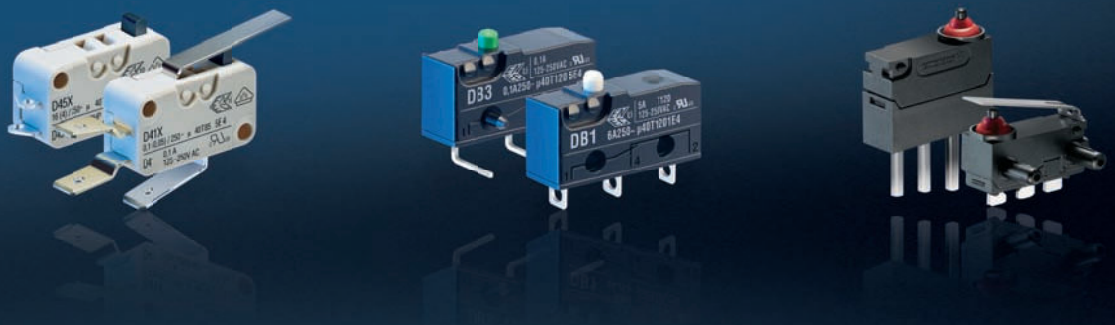
Perfection
down to the smallest detail



CHERRY®

CONTENTS

For many years, Cherry snap switches and keyboards have been synonymous with quality and reliability. Cherry is a trademark of ZF Friedrichshafen AG. Whether in household appliances, industrial applications, vehicles or input systems, electronic components ensure reliable operation as well as safety and comfort. Our Quality Assurance System is ISO 9001 and TS 16949-certified and our Environmental Management is ISO 14001-certified.

In our experience you need a little advice to get the best out of your switches. This is why we always start by asking users for detailed information on the intended scope of application, its basic conditions and all associated specifications and data. We regard this as an absolutely indispensable first step. This catalogue is intended only as a reference document. No responsibility is taken for the correctness of the details. We reserve the right to make changes which are minor or serve the purpose of progress.

The technical details relate only to the product specifications; product characteristics are not warranted. We reserve the right to make technical changes and adjustments due to changed delivery opportunities up to the contract signing. Only our general sales and delivery conditions apply. We will gladly send you these on request.

Winner 2005

Lean Production Award 2006

Bavarian Quality Award 2008

Kaizen 5S Award 2009

It's not the size which determines the power, but rather each individual component.

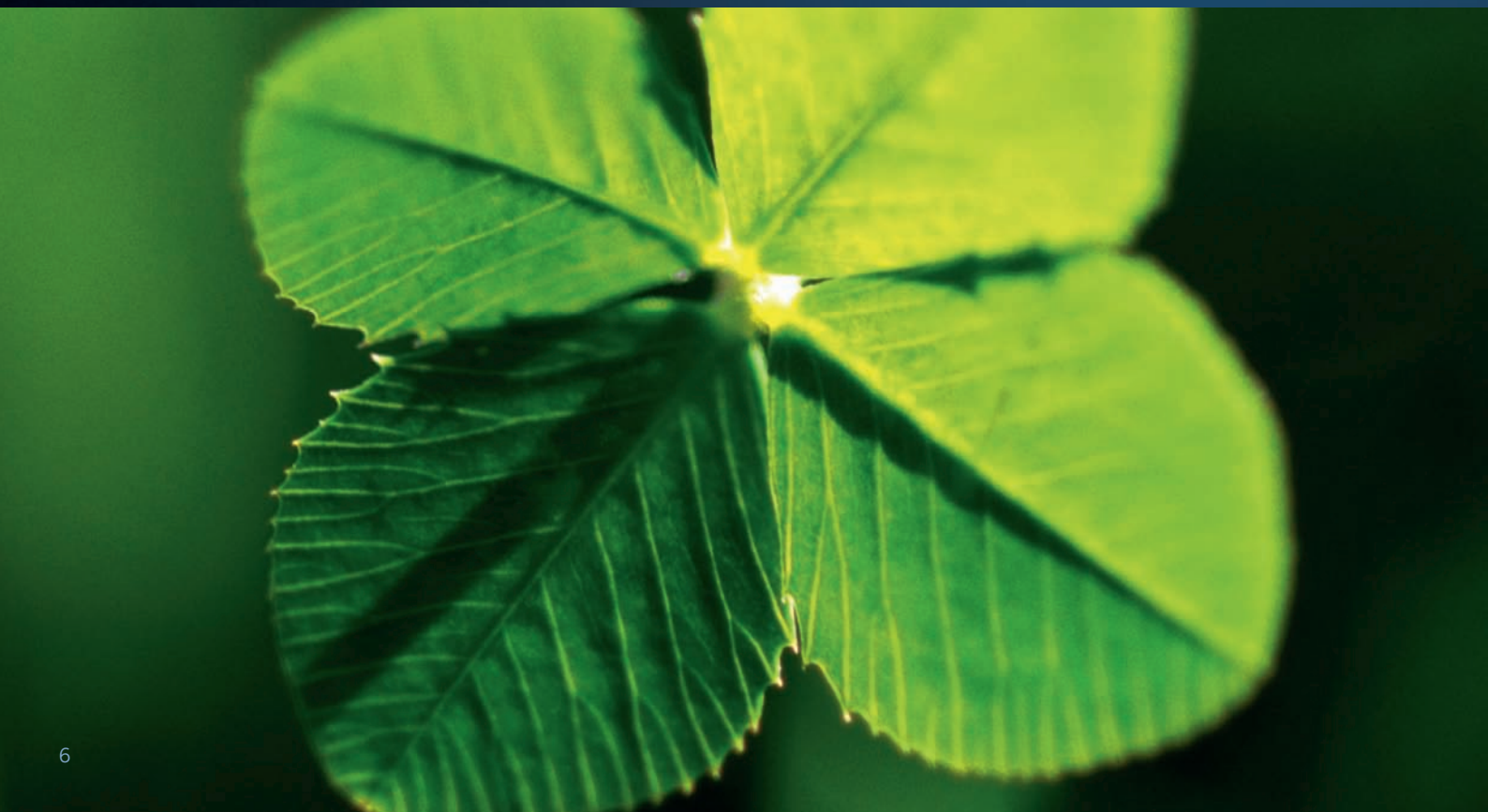
What makes the difference between a good and an excellent technical solution? Reliability, the power of innovation, these are the foundations of success. But how can success be achieved? Is there a formula which can be transferred to all industries? We think there is.

The quality of a total solution is determined by the quality of its components. A fault in a component which only costs a few cents can paralyse everything. Perfection down to the smallest detail is therefore the basis of our philosophy as a supplier of mechatronic components. Another is attuning the individual elements optimally to one another. Therefore, we see ourselves as our customers' active partner when it comes to developing new products.

Our record proves we are right. For many years, Cherry snap switches and keyboards have been synonymous with the highest quality and reliability. This principle has also made us one of the leading suppliers of electronic components. Regardless of whether you use our products in household appliances, industrial applications, in the automobile industry or for input systems – you can rely on safety and comfort in addition to reliable performance.

Customer satisfaction grows with quality. And quality with closeness to the customer.

With ever-shorter product cycles, the development time for new products is also being reduced. In order to guarantee maximum quality, close cooperation among all partners is important. We interpret the term “close cooperation” in an old-fashioned way – and wherever possible, we prefer personal contact with our partners.



To be as close to our customers as possible was the principle of Cherry Electrical Products Corporation, which was founded in the USA in 1953. In 1964 we established a subsidiary in Germany and in 1972 in England.

Additional European subsidiaries followed in France and Czech Republic in 1985 and 1992, respectively. Today, the company acts on a global basis – with sites throughout the world: in North America and Europe as well as in Asia and Australia. Proximity on location allows us to react quickly to regional or individual requirements. We continue this philosophy while integrating the Cherry trademark in ZF Friedrichshafen AG. Being part of a worldwide network, we can thus be even more responsive to customer and market requirements.

1. ZF Friedrichshafen AG
2. ZF Electronics UK Ltd.
3. ZF Electronics France S.a.r.l.
4. ZF Electronics Klasterecz spol. s.r.o.
5. ZF Electronics Office Italy
6. ZF Electronics Corporation
7. ZF Electronics de Mexico
8. ZF Electronics Office Australia
9. ZF Electronics Asia Limited
10. ZF Electronics Office Japan
11. ZF Electronics TVS India Private Ltd.
12. ZF Electronics (Zhuhai) Co. Ltd.

Customer satisfaction grows by quality. And quality by closeness to the customer

Growth and success across more than 50 years are no accident, but the result of a sustainable company strategy. A strategy which is applied equally to customers, employees, our own products and the environment. This guarantees that our innovations will fall on fertile ground in the long and short term – and it will ensure growth for us and our partners.

Quality and environment

For us, environmental consciousness is more than the fulfillment of a duty; we live it every day. Therefore, years ago we introduced an integrated management system based on the ISO 9001, ISO 14001 and TS 16949 standards, whose quality and environmental standards have become second nature for our employees. In order to comply we must fulfill and even exceed the requirements of our customers, suppliers, investors, employees and, last but not least, the public, through consistent process orientation. This is also one of the reasons why our company has been honored with several awards in recent years.

Quality guideline

Customer satisfaction

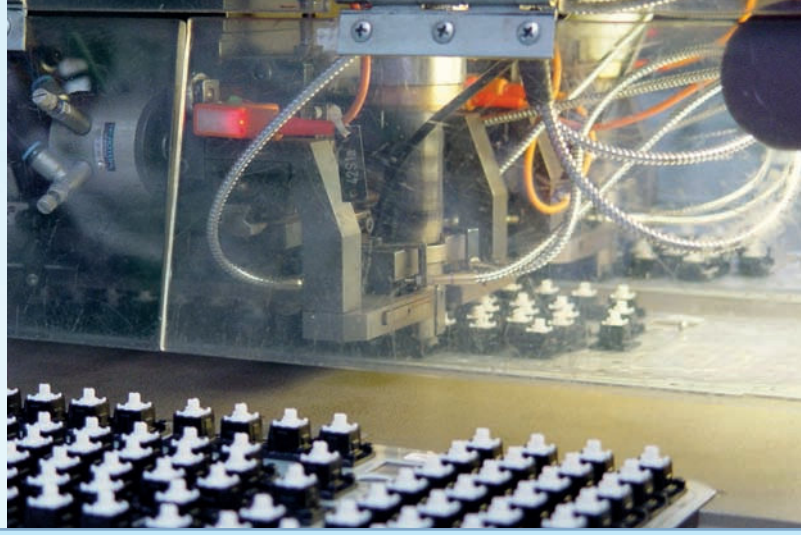
In the context of a cooperation based on partnership and trust it is our major objective to fully live up to our customers' expectations.

Competitiveness

We can ensure ZF's long-term corporate success by providing innovative, high quality, and cost-efficient solutions for a global market

Sense of responsibility

The prerequisites for achieving optimum working results are a distinct awareness of quality as well as assuming responsibility both for oneself and for the Group.



Employee satisfaction

ZF's efficiency is determined by our highly motivated staff. By involving all stakeholders and continuous communication, our employees' satisfaction can be maintained on a permanent basis.

Process-oriented management approach

Applying efficient processes with balanced interaction to achieve highest product and service quality – that is the basis for our management system.

Partner supplier

Our suppliers make an essential contribution to the quality of our products. In order to achieve common quality objectives we cooperate with our suppliers as partners.

Permanent improvement

The principle of continuous improvement is an important element of our actions and secures corporate success for the future.

Principles of environmental protection

Cherry products are contributing to the technical progress on a global basis. However, this also means that the company has a responsibility to continuously improve the environmental compatibility of its products over their entire life cycle and to reduce the strains placed on natural resources.

The Environmental Policy is checked regularly and is binding for all employees. It is based on the following principles:

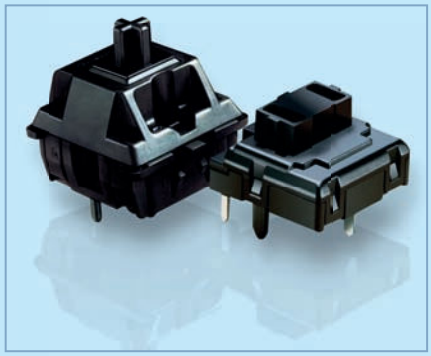
1. We design our products and production processes in as energy and resource-efficient a manner as possible. We use state-of-the-art environmentally friendly technologies whenever investments are made.
2. We put appropriate measures into place to ensure that environmentally damaging incidents are avoided wherever possible and properly contained in the event of any incident. We comply fully with all relevant environmental directives.
3. We involve our employees in the development and implementation of our environmental policy. We regularly train and motivate them so that they can actively assist in shaping our environmental protection policy.
4. We are continuously improving operational environmental protection. Our suppliers are taken into account during this process.
5. We implement the objectives we set ourselves right around the world with the assistance of appropriate management systems, we check the agreed performance levels on a regular basis and, if any discrepancy is detected, respond rapidly with appropriate remedial action.
6. In matters relating to environmental protection, we engage in dialogue with customers, suppliers, authorities, and all local interested parties. Furthermore, we regularly report on the consequences of our activities

Diversity generates options. Options result in exactly solutions for your requirements.

Higher, faster, further – the demands for technical developments are increasing, while their size is being reduced. A challenge also for the engineers of the individual components. To fulfill both the requirements and the unusual demands of our partners, we have created a broad spectrum of switches. Decades of experience in the development and manufacture of switches equates to the best solution for your application. The following pages present a detailed overview of our ranges, which are divided into three types of switches. But in addition to the switches presented here, we offer several other broad product lines, including electronic controls, mechatronic assemblies, sensors and rocker switches.

From single components to electronic assemblies

More information on solutions concerning our range of mechatronics, sensors and rocker switches can be obtained from our respective product catalogues. These can be either ordered as a printed copy from us or simply be downloaded as PDF file on **www.cherry.de**.



Key modules

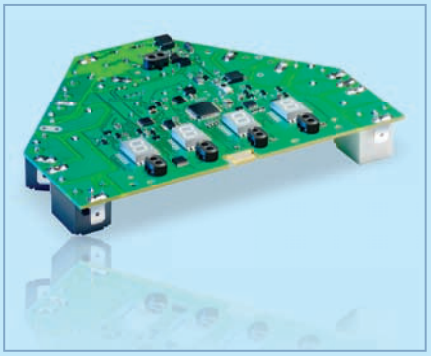
Read up on our key modules enabling flexible design of keypads and keyboards.
Depending on the key cap, different lead spacings are also possible.

Sensors

Get informed about our standard program of sensors based on Hall- and Reed-technology.

Rocker switches

Our rocker switch range covers device switches to be used for example in household appliances and power tools as well as for machinery and equipment.



Mechatronics

Experience our competence concerning control units and electronic assemblies – from cooktops and flow-heaters to many other applications.

Selector switches

Information on our range of selector switches is available on our website **www.cherry.de** under the category Switches and Controls.

Snap Switches – Definitions and descriptions

Snap switches are activated by a spring-operated (or "snap-action") mechanism. Depressing the actuator triggers the switching operation, with a pre-defined force and travel. The switching speed itself is largely independent of the speed of actuation.

Actuator

Applying force to the actuator of a snap switch releases the snap-action mechanism, which in turn triggers the switching operation.

Auxiliary actuator

It is possible to attach an auxiliary actuator to a snap switch in order to meet the specific requirements of a given application. Doing so usually alters the travel and forces involved in the switching operation, depending on the length of the levers. By attaching an appropriate auxiliary actuator, it is possible to increase travel and/or reduce the actuating force required.

Terminals

COM (Common = 1):	Base terminal
NC (Normally Closed = 2):	The contact is closed in the rest position, that is, the terminal is connected to COM. When the switch is actuated, the contact opens.
NO (Normally Open = 4):	The contact is open in the rest position, that is, the terminal is separated from COM. When the switch is actuated, the contact closes.

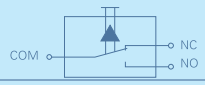
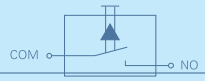
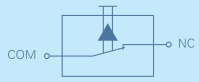
Contact gap (contact opening distance)

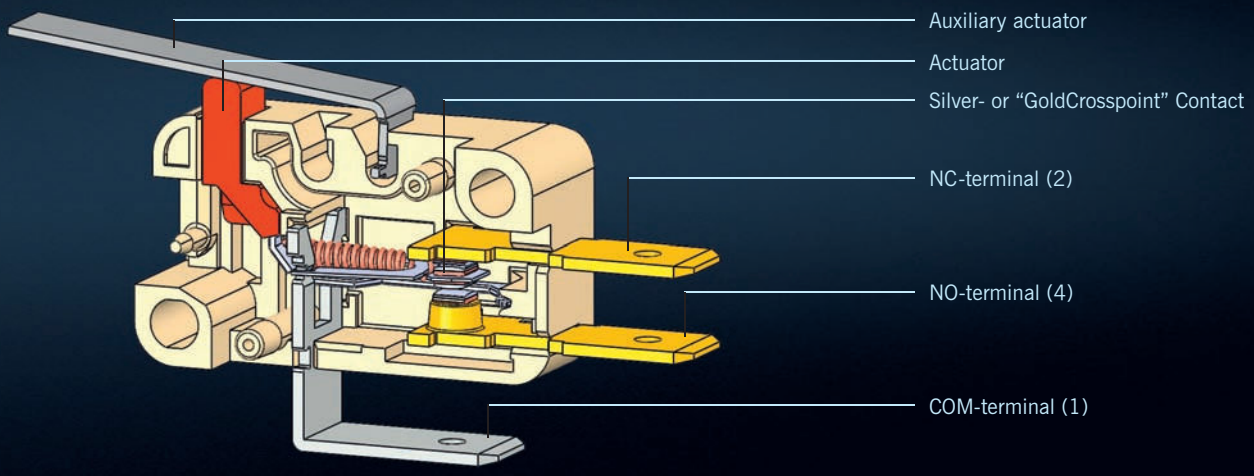
The contact gap is the distance between a pair of open contacts. For snap switches, it is usually around 0.3 mm. Generally speaking, for switches with contact gaps < 3 mm, additional measures are necessary for separation from the mains. These switches bear the mark μ for European approvals. Switches with a contact gap > 3 mm can generally be used directly for separation from the mains. Please check the device specifications applying to your particular product, and if there is any doubt, please clarify with the responsible testing agencies.

Clearance and creepage distance

Clearance is the shortest distance through the air between two electrically conductive parts or between an electrically conductive part and a metal foil affixed to an accessible surface of some insulating material. The creepage distance is the shortest distance along the surface of an isolating material between two electrically conductive parts or between an electrically conductive part and a metal foil fixed to an accessible surface of the insulating material.

Graphical symbols

Description	Function	Graphical
S.P.D.T. Single Pole Double Throw (Changeover contact)	In rest position the COM terminal is connected to the NC contact. When the actuator is depressed, COM and NC break contact and COM and NO make contact.	
S.P.S.T. - N.O. Single Pole Single Throw Normally Open (Make contact)	When the switch is actuated, contact is made.	
S.P.S.T. - N.C. Single Pole Single Throw Normally Closed (Break contact)	When the switch is actuated, contact is broken.	



Positions, forces and travels

Actuator positions

Dimensions for actuator positions are always specified in relation to a given reference line.

Rest position

The rest position is the position of the actuator when no external force is being applied. Sometimes referred to as the “free position”.

Operating point (mech.)

The point along the actuator’s travel path at which the spring-operated mechanism is actuated.

Final position (total travelled position)

The position of the actuator at the end of its travel.

Reset point (mech.)

The point along the actuator’s path, as it travels back to its rest position, at which the spring-operated mechanism snaps back to its original position.

Actuator travel

Pretravel

The distance travelled between the actuator’s rest position and the switching point.

Overtravel

The distance travelled between the switching point and the end position. To make absolutely sure that the switching operation takes place, an actuator should use up at least 50 % of the available overtravel.

Reset travel

The distance travelled between the end position and the release point.

Free travel (open circuit travel)

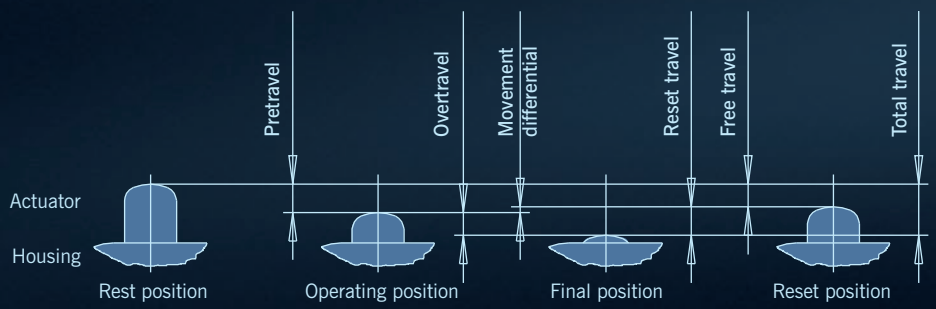
The distance travelled between the reset point and the rest position.

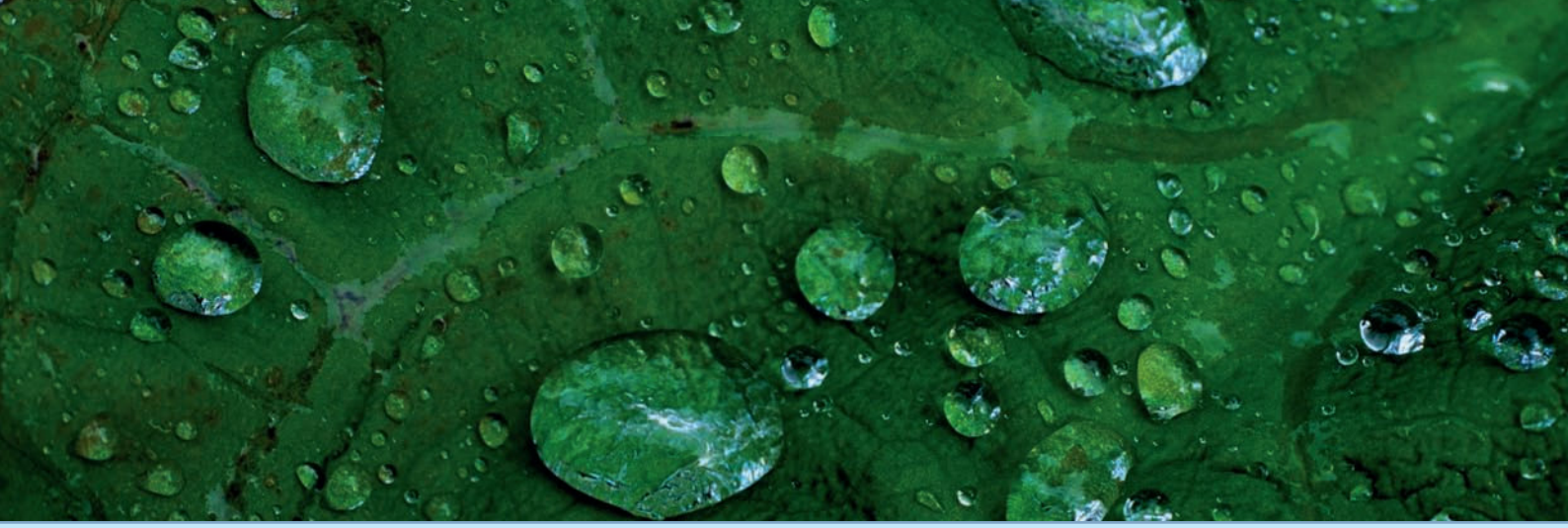
Total travel

The sum of pretravel and overtravel, or of reset travel and free travel.

Movement differential

The distance travelled between the operating point and the reset point.





Forces

Initial force

The force required to move the actuator away from its rest position.

Operating force

The force required to move the actuator through the operating point.

Sustaining force

The force required to hold the actuator in its final position.

Reset force

The level to which the operating force must be reduced to allow the spring-operated mechanism to return to its original position.

Differential force

The difference between the operating force and the reset force.

Conversion US-Units

Inch / millimeter

Generally, measures in this catalogue are based on the metric system and indicated in millimeter (mm). For the conversion please use the following relation:

1 millimeter = 0.03937 inches
Example: 27.8 mm x 0.03937 = 1.094 inches

And for the reverse calculation:

1 inch = 25. 4 millimeters
Example: 0. 51 inches x 25.4 = 12.95 mm

Forces

The specifications of the operating force for the switches are indicated in hundredth Newton (cN). For the conversion please use the following relation:

1 Newton (N) = 100 cN = 101.972 gf
1 cN = 1.01972 gf
Example: 250 cN x 1.01972 = 254.93 gf

The re-conversion corresponds to:

1 gf = 0.981 cN,
Example: 850 gf x 0.981 = 833.85 cN

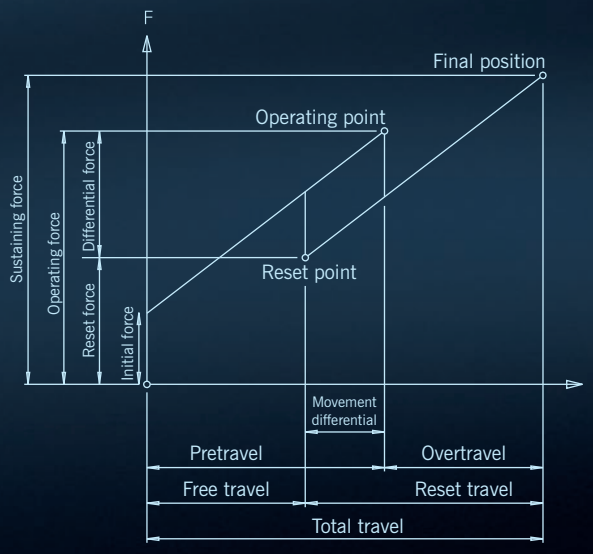


Diagram showing relationship between operating force and travel

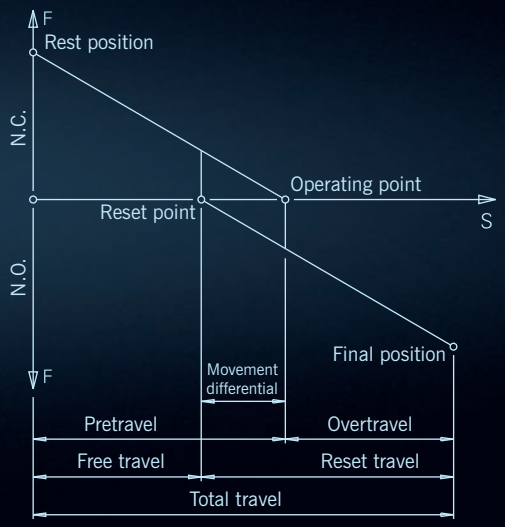


Diagram showing relationship between contact force and travel

Operating life, temperature resistance, vibration and electric resistance

Operating life

The operating life specifies the minimum number of switch cycles within the specific values. It depends on a large number of parameters that are determined by the intended application case. Among these are, for example:

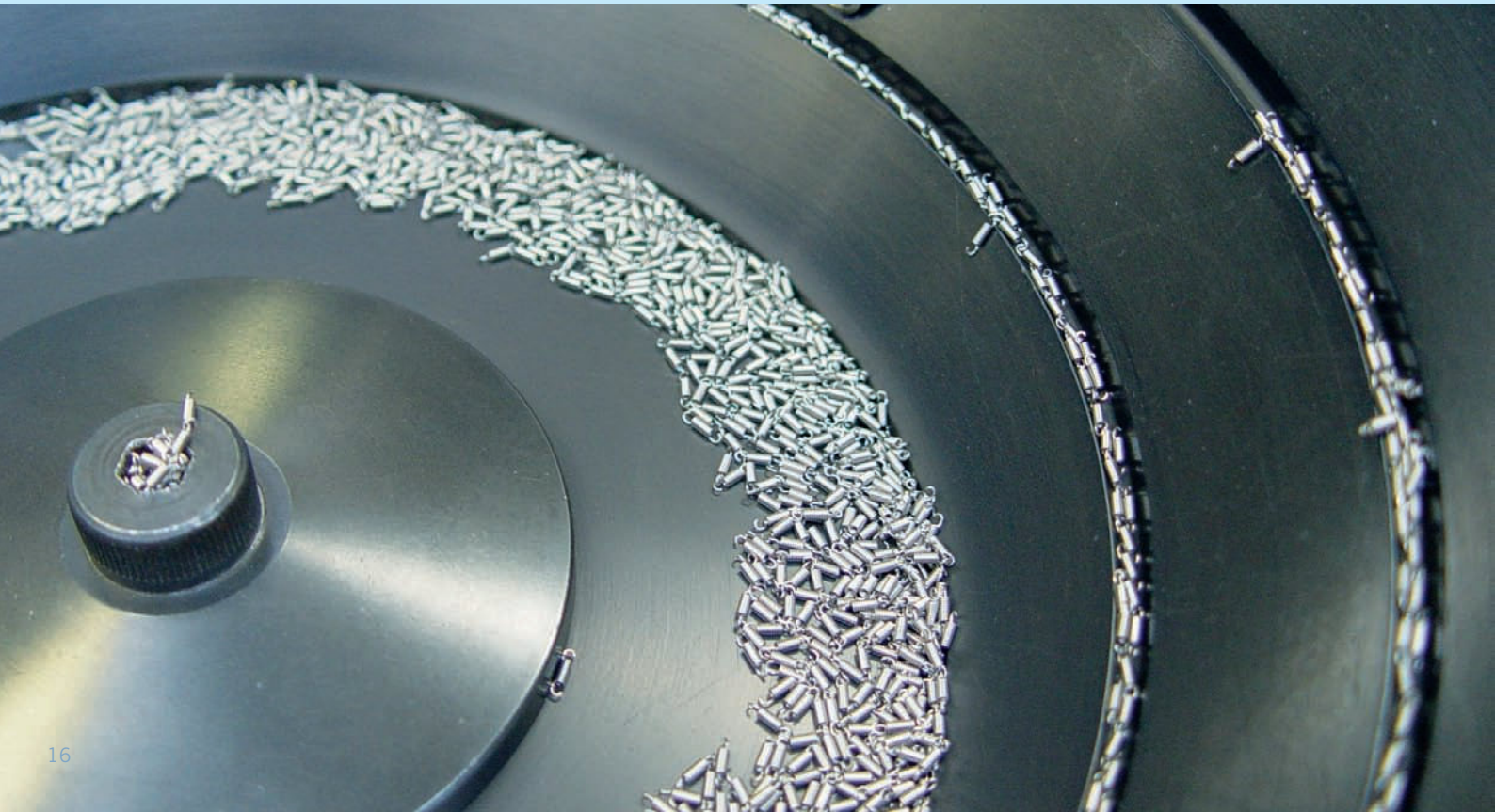
- switched current and switching voltage
- type of load (e.g. ohmic, inductive or lamp load)
- Combination of materials in actuating element/actuator
- Actuator type
- Actuator speed
- Switching frequency (switching cycles / min)
- Pretravel / Overtravel
- Environmental factors such as climate conditions or harmful gases (e.g. SO_2)

Please note:

Media such as greases, oils and materials which contain silicon must not be used on the switch. There is a distinction between mechanical and electrical operating life.

Mechanical life

Indicates how often a switch can be actuated without an electrical load. Mechanical endurance is calculated by actuating the snap switches axially in relation to the actuator in a sinusoidal pattern using about 80 % over-travel at a switching frequency of 4 Hz at room temperature.



Electrical life

The selection of the optimal contact material has great influence on the operating life. The electrical life test is conducted at rated voltage, rated current and resistive load at 23 °C ambient temperature. The lower the electrical current, the longer the electrical life – under some circumstances it may even equal the switch's mechanical life.

Please note:

For switching loads which deviate from the values specified in the catalogue, we recommend that you discuss the issues involved with Cherry. This is especially important if you are using other loads as linear resistances. These can be electrical circuits with inductive resistances (motors), capacitive resistances (condensers) or lamp loads. To ensure that a switch reaches the maximum of its electrical operating life, the switch should not be subjected to pressure in its rest position (pre-stressed) and at least 50 % of the available overtravel must be used. Operating life specifications for direct current loads are available on request. Where higher switching capacities are involved, we recommend the use of fuses to provide protection against arcing.

Please note:

Since the operating life of a snap switch depends on a number of factors, we recommend that field trials be performed in order to establish the likely electrical life of a switch in a given application. This is especially recommended when the application deviates considerably from the test conditions described above. Our specialists are always ready to provide you with more advice regarding possible solutions for your particular application.

Behaviour at different temperatures

Depending on the model, the operating temperatures of our switches range from -25 to +70 °C and -40 to +150 °C. If you attempt to use a switch at operating temperatures either above or below those recommended for your particular model, the switch's material properties will change and its reliability will be affected. Where switch model codes start with "T" (e.g. 40T125 in compliance with EN 61058), the switches involved have been approved for use at the corresponding temperatures.

Vibration and shock resistance

Snap switches are naturally fairly resistant to shocks and vibrations thanks to their minimal mass of moving parts. They are at their most resistant when the actuator is in the rest position or end position, when vibration resistance is as high as 5 g at 20 – 200 Hz while shock resistance attains 50 g (6 ms).

Please note:

Snap switches are more susceptible to vibrations at the switching point and at the release point. In certain conditions, this could result in transient make or break contacts (bouncing) to the detriment of

the switch's operating life. This is why snap switches which are regularly exposed to vibration should, wherever possible, not be actuated slowly.

Electric strength

The electric strength of our snap switches – in the case of models suited for mains voltages – exceeds 1500 V AC between conducting parts and the earth and 750 V AC between the terminals (open contacts) measured over a period of one minute at an ambient temperature of 23 °C ± 5 °C, relative humidity of < 70 % and normal atmospheric pressure.

Operation, contact types and materials

Operating speed

Snap switches are suitable for a broad spectrum of operating speeds. However, extremely slow or fast actuations can affect the switch performance and operating life. For product-specific values, please see the technical specifications. The maximum switching frequency (switchings/s) is limited by the electric load. With low switch loads, up to 10 actuations per second are possible.

Please note:

Sudden actuation must be avoided since it decreases the mechanical operating life.

Contact bounce

Bounce time is the time between the moment closing contacts first touch and final (definitive) contact closure. The typical bounce time for our snap switches is between 1.5 and 3 ms, depending on the series.

Transit time

In two-way (double-throw) switches, transit time is the time between the moment the break contact element (NC contact) first opens and the make contact element (NO contact) first closes. Transit time is generally determined by design features such as e. g. contact travel and elastic characteristics.
It generally varies between 3 and 10 ms, depending on the model.

Please note:

If transit time is critically important to the functioning of your application, don't hesitate to contact us.

Contacts

We supply switches with standard and crosspoint contact technology. For low-voltage and low-current applications, we strongly recommend the use of gold crosspoint contacts. The reduced surface area of the cross-shaped contacts means that the surface pressure is greater, which in turn enhances reliability. Standard contacts are more suitable for higher switched loads.

Contact materials

Gold and gold alloys: primarily AuAg; AuAgPt

Silver and silver alloys: primarily AgNi; $AgSnO_2$

Gold alloys are especially suitable for low currents and voltages. Typically they are used in the range from 5 V, 1 mA DC to 12 V 100 mA DC. But it may also make sense to use them in switches which are only occasionally operated or in atmospheres with a high sulphur content.
For switching heavier loads, it usually makes sense to use silver or silver alloys. In this case, the range typically extends from 12 V, 100 mA DC to 250 V 21 mA AC.

Please note:

Because choosing the right contact materials depends on a large number of factors, such as switching voltage and current, operating environment, atmospheric conditions, etc., we are always pleased to advise you on the best choice of material for your application. Before making any firm decisions, we do advise you to carry out field trials of our switches in real-life conditions.

Materials and contact resistance

Materials

For our standard switches, we use high-quality, cadmium-free plastics which are optimized for the intended application. As a rule, we seek to avoid the use of toxic or hazardous materials. You can find out more about our materials policy by consulting our hazardous substances exclusion list.

Behaviour of materials in fire

Insulating materials which are directly connected to electrically conductive parts are classified according to their degree of flammability. Most of the materials we use to manufacture housings are self-extinguishing and categorised under the UL 94 V0 standard.

Tracking resistance

Most of the insulating materials we use in our snap switches have a proof tracking index of PTI 250 (PTI 300, e.g. D4) or PTI 175 (PTI 250, e.g. DB, DC). This means that they are capable of 50 drops of test fluid at a test voltage of 250 V without producing any leakage current (IEC 60112).

RoHS

Switches without leads already conform to RoHS. Switches with leads are available in RoHS-conforming models on request. In case of further processing with lead-free soldering, the product-specific solder recommendations must be heeded.

Glow wire test

The insulation materials used for snap switches with ENEC approval fulfil the required filament tests GWFI according to the household appliance standard IEC 60335-1 at 850 °C and GWIT at 775 °C or alternatively the filament test GWT at 750 °C.

Contact resistance

The contact resistance of snap switches is composed of the contact resistance and the resistance of the conductive parts. It depends primarily on the construction and the contact material. The contact resistance of silver contacts is max. 100 mΩ, of gold contacts max. 50 mΩ when they are new.

Insulation resistance

The insulation resistance between the conductive parts of our snap switches and a conductive underlay or between the open contacts exceeds 10 MΩ when they are new, measured over a period of one minute at room temperature with 500 V DC.
Caution: humidity and soiling can decrease the insulation resistance.

Designations

ASA	Acrylonitrile-styrene-acrylicester
LCP	Liquidcristal polymer
LSR	Liquid silicone rubber
PA	Polyamide
PBT	Polybutyleneterephthalate
PET	Polyethyleneterephthalate
POM	Polyacetal
PPHS	Polyphenylene sulphide
PPS	Polyether sulphone
SI	Silicone
TPE	Thermoplastic elastomer
VMQ	Vinyl-methyl-polysiloxane

Degree of flammability UL	ICE / VDE	In vertical flammability test, goes out after no more than	Drops of molten material capable of igniting wadding	Max. duration of afterglow
V-0	FV-0	5 seconds	no	30 seconds
V-1	FV-1	25 seconds	no	30 seconds
V-2	FV-2	25 seconds	possibly	60 seconds
HB	FH	Burning rate in horizontal flammability test: up to 3 mm thick < 7.5 mm/min; over 3 mm thick > 3.8 mm/min		

Approvals, markings and protection

Approvals

ENEC -	VDE	
ENEC -	KEMA	
UL USA		
UL USA and Canada		

Remark

ENEC is the abbreviation for »European Norms Electrical Certification«. The ENEC mark is a common European safety certification mark, based on testing to harmonized European safety standards and includes switches for appliances in accordance with EN61058.

Degree of protection

Degrees of protection are expressed in terms of compliance with IEC 60529. They are designated by the letters IP followed by two numbers. The first number indicates the extent to which the switch is protected against contact with live parts and the ingress of solid parts; the second number indicates the extent to which it is protected against the ingress of water. For the most part, our switches are covered by the following types of protection.

IP00	No special protection
IP40	Protected against access solid foreign objects of 1 mm diameter and greater
IP50	Dust-protected
IP65	Dustproof and protected against flowing water
IP67	Dustproof and protected against short-term immersion

Switch markings (Example)

EN61 058-1	**10A**	**(3)A**	**250V~**	**μ**	**40T85**	**5E4**
	Rated current resistive load	Rated current motor load	Rated voltage	Microdisconnection contact gap < 3 mm	Rated ambient temperature (–40 °C to +8 5 °C)	Operation cycles 50.000

UL 1054	**10 A**	**1/2 HP**	**125-250 V AC**
	Rated current inductive load	Rated current motor load	Rated voltage

Assembly and installation

Please note:

Cherry snap switches should only be installed by trained staff. Generally, adherence to the required air gap and creepage distance must be ensured with suitable measures. These must also be adhered to for lines connected to the switch.
If installation is to occur on a conductive surface, insulating panels must be used. Under some circumstances, their use is also required between switches installed alongside one another and plug-in connections. Switches can be installed in any position. Power transmission to the connections of the switch is not permitted. When fastening with screws, screws with a co-planar contact surface must be used (e.g. in accordance with DIN 84, DIN 912). Smooth, solid surfaces are suitable for installation.
Exceeding of the following tightening torque values is not permissible. We recommend trial installations. If you wish to install your switches using coupling pins, we would be happy to advise you on suitable parameters.

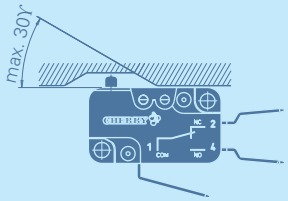
Please note:

If components are likely to be subjected to vibrations, we advise you to take additional measures to secure them. With solder connections, the product-specific solder recommendations must be heeded in order to prevent damage or destruction of the switches.

Please note:

Cleaning agents and solvents in proximity to the switches can impair their function, especially in case of watertight models. When using greases (especially mineral oil-based ones), we recommend consultation with ZF Electronics. The switching action may be initiated by a force acting vertically on the actuator, or by an angled actuation lever.

Example:



The angle of the lever in relation to the top of the switch housing should not exceed 30°. The precise angle will also depend on the actuating speed, combination of materials, surface characteristics and so on. In case of auxiliary actuators with rollers or simulated rollers, steps should be taken to ensure that the lever does not impede its own action. This means that the direction of actuation should be away from the actuator's mounting point towards the roller, and the angle of actuation should be adjusted to allow for the geometry of the actuation system. We would always recommend a preliminary discussion with ZF Electronics.

Please note:

The actuator may not be pre-stressed when at rest. When actuated, the switch should travel well beyond the switching point. for at least 50% of the predefined overtravel, in order to ensure that full contact is made.
It is quite unacceptable for the switch to exceed the specified overtravel or end position. Using the switch as a mechanical end stop should be avoided. A high-impact actuation of the switch can have a negative effect on the switch's mechanical life.

Switch	Screw	max. tightening torque
DH	M 1,6	10 N cm
DG	M 2	13 N cm
DB, DZ	M 2,3	12 N cm
DC	M 2,3	20 N cm
D3, D4	M 3	60 N cm

Order code/Preferred parts

Order code

The order code is an 8-digit combination, consisting of letters and numbers which describes the unique characteristics of a switch.
The following scheme gives an abstract on the composition of the order code:

Order code Snap switches (example)

Switch type (1./2. digit)	Electrical rating (3. digit)	Actuator shape (4. digit)	–	Terminals and fixation pins (5./6. digit)	Auxiliary actuator options (7./8. digit)
DR	1	P	–	AL	AO

Order code Keymodules (example)

Keymodule type (1./2. digit)	Contact/current material (3. digit)	Number of contacts/functions (4. digit)	–	Operating characteristics / actuator force (5. digit)	Keysystem configuration (6. digit)	Diode (7. digit)	Pins (8. digit)
MX	1	A	–	1	1	N	M

Preferred parts

The product pages in this brochure contain for each product a list of most common part numbers / preferred versions. The variants in this list are usually those with a high availability and mostly flexible order quantities, which can be also found as a stocking item at our distributors

Generally we can produce any switch variant on a customer-specific basis. But we kindly ask for your understanding that this may eventually cause longer lead-times or the requirement for certain minimum order quantities.

The complete overview of all possible switch variants can be found in the dedicated technical specification for each product which we will be pleased to provide you with on demand.

A checklist on the key parameters and requirements to identify the best suitable product can be found on the fold-out page at the back cover.

Please also make use of this checklist by making a photocopy, fill it out with your requirements and fax it to one of our regional offices on the back cover. We will be pleased to advise you!

Product overview

General purpose switches	Type	Features	Size in mm	Switched current	Switched voltage	Operating force	Actuator travel	Ambient temperature min./max.
	E	Single pole	46,3x16,26x16,26	0,1-30,1 A	250 V AC	425 - 850 cN	3,81 mm	-40 °C/+150 °C
	E	Double pole	46,05x28,58x16,36	0,1-30,1 A	250 V AC	850 - 1280 cN	3,81 mm	-40 °C/+150 °C
Miniature switches	**Type**	**Features**	**Size in mm**	**Switched current**	**Switched voltage**	**Operating force**	**Actuator travel**	**Ambient temperature min./max.**
	D3 >3 mm	contact gap > 3 mm	27,8x17,6x10,3	4–10 A	250 V AC	500 cN	2,6 mm	-40 °C/+85 °C
	D3	Standard	27,8x15,9x10,3	16 A	250 V AC	380 cN	2,6 mm	-40 °C/+85 °C
	D4	Standard	27,8x15,9x10,3	0,1–21 A	250 V AC	45–400 cN	2,6 mm	-40 °C/+150 °C
Subminiature switches	**Type**	**Features**	**Size in mm**	**Switched current**	**Switched voltage**	**Operating force**	**Actuator travel**	**Ambient temperature min./max.**
	DB	Standard	20,0x9,65x6,5	0,1–10 A	250 V AC	70–280 cN	1,6 mm	-40 °C/+120 °C
	DC	IP67	20,0x10,05x6,5	0,1–10 A	250 V AC	200–340 cN	1,6 mm	-40 °C/+120 °C
	DZ	Pos. break action	20,0x9,7x6,5	3 (3) A	250 V AC	220 cN	1,6 mm	-20 °C/+85 °C
	DCJK	IP67	20,0x10,2x6,4	0,1–10 A	12 V DC	300 cN	1,6 mm	-40 °C/+120 °C
Subsubminiature switches	**Type**	**Features**	**Size in mm**	**Switched current**	**Switched voltage**	**Operating force**	**Actuator travel**	**Ambient temperature min./max.**
	DJ	IP67	15,2x8,15x6,4	0,005–2 A	12 V DC	120 cN	2,0 mm	-40 °C/+85 °C
	DK	IP65	14,7x6,8x5,4	0,005–2 A	12 V DC	75 cN	2,0 mm	-40 °C/+85 °C
	DR	Standard	13,7x6,8x5,4	0,005–2 A	12 V DC	75 cN	2,0 mm	-40 °C/+85 °C
	DG	Standard	12,8x6,5x5,8	0,05-2 A 1-3 A	30 V DC 125 V AC	75–140 cN	0,7 mm	-25 °C/+85 °C
Ultraminiature switches	**Type**	**Features**	**Size in mm**	**Switched current**	**Switched voltage**	**Operating force**	**Actuator travel**	**Ambient temperature min./max.**
	DH	Standard	8,2x6,2x2,7	0,005–0,5 A	30 V DC	90 cN	0,85 mm	-25 °C/+70 °C
Center-off switches	**Type**	**Features**	**Size in mm**	**Switched current**	**Switched voltage**	**Operating force**	**Actuator travel**	**Ambient temperature min./max.**
	NM02	IP67	13,0x15,1x5,5	0,05–0,1 A	12 V DC	50 cN	2x40°	-25 °C/+85 °C
Pushbutton switches	**Type**	**Features**	**Size in mm**	**Switched current**	**Switched voltage**	**Operating force**	**Actuator travel**	**Ambient temperature min./max.**
	E6/F6	Single pole	31,8x17,3x26,7	0,1-16 A	125/250 V AC	285 - 585 cN	3,2 mm	-40 °C/+85 °C
	E7/F7	Double pole	39,9x17,3x26,7	0,1-16 A	125/250 V AC	285 - 585 cN	3,2 mm	-40 °C/+85 °C
	F8	Line interrupt	39,9x17,4x32,9	0,1-16 A	125/250 V AC	866 cN	6 mm	-25 °C/+85 °C

General purpose switch E-Series

Electrical rating and operating life

Switch series	Electrical rating according to EN 61058-1	Electrical rating according to UL 1054	Electrical life for 40T85 (operations) to EN	to UL
E13/E19	N/A	15A, 125/250VAC; 3/4HP, 125VAC; 1-1/2HP, 250VAC; 2A, 48VDC (E13 Only)	N/A	6.000*
E19A (mixed ratings)	N/A	15A, 125/250VAC; 3/4HP, 125VAC; 1-1/2HP, 250VAC; 0.1A, 125VAC	N/A	6.000
E14/E25	N/A	25A, 125/250VAC; 1HP, 125VAC; 2HP, 250VAC; 2A, 48VDC (E14 Only)	N/A	6.000
E20	N/A	20A, 125/250VAC; 1HP, 125VAC; 2HP, 250VAC	N/A	6.000
E28/E29	N/A	30.1A, 125/250/277VAC; (UL Approved Only — Resistive Load Only)	N/A	6.000
E30	N/A	30.1A, 125/250VAC; 1HP, 125VAC; 2HP, 250VAC (UL Only)	N/A	6.000
G13/G20	N/A	0.1A, 125VAC; 0.1A, 30VDC (G13 Only)	N/A	6.000

Technical specifications

Electrical	
Ambient temperature	105°C Std. (150°C and 200°C optional – E13, E14, E19, E20, G13) 85°C Std. (E28 and E29), 85°C Std. (150°C optional) E25
Flammability rating	UL94 HB
Materials	
Housing	General Purpose Phenolic
Actuator	Thermoplastic Nylon
Common Terminal	Brass (E13, E19, E19A, G13, G20), Silver-Plated Brass (E14, E20), Silver-Plated Copper (E28, E29, E30)
NO and NC terminals	Brass (E13, E19, E19A, G13, G20) Copper (E14, E20, E28, E29, E30)
Moving blade	Brass (E13, E19, E19A, G13, G20) Silver-Plated Beryllium Copper (E14, E20, E28, E29, E30)
Spring	Stainless Steel
Auxiliary actuator	Cold-Rolled Steel (Nickel-Plated)
Roller	Sintered Stainless Steel
Contacts	Gold Crosspoint (G13, G20, E19A) Silver-Cadmium Oxide (E13, E14, E19, E19A, E20, E28, E29, E30) Silver Alloy (E19A, E29, E30)
Approvals	c US (T200 E19, E20)

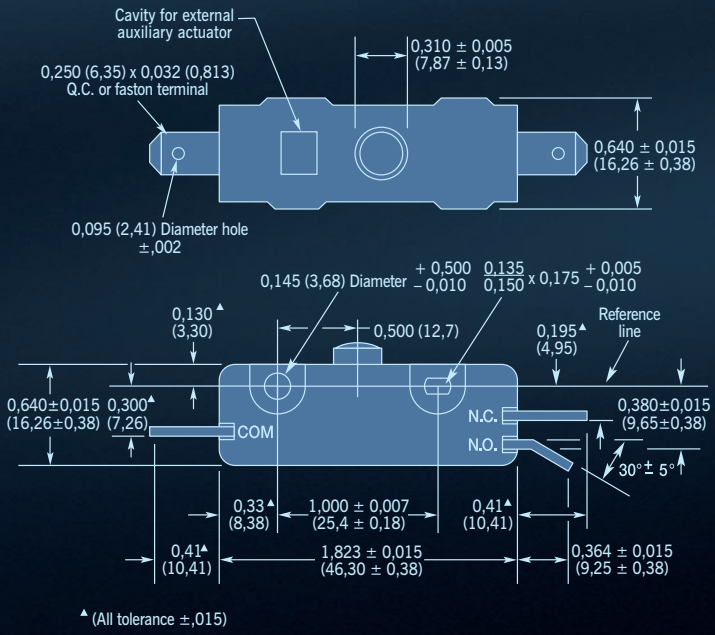
*Indicates 100K life available.

Features

- 5 current ratings
- Choice of actuator styles
- 3 contact arrangements
- Long-life coil spring mechanism
- High-temperature 150°C and 200°C available on select models (consult factory)

Dimensions in inch (mm)

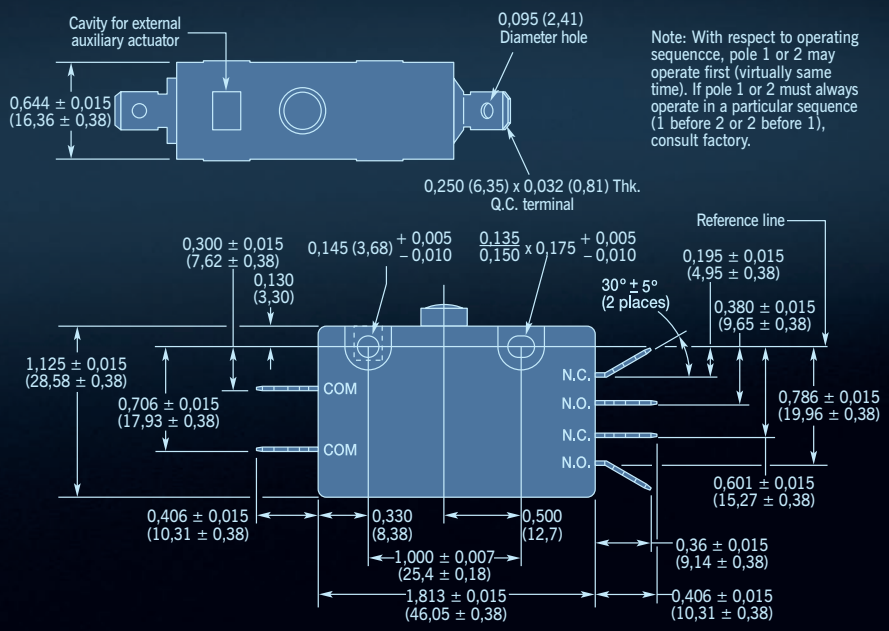
Single pole version



Preferred parts

Type	Order code	Electrical rating EN	Electrical rating UL	Terminals	Auxiliary actuator	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)
Single pole version	E13-00E	–	15A, 125/250 V AC 3/4HP, 125 V AC 1-1/2HP, 250 V AC 2A, 48 V DC	Q.C. terminals 6,35 x 0,8 mm	–	425	7,24 ± 0,51	1,27	2,54	0,4
	E13-00H	–	15A, 125/250 V AC 3/4HP, 125 V AC 1-1/2HP, 250 V AC 2A, 48 V DC	Q.C. terminals 6,35 x 0,8 mm	Straight, length 38,1 mm	100	7,93 ± 1,57	6,35	4,75	2,4
	E13-00J	–	15A, 125/250 V AC 3/4HP, 125 V AC 1-1/2HP, 250 V AC 2A, 48 V DC	Q.C. terminals 6,35 x 0,8 mm	Thermoplastic over-travel button	425	17,02 ± 0,76	1,27	2,74	0,4
	E13-00M	–	15A, 125/250 V AC 3/4HP, 125 V AC 1-1/2HP, 250 V AC 2A, 48 V DC	Q.C. terminals 6,35 x 0,8 mm	Metal, over-travel button	425	20,63 ± 0,76	1,27	5,54	0,4
Double pole version	E19-00H	–	15A, 125/250 V AC 3/4HP, 125 V AC 1-1/2HP, 250 V AC	Q.C. terminals 6,35 x 0,8 mm	Straight, length 38,1 mm	205	7,92 ± 1,57	6,99	4,75	2,4
	E19-00K	–	15A, 125/250 V AC 3/4HP, 125 V AC 1-1/2HP, 250 V AC	Q.C. terminals 6,35 x 0,8 mm	Roller actuator, length 35,3 mm	212	18,24 ± 1,57	6,35	4,75	2,4
	E19-50H	–	15A, 125/250 V AC 3/4HP, 125 V AC 1-1/2HP, 250 V AC	Q.C. terminals 6,35 x 0,8 mm	Straight, length 44,5 mm	130	7,14 ± 1,57	10,16	4,75	3,6
	E20-00K	–	20A, 125/250 V AC 1HP, 125 V AC 2HP, 250 V AC	Q.C. terminals 6,35 x 0,8 mm	Roller actuator, length 17,5 mm	425	21,84 ± 1,57	8,84	3,96	1,1

Double pole version



D3 miniature switch

Technical specifications

Contact configuration	S.P.D.T, S.P.S.T.-N.O., S.P.S.T.-N.C. (see table)
Conact gap	< 3 mm (μ) or > 3 mm
Switching voltage	250 V AC
Switched current max.	10 A (> 3 mm) or 16 A (< 3 mm, μ) (see table)
Total travel	2,6 mm without auxiliary actuator
Mechanical life	1 x 10⁶ operations (> 3 mm) 10 x 10⁶ operations (< 3 mm, μ)
Electrical life (max. load)	> 50.000 switching cycles acc. to EN 61058 > 10.000 switching cycles acc. to UL 1054 (>3 mm) > 6.000 sw. cycles acc. to UL 1054 (<3 mm, μ)
Ambient temperature	40T85
Proof tracking index	PTI 250
Materials	
Case / cover	PET (UL94 V-0)
Actuator	POM / PET
Contacts	AgNi
Terminals	Cu / CuZn
Auxiliary actuator	nickel-plated steel, alternative stainless steel
Approvals	

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

- Standard switch proven millions of times over, extremely frictional, self-cleaning contacts
- Version with contact gap > 3 mm on an identical basis
- Flexible thanks to various auxiliary actuators and various mounting points
- Wide variety of terminal types
- Approved according to EN 61058 and UL 1054

Switching parameters

Model		Max. Operating force (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)
Without auxiliary actuator	> 3 mm	500	1,9	0,7	1,2	16,0	14,4 ± 0,5
Without auxiliary actuator	< 3 mm	400	1,5	1,2	0,3	16,0	14,7 ± 0,5

Electrical rating and variants

Electrical rating according to		Availability				Housing mark
EN 61058	**UL 1054**	**S.P.S.T. - N.O**	**S.P.S.T. - N.C.**	**S.P.T.D**	**Contact gap**	
4 (3) A, 250 V AC	4 A, 125–250 V AC	yes	–	–	> 3 mm	D36
8 (8) A, 250 V AC	10 A, 125–250 V AC	–	yes	yes	> 3 mm	D3B
10 (10) A, 250 V AC	10 A, 125–250 V AC	yes	–	–	> 3 mm	D3F
16 (4) A, 250 V AC	16 A, 125–250 V AC	yes	yes	yes	< 3 mm (μ)	D38

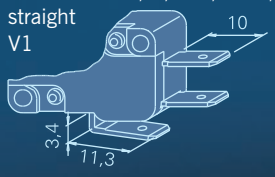
Additional breaking capacities on request

Preferred parts

Order code	Electrical rating EN	Electrical rating UL	Terminals	Auxiliary actuator	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)
D364-V1AA	4 (3) A, 250 V AC	4 A, 125 - 250 V AC	Q.C. terminals 6,3 x 0,8 mm, straight	–	500	14,4 ± 0,5	1,9	0,7	1,2
D3B6-V3AA	8 (8) A, 250 V AC	10 A, 125 - 250 V AC	Q.C. terminals 6,3 x 0,8 mm, dog-leg	–	500	14,4 ± 0,5	1,9	0,7	1,2
D3F4-S8AA	10 (10) A, 250 V AC	10 A, 125 - 250 V AC	Solder terminals with temperature stop	–	500	14,4 ± 0,5	1,9	0,7	1,2
D3F4-V1AA	10 (10) A, 250 V AC	10 A, 125 - 250 V AC	Q.C. terminals 6,3 x 0,8 mm, straight	–	500	14,4 ± 0,5	1,9	0,7	1,2

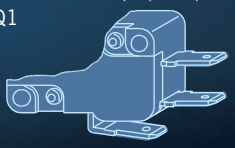
Terminals

Q.C. terminals, 6,3 x 0,8 mm, straight
V1



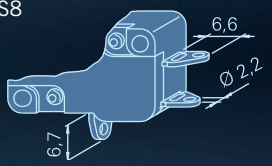
Q.C. terminals, 6,3 x 0,8 mm, dog-leg
V3

Q.C. terminals, 4,8 x 0,8 mm
Q1

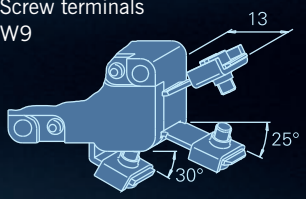


Q.C. terminals, 4,8 x 0,8 mm
dog-leg
Q3

Solder terminals
S8

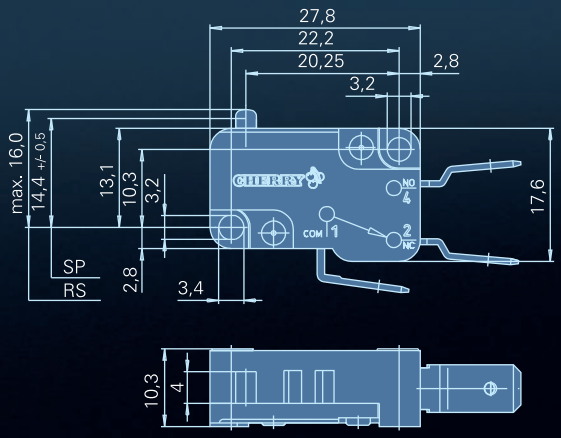


Screw terminals
W9

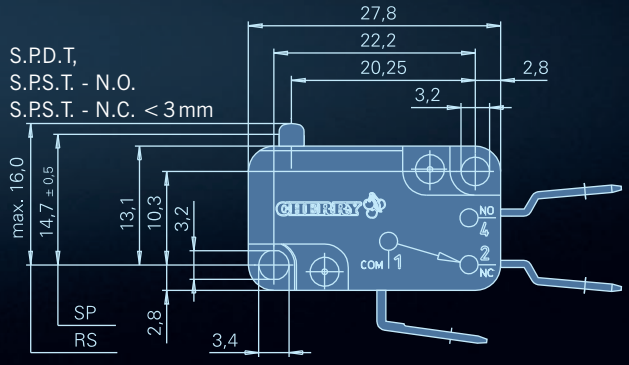


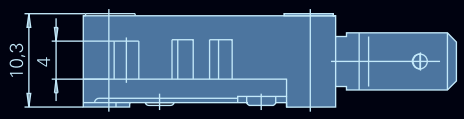
Dimensions in mm

S.P.D.T,
S.P.S.T. - N.C. > 3 mm



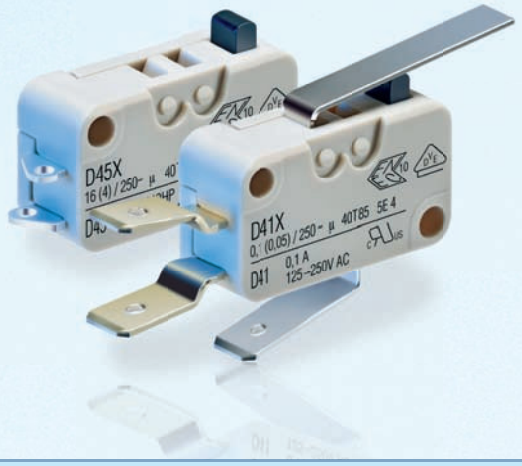
S.P.D.T,
S.P.S.T. - N.O.
S.P.S.T. - N.C. < 3 mm





Screw terminals W9

D4 miniature switch



Technical specifications

Contact configuration		S.P.D.T., S.P.S.T. - N.O., S.P.S.T. - N.C
Conact gap		< 3 mm (μ)
Switching voltage		250 V AC (400 V on request)
Switched current max.		< 0,1 to 21 A, depending on model
Total travel		2,6 mm
Mechanical life		see table
Electrical life		see table
Ambient temperature		40T85; 40T125; 40T150
Proof tracking index		PTI 300
Materials		
Housing / cover		PET (UL94 V-0)
Actuator		POM (max. 85 °C) alternative PET (UL94 V-0)
Contacts	**D41**	AuAgPt (Crosspoint)
	D42	Ag
	D43 - D48	AgNi
Terminals		CuZn alternative Cu
Auxiliary actuator		nickel-plated steel, alternative stainless steel
Approvals		
Degree of protection (switch interior)		IP40

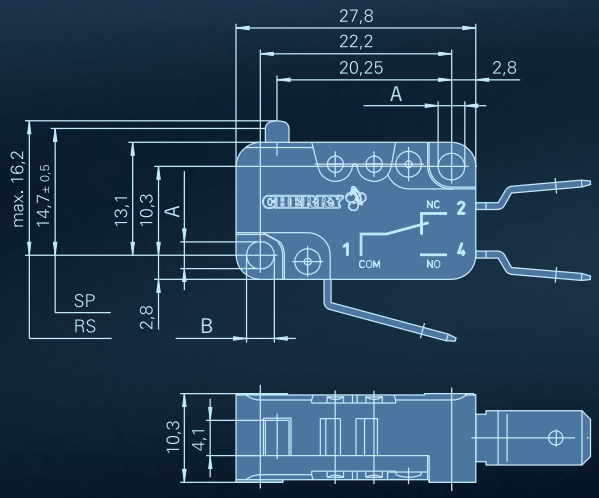
For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

Mounting holes

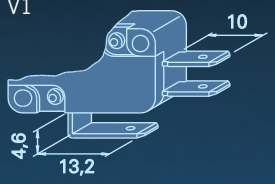
Hole dimensions	**Measurement „A“**	**Measurement “B”**
International version	3,1 +0,15 mm	3,3 +0,15 mm
US version	2,9 ±0,05 mm	3,2 ±0,05 mm

Dimensions in mm

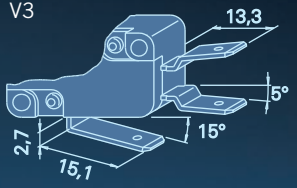


Terminals

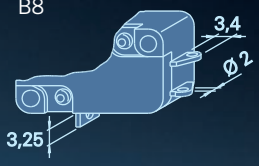
Q.C. terminal, 6,3x0,8mm, straight
V1



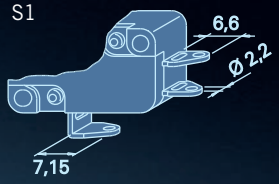
Q.C. terminal, 6,3x0,8mm, dog-leg
V3



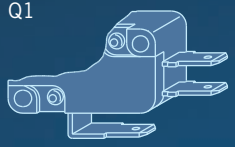
Solder terminal, short
B8



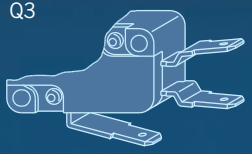
Solder terminal with temperature-stop
S1



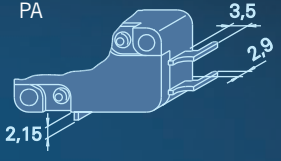
Q.C. terminal 4,8x0,8 straight
Q1



Q.C. terminal, 4,8x0,8mm dog-leg
Q3

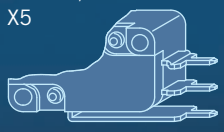


PCB terminal 1,3x0,8mm housing side
PA

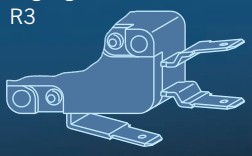


PCB terminal 1,3x0,8mm cover side
PB

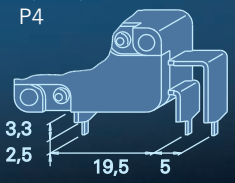
Q.C. terminal RAST 2,5
X5



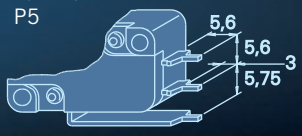
Q.C. terminal 4,8x0,5mm dog-leg
R3



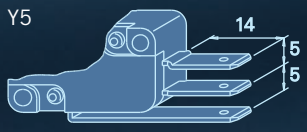
PCB terminal 1,3x0,5mm underside
P4



PCB terminal 1,3x0,8mm rear
P5

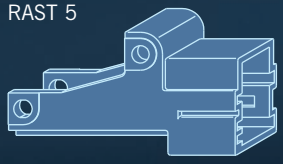


Q.C. terminal 6,3x0,8mm RAST 5
Y5



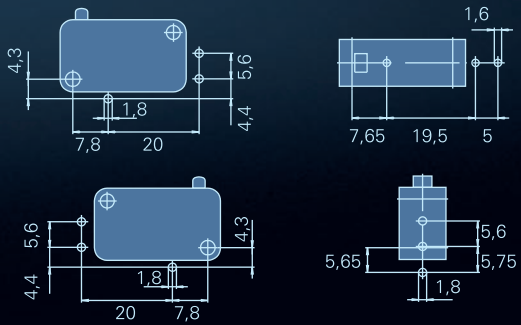
Q.C. terminal 2,8x0,8mm bifurcated dog-leg
C3

Connector housing for Q.C. terminals RAST 5

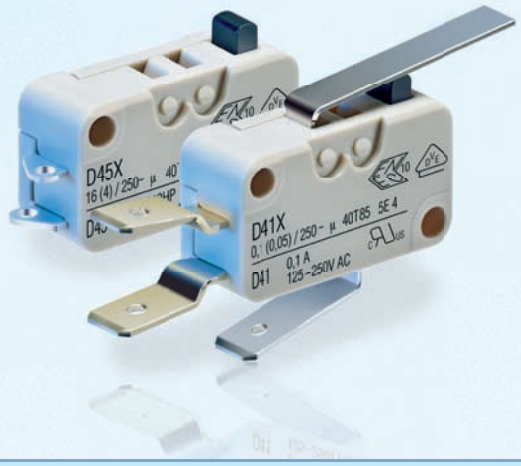


Other terminals available on request.

Drilling patterns for PCB terminals



D4 miniature switch



Electrical rating and operating life

Electrical rating according to		Electrical life for 40T85* (operations)		Mechanical lifetime actuator material		Max. operating force (cN)	Housing mark
EN 61058-1	UL 1054	acc. to EN	acc. to UL	POM	PET		
Standard operating force							
0,1 (0,05) A, 250 VAC	0,1 A 125–250 VAC	50.000	6.000	10×10^6	1×10^6	170	D4 1 Y
3 (1) A, 250 VAC	3 A, 125–250 VAC 1/10 HP 250 VAC	50.000	6.000	10×10^6	1×10^6	170	D4 2 Y
6 (2) A, 250 VAC	5 A, 125–250 VAC, 1/4 HP 250 VAC	50.000	6.000	5×10^6	25×10^4	170	D4 3 Y
10 (3) A, 250 VAC	10 A, 1/2 HP, 125–250 VAC	50.000	6.000	1×10^6	1×10^5	285	D4 4 Y
16 (4) A, 250 VAC	15 A, 1/2 HP, 125–250 VAC	50.000	6.000	2×10^5	1×10^5	400	D4 5 Y
10 (3) A, 400 VAC							
Light operating force							
0,1 (0,05) A, 250 VAC	0,1 A, 125–250 VAC	50.000	6.000	10×10^6	1×10^6	45**	D4 1 X
3 (1) A, 250 VAC	3 A, 125–250 VAC, 1/10 HP 250 VAC	50.000	6.000	10×10^6	1×10^6	45**	D4 2 X
6 (2) A, 250 VAC	5 A, 125–250 VAC, 1/4 HP 250 VAC	50.000	6.000	10×10^6	5×10^5	45	D4 3 X
10 (3) A, 250 VAC	10 A, 1/2 HP, 125–250 VAC	50.000	6.000	10×10^6	25×10^4	75	D4 4 X
16 (4) A, 250 VAC	15 A, 1/2 HP, 125–250 VAC	50.000	6.000	10×10^6	25×10^4	100	D4 5 X
21 (8) A, 250 VAC	21 A, 250 VAC 1 HP 125 VAC 2 HP 250 VAC	10.000	6.000	3×10^6	25×10^4	150	D4 8 X

* Operating life for 40T125 and 40T150 on request
** Lower operating forces and additional electrical ratings on request

Switching parameters

Model	Type	Max. operating force (cN)		Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)
		Standard	Light					
Without auxiliary actuator	D41	170	45	1,2	1,3	0,3	16,2	14,7 ± 0,5
	D42	170	45	1,2	1,3	0,3	16,2	14,7 ± 0,5
	D43	170	45	1,2	1,3	0,3	16,2	14,7 ± 0,5
	D44	285	75	1,2	1,3	0,3	16,2	14,7 ± 0,5
	D45	400	100	1,2	1,3	0,3	16,2	14,7 ± 0,5
	D48	–	150	1,6	1,2	0,3	16,2	14,7 ± 0,5

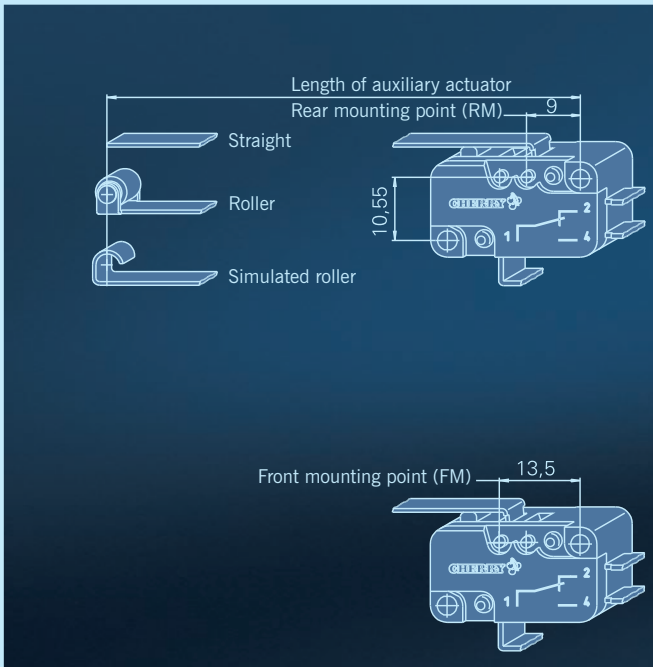
Preferred parts

Type	Order code	Electrical rating EN	Electrical rating UL	Terminals	Auxiliary actuator	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)
US mounting holes	D41C-R1AA*	0.1(0.05)A, 250V~	0,1 A, 125/250 V AC	Q.C. terminals 4,8x0,5mm, straight	–	170	14,7 ± 0,5	1,2	1,3	0,3
	D41C-R1LD*	0.1(0.05)A, 250V~	0,1 A, 125/250 V AC	Q.C. terminals 4,8x0,5mm, straight	Straight RM rear, length 35,6 mm	86	15,3 ± 1,2	3,2	2,2	0,8
	D42L-R1ML	3(1)A, 250V~	3 A, 125/250 V AC 1/10HP, 250VAC	Q.C. terminals 4,8x0,5mm, straight	Straight FM front, length 74,5 mm	6	15,2 ± 4,2	12,7	7,9	2,5
	D44L-R1AA	10(3)A, 250V~	10 A, 1/2HP, 125/250 V AC	Q.C. terminals 4,8x0,5mm, straight	–	75	14,7 ± 0,5	1,2	1,3	0,3
	D44L-R1LD	10(3)A, 250V~	10 A, 1/2HP, 125/250 V AC	Q.C. terminals 4,8x0,5mm, straight	Straight RM rear, length 35,6 mm	40	15,3 ± 1,2	3,2	2,2	0,8
	D44L-R1RA	10(3)A, 250V~	10 A, 1/2HP, 125/250 V AC	Q.C. terminals 4,8x0,5mm, straight	Roller RM rear, length 20,6 mm	75	20,5 ± 0,8	1,2	1,0	0,3
	D45L-R1LL	16(4)A, 250V~	15 A, 1/2HP, 125/250 V AC	Q.C. terminals 4,8x0,5mm, straight	Straight RM rear, length 69,9 mm	22	15,2 ± 3,2	7,6	4,7	1,7
International mounting holes	D419-V3AA	0.1(0.05)A, 250V~	0,1 A, 125/250 V AC	Q.C. terminals 6,3x0,8mm, dog-leg	–	45	14,7 ± 0,5	1,2	1,3	0,3
	D429-V1AA	3(1)A, 250V~	3 A, 125/250 V AC 1/10HP, 250VAC	Q.C. terminals 6,3x0,8mm, straight	–	45	14,7 ± 0,5	1,2	1,3	0,3
	D449-V1AA	10(3)A, 250V~	10 A, 1/2HP, 125/250 V AC	Q.C. terminals 6,3x0,8mm, straight	–	75	14,7 ± 0,5	1,2	1,3	0,3
	D459-B8AA	16(4)A, 250V~	15 A, 1/2HP, 125/250 V AC	Solder terminals, short	–	100	14,7 ± 0,5	1,2	1,3	0,3
	D459-V3AA	16(4)A, 250V~	15 A, 1/2HP, 125/250 V AC	Q.C. terminals 6,3x0,8mm, dog-leg	–	100	14,7 ± 0,5	1,2	1,3	0,3
	D459-V3LD	16(4)A, 250V~	15 A, 1/2HP, 125/250 V AC	Q.C. terminals 6,3x0,8mm, dog-leg	Straight RM rear, length 35,6 mm	40	15,3 ± 1,2	3,2	2,2	0,8
	D489-V3AA	16(4)A, 250V~	15 A, 1/2HP, 125/250 V AC	Q.C. terminals 6,3x0,8mm, dog-leg	–	150	14,2 ± 0,5	1,8	0,9	0,3

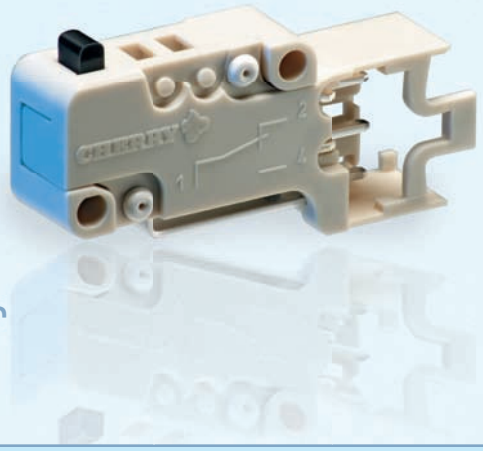
* Versions with standard operating force; other versions with operating force light

Auxiliary actuator options

Model	Mounting point	Length (mm)
Straight	RM rear	21,2
		35,6
		69,9
	FM front	25,7
		40,1
		74,4
Roller	RM rear	20,6
		34,1
	FM front	25,1
		38,6
Simulated Roller	RM rear	20,6
	FM front	25,1



D4 miniature switch with RAST 2.5 connector



Technical specifications

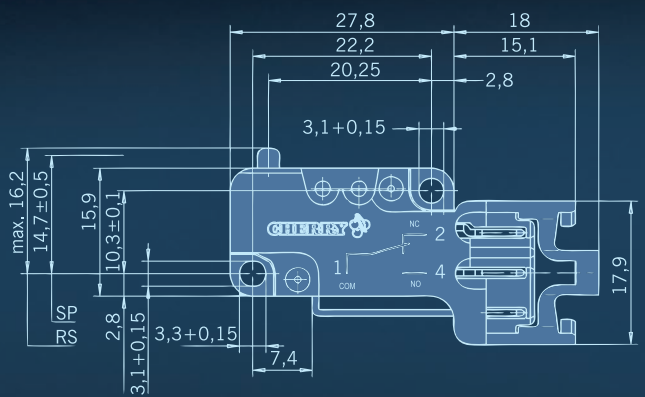
Switched current max.	< 0,1 up to 6 A, depending on model
Ambient temperature	40T85/40T125

All other technical specifications are identical with D4 miniature switch (please see page 28)

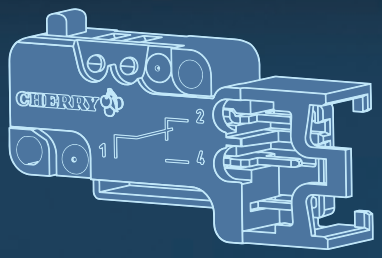
Features

- RAST 2,5 connection technology with integrated connector housing for external locking
- For RAST 2.5 connector with R2,5/2-3adef keying
- Case-sided wire direction
- Preferred connecting system in the white goods industry
- Cost-effective plug-system for the standardization of wire harness assemblies

Dimensions in mm



Terminals D4 RAST 2,5



W4 miniature switch with wiping contact system

Technical specifications

Contact configuration		S.P.D.T., S.P.S.T. - N.O., S.P.S.T. - N.C.
Contact gap		< 3 mm (μ)
Switching voltage		250 V AC
Switched current max.		< 0,1 bis 16 A
Total travel		2,6 mm
Electrical life		50.000
Ambient temperature		40T85
Proof tracking index		PTI 300
Materials		
Housing/Cover		PET (UL 94 V-0)
Actuator		POM alternative PET (UL 94 V-0)
Contacts	**W41**	AuAgPt (Crosspoint)
	W42	Ag
	W44/W45	AgNi
Terminals		CuZn silver-plated
Auxiliary actuator		nickel-plated steel, alternative stainless steel
Approvals		
Degree of protection (switch interior)		IP40

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

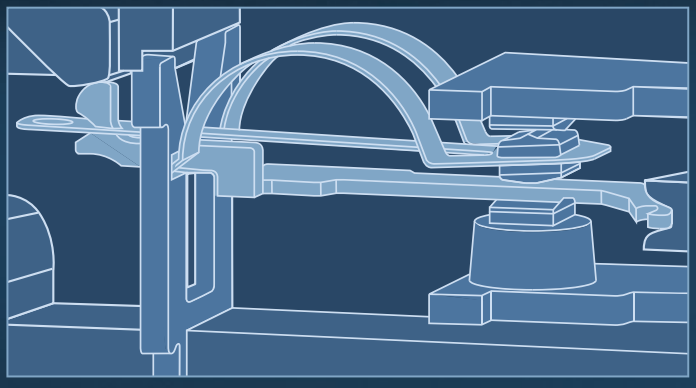
Features

- Wiping contact system
- Suitable for special requirements like capacitor loads
- Fulfills requirements of IEC 60335-1: GWFI at 850 °C, GWIT at 775 °C and GWT 750 °C
- High contact stability thanks to application-specific contact materials for switching currents of 0.1 to 16 A at 250 V AC
- IEC 61058-1 approved
- Terminal versions available upon request

Dimensions in mm

Identical with D4 miniature switch (please see page 28)

Leaf spring contact system



DB subminiature switch

Technical specifications

Contact configuration	S.P.D.T., S.P.S.T. - N.O., S.P.S.T. - N.C.
Contact gap	< 3 mm (µ)
Switching voltage	max. 250 V AC
Switched current	0,1 to 10 A AC, dependig on model (see table)
Operating force	70 to 280 cN without auxiliary actuator, depending on model
Total travel	1,6 mm
Mechanical life	Min. 10 x 10^6 operations (see table)
Electrical life (max. load)	Up to 10^5 operations (see table)
Ambient temperature	-40 to +85 °C /120 °C
Proof tracking index	PTI 175 (PTI 250 on request)
Materials	PET (UL 94 V-0)
Base	PET (UL 94 V-0)
Cover	PBT (UL 94 V-0); PET (UL 94 V-0)
Actuator	PBT (UL 94 V-0) T120, POM (UL 94 HB) T85
Contacts	$AgSnO_2$, AgNi, AuAgPt (Crosspoint)
Terminals	CuZn (silver-plated)
Auxiliary actuator	Stainless steel or plastic
Approvals	depending on model
Degree of protection (switch interior)	IP50

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

- Precision switch with high repeat accuracy
- Available for up to 120 °C operating temperature
- Nominal current up to 10 A at 250 V AC
- Various auxiliary actuators (can also be retrofitted), two mounting positions
- Various application-specific contact materials
- Mechanical operational life up to 15 x 10^6 actuations
- Wide variety of terminal types

Electrical rating and operating life

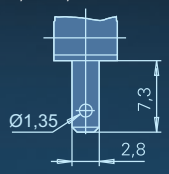
Electrical rating according to		Electrical life at rated load for 40T85* (operations)		Mechanical lifetime	Operating force max. (cN)	Housing mark
EN 61058-1	**UL 1054**	**acc. to EN**	**acc. to UL**			
6A 250 V AC	5 A 125–250 V AC	10.000	6.000	15 x 10^6	150	DB 1
10 (1,5) A, 250 V AC	10,1 A, 125–250 AC, 1/4 HP, 125 V AC	10.000	6.000	10 x 10^6	250	DB 2
0.1 A, 250 V AC	0,1 A 125–250 V AC	50.000	100.000	15 x 10^6	150	DB 3
4 A, 250 V AC	4 A, 125–250 V AC	50.000	6.000	15 x 10^6	90	DB 4
1 A, 250 V AC	1 A, 125–250 V AC	50.000	6.000	15 x 10^6	70	DB 5*
10 (1,5) A, 250 V AC	10.1 A, 125–250 V AC, 1/4 HP, 125 V AC	50.000	6.000	10 x 10^6	280	DB 7*
10 (3) A, 250 V AC	10.1 A, 125–250 V AC, 1/4 HP, 125 V AC	10.000	6.000	10 x 10^6	280	DB L
3 A, 250 V AC	3 A, 125–250 V AC	50.000	6.000	15 x 10^6	90	DB M
6 (2) A, 250 V AC	5 A, 125–250 V AC	50.000	6.000	15 x 10^6	150	DB O

Special versions with lower ratings upon request

* only T85

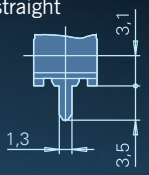
Terminals

Q.C. terminal
2,8x0,5mm

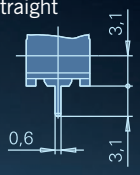


Solder terminal, short

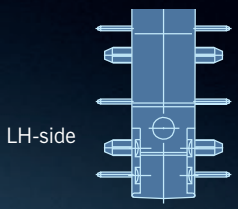
PCB terminal 1,3x0,5mm
straight



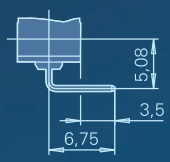
PCB terminal 0,6x0,5mm
straight



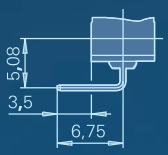
Side definition with
terminals and location pins



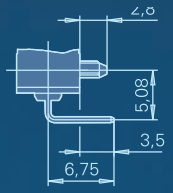
PCB terminal 0,6x0,5mm
RH-side w/o location pins



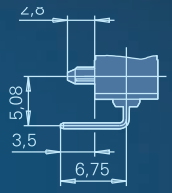
PCB terminal 0,6x0,5mm
LH-side w/o location pins



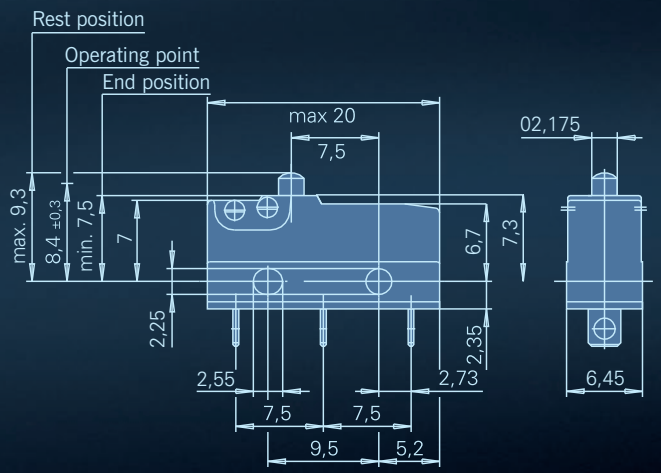
PCB terminal 0,6x0,5mm
RH-side with location pins



PCB terminal 0,6x0,5mm
LH-side with location pins

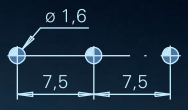


Dimensions in mm

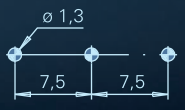


Drilling patterns

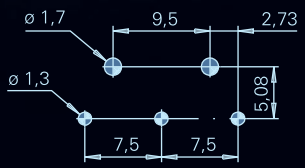
Drilling pattern for PCB terminal
1,3x0,5mm

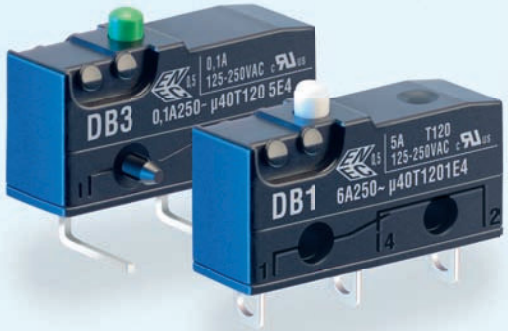


Drilling pattern for PCB terminal
0,6x0,5mm straight/lateral



Drilling pattern for PCB terminal
0,6x0,5mm lateral with location pins





DB subminiature switch

Switching parameters

Model	Type	Operating force max. (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)
Spherical-head actuator or actuator with radius, without auxiliary actuator	DB5	70	1,0	0,6	0,1	9,3	8,4 ± 0,3
	DB1/0/3	150	1,0	0,6	0,1	9,3	8,4 ± 0,3
	DBL	280	1,0	0,6	0,1	9,3	8,4 ± 0,3
	DB2	250	1,0	0,6	0,1	9,3	8,4 ± 0,3
	DB7	280	1,0	0,6	0,15	9,3	8,4 ± 0,3
	DB4	90	1,0	0,6	0,1	9,3	8,4 ± 0,3
	DBM	90	1,0	0,6	0,1	9,3	8,4 ± 0,3

Preferred parts

	Electrical rating				Operating force	Operating point	Max. pretravel	Min. overtravel	Differential travel max.
Order code	EN	UL	Terminals	Auxiliary actuator	(cN)	(mm)	(mm)	(mm)	(mm)
DB1C-A1AA	6 A, 250 VAC	5 A, 125-250 VAC	Solder terminal short	without actuator, spherical-head	150	8,4 ± 0,3	1,0	0,6	0,1
DB1C-A1LB	6 A, 250 VAC	5 A, 125-250 VAC	Solder terminal short	Straight, RM rear, length 4,8	60	10,7 ± 1,3	4,0	2,0	0,5
DB1C-A1RC	6 A, 250 VAC	5 A, 125-250 VAC	Solder terminal short	Straight, RM rear, length 4,7	55	16,2 ± 1,5	4,5	2,0	0,6
DB1C-B1AA	6 A, 250 VAC	5 A, 125-250 VAC	Q.C. terminal, 2,8 x 0,5 mm, straight	without actuator, spherical-head	150	8,4 ± 0,3	1,0	0,6	0,1
DB1C-C1AA	6 A, 250 VAC	5 A, 125-250 VAC	PCB terminal 1,3 x 0,5 mm, straight	without actuator, spherical-head	150	8,4 ± 0,3	1,0	0,6	0,1
DB1C-C1LB	6 A, 250 VAC	5 A, 125-250 VAC	PCB terminal 1,3 x 0,5 mm, straight	Straight, RM rear, length 4,8	60	10,7 ± 1,3	4,0	2,0	0,5
DB1C-C1RC	6 A, 250 VAC	5 A, 125-250 VAC	PCB terminal 1,3 x 0,5 mm, straight	Roller, RM rear, length 4,7	55	15,8 ± 1,3	4,5	2,0	0,6
DB2C-A1AA	10 (1,5) A, 250 VAC	10,1 A, 125-250 VA C 1/4 HP, 125 VAC	Solder terminal short	without actuator, spherical-head	250	8,4 ± 0,3	1,0	0,6	0,1
DB2C-C1AA	10 (1,5) A, 250 VAC	10,1 A, 125-250 VA C 1/4 HP, 125 VAC	PCB terminal 1,3 x 0,5 mm, straight	without actuator, spherical-head	250	8,4 ± 0,3	1,0	0,6	0,1
DB3C-A1AA	0,1 A, 250 VAC	0,1 A, 125-250 VAC	Solder terminal short	without actuator, spherical-head	150	8,4 ± 0,3	1,0	0,6	0,1
DB3C-A1LB	0,1 A, 250 VAC	0,1 A, 125-250 VAC	Solder terminal short	Straight, RM rear, length 4,8	60	10,7 ± 1,3	4,0	2,0	0,5
DB3C-B1AA	0,1 A, 250 VAC	0,1 A, 125-250 VAC	Q.C. terminal, 2,8 x 0,5 mm, straight	without actuator, spherical-head	150	8,4 ± 0,3	1,0	0,6	0,1
DB3C-B1LB	0,1 A, 250 VAC	0,1 A, 125-250 VAC	Q.C. terminal, 2,8 x 0,5 mm, straight	Straight, RM rear, length 4,8	60	10,7 ± 1,3	4,0	2,0	0,5
DB3C-C1AA	0,1 A, 250 VAC	0,1 A, 125-250 VAC	PCB terminal 1,3 x 0,5 mm, straight	without actuator, spherical-head	150	8,4 ± 0,3	1,0	0,6	0,1

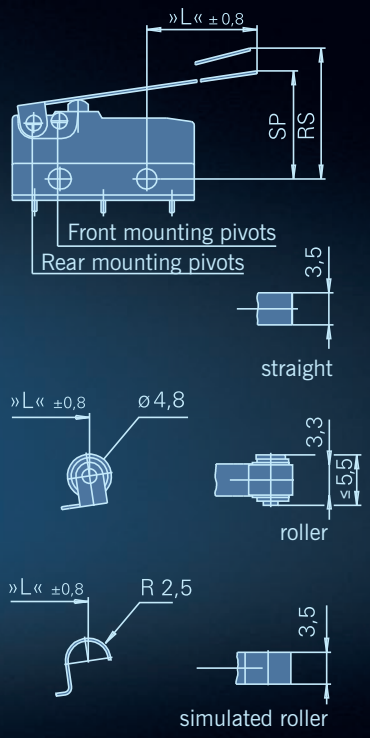
Auxiliary actuator options

Model	Mounting point	Length (mm)	Order code*
Without lever, spherical head lever, radius shape	–	–	
	–	–	
Straight	RM rear	4,8	6141232
		7	6141233
		42	6141234
	FM front	7	6141232
		9,4	6141233
		43,5	6141234
Roller	RM rear	2,5	7140260
		4,7	7140261
		39,7	7140262
	FM front	4,7	7140260
		7,1	7140261
		41,2	7140262
Simulated roller	RM rear	2,5	6141237
		4,7	6141238
		39,7	6141239
	FM front	4,7	6141237
		7,1	6141238
		41,2	6141239
Plastic straight	RM rear	7	6141247
		14	6141253
	FM front	9,4	6141247
		16,2	6141253
Plastic roller	RM rear	5,2	7140299
	FM front	7,3	7140299
Plastic simulated roller	RM rear	5,6	6141249
	FM front	7,9	6141249

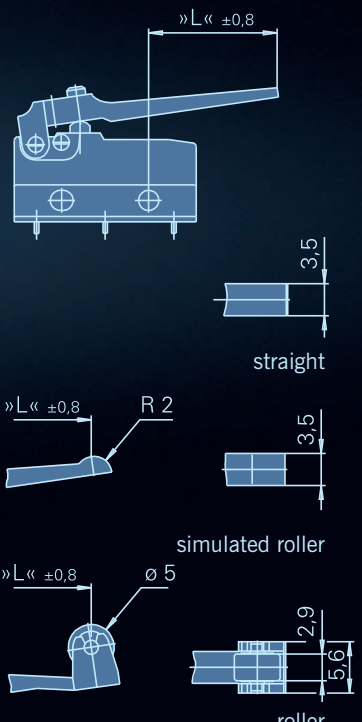
* For retrofitting

Auxiliary actuator options

Steel auxiliary actuator



Plastic auxiliary actuator
with/without adjusting screw



DZ subminiature switch

Technical specifications

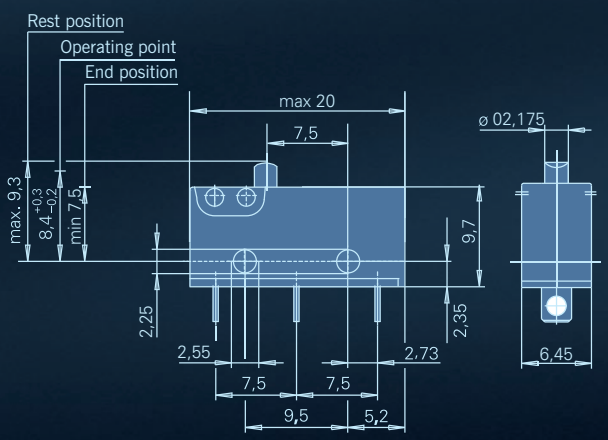
Contact configuration	S.P.D.T., S.P.S.T. - N.C.
Contact gap	< 3 mm (μ)
Switching voltage max.	250 V AC
Switched current	3 (3) A
Operating force	220 cN without auxiliary actuator
Total travel	1,6 mm
Mechanical life	Min. 1×10^6 operations
Electrical life	25E3
Ambient temperature	–20 to +85 °C
Proof tracking index	PTI 250
Materials	
Base / cover	PET (UL 94 V-0)
Actuator	POM (UL 94 HB)
Positive break lever	LCP (UL 94 V-0)
Contacts	$AgSnO_2$
Terminals	CuZn (silver-plated)
Auxiliary actuator	Stainless steel
Approvals	
Degree of protection (switch interior)	IP40

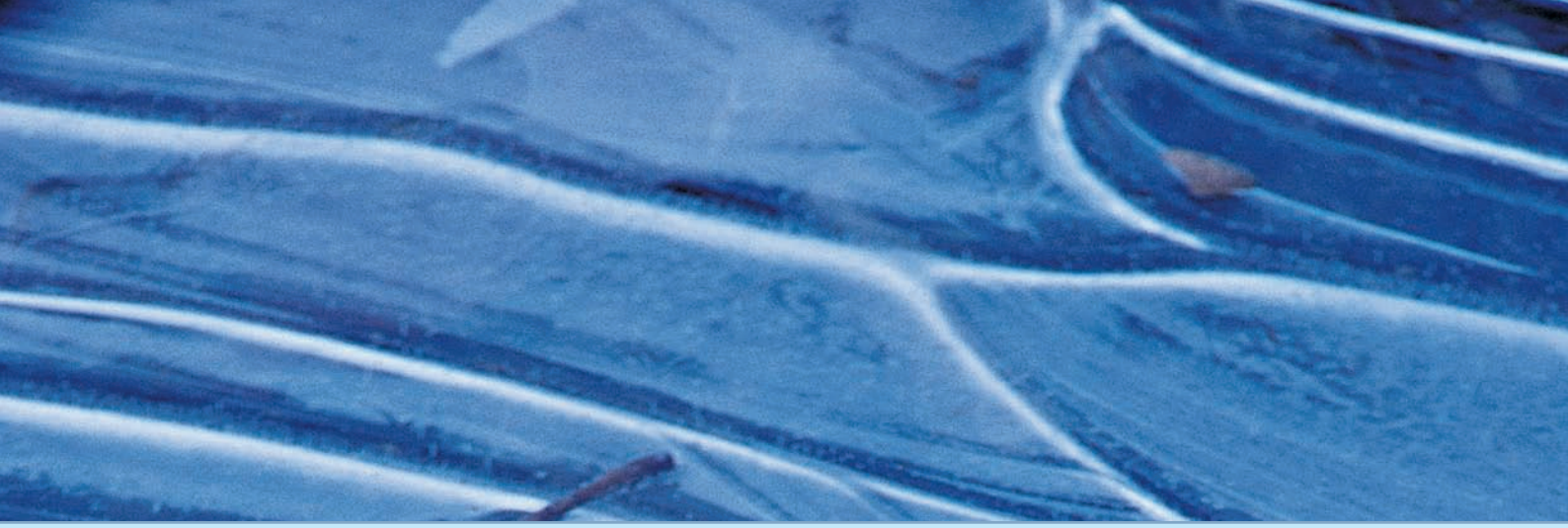
For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

- Positive break action on NC contact
- Precision switch with high switch accuracy
- Various auxiliary actuators (can also be retrofitted) two mounting positions
- Various terminal types available

Dimensions in mm





Electrical rating and operating life

Electrical rating according to		Electrical life at rated load for 40T85* (Operations)				
EN 61058-1	UL 1054	acc. to EN	acc. to UL	Mechanical life	Max. operating force (cN)	Housing mark
3 (3) A 250VAC	5 A 125–250VAC	25.000	6.000	1×10^6	220	DZ 1

Preferred parts

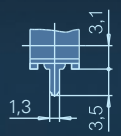
	Electrical rating			Auxiliary actuator	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)
Order code	EN	UL	Terminals						
DZ1G-B1BA	3 (3) A, 250VAC	5 A, 125-250VAC	Q.C. terminal, 2,8x0,5mm, straight	–	220	8,4 +0,3/–0,2	1,0	0,6	0,01 – 0,15

Terminals

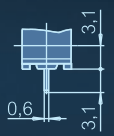
Solder terminal, short

Q.C. terminal 2,8x0,5mm

PCB terminal 1,3x0,5mm

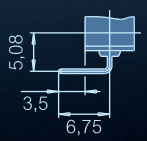


PCB terminal 0,6x0,5mm

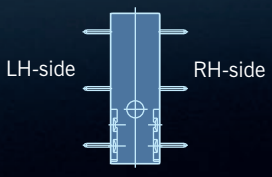


PCB terminal 0,6x0,5mm RH-side w/o location pins

PCB terminal 0,6x0,5mm LH-side w/o location pins



Side definition



Drilling patterns

PCB terminals underside 1,3x0,5mm

PCB terminals u nderside and lateral 0,6x0,5mm

DC subminiature switch

Technical specifications

Contact configuration		S.P.D.T., S.P.S.T. - N.O., S.P.S.T. - N.C.
Contact gap		< 3 mm (μ)
Switching voltage max.		250 V AC
Switched current		0,1 to 10 A AC (see table) depending on model
Operating force		200 to 340 cN without auxiliary actuator depending on model
Total travel		ca. 1,6 mm
Mechanical life		min. 1×10^6 operations (see table)
Electrical life		min 10^4 operations (see table)
Ambient temperature		–40 to +85 °C/120 °C
Model with leads		–40 to +105 °C
Proof tracking index		PTI175, PTI250 auf Anfrage
Materials		
Housing		PBT (UL 94 V-0), PET (UL 94 V-0)
Actuator		POM UL 94 HB (T85), PBT UL 94 V-0 (T120)
Base		PET (UL 94 V-0)
Contacts	**DC1, DC2, DC4**	AgNi
	DC3	AuAgPt (Crosspoint)
Terminals		CuZn (silver-plated)
Auxiliary actuator		Stainless steel or plastic
Sealing gasket		SI, silicon-free alternative available
Leads		Cu, PVC-sheated
Approvals		depending on model
Degree of protection (switch interior)		IP67

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

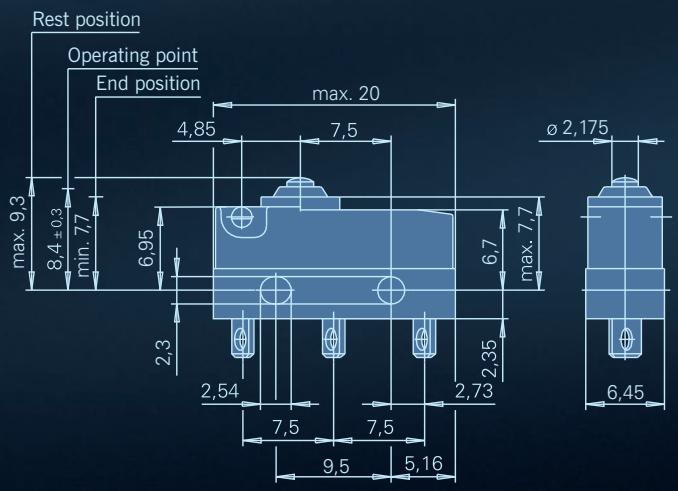
- Sealed switch IP6K7 protection
- Silicon-free variants available
- Models available for 120 °C operating temperature
- Nominal currents from 10 A at 250 V AC
- Various auxiliary actuators available (can also be retrofitted)
- Various application-specific contact materials
- Mechanical operating life min. 1.000.000 actuations
- Wide variety of terminal types

Auxiliary actuator options*

Model	Length (mm)
Without auxiliary actuator	–
Straight	4,8; 8; 42
Roller	2,5; 4,7; 39,7
Simulated roller	2,5; 4,7; 39,7
Plastic straight	7; 14
Plastic roller	5,2
Plastic simulated roller	5,6

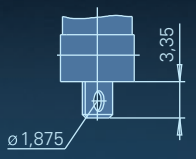
* Order codes identical to DB series, please see page 37

Dimensions in mm

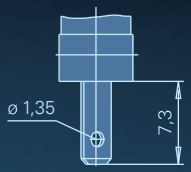


Terminals

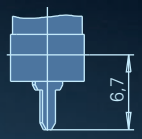
Solder terminal short
max. 30° twisted



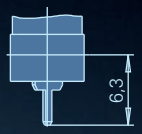
Q.C. terminal 2,8 x 0,5
max. 30° twisted



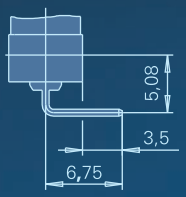
PCB terminal 1,3 x 0,5 mm
max. 30° twisted



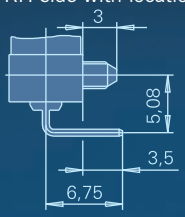
PCB terminal 0,6 x 0,5 mm
max. 30° twisted



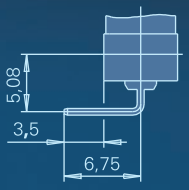
PCB terminal 0,6 x 0,5 mm
RH-side w/o location pin



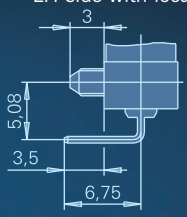
PCB terminal 0,6 x 0,5 mm
RH-side with location pin



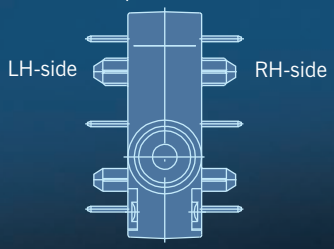
PCB terminal 0,6 x 0,5 mm
LH-side w/o location pin



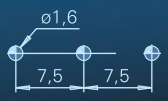
PCB terminal 0,6 x 0,5 mm
LH-side with location pin



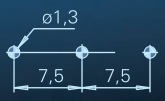
Side definition with terminals
and location pins



Drilling pattern for
PCB terminals 1,3 x 0,5 mm



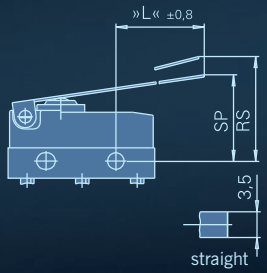
Drilling pattern for lateral
PCB terminals 0,6 x 0,5 mm
straight/lateral

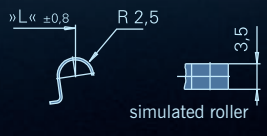


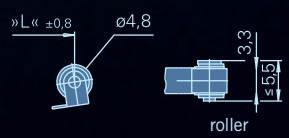
Drilling pattern for lateral PCB terminals
0,6 x 0,5 mm with location pins

Auxiliary actuator options

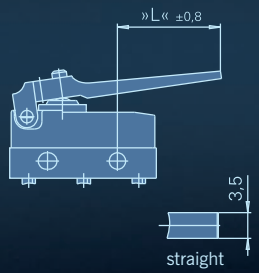
Steel auxiliary actuator

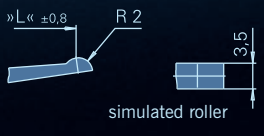


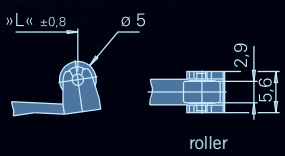




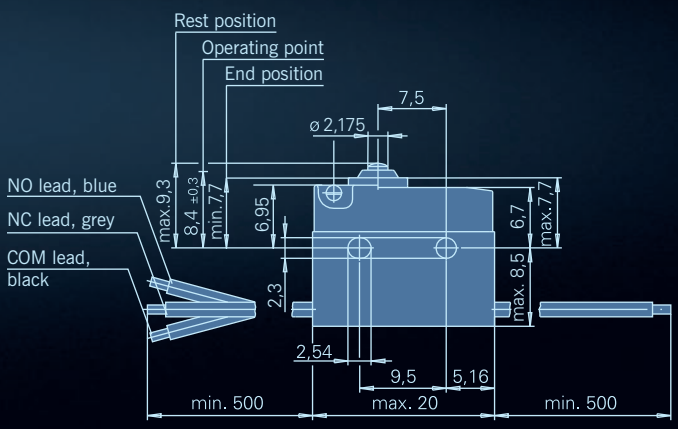
Plastic auxiliary actuator
with/without adjusting screw







Model with connecting leads (IP67)



Leads attached
on actuator side

Leads attached
on side opposite actuator

Form A

Form B

Special model with tall base
available on request

DC subminiature switch

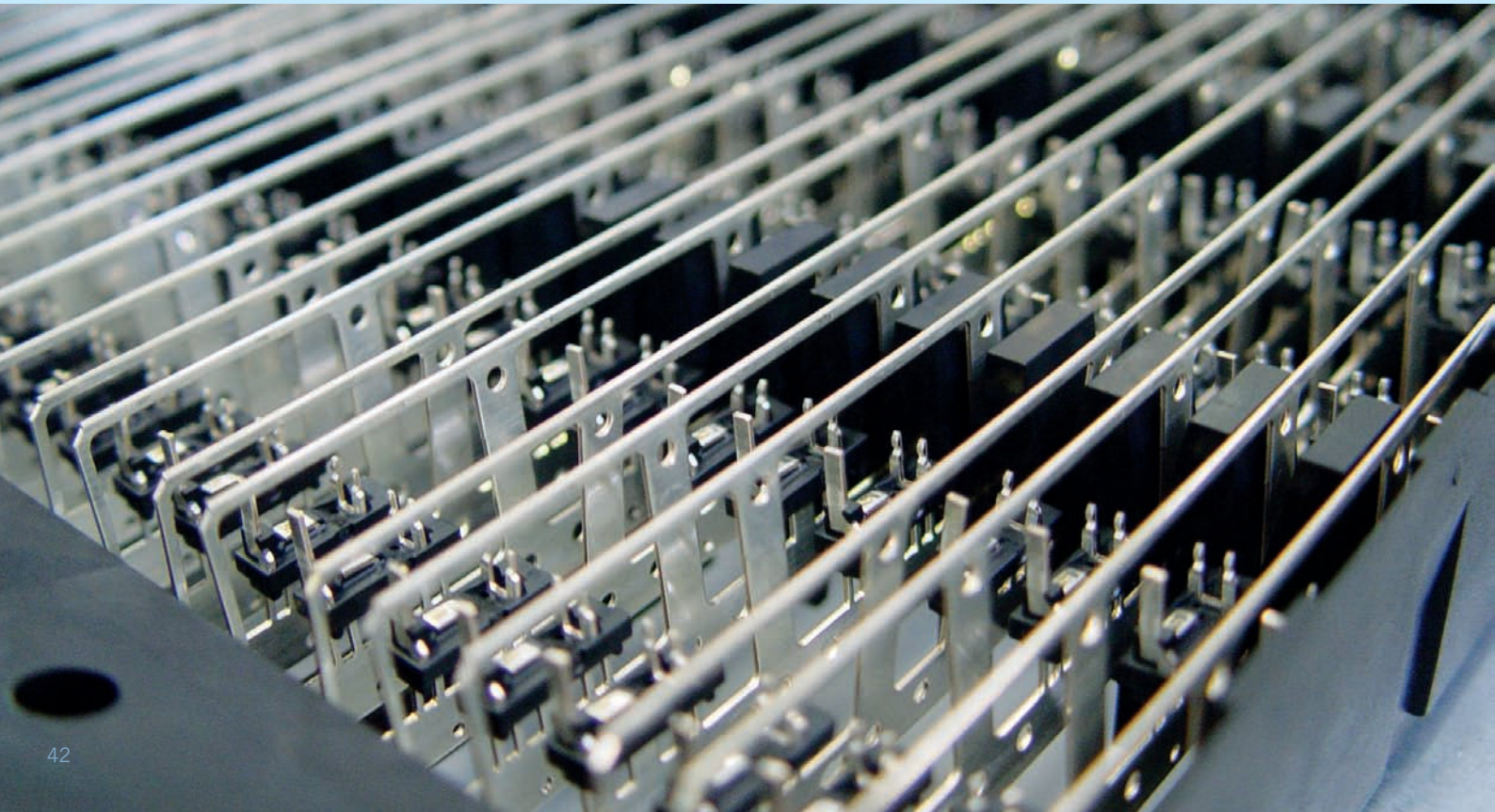
Electrical rating and operating life

Electrical rating according to		Electrical life at rated load for 40T85* (operations)				
EN 61058-1	UL 1054	acc. to EN	acc. to UL	Mechanical life	Operating force max. (cN)	Housing mark
6 A 2 50 V AC	5 A 1 25–250 V AC	10.000	6.000	1×10^6	200	DC 1
10 (1,5) A , 2 50 V AC	10,1 A 1 25–250 V AC 1/4 HP, 1 25 V AC	10.000	6.000	1×10^6	340	DC 2
0,1 A , 2 50 V AC	0,1 A 1 25–250 V AC	50.000	100.000	1×10^6	200	DC 3
3 A , 2 50 V AC	3 A 1 25–250 V AC	50.000	6.000	1×10^6	200	DC 4*

* DC4 only possible as line version with line diameter 0.5 mm^2 and AWG 22

Switching parameters

Model	Type	Operating force max. (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)	Length actuator (mm) ± 0,8
Without auxiliary actuator	DC1, 3, 4	200	1,0	0,6	0,1	9,3	8,4 ± 0,3	
	DC2	340	1,0	0,6	0,1	9,3	8,4 ± 0,3	–



Preferred parts

	Electrical rating				Operating force	Operating point	Max. pretravel	Min. overtravel	Differential travel max.
Order code	EN	UL	Terminals	Auxiliary actuator	(cN)	(mm)	(mm)	(mm)	(mm)
DC1C-A1AA	6A, 250VAC	5A, 125–250VAC	Solder terminal short	-	200	8,4 ± 0,3	1,0	0,6	0,1
DC1C-A1RB	6A, 250VAC	5A, 125–250VAC	Solder terminal short	Roller, length 2,5mm	90	15,8 ± 1,3	4,5	1,5	0,5
DC1C-C3AA	6A, 250VAC	5A, 125–250VAC	Leads 0,75mm² on actuator side	-	200	8,4 ± 0,3	1,0	0,6	0,1
DC1C-L1AA	6A, 250VAC	5A, 125–250VAC	Q.C. terminal 2,8x0,5mm, straight	-	200	8,4 ± 0,3	1,0	0,6	0,1
DC2C-A1AA	10(1,5)A, 250VAC	10,1A, 125–250VAC 1/4 HP, 125VAC	Solder terminal short	-	340	8,4 ± 0,3	1,0	0,6	0,1
DC2C-A1LB	10(1,5)A, 250VAC	10,1A, 125–250VAC 1/4 HP, 125VAC	Solder terminal short	Straight, length 4,8mm	150	10,7 ± 1,6	5,0	1,5	0,7
DC2C-A1RB	10(1,5)A, 250VAC	10,1A, 125–250VAC 1/4 HP, 125VAC	Solder terminal short	Roller, length 2,5mm	160	15,8 ± 1,6	5	1,5	0,7
DC3C-A1AA	0,1A, 250VAC	0,1A, 125–250VAC	Solder terminal short	-	200	8,4 ± 0,3	1,0	0,6	0,1
DC3C-A1LB	0,1A, 250VAC	0,1A, 125–250VAC	Solder terminal short	Straight, length 4,8mm	80	10.7 ± 1.3	4,5	1,5	0,7
DC3C-B3AA	0,1A, 250VAC	0,1A, 125–250VAC	Leads 0,5mm² on actuator side	-	200	8,4 ± 0,3	1,0	0,6	0,1
DC3C-L1AA	0,1A, 250VAC	0,1A, 125–250VAC	Q.C. terminal 2,8x0,5mm, straight	-	200	8,4 ± 0,3	1,0	0,6	0,1
DC3C-L1LB	0,1A, 250VAC	0,1A, 125–250VAC	Q.C. terminal 2,8x0,5mm, straight	Straight, length 4,8mm	80	10,7 ± 1,3	4,5	1,5	0,5
DC3C-M5RB*	0,1A, 250VAC	0,1A, 125–250VAC	Leads 20 AWG	Roller, length 2,5mm	90	15,8 ± 1,3	4,5	1,5	0,5

* UL leads

DCJK
subminiature switch

Technical specifications

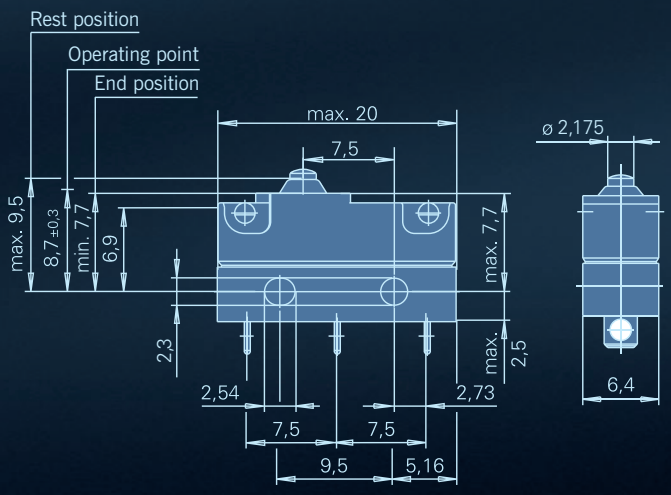
Contact configuration	S.P.D.T, S.P.S.T.-N.O. or S.P.S.T.-N.C.
Contact gap	< 3 mm
Switching voltage max.	12 V DC
Switched current	0,005 to 3 A DC
Operating force	300 cN without auxiliary actuator depending on model
Total travel	up to ca. 2,0 mm
Mechanical life	> 2 x 10^6 operations
Electrical life	min 300.000 operations
Ambient temperature	– 40 to + 85 °C / 120 °C
Model with leads	– 40 to + 105 °C
Materials	
Housing	PET/PA
Actuator	POM (T85), PA (T120)
Auxiliary actuator	Stainless steel or plastic
Sealing gasket	SI, silicon-free alternative available
Terminals	CuZn (silver-plated)
Leads	Cu, PVC-sheated
Contacts	AgNi; Ag; SnO_2 AuAgPt (Crosspoint) AgPd (Crosspoint) AuAg (Crosspoint)
Degree of protection (switch interior)	IP67

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing

Features

- Special variant of the DC switch for special applications
- Sealded switch protection type IP6K7
- Silicon-free version available
- Models available for 120 °C operating temperature
- Nominal currents up to 10 A at 12 V DC (on request)
- Optimal adjustment with 2 mounting positions and various auxiliary actuators, which can also be retrofitted
- Wide variety of terminal types;
- 3 pedestal heights
- High contact stability with various application-specific contact materials
- 4 different switching points can be selected
- No UL/EN approval

Dimensions in mm



Terminals

Type of terminal available off-the-shelf:
Solder terminal, straight
Connecting leads on actuator side
Connecting leads opposite actuator side
Types of connector available on request:
Welding terminal
Solder terminal
Solder terminal, lateral
PCB terminal 0,8 x 0,5 straight
PCB terminal 0,6 x 0,5 straight

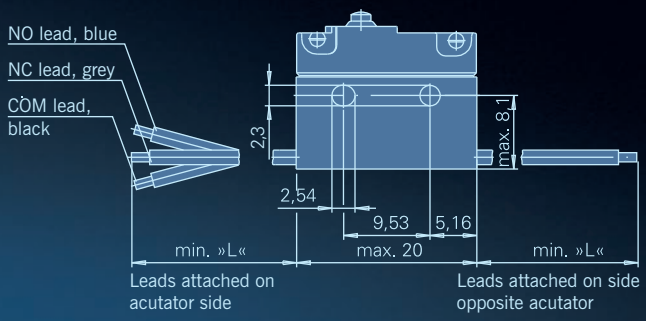
Auxiliary actuator options

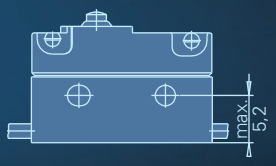
Switches in the DC JK family have two mountings for attaching auxiliary actuators. This, combined with the range of actuators available in the DC switch family and various operating points, means that a wide variety of operating forces and travel combinations is feasible. To find the perfect fit for your requirements, please contact us.

Further information and order codes on request.

Switch options

Model with leads, 8,1 mm from base to drill hole

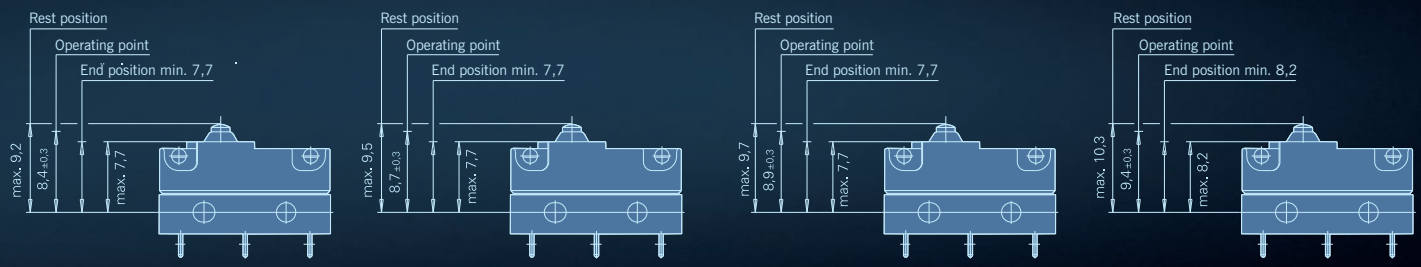




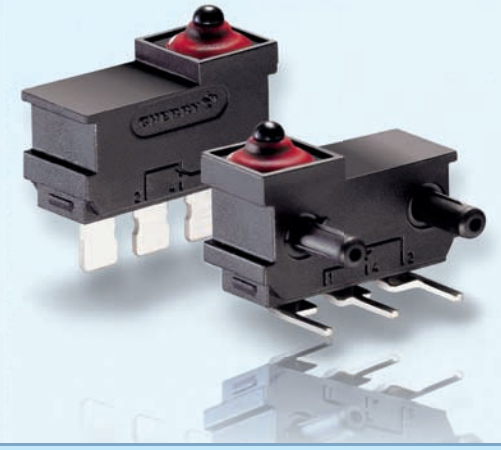
Model with leads, 5,2 mm from base to drill hole

Switching point options

For customizing to individual requirements, switches in the DCJK family are available with four different switching points.



DJ sub-sub-miniature switch



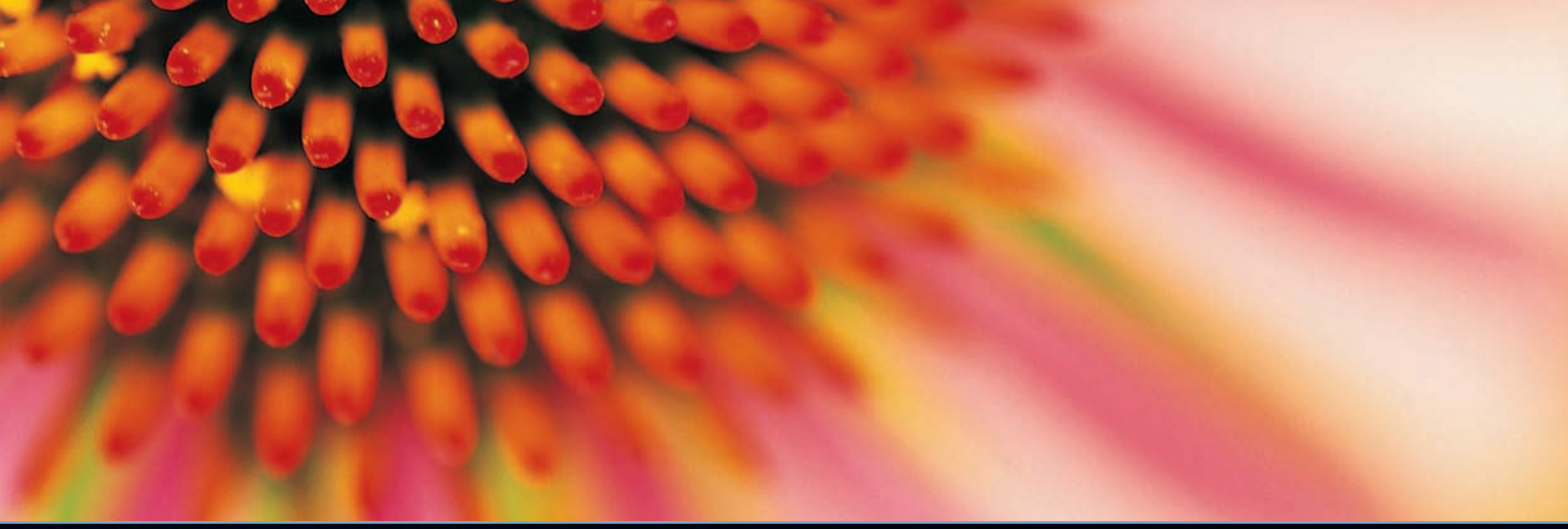
Technical specifications

Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage max.	12 V DC up to 60 V on request
Switched current	0,005 to 2 A DC
Operating force max.	120 cN
Total travel	ca. 2,0 mm
Mechanical life	min. 500.000 operations
Electrical life (max. load)	min. 100.000 operations
Ambient temperature	–40 to +85 °C
Materials	
Base	PBT / PES
Cover	PBT + ASA
Actuator	POM
Sealing gasket	SI (VMQ)
Terminals	CuZn (silver-plated)
Contacts	AuAg (Crosspoint)
Degree of protection (switch interior)	IP67

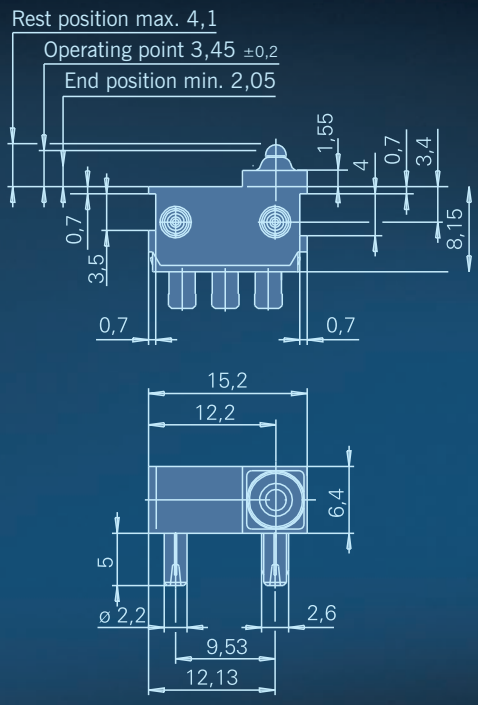
For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

- Sealed switch up to protection IP67
- Suitable for actuation at angles of up to 40 °C depending on slide partner material, etc.
- Easy installation thanks to connector pins and fastening nut
- Smallest dimensions
- Models available for up to 85 °C operating temperature
- Nominal currents 5 mA to 2 A at 12 V DC
- High contact stability with AuAg crosspoint contacts
- Mechanical operating life min. 500.000 actuations
- Many connection possibilities

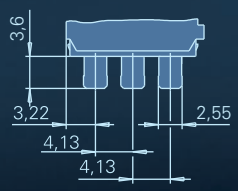


Dimensions in mm

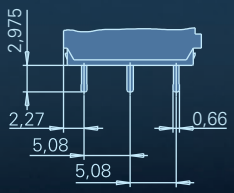


Terminals

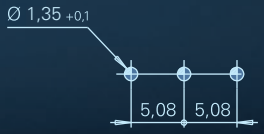
Solder terminal 2,5 x 0,5 mm



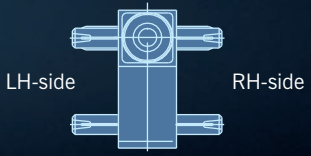
PCB terminal
0,7 x 0,5 mm, straight



Drilling pattern for PCB terminal
0,7 x 0,5 mm



Side definition



DK sub-sub-miniature switch

Technical specifications

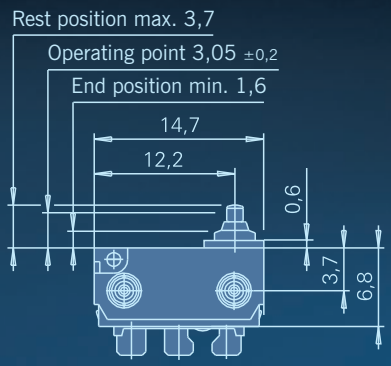
Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage max.	12 V DC up to 60 V on request
Switched current	0,005 bis 2 A DC
Operating force max.	75 cN without auxiliary actuator
Total travel	ca. 2,0 mm
Mechanical life	min. 500.000 operations
Electrical life (max. load)	min. 100.000 operations
Ambient temperature	–40 to +85 °C/105°C
Materials	
Base	PBT / PES
Cover	PBT + ASA
Actuator	POM (+85°)
Auxiliary actuator	Stainless steel
Sealing gasket	SI (VMQ)
Terminals	CuZn (silver-plated)
Leads	Cu, Isolation PVC
Contacts	AuAg (Crosspoint)
Degree of protection (switch interior)	IP65, IP67 on request

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

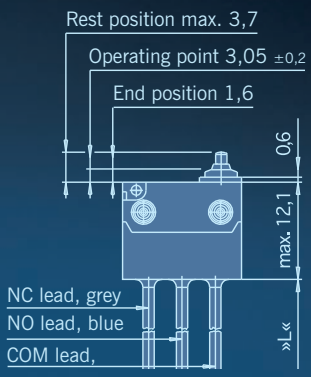
Features

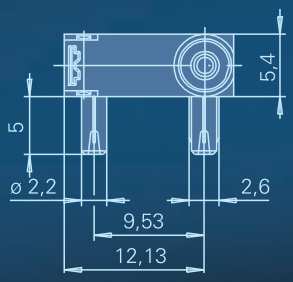
- Sealed switch up to protection IP65. IP67 on request
- Smallest dimensions
- Models available up to 105 °C operating temperature
- Nominal currents 5 mA up to 2 A at 12 V DC
- Actuation vertically or with auxiliary actuator
- High contact stability thanks to AuAg crosspoint contacts
- Mechanical operating life min. 500.000 actuations
- Many connection possibilities, also available with leads

Dimensions in mm



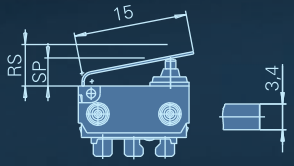
For DK sub-subminiature switch with leads (IP67-compliant)



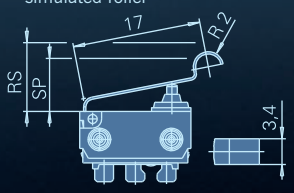


Auxiliary actuator options

straight

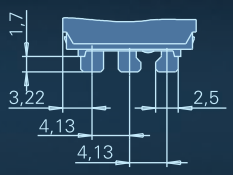


simulated roller

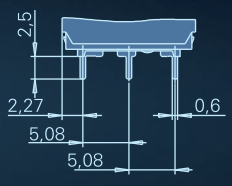


Terminals

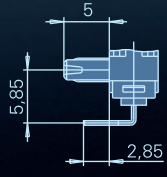
Solder terminal 2,5x0,5mm



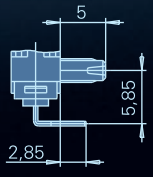
PCB terminal 0,6x0,5mm



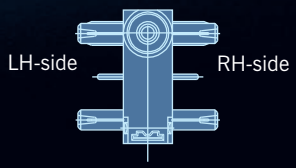
PCB terminal 0,6x0,5mm LH-side with location pins



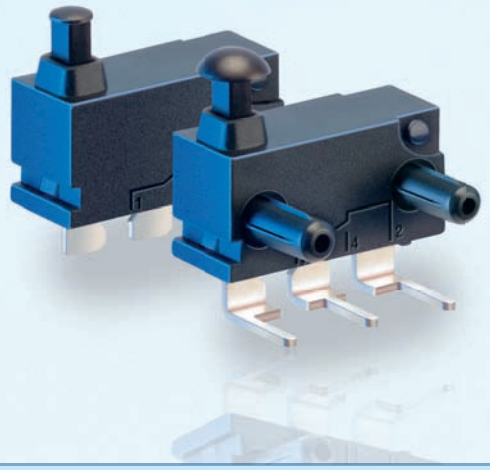
PCB terminal 0,6x0,5mm RH-side with location pins



Side definition



DR sub-sub-miniature switch



Technical specifications

Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage max.	12 V DC, to 60 V on request
Switched current	0,005 to 2 A DC
Operating force	max. 75 cN without auxiliary actuator
Total travel	ca. 2,0 mm
Mechanical life	min. 1×10^6 operations
Electrical life (max. load)	min. 100.000 operations
Ambient temperature	–40 to +85 °C/105 °C
Materials	
Base	PBT
Cover	PBT
Actuator	PES
Auxiliary actuator	Stainless steel
Terminals	CuZn (silver-plated)
Contacts	AuAg (Crosspoint)
Degree of protection (switch interior)	IP40

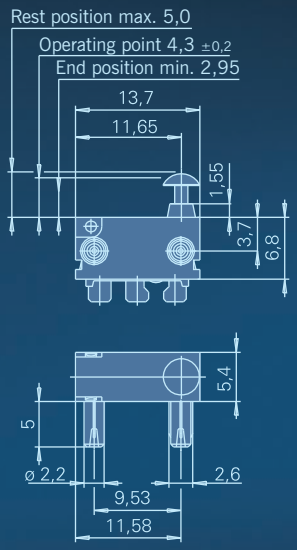
For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

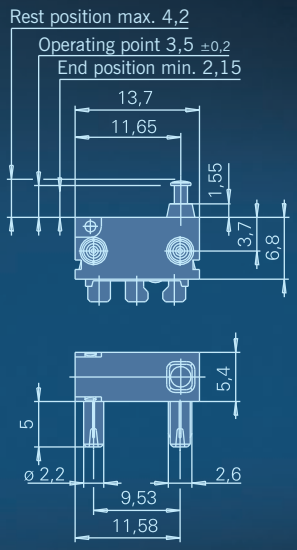
- Switch with mushroom or pan-head actuator for many actuation possibilities
- Dustproof according to IP40
- Models available up to 105 °C operating temperature
- Nominal currents 5 mA up to 2 A at 12 V DC
- Auxiliary actuator on request
- High contact stability thanks to AuAg crosspoint contacts
- Mechanical operating life min. 1×10^6 actuations
- Various connection possibilities

Dimensions in mm

with mushroom actuator

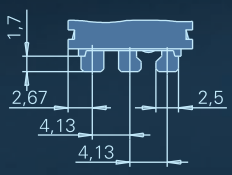


with pan-head actuator

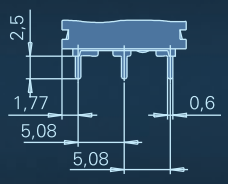


Terminals

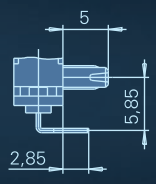
Solder terminal
2,5x0,5mm



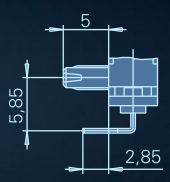
PCB terminal 0,6x0,5mm



PCB terminal 0,6x0,5mm
RH-side with location pins

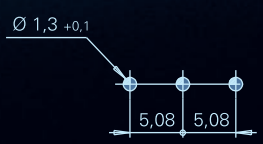


PCB terminal 0,6x0,5mm
LH-side with location pins



Side definition

Drilling pattern for PCB terminals
0,6x0,5mm, side and underside



DG sub-sub-miniature switch

Technical specifications

Contact configuration		S.P.D.T.
Contact gap		< 3 mm
Switching voltage max.		125 V AC
Switched current		3 A AC
Operating force max.		75 cN or 140 cN without auxiliary actuator
Total travel		0,7 mm without auxiliary actuator
Mechanical life		> 1 x 10^6 operation
Electrical life (max. load)		see table
Ambient temperature		–25 °C to +85 °C
Materials		
Base		PPS (UL 94V-0)
Cover		PBT (UL 94V-0)
Actuator		PBT (UL 94V-0)
Auxiliary actuator		Stainless steel
Termials		CuZn striped silver-plated
Contacts	**DG 1/4**	AgNi
	DG2	AgNi, gal. Au
Approvals		c UL us
Degree of protection (switch interior)		IP40

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

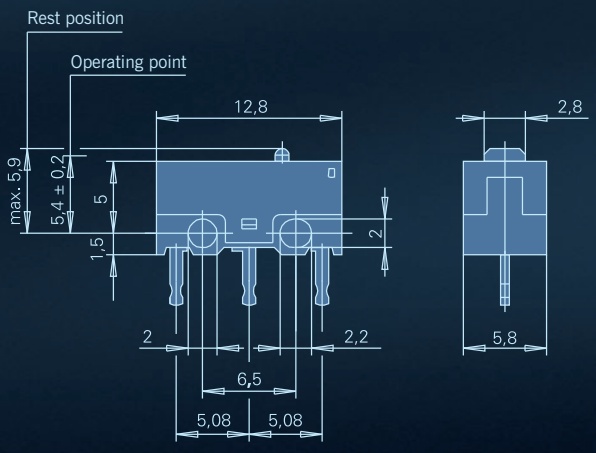
Features

- Very small size (only 12.8 x 5.8 x 6.5 mm)
- Depending on the model, the breaking capacity ranges from small switching currents and voltages to low-voltage applications up to 3 A 125 V AC
- Optionally available with or without auxiliary actuator
- Use on circuit boards with connections to the left or right and standing
- High mechanical operating life, depending on the model > 1.000.000 actuations

Electrical rating and operating life

Electrical rating according to UL	**Operating life**		
	Nominal load UL	**mechanical**	**Housing mark**
3 A, 125 V AC 2 A, 30 V DC	6.000	1 x 10^6	DG 1
0,05 A, 30 V DC	6.000	1 x 10^6	DG 2
1 A, 125 V AC 1 A, 30 V DC	6.000	1 x 10^6	DG 4

Dimensions in mm



Auxiliary actuator options

Auxiliary actuator	Type	Max. operating force (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)
Without auxiliary actuator	DG 1,2 B	140	0,5	0,2	0,1	5,9	5,4 ± 0,2
	DG 2,4 C	75	0,5	0,2	0,1	5,9	5,4 ± 0,2
Auxiliary actuator straight	DG 1,2 B	45	1,8	0,55	0,5	9,4	6,8 +0,8/-0,4
	DG 2,4 C	30	1,8	0,55	0,5	9,4	6,8 +0,8/-0,4
Auxiliary actuator roller	DG 1,2 B	60	1,5	0,55	0,5	13,9	12,4 ± 0,5
	DG 2,4 C	35	1,5	0,55	0,5	13,9	12,4 ± 0,5

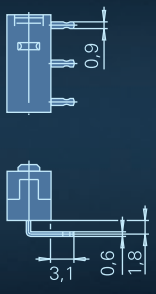
Preferred parts

Order code	Electrical rating	Terminals	Auxiliary actuator	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)
DG13-B1LA	3A, 125VAC; 2A, 30VDC	PCB terminal straight	Auxiliary actuator straight	45	6,8 +0 ,8/–0,4	1,8	0,55	0,5
DG13-B1RA	3A, 125VAC; 2A, 30VDC	PCB terminal straight	Auxiliary actuator roller	60	12,4 ± 0,5	1,5	0,55	0,5
DG13-B2LA	3A, 125VAC; 2A, 30VDC	PCB terminal straight	Auxiliary actuator straight	45	6,8 +0 ,8/–0,4	1,8	0,55	0,5
DG23-B1LA	0,05A, 30VDC	PCB terminal straight	Auxiliary actuator straight	45	6,8 +0 ,8/–0,4	1,8	0,55	0,5
DG23-B1RA	0,05A, 30VDC	PCB terminal straight	Auxiliary actuator roller	60	12,4 ± 0,5	1,5	0,55	0,5
DG23-B2LA	0,05A, 30VDC	PCB terminal right	Auxiliary actuator straight	45	6,8 +0 ,8/–0,4	1,8	0,55	0,5
DG23-B3LA	0,05A, 30VDC	PCB terminal left	Auxiliary actuator straight	45	6,8 +0 ,8/–0,4	1,5	0,55	0,5

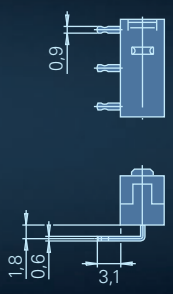
Terminals

Solder terminal

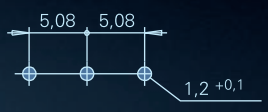
PCB terminal right



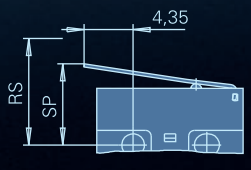
PCB terminal left

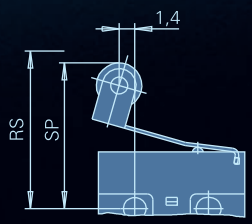


Drilling pattern



Auxiliary actuator options





DH 2 ultra-miniature switch

Technical specifications

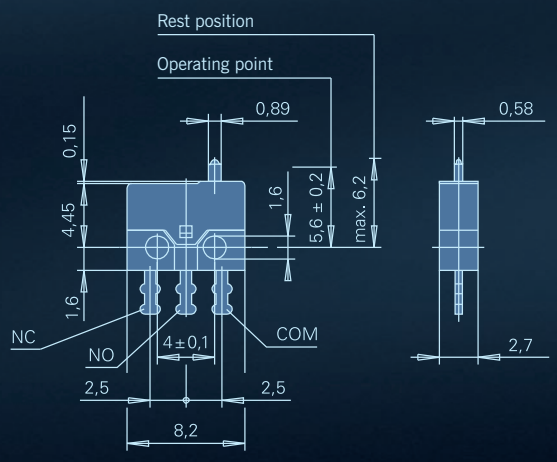
Contact configuration	S.P.D.T.
Contact gap	< 3 mm
Switching voltage max.	30 V DC
Switched current	5 to 500 mA DC
Operating force max.	90 cN
Total travel	ca. 0,85 mm without auxiliary acutator
Mechanical life	> 50.000 operations
Electrical life (max. load)	> 30.000 operations
Ambient temperature	–25 °C to +70 °C
Materials	
Housing	PPS (UL 94V-0)
Cover	PBT (UL 94V-0)
Auxiliary actuator	PBT (UL 94V-0)
Termials	CuZn striped silver-plated
Contacts	AgNi, gal. Au
Degree of protection (switch interior)	IP40

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

Features

- Extremely small size (only 8,2 x 2,7 x 6,2 mm)
- Specially-conceived for low switching currents and voltages
- Available with or without integrated auxiliary actuator
- Solder connection or use lying or standing on a circuit board

Dimensions in mm



Auxiliary actuator options

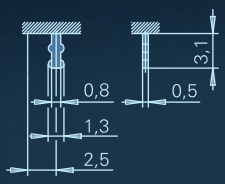
Auxiliary actuator	Operating force max. (cN)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)	Max. rest position (mm)	Operating point (mm)
Without auxiliary actuator	90	0,35	0,1	0,07	6,2	5,6 ± 0,15
With auxiliary actuator	50	1,3	0,3	0,6	8,5	6,7 ± 0,5

Preferred parts

Order code	Electrical rating	Terminals	Auxiliary actuator	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)
DH2C-B1AA	5–500 mA, 30 V DC	Solder terminal straight, 1,3x3,1 mm	–	90	5,6 ± 0,15	0,35	0,1	0,07
DH2C-B1PA	5–500 mA, 30 V DC	Solder terminal straight, 1,3x3,1 mm	Plastic, straight	50	6,7 ± 0,5	1,3	0,3	0,6
DH2C-C4AA	5–500 mA, 30 V DC	PCB terminal straight, 0,64x3,1 mm	–	90	5,6 ± 0,15	0,35	0,1	0,07
DH2C-C5AA	5–500 mA, 30 V DC	PCB terminal right, 0,64x3,1 mm	–	90	5,6 ± 0,15	0,35	0,1	0,07
DH2C-C6AA	5–500 mA, 30 V DC	PCB terminal left, 0,64x3,1 mm	–	90	5,6 ± 0,15	0,35	0,1	0,07

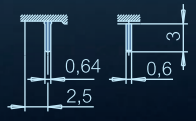
Terminals

Solder terminal



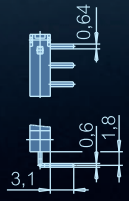
Drilling pattern

PCB terminal straight

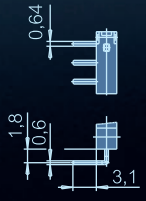


PCB terminal

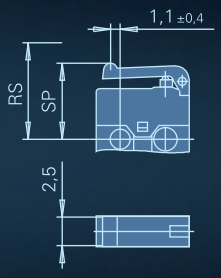
RH-side



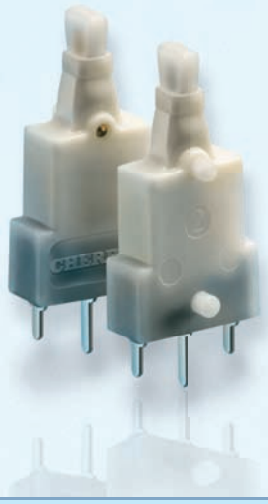
LH-side



Auxiliary actuator options (plastic)



NM02
center-off switch



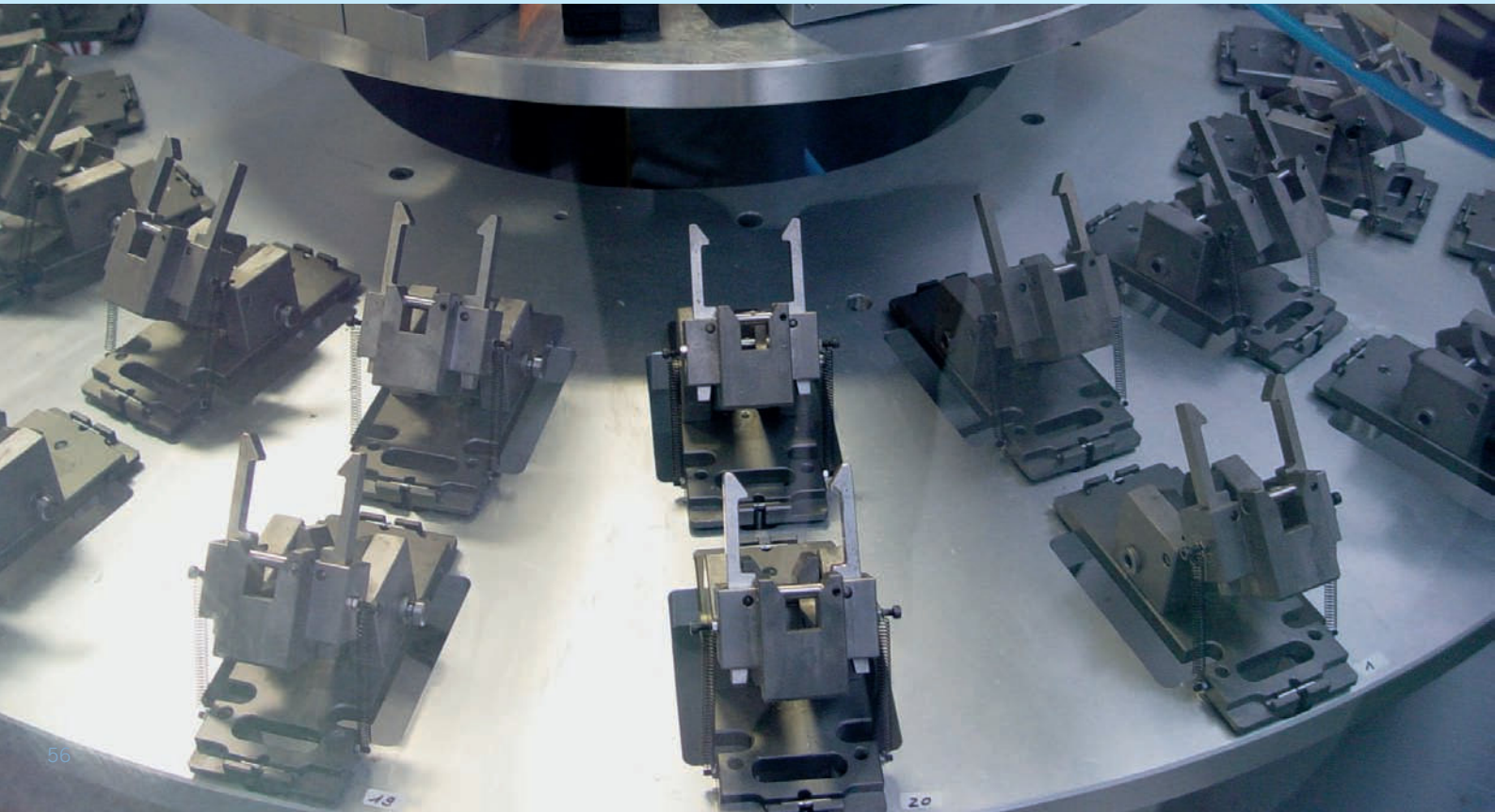
Technical specifications

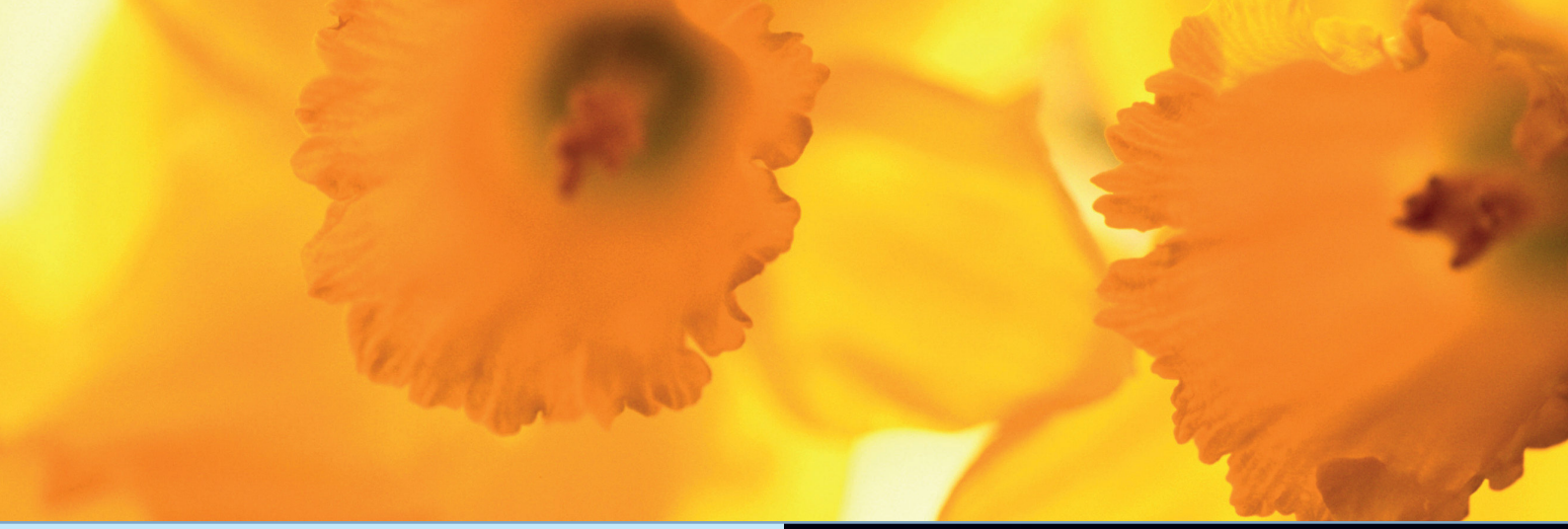
Contact configuration	2 contacts with common middle contact
Contact gap	< 3 mm
Switched current	5 to 100 mA at 12 V DC
Actuator travel	max. 40°
Switching point	10° ± 5°
Operating force max.	max. 50 cN
Mechanical life	100.000 operations in every direction
Materials	
Housing	PA
Actuator	PA
Termials	CuZn (silver-plated)
Contacts	AuAg (Crosspoint)
Sealing gasket	TPE (silicon-free)
Degree of protection (switch interior)	IP67

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

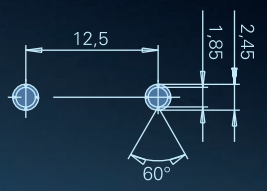
Features

- Switch in miniature construction with neutral middle setting and large actuation angle (± 40°) to the left and right
- Switching point of 10 ± 5°
- Large overtravel for high switching stability
- Depending on the actuation direction, the opposite contact closes
- Operating life > 100.000 switch actuations
- Waterproof according to protection type IP67 with silicon-free sealing gasket
- Ambient temperature –40 to +85 °C
- Order code NM02-0058

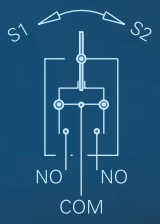




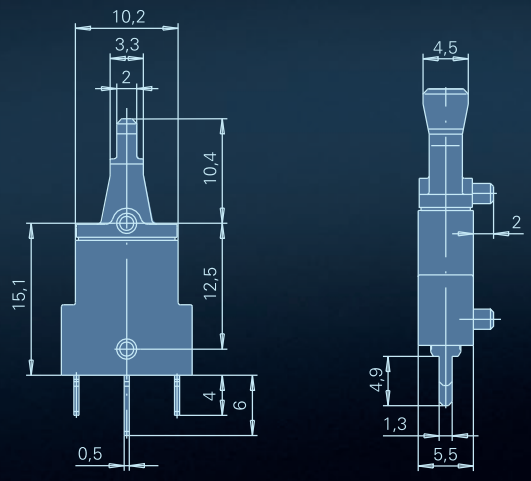
Hole pattern for fixation pins



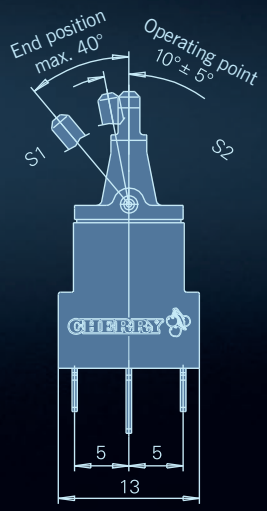
How it works



Dimensions in mm



Travel/deflection



E/F6-series, E/F7-series panel mount switches

Eletrical rating and operating life

Switch series	Electrical rating according to EN 61058-1	Electrical rating according to UL 1054	Operating life at 40T85 (operations) acc. to EN	acc. to UL
E65	N/A	16 A, 125/250 VAC; 1/3 HP, 1 25/250 VAC	N/A	6.000
E/F68	0,1(0,05) A, 1 25 VAC	0,1 A, 1 25 VAC	50.000	6.000*
E/F69	10(4) A, 2 50 VAC	10 A, 125/250 VAC; 1/3 HP, 1 25/250 VAC	50.000	6.000*
E/F77	0,1(0.05) A, 125 VAC; 10(4) A, 250 VAC	0,1 A, 1 25 VAC; 1 0 A, 1/3 HP, 1 25/250 VAC	50.000	6.000*
E/F78	0,1(0.05) A, 1 25 VAC	0,1 A, 1 25 VAC	50.000	6.000*
E/F79	10(4) A, 2 50 VAC	10 A, 125/250 VAC; 1/3 HP, 1 25/250 VAC	50.000	6.000*
E75	N/A	16 A, 125/250 VAC; 1/3 HP, 1 25/250 VAC; 0 ,1 A VAC, 0 ,1 A VDC (optional); mixed ratings available upon request	N/A	6.000*

* Indicates 100K life available.

Technical specifications

Electrical		
Ambient temperature		–40 °C to +85 °C
Flammability rating		UL 94 V-O
Materials		
Housing		Thermoplastic Polyester, Valox (single pole versions) Vandar (double pole versions)
Actuator	**E-series**	Thermoplastic Acetal
	F-series	Valox
Terminals*		Brass
Moving blade		Beryllium Copper
Spring		Stainless steel
Contacts		Silver-Cadmium Oxide (E65, E/F69, E75, E/F77, E/F79) Gold Crosspoint (E/F68, E/F78)
Approvals		c UL us on selected models

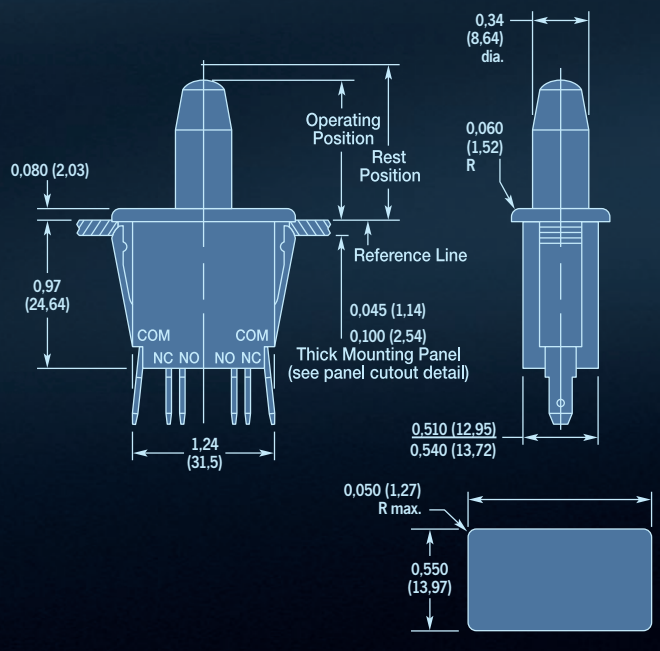
* Common terminals are plated – the remaining two terminals are not plated.

Features

- E/F6 – single pole versions
- E/F7 – double pole versions
- Choice of Momentary, Push-Pull (reset) and Cheat Interlock switches
- Snap-in panel mounting
- Long-life coil spring, snap-action mechanism
- Agency approved extended-life versions available
- VDE approval available on select models (F Series)
- Various terminal forms available (consult factory)

Dimensions in inch (mm)

Double pole version

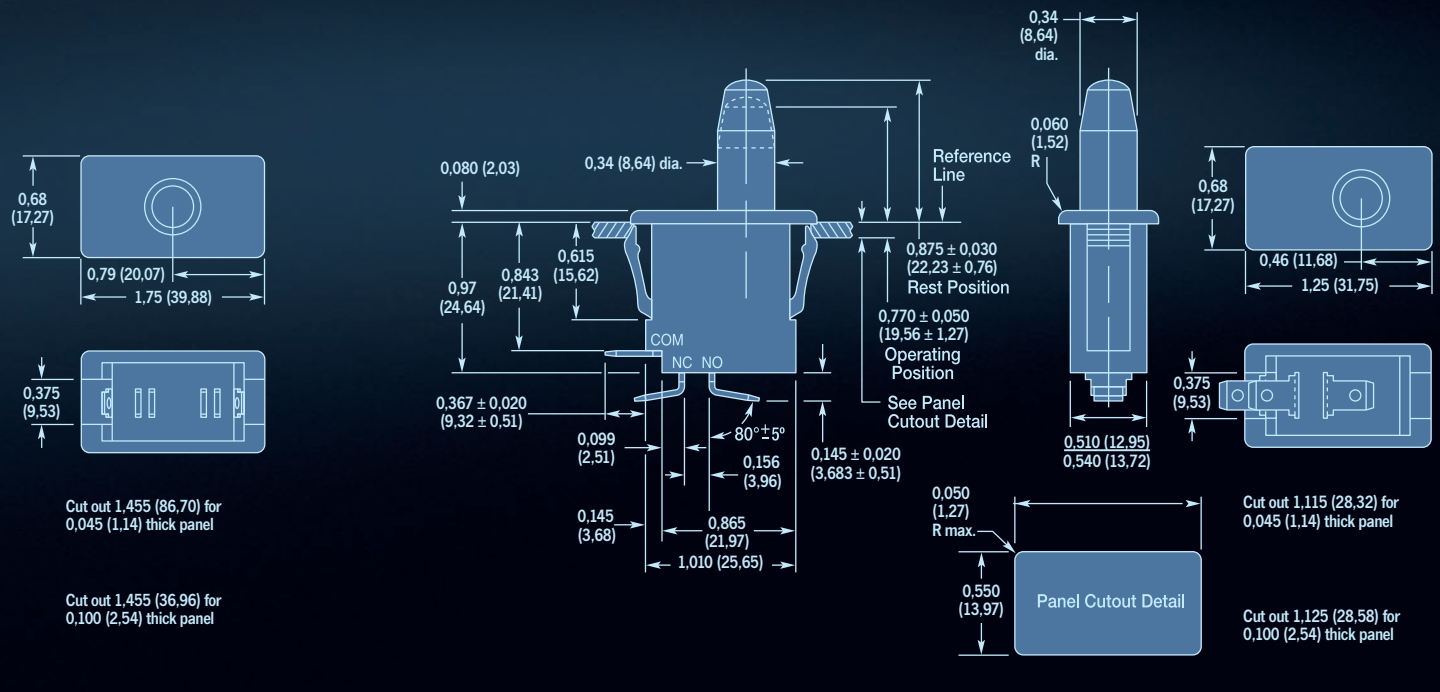


Preferred parts

Type	Order code	Electrical rating EN	Electrical rating UL	Terminals	Auxiliary actuator	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)	Differential travel max. (mm)
Single pole version	E65-00A	–	16A, 125/250VAC; 1/3HP, 125/250VAC	Q.C. terminal 6,3x0,8mm	Standard (Momentary)	425	18,29–20,83	3,18	9,53	1,1
	E68-00A	–	0.1A, 125VAC	Q.C. terminal 4,8x0,5mm	Standard (Momentary)	425	18,29–20,83	3,18	9,53	1,1
	E68-30A	–	0.1A, 125VAC	Q.C. terminal 4,8x0,5mm	Standard (Momentary + Cheat interlock)	385/475	15,49–18,03/ 20,32–22,86	3,18	2,54	1,1
	E68-40A	–	0.1A, 125VAC	Q.C. terminal 4,8x0,5mm	Short actuator (Momentary)	425	7,62–10,16	3,18	4,45	1,1
	E69-00A alt. F69-00A*	10(4)A, 250VAC	10A, 125/250VAC 1/3HP, 125/250VAC	Q.C. terminal 4,8x0,5mm (alt. 4,8x0,8mm)	Standard (Momentary)	425	18,29–20,83	3,18	9,53	1,1
	E69-30A alt. F69-30A*	10(4)A, 250VAC	10A, 125/250VAC 1/3HP, 125/250VAC	Q.C. terminal 4,8x0,5mm (alt. 4,8x0,8mm)	Standard (Momentary + Cheat interlock)	385/475	15,49–18,03/ 20,32–22,86	3,18	2,54	1,1
	E69-40A	–	10A, 125/250VAC 1/3HP, 125/250VAC	Q.C. terminal 4,8x0,5mm	Short actuator (Momentary)	425	7,62–10,16	3,18	4,45	1,1
Double pole version	E78-00A	–	0.1A, 125VAC	Q.C. terminal 4,8x0,5mm	Standard (Momentary)	680	18,29–20,83	3,18	9,53	1,9
	E78-30A	–	0.1A, 125VAC	Q.C. terminal 4,8x0,5mm	Standard (Momentary + Cheat interlock)	567/757	15,49–18,03/ 20,32–22,86	3,18/3,94	2,54	1,9
	E78-40A	–	0.1A, 125VAC	Q.C. terminal 4,8x0,5mm	Short actuator (Momentary)	680	7,62–10,16	3,18	4,45	1,9
	E79-00A alt. F79-00A*	–	10A, 125/250VAC 1/3HP, 125/250VAC	Q.C. terminal 4,8x0,5mm (alt. 4,8x0,8mm)	Standard (Momentary)	680	18,29–20,83	3,18	9,53	1,9
	E79-30A alt. F79-30A*	10(4)A, 250VAC	10A, 125/250VAC 1/3HP, 125/250VAC	Q.C. terminal 4,8x0,5mm (alt. 4,8x0,8mm)	Standard (Momentary + Cheat interlock)	567/757	15,49–18,03 / 20,32-22,86	3,18/3,94	2,54	1,9
	E79-40A	10(4)A, 250VAC	10A, 125/250VAC 1/3HP, 125/250VAC	Q.C. terminal 4,8x0,5mm	Short actuator (Momentary)	680	7,62 – 10,16	3,18	4,45	1,9

* E-versions with UL approval ; F-versions with VDE approval

Single pole version



F8
line interrupt switch

Technical specifications

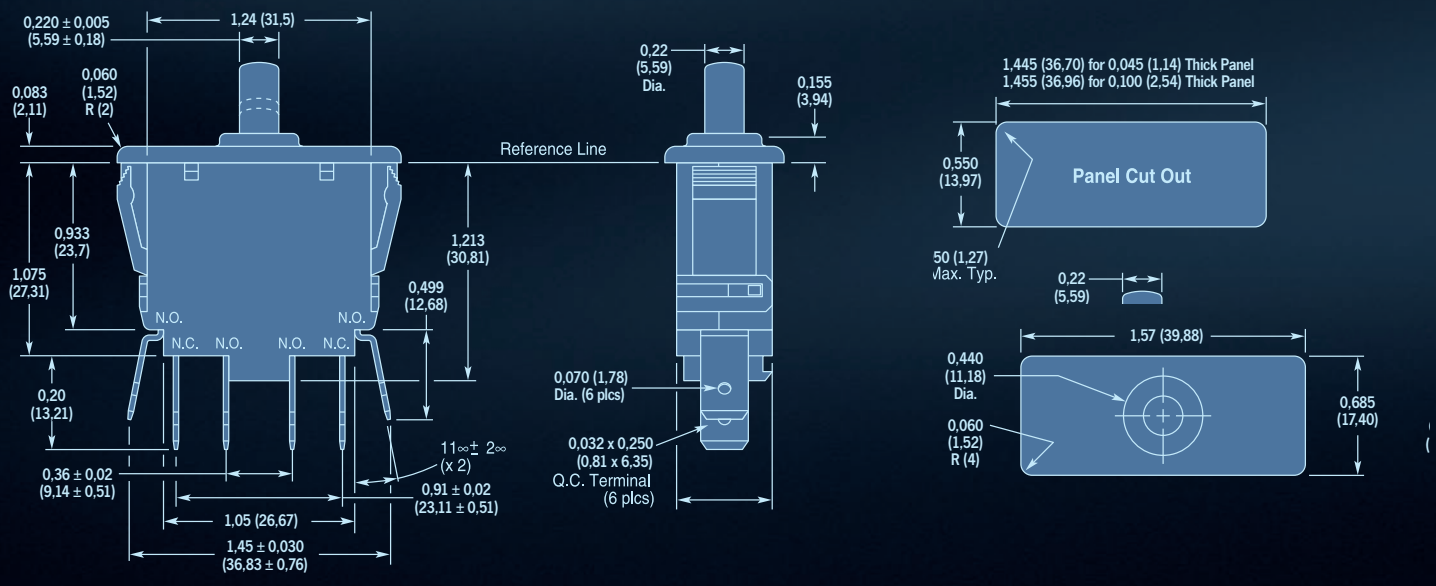
Electrical		
Ambient temperature		–25°to + 85°C
Flammability rating		UL 94 V-0
Materials		
Housing		Thermoplastic Polyester,
Actuator		Thermoplastic Polyester,
Terminals*		Brass
Moving Blade		Brass
Spring		Stainless steel
Contacts	**F81, F82**	Silver Alloy
	F83	Gold Crosspoint
	F84	Silver Alloy/Gold Crosspoint
Approvals		

Features

- Snap-in panel mounting
- High overtravel
- Choice of button barrier or standard housing
- 3 terminal types
- Double make/double break shorting bars
- Agency approved extended-life versions available
- 3 mm (0,12") minimum contact gaps

Dimensions in inch (mm)

Basic case housing



Eletrical rating and operating life

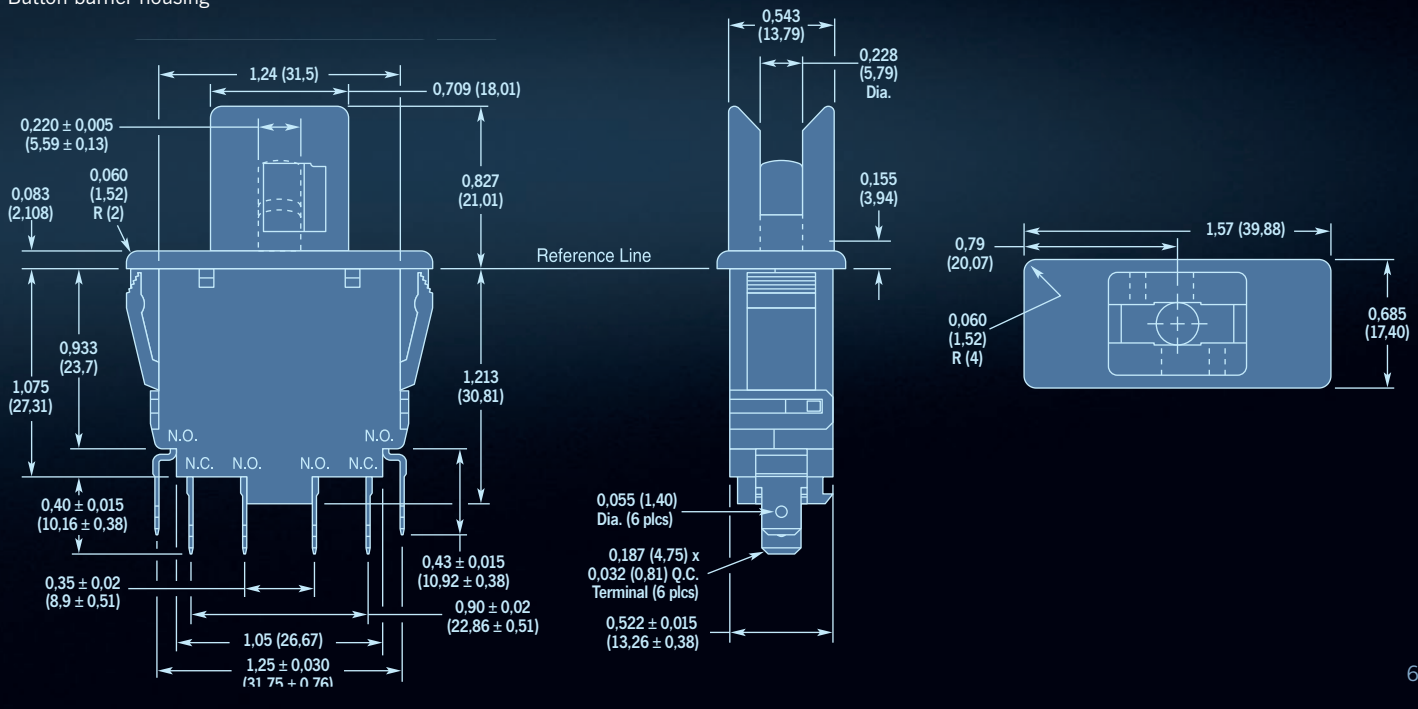
Switch series	Electrical rating according to EN 61058-1	Electrical rating according to UL 1054	Operating life at 40T85 (operations) acc. to EN	acc. to UL
F81	10A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	10A, 125/250VAC, 3/4	50.000	6.000*
F82	16(6)A, 250VAC	16A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	50.000	6.000*
F83	0,1(0,5)A, 250VAC	0,1A, 125/250VAC	50.000	6.000*
F84	on request	Combines two different ratings in a single switch. Available upon request	50.000	6.000*

* Indicates 100K life available.

Preferred parts

Order code	Switch type	Electrical rating EN	Electrical rating UL	Terminals	Operating force (cN)	Operating point (mm)	Max. pretravel (mm)	Min. overtravel (mm)
F81A-B140	Button barrier housing	10(3)A, 400VAC	10A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	Q.C. terminal 4,8x0,8mm	850	8,99±0,76	5,99	2,01
F81J-B120	Button barrier housing	10(3)A, 400VAC	10A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	Q.C. terminal 6,3x0,8mm	850	8,99±0,76	5,99	2,01
F82A-A120	Basic case housing	16(6)A, 250VAC	16A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	Q.C. terminal 6,3x0,8mm	850	8,99±0,76	5,99	2,01
F82A-B120	Button barrier housing	16(6)A, 250VAC	16A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	Q.C. terminal 6,3x0,8mm	850	8,99±0,76	5,99	2,01
F82J-A120	Basic case housing	16(6)A, 250VAC	16A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	Q.C. terminal 6,3x0,8mm	850	8,99±0,76	5,99	2,01
F82X-A120	Basic case housing	16(6)A, 250VAC	16A, 125/250VAC; 3/4HP, 125VAC 1-1/2HP, 250VAC; 6A, 30VDC	Q.C. terminal 6,3x0,8mm	850	8,99±0,76	5,99	2,01
F83Y-A120	Basic case housing	0,1(0,5)A, 250VAC	0,1A, 250VAC	Q.C. terminal 6,3x0,8mm	850	8,99±0,76	5,99	2,01
F83Z-A120	Basic case housing	0,1(0,5)A, 250VAC	0,1A, 250VAC	Q.C. terminal 6,3x0,8mm	850	8,99±0,76	5,99	2,01

Button barrier housing



SJ sub-sub-miniature switch

Technical specifications

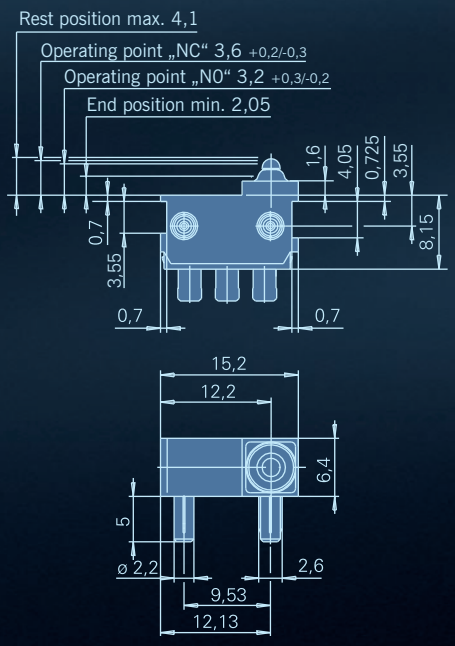
Contact configuration	S.P.S.T. - N.O., S.P.S.T. - N.C.
Switching voltage max.	12 V DC
Switched current	10 mA to 100 mA
Operating force max.	200 cN
Total travel	ca. 2,0 mm
Mechanical life	min. 500.000 operations
Electrical life (max. load)	min. 100.000 operations
Ambient temperature	–40 °C to +85 °C
Materials	
Base	PPS
Cover	PBT + ASA
Actuator	POM
Sealing gasket	Silicone
Termials	CuSn6 gal. Ag
Leads	Cu, Isolation PVC
Degree of protection (switch interior)	IP6K7

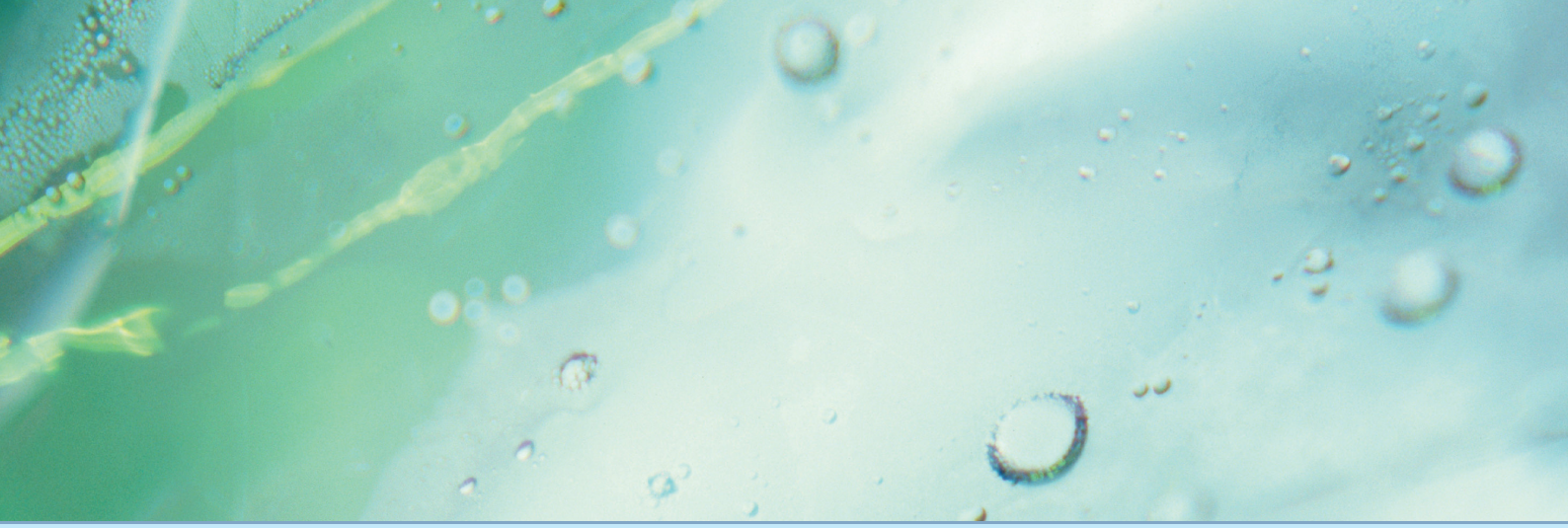
For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifi cations and drawing.

Features

- Sealed switch up to protection IP67
- Suitable for actuation at angles of up to 40 °C depending on slide partner material, etc
- Easy installation thanks to connector pins and fastening nut
- Smallest dimensions
- Models available for up to 85 °C operating temperature
- High contact stability by double redundant contact system
- High operating life
- Many connection possibilites, also with leads available on request

Dimensions in mm





Terminals and location pins

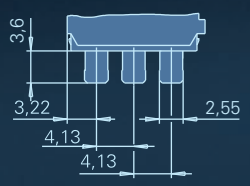
Type of terminal
Solder terminals 2,5 x 0,4 mm, straight without pins
Solder terminals 2,5 x 0,4 mm, straight with RH pins
Solder terminals 2,5 x 0,4 mm, straight with LH pins
PCB terminals 0,7 x 0,4 mm, straight without pins
PCB terminals 0,7 x 0,4 mm, straight with RH pins
PCB terminals 0,7 x 0,4 mm, straight with RH pins

Auxiliary actuator options

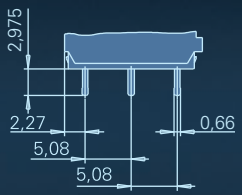
Auxiliary actuator
Without auxiliary acutator

Terminals

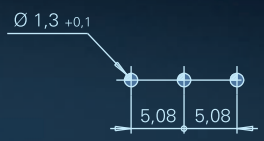
Solder terminal 2,5 x 0,5 mm



PCB terminal
0,7 x 0,5 mm, straight

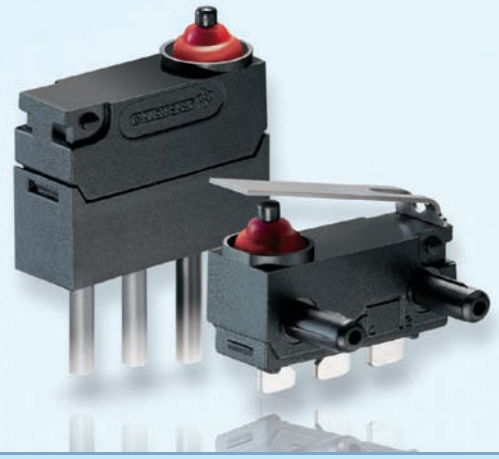


Drilling pattern for PCB terminal
0,7 x 0,5 mm



Side definition

SK sub-sub-miniature switch



Technical specifications

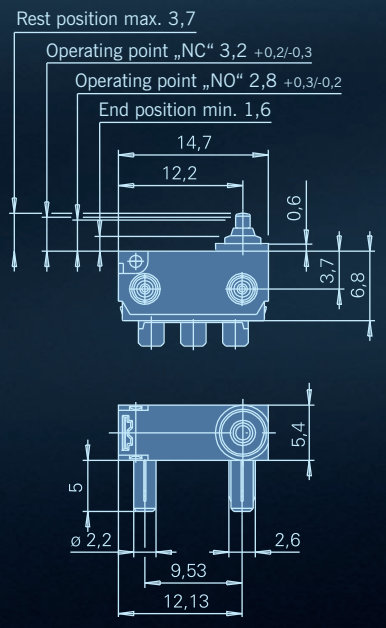
Contact configuration	S.P.S.T. - N.O., S.P.S.T. - N.C.
Switching voltage max.	12 V DC
Switched current	10 mA to 100 mA
Operating force	max. 200 cN
Total travel	ca. 2,0 mm
Mechanical life	min. 500.000 operations
Electrical life (max. load)	min. 100.000 operations
Ambient temperature	-40 °C to +85 °C
Materials	
Base	PPS
Cover	PBT + ASA
Actuator	POM
Auxiliary actuator	Stainless steel
Sealing gasket	Silicone
Termials	CuSn6 gal. Ag
Leads	Cu, Isolation PVC
Degree of protection (switch interior)	IP6K5, IP6K7 with potted leads

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifi cations and drawing.

Features

- Sealed switch up to protection IP65. IP67 on request
- Smallest dimensions
- Models available up to 85 °C operating temperature
- Actuation vertically or with auxiliary actuator
- High contact stability by double redundant contact system
- High operating life
- Many connection possibilities, also with leads available on request

Dimensions in mm

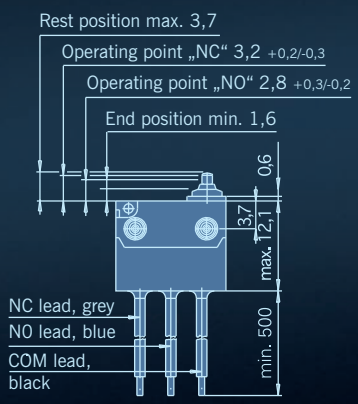


Terminals and location pins

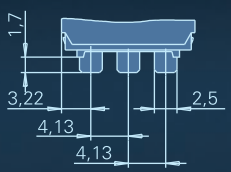
Type of terminal
Solder terminals 2,5 x 0,4 mm, straight, without pins
Solder terminals 2,5 x 0,4 mm, straight, with RH pins
Solder terminals 2,5 x 0,4 mm, straight, with LH pins
PCB terminals 0,6 x 0,4 mm, straight, without pins
PCB terminals 0,6 x 0,4 mm, straight, with RH pins
PCB terminals 0,6 x 0,4 mm, straight, with LH pins
PCB terminals 0,6 x 0,4 mm, RH-s. with RH pins
PCB terminals 0,6 x 0,4 mm, LH-s. with LH pins
500 mm leads 0,35 mm² to underside without pins
500 mm leads 0,35 mm² to underside with pins
500 mm leads 0,35 mm² to underside with pins

Terminals

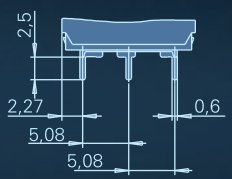
For SK sub-subminiature switch with leads (IP67-compliant)



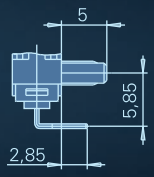
Solder terminal 2,5 x 0,4 mm



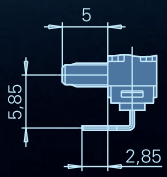
PCB terminal 0,6 x 0,4 mm



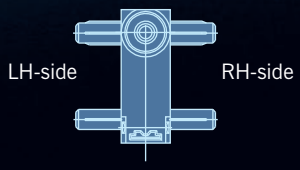
PCB terminal 0,6 x 0,4 mm RH-side with location pins



PCB terminal 0,6 x 0,4 mm LH-side with location pins

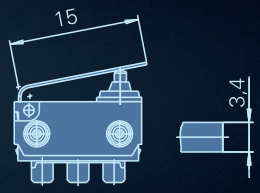


Side definition

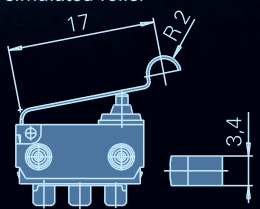


Auxiliary actuator options

straight



simulated roller



Keymodule

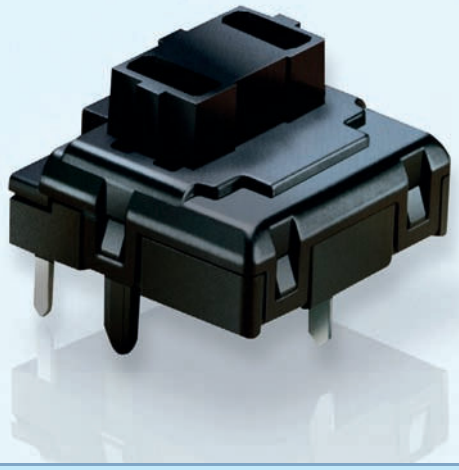
Cherry keymodules are mechanical input elements with a single-gap make contact element. Low assembly height, comfortable actuation and excellent contact reliability thanks to Gold-Crosspoint contact technology allows flexible designing of low-cost keypads and keyboards. Depending on the key cap, different lead spacings are also possible. Very short bounce times, outstanding tactile feeling and exceptionally high reliability and durability pave the way for a wide range of applications.

Technical specifications

Electrical characteristics	**Module ML**	**Module MX**
Switching voltage	12 V AC/DC max.	12 V AC/DC max.
Switching current	10 mA AC/DC max.	10 mA AC/DC max.
Dielectric strength	500 V/50 Hz	500 V/50 Hz
Durability at 5V, 1mA linear actuation	–	50×10^6
Durability at 5V, 1mA tactile feel click	20×10^6	50×10^6
Durability at 5V, 1mA alternate action	–	$0{,}5 \times 10^6$
Durability at 5V, 1mA alternate action		50×10^6
Mechanical characteristics		
Contact configuration	Single-pole contact	Single-pole contact
Action	Pressure point click	Linear, pressure point click, alternate action, ergonomic
Actuator travel	3,0 – 0,5 mm	4,0 – 0,4 mm Impuls/4,2 0,3 mm Rast/4 – 0,5 mm click
Pretravel	1,5 ± 0,5 mm	2 ± 0,6 mm Impuls/1,4 0,4 mm Rast/2,2 0,6 mm click
Initial force	30 cN min	25 cN min.
Actuation force	45 ± 20 cN	60 ± 20 cN linear a. Rast; 45 20 cN, ergonom. and 50 15 cN click
Pressure point force	50 ± 20 cN	55 ± 20 cN, pressure point ergonomic/60 15 cN pressure point click
Bounce time during actuation with 0,4 m/s	≤ 5 ms	≤ 5 ms
Standard lead spacing	18 mm (16 mm min.)	19,05 mm (16 mm min.)
Fastening	Fixing pins in the printed circuit board	Snap fastening in frame or fixing pins in the printed circuit board
Lighting (optional)	–	LED in red, green or yellow
Decoupling diode	–	optional
Wire jumper	optional	optional
Materials		
Insulation materials	Thermoplastics (min.UL 94 HB)	Thermoplastics (min.UL 94 HB)
Spring	Stainless steel	Stainless steel
Contacts	High-quality gold alloy	High-quality gold alloy
Other Characteristics		
Protection class	IP 40	IP 40
Operating temperature	– 10 °C to + 70 °C	– 10 °C to + 70 °C
Storage temperature	– 40 °C to + 70 °C	– 40 °C to + 70 °C
Humidity (without condensation)	5 % to 95 %	5 % to 95 %
Soldering capability	see soldering specifications	see soldering specifications

For detailed information and the layout of the details described above, please do not hesitate to ask for our technical specifications and drawing.

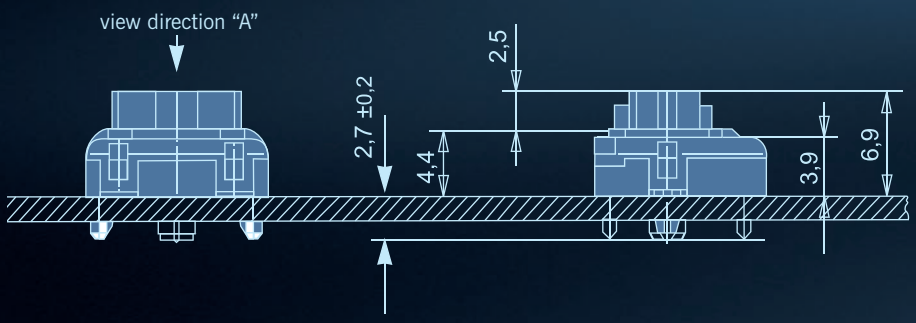
Keymodule ML

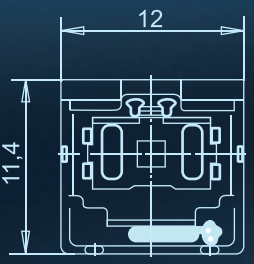


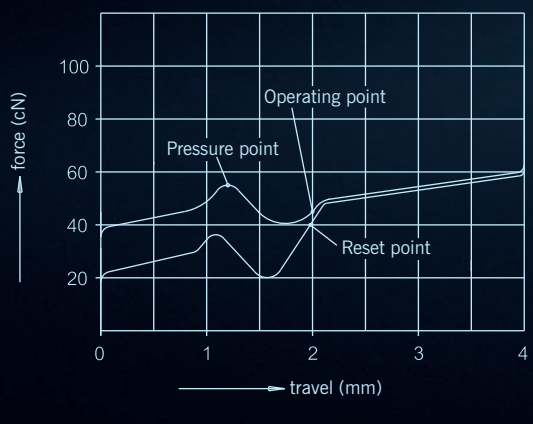
Features

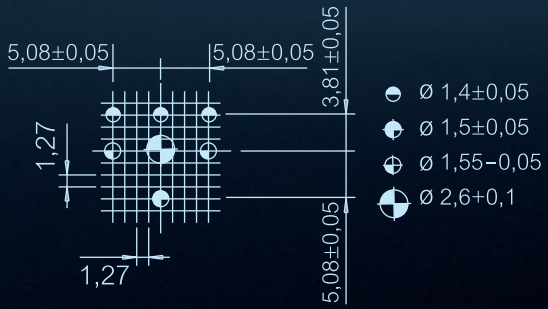
The Cherry ML keymodule is a mechanical switching element using single-gap make contact element in Gold-Crosspoint contact technology. Its comfortable actuation makes the module particulary suitable for low-cost construction of keyboards and keypads with great diversity and very low height.

A multitude of different key cap shapes allows flexible designs. Very short bounce time, reliable stroke, excellent tactile feeling and enormous cost-saving pave the way for a wide range of applications.



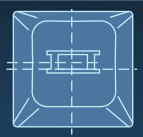
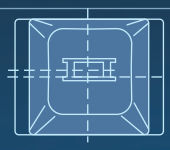
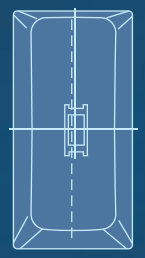
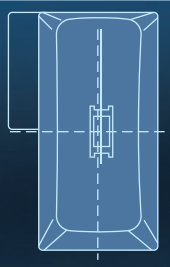
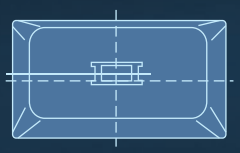
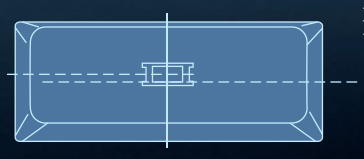






Drilling pattern, view direction „A"

Keycaps and mechanics

Keycaps	Keycap format	Dimension X (mm)	Bar	Assembly number (mechanics + Bar)
	1x1 1x0,84	– –	– –	– –
	1x1,25	–	–	–
	1x2 vertical	25,6	614-5007	G99-1303 ZUB
	1,25x2x1 vertical 1,5x2x1,25 vertical	25,6 25,6	614-5007 614-5007	G99-1303 ZUB G99-1303 ZUB
	1x1,5 1x1,53 1x1,75 1x2 1x2,25	17,45 17,45 21,65 25,6 30,65	614-5004 614-5004 614-5005 614-5007 614-5009	G99-1300 ZUB G99-1300 ZUB G99-1301 ZUB G99-1303 ZUB G99-1369 ZUB
	1x5 1x7	80,15 116,15	614-5006 614-5010	G99-1302 ZUB G99-1370 ZUB

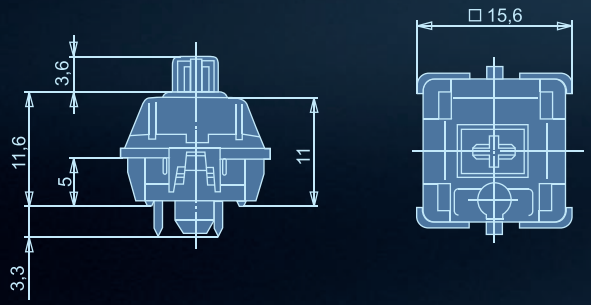
Keymodule MX

Features

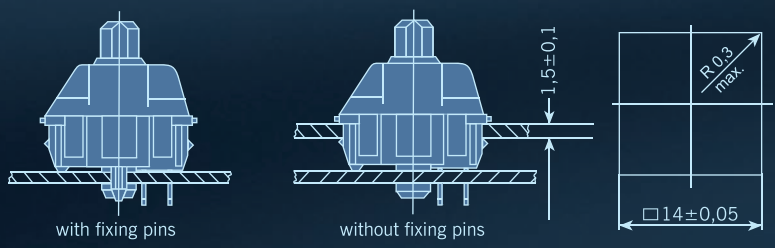
The constructive design of the key and the design of the associated keycaps fulfil the ergonomic requirements for data input workstations. Long operating life with gold crosspoint contact and high reliability with quick actuation. Optionally with integrated colour LED decoupling diode or wire bridge. 4 mm actuation travel.

Size of keycap	1 x 2 1 x 2,25 1 x 2,75	1 x 3	1 x 8
Type of keycap	8 mm/Cyln	8 mm/Cyln	8 mm/Cyln
„A“ (in mm)	23,8	38,1	133,35
Part-No. (without Pins)	G99-0224	G99-0225	G99-0226
Part-No. (with Pins)	G99-0742	G99-0743	G99-0744

View of keymodule

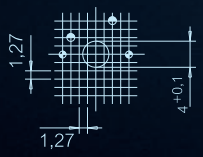


Keyswitch assembly



Drilling patterns

with fixing pins

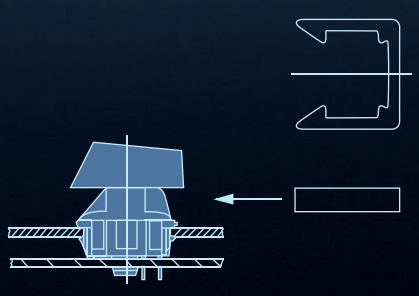


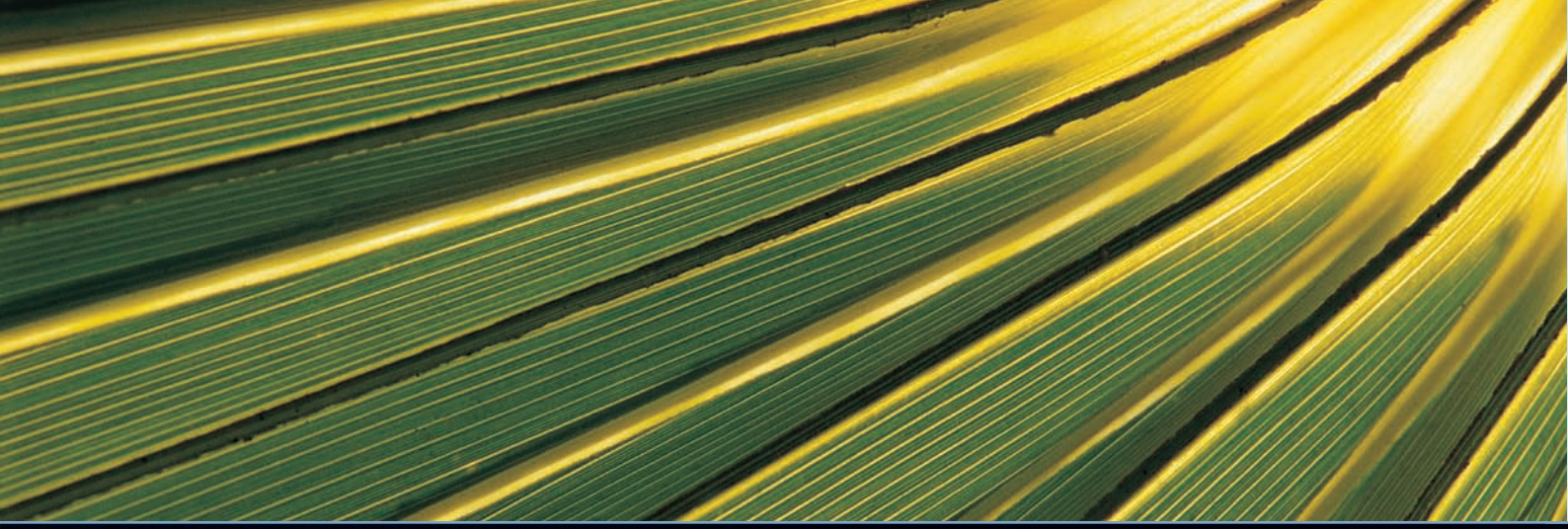
with fixing pins and LED

with fixing pins and diode or wire bridge

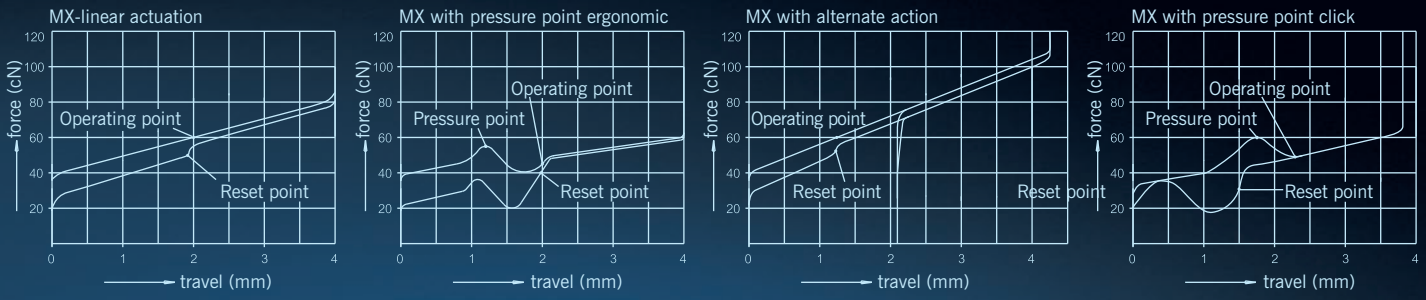
- ø 1,7 - 0,05
- ø 1,5 ± 0,05
- ø 1,0 + 0,1

Locking unit



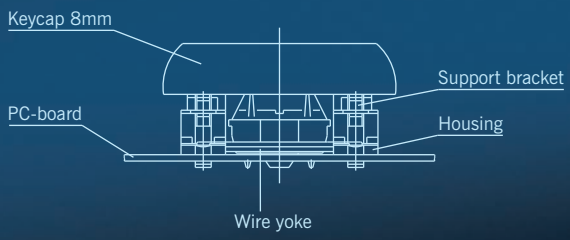


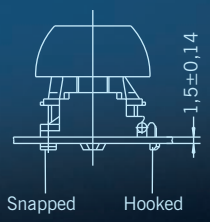
Force/travel diagram



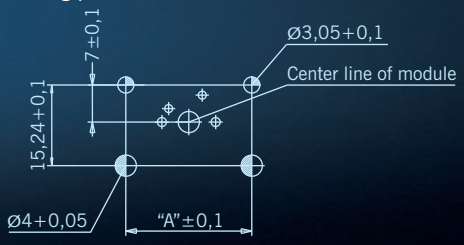
Multiple key mechanical

without frame

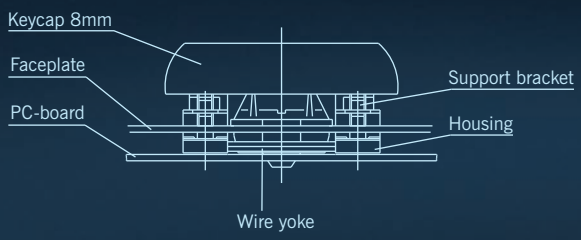




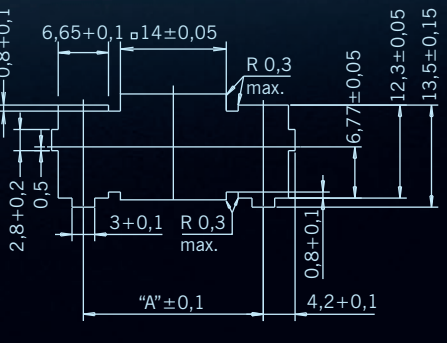
Drilling pattern



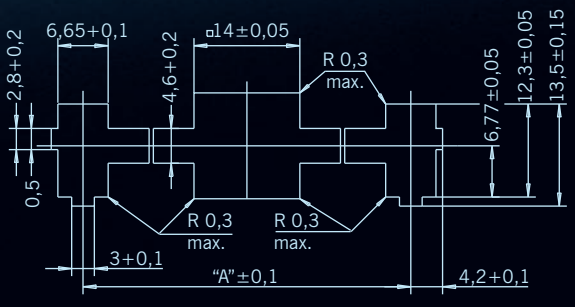
with frame



Cutout of frame for keycaps sizes
1x2, 1x2,25, 1x2,75



Cutout of frame for keycaps sizes
1x3, 1x7, 1x8, 1x9, 1x10



Check list for switch requirements

Companny		**Name**	
Department		**Street**	
ZIP Code/City		**Country**	
Telephone		**Fax**	
EMail		**Date**	

Application (description)

Annual demand

Electrical parameters

Switch type:	☐ Normally open	☐ Normally closed	☐ Double throw
Usage:	☐ Heater	☐ Lamp	☐ Electromagnet
	☐ Contactor	☐ Motor	☐ Electronics
	☐ Other:		
Switching voltage:	V	☐ AC cos	☐ DC L/R: ms
Constant current:	A	**Switch-on current:** A	
Operating life:	☐ 10.000 cycles	☐ 50.000 cycles	☐ Other
Proof tracking index:	☐ PTI 175	☐ PTI 250	☐ PTI 300
Contact gap:	☐ μ	☐ > 3 mm	
	☐ EN 61058	☐ UL 1054	

Actuation

Operating force:	min. cN	max. cN	
Operating speed:	mm/s	**Operating frequency:** Hz	
Type of operation:	☐ Without auxiliary actuator	☐ With auxiliary actuator	☐ Cam shaft
	☐ Horizontal	☐ Lateral actuation	☐ Angle
	☐ Magnet	☐ Membrane	☐ Spring/Bimetal
	☐ Other		
Auxiliary actuator:	☐ straight	☐ with roller	☐ with simulated roller
	Length: mm from mounting hole		Mounting point:

Terminals and mounting

Type of terminal:	☐ Q.C. terminal 2,8x0,8mm	☐ Q.C. terminal 4,8x0,5mm	☐ Q.C. terminal 4,8x0,8mm
	☐ Q.C. terminal 6,3x0,8mm	☐ Solder terminal short	☐ Solder terminal with temperature-stop
	☐ Welding	☐ Screw	☐ PCB:
	☐ Other		
Mounting type:	☐ Welded	☐ Snapped	☐ Plugged
	☐ Riveted	☐ Bonded	☐ Soldered
	☐ Other		

Environmental Requirements

Ambient temperature:	min.	°C	max.	°C	
Type of protection::	☐ IP40		☐ IP67		☐ Other
Resistance against media:					

Additional requirements

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91275 Auerbach
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Fax: +49 96 43 18 17 20
switches@cherry.de
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