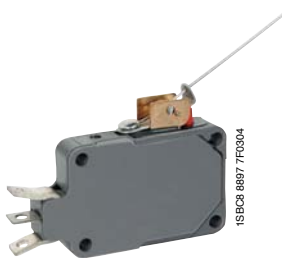
CM11A1



M11L26G



CM11L43



CM11L41

### Application

Microswitch for industrial applications.

- Operating temperature: -25 °C ... +85 °C.
- 2 available product types according to pin actuator position:
  - low travel device "M",
  - low operating force device **CM**.
- Mechanical life: 1 000 000 cycles.

### Description

Snap action switch - unsealed.

- Plastic casing.
- Silver contacts.
- Mounting holes for M2 screws.
- Pin actuator or auxiliary actuator (accessory).
- Terminals: solder terminals.

### Ordering Details

Version	Pin actuator position mm	Type	Order code	Weight 1 piece kg
<b>Microswitch with pin actuator</b>				
Low travel	12.7	M11A1	1SBU 20 0000 R4001	0.006
Low operating force	3.2	CM11A1	1SBU 20 0000 R4002	0.006
		CM21A1	1SBU 20 0000 R4003	0.006

#### Microswitch with flexible roller lever actuator

Low operating force	3.2	CM31L10G	1SBU 20 0000 R4050	0.007
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#### Microswitch with integral lever actuator

Low operating force	3.2	CM31L25	1SBU 20 0000 R4051	0.008
Low travel	12.7	M11L26	1SBU 20 0000 R4052	0.008

#### Microswitch with integral roller lever actuator

Low travel	12.7	M11L26G	1SBU 20 0000 R4053	0.008
		M11L27G	1SBU 20 0000 R4054	0.008

#### Microswitch with wire rod actuator

Low operating force	3.2	CM11L41	1SBU 20 0000 R4055	0.007
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#### Microswitch with spring lever actuator

Low operating force	3.2	CM11L43	1SBU 20 0000 R4056	0.008
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Note: Only above listed product types are available.

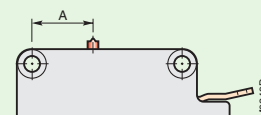
### Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

M type - Low travel		M11A1	M11L26	M11L26G	M11L27G
<b>Max. operating force</b>	<b>N</b>	1.90	0.50	0.50	0.90
<b>Pretravel</b>	<b>mm</b>	0.30 ... 0.80	2.50 ... 7.0	2.50 ... 7.0	0.80 ... 2.10
<b>Differential movement</b>	<b>mm</b>	0.08 ... 0.20	0.50 ... 2.0	0.75 ... 2.0	0.25 ... 0.60
<b>Min. overtravel (1)</b>	<b>mm</b>	0.50	1.50	1.50	0.60
<b>Pin actuator position: "A" dimension mm</b>		12.7			

(1) Do not exceed this value in use.

**Pin actuator position**  
dimension A: 12.7 mm or 3.2 mm



# M and CM Microswitches

## Low Travel M Types, Low Operating Force CM Types

### Operating Characteristics (continued)

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

CM type - Low operating force		CM11A1	CM21A1	CM31L10G	CM31L25	CM11L41	CM11L43
Max. operating force	N	0.35	0.50	2.0	0.07	0.03	0.04
Pretravel	mm	0.40 ... 1.0	0.70 ... 1.20	0.60 ... 1.50	17.0 max.	10.0 ... 17.0	12.0 max.
Differential movement	mm	0.2 ... 0.60	0.3 ... 0.60	0.25 ... 0.80	11.50 max.	4.0 ... 12.0	7.0 max.
Min. overtravel (1)	mm	1.50	1.50	0.30	10.0	20.0	10.0
Pin actuator position: "A" dimension	mm	3.2					

(1) Do not exceed this value in use.

### Electrical Data

Types	M	CM
<b>Ratings</b> (electrical load on one throw only)	<b>30 ... 48 V d.c.</b>	<b>125 V a.c. - 50Hz</b>
- resistive load	<b>A</b> 4	<b>5</b>
- inductive load	<b>A</b> 2 (L/R ≤ 5 ms)	<b>3</b> (cos φ ≥ 0.5)
<b>Electrical life</b>	<b>cycles</b> 100 000	<b>cycles</b> 100 000
<b>Dielectric strength</b> (50 Hz - 1 mn)		
- between terminals	<b>V a.c.</b> 500	<b>V a.c.</b> 500
- between all terminals and earth (ground)	<b>V a.c.</b> 1500	<b>V a.c.</b> 1500

### Specific Products - Contact us for more information ; data sheet on request

- Devices with quick connect 2.8 x 0.5 mm terminals are available.
- Product design according to local climatic stress.

### Connection Type

**Circuit diagram**

**Available terminals**

- Solder terminals

### Dimensions (in mm)

#### M type - Low travel

Mounting holes for M2 screws - Recommended tightening torque: 0.25 to 0.30 Nm.

**M11A1**

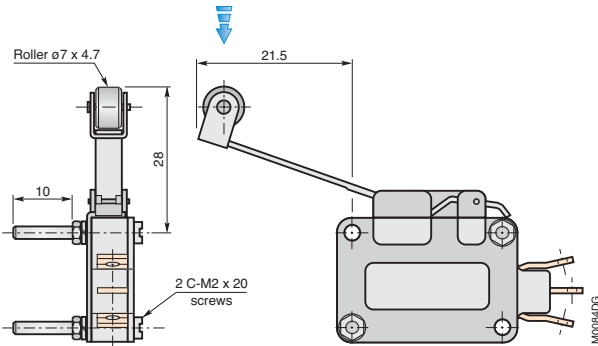
**M11L26**

# M and CM Microswitches

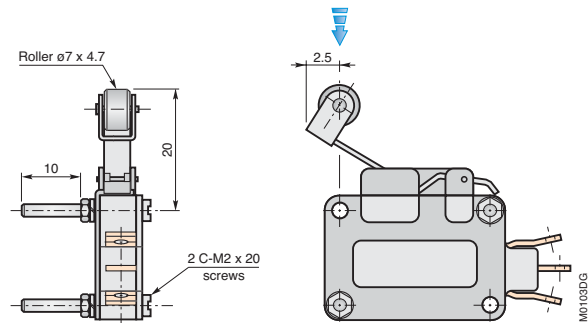
## Low Travel M Types, Low Operating Force CM Types

### Dimensions (continued)

**M type - Low travel** - Mounting holes for M2 screws - Recommended tightening torque: 0.25 to 0.30 Nm.

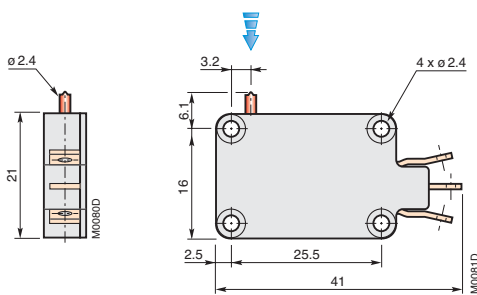


**M11L26G**

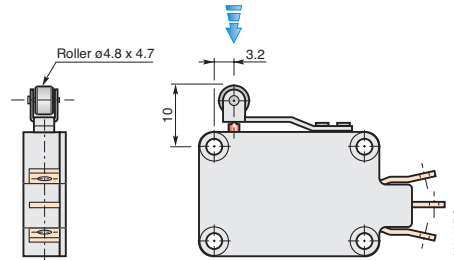


**M11L27G**

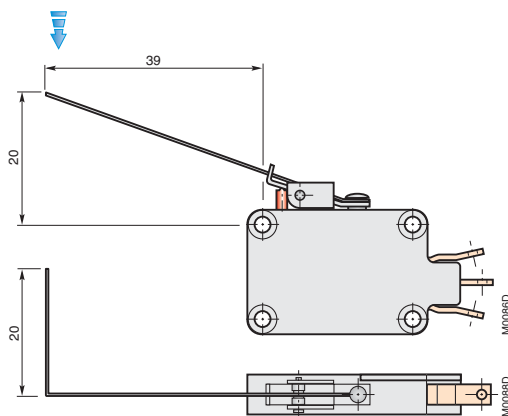
**CM type - Low operating force** - Mounting holes for M2 screws - Recommended tightening torque: 0.25 to 0.30 Nm.



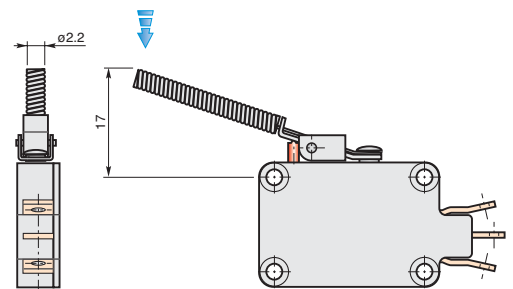
**CM11A1**



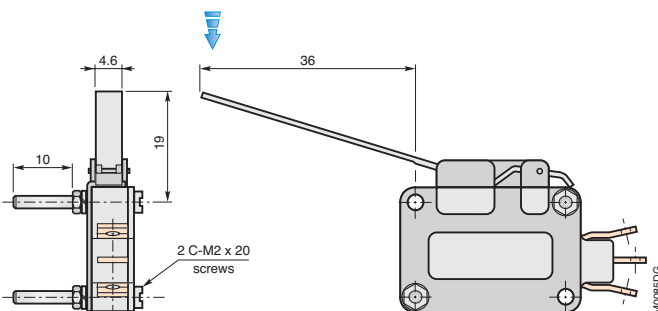
**CM31L10G**



**CM11L41**



**CM11L43**



**CM31L25**

**Notes**





# Watertight







# **ABB** Watertight Microswitches

## Contents

IE Watertight Microswitch .....	56
Z3_E Watertight Subminiature Microswitch .....	58

# IE Watertight Microswitch



IE...F



IE...C

**Coding :** IE242F (example)

**IE242F**  
**IE** ..... Watertight Microswitch

**IE242F**  
**4** ..... Fixing centres distance 14 mm  
**9** ..... Fixing centres distance 19 mm

**IE242F**  
**1** ..... C-NC Wiring options  
**2** ..... C-NO Wiring options  
**3** ..... Changeover contact

**IE242F**  
**F** ... Leadwires  
**C** ... Cable terminals  
 See Description section

## Application

Microswitch for industrial applications where watertightness is required.

- Operating temperature: -20 °C ... +85 °C.
- Rated breaking capacity: from few mA up to 5 amperes.
- Degree of protection: IP66 / IP67.
- Mechanical life: 1 000 000 cycles.

## Description

Environment sealed Microswitch including a snap-action precision switch.

- PA66 polyamide casing.
- Gold plated silver contacts.
- Mounting holes for M3 screws ; mounting centres available: 14 or 19 mm.
- Connections: 3 wiring options in 2 available configurations:
  - 0.75 mm<sup>2</sup> H05 V-K leadwires - PVC insulated,
  - 2 or 3 x 0.75 mm<sup>2</sup> A05 VV-F cable - PVC insulated .
- Pin actuator.

## Ordering Details

Standard leadwire length = 0.5 m or cable length = 1 m ; other length on request.

Fixing centres distance mm	Wiring options	Type	Order code	Weight 1 piece kg
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### Microswitch with leadwires terminals

14	C – NC	IE241F	1SBU 37 1000 R4001	0.040
	C – NO	IE242F	1SBU 37 1000 R4003	0.040
	Changeover contact	IE243F	1SBU 37 1000 R4005	0.050
19	C – NC	IE291F	1SBU 37 1000 R4007	0.040
	C – NO	IE292F	1SBU 37 1000 R4009	0.040
	Changeover contact	IE293F	1SBU 37 1000 R4011	0.050

### Microswitch with cable terminals

14	C – NC	IE241C	1SBU 37 1010 R4002	0.070
	C – NO	IE242C	1SBU 37 1010 R4004	0.070
	Changeover contact	IE243C	1SBU 37 1010 R4006	0.080
19	C – NC	IE291C	1SBU 37 1010 R4008	0.070
	C – NO	IE292C	1SBU 37 1010 R4010	0.070
	Changeover contact	IE293C	1SBU 37 1010 R4012	0.080

Consult us if you need an actuating lever or other accessories.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Watertight Microswitches		IE...F, leadwires terminals / IE...C, cable terminals
Max. operating force	N	2.0
Min. release force	N	0.40
Max. pretravel	mm	1.0
Max. differential movement	mm	0.45
Min. overtravel	mm	0.50 (Do not exceed this value in use)

# IE Watertight Microswitch

## Electrical Data

Ratings (electrical load on one throw only)		30 V d.c.	125 V a.c. - 50 Hz	250 V a.c. - 50 Hz
- resistive load	<b>A</b>	50 mA ... 2 A	5 A	2 A
- inductive load	<b>A</b>	25 mA ... 1 A (L/R ≤ 5 ms)	2.5 A (cos φ ≥ 0.3)	1.0 A (cos φ ≥ 0.3)
<b>Electrical life</b>	<b>cycles</b>	100 000		
<b>Dielectric strength</b> (50 Hz - 1 mn)				
- between terminals	<b>V a.c.</b>	500 V a.c.		
- between all terminals and earth (ground)	<b>V a.c.</b>	1500 V a.c.		
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)		

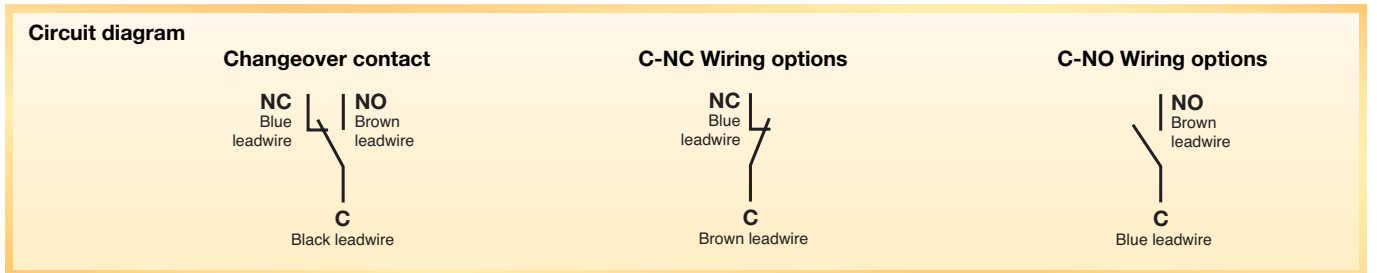
## Environmental Conditions - For other test results, please contact us.

<b>Salt spray</b>	48 hours
<b>Humidity</b>	93 % relative humidity, +40 °C duration 168 hours (7 days)
<b>Sinusoidal vibrations</b>	5 _ 500 Hz, 10 g in each of 3 orthogonal axis

## Specific Products - Contact us for more information ; data sheet on request.

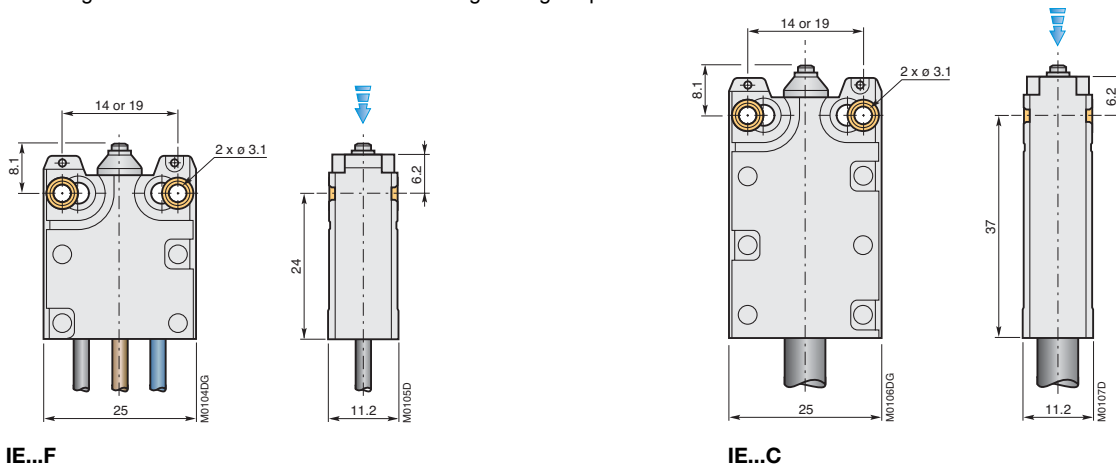
"ATEX" devices for use in explosive atmospheres - equipment group / category II2GD - according to Directive 94/9/CE and Standards: EN 50014, EN 50018 and EN 50281-1-1.

## Connection Type

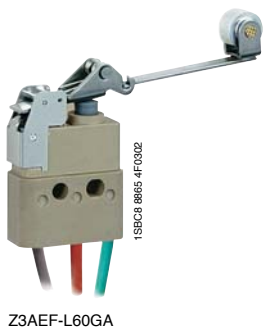
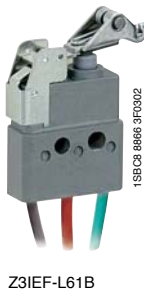
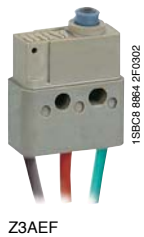
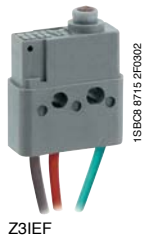


## Dimensions (in mm)

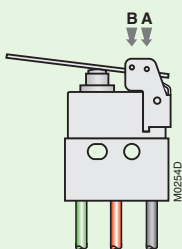
Mounting holes for M3 screws - Recommended tightening torque: 2 Nm.



# Z3...E Watertight Subminiature Microswitch



Actuating lever pivot point: **A** or **B**  
 Due to factory mounting, actuating lever pivot point must be defined for Microswitches with integral levers.  
 See Mechanical characteristics tables for required travel and/or force.



## Application

Subminiature Microswitch for use in locations where watertightness is required.

- Operating temperature: up to +150 °C according to casing material:
  - 40 °C ... +85 °C ..... Industrial design (**Z3IEF** types)
  - 55 °C ... +150 °C ..... Standard design (**Z3AEF** types)
- Rated breaking capacity: from few mA up to 4 amperes
- Degree of protection: IP65 / IP67
- Mechanical life: 500 000 cycles

## Description

Environment sealed snap-action switch.

- Plastic casing: Polyamide (Z3INS types) or PPS Ryton® (Z3ANS types).
- Gold plated contacts.
- Mounting holes for M2 screws.
- Terminal: 0.38 mm<sup>2</sup> (AWG 22) leadwires\*, FEP insulation.
  - \* Compliant to AIR 4524 specification ; NF L 52-125A Category B of 1971 - lightweight cables. Interchangeability: AICMA No 5116 recommendation of February 1961.
- Pin actuator or integral actuator (factory assembled).

## Ordering Details

Standard leadwire length = 0.5 m ; other length on request.

Product type	Temp. °C	Lever length mm	Actuating lever pivot point	Type	Order code	Weight 1 piece kg
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### Microswitch with pin actuator

Industrial use	+85°	–	–	Z3IEF	1SBU 21 1001 R4001	0.007
Standard design	+150°	–	–	Z3AEF	1SBU 21 1000 R4001	0.007

### Microswitch with integral lever actuator

Industrial use	+85°		A	Z3IEF-L20A	1SBU 21 1001 R4051	0.008
			B	Z3IEF-L20B	1SBU 21 1001 R4052	0.008
Standard design	+150°		A	Z3AEF-L20A	1SBU 21 1000 R4051	0.008
			B	Z3AEF-L20B	1SBU 21 1000 R4052	0.008

### Microswitch with integral roller lever actuator

Industrial use	+85°		A	Z3IEF-L20GA	1SBU 21 1001 R4053	0.008
			B	Z3IEF-L20GB	1SBU 21 1001 R4054	0.008
Standard design	+150°		A	Z3AEF-L20GA	1SBU 21 1000 R4053	0.008
			B	Z3AEF-L20GB	1SBU 21 1000 R4054	0.008

### Microswitch with added overtravel lever actuator

Industrial use	+85°	30	A	Z3IEF-L60A	1SBU 21 1001 R4055	0.008
			B	Z3IEF-L60B	1SBU 21 1001 R4056	0.008
Standard design	+150°	30	A	Z3AEF-L60A	1SBU 21 1000 R4055	0.008
			B	Z3AEF-L60B	1SBU 21 1000 R4056	0.008
Industrial use	+85°	20	A	Z3IEF-L61A	1SBU 21 1001 R4057	0.008
			B	Z3IEF-L61B	1SBU 21 1001 R4058	0.008
Standard design	+150°	20	A	Z3AEF-L61A	1SBU 21 1000 R4057	0.008
			B	Z3AEF-L61B	1SBU 21 1000 R4058	0.008

### Microswitch with added overtravel roller lever actuator

Industrial use	+85°	30	A	Z3IEF-L60GA	1SBU 21 1001 R4059	0.009
			B	Z3IEF-L60GB	1SBU 21 1001 R4060	0.009
Standard design	+150°	30	A	Z3AEF-L60GA	1SBU 21 1000 R4059	0.009
			B	Z3AEF-L60GB	1SBU 21 1000 R4060	0.009
Industrial use	+85°	20	A	Z3IEF-L61GA	1SBU 21 1001 R4061	0.008
			B	Z3IEF-L61GB	1SBU 21 1001 R4062	0.008
Standard design	+150°	20	A	Z3AEF-L61GA	1SBU 21 1000 R4061	0.008
			B	Z3AEF-L61GB	1SBU 21 1000 R4062	0.008

# Z3...E Watertight Subminiature Microswitch

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Subminiature Microswitches		Z3IEF, Z3AEF
Max. operating force	N	3.3
Min. release force	N	0.70
Pretravel	mm	0.17 ... 0.42
Max. differential movement	mm	0.06
Min. overtravel (1)	mm	0.10

(1) Do not exceed this value in use.

## Microswitches

with integral lever (factory assembled)

Type	Z3...EF-L20 Z3...EF-L20G		Z3...EF-L60 Z3...EF-L60G		Z3...EF-L61 Z3...EF-L61G		
	A	B	A	B	A	B	
Actuating lever pivot point							
Max. operating force	N	1.20	0.90	0.90	0.60	1.20	0.90
Min. release force	N	0.30	0.20	0.20	0.10	0.30	0.20
Max. pretravel	mm	1.35	1.85	2.20	2.90	1.35	1.85
Max. differential movement	mm	0.30	0.40	0.60	0.75	0.30	0.40
Min. overtravel (1)	mm	0.35	0.65	2.60	3.20	1.30	1.60

(1) Do not exceed this value in use.

## Electrical Data

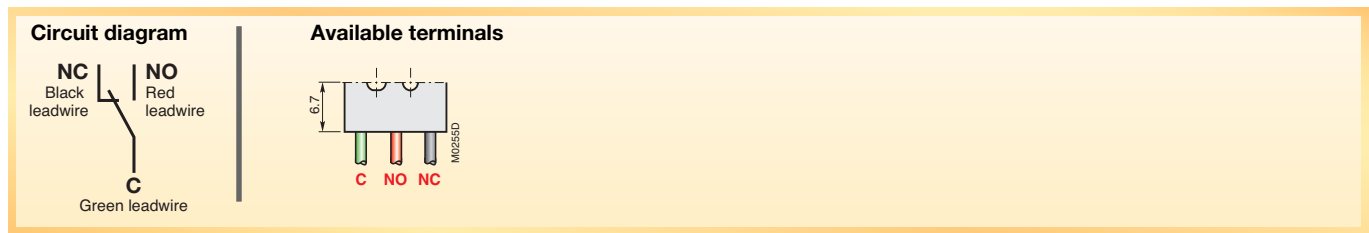
Ratings (electrical load on one throw only)		5 mV ... 30 V d.c.	30 V d.c.	115 V a.c. - 400 Hz	220 V a.c. - 50 Hz
- resistive load	A	0.05	4	1	1
- inductive load	A	0.025 (L/R ≤ 5 ms)	0.5 (L/R ≤ 5 ms)	-	0.5 (cos φ ≥ 0.3)
Electrical life	cycles	100 000			
Changeover time	ms	≤ 10			
Résistance de contacts aux bornes	mΩ	≤ 25 mΩ under 6 V d.c. - 100 mA according to MIL-S-8805 - (As new, wires or cable not included)			
Dielectric strength (50 Hz - 1 mn)					
- between terminals	V a.c.	500 V a.c.			
- between all terminals and earth (ground)	V a.c.	1500 V a.c.			
Insulation resistance	MΩ	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)			

## Environmental Conditions - For other test results, please contact us.

Salt spray	48 hours
Humidity	93 % relative humidity, +40 °C duration 168 hours (7 days)
Sinusoidal vibrations	5 _ 500 Hz, 10 g in each of 3 orthogonal axis

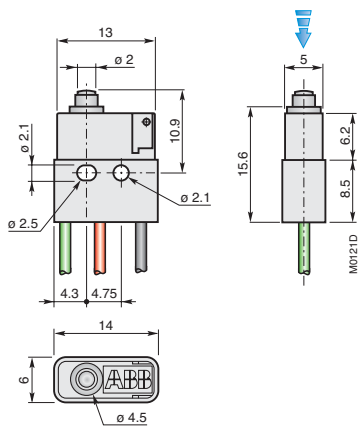
# Z3...E Watertight Subminiature Microswitch

## Connection Type

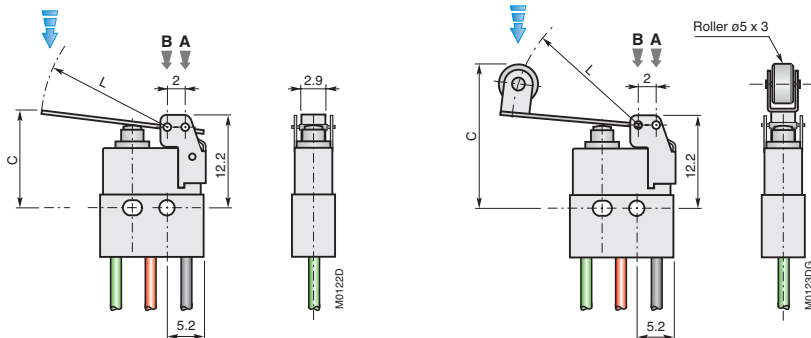


## Dimensions (in mm)

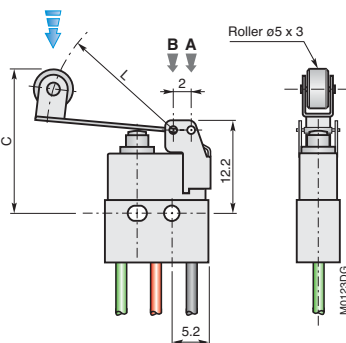
M2 Screw terminals - Recommended tightening torque: 0.18 to 0.20 Nm.



### Z3IEF, Z3AEF

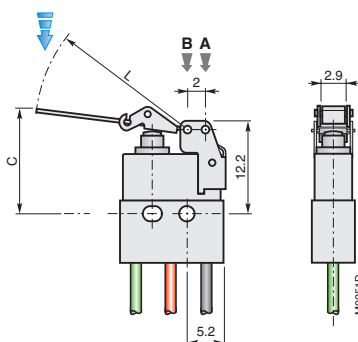


### Z3IEF-L20..., Z3AEF-L20...

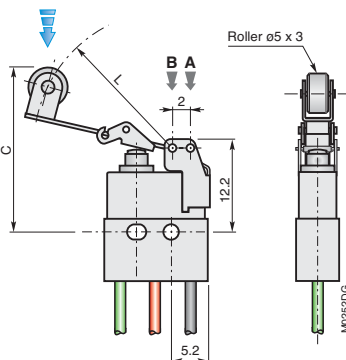


### Z3IEF-L20G..., Z3AEF-L20G...

Levers	Dim. mm L	Actuating lever pivot point	Dim. mm C
<b>L20</b>	20	A	12.4
		B	12.6
<b>L20G</b>	18.5	A	14.3
		B	14.9
<b>L61</b>	20	A	13.3
		B	13.5
<b>L60</b>	30	A	14.3
		B	14.9
<b>L61G</b>	18.55	A	19.2
		B	19.4
<b>L60G</b>	28.65	A	20.2
		B	20.8



### Z3IEF-L60..., Z3AEF-L60... Z3IEF-L61..., Z3AEF-L61...



### Z3IEF-L60G..., Z3AEF-L60G... Z3IEF-L61G..., Z3AEF-L61G...

# Notes





# Limit Switches







# **ABB** Limit Switches

## Contents

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F3 Limit Switches .....	68
F4 and FCE Waterproof Limit Switches .....	70

# F2 Limit Switch

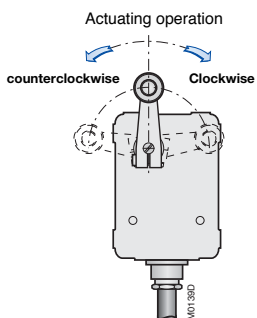


F21LG1RC-R6



F20LG2R-B13

**Coding: F20LG1R-B13 (example)**  
**F20LG1R-B13**  
**F2** ..... Limit switch  
**F20LG1R-B13**  
**0** ..... Counterclockwise operation  
**1** ..... Clockwise operation  
**F20LG1R-B13**  
**LG** ..... Roller lever actuator supplied  
**F20LG1R-B13**  
**1R** ..... 1-pole limit switch, including 1 Microswitch  
**2R** ..... 2-pole limit switch, including 2 Microswitches  
**F20LG1R-B13**  
**B** ..... Terminal box output  
**C** ..... Cable terminals  
**F20LG1R-B13**  
**13** ... Cable-gland PE 13  
**21** ... Cable-gland PE 21  
**F20LG1R-B13**  
**-R6** .... Cable specification



## Application

Limit switch for aggressive atmospheres: oil and gas industries, power generation...  
 Devices including 1 or 2 "R" type Microswitches.

- Operating temperature:
  - terminal box with cable gland output: -30 ... +85 °C
  - reticulated synthetic rubber insulated cable output: -30 ... +120 °C
  - PVC insulated cable output: -30 ... +65 °C
- Ratings (220 V a.c. - 50 Hz voltage): 2.5 A.
- Degree of protection: IP66 / IP67.
- Mechanical life: 100 000 cycles.

## Description

Environment sealed limit switch including an hermetically sealed snap-action switch.

- Painted aluminium alloy casing.
- Stainless steel driving shaft.
- Clockwise or counterclockwise operation design available.
- Rotary arm actuator.
- Mounting holes for M5 screws on 4 sides of the casing.
- Available terminations:
  - sealed terminal box with cable-gland integral with the limit switch,
  - reticulated synthetic rubber Varpen® cable insulated, (conductors 1 mm<sup>2</sup>) or PVC insulated (conductors 1.5 mm<sup>2</sup>)

## Ordering Details

Standard cable length = 2 m ; other length on request

Connection type	Number of internal Microswitches	Type	Order code	Weight 1 piece kg
<b>Limit switch with roller arm actuator - Counterclockwise operation</b>				
Reticulated synthetic rubber insulated cable	1-pole	F20LG1RC	1SBU 32 1020 R4001	0.750
	2-poles	F20LG2RC	1SBU 32 1020 R4002	0.980
PVC insulated cable	1-pole	F20LG1RC-R6	1SBU 32 1026 R4001	0.950
	2-poles	F20LG2RC-R6	1SBU 32 1026 R4002	1.200
Terminal box + cable-gland Ø 6.5 ... 12.5 mm cable diameter	1- pole	F20LG1R-B13	1SBU 32 0010 R4001	0.850
	2-poles	F20LG2R-B13	1SBU 32 0010 R4002	0.900
Bornier + presse-étoupe Ø 11.5 ... 19 mm cable diameter	1-pole	F20LG1R-B21	1SBU 32 0010 R4003	0.850
	2-poles	F20LG2R-B21	1SBU 32 0010 R4004	0.900
<b>Limit switch with roller arm actuator - Clockwise operation</b>				
Reticulated synthetic rubber insulated cable	1-pole	F21LG1RC	1SBU 32 1020 R4101	0.750
	2-poles	F21LG2RC	1SBU 32 1020 R4102	0.980
PVC insulated cable	1-pole	F21LG1RC-R6	1SBU 32 1026 R4101	0.950
	2-poles	F21LG2RC-R6	1SBU 32 1026 R4102	1.200
Terminal box + cable-gland Ø 6.5 ... 12.5 mm cable diameter	1-pole	F21LG1R-B13	1SBU 32 0010 R4101	0.850
	2-poles	F21LG2R-B13	1SBU 32 0010 R4102	0.900
Bornier + presse-étoupe Ø 11.5 ... 19 mm cable diameter	1-pole	F21LG1R-B21	1SBU 32 0010 R4103	0.850
	2-poles	F21LG2R-B21	1SBU 32 0010 R4104	0.900

**Note:** Characteristics recorded with an actuating arm on the limit switch.

Limit switches are supplied with factory mounted (standard) actuating roller arm. Different actuating arms are available as accessories (see accessories table on next page). Actuating operation direction is factory defined and cannot be modified.

# F2 Limit Switch



## Ordering Details - Accessories

	Type	Order code	Weight 1 piece kg
Double roller arm	LSG	1SBU 53 3110 R4000	0.080
Adjustable roller arm	LRG	1SBU 53 3110 R4001	0.100
Fixing plate	–	FPTN 40 4595 R0001	0.050

**Note:** Screws are supplied with the fixing plate.

Many others actuating arms are available: spring rod, bronze or stainless steel roller arm... Do not hesitate to consult us.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

F2 Limit switches		F20LG1R...	F21LG1R...	F20LG2R...	F21LG2R...
<b>Max. operating force</b>	<b>N</b>	9.0	9.0	10.0	11.0
<b>Min. release force</b>	<b>N</b>	2.20			
<b>Max. pretravel</b>	<b>degree</b>	15°			
<b>Max. differential movement</b>	<b>mm</b>	1.0 ... 3.5			
<b>Min. overtravel</b>	<b>degree</b>	60° (Do not exceed this value in use)			

**Note:** Characteristics recorded with an actuating arm on the limit switch.

## Electrical Data

Ratings (electrical load on one throw only)		30 ... 48 V d.c.	115 V d.c.	220 V d.c.	250 V a.c. - 50 Hz
– resistive load	<b>A</b>	2.5	1	0.4	2.5
– inductive load	<b>A</b>	1.8 (L/R ≤ 40 ms)	0.5 (L/R ≤ 40 ms)	0.25 (L/R ≤ 25 ms)	1.5 (cos φ ≥ 0.3)
<b>Electrical life</b>	<b>cycles</b>	100 000			
<b>Min. switched current</b>	<b>mA</b>	5			
<b>Acceptable overload current</b> without switching					
– permanent service	<b>A</b>	9			
– for short time	<b>A</b>	60 A (during 100 ms, at ambient temperature)			
<b>Dielectric strength</b> (50 Hz - 1 mn)					
– between terminals	<b>V a.c.</b>	500			
– between all terminals and earth (ground)	<b>V a.c.</b>	1500			
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)			

## Environmental Conditions - For other test results, please contact us.

<b>Salt spray</b>	96 hours
<b>Temperature variations</b>	-40 °C / +70 °C ; 30 minutes exposure time, 5 cycles
<b>Mechanical shocks</b>	50 g - duration 11 ms (pulse shape = 1/2 sinus) 18 shocks (3 / direction, both of 3 orthogonal axis)
<b>Sinusoidal vibrations</b>	10 _ 500 Hz, 5g in each of 3 orthogonal axis

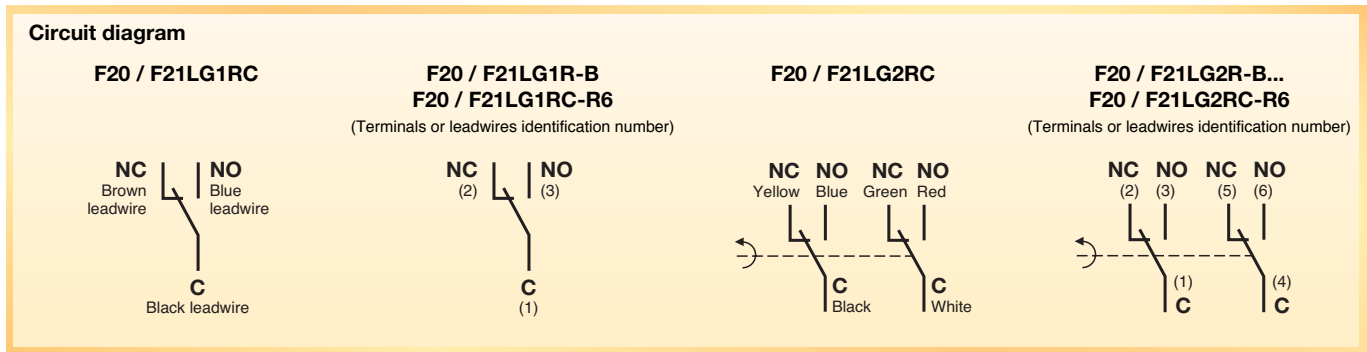
## Specific Products - Contact us for more information ; data sheet on request.

Among the large number of possible variants, the following ones are offered:

- Devices with connector.
- EDF (French Electricity Supply Board) certified limit switches for nuclear environment use.
- **F5705**, **F5777** (1-pole) and **F5778**, **F5779** (2-pole) limit switches with Teflon® insulated cables, for operating temperatures up to 160 °C.
- The possibility to include **R** type Microswitches whose breaking capacity = 5 Amperes.
- Low differential movement **F22** / **F23** limit switch types.

# F2 Limit Switch

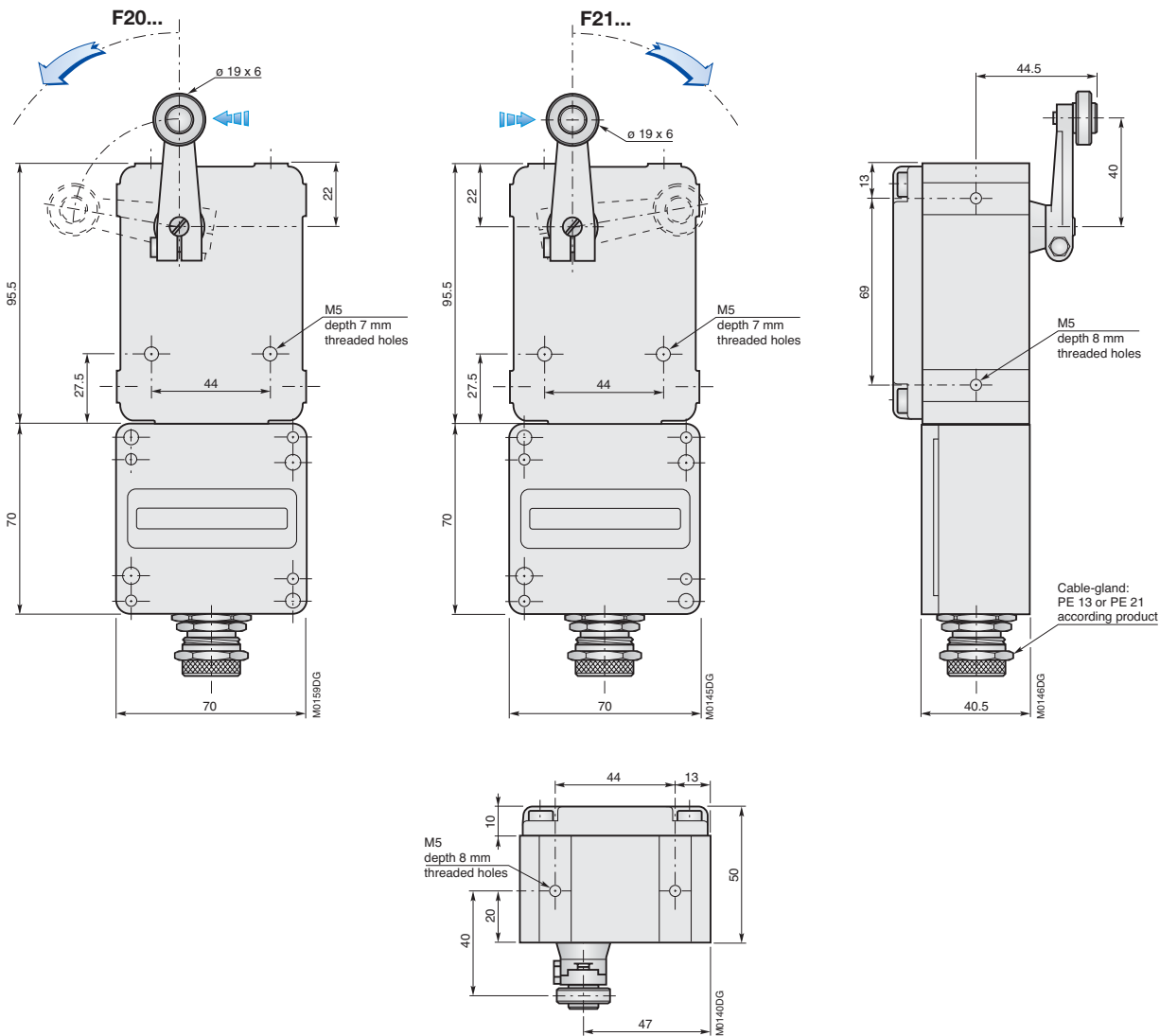
## Connection Type



## Dimensions (in mm)

Mounting holes for M5 screws - Recommended tightening torque: 6.0 Nm.

### F20LG1R-B... / F21LG1R-B...



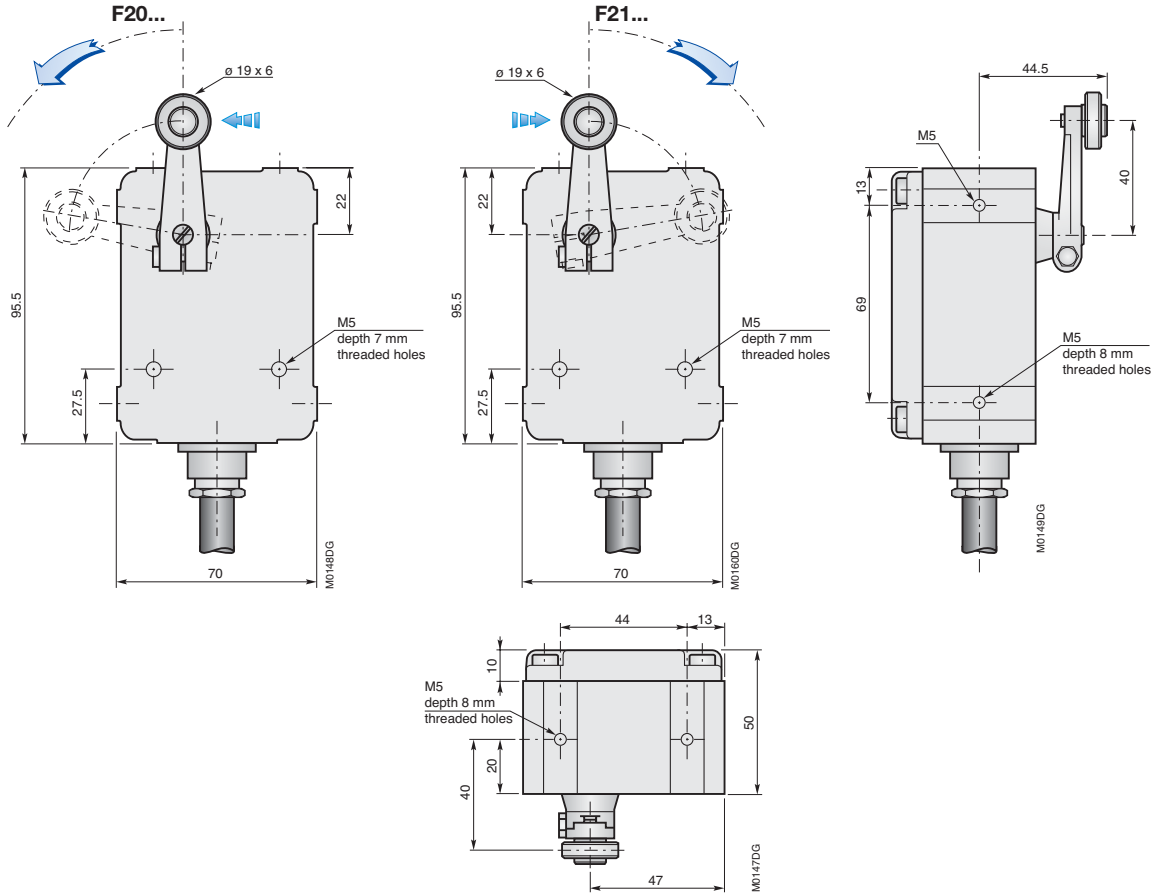
Refer to mounting instructions: - FPTM 91047 ..... for limit switches with terminal box  
- 1SBC148004M1700 ..... for fixing plates

# F2 Limit Switch

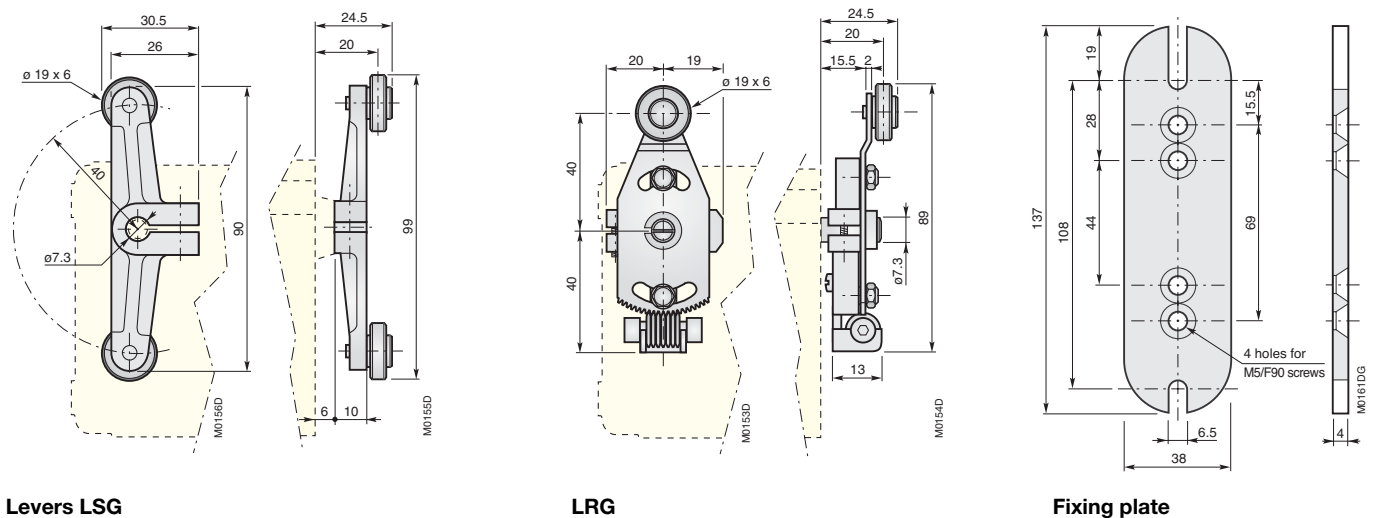
## Dimensions (continued)

Mounting holes for M5 screws - Recommended tightening torque: 6.0 Nm.

### F20LG1RC... / F21LG1RC...



## Accessories



Levers LSG

LRG

Fixing plate

Refer to mounting instructions: - FPTM 91047 ..... for limit switches with cable terminals  
 - 1SBC148004M1700 ..... for fixing plates

# F3 Limit Switch



F32-2RC

1SBU33 8876 3F0302

## Application

Limit switch for salt, wet, dusty or corrosive atmospheres. Devices including 2 "R" type Microswitches.

- Operating temperature: -25 °C ... +85 °C.
- Ratings (220 V a.c. - 50 Hz voltage): 2.5 A.
- Degree of protection: IP66 / IP67.
- Mechanical life: 100 000 cycles.

## Description

Environment sealed limit switch including an hermetically sealed snap-action switch.

- Bronze casing.
- Stainless steel driving shaft.
- Clockwise or counterclockwise operation design available.
- Rotary arm actuator (accessory).
- Mounting holes for M6 screws on 4 sides of the casing.
- Connection: 7 x 0.34 mm<sup>2</sup> cable, according to French Navy 6145 DJ standard.

## Ordering Details

Standard cable length = 2 m ; other length on request.

	Type	Order code	Weight 1 piece kg
Counterclockwise operation	F32-2RC	1SBU 33 1020 R4002	1.600
Clockwise operation	F33-2RC	1SBU 33 1020 R4003	1.600


**Note:** Characteristics recorded with an actuating arm on the limit switch.

Actuating operation direction is factory defined and cannot be modified.

**Coding: F32-2RC (example)**

- F32-2RC**  
**F3** ..... Waterproof limit switch
- F32-2RC**  
**2** ..... Counterclockwise operation  
**3** ..... Clockwise operation
- F32-2RC**  
**-2R** ..... 2-pole limit switch,  
 including 2 Microswitches
- F32-2RC**  
**C** ..... Cable terminals

Product code must be ended with the actuating arm code if the actuator needs to be factory assembled.

**F32-2RC** - **LSG**  accessories table below.

Accessories type code

Basic product type code

## Ordering Details - Accessories

	Type	Order code	Weight 1 piece kg
Double roller arm	LSG	1SBU 53 3110 R4000	0.080
Adjustable roller arm	LRG	1SBU 53 3110 R4001	0.100

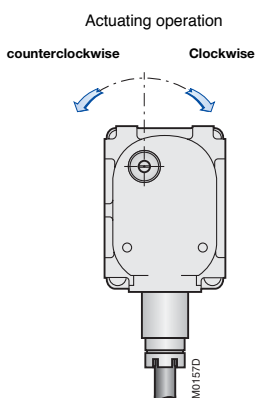
## Approvals and Compliance to Standards

Limit switch compliant with DCN (French Navy) requirements and technical specifications.  
 Approval as per letter STCAN 117.173 dated 1966 April 28, and test report 1.284 dated 1966 April 13.

## Operating Characteristics

F3 Limit switches		F32-2RC	F33-2RC
<b>Max. operating torque</b>	<b>Nmm</b>	400	400
<b>Max. release torque</b>	<b>Nmm</b>	88	88
<b>Pretravel</b>	<b>degree</b>	18° ... 25°	18° ... 25°
<b>Max. differential movement</b>	<b>degree</b>	1° ... 6°	1° ... 4°
<b>Max. overtravel</b>	<b>degree</b>	50° (Do not exceed this value in use)	

**Note:** Characteristics recorded with an actuating arm on the limit switch.



# F3 Limit Switch

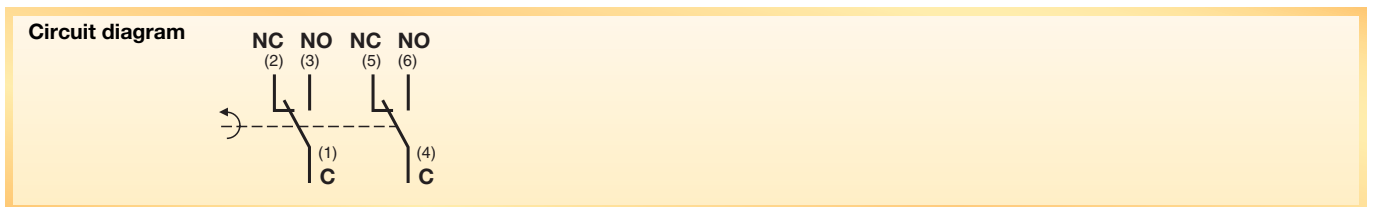
## Electrical Data

Ratings (electrical load on one throw only)		30 ... 48 V d.c.	115 V d.c.	220 V a.c. - 50 Hz	220 V a.c. - 400 Hz
- resistive load	<b>A</b>	2.5	1	2.5	2.5
- inductive load	<b>A</b>	1.8 (L/R ≤ 50 ms)	0.5 (L/R ≤ 50 ms)	1.5 (cos φ ≥ 0.3)	-
<b>Electrical life</b>	<b>cycles</b>	100 000			
<b>Contact resistance</b>	<b>mΩ</b>	≤ 60 mΩ under I = 1 A (As new, wires or cable not included)			
<b>Dielectric strength</b> (50 Hz - 1 mn)					
- between terminals	<b>V a.c.</b>	500			
- between all terminals and earth (ground)	<b>V a.c.</b>	1500			
<b>Insulation resistance</b>	<b>MΩ</b>	≥ 100 MΩ under 500 V d.c. (at 23 °C with < 80 % relative humidity)			

## Specific Products - Contact us for more information ; data sheet on request.

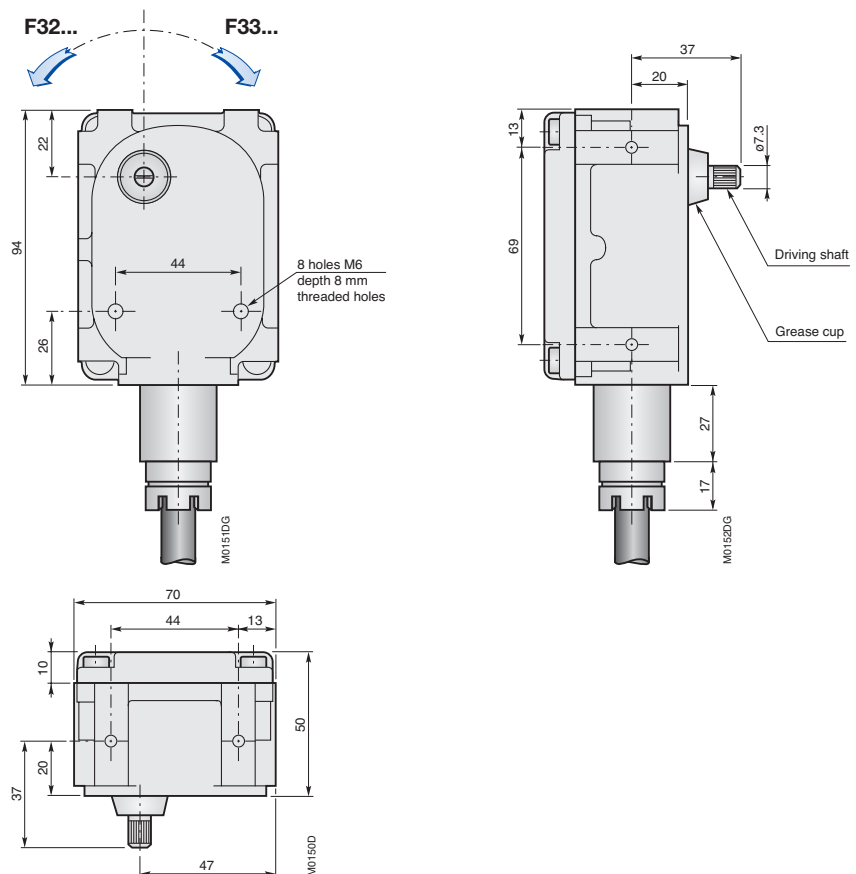
- Devices with Deutsch DCIN or DBA connectors series are available.

## Connection Type



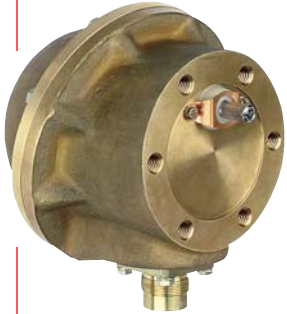
## Dimensions (in mm)

Mounting holes for M6 screws - Recommended tightening torque: 7.0 Nm.



LSG, LRG Levers: see F2 Limit Switches Dimensions in page 67.

# F4 and FCE Waterproof Limit Switches



F44-2RJU

1SBC8 8877 4F0302

## Application

Limit switch for submarine applications according to specifications of the French Navy.

- Operating temperature: -25 °C ... +85 °C ..... for **F4** types,  
-30 °C ... +70 °C ..... for **FCE** types.
- Permissible pressure: 60 bars absolute ..... for **F4** types,  
95 bars absolute ..... for **FCE** types.
- Degree of protection: IP68.
- Mechanical life: 100 000 cycles.

## Description - Contact us for more information ; data sheet on request.

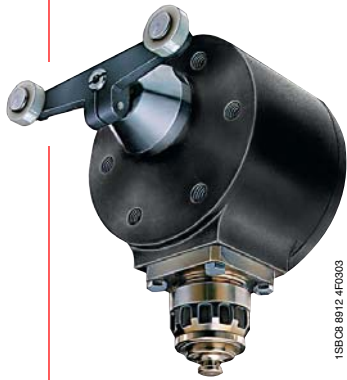
Two pole limit switches (Two Single Pole Double Throw circuits).

- Bronze casing.
- Stainless steel driving shaft.
- Rotary roller actuator arm.
- Specific connector output.
- Equipressure operation for **FCE** type.
- Internal Microswitches: "**R**" types ..... for **F4**,  
"**H**" types ..... for **FCE**.

## Ordering Details

Please contact us for product codification or conformity with NATO product code.

	Type	Order code	Weight 1 piece kg
<b>Counterclockwise operation</b>			
DCIH 51-7P (Deutsch) receptacle	F44-2RD	-	3.500
REC M10 MT0720 (Souriau) receptacle	F44-2RJU	-	3.500
JCI EE M B1 (Souriau) receptacle	FCE.02.G21.RG	-	4.000
<b>Clockwise operation</b>			
DCIH 51-7P (Deutsch) receptacle	F45-2RD	-	3.500
REC M10 MT0720 (Souriau) receptacle	F45-2RJU	-	3.500
JCI EE M B1 (Souriau) receptacle	FCE.02.G21.RD	-	4.000



FCE.02.G21...

1SBC8 8812 4F0303

## Ordering Details - Accessories

	Type	Order code	Weight 1 piece kg
Double roller arm	LSG	1SBU 53 3110 R4000	0.080
Adjustable roller arm	LRG	1SBU 53 3110 R4001	0.100
Double roller arm for "FCE" limit switch	-	FPTN 30 4669 R0014	0.080

## Approvals and Compliance to Standards

DCN (French Navy) approved limit switches according to technical specifications : MAT 658-0043 (F44 / F45) or MAT 658-0002 (FCE).

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Limit switches		F44, F45	FCE
<b>Max. operating torque</b>	<b>Nm</b>	0.48	0.70
<b>Pretravel</b>	<b>degree</b>	25° max.	15° ±2°
<b>Differential movement</b>	<b>degree</b>	3° ... 8° max.	1° ... 3°
<b>Overtravel</b> (1)	<b>degree</b>	60° max.	not measured : total travel 43° min.

(1) Do not exceed this value in use.



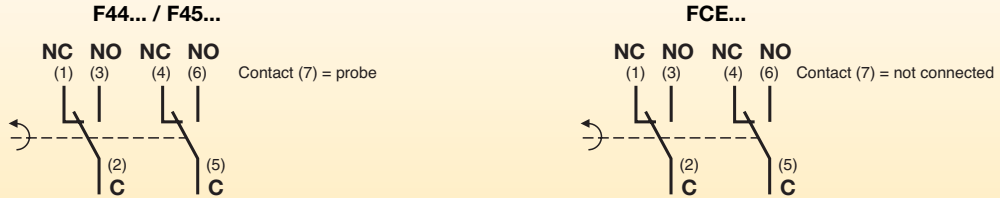
# F4 and FCE Waterproof Limit Switches

## General Information

For these devices, electrical data and environmental capabilities are available only on request.

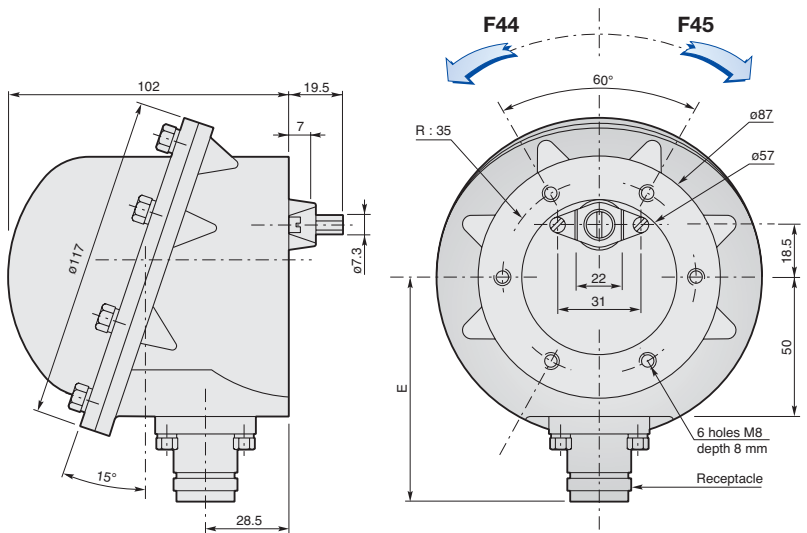
## Connection Type

### Circuit diagram



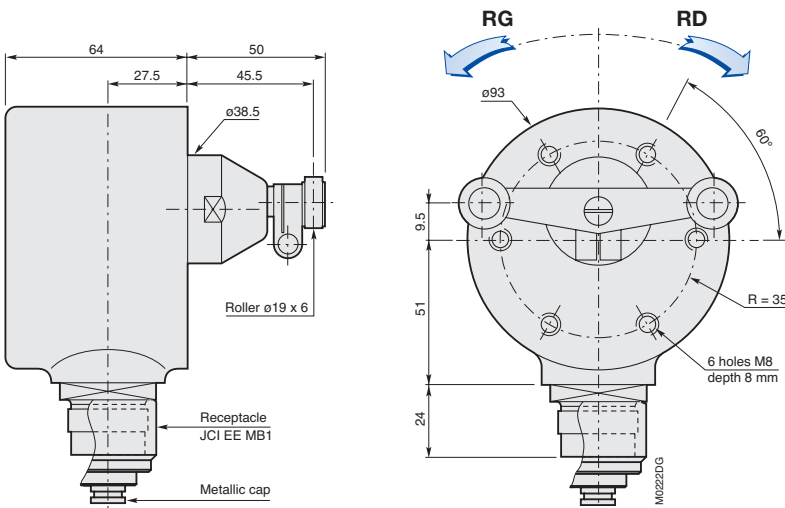
## Dimensions (in mm)

Wiring instructions and other specificities according to data sheets.



Limit switches	Dim. E in mm	receptacle
F44-2RD / F45-2RD	80	DCIH 51-7P
F44-2RJU / F45-2RJU	73	REC M10M T 07.20

### F44... / F45...



### FCE...

LSG, LRG Levers: see F2 Limit switches Dimensions in page 67.



# Other Products





# ABB Other Products

## Contents

CF6165 Switch for Rabbets .....	74
Manual Control Switches .....	76

# CF6165 Switch for Rabbets



CF6165-NC

## Application

Device for use on industrial or home applications: doors, windows...

- Operating temperature: -25 °C ... +55 °C.
- 2 available product types: C – NO arrangement: make contacts,  
C – NC arrangement: break contacts.
- Mechanical life: 50 000 cycles.

## Description

Snap action switch - unsealed.

- Plastic casing.
- Silver contacts.
- Mounting holes for M3 / F90 screws and fitting into the equipment.
- Pin actuator.
- Connection: 2 x 1.5 mm<sup>2</sup> cable, PVC insulated.

## Ordering Details

Standard cable length = 2 m ; other length on request (up to 10 m).

	Type	Order code	Weight 1 piece kg
<b>Switch for rabbets</b>			
Make contact (normally open)	C - NO	CF6165-NO 1SBU 20 1026 R6165	0.200
Break contact (normally closed)	C - NC	CF6165-NC 1SBU 20 1025 R6165	0.200

Note: Only above listed product types are available.

## Operating Characteristics

Characteristics according to the actuating point (arrow) indicated on dimension drawings.

Switch for rabbets		CF6165...
<b>Max. operating force</b>	<b>N</b>	6.5
<b>Min. release force</b>	<b>N</b>	Operating force / 3
<b>Total travel</b>	<b>mm</b>	≈ 6.0
<b>Min. overtravel</b>	<b>mm</b>	2.0 (Do not exceed this value in use)

## Electrical Data

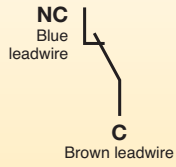
<b>Ratings</b> (electrical load on one throw only)		<b>220 V a.c. - 50 Hz</b>
– resistive load	<b>A</b>	16
– inductive load	<b>A</b>	–
<b>Electrical life</b>	<b>cycles</b>	10 000
<b>Dielectric strength</b> (50 Hz - 1 mn)		
– between terminals	<b>V a.c.</b>	1000
– between all terminals and earth (ground)	<b>V a.c.</b>	3000

# CF6165 Switch for Rabbits

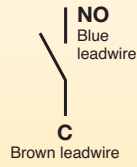
## Connection Type

### Circuit diagram

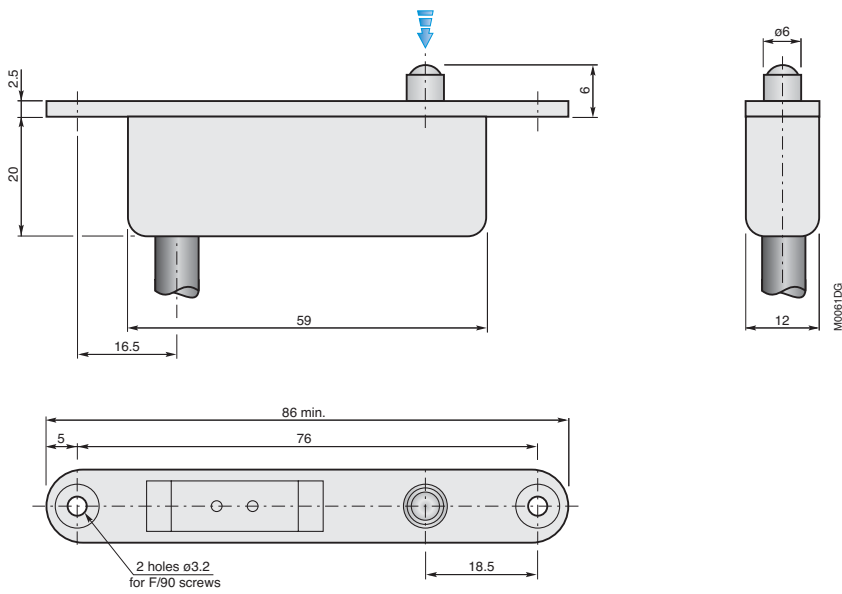
**CF6165-NO**



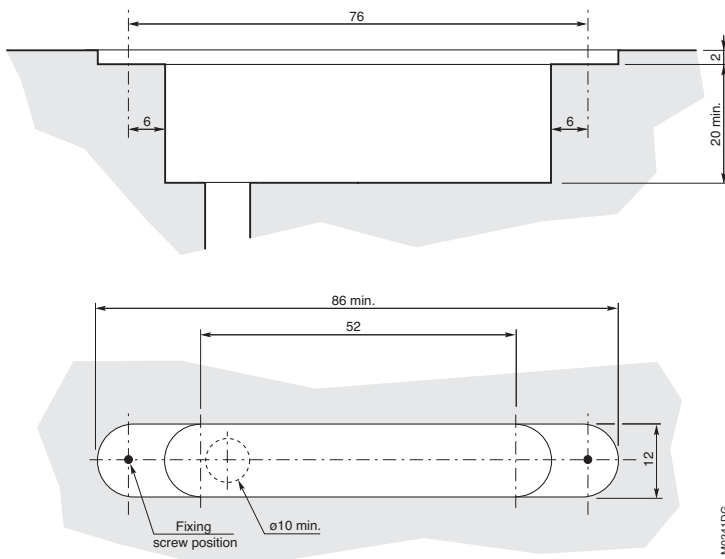
**CF6165-NC**



## Dimensions (in mm)



**CF6165-NO, CF6165-NC**



## Product fitting detail

# Manual Control Switches



42L59



32PN61



24PER67

Coding: □4PE□59 (example)

- 4PE□59
- 1, 2, 3, 4 ..... Number of poles
- 4PE□59
- 2 ..... M12, for L and P variants
- 4 ..... M14, for PE variants
- 4PE□59
- L, P, PE ..... Operating mode
- 4PE□59
- N, R, V ..... Button/pushbutton colour code
- 4PE□59
- ..... Microswitch type
- See Description section

## Application

Switch assemblies for command and control systems...

- Operating temperature: -55°C ... +85 °C ..... with **H5459** or **H5463** Microswitches
- 55°C ... +150 °C ..... with **H5461** or **H5467** Microswitches
- 2 available contact configurations: up to 200 mA for low level applications or 4 A.
- 2 product types according to operating mode:
  - 2 maintained positions toggle switch,
  - momentary action for button or pushbutton switches
- Mechanical life: 20 000 cycles.

## Description

Manual control switches including snap-action switches.

- "H" type Microswitches ; 4 variants available:
  - **H5459** ..... : 59 termination product types
  - **H5461** ..... : 61 termination product types
  - **H5463** ..... : 63 termination product types
  - **H5467** ..... : 67 termination product types
- 1 to 4-poles.
- Panel mounting by way of M12 or M14 threaded bushing for sealed pushbutton.
- Fork terminals.
- Operating option:
  - toggle switch ..... "L"
  - metallic round button ..... "P"
  - plastic round button ..... "P" + colour code
  - metallic sealed pushbutton ..... "PE" + colour code

## Ordering Details

Operating mode	Mounting bushing diameter	Microswitch type	Type	Order code	Weight 1 piece kg
Lever	M12	H5459	□2L59	-	≤ 0.040
		H5461	□2L61	-	
		H5463	□2L63	-	
		H5467	□2L67	-	
Metallic round button	M12	H5459	□2P59	-	≤ 0.040
		H5461	□2P61	-	
		H5463	□2P63	-	
		H5467	□2P67	-	
Plastic round button	M12	H5459	□2P□59	-	≤ 0.040
		H5461	□2P□61	-	
		H5463	□2P□63	-	
		H5467	□2P□67	-	
Metallic sealed pushbutton	M14	H5459	□4PE□59	-	≤ 0.055
		H5461	□4PE□61	-	
		H5463	□4PE□63	-	
		H5467	□4PE□67	-	

□ to be completed with bellow codes

□4PE□67

Number of poles: 1-pole ..... 1  
 2-pole ..... 2  
 3-pole ..... 3  
 4-pole ..... 4

Button/pushbutton colour code:  
 N ..... black  
 R ..... red  
 V ..... green

## Electrical Data

See "H" types data for Microswitches assembled into manual control switches.

>> "H" Microswitches ..... pages 30 to 33

# Manual Control Switches

## Connection Type

**Circuit diagram**

- 1 to 4-poles pushbutton switch

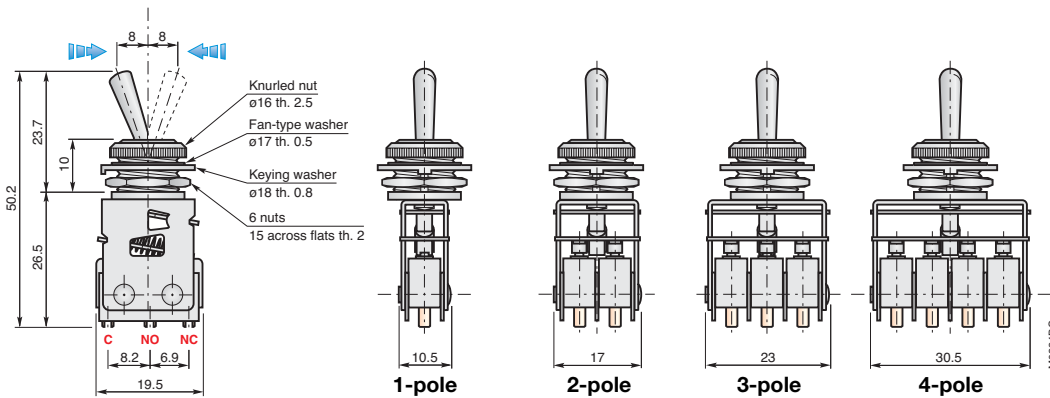
- 1 to 4-poles toggle switch

**Available terminals**

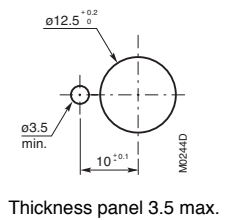
- "F" Fork terminals

## Dimensions (in mm)

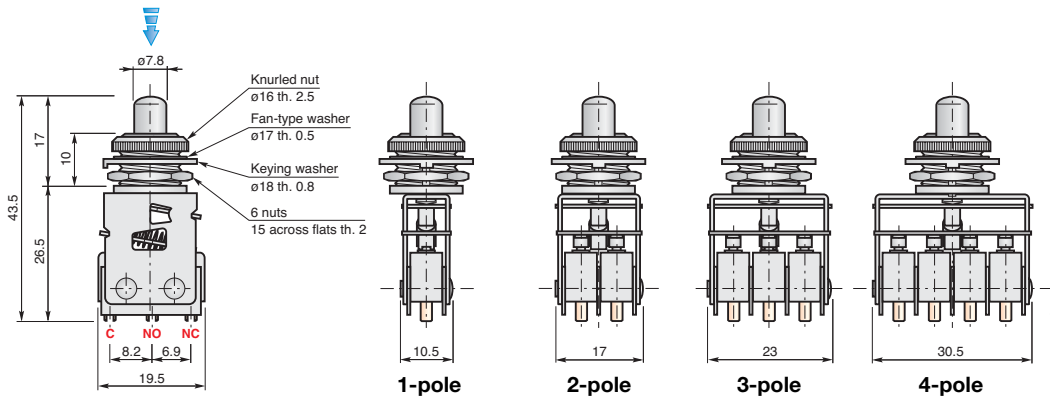
### Toggle switch \_2L...



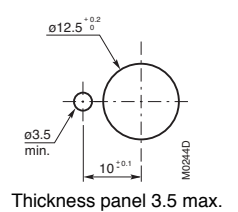
### Panel hole detail



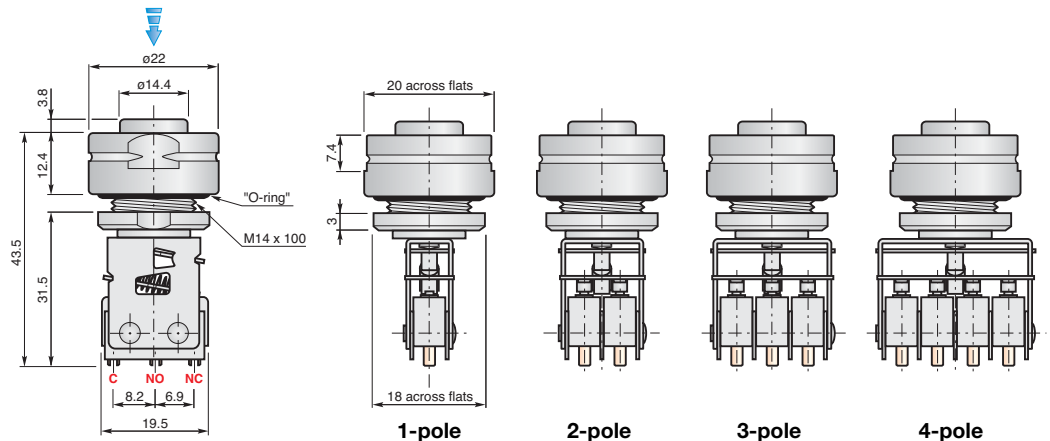
### Pushbutton switch \_2P...



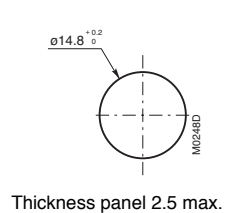
### Panel hole detail



### sealed pushbutton switch \_4PE...



### Panel hole detail



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**Notes**

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# Notes

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