

# Safety in system: Protection for man and machine

Catalogue Automation Technology



# Introduction



Heinz and Philip Schmersal,  
Managing directors of the Schmersal Group

## **Turning workplaces into safer places.**

Industry finds itself in exciting times - in the age of Industry 4.0, production systems are becoming increasingly flexible and with decentralised intelligence, with man and machine working ever closer. Whatever the change, the safety of employees remains paramount, nothing less is acceptable, and through standards and norms, safety is becoming more and more consistent around the globe.

The Schmersal Group can support you in designing your machinery and plants to ensure maximum safety in accordance with relevant standards and legislation. We offer the world's widest selection of safety components and link them to integrated solutions to satisfy your requirements. We ensure that safety remains an integral component of your processes, thereby helping to maximise system productivity.

Efficient machine safety that complies with relevant standards is a prerequisite for success in international markets. At the same time, the global dimension itself makes machine safety a demanding task. Our international network of tec.nicum experts offers independent advice on all aspects of functional safety, as well as a comprehensive service programme.

When it comes to the safety of machinery and efficient safety technology, you can count on us to be a reliable partner.

**Talk to us – we look forward to working with you!**

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# Chapter Overview

**Mechanical position detection**

**Mechanical position detection – Special variants**



3. Gear switches

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Proximity switches  
**Separate catalogue**



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Further command and signalling devices  
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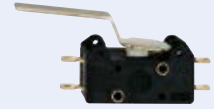
# Safety in system: Protection for man and machine



Position and limit switches



Belt alignment switches



Micro switches

## Automation technology: versatile portfolio and customer-specific solutions

For decades, progress in automation technology has ensured ever more efficient production. Digitally automated production started with the introduction of the programmable logic controller (PLC) in the 1970s. Industry 4.0 is continuing this development: with intelligent machines, widespread usage of networks and connection to the Internet, automation technology is reaching a new stage. The resulting positive effects include, for instance, cost and time savings in production as well as an overall increase in competitiveness.

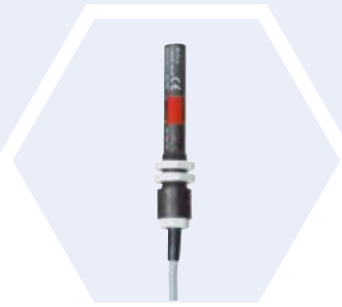
The Schmersal Group has made a significant contribution to this progress over the past few decades, particularly in the area of position acquisition. Schmersal was one of the pioneers during the development of non-contact proximity switches in the 70s.

Today Schmersal offers a broad range of position switches, gear switches, pull-wire switches, foot switches, micro switches and magnetic reed switches... for the automation of work processes in industrial installations.

The continuously further developed series from Schmersal help to increase the efficiency of the manufacturing processes and are suitable for many applications in a very wide range of sectors – from lift switchgear, through automotive technology to heavy industry.

For example the proximity switches are used in, among other areas, robotics and in the automated production lines in the automotive industry. Schmersal also offers a large variety of switchgear for lift and escalator manufacturers for positioning and monitoring the functions of lifts that meet the requirements in directives and standards worldwide.

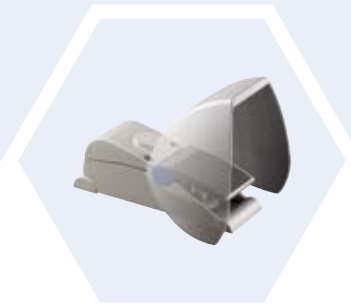
Besides the standard versions, customised variants for special requirements such as high operating temperatures or sector-specific approvals, e. g. IECEx, are also available.



Magnetic reed switches



Pull-wire switches



Foot switches

**Turning workplaces into safer places. With systems and solutions from Schmersal.**

Along with its varied portfolio of automation components, the Schmersal Group offers a comprehensive range of services through its tec.nicum division. The international network of tec.nicum experts develop individual solutions optimally adapted to the related application on-site for customers.

As a provider of systems and solutions, the Schmersal Group therefore offers everything from a single source: the latest automation technology, sector-specific know-how as well as consulting and engineering.



# History

## Milestones 1945 – 2016



Schmersal Brazil 1974



Schmersal China 2013



Startup of the new central warehouse in 2013

1945

The brothers Kurt Andreas Schmersal and Ernst Schmersal **form the company** in Wuppertal.

1950s

The **product portfolio** is continuously expanded. Many switchgears are used in safety related applications such as in explosive areas.

1970s

Schmersal is one of the first companies to begin development and production of **electronic proximity switches**.

1974

**ACE Schmersal** is formed in Boituva, Brazil.

1982

**Generational change:** Heinz and Stefan Schmersal take over the company from their fathers.

1997

**ELAN Schaltelemente GmbH & Co. KG** based in Wettenberg is acquired.

1999

The production facility **Schmersal Industrial Switchgear Co. Ltd** (SISS) is formed in Shanghai, China.

2007

Philip Schmersal joins the **third generation of the** Schmersal Group.

2008

In October 2008 the Schmersal Group takes over **Safety Control GmbH** and its affiliate Protec GmbH in Mühldorf/Inn.

2013

**Böhnke + Partner Steuerungssysteme GmbH** is acquired.  
**Schmersal India** becomes a production facility.  
Startup of the new **European central warehouse** in Wuppertal.

2015

In 2015, the Schmersal Group celebrated its **70th anniversary**.

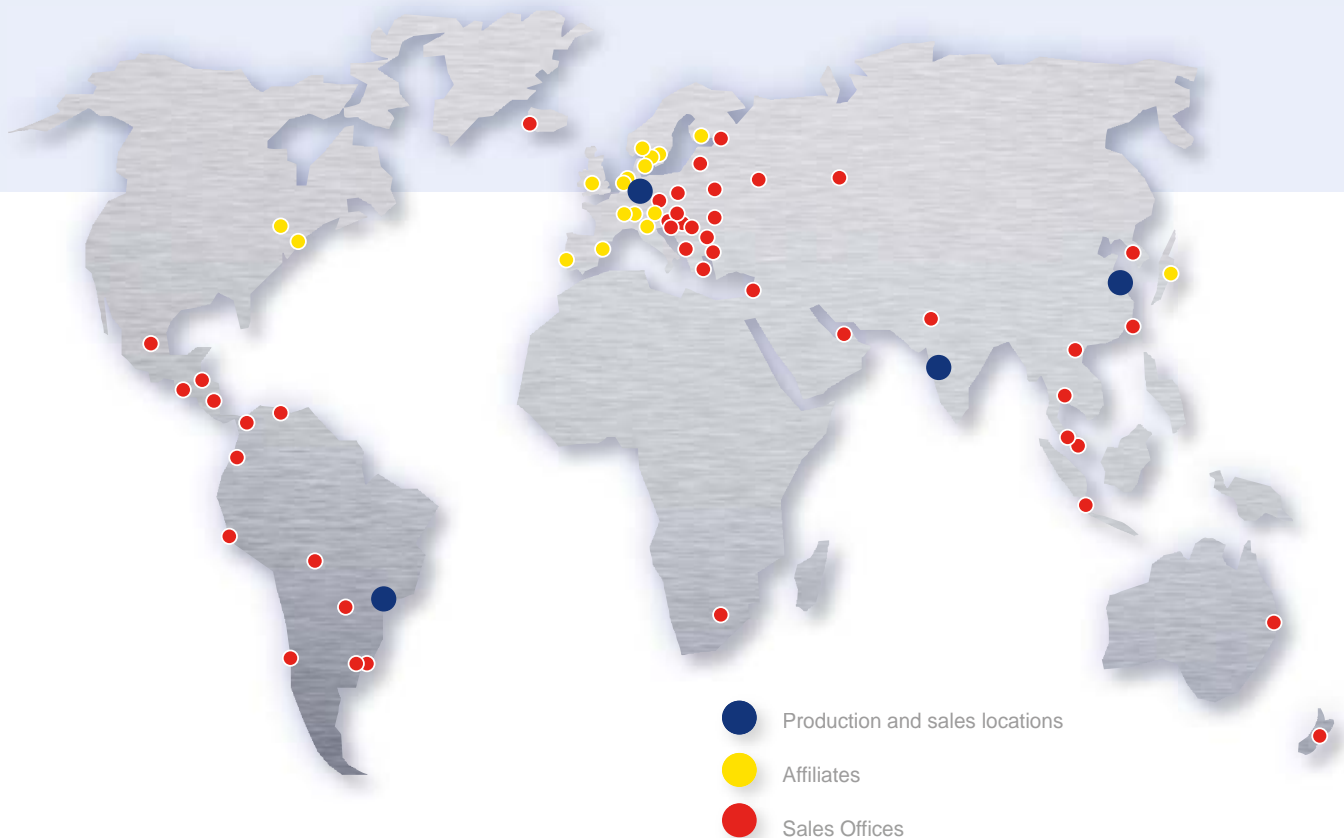
Schmersal Böhnke+Partner move into a **new production and office building** in Bergisch Gladbach.

2016

The Schmersal Group is establishing its own business area for services under the name **tec.nicum**.



## Schmersal worldwide



With its own affiliates in around 20 countries and capable sales and service partners in 30 more countries, the Schmersal Group has operations worldwide.

We started quite early with the internationalisation of sales, consultancy and production. This is also one of the reasons that we are a favoured global partner for machinery and plant construction and also an approved partner for many medium sized engineering companies with local presence. Wherever there are machines that work with Schmersal safety switches, the nearest branch or representative is not far away.

Germany, Wuppertal  
 Germany, Wettenberg  
 Germany, Mühldorf  
 Germany, Bergisch Gladbach  
 Brazil, Boituva  
 China, Shanghai  
 India, Pune

Belgium, Aarschot  
 Denmark, Ballerup  
 Finland, Helsinki  
 France, Seyssins  
 United Kingdom, Malvern, Worcestershire  
 Italy, Borgosatollo  
 Japan, Tokyo  
 Canada, Brampton  
 Netherlands, Harderwijk  
 Norway, Oslo  
 Austria, Vienna  
 Portugal, Póvoa de Sta. Iria  
 Sweden, Mölnlycke  
 Switzerland, Arni  
 Spain, Barcelona  
 USA, Tarrytown NY

Argentina, Buenos Aires  
 Australia, Brisbane  
 Baltic States, Kaunas  
 Bolivia, Santa Cruz de la Sierra  
 Bulgaria, Ruse City  
 Chile, Santiago  
 Ecuador, Quito  
 Greece, Athens  
 Guatemala, Guatemala-City  
 Indonesia, Jakarta  
 Iceland, Reykjavik  
 Israel, Petach Tikva  
 Kazakhstan, Ayrar  
 Colombia, Medellín  
 South Korea, Seoul  
 Croatia, Zagreb  
 Malaysia, Rawang  
 Macedonia, Skopje  
 Mexico, Mexico City  
 New Zealand, Christchurch  
 Pakistan, Islamabad

Paraguay, Minga Guazú  
 Peru, Lima  
 Poland, Warsaw  
 Romania, Sibiu  
 Russia, Moscow  
 Serbia, Belgrade  
 Singapore, Singapore  
 Slovenia, Ljubljana  
 South Africa, Johannesburg  
 Taiwan, Taichung  
 Thailand, Bangkok  
 Czech Republic, Prague  
 Turkey, Istanbul  
 Ukraine, Kiev  
 Hungary, Győr  
 Uruguay, Montevideo  
 United Arab Emirates, Sharjah  
 Venezuela, Caracas  
 Vietnam, Hanoi  
 Belarus, Minsk

# Schmersal Worldwide

## Offices in Germany

### Wuppertal



#### **K.A. Schmersal GmbH & Co. KG**

Founded in 1945  
Around 700 employees

#### **Focal points**

Headquarters of the Schmersal Group  
Development and manufacture of switchgears and switching systems for safety, automation and lift engineering  
Accredited test laboratory  
Central research and development  
Logistics centre for European markets

### Wettenberg



#### **K.A. Schmersal GmbH & Co. KG**

Founded in 1952 (1997)  
Around 180 employees

#### **Focal points**

Development and manufacture of switchgears for operation and monitoring, safety-related relay modules and controls as well as switchgears for explosion protection

### Mühdorf / Inn



#### **Safety Control GmbH**

Founded in 1994 (2008)  
Around 30 employees

#### **Focal points**

Development and manufacture of optical electronic components for safety and automation engineering

### Bergisch Gladbach



#### **Böhnke + Partner GmbH Steuerungssysteme**

Founded in 1991 (2013)  
Around 70 employees

#### **Focal points**

Development and manufacture of components, controls and remote diagnostic systems for the lift industry

( ) = inclusion in the Schmersal Group

# Schmersal Worldwide

## International Offices

### Boituva / Brazil



#### ACE Schmersal

Founded in 1974  
Around 400 employees

#### Focal points

Manufacture of electromechanical and electronic switchgears  
Customer-specific control systems for the North and South American market

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### Shanghai / China



#### Schmersal Industrial Switchgear Co. Ltd

Founded in 1999  
Around 165 employees

#### Focal points

Development and manufacture of switchgears for safety, automation and lift engineering for the Asian market

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### Pune / India



#### Schmersal India Private Limited

Founded in 2013  
Around 60 employees

#### Focal points

Development and manufacture of switchgears for safety, automation and lift engineering for the Indian market

# 1. Position switches according to EN 50041 / EN 50047

## Description

### System universally deployable series

Recording and monitoring, from extraordinarily compact to very robust.

With these properties, the new position switches are aimed at a wide variety of applications across all disciplines of mechanical engineering and plant manufacturing as well as elevator technology.

The advantages of the new position switch series at a glance:

- Reliable position detection
- Highly versatile
- Robust and reliable
- Can be combined in numerous ways thanks to modular design

### Area of application

Type 1 position switches according to ISO 14119 are for determining the position and monitoring of movable components on machines and for protective equipment that can be moved laterally or is rotatable. This allows them to be used in all industrial environments.

The protection classes IP66 an IP67 form the requirements for the use of position switches in adverse ambient conditions.

### Design and way of functioning

All position switches are equipped with positive break NC contacts in accordance with IEC 60947-5-1 and are available with snap action and also slow action. In conjunction with an appropriate safety controller, a single position switch can be used up to PL d. Using two position switches PL e can be achieved according to ISO 13849-1.

### Flexible solutions

#### Switching elements with up to three contacts

Switching elements with three contacts ensures a redundant switch-off with additional signalling contact. All switching elements of the diverse contact combinations are equipped with galvanically separated contacts with positive break NC contacts.

#### Latching function

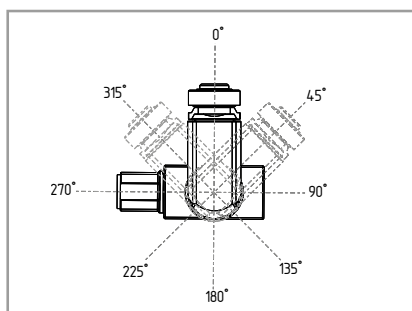
To save the switching state, versions are available with snap action and an optional latching function where the mounting element must be manually reset to the starting condition.

#### Modular diversity

The modular design with consistent components across all series reduces the number of different versions, lowers the effort required for storage and increases availability.

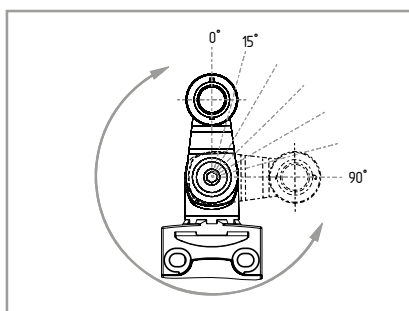


## Actuator elements and lever



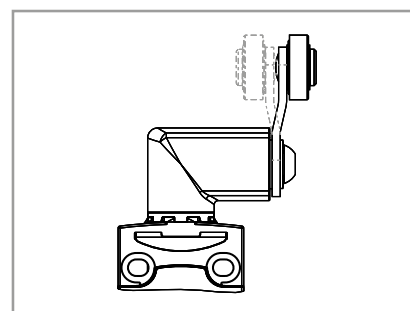
### Adjustable actuator elements

All actuating elements can be rotated in 45° steps and can be quickly replaced and implemented due to the simple mounting design.



### Adjustable lever

Roller lever can be set in 15° steps.



### Rotatable lever

For versions with a rotatable roller lever, the lever can be fitted so that the roller is on the inside.

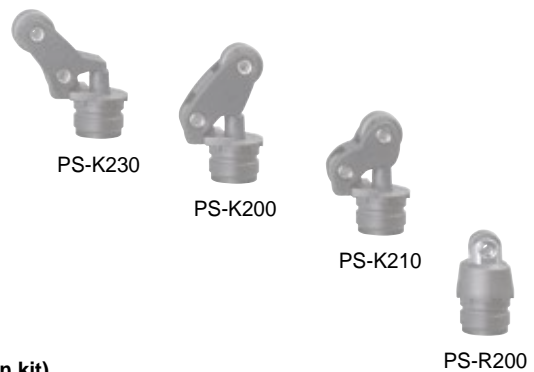
# 1. Position switches according to EN 50041 / EN 50047

Order information complete device or modular construction kit

All position switches of the PS116, PS2xx and PS3xx series can be obtained either as a complete device or a modular construction kit. The complete device with actuating element S200 serves as a basic switch in the construction kit system. The following ordering example can therefore be transferred to all of the series listed.

## Ordering example

Position switch PS116, snap action 1 NO contact / 1 NC contact, roller lever, M12 connector on right



**Complete device**

**Modular selection (construction kit) to be ordered separately**



PS116-Z11-STR-H200



**Basic switch:**  
PS116-Z11-STR-S200



**Actuator head:**



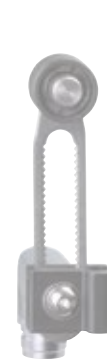
PS-H200

PS-K240

For assembly of the modular selection, the enclosure of the thrust pin included in the basic switch must be removed and replaced by the roller lever PS-H200.



PS-J200



PS-N200



PS-K250

## Ordering code

### PSxxx-Z11-L200-S200

#### Switching elements (others on request)

Z11	Snap action 1 NO contact / 1 NC contact
Z12	Snap action 1 NO contact / 2 NC contacts
Z11R	Snap action 1 NO contact / 1 NC contact with latching (not for PS3xx)
T11	Slow action 1 NO contact / 1 NC contact
T12	Slow action 1 NO contact / 2 NC contacts
T03	Slow action 3 NC contacts
T11UE	Slow action 1 NO contact / 1 NC contact with overlapping contacts
T02H	Slow action 2 NC contacts with staggered contacts

#### Connection

	Cable entry M20, screw connection
ST	Connector plug M12, bottom
STR	Connector plug M12, right
L200	Pre-wired cable bottom, 2 m (PS116 only)
LR200	Pre-wired cable right, 2 m (PS116 only)

#### Actuator elements (more on request)

##### PS116 and PS2xx series

S200	Plunger
R200	Roller plunger, roller Ø 9.5 mm
K200	Offset roller lever, roller Ø 12 mm
K210	Offset roller lever, roller Ø 14 mm
K230	Angle roller lever, roller Ø 14 mm
K240	Angle roller lever, roller Ø 22 mm
K250	Angle roller lever, roller Ø 22 mm
H200	Roller lever, roller Ø 16 mm, length 24 mm
N200	Roller lever, roll Ø 20 mm, can be adjusted in 2 mm increments (24 ... 66 mm)
J200	Rod lever with plastic rod Ø 6 mm, length 200 mm

##### PS3xx series

S300	Plunger
R300	Roller plunger, roller Ø 17.2 mm
K360	Angle roller lever, roller Ø 20 mm
K370	Offset roller lever, roller Ø 20 mm
H300	Offset roller lever, roller Ø 25 mm
N300	Roller lever, roll Ø 20 mm, can be adjusted in 2 mm increments (24 ... 66 mm)
J300	Rod lever, rod Ø 6 mm, length 200 mm

# 1. Position switches according to EN 50041 / EN 50047

Standardised construction forms, extraordinary features

Folding  
latching cover



All plastic versions are fitted with a folding and captive latching cover. The cover can be opened with the aid of a flat-head screwdriver and needs no tools to be closed.

Reduced  
assembly times

The 45° rotated connection terminals of all switch elements reduce the assembly time considerably.





## Actuating element replace and turn

All actuating elements can be rotated in 45° steps and can be quickly replaced and implemented due to the simple mounting design. This means that adaptation to the prescribed actuating direction is possible at any time.

### PS116



1. Release locking plate  
(flat-head screwdriver or  
accessory tool ACC-PS116-1)

2. Remove or turn existing  
actuating element

3. Position of new  
actuating element

4. Secure locking plate

The symmetrical layout of the enclosure means that it can be used for left-hand and right-hand versions of the same switch. This applies to both the cable and the connector design.

### PS2xx / PS3xx



1. Release locking plate  
(flat-head screwdriver)

2. Remove or turn existing  
actuating element

3. Position of new  
actuating element

4. Secure locking plate

# 1. Position switches according to EN 50041 / EN 50047

## Overview of the series



■ PS116



■ PS215



■ PS216

### Key Features

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>• Symmetrical casing</li> <li>• Compact design</li> <li>• Fitted (cable / M12 connector)</li> <li>• Complete device or modular construction kit</li> <li>• Design to EN 50047</li> </ul> | <ul style="list-style-type: none"> <li>• Simplified connection (connection terminals rotated by 45°)</li> <li>• Robust design</li> <li>• Complete device or modular construction kit</li> <li>• Design to EN 50047</li> </ul> | <ul style="list-style-type: none"> <li>• Simplified connection (connection terminals rotated by 45°)</li> <li>• Folding latching cover</li> <li>• Complete device or modular construction kit</li> <li>• Design to EN 50047</li> </ul> |
|---|---|--|

### Technical features

Electrical characteristics			
<b>Switching system</b>	Snap-/slow action	Snap-/slow action	Snap-/slow action
<b>Latching variant</b>	■	■	■
<b>Max. number of contacts</b>	3	3	3
<b>Max. switching capacity U/I</b>	230 VAC / 3 A; 24 VDC / 1.5 A	230 VAC / 3 A; 24 VDC / 3 A	230 VAC / 3 A; 24 VDC / 3 A
Mechanical data			
<b>Housing material</b>	Metal / thermoplastic enclosure	Metal enclosure, painted	Thermoplastic enclosure
<b>Connection</b>	Cable 4/6 pole M12 connector 4/6 pole	1 x M20 M12 connector 5/8 pole	1 x M20 M12 connector 4/8 pole
<b>Cable section <sup>3)</sup></b>	4/6 x 0.5 mm <sup>2</sup>	max. 1.5 mm <sup>2</sup> (incl. conductor ferrules)	max. 1.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Dimensions (W x H x D)</b>	31 x 52 x 16.6 mm	31 x 66 x 33 mm	31 x 66 x 33 mm
Ambient conditions			
<b>Ambient temperature</b>	-30 °C ... +80 °C	-30 °C ... +80 °C	-30 °C ... +80 °C
<b>Protection class</b>	IP66, IP67	IP66, IP67	IP66, IP67
<b>Actuator heads</b>	see page 18	see page 18	see page 18

### Safety classification

<b>Standards</b>	ISO 13849-1	ISO 13849-1	ISO 13849-1
<b>B<sub>10D</sub> NC contact</b>	20,000,000	20,000,000	20,000,000
<b>Certificates</b>			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ PS226



■ PS315



■ PS316

- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"> <li>• Simplified connection (connection terminals rotated by 45°)</li> <li>• Folding latching cover</li> <li>• Complete device or modular construction kit</li> <li>• Design to EN 50047</li> </ul> | <ul style="list-style-type: none"> <li>• Simplified connection (connection terminals rotated by 45°)</li> <li>• Robust design</li> <li>• Complete device or modular construction kit</li> <li>• Design to EN 50041</li> </ul> | <ul style="list-style-type: none"> <li>• Simplified connection (connection terminals rotated by 45°)</li> <li>• Folding latching cover</li> <li>• Complete device or modular construction kit</li> <li>• Design to EN 50041</li> </ul> |
|--|---|--|

Snap-/slow action	Snap-/slow action	Snap-/slow action
■	–	–
3	3	3
230 VAC / 3 A; 24 VDC / 3 A	230 VAC / 3 A; 24 VDC / 3 A	230 VAC / 3 A; 24 VDC / 3 A
Thermoplastic enclosure	Metal enclosure, painted	Thermoplastic enclosure
2 x M20 M12 connector 4/8 pole	1 x M20 M12 connector 5/8 pole	1 x M20 M12 connector 4/8 pole
max. 1.5 mm <sup>2</sup> (incl. conductor ferrules)	max. 1.5 mm <sup>2</sup> (incl. conductor ferrules)	max. 1,5 mm <sup>2</sup> (incl. conductor ferrules)
31 x 59.2 x 33 mm	40 x 77.7 x 37.2 mm	40 x 77.7 x 37.2 mm
–30 °C ... +80 °C	–30 °C ... +80 °C	–30 °C ... +80 °C
IP66, IP67	IP66, IP67	IP66, IP67
see page 18	see page 22	see page 22

ISO 13849-1 20,000,000	ISO 13849-1 20,000,000	ISO 13849-1 20,000,000

# 1. Position switches according to EN 50041 / EN 50047 PS116 / PS2xx – Actuator heads



**Plunger S200**

**Roller plunger R200**

### Actuator heads

Actuator description	Thermoplastic plunger Actuator type B according to EN 50047	Thermoplastic roller plunger Actuator type C according to EN 50047
<b>Positive break force</b>	> 40 N	> 40 N
<b>Actuating speed</b>	min. 10 mm/min, max. 0.5 m/s	min. 10 mm/min, max. 0.5 m/s
<b>Snap action</b>		
<b>Slow action</b>	min. 60 mm/min, max. 0.5 m/s	min. 60 mm/min, max. 0.5 m/s
<b>Positioning the lever</b>	-	-

### Ordering data modular construction kit

Product type description	PS-S200	PS-R200
<b>Material number</b>	103010968	103010967

### Switch travel diagrams

<b>Snap action</b>	<b>Per NO contact / per NC contact</b>		
<b>Slow action</b>	<b>Per NO contact / per NC contact</b>		
	<b>1 NO / 1 NC with overlapping</b>		
	<b>2 NC with staggered contacts</b>		

Contact closed

Contact open

Positive break travel / angle



Offset roller lever K200



Offset roller lever K210



Angle roller lever K230

Thermoplastic offset roller lever  
Actuator type E according to EN 50047

> 40 N

min. 10 mm/min,  
max. 1 m/s

min. 60 mm/min,  
max. 1 m/s

-

Thermoplastic offset roller lever

> 40 N

min. 10 mm/min,  
max. 1 m/s

min. 60 mm/min,  
max. 1 m/s

-

Thermoplastic angle roller lever

> 40 N

min. 10 mm/min,  
max. 1 m/s

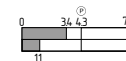
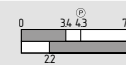
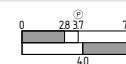
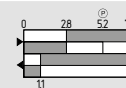
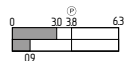
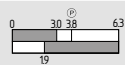
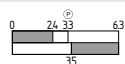
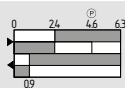
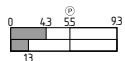
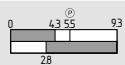
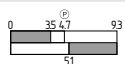
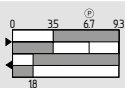
min. 60 mm/min,  
max. 1 m/s

-

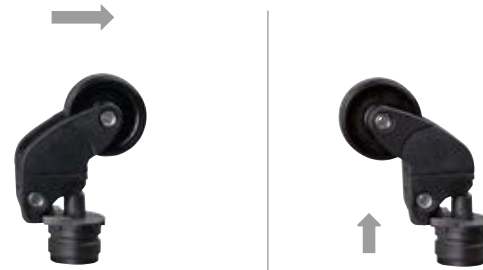
PS-K200  
103010961

PS-K210  
103010962

PS-K230  
103010963



# 1. Position switches according to EN 50041 / EN 50047 PS116 / PS2xx – Actuator heads



**Angle roller lever K240**                      **Angle roller lever K250**

**Actuator heads**

Actuator description	Thermoplastic angle roller lever	Thermoplastic angle roller lever
<b>Positive break force</b>	> 40 N	> 40 N
<b>Actuating speed</b>	min. 10 mm/min, max. 1 m/s	min. 10 mm/min, max. 1 m/s
<b>Snap action</b>		
<b>Slow action</b>	min. 60 mm/min, max. 1 m/s	min. 60 mm/min, max. 1 m/s
<b>Positioning the lever</b>	-	-

**Ordering data modular construction kit**

Product type description	PS-K240	PS-K250
<b>Material number</b>	103010964	103010965

**Switch travel diagrams**

<b>Snap action</b>	<b>Per NO contact / per NC contact</b>		
<b>Slow action</b>	<b>Per NO contact / per NC contact</b>		
	<b>1 NO / 1 NC with overlapping</b>		
	<b>2 NC with staggered contacts</b>		

■ Contact closed

□ Contact open

Ⓟ Positive break travel / angle



**Roller lever H200**



**Roller lever N200**



**Roller lever J200**

Metal lever with plastic roller  
Actuator type A according to EN 50047

Length adjustable metal lever  
with plastic roller  
adjustable in 2 mm increments

Plastic rod, 200 mm  
Can only be used for positioning tasks

> 40 N

min. 10 mm/min,  
max. 1 m/s

min 60 mm/min,  
max. 1 m/s

adjustable in 15° steps

> 40 N

min. 10 mm/min,  
max. 1 m/s

min. 60 mm/min,  
max. 1 m/s

adjustable in 15° steps

> 40 N

min. 10 mm/min,  
max. 1 m/s

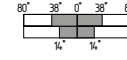
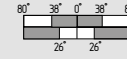
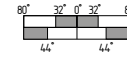
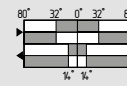
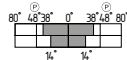
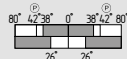
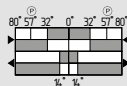
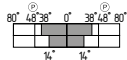
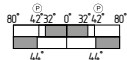
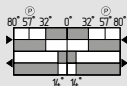
min 60 mm/min,  
max. 1 m/s

adjustable in 15° steps

PS-H200  
103010948

PS-N200  
103010966

PS-J200  
103010951



# 1. Position switches according to EN 50041 / EN 50047

## PS3xx – Actuator heads



Plunger S300



Roller plunger R300

### Actuator heads

Actuator description	Thermoplastic plunger Actuator type B according to EN 50041	Thermoplastic roller plunger Actuator type C according to EN 50041
Positive break force	> 50 N	> 50 N
Actuating speed	min. 10 mm/min, max. 0.5 m/s	min. 10 mm/min, max. 0.5 m/s
Snap action		
Slow action	min. 60 mm/min, max. 0.5 m/s	min. 60 mm/min, max. 0.5 m/s
Positioning the lever	-	-

### Ordering data modular construction kit

Product type description	PS-S300	PS-R300
Material number	103015397	103015398

### Switch travel diagrams

<b>Snap action</b>	<b>Per NO contact / per NC contact</b>		
<b>Slow action</b>	<b>Per NO contact / per NC contact</b>		
	<b>1 NO / 1 NC with overlapping</b>		
	<b>2 NC with staggered contacts</b>		

Contact closed

Contact open

Positive break travel / angle





Angle roller lever K360

Offset roller lever K370

Roller lever H300

Thermoplastic angle roller lever	Thermoplastic offset roller lever	Metal lever with plastic roller Actuator type A according to EN 50041
> 50 N min. 10 mm/min, max. 1 m/s	> 50 N min. 10 mm/min, max. 1 m/s	> 50 N min. 10 mm/min, max. 1 m/s
min. 60 mm/min, max. 1 m/s	min. 60 mm/min, max. 1 m/s	min. 60 mm/min, max. 1 m/s
-	-	adjustable in 15° steps
PS-K360 103015399	PS-K370 103015400	PS-H300 103015401


# 1. Position switches according to EN 50041 / EN 50047

## PS3xx – Actuator heads



**Roller lever N300**

**Roller lever J300**

### Actuator heads

Actuator description	Roller lever N300	Roller lever J300
Actuator description	Length adjustable metal lever with plastic roller adjustable in 2 mm increments	Plastic rod, 200 mm Can only be used for positioning tasks Actuator type A according to EN 50041
Positive break force	> 50 N	-
Actuating speed	min. 10 mm/min, max. 1 m/s	min. 10 mm/min, max. 1 m/s
Snap action		
Slow action	min. 60 mm/min, max. 1 m/s	min. 60 mm/min, max. 1 m/s
Positioning the lever	adjustable in 15° steps	adjustable in 15° steps

### Ordering data modular construction kit

Product type description	PS-N300	PS-J300
Material number	103015402	103015403

### Switch travel diagrams

Snap action	Per NO contact / per NC contact	PS-N300	PS-J300
Snap action	Per NO contact / per NC contact		
Slow action	Per NO contact / per NC contact		
	1 NO / 1 NC with overlapping		
	2 NC with staggered contacts		

Contact closed

Contact open

Positive break travel / angle

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# 1. Position switches according to EN 50041 / EN 50047

## PS116 – Preferred types and ordering details



Position switch with actuating element	Connection	Switching system	NO contacts	NC contacts	Type designation	Material number	
<b>S200</b> Basic switch	Connector plug	Snap action	1	1	<b>PS116-Z11-ST-S200</b>	<b>103006651</b>	
			1	2	<b>PS116-Z12-ST-S200</b>	<b>103006662</b>	
		Slow action	1	1	<b>PS116-T11-ST-S200</b>	<b>103006652</b>	
	Connecting cable	Snap action	1	1	<b>PS116-Z11-L200-S200</b>	<b>103006633</b>	
			1	2	<b>PS116-Z12-L200-S200</b>	<b>103006647</b>	
		Snap action with latch	1	1	<b>PS116-Z11R-L200-S200</b>	<b>103009907</b>	
			0	2	<b>PS116-Z02R-L200-S200</b>	<b>103012043</b>	
		Slow action	1	1	<b>PS116-T11-L200-S200</b>	<b>103006634</b>	
<b>R200</b>	Connector plug	Snap action	1	1	<b>PS116-Z11-ST-R200</b>	<b>103006653</b>	
			0	2	<b>PS116-Z02-ST-R200</b>	<b>103008391</b>	
			1	2	<b>PS116-Z12-ST-R200</b>	<b>103006663</b>	
		Snap action with latch	1	2	<b>PS116-Z12R-ST-R200</b>	<b>103009897</b>	
			1	1	<b>PS116-T11-ST-R200</b>	<b>103006654</b>	
		Slow action	2	1	<b>PS116-T21-ST-R200</b>	<b>103009215</b>	
	Connecting cable	Snap action	1	1	<b>PS116-Z11-L200-R200</b>	<b>103006635</b>	
			1	1	<b>PS116-T11-L200-R200</b>	<b>103006636</b>	
		Slow action	1	2	<b>PS116-T12-L200-R200</b>	<b>103006648</b>	
<b>K200</b>	Connector plug	Snap action	1	1	<b>PS116-Z11-ST-K200</b>	<b>103006655</b>	
			1	2	<b>PS116-Z12-ST-K200</b>	<b>103006664</b>	
	Connecting cable		1	1	<b>PS116-Z11-L200-K200</b>	<b>103006637</b>	
<b>K210</b>	Connector plug	Snap action	1	1	<b>PS116-Z11-ST-K210</b>	<b>103006656</b>	
			1	2	<b>PS116-Z12-ST-K210</b>	<b>103009491</b>	
		Slow action	1	1	<b>PS116-T11-ST-K210</b>	<b>103006657</b>	
			2	1	<b>PS116-T21-ST-K210</b>	<b>103013834</b>	
	Connecting cable	Snap action	1	1	<b>PS116-Z11-L200-K210</b>	<b>103006638</b>	
			1	2	<b>PS116-Z12R-L200-K210</b>	<b>103009906</b>	
		Slow action	1	1	<b>PS116-T11-L200-K210</b>	<b>103006639</b>	
<b>K230</b>	Connector plug	Snap action	1	1	<b>PS116-Z11-ST-K230</b>	<b>103006658</b>	
			0	2	<b>PS116-T02-ST-K230</b>	<b>103014690</b>	
	Connecting cable	Snap action	1	1	<b>PS116-Z11-L200-K230</b>	<b>103006640</b>	
			0	2	<b>PS116-Z02-L200-K230</b>	<b>103011608</b>	
		Slow action					
<b>K240</b>	Connector plug	Snap action	1	2	<b>PS116-Z12-ST-K240</b>	<b>103006665</b>	
	Connecting cable		1	1	<b>PS116-Z11-L200-K240</b>	<b>103006641</b>	
<b>K250</b>	Connector plug	Snap action	1	2	<b>PS116-Z12-ST-K250</b>	<b>103006666</b>	
			1	2	<b>PS116-T12-ST-K250</b>	<b>103006667</b>	
	Connecting cable	Snap action	1	1	<b>PS116-Z11-L200-K250</b>	<b>103006642</b>	
			1	1	<b>PS116-T11-L200-K250</b>	<b>103006643</b>	
		Slow action	1	2	<b>PS116-T12-L200-K250</b>	<b>103015281</b>	

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

# 1. Position switches according to EN 50041 / EN 50047

## PS116 – Preferred types and ordering details



Position switch with actuating element	Connection	Switching system	NO contacts	NC contacts	Type designation	Material number
H200	Connector plug	Snap action	1	1	PS116-Z11-ST-H200	103006659
			1	2	PS116-Z12-ST-H200	103009490
		Slow action	1	1	PS116-T11-ST-H200	103006660
			1	2	PS116-T12-ST-H200	103006668
			0	3	PS116-T03-ST-H200	103012315
	Connecting cable	Snap action	1	1	PS116-Z11-L200-H200	103006644
		Slow action	1	1	PS116-T11-L200-H200	103006645
			1	2	PS116-T12-L200-H200	103006649
N200	Connector plug	Snap action	1	1	PS116-Z11-ST-N200	103006661
			1	2	PS116-Z12-ST-N200	103010921
		Slow action	1	1	PS116-T11-ST-N200	103011367
			2	0	PS116-T20-ST-N200	103010065
			1	2	PS116-T12-ST-N200	103011553
			2	1	PS116-T21-ST-N200	103010067
	Connecting cable	Snap action	1	1	PS116-Z11-L200-N200	103006646
			1	2	PS116-Z12-L200-N200	103008748
		Slow action	1	2	PS116-T12-L200-N200	103006650
J200	Connector plug	Slow action with staggered contacts	0	2	PS116-T02H-ST-J200	103014413

# 1. Position switches according to EN 50041 / EN 50047

## PS2xx – Preferred types and ordering details



Position switch with actuating element	Switching system	NO contacts	NC contacts	Type designation	Material number	
<b>S200</b> Basic switch	PS215 Metal	Snap action	1	1	PS215-Z11-S200	103014952
			0	2	PS215-Z02-S200	103014953
			1	2	PS215-Z12-S200	103014954
		Slow action	1	1	PS215-T11-S200	103014977
			0	2	PS215-T02-S200	103014978
			1	2	PS215-T12-S200	103014979
	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-S200	103013713
			0	2	PS216-Z02-S200	103015001
			1	2	PS216-Z12-S200	103015002
		Slow action	1	1	PS216-T11-S200	103015022
			0	2	PS216-T02-S200	103015023
			1	2	PS216-T12-S200	103015024
	PS226 Thermoplastic	Snap action	1	1	PS226-Z11-S200	103015048
			0	2	PS226-Z02-S200	103015049
			1	2	PS226-Z12-S200	103015050
		Slow action	1	1	PS226-T11-S200	103015073
			0	2	PS226-T02-S200	103015074
			1	2	PS226-T12-S200	103015075
<b>R200</b>	PS215 Metal	Snap action	1	1	PS215-Z11-R200	103014955
		Slow action	1	1	PS215-T11-R200	103014981
	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-R200	103015003
			0	2	PS216-Z02-R200	103015004
			1	2	PS216-Z12-R200	103015005
		Slow action	1	1	PS216-T11-R200	103015028
			0	2	PS216-T02-R200	103015029
			1	2	PS216-T12-R200	103015030
	PS226 Thermoplastic	Snap action	1	1	PS226-Z11-R200	103015051
		Slow action	1	1	PS226-T11-R200	103015076

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# 1. Position switches according to EN 50041 / EN 50047

## PS2xx – Preferred types and ordering details



Position switch with actuating element		Switching system	NO contacts	NC contacts	Type designation	Material number
K200	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-K200	103015006
		Slow action	1	1	PS216-T11-K200	103015031
K210	PS215 Metal	Snap action	1	1	PS215-Z11-K210	103014960
		Slow action	1	1	PS215-T11-K210	103014988
	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-K210	103015008
		Slow action	1	1	PS216-T11-K210	103015033
K230	PS215 Metal	Snap action	1	1	PS215-Z11-K230	103014963
		Slow action	1	1	PS215-T11-K230	103014988
	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-K230	103015010
		Slow action	1	1	PS216-T11-K230	103015035
K240	PS215 Metal	Slow action	1	1	PS215-T11-K240	103014991
		Snap action	1	1	PS216-Z11-K240	103015013
	PS216 Thermoplastic	Slow action	1	1	PS216-T11-K240	103015038
		Snap action	1	1	PS226-Z11-K240	103015061
K250	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-K250	103015015
		Slow action	1	1	PS216-T11-K250	103015040
H200	PS215 Metal	Slow action	1	1	PS215-T11-H200	103014995
		Snap action	1	1	PS216-Z11-H200	103013857
	PS216 Thermoplastic	Snap action	1	2	PS216-Z12-H200	103015017
		Slow action	1	1	PS216-T11-H200	103015042
		Slow action	1	2	PS216-T12-H200	103015043
N200	PS215 Metal	Snap action	1	1	PS215-Z11-N200	103014972
		Slow action	1	1	PS215-T11-N200	103014997
	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-N200	103015018
			1	2	PS216-Z12-N200	103015019
		Slow action	1	1	PS216-T11-N200	103015044
			1	2	PS216-T12-N200	103015045
J200	PS215 Metal	Snap action	1	1	PS215-Z11-J200	103014974
	PS216 Thermoplastic	Snap action	1	1	PS216-Z11-J200	103015020

# 1. Position switches according to EN 50041 / EN 50047

## PS3xx – Preferred types and ordering details



Position switch with actuating element	Switching system	NO contacts	NC contacts	Type designation	Material number		
<b>S200</b> Basic switch	PS315 Metal	Snap action	1	1	PS315-Z11-S200	103015406	
			0	2	PS315-Z02-S200	103015407	
			1	2	PS315-Z12-S200	103015408	
		Slow action	1	1	PS315-T11-S200	103015412	
			0	2	PS315-T02-S200	103015414	
			1	2	PS315-T12-S200	103015415	
	PS316 Thermoplastic	Snap action	1	1	PS316-Z11-S200	103015409	
			0	2	PS316-Z02-S200	103015410	
			1	2	PS316-Z12-S200	103015411	
		Slow action	1	1	PS316-T11-S200	103015417	
			0	2	PS316-T02-S200	103015418	
			1	2	PS316-T12-S200	103015419	
	<b>S300</b>	PS315 Metal	Snap action	1	1	PS315-Z11-S300	103015096
				0	2	PS315-Z02-S300	103015097
				1	2	PS315-Z12-S300	103015098
Slow action			1	1	PS315-T11-S300	103015112	
			0	2	PS315-T02-S300	103015113	
			1	2	PS315-T12-S300	103015114	
PS316 Thermoplastic		Snap action	1	1	PS316-Z11-S300	103015129	
			0	2	PS316-Z02-S300	103015130	
			1	2	PS316-Z12-S300	103015131	
		Slow action	1	1	PS316-T11-S300	103015146	
			0	2	PS316-T02-S300	103015147	
			1	2	PS316-T12-S300	103015148	
<b>R300</b>		PS315 Metal	Snap action	1	1	PS315-Z11-R300	103015099
				0	2	PS315-Z02-R300	103015100
			Slow action	1	1	PS315-T11-R300	103015116
	0	2		PS315-T02-R300	103015117		
	PS316 Thermoplastic	Snap action	1	1	PS316-Z11-R300	103015132	
			0	2	PS316-Z02-R300	103015133	
		Slow action	1	1	PS316-T11-R300	103015152	
			0	2	PS316-T02-R300	103015153	

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).



# 1. Position switches according to EN 50041 / EN 50047

## PS3xx – Preferred types and ordering details



Position switch with actuating element		Switching system	NO contacts	NC contacts	Type designation	Material number
K360	PS315 Metal	Snap action	1	1	PS315-Z11-K360	103015102
		Slow action	1	1	PS315-T11-K360	103015119
	PS316 Thermoplastic	Snap action	1	1	PS316-Z11-K360	103015135
		Slow action	1	1	PS316-T11-K360	103015155
K370	PS315 Metal	Snap action	1	1	PS315-Z11-K370	103015104
		Slow action	1	1	PS315-T11-K370	103015121
	PS316 Thermoplastic	Snap action	1	1	PS316-Z11-K370	103015137
		Slow action	1	1	PS316-T11-K370	103015157
H300	PS315 Metal	Snap action	1	1	PS315-Z11-H300	103015106
		Slow action	1	1	PS315-T11-H300	103015123
	PS316 Thermoplastic	Snap action	1	1	PS316-Z11-H300	103015139
		Slow action	1	1	PS316-T11-H300	103015159
			1	2	PS316-T12-H300	103015160
N300	PS315 Metal	Snap action	1	1	PS315-Z11-N300	103015108
		Slow action	1	1	PS315-T11-N300	103015125
	PS316 Thermoplastic	Snap action	1	1	PS316-Z11-N300	103015141
		Slow action	1	1	PS316-T11-N300	103015161
			1	2	PS316-T12-N300	103015162
J300	PS315 Metal	Snap action	1	1	PS315-Z11-J300	103015110
		Slow action	1	1	PS315-T11-J300	103015127
	PS316 Thermoplastic	Snap action	1	1	PS316-Z11-J300	103015143
		Slow action	1	1	PS316-T11-J300	103015163

## 2. Position and limit switches

### Description

### Area of application

Position and limit switches are used to detect the position and monitoring of moving parts in machinery and plants. The various series are suitable for applications including steel processing, the transport and handling of bulk materials, as well as in other fixed plants and vehicles.

### Design and operating principle

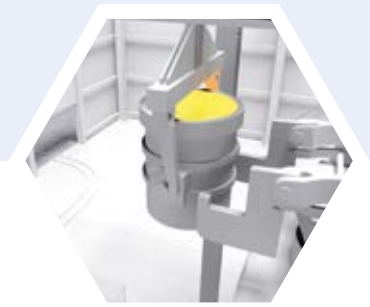
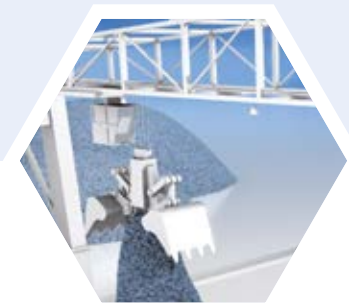
Various series are available, all of which are equipped with a robust metal enclosure and all of which are suitable for position detection under extreme ambient conditions. These include types with extended temperature ranges, covering applications at high temperature in steel works or foundries, as well as applications at low temperature in cold store warehouses. The enclosures, coated in a dual-component finish, protect the switches from oil, grease, salt and acids in diluted concentrations.

The ATEC/IECEX-certified types allow for use in potentially explosive environments. Corresponding solutions exist for zones 1 and 21.

In the individual series there are, in addition to the various standard actuators, also individual actuating elements for different applications. With the switching elements, the user has the choice of a number of different variants with up to six contacts.

Position and limit switches have been part of the core programme of the Schmersal Group for decades. The variety of designs and product ranges is correspondingly large.





## Overview

Position and limit switches		you can find from
Standard switches	M 330	Page 38
Series S0	T/M 015	Page 48
	T 016	
	T/M 017	
Series S1	T 422	Page 56
	T/M 441	
	T 454	
	T/M 461	
Series U	U 432	Page 62
	U 434	
Series S3	T/M 035	Page 68
	T/M 250	
Series S2	T/M 064	Page 72
	T/M 471	
	T 130/136	

## 2. Position and limit switches

### Overview of the series



■ M 330



■ T/M 015



■ T 016

#### Key Features

- **Standard switch**
- 2 contacts
- Metal enclosure
- Design EN 50041

- **Series S0**
- 2 contacts
- Metal enclosure

- **Series S0**
- 3 contacts
- Metal enclosure

#### Technical features

Electrical characteristics			
<b>Switching principle</b>	Snap action	Slow action or snap action, positive break NC contact	Slow action, positive break NC contact
<b>Max. switching capacity U/I</b>			
- Snap action	230 VAC / 2.5 A	400 VAC / 2.5 A	-
- Slow action	-	400 VAC / 4 A	400 VAC / 4 A
<b>Mechanical data</b>			
<b>Housing material</b>	Aluminium die-cast, paint finish	Aluminium die-cast, paint finish	Aluminium die-cast, paint finish
<b>Cable entry</b>	1 x M20	3 x M20	3 x M20
<b>Connection</b>	Screw terminals	Screw terminals	Screw terminals
<b>Cable section <sup>1)</sup></b>	max. 2.5 mm <sup>2</sup>	max. 2.5 mm <sup>2</sup>	max. 2.5 mm <sup>2</sup>
<b>Dimensions (W x H x D)</b>	40 x 76 x 40 mm	67 x 75 x 43 mm	67 x 105 x 43 mm
<b>Ambient conditions</b>			
<b>Ambient temperature</b>	-30 °C ... +90 °C up to -40 °C (-1172) up to +160 °C (-1366)	-30 °C ... +90 °C	-30 °C ... +90 °C
<b>Protection class</b>	IP65	IP65	IP65
<b>Actuator heads</b>	see page 38	see page 48	see page 48

#### Safety classification

<b>Standards</b>	IEC 60947-5-1	IEC 60947-5-1	IEC 60947-5-1
<b>B<sub>10D</sub> NC contact</b>	20,000,000	2,000,000	2,000,000
<b>Certificates</b>			

#### Other versions

<b>ATEX / IECEx</b>	Zone 22	-	-
<b>with gold-plated contacts</b>	-	-	-
<b>With blow-out magnets to switch high DC currents</b>	-	■	■



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ T/M 017



■ T 422



■ T/M 441



■ T 454



■ T/M 461

- **Series S0**
- 4 contacts
- Metal enclosure

- **Series S1**
- 1 contact
- Metal enclosure

- **Series S1**
- 2 contacts
- Metal enclosure

- **Series S1**
- 2 or 4 contacts
- Metal enclosure
- Exterior parts made of stainless steel

- **Series S1**
- 3 or 4 contacts
- Metal enclosure

Slow action or snap action, positive break NC contact	Slow action, positive break NC contact	Slow action or snap action, positive break NC contact	Slow action, positive break NC contact	Slow action or snap action, positive break NC contact
400 VAC / 2.5 A 400 VAC / 4 A	- 400 VAC / 4 A	230 VAC / 4 A 400 VAC / 4 A	230 VAC / 4 A 230 VAC / 4 A	230 VAC / 4 A 400 VAC / 4 A
Aluminium die-cast, paint finish	Grey cast iron, galvanised and painted	Grey cast iron, galvanised and painted	Grey cast iron, galvanised and painted	Grey cast iron, galvanised and painted
3 x M20	2 x M20	2 x M20	2 x M20	2 x M20
Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 2.5 mm <sup>2</sup>
67 x 130 x 43 mm	75 x 71 x 63 mm	75 x 99 x 63 mm	83 x 127 x 64 mm	83 x 155 x 64 mm
-30 °C ... +90 °C	-30 °C ... +90 °C -40 °C ... +200 °C	-30 °C ... +90 °C -40 °C ... +200 °C	-40 °C ... +70 °C	-30 °C ... +90 °C -40 °C ... +200 °C
IP65 see page 48	IP65 see page 56	IP65 see page 56	IP66, IP67 see page 56	IP65 see page 56

IEC 60947-5-1 2,000,000	IEC 60947-5-1 2,000,000	IEC 60947-5-1 2,000,000	IEC 60947-5-1 2,000,000	IEC 60947-5-1 2,000,000

-	-	Zone 21, 22	Zone 1, 21	-
-	0.3 µm	0.3 µm	0.3 µm	0.3 µm
■	-	-	-	-

<sup>1)</sup> Including conductor ferrules

## 2. Position and limit switches

### Overview of the series



■ U 432

■ U 434

■ T/M 035

#### Key Features

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>• <b>Series U</b></li> <li>• 2 contacts</li> <li>• Metal enclosure</li> <li>• Switching points and contact type adjustable</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Series U</b></li> <li>• 4 contacts</li> <li>• Metal enclosure</li> <li>• Switching points and contact type adjustable</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Series S3</b></li> <li>• 2 contacts</li> <li>• Metal enclosure</li> <li>• Ball-bearing mounted switching shaft</li> </ul> |
|--|--|---|

#### Technical features

Electrical characteristics			
<b>Switching principle</b>	Slow action	Slow action	Slow action or snap action, positive break NC contact
<b>Max. switching capacity U/I</b>			
- Snap action	-	-	400 VAC / 2.5 A
- Slow action	400 VAC / 6 A	400 VAC / 6 A	400 VAC / 4 A
Mechanical data			
<b>Housing material</b>	Aluminium die-cast, paint finish	Aluminium die-cast, paint finish	Grey cast iron, galvanised and painted
<b>Cable entry</b>	3 x M20	3 x M20	3 x M20
<b>Connection</b>	Screw terminals	Screw terminals	Screw terminals
<b>Cable section <sup>1)</sup></b>	max. 2.5 mm <sup>2</sup>	max. 2.5 mm <sup>2</sup>	max. 2.5 mm <sup>2</sup>
<b>Dimensions (W x H x D)</b>	62 x 80 x 50 mm	62 x 127 x 50 mm	58 x 142 x 61.5 mm
Ambient conditions			
<b>Ambient temperature</b>	-20 °C ... +60 °C	-20 °C ... +60 °C	-30 °C ... +90 °C
- Tropical and temperature resistant	up to -30 °C (-1272)	up to -30 °C (-1272)	
<b>Protection class</b>	IP65	IP65	IP67
<b>Actuator heads</b>	see page 62	see page 62	see page 68

#### Safety classification

<b>Standards</b>	IEC 60947-5-1	IEC 60947-5-1	IEC 60947-5-1
<b>B<sub>10D</sub> NC contact</b>	2,000,000	2,000,000	2,000,000
<b>Certificates</b>			

#### Other versions

<b>ATEX / IECEx</b>	-	-	-
<b>with gold-plated contacts</b>	-	-	-
<b>With blow-out magnets to switch high DC currents</b>	-	-	■



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ T/M 250



■ T/M 064



■ T/M 471



■ T 130/136

- |  |   |   |  |
|--|---|---|--|
| <ul style="list-style-type: none"> <li>• <b>Series S3</b></li> <li>• 2 or 4 contacts</li> <li>• Metal enclosure</li> <li>• Switching mechanism can be set</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Series S2</b></li> <li>• 3 or 4 contacts</li> <li>• Metal enclosure</li> <li>• Switching mechanism can be set for switching to right, left or in both directions</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Series S2</b></li> <li>• 4 or 6 contacts</li> <li>• Metal enclosure</li> <li>• Switching mechanism can be set for switching to right, left or in both directions</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Series S2</b></li> <li>• T 130: 6 contacts;</li> <li>• T 136: 4 contacts</li> <li>• Metal enclosure</li> </ul> |
|--|---|---|--|

Slow action or snap action, positive break NC contact	Slow action or snap action, positive break NC contact	Slow action or snap action, positive break NC contact	Slow action, positive break NC contact
230 VAC / 2.5 A 400 VAC / 4 A	400 VAC / 25 A 400 VAC / 25 A	400 VAC / 25 A 400 VAC / 25 A	- T 130: 400 VAC / 25 A T 136: 400 VAC / 25 A
Grey cast iron, galvanised and painted 2 x M25	Grey cast iron, galvanised and painted 2 x M25	Grey cast iron, galvanised and painted 3 x M25	Grey cast iron, galvanised and painted 4 x M25
Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 4 mm <sup>2</sup>	Screw terminals max. 4 mm <sup>2</sup>	Screw terminals max. 4 mm <sup>2</sup>
103 x 180 x 125 mm	149 x 156 x 111 mm	130 x 194 x 150 mm	T 130: 135 x 154 x 120; T 136: 154 x 154 x 120
-30 °C ... +90 °C -40 °C ... +200 °C	-30 °C ... +90 °C	-30 °C ... +90 °C	-30 °C ... +90 °C
IP67 see page 69	IP65 see page 72	IP65 see page 72	IP65 see page 72

IEC 60947-5-1 2,000,000	IEC 60947-5-1 2,000,000	IEC 60947-5-1 2,000,000	IEC 60947-5-1 1,000,000

Zone 21, 22	Zone 21, 22	-	-
-	-	-	-
■	-	-	-

<sup>1)</sup> Including conductor ferrules

## 2. Position and limit switches

### Series M330 – Actuating elements



**Plunger S**



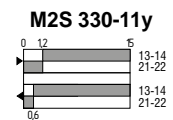
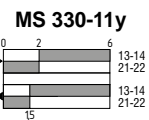
**Telescopic plunger 2 S**

#### Actuator heads

Actuator description	Plunger to DIN EN 50041	Sleeve for protection against the ingress of dirt
Head can be turned 4 x 90°	-	-
Actuating force	17.5 N	45 N
Actuating torque	-	-

#### Switch travel diagrams

Snap action 1 NO / 1 NC







**Roller plunger R**



**Offset roller lever K**



**Angle roller lever 3K**

to DIN EN 50041  
Plastic roller  
Actuation head can be rotated by 90°  
with metal roller available on request

-

17.5 N

-

Plastic roller  
Actuator head can be repositioned  
in steps 4 x 90°  
with metal roller available on request

-

19 N

-

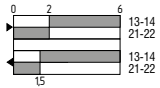
Plastic roller  
Actuation parallel to axis of switch  
from below  
Actuator head can be repositioned  
in steps 4 x 90°  
with metal roller available on request

-

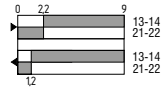
16 N

-

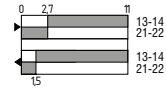
**MR 330-11y**



**MK 330-11y**



**M3K 330-11y**



## 2. Position and limit switches

### Series M330 – Actuating elements



Side plunger 3S



Side roller plunger 3R

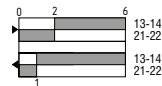
#### Actuator heads

Actuator description	Side plunger 3S	Side roller plunger 3R
Actuator description	Sleeve for protection against the ingress of dirt	Plastic roller Sleeve for protection against the ingress of dirt with metal roller available on request
Head can be turned 4 x 90°	■	■
Actuating force	17 N	17 N
Actuating torque	-	-

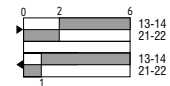
#### Switch travel diagrams

Snap action 1 NO / 1 NC

M3S 330-11y



M3R 330-11y





**Spring rod lever AF**



**Fork roller level 4D**



**Rod lever V.**

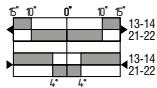
can be deflected in any direction  
Elasticity of the spring allows  
for deflection above the max.  
switching angle of 15°

Plastic rollers  
Actuation head with  
90° end-position latching  
Continuous adjustment of  
lever position 360°  
Actuator can be turned  
by 180° on the shaft  
with metal roller available on request

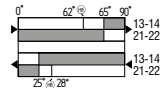
Low-wear rod lever  
Temperature-resistant design  
up to +160 °C  
incl. 10° gearing, suffix -1366  
Shaft and actuator with  
10° gearing, suffix -1164

-	■	■
9 N	-	-
-	50.5 Ncm	50.5 Ncm

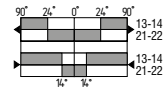
**MAF 330-11y**



**M3V4D 330-11y**



**MV. 330-11y**



## 2. Position and limit switches

### Series M330 – Actuating elements



Roller lever 8H



Roller lever H

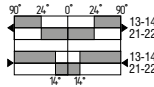
#### Actuator heads

Actuator description	Roller lever 8H	Roller lever H
Actuator description	Plastic roller Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft with metal roller available on request with 10 gearing, suffix -1164	Plastic roller Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft with metal roller available on request with 10 gearing, suffix -1164
Head can be turned 4 x 90	■	■
Actuating force	-	-
Actuating torque	24 Ncm	50.5 Ncm

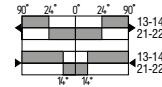
#### Switch travel diagrams

Snap action 1 NO / 1 NC

MV8H 330-11y



MVH 330-11y





**Roller lever 3H**

**Roller lever 7H**

**Spring rod lever on shaft 4H**

Plastic roller  
Continuous adjustment  
of lever position 360°  
Actuator can be turned  
by 180° on the shaft  
with metal roller available on request  
with 10 gearing, suffix -1164

Length adjustable metal lever  
with plastic roller  
Continuous adjustment  
of lever position 360°  
Actuator can be turned  
by 180° on the shaft  
with metal roller available on request

Spring with rod  
Continuous adjustment  
of lever position 360°  
Actuator can be turned  
by 180° on the shaft

■

■

-

-

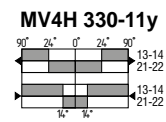
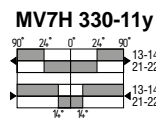
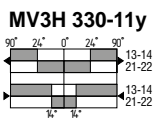
-

-

50.5 Ncm

50.5 Ncm

50.5 Ncm



## 2. Position and limit switches

### Series M330 – Actuating elements



Rod lever 9H



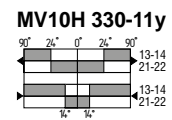
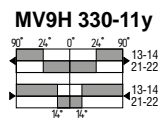
Rod lever 10H

#### Actuator heads

Actuator description	Rod lever 9H	Rod lever 10H
Actuator description	Stainless steel round rod Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft	Plastic rod Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft Rod available in aluminium or stainless steel
Head can be turned 4 x 90°	■	■
Actuating force	-	-
Actuating torque	50.5 Ncm	50.5 Ncm

#### Switch travel diagrams

Snap action 1 NO / 1 NC





**Leaf spring rod lever 2H**



**Leaf spring lever 6H**

Epoxy-resin leaf spring  
 Leaf spring thickness 2.5 mm  
 Continuous adjustment  
 of lever position 360°  
 Actuator can be turned  
 by 180° on the shaft

Spring-steel leaf spring  
 Leaf spring thickness 0.8 mm  
 Continuous adjustment  
 of lever position 360°  
 Actuator can be turned  
 by 180° on the shaft



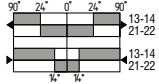
-

-

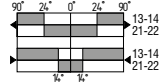
50.5 Ncm

50.5 Ncm

**MV2H 330-11y**



**MV6H 330-11y**



## 2. Position and limit switches

### Series M330 – Preferred types



Series	Switching system	Contacts	Actuator	Special features	Type designation	Material number
M 330	Snap action	1 NO / 1 NC	Telescopic plunger 2 S	---	<b>M2S 330-11Y</b>	<b>101149639</b>
			Angle roller lever 3K	---	<b>M3K 330-11Y</b>	<b>101168054</b>
			Side roller plunger 3R	---	<b>M3R 330-11Y</b>	<b>101161735</b>
			Side plunger 3S	---	<b>M3S 330-11Y</b>	<b>101168055</b>
			Fork roller level 4D	---	<b>M3V4D 330-11Y</b>	<b>101165920</b>
			Spring rod lever AF	---	<b>MAF 330-11Y</b>	<b>101160633</b>
			Offset roller lever K	---	<b>MK 330-11Y</b>	<b>101163173</b>
				---	<b>MR 330-11Y</b>	<b>101165677</b>
			Roller plunger R	Temperature-resistant design up to +160 °C	<b>MR 330-11Y-1366</b>	<b>101162603</b>
				---	<b>MS 330-11Y</b>	<b>101160614</b>
			Plunger S	Temperature-resistant design up to +160 °C	<b>MS 330-11Y-1366</b>	<b>101164485</b>
			Rod lever V.	---	<b>MV. 330-11Y</b>	<b>101164341</b>
				---	<b>MV10H 330-11Y</b>	<b>101168057</b>
			Rod lever 10H	Temperature-resistant design up to +160 °C incl. 10° gearing	<b>MV10H 330-11Y-1366</b>	<b>101174397</b>
			Leaf spring rod lever 2H	---	<b>MV2H 330-11Y</b>	<b>101057633</b>
				---	<b>MV3H 330-11Y</b>	<b>101168052</b>
			Roller lever 3H	Temperature-resistant design up to +160 °C incl. 10° gearing	<b>MV3H 330-11Y-1366</b>	<b>101057642</b>
				---	<b>MV4H 330-11Y</b>	<b>101168053</b>
			Spring rod lever on shaft 4H	Temperature-resistant design up to +160 °C incl. 10° gearing	<b>MV4H 330-11Y-1366</b>	<b>101057649</b>
			Leaf spring lever 6H	---	<b>MV6H 330-11Y</b>	<b>101149664</b>
		---	<b>MV7H 330-11Y</b>	<b>101158933</b>		
	Roller lever 7H	Temperature-resistant design up to +160 °C incl. 10° gearing	<b>MV7H 330-11Y-1366</b>	<b>101160085</b>		
		---	<b>MV9H 330-11Y</b>	<b>101168056</b>		
	Rod lever 9H	Temperature-resistant design up to +160 °C incl. 10° gearing	<b>MV9H 330-11Y-1366</b>	<b>101168903</b>		
		---	<b>MVH 330-11Y</b>	<b>101160129</b>		
	Roller lever H	Temperature-resistant design up to +160 °C incl. 10° gearing	<b>MVH 330-11Y-1366</b>	<b>101166264</b>		
	Operating lever as accessory			<b>Leaf spring lever 6H</b>	<b>101064152</b>	
			<b>Spring rod lever on shaft 4H</b>	<b>101064151</b>		
			<b>Roller lever 3H</b>	<b>101064143</b>		
			<b>Roller lever 7H</b>	<b>101064153</b>		
			<b>Roller lever H</b>	<b>101064128</b>		
			<b>Rod lever 10H</b>	<b>101064157</b>		
		<b>Rod lever 9H</b>	<b>101064156</b>			



## 2. Position and limit switches

### Series M330 – Ordering code



## MV7H 330-11Y-G24-1366

### Actuator selection

S	Plunger
2NO	Telescopic plunger
R	Roller plunger
K	Offset roller lever
3K	Angle roller lever
3NO	Side plunger
3R	Side roller plunger
AF	Spring rod lever
4D	Fork roller lever
V.	Rod lever
H	Roller lever H
3H	Roller lever 3H
7H	Roller lever 7H
4H	Spring rod lever on shaft 4H
9H	Rod lever 9H
10H	Rod lever 10H
2H	Leaf spring rod lever 2H
6H	Leaf spring lever 6H

### Special versions

AuNi	Gold-nickel alloy contacts
1164	Shaft and actuator with 10° gearing
1366	Temperature-resistant design to +160 °C incl. 10° gearing for swivel levers
LED	
	without LED
G24	with LED

For technical reasons, not all possible variations and/or combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

## 2. Position and limit switches

### Series S0 – Actuating elements



Plunger S

Telescopic plunger 2 S

#### Actuator heads

Actuator description	Thermoplastic plunger	Actuator head with captive stainless steel ball actuator With large after-travel Available with bellows to protect against coarse dirt, ordering suffix -q
Head can be turned 4 x 90°	-	-
Actuating speed	max. 1 m/s	max. 1 m/s
Vertical actuating angle	max.20°	max.20°
from right	-	-
from left	-	-

#### Switch travel diagrams

<b>Snap action</b> 1 NO / 1 NC	<b>MS 015-11y</b> 	<b>M2S 015-11y</b> 
<b>Slow action</b> 1 NO / 1 NC	<b>TS 015-11y</b> 	<b>T2S 015-11y</b> 
<b>2 NC</b>	<b>TS 015-02y</b> 	<b>T2S 015-02y</b> 
<b>2 NO</b>	<b>TS 015-20y</b> 	<b>T2S 015-20y</b> 

The switching distances of the contacts in series T 016 and T/M 017 correspond to series T/M 015.



**Offset roller lever K**



**Tilt lever 2K**



**Angle roller lever 3K**

Plastic roller  
Actuator head can be repositioned  
in steps 4 x 90°  
with metal roller available on request

Plastic roller  
Actuation only possible from left  
Free movement of actuator from right  
Actuator head can be repositioned  
in steps 4 x 90°  
with metal roller available on request

Plastic roller  
Actuation parallel to axis  
of switch from below  
Actuator head can be repositioned  
in steps 4 x 90°  
with metal roller available on request

-

max. 0.5 m/s

-

max.30°

max.45°

-

max. 0.5 m/s

-

max.60°

max.45°

-

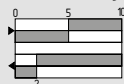
max. 0.5 m/s

max.45°

-

-

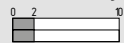
**MK 015-11y**



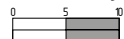
**TK 015-11y**



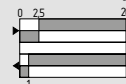
**TK 015-02y**



**TK 015-20y**



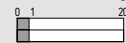
**M2K 015-11y**



**T2K 015-11y**



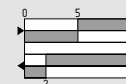
**T2K 015-02y**



**T2K 015-20y**



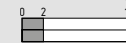
**M3K 015-11y**



**T3K 015-11y**



**T3K 015-02y**



**T3K 015-20y**



■ Contact closed  
□ Contact open

## 2. Position and limit switches

### Series S0 – Actuating elements



Rod lever V.

Roller lever 8H

#### Actuator heads

Actuator description	Shaft and actuator available with gearing, suffix -1164	Plastic roller Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft with metal roller available on request
Head can be turned 4 x 90°	■	■
Actuating speed	max. 3 m/s	max. 3 m/s
Vertical actuating angle	–	–
from right	max.30°	max.30°
from left	max.30°	max.30°

#### Switch travel diagrams

<b>Snap action</b>	<b>1 NO / 1 NC</b>	<b>MV. 015-11y</b> 	<b>MV8H 015-11y</b> 
<b>Slow action</b>	<b>1 NO / 1 NC</b>	<b>TV. 015-11y</b> 	<b>TV8H 015-11y</b> 
	<b>2 NC</b>	<b>TV. 015-02y</b> 	<b>TV8H 015-02y</b> 
	<b>2 NO</b>	<b>TV. 015-20y</b> 	<b>TV8H 015-20y</b> 

The switching distances of the contacts in series T 016 and T/M 017 correspond to series T/M 015.



**Roller lever H**

**Roller lever 3H**

**Roller lever 7H**

Plastic roller  
Continuous adjustment  
of lever position 360°  
Actuator can be turned  
by 180° on the shaft  
with metal roller available on request

Plastic roller  
Continuous adjustment  
of lever position 360°  
Actuator can be turned  
by 180° on the shaft  
with metal roller available on request

Length adjustable metal lever  
with plastic roller  
Continuous adjustment  
of lever position 360°  
Actuator can be turned  
by 180° on the shaft  
with metal roller available on request

■  
max. 3 m/s

■  
max. 3 m/s

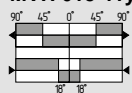
■  
max. 3 m/s

-  
max.30°  
max.30°

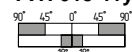
-  
max.30°  
max.30°

-  
max.30°  
max.30°

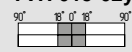
**MVH 015-11y**



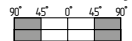
**TVH 015-11y**



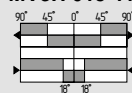
**TVH 015-02y**



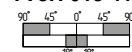
**TVH 015-20y**



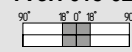
**MV3H 015-11y**



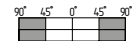
**TV3H 015-11y**



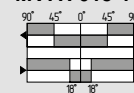
**TV3H 015-02y**



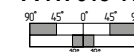
**TV3H 015-20y**



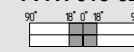
**MV7H 015-11y**



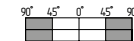
**TV7H 015-11y**



**TV7H 015-02y**



**TV7H 015-20y**



■ Contact closed  
□ Contact open

## 2. Position and limit switches

### Series S0 – Actuating elements



Spring rod lever on shaft 4H

Rod lever 9H

#### Actuator heads

Actuator description	Spring rod lever on shaft 4H	Rod lever 9H
Actuator description	Elasticity of spring allows for inexact movement of actuator Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft	Steel rod Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft
Head can be turned 4 x 90°	■	■
Actuating speed	max. 3 m/s	max. 3 m/s
Vertical actuating angle	–	–
from right	max.30°	max.30°
from left	max.30°	max.30°

#### Switch travel diagrams

Snap action	1 NO / 1 NC	MV4H 015-11y	MV9H 015-11y
Slow action	1 NO / 1 NC	TV4H 015-11y	TV9H 015-11y
	2 NC	TV4H 015-02y	TV9H 015-02y
	2 NO	TV4H 015-20y	TV9H 015-20y

The switching distances of the contacts in series T 016 and T/M 017 correspond to series T/M 015.



<b>Rod lever 10H</b>	<b>Leaf spring rod lever 2H</b>	<b>Leaf spring lever 6H</b>
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<p>Epoxy resin rod Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft</p>	<p>Epoxy-resin leaf spring Leaf spring thickness 2.5 mm Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft</p>	<p>Spring-steel leaf spring Leaf spring thickness 0.8 mm Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft</p>
■	■	■
max. 3 m/s	max. 3 m/s	max. 3 m/s
-	-	-
max.30°	max.30°	max.30°
max.30°	max.30°	max.30°


<p><b>MV10H 015-11y</b></p>	<p><b>MV2H 015-11y</b></p>	<p><b>MV6H 015-11y</b></p>
<p><b>TV10H 015-11y</b></p>	<p><b>TV2H 015-11y</b></p>	<p><b>TV6H 015-11y</b></p>
<p><b>TV10H 015-02y</b></p>	<p><b>TV2H 015-02y</b></p>	<p><b>TV6H 015-02y</b></p>
<p><b>TV10H 015-20y</b></p>	<p><b>TV2H 015-20y</b></p>	<p><b>TV6H 015-20y</b></p>

■ Contact closed  
□ Contact open

## 2. Position and limit switches

### Series S0 – Preferred types



Series	Switching system	Contacts	Actuator	Type designation	Material number
 <b>S0</b>	Snap action	1 NO / 1 NC	Telescopic plunger - 2 S	<b>M2S 015-11Y</b>	<b>101160497</b>
			Offset roller lever K	<b>MK 015-11Y</b>	<b>101160412</b>
			Plunger S	<b>MS 015-11Y</b>	<b>101170443</b>
			Rod lever V.	<b>MV. 015-11Y</b>	<b>101174600</b>
			Roller lever 3H	<b>MV3H 015-11Y</b>	<b>101058452</b>
			Roller lever H	<b>MVH 015-11Y</b>	<b>101160442</b>
	Slow action	1 NO / 1 NC	Plunger S	<b>TS 015-11Y</b>	<b>101170456</b>
			Tilt lever 2K	<b>T2K 015-11Y</b>	<b>101170062</b>
			Telescopic plunger - 2 S	<b>T2S 015-11Y</b>	<b>101161467</b>
	Slow action	2 NC	Offset roller lever K	<b>TK 015-02Y</b>	<b>101054782</b>
		2 NO / 1 NC	Telescopic plunger - 2 S	<b>T2S 016-21Y</b>	<b>101054869</b>
			Plunger S	<b>TS 016-03Y</b>	<b>101168064</b>
		3 NC	Rod lever V.	<b>TV. 016-03Y</b>	<b>101060212</b>
	2 NO / 2 NC		Offset roller lever K	<b>MK 017-22Y</b>	<b>101164045</b>
		<b>TK 017-22Y</b>		<b>101054954</b>	
	Snap action	Operating lever as accessory		<b>Leaf spring lever 6H</b>	<b>101064152</b>
	Slow action			<b>Spring rod lever on shaft 4H</b>	<b>101064151</b>
				<b>Roller lever 3H</b>	<b>101064143</b>
				<b>Roller lever 7H</b>	<b>101064153</b>
				<b>Roller lever 8H</b>	<b>101064239</b>
	<b>Roller lever H</b>			<b>101064128</b>	
	<b>Rod lever 10H</b>			<b>101064157</b>	
	<b>Rod lever 9H</b>			<b>101064156</b>	



## 2. Position and limit switches

### Series S0 – Ordering code



## MV3H 015-11Y-C

#### Switching system

T	Slow action ⊖
M	Snap action

#### Actuator selection

S	Plunger
2NO	Telescopic plunger
K	Offset roller lever
2K	Tilt lever
3K	Angle roller lever
V.	Rod lever
8H	Roller lever 8H
H	Roller lever H
3H	Roller lever 3H
7H	Roller lever 7H
4H	Spring rod lever on shaft 4H
9H	Rod lever 9H
10H	Rod lever 10H
6H	Leaf spring lever 6H

#### Special versions

Ü	Slow action with overlapping contacts
H	Slow action with staggered contacts
C	Magnetic blow-out

#### Contacts

02	2 NC
03	3 NC
11	1 NO/1 NC
12	2 NO/1 NC
13	3 NO/1 NC
20	2 NO
21	1 NO/2 NC
22	2 NO/2 NC
30	3 NO
31	1 NO/3 NC

#### Enclosure selection

015	Metal enclosure with 2 contacts
016	Metal enclosure with 3 contacts
017	Metal enclosure with 4 contacts

For technical reasons, not all possible variations and/or combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

## 2. Position and limit switches

### Series S1 – Actuating elements



Plunger S



Telescopic plunger - 2 S

#### Actuator heads

Actuator description	Plunger	Actuator with captive metal ball With large after-travel Available with bellows to protect against coarse dirt, ordering suffix -q
Head can be turned 4 x 90°	–	–
Actuating speed	max. 1 m/s	max. 1 m/s
Vertical actuating angle	max.20°	max.20°
from right	–	–
from left	–	–

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>MS 441-11y</b> 	<b>M2S 441-11y</b> 
Slow action	1 NO / 1 NC	<b>TS 441-11y</b> 	<b>T2S 441-11y</b> 
	1 NC	<b>TS 422-01y</b> 	<b>T2S 422-01y</b> 
	1 NO	<b>TS 422-10y</b> 	<b>T2S 422-10y</b> 

The switching distances of the contacts in series T 452 and T/M 461 correspond to series T/M 441 and T 422.



**Roller plunger R**



**Offset roller lever K**



**Offset roller lever J**

Plastic roller Actuator can be turned by 90° with metal roller available on request	Plastic roller Actuation only possible from left Actuator head can be repositioned in steps 4 x 90° with metal roller available on request	Plastic roller Actuation only possible from left Actuator head can be repositioned in steps 4 x 90° with metal roller available on request
–	–	–
max. 0.5 m/s	max. 0.5 m/s	max. 0.5 m/s
–	–	–
max.30°	max.30°	max.30°
max.30°	max.45°	max.45°

<p><b>MR 441-11y</b></p>	<p><b>MK 441-11y</b></p>	<p><b>MJ 441-11y</b></p>
<p><b>TR 441-11y</b></p>	<p><b>TK 441-11y</b></p>	<p><b>TJ 441-11y</b></p>
<p><b>TR 422-01y</b></p>	<p><b>TK 422-01y</b></p>	<p><b>TJ 422-01y</b></p>
<p><b>TR 422-10y</b></p>	<p><b>TK 422-10y</b></p>	<p><b>TJ 422-10y</b></p>

## 2. Position and limit switches

### Series S1 – Actuating elements



Fork lever 2C



Roller lever L

#### Actuator heads

Actuator description	Fork lever 2C	Roller lever L
Actuator description	with end-position latching Actuator head can be repositioned in steps 4 x 90° Changes to the actuation direction by turning the actuator Surface-hardened actuator	Plastic roller Continuous adjustment of lever position 360° Actuator can be turned by 180° on the shaft with metal roller available on request Shaft and actuator with gearing, suffix -1801
Head can be turned 4 x 90°	–	■
Actuating speed	max. 0.5 m/s	max. 3 m/s
Vertical actuating angle	–	–
from right	–	max.30°
from left	–	max.30°

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>M2C 441-11y</b> 	<b>ML 441-11y</b> 
Slow action	1 NO / 1 NC	<b>T2C 441-11y</b> 	<b>TL 441-11y</b> 
	1 NC	<b>T2C 422-01y</b> 	<b>TL 422-01y</b> 
	1 NO	<b>T2C 422-10y</b> 	<b>TL 422-10y</b> 

The switching distances of the contacts in series T 452 and T/M 461 correspond to series T/M 441 and T 422.



### Roller lever D

Plastic roller  
 Continuous adjustment  
 of lever position 360°  
 Actuator can be turned  
 by 180° on the shaft  
 with metal roller available on request  
 Shaft and actuator with gearing,  
 suffix -1801

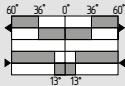
max. 3 m/s

-

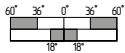
max.30°

max.30°

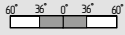
#### MD 441-11y



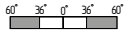
#### TD 441-11y



#### TD 422-01y





#### TD 422-10y



## 2. Position and limit switches

### Series S1 – Preferred types



Series	Switching system	Contacts	Actuator	Special features	Type designation	Material number		
 	Slow action	1 NO	Roller lever D	---	TD 422-10Y	101059468		
		1 NC		Roller plunger R	---	TD 422-01Y	101170460	
			Fork lever 2C	---	TR 422-01Y	101058682		
			Roller lever L	---	T2C 422-01Y	101059651		
		1 NO	Roller lever L	---	TL 422-01Y	101168785		
	Snap action	1 NO / 1 NC			---	TL 422-10Y	101059278	
					---	M. 441-11Y	101170470	
					-40°C ... +200°C	M. 441-11Y-T	101170473	
					Fork lever 2C	---	M2C 441-11Y	101059676
					Telescopic plunger 2 S	---	M2S 441-11Y	101058560
					Offset roller lever J	---	MJ 441-11Y	101059115
					Offset roller lever K	---	MK 441-11Y	101058945
					Roller lever L	---	ML 441-11Y	101170496
					-40°C ... +200°C	ML 441-11Y-T	101170498	
					Roller plunger R	---	MR 441-11Y	101058758
	Plunger S	---	MS 441-11Y	101169605				
	Slow action	1 NO / 1 NC			---	T. 441-11Y	101162538	
					-40°C ... +200°C	T. 441-11Y-T	101056534	
					Fork lever 2C	---	T2C 441-11Y	101059661
					Roller lever D	---	TD 441-11Y	101170463
					Offset roller lever K	---	TK 441-11Y	101058908
					Roller lever L	---	TL 441-11Y	101059310
	Roller plunger R	---	TR 441-11Y	101171772				
Slow action. with staggered contacts	2 NO / 2 NC			---	T. 454-22Z-H	103013113		
Snap action	2 NO / 2 NC	Roller lever D		---	MD 461-22Y	101059618		
Operating lever as accessory					Roller lever D	101064671		
					Roller lever L	101064609		

## 2. Position and limit switches

### Series S1 – Ordering code



## M2C 441-11Y-1276-2

#### Switching system

T	Slow action ⊖
M	Snap action

#### Actuator selection

S	Plunger
2NO	Telescopic plunger
R	Roller plunger
K	Offset roller lever
J	Offset roller lever
2C	Fork lever
L	Roller lever L
D	Roller lever D

#### Enclosure selection

422	Metal enclosure with 1 contact
441	Metal enclosure with 2 contacts
454	Metal enclosure with 2 or 4 contacts
461	Metal enclosure with 3 or 4 contacts

#### Special versions

T	Tropic and temperature-resistant version -40 °C to +200 °C
1276-2	Gold-plated contacts

#### Contacts

01	1 NC
02	2 NC
03	3 NC
10	1 NO
11	1 NO/1 NC
12	2 NO/1 NC
13	3 NO/1 NC
20	2 NO
21	1 NO/2 NC
22	2 NO/2 NC
30	3 NO
31	1 NO/3 NC

For technical reasons, not all possible variations and/or combinations can be delivered. The existing key type is used to translate the product type designation.

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## 2. Position and limit switches

### Series U – Actuating elements



Plunger S



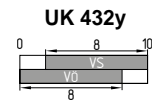
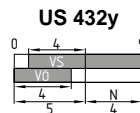
Offset roller lever K

#### Actuator heads

Actuator description	Plunger Switching points and contact type adjustable	Plastic roller with metal roller available on request Switching points and contact type adjustable
Head can be turned 4 x 90°		
Actuating speed	max. 0.5 m/s	max. 0.5 m/s
Vertical actuating angle	max.20°	-
from right	-	max.30°
from left	-	max.45°
Actuator weight	-	-

#### Switch travel diagrams

Slow action    Optionally  
adjustable  
NO contact or  
NC contact



Contact function, i. e. NC or NO contact, and switching points can be adjusted using a screwdriver.  
On request, the contact type and switching points can also be supplied as adjustable.  
On swivel levers, each contact setting is effective in both directions of rotation.





Rod lever V



Roller lever 8H



Roller lever H

Shaft and actuator available with gearing, suffix -1164  
Switching points and contact type adjustable

Plastic roller  
Shaft and actuator available with gearing with metal roller, ordering suffix -RMS  
Switching points and contact type adjustable

Plastic roller  
Shaft and actuator available with gearing with metal roller, ordering suffix -RMS  
Switching points and contact type adjustable

max. 3 m/s

-

max.30°

max.30°

-

max. 3 m/s

-

max.30°

max.30°

25 g

max. 3 m/s

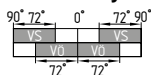
-

max.30°

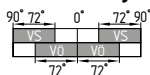
max.30°

45 g

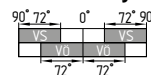
UV. 432y



UV8H 432y



UVH 432y



**Key**

VS: Adjustment range, NO contact  
VO: Adjustment range, NC contact  
N: After-travel

## 2. Position and limit switches

### Series U – Actuating elements



Roller lever 3H

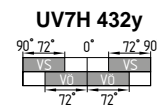
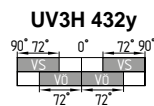
Roller lever 7H

#### Actuator heads

Actuator description	Roller lever 3H	Roller lever 7H
Actuator description	Plastic roller Shaft and actuator available with gearing with metal roller, ordering suffix -RMS Switching points and contact type adjustable	Length adjustable metal lever with plastic roller with metal roller, ordering suffix -RMS Switching points and contact type adjustable
Head can be turned 4 x 90°		
Actuating speed	max. 3 m/s	max. 3 m/s
Vertical actuating angle	-	-
from right	max.30°	max.30°
from left	max.30°	max.30°
Actuator weight	95 g	105 g

#### Switch travel diagrams

Slow action      Optionally adjustable  
NO contact or NC contact



Contact function, i. e. NC or NO contact, and switching points can be adjusted using a screwdriver. On request, the contact type and switching points can also be supplied as adjustable. On swivel levers, each contact setting is effective in both directions of rotation.



Spring rod lever on shaft 4H

Rod lever 9H

Rod lever 10H

Spring rod lever on shaft  
Switching points and  
contact type adjustable

Steel rod  
Switching points and  
contact type adjustable

Plastic rod  
Switching points and  
contact type adjustable

max. 3 m/s

max. 3 m/s

max. 3 m/s

-

-

-

max.30°

max.30°

max.30°

max.30°

max.30°

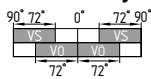
max.30°

105 g

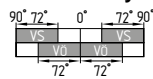
90 g

75 g

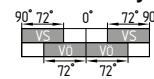
UV4H 432y



UV9H 432y



UV10H 432y



**Key**

VS: Adjustment range, NO contact

VO: Adjustment range, NC contact

N: After-travel

## 2. Position and limit switches

### Series U – Actuating elements



Leaf spring rod lever 2H

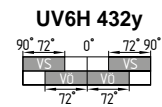
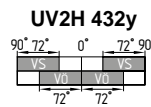
Leaf spring lever 6H

#### Actuator heads

Actuator description	Epoxy-resin leaf spring Leaf spring thickness 2.5 mm	Spring-steel leaf spring Leaf spring thickness 0.8 mm
Head can be turned 4 x 90°		
Actuating speed	max. 3 m/s	max. 3 m/s
Vertical actuating angle	-	-
from right	max.30°	max.30°
from left	max.30°	max.30°
Actuator weight	85 g	85 g

#### Switch travel diagrams

Slow action    Optionally  
adjustable  
NO contact or  
NC contact



#### Key

VS: Adjustment range, NO contact  
VO: Adjustment range, NC contact  
N: After-travel

Contact function, i. e. NC or NO contact, and switching points can be adjusted using a screwdriver.  
On request, the contact type and switching points can also be supplied as adjustable.  
On swivel levers, each contact setting is effective in both directions of rotation.

## 2. Position and limit switches

### Series U – Preferred types and ordering code



Series	Switching system	Contacts	Actuator	Type designation	Material number
<b>U 432/434</b> 	Slow action	2 NC	Offset roller lever K	<b>UK 432Y</b>	<b>101166388</b>
			Plunger S	<b>US 432Y</b>	<b>101176036</b>
			Rod lever V.	<b>UV. 432Y</b>	<b>101162761</b>
			Rod lever 10H	<b>UV10H 432Y</b>	<b>101060554</b>
			Roller lever 3H	<b>UV3H 432Y</b>	<b>101060537</b>
			Rod lever 9H	<b>UV9H 432Y</b>	<b>101060553</b>
			Roller lever H	<b>UVH 432Y</b>	<b>101161093</b>
		2 NO / 2 NC	Plunger S	<b>US 434Y</b>	<b>101176035</b>
	Operating lever as accessory		Leaf spring lever 6H	<b>101064152</b>	
			Spring rod lever on shaft 4H	<b>101064151</b>	
			Roller lever 3H	<b>101064143</b>	
			Roller lever 7H	<b>101064153</b>	
			Roller lever 8H	<b>101064239</b>	
			Roller lever H	<b>101064128</b>	
			Rod lever 10H	<b>101064157</b>	
	Rod lever 9H	<b>101064156</b>			

## UV10H 432Y-2S-1172

<b>Actuator selection</b>		<b>Special versions</b>	
S	Plunger	1172	Low-temperature design to -30 °C
K	Offset roller lever	<b>Contacts</b>	
V.	Rod lever	<b>Series 432 with 2 contacts</b>	
8H	Roller lever 8H		2 NC
H	Roller lever H	2NO	2 NO
3H	Roller lever 3H	1NO/1NC	1 NO/1 NC contacts
7H	Roller lever 7H	<b>Series 434 with 4 contacts</b>	
4H	Spring rod lever on shaft 4H		2 NO/2 NC contacts
9H	Rod lever 9H	4NC	4 NC
<b>Enclosure selection</b>		4NO	4 NO
432	Metal enclosure with 2 contacts	1NO/3NC	3 NO/1 NC contacts
434	Metal enclosure with 4 contacts	3NO/1NC	1 NO/3 NC contacts

For technical reasons, not all possible variations and/or combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

## 2. Position and limit switches

### Series S3 – Actuating elements



Roller lever 2L

#### Actuator heads

Actuator description	Metal roller Ball-bearing mounted switching shaft
Head can be turned 4 x 90°	■
Actuating speed	max. 1 m/s
Vertical actuating angle	–
from right	max.30°
from left	max.30°

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>M2L 035-11z</b> 
Slow action	1 NO / 1 NC	
	2 NC	<b>T2L 035-02z</b> 
	2 NO	<b>T2L 035-20z</b> 

## 2. Position and limit switches

### Series S3 – Actuating elements



Roller lever D

#### Actuator heads

<b>Actuator description</b>	Plastic roller Switching mechanism can be set for switching: right, left or in both directions
<b>Head can be turned 4 x 90°</b>	-
<b>Actuating speed</b>	max. 3 m/s
<b>Vertical actuating angle</b>	-
<b>from right</b>	max.30°
<b>from left</b>	max.30°



#### Switch travel diagrams

<b>Snap action</b>	<b>1 NO / 1 NC</b>	<b>MD 250-11z</b> 
<b>Slow action</b>	<b>1 NO / 1 NC</b>	<b>TD 250-11z</b> 
	<b>2 NC</b>	<b>TD 250-02z</b> 
	<b>2 NC contact to the left</b> <b>2 NC contact to the right</b>	<b>TD 250-02/02z</b> 

## 2. Position and limit switches

### Series S3 – Preferred types



Series	Switching system	Contacts	Actuator	Type designation	Material number	
S3	T/M 035 	Slow action	Roller lever 2L	2 NC contact	T2L 035-02Z	101056296
				2 NO	T2L 035-20Z	101056298
	T/M 250 	Snap action	1 NO / 1 NC	Roller lever D	MD 250-11Z	101057965
		Slow action	1 NC to the right/ 1 NC to the left		TD 250-01/01Z	101058138
			2 NC to the right/ 2 NC to the left		TD 250-02/02Z	101058179
			2 NC contact		TD 250-02Z	101057989
			1 NO/1 NC to the right/ 1 NO/1 NC to the left		TD 250-11/11Z	101058150
			2 NO / 2 NC		TD 250-22Z	101058095



## 2. Position and limit switches

### Series S3 – Ordering code



#### T2L 035-02ZÜ-C

##### Switching system

T	Slow action ⊖
M	Snap action

##### Contacts

02	2 NC
11	1 NO/1 NC contacts
20	2 NO

##### Special versions

	Without
C	Magnetic blow-out

##### Special versions

Ü	Slow action with overlapping contacts
H	Slow action with staggered contacts

#### TD 250-11/11ZÜ-R-T

##### Switching system

T	Slow action ⊖
M	Snap action

##### Contacts

02	2 NC
11	1 NO/1 NC contacts
01/01	1 NC to the right/1 NC to the left
02/02	2 NC to the right/2 NC to the left
11/11	1 NO/1 NC to the right/ 1 NO/1 NC to the left

##### Special versions

T	Tropic and temperature-resistant version -40 °C to +200 °C
1276-2	Gold-plated contacts

##### Special versions

C	Magnetic blow-out
R	Latching 2 x 45°

##### Special versions

	Without
Ü	Slow action with overlapping contacts

For technical reasons, not all possible variations and/or combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

## 2. Position and limit switches

### Series S2 – Actuating elements



Plunger S



Offset roller lever J

#### Actuator heads

Actuator description	Plunger Roller levers J and X can be subsequently fitted at plunger S	Plastic roller with metal roller available on request available with rubber roller, suffix -1
Head can be turned 4 x 90°	–	■
Actuating speed	max. 1 m/s	max. 0.5 m/s
Vertical actuating angle	max.20°	–
from right	–	max.45°
from left	–	max.30°

#### Switch travel diagrams

Slow action	Per NO contact / per NC contact	TS 064	TJ 064
Snap action	Per NO contact / per NC contact	MS 064	MJ 064
	Per NO contact / per NC contact		

These actuators can only be used with series TS/MS 064.  
Roller levers J and X can be subsequently fitted at plunger S



Offset roller lever X



Roller lever L



Roller lever A

Plastic roller  
with metal roller available on request

Plastic roller  
with metal roller available on request  
available with rubber roller, suffix -1  
Continuous adjustment  
of lever position 360°

Plastic roller  
with metal roller available on request  
available with rubber roller, suffix -1  
Continuous adjustment  
of lever position 360°

max. 0.5 m/s

max. 3 m/s

max. 3 m/s

max.45°

max.30°

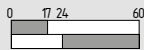
max.30°

max.30°

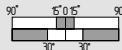
max.30°

max.30°

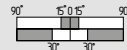
TX 064



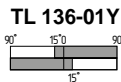
TL 064-11Y



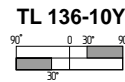
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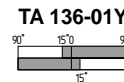
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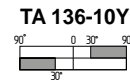
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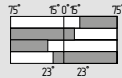
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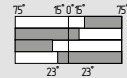
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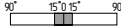
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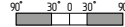
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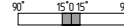
TL 130-01Y



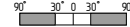
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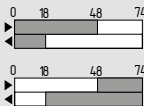
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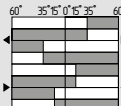
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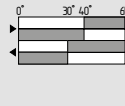
MX 064



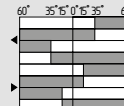
ML 471-11Y



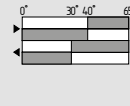
ML 471-11Y-Li



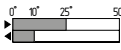
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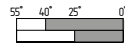
MA 471-11Y-Li



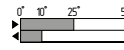
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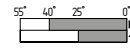
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MA 064-01Y



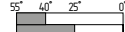
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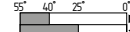
ML 064-10Y-Li



MA 064-10Y



MA 064-10Y-Li



## 2. Position and limit switches

### Series S2 – Actuating elements



Roller lever 2A

Roller lever V

#### Actuator heads

Actuator description	Roller lever 2A	Roller lever V
Actuator description	Plastic roller with metal roller available on request available with rubber roller, suffix -1 Continuous adjustment of lever position 360°	Plastic roller with metal roller available on request available with rubber roller, suffix -1 Continuous adjustment of lever position 360°
Head can be turned 4 x 90°	-	-
Actuating speed	max. 3 m/s	max. 3 m/s
Vertical actuating angle	-	-
from right	max.30°	max.30°
from left	max.30°	max.30°

#### Switch travel diagrams

Slow action	Per NO contact / per NC contact	<b>T2A 064-11Y</b> 		<b>TV 064-11Y</b> 	
	Per NO contact / per NC contact	<b>T2A 064-01Y</b> <b>T2A 136-01Y</b> 	<b>T2A 064-10Y</b> <b>T2A 136-10Y</b> 	<b>TV 064-01Y</b> <b>TV 136-01Y</b> 	<b>TV 064-10Y</b> <b>TV 136-10Y</b> 
	Per NO contact / per NC contact	<b>T2A 471-11Y</b> 		<b>TV 471-11Y</b> 	
Snap action	Per NO contact / per NC contact	<b>T2A 130-01Y</b> 	<b>T2A 130-10Y</b> 	<b>TV 130-01Y</b> 	<b>TV 130-10Y</b> 
	Per NO contact / per NC contact	<b>M2A 471-11Y</b> 	<b>M2A 471-11Y-Li</b> 	<b>MV 471-11Y</b> 	<b>MV 471-11Y-Li</b> 
	Per NO contact / per NC contact	<b>M2A 064-01Y</b> 	<b>M2A 064-01Y-Li</b> 	<b>MV 064-01Y</b> 	<b>MV 064-01Y-Li</b> 
		<b>M2A 064-10Y</b> 	<b>M2A 064-10Y-Li</b> 	<b>MV 064-10Y</b> 	<b>MV 064-10Y-Li</b> 



**Pull lever Z**

**Pull lever 2Z**

**Offset roller lever 4D**

Continuous adjustment  
of lever position 360°

Continuous adjustment  
of lever position 360°

Continuous adjustment  
of lever position 360°

max. 3 m/s

max. 3 m/s

max. 3 m/s

max.30°

max.30°

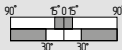
max.30°

max.30°

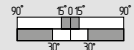
max.30°

max.30°

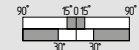
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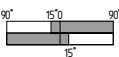
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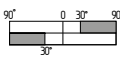
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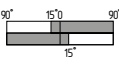
**TZ 064-01Y**



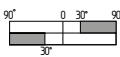
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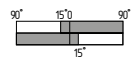
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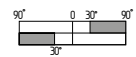
**TZ 136-10Y**



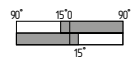
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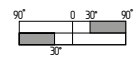
**T2Z 064-10Y**



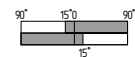
**T2Z 136-01Y**



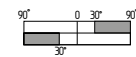
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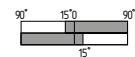
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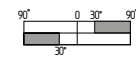
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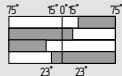
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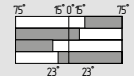
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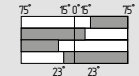
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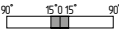
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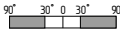
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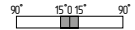
**TZ 130-01Y**



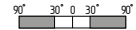
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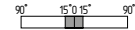
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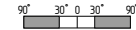
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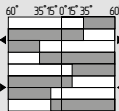
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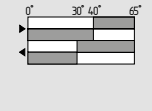
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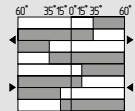
**MZ 471-11Y**



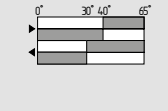
**MZ 471-11Y-Li**



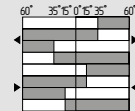
**M2Z 471-11Y**



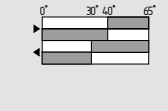
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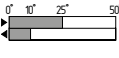
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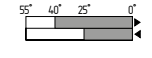
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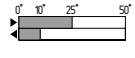
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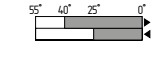
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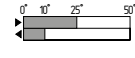
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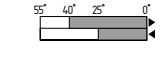
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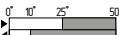
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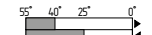
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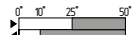
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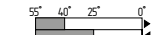
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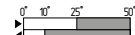
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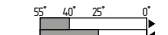
**M2Z 064-10Y-Li**



**M4D 064-10Y**







**M4D 064-10Y-Li**



## 2. Position and limit switches

### Series S2 – Preferred types



Series	Switching system	Contacts	Actuator	Special features	Type designation	Material number	
S2	<b>T/M 064</b> 	Snap action	3 NC	Offset roller lever J	---	<b>MJ 064-03Y</b>	<b>101056945</b>
		Slow action	3 NC	Offset roller lever J	---	<b>TJ 064-03Y</b>	<b>101057481</b>
			1 NO / 2 NC	Plunger S	---	<b>TS 064-12Y</b>	<b>101057473</b>
			2 NO / 1 NC	Pull lever Z	---	<b>TZ 064-21Y</b>	<b>101060723</b>
			3 NC		Latching 2 x 45°	<b>TZ 064-03Y-R=2X45GR.</b>	<b>101116036</b>
			1 NO / 2 NC	Roller lever A	---	<b>TA 064-12Y</b>	<b>101060739</b>
			3 NC		---	<b>TA 064-03Y</b>	<b>101060769</b>
			1 NO / 2 NC	Offset roller lever	Latching 2 x 90°	<b>T4D 064-12Y-R=2X90GR.</b>	<b>101099338</b>
	<b>T./M. 064</b> 	Snap action	1 NO / 2 NC	Rod lever	Actuating direction always 50° right-hand side rotation	<b>M. 064-12Y</b>	<b>101060848</b>
		Slow action	1 NO to the left/ 2 NO to the right	Rod lever	Actuating direction, each time 90° right-hand side and left-hand side rotation	<b>T. 064-10/20Y</b>	<b>101060794</b>
			3 NO			<b>T. 064-30Y</b>	<b>101060756</b>
			2 NO / 1 NC			Latching 1 x 90°	<b>T. 064-21Y-R=1X90GR.</b>
	<b>T/M 471</b> 	Snap action	1 NO/2 NC to the left/ 1 NO/2 NC to the right	Rod lever	Actuating direction, each time 60° right-hand side and left-hand side rotation	<b>M. 471-12/12Y</b>	<b>101061195</b>
		Slow action	2 NC to the left/ 2 NC to the right		Actuating direction, each time 75° right-hand side and left-hand side rotation	<b>T. 471-02/02Y</b>	<b>101061077</b>
	<b>T 130/136</b> 	Slow action	3 NO / 3 NC	Rod lever	---	<b>T. 130-33Y</b>	<b>101061303</b>
				Roller lever	Actuating direction, each time 90° right-hand side and left-hand side rotation	<b>TA 130-30/03Y</b>	<b>101135027</b>
	Operating lever as accessory					<b>Roller lever 2A</b>	<b>101064634</b>
						<b>Roller lever A</b>	<b>101064371</b>
						<b>Roller lever D</b>	<b>101064671</b>
					<b>Roller lever L</b>	<b>101064609</b>	
					<b>Offset roller lever 4D</b>	<b>101065612</b>	
					<b>Pull lever Z</b>	<b>101064387</b>	

## 2. Position and limit switches

### Series S2 – Ordering code



#### MX 064-22Y-R

##### Switching system

T	Slow action ⊖
M	Snap action

##### Actuator selection

S	Plunger
J	Offset roller lever
X	Offset roller lever

##### Contacts

03	3 NC
12	2 NO/1 NC
21	1 NO/2 NC
30	3 NO
04	4 NC
13	3 NO/1 NC
22	2 NO/2 NC
31	1 NO/3 NC
40	4 NO

##### Special versions

Ü	Slow action with overlapping contacts
H	Slow action with staggered contacts
R	Latching 2 x 45°

#### T. 471-02/02Y-Ü-Li

##### Switching system

T.	Slow action ⊖
M.	Snap action

##### Enclosure selection

064	Metal enclosure with 3 or 4 contacts
471	Metal enclosure with 4 or 6 contacts
130	Metal enclosure with up to 6 contacts
136	Metal enclosure with up to 10 contacts

##### Contacts

03	3 NC
04	4 NC
12	2 NO/1 NC contacts
13	3 NO/1 NC contacts
21	1 NO/2 NC contacts
22	2 NO/2 NC contacts
30	3 NO
31	1 NO/3 NC contacts
33	3 NO/3 NC contacts
40	4 NO
01/02	1 NC to the left/2 NC to the right
02/01	2 NC to the left/1 NC to the right
02/02	2 NC to the left/2 NC to the right
03/03	3 NC to the left/3 NC to the right
10/20	1 NC to the left/2 NC to the right
12/12	1 NO/2 NC left/1 NO/2 NC right
20/10	2 NC left/1 NC right
20/20	2 NO to the left/2 NO to the right
21/21	2 NO/1 NC left/2 NO/1 NC right
30/30	3 NO to the left/3 NO to the right

##### Actuation direction

	Right-hand side rotation
LI	Left-hand side rotation

##### Special versions

Ü	Slow action with overlapping contacts
H	Slow action with staggered contacts
R	Latching 2 x 45°

The switches are supplied with rod levers. The actuation lever must be ordered as an additional accessory.

##### Actuator selection

L	Roller lever L
A	Roller lever A
2A	Roller lever 2A
V	Roller lever V
Z	Pull lever Z
2Z	Pull lever 2Z
2C	Fork lever 2C
4D	Offset roller lever 4D

For technical reasons, not all possible variations and/or combinations can be delivered. The existing key type is used to translate the product type designation.

## 3. Position switches – Special variants

### Description

#### Gear switch

##### Area of application

Gear limit switches are used in the materials lifting and handling industry, roller doors, stage systems etc. Depending on the contact configuration, they are used for deactivation or for positioning motion sequences. The drive is provided via a shaft.

##### Design and operating principle

Both the enclosure, which is largely made of a seawater-resistant die-cast alloy housing, and the covers made of shock-resistant thermoplastic resistant to many chemicals are suitable for extreme ambient conditions.

On the basic versions with the transmission ratios 1:50 (G50) and 1:150 (G150) the turns of the drive are transmitted directly to the disc cam via a worm and worm wheel, i. e. the disc cams rotate once by 360° for 50 or 150 turns of the drive shaft.

The switching point of the contact is adjusted on the standard version by undoing the central screw, or conveniently via the disc cam with front setting, e. g. using ordering suffix "1600-1". Along with the standard transmission ratios, other transmission ratios are available.

#### Rotating spindle limit switches

##### Area of application

Rotating spindle limit switches are used in, among other areas, machine tools, cranes and material handling plants.

##### Design and operating principle

The robust cast-iron enclosure with 2-component paint finish is suitable for extreme ambient conditions. The movement range of the spindle of between 4 and 55 turns permits exact switching of the change-over contact with galvanically separated contact bridges.





## Slack-wire switches

### Area of application

Slack-wire switches are used to monitor the wire tension.

### Design and operating principle

A slack, sagging wire, for example here on a material handling plant, releases the normally actuated switch and the plant is switched off.

## Belt alignment switches

### Area of application

Belt alignment switches monitor the straight running of conveyor plants. If the conveyor belt moves off-centre from the drive and pulleys the switching devices trigger.

### Design and operating principle

With staggered switching a pre-warning for example is initiated with 10° deviation and the conveyor belt is switched off for example at 25°. Individual staggered switching is available upon request. In addition to multiple versions of belt alignment switches, Schmersal offers a comprehensive programme of stainless steel rollers with different lengths and diameters. The roller diameter to be selected is dependent on the belt speed.

On staggered or long conveyor systems, the transparency of the system can be increased considerably by using a 2-wire bus connection because the switching condition of all belt alignment switches can be indicated individually with all the other warning messages in a collective indication system. This helps with any troubleshooting and drastically reduces any downtime. The overall installation effort and expenditure is considerably reduced.

### 3. Position switches – Special variants

#### Overview of the series



■ G50 / G150



■ MSP 452



■ T/M 441

#### Key Features

- **Gear switches**
- Up to 8 contacts
- Different cam forms for various switching travels
- Switching point adjustment using disc cams with front setting (e.g. 1600-1)

- **Rotating spindle limit switches**
- 4 contacts
- Movement range 4...55 turns

- **Slack-wire switches**
- 2 contacts
- Suitable for heavy duty

#### Technical features

Electrical characteristics			
<b>Switching principle</b>	Slow action or snap action, positive break NC contact	Snap action	Slow action or snap action, positive break NC contact
<b>Max. switching capacity U/I</b>	T/M 697: 230 VAC / 4 A Z/T 6881: 230 VAC / 2.5 A	230 VAC / 2.5 A	230 VAC / 4 A
Mechanical data			
<b>Housing material</b>	Metal with shock-resistant thermoplastic cover	Cast iron, 2-component paint finish	Cast iron, 2-component paint finish
<b>Cable entry</b>	2 x M20 x 1.5	2 x M20 x 1.5	2 x M20 x 1.5
<b>Connection</b>	Screw terminals	Screw terminals	Screw terminals
<b>Cable section <sup>1)</sup></b>	max. 2.5 mm <sup>2</sup>	3 x 0.75 mm <sup>2</sup>	max. 2.5 mm <sup>2</sup>
<b>Dimensions (W x H x D)</b>	200 x 114 x 120 mm	118 x 174 x 64 mm	106 x 181 x 63 mm
Ambient conditions			
<b>Ambient temperature</b>	-30 °C ... +80 °C	-30 °C ... +90 °C	-30 °C ... +90 °C
<b>Protection class</b>	IP65	IP65	IP65
<b>Actuator heads</b>	-	-	-

#### Safety classification

<b>Standards</b>	IEC 60947-5-1	IEC 60947-5-1	IEC 60947-5-1
<b>B<sub>10D</sub> NC contact</b>	20,000,000	-	2,000,000
<b>Certificates</b>			

#### Other versions

<b>ATEX / IECEx</b>	-	-	Zone 21, 22
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<sup>1)</sup> Including conductor ferrules

To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ M 330



■ T/M 441



■ T. 454



■ T/M 250

- **Belt alignment switches**
- 2 contacts
- Adjustable length lever with nylon roller
- Belt speeds  $\leq 1$  m/s

- **Belt alignment switches**
- 2 contacts
- Stainless steel roller
- Belt speeds  $\leq 3$  m/s (roller  $\varnothing 30$  mm)

- **Belt alignment switches**
- 4 contacts
- Stainless steel roller
- 2 switching angles (prewarning, deactivation)
- Exterior parts made of stainless steel
- Optionally with Dupline interface

- **Belt alignment switches**
- 4 contacts
- Stainless steel roller
- Belt speeds  $\leq 6$  m/s (roller  $\varnothing 50$  mm)
- 2 switching angles (prewarning, deactivation)

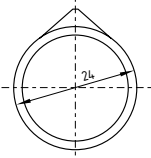
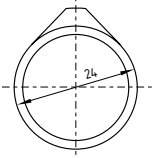
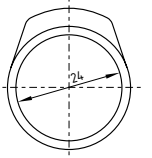
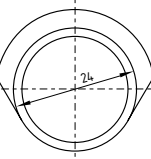
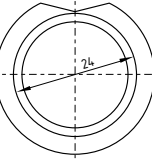
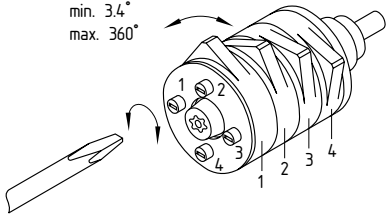
Snap action with self-cleaning contact	Snap action or slow action	Slow action	Snap action or slow action
230 VAC / 2.5 A	230 VAC / 4 A	230 VAC / 4 A; 24 VDC / 1 A	400 VAC / 6 A
Aluminium die-cast, paint finish	Cast iron, 2-component paint finish	Cast iron, 2-component paint finish	Cast iron, 2-component paint finish
1x M20 x 1.5	2x M20 x 1.5	2x M20 x 1.5	2x M25 x 1.5
Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 2.5 mm <sup>2</sup>	Screw terminals max. 2.5 mm <sup>2</sup>
40 x 76 x 40 mm	106 x 105 x 63 mm	67 x 130 x 43 mm	62 x 58 x 50 mm
-30 °C ... +90 °C	-30 °C ... +90 °C	-40 °C ... +70 °C	-30 °C ... +90 °C
IP65	IP65	IP66, IP67	IP67
see page 83	see page 83	see page 83	see page 83

IEC 60947-5-1	IEC 60947-5-1	IEC 60947-5-1	IEC 60947-5-1
-	2,000,000	2,000,000	2,000,000

- | Zone 21, 22 | Zone 1, 2, 21, 22 | Zone 21, 22

### 3. Position switches – Special variants

#### Gear switches – cam shapes

Pointed cam Ø 24 mm 1600-	30° cam Ø 24 mm 2281-	90° cam Ø 24 mm 1601-
 <ul style="list-style-type: none"> <li>■ Standard cam shapes: pointed cam Ø 24 mm</li> <li>■ Max. 8 switching elements possible</li> <li>■ Suitable for front setting</li> </ul>	 <ul style="list-style-type: none"> <li>■ Standard cam shapes: 30° cam Ø 24 mm</li> <li>■ Max. 8 switching elements possible</li> <li>■ Suitable for front setting</li> </ul>	 <ul style="list-style-type: none"> <li>■ Standard cam shapes: 90° cam Ø 24 mm</li> <li>■ Max. 8 switching elements possible</li> <li>■ Suitable for front setting</li> </ul>
180° cam Ø 24 mm 2269-	360° solid cam Ø 24 mm 1905-	Pointed cam with front setting -1600-1
 <ul style="list-style-type: none"> <li>■ Standard cam shapes: 180° cam Ø 24 mm</li> <li>■ Max. 8 switching elements possible</li> <li>■ Suitable for front setting</li> </ul>	 <ul style="list-style-type: none"> <li>■ Standard cam shapes: 360° cam Ø 24 mm</li> <li>■ Max. 8 switching elements possible</li> <li>■ Suitable for front setting</li> </ul>	 <ul style="list-style-type: none"> <li>■ Pointed cam with front setting -1600-1</li> <li>■ Example with 4 pointed cams</li> </ul>

### 3. Position switches – Special variants

#### Belt alignment switches – actuating elements/accessories

<b>Belt alignment lever 243</b> 101065529	<b>Belt alignment lever 966</b> 101095169	<b>Belt alignment lever 1224</b> 101065592
 <ul style="list-style-type: none"> <li>■ Cast lever with stainless steel roller</li> <li>■ Roller diameter 25 mm</li> <li>■ Roller length 50 mm</li> <li>■ Belt speeds ≤ 1 m/s</li> </ul>	 <ul style="list-style-type: none"> <li>■ Cast lever with stainless steel roller</li> <li>■ Roller diameter 32 mm</li> <li>■ Roller length 65 mm</li> <li>■ Belt speeds ≤ 3 m/s</li> </ul>	 <ul style="list-style-type: none"> <li>■ Cast lever with stainless steel roller</li> <li>■ Roller diameter 32 mm</li> <li>■ Roller length 100 mm</li> <li>■ Belt speeds ≤ 3 m/s</li> </ul>
<b>LEV-U14-B30-150-RVA</b> 103014651	<b>LEV-U14-B50-150-RVA</b> 103012919	<b>RF-454-DN</b> 103013689
 <ul style="list-style-type: none"> <li>■ Stainless steel lever with stainless steel roller</li> <li>■ Roller diameter 30 mm</li> <li>■ Roller length 155 mm</li> <li>■ Belt speeds ≤ 3 m/s</li> </ul>	 <ul style="list-style-type: none"> <li>■ Stainless steel lever with stainless steel roller</li> <li>■ Roller diameter 50 mm</li> <li>■ Roller length 155 mm</li> <li>■ Belt speeds ≤ 6 m/s</li> </ul>	 <ul style="list-style-type: none"> <li>■ Dupline interface RF-454-DN</li> <li>■ Monitoring of two floating contacts on the T. 454</li> </ul>
<b>Cable gland</b> 103006011	<b>Cable gland</b> 103007570	<b>Screw plug</b> 103006009
 <ul style="list-style-type: none"> <li>■ M20 x 1,5 cable gland, metal</li> <li>■ Brass, nickel-plated</li> <li>■ Authorised cable diameter 6 ... 12 mm</li> <li>■ Tightening torque 8 Nm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Cable gland M20 x 1.5 with pressure compensation element</li> <li>■ Brass, nickel-plated</li> <li>■ Authorised cable diameter 6 ... 12 mm</li> <li>■ Tightening torque 3 Nm</li> </ul>	 <ul style="list-style-type: none"> <li>■ M20 x 1.5 screw plug, metal</li> <li>■ Brass, nickel-plated</li> <li>■ Tightening torque 8 Nm</li> </ul>

### 3. Position switches – Special variants

#### Preferred types

Series	Switching element	Contacts	Special features	Type designation	Material number	
Gear switches	G 50	1NO/1NC		G50-017M11/11Y	101167213	
		1NO/1NC		G50-035M11/11Y	101166487	
		2NO/2NC		G50-025M22/22Y	101166507	
		2NO/2NC		G50-050M22/22Y	101166440	
		3NO/3NC		G50-017M33/33Y	101173256	
		3NO/3NC		G50-050M33/33Y	101166453	
		4NO/4NC		G50-050M44/44Y	101166455	
	Snap action Z	2NO/2NC		G50-035Z22/22Y	101166495	
		2NO/2NC		G50-050Z22/22Y	101166463	
	Slow action T	2NO/2NC	with adjustable pointed cam	G50-017T22/22Y-1600-1	101100246	
	G150	Snap action Z/M	2NO/2NC 4NO/4NC	with adjustable pointed cam	G150-075Z22/M44Y-1600-1	101166383
		Snap action M	1NO/1NC	with adjustable pointed cam	G150-075M11/11Y-1600-1	101094554
			1NO/1NC		G150-150M11/11Y	101173980
		Snap action Z	2NO/2NC		G150-050Z22/22Y	101063401
Slow action T	2NC/2NO		G150-150T02/02Y	101123693		
Rotating spindle limit switches	MSP 452	Snap action	1NO/1NC	MSP 452-11/11Y	101160615	
Slack-wire switches	T/M 441	Snap action	1NO/1NC	with slack-wire lever type 14	M. 441-11Y-14	101058315
		Slow action	1NO/1NC	with slack-wire lever type 14	T. 441-11Y-14	101056537
Belt alignment switches	M 330	Snap action	1NO/1NC	with belt alignment lever 1348	MV10H 330-11Y-1348	101159310
	T/M 441	Snap action	1NO/1NC	with belt alignment lever 243	M. 441-11Y-243	101168784
		Slow action	1NO/1NC	with belt alignment lever 243	T. 441-11Y-243	101170427
		Slow action	1NO/1NC	with belt alignment lever 966	T. 441-11Y-966	101081746
	T. 454	Slow action	2NO/2NC	without belt alignment lever	T. 454-22Z-H	103013113
		Slow action	2NO/2NC	without belt alignment lever, with integrated Dupline interface	T. 454-22Z-H-DN	103014142
	T/M 250	Slow action	1NO/1NC	with belt alignment lever 966	T. 250-02Z-966	101055273
		Slow action	1NO/1NC	with belt alignment lever 966	T. 250-11Z-966	101057959
		Slow action	2NO/2NC	with belt alignment lever 966	T. 250-22Z-966	101058103
		Slow action	2NO/2NC	with belt alignment lever 1224	T. 250-22Z-H-1224	101134281
Snap action		1NO/1NC	with belt alignment lever 1224	M. 250-11Z-1224	101057978	
Snap action		2NO/2NC	with belt alignment lever 1224	M. 250-22Z-1224	101083514	
Slow action	2NO/2NC	with belt alignment lever 1224	T. 250-22Z-1224	101058212		

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## 4. Micro switches

### Description

#### Area of application

Micro switches are used as control and precision engineering systems, in apparatus and in vehicle construction. Schmersal devices are designed for industrial applications with stringent quality and reliability requirements.

#### Design and way of functioning

Minimum space requirements, a high switching capacity and a robust design are just a few of the many benefits of a micro switch. With its internationally standardised mounting and external dimensions, as well as different termination types, switches can be used universally.

Micro switches are available with snap action or slow action and can be combined with a wide range of actuators.

##### **Snap action**

Contact where the movement of the switch is abrupt and independent of the actuating speed.

##### **Slow action**

Contact where the movement of the switch is independent of the actuating speed.

##### **Positive break**

The design of a contact separation as a direct result of a defined movement of the actuator in the switch using non-sprung parts. To guarantee the positive break, the actuator must be actuated with the defined positive break travel.

##### **Friction or self-cleaning contacts**

The moving contact bridge is centrally aligned to the V-shaped fixed contact under spring pressure, thereby generating a defined friction. The friction process has a self-cleaning effect on the fixed contacts each time the switch is actuated.

##### **Switching elements**

Switches are classified into the following types in accordance with IEC 60947-5-1.





## Switching elements

Switching elements may be classified according to one of the following construction form letters:

Type	Contact configuration	Circuit diagram
Type A	NO contact with single break. Switching element with two terminals.	
Type B	NC contact with single break. Switching element with two terminals.	
Type X	NO contact with double break. Switching element with two terminals.	
Type Y	NC contact with double break. Switching element with two terminals.	
Type C	Change-over contact with single break. Switching element with three terminals.	
Type Za	Change-over contact with double break. Switching element with four terminals. The contacts have the same polarity.	
Type Zb	Change-over contact with double break. Switching element with four terminals. The two moving contacts are electrically isolated from one another.	

Micro switches have protection class IP 40, except for versions with rubber casing. In addition, versions with cover for protection against contact with live parts are also available. The following device types are sorted according to enclosure dimensions, starting with the smallest construction form.

## 4. Micro switches

### Overview of the series



■ M 610



■ M 630



■ M 6800 / 6900

#### Key Features

<ul style="list-style-type: none"> <li>• Change-over contact with single break, type C</li> <li>• Self-cleaning contacts</li> <li>• Telescopic attachment</li> </ul>	<ul style="list-style-type: none"> <li>• Change-over contact with single break, type C</li> <li>• Self-cleaning contacts</li> <li>• Magnetic arc quenching (ordering suffix c)</li> <li>• Reduced actuating force 0.4 N (ordering suffix 934)</li> </ul>	<ul style="list-style-type: none"> <li>• Change-over contact with double break, type Za</li> <li>• Self-cleaning contacts</li> <li>• End-position latching (ordering suffix P2)</li> <li>• Tandem version (ordering suffix P3)</li> </ul>
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#### Other versions

Gold contacts	■	-	-
---------------	---	---	---

#### Technical features

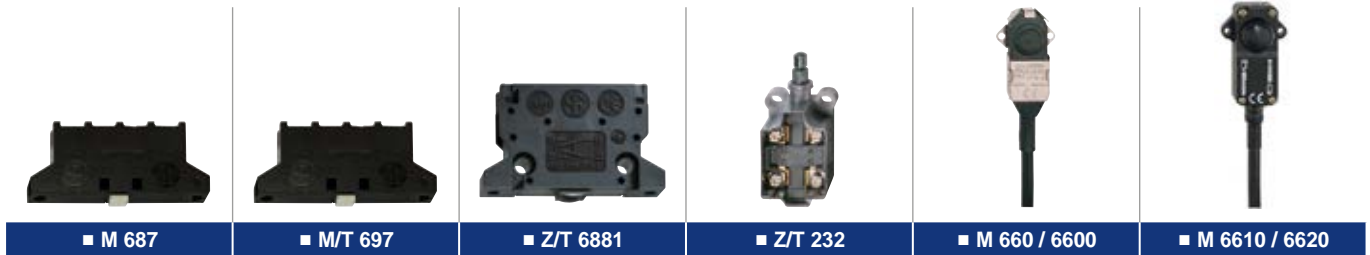
Electrical characteristics			
Switching principle	Snap action with self-cleaning contact	Snap action with self-cleaning contact	Snap action with self-cleaning contact
Thermal test current $I_{the}$	4 A	10 A	6 A
Max. switching capacity U/I	230 VAC / 2.5 A	230 VAC / 4 A	230 VAC / 4 A
Mechanical data			
Housing material	glass-fibre reinforced thermoplastic	glass-fibre reinforced thermoplastic	thermoplastic
Mechanical life	10 million operations	30 million operations	30 million operations
Connection	Soldering, plug-in or screw terminal	Soldering, plug-in or universal terminal	Soldering, flat plug or universal terminal
Cable section <sup>1)</sup>	max. 1.5 mm <sup>2</sup>	max. 1.5 mm <sup>2</sup>	max. 1.5 mm <sup>2</sup>
Dimensions (W x H x D)	19.8 x 11.1 x 6.4 mm	27.8 x 18.3 x 10 mm	32 x 16.6 x 12.6 mm
Ambient conditions			
Ambient temperature	-30 °C ... +85 °C	-30 °C ... +120 °C	-30 °C ... +85 °C
Protection class	Enclosure: IP40; Connections: IP00	Enclosure: IP40; Connections: IP00	Enclosure: IP40; Connections: IP00
Actuator heads	refer to page 90	refer to page 94	refer to page 98

#### Safety classification

Standards	IEC 60947-5-1	IEC 60947-5-1	IEC 60947-5-1
$B_{100}$ NC contact	20,000,000	20,000,000	20,000,000
Certificates	-	-	-

<sup>1)</sup> Including conductor ferrules









- |   |   |   |   |  |  |
|---|---|---|---|--|--|
| <ul style="list-style-type: none"> <li>• Change-over contact with double break, type Za</li> <li>• Self-cleaning contacts</li> <li>• Slim design</li> </ul> | <ul style="list-style-type: none"> <li>• Change-over contact with double break, type Za (snap action)</li> <li>• NC contact with double break, type Y (slow action)</li> <li>• Slim design</li> </ul> | <ul style="list-style-type: none"> <li>• Change-over contact with double break, type Zb</li> <li>• Positive break to IEC 60947-5-1 Appendix K</li> <li>• High resistance to vibration and shock</li> <li>• Switching of low voltages</li> </ul> | <ul style="list-style-type: none"> <li>• Change-over contact with double break, type Zb</li> <li>• Positive break to IEC 60947-5-1 Appendix K</li> <li>• Contact opening 2 x 2 mm</li> <li>• Plastic plunger</li> </ul> | <ul style="list-style-type: none"> <li>• Change-over contact with single break, type C</li> <li>• Self-cleaning contacts</li> <li>• Suitable for aggressive ambient conditions</li> <li>• Protection class IP 65</li> <li>• Largely resistant to oil and fuel</li> </ul> | <ul style="list-style-type: none"> <li>• Change-over contact with single break, type C</li> <li>• Self-cleaning contacts</li> <li>• Suitable for aggressive ambient conditions</li> <li>• Protection class IP 67</li> <li>• Largely resistant to oil and fuel</li> </ul> |
|---|---|---|---|--|--|



Snap action with self-cleaning contact	Snap action Slow action, positive break	Snap/slow action, both positive break	Snap/slow action, both positive break	Snap action with self-cleaning contact	Snap action with self-cleaning contact
6 A	6 A	10 A	10 A	4 A	4 A
230 VAC / 2.5 A	230 VAC / 2.5 A	230 VAC / 2.5 A; 24 VDC / 6 A (600 mm/min) 24 VDC / 5 mA	230 VAC / 4 A 24 VDC / 1 A	230 VAC / 1 A	230 VAC / 1 A
glass-fibre reinforced thermoplastic	glass-fibre reinforced thermoplastic	glass-fibre reinforced thermoplastic	glass-fibre reinforced thermoplastic	Rubber (Perbunan)	glass-fibre reinforced thermoplastic
30 million operations	30 million operations	Z: 1 million switching operations T: 30 million switching operations	20 million operations	3 million operations	3 million operations
g-in terminals	g-in terminals	Screw terminals	Screw terminals	Pre-wired cable 0.5 m	Pre-wired cable 0.5 m
max. 2.5 mm <sup>2</sup> 60 x 25 x 11.9 mm	max. 2.5 mm <sup>2</sup> 60 x 25 x 11.9 mm	max. 2 x 1.5 mm <sup>2</sup> 60 x 35 x 12 mm	max. 2.5 mm <sup>2</sup> 27 x 62 x 25 mm	H05VV-F 3 x 0.75 mm <sup>2</sup> 32 x 77 x 11.8 mm	H05VV-F 3 x 0.75 mm <sup>2</sup> 34 x 62.5 x 18 mm
-30 °C ... +120 °C	-30 °C ... +120 °C	-30 °C ... +85 °C	-30 °C ... +80 °C	-30 °C ... +80 °C	-30 °C ... +80 °C
Enclosure: IP40; Connections: IP00 Index i: IP20 refer to page 102	Enclosure: IP40; Connections: IP00 Index i: IP20 refer to page 102	Enclosure: IP40; Connections: IP00 Index i: IP20 refer to page 103	Enclosure: IP40; Connections: IP00 refer to page 101	IP65 refer to page 104	IP65 refer to page 106

IEC 60947-5-1 20,000,000	IEC 60947-5-1 20,000,000	IEC 60947-5-1 20,000,000	IEC 60947-5-1 20,000,000	IEC 60947-5-1 20,000,000	IEC 60947-5-1 20,000,000
			-	 (only M 6600)	-

## 4. Micro switches

### Series M 610 – Actuating elements



Plunger



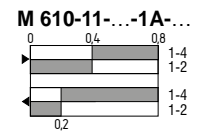
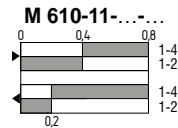
Actuator 1A

#### Actuator heads

Actuator description	Plastic cone Can be actuated from all directions	Lever can subsequently be realised in 3 lever bearings		
Lever bearing	–	I	II	III
Actuating travel, total [mm]	1.2	2.70	1.90	1.50
Pre-travel [mm]	–	1.50	1.05	0.80
Max. differential [mm]	–	0.60	0.45	0.35
Actuating force [N]	0.8	0.36	0.52	0.68
Max. ejection force [N]	0.3	0.10	0.14	0.18

#### Switch travel diagrams

Snap action with self-cleaning contact





Actuator 1C



Actuator 1E



Actuator 1D

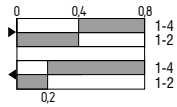
Lever can subsequently be realised in 3 lever bearings

Roller width 2.5 mm  
Lever can subsequently be realised in 3 lever bearings

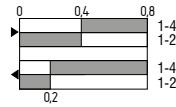
Lever can subsequently be realised in 3 lever bearings

I	II	III	I	II	III	I	II	III
2.10	1.50	1.20	2.60	1.80	1.40	3.50	2.50	1.90
1.20	0.80	0.65	1.45	1.00	0.75	1.90	1.40	1.00
0.50	0.35	0.25	0.55	0.40	0.30	0.80	0.55	0.40
0.47	0.67	0.87	0.38	0.54	0.70	0.28	0.40	0.52
0.13	0.18	0.23	0.11	0.15	0.19	0.08	0.11	0.14

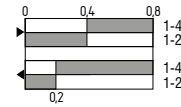
M 610-11-...-1C-...



M 610-11-...-1E-...



M 610-11-...-1D-...



## 4. Micro switches

### Series M 610 – Actuating elements



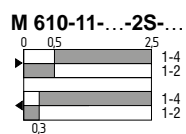
Telescopic plunger 2S

#### Actuator heads

Actuator description	Thermoplastic plunger
Actuating travel, total [mm]	2.50
Pre-travel [mm]	0.50
Max. differential [mm]	0.20
Actuating force [N]	2.10
Max. ejection force [N]	0.30

#### Switch travel diagrams

Snap action with self-cleaning contact



## 4. Micro switches

### Series M 610 – Terminations



#### Soldering terminal with hole



- Ordering suffix -20

#### Soldering terminal with collar



- Ordering suffix -21

#### Screw terminals



- Ordering suffix -60

## 4. Micro switches

### Series M 630 – Actuating elements



Plunger



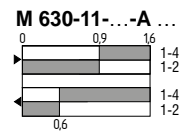
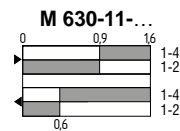
Actuator A

#### Actuator heads

Actuator description	Thermoplastic plunger	Lever can subsequently be realised in two lever bearings				
Actuating force [N]	1.2	See force-travel diagram on page 96				
Actuating travel [mm]	1.6	See force-travel diagram on page 96				
Actuators / Lever	–	<b>A17</b>	<b>A24</b>	<b>A30</b>	<b>A40</b>	<b>A50</b>
Length L1 [mm]	–	17	24	30	40	50
Total length L [mm]	–	20	27	33	43	53

#### Switch travel diagrams

Snap action  
with double break







**Actuator E**



**Actuator F**

Plastic roller Ø 8 mm  
Lever can subsequently be realised in two lever bearings

See force-travel diagram on page 96

See force-travel diagram on page 96

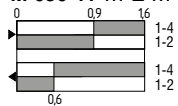
Plastic roller Ø 5 mm  
Lever can subsequently be realised in two lever bearings

See force-travel diagram on page 96

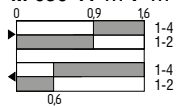
See force-travel diagram on page 96

<b>E17</b>	<b>E24</b>	<b>E30</b>	<b>E40</b>	<b>E50</b>	<b>F</b>
17	24	30	40	50	16.2
20	27	33	43	53	18.2

**M 630-11-...-E ...**






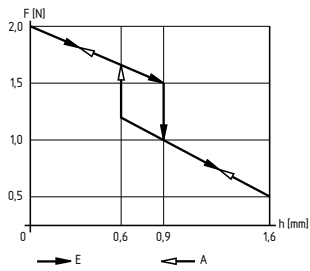
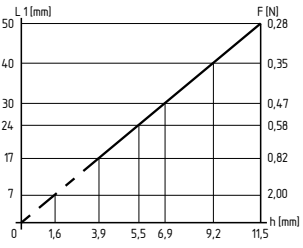
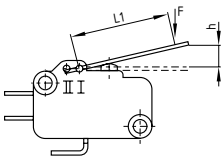
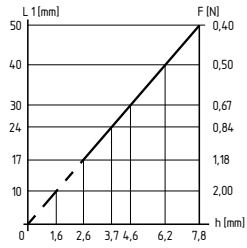
**M 630-11-...-F ...**





## 4. Micro switches

### Series M 630 – Terminations and force-travel diagrams

Soldering terminals	Plug-in connector	Universal terminal
 <ul style="list-style-type: none"> <li>■ Ordering suffix -2</li> </ul>	 <ul style="list-style-type: none"> <li>■ Ordering suffix -3</li> </ul>	 <ul style="list-style-type: none"> <li>■ Ordering suffix -5</li> <li>■ Universal terminal can be used as a soldering, plug-in or screw terminal</li> </ul>
Force travel at plunger	Force travel at lever bearing I	Force travel at lever bearing II
 <p><b>Key</b></p> <ul style="list-style-type: none"> <li>L1: Actuating distance</li> <li>h: Travel at actuator/plunger</li> <li>F: Actuating force at actuator/plunger</li> <li>E: Travel on depression of plunger</li> <li>A: Travel on return of plunger</li> <li>S: Switching point = <math>h / 1.78</math></li> <li><math>\Delta h</math>: Differential = <math>h / 5.33</math></li> </ul>	 	

## Proximity switches

Non-contact and electronic



Detailed information can be found in a separate catalogue  
**"Inductive Proximity switches"**

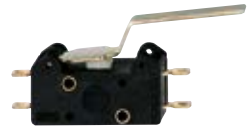


## 4. Micro switches

### Series M 6800 / 6900 – Actuating elements



Plunger



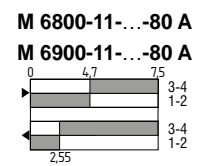
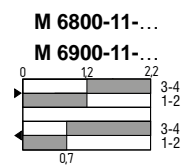
Actuator 80 A

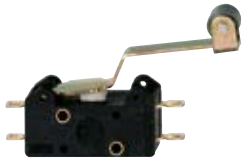
#### Actuator heads

Actuator description	Thermoplastic plunger	
Actuating force	approx. 4 N	approx. 0.9 N
Actuating travel	2.2 mm	7.5 mm
Actuator weight	-	2.7 g

#### Switch travel diagrams

Snap action with self-cleaning contact





**Actuator 80 E**



**Actuator 80 M**



**Actuator 80 B 9**

Plastic roller Ø 8 mm

Stainless steel metal ball Ø 9 mm

approx. 0.95 N

approx. 2.4 N

approx. 3.8 N

7.5 mm

2.8 mm

2.2 mm

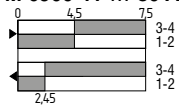
4 g

1 g

3.9 g

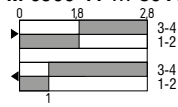
**M 6800-11-...-80 A**

**M 6900-11-...-80 A**



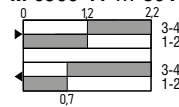
**M 6800-11-...-80 A**

**M 6900-11-...-80 A**



**M 6800-11-...-80 A**




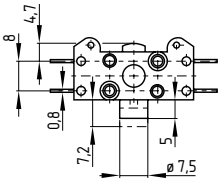
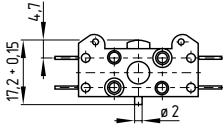
**M 6900-11-...-80 A**



## 4. Micro switches

### Series M 6800 / 6900 – Terminations



Soldering terminals	Flat plug-in connector	Universal terminal
 <ul style="list-style-type: none"> <li>Ordering suffix -2</li> </ul>	 <ul style="list-style-type: none"> <li>Ordering suffix -3</li> </ul>	 <ul style="list-style-type: none"> <li>Ordering suffix -5</li> </ul>
Latching in the limit positions	Tandem design	
 <ul style="list-style-type: none"> <li>Ordering suffix -P2</li> </ul>	 <ul style="list-style-type: none"> <li>Ordering suffix -P3</li> </ul>	

## 4. Micro switches



### Series Z/T 232 – Actuating elements



Plunger

#### Actuator heads

Actuator description	Thermoplastic plunger
Actuating force	approx. 9 N
Actuating travel	6.0 mm

#### Switch travel diagrams

<b>Snap action</b> 1 NO / 1 NC	<b>ZS 232-11</b> 
<b>Slow action</b> 1 NO / 1 NC	<b>TS 232-11</b> 
<b>2 NC</b>	<b>TS 232-02</b> 
<b>2 NO</b>	<b>TS 232-20</b> 
<b>1 NC</b>	<b>TS 232-01</b> 
<b>1 NO</b>	<b>TS 232-10</b> 

## 4. Micro switches

### Series M 687 and M/T 697 – Actuating elements



Plunger

Offset roller lever 8 R

#### Actuator heads

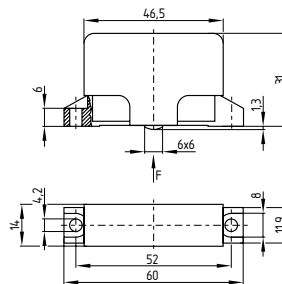
<b>Actuator description</b>	Thermoplastic plunger	Plastic roller Ø 8 mm Roller width 6.4 mm
<b>Actuating force</b>	approx. 4 N	approx. 4 N
<b>Actuating travel</b>	2.2 mm	6 mm

#### Switch travel diagrams

<b>Snap action</b> 1 NO / 1 NC	<p><b>M 687-11-...</b> <b>M 697-11-...</b></p>	<p><b>M 687-11-...-8R-...</b> <b>M 697-11-...-8R-...</b></p>
<b>Slow action</b> 1 NC	<p><b>T 697-01-...</b></p>	<p><b>T 697-01-...-8R-...</b></p>

#### Accessories

##### Terminal cover



- Ordering suffix -i
- As protection against contact with live parts
- Hand and finger guard in accordance with VDE 0106-100
- Clips into position



## 4. Micro switches

### Series Z/T 6881 – Actuating elements



Plunger

Offset roller lever 80R

#### Actuator heads

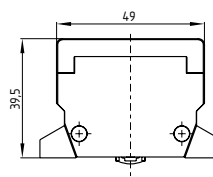
<b>Actuator description</b>	Thermoplastic plunger	Plastic roller $\varnothing$ 8 mm Roller width 6.4 mm
<b>Actuating force</b>	Snap action: approx. 20 N; Slow action: approx. 7 N	Snap action: approx. 12 N; Slow action: approx. 4 N
<b>Actuating travel</b>	4.2 mm	6 mm

#### Switch travel diagrams

<b>Snap action</b>	<b>1 NO / 1 NC</b>	<b>Z 6881-11-1-...</b> 	<b>Z 6881-11-1-80 R-...</b> 
<b>Slow action</b>	<b>1 NO / 1 NC</b>	<b>T 6881-11-1-...</b> 	<b>T 6881-11-1-80 R-...</b> 

#### Accessories

##### Terminal cover



- Ordering suffix -i
- As protection against contact with live parts
- Hand and finger guard in accordance with VDE 0106-100
- Clips into position
- P7 with 4 mm extended plunger

## 4. Micro switches

### Series M 660 / 6600 – Actuating elements



Basic component M

Semicircular rubber dome S

#### Actuator heads

##### Actuator description

Rubber enclosure  
Metal sheath: Stainless steel  
without mounting flange M 660,  
with mounting flange M 6600

Semicircular rubber dome  
Rubber enclosure  
Metal sheath: Stainless steel

##### Actuating force

2.5 N

–

##### Actuating travel

1.7 mm

3.5 mm

##### Actuating speed

–

–

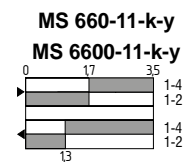
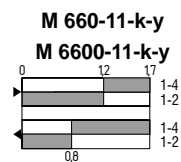
##### Vertical actuating angle

–

–

#### Switch travel diagrams

##### Snap action with self-cleaning contact





**Telescopic plunger 1S**

**Telescopic plunger 2S**

**Roller telescopic plunger 2R**

Threaded tube: nickel-plated brass  
Simple mounting with steel hex nuts  
Large after-travel  
Excellent switching point setting options

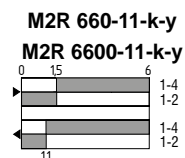
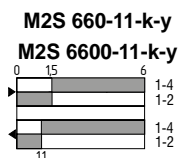
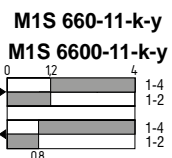
Threaded tube: nickel-plated brass  
Simple mounting with steel hex nuts  
Large after-travel  
Excellent switching point setting options  
With bellows to protect the plunger from soiling

Threaded tube: nickel-plated brass  
Simple mounting with steel hex nuts  
Large after-travel  
Excellent switching point setting options  
with roller across the switch axis, ordering suffix -u

-  
4 mm  
-  
-

-  
6 mm  
-  
-

-  
6 mm  
max. 0.5 m/s  
max. 30°



## 4. Micro switches

### Series M 6610 / 6620 – Actuating elements



Semicircular rubber dome S



Telescopic plunger 1S

#### Actuator heads

##### Actuator description

Thermoplastic enclosure  
without mounting flange M 6610,  
with mounting flange M 6620

Simple mounting with  
steel hex nuts  
Large after-travel  
Excellent switching point  
setting options  
With bellows to protect the plunger  
from soiling

##### Actuating force

2.5 N

–

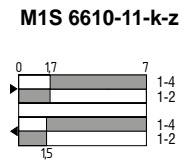
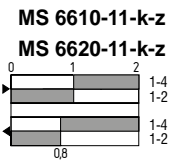
##### Actuating travel

2 mm

7 mm

#### Switch travel diagrams

##### Change-over contact with single break





**Telescopic plunger 2S**

**Roller telescopic plunger 2R**

Simple mounting with steel hex nuts  
 Large after-travel  
 Excellent switching point setting options  
 With bellows to protect the plunger from soiling

Simple mounting with steel hex nuts  
 Large after-travel  
 Excellent switching point setting options  
 with roller across the switch axis, ordering suffix -u

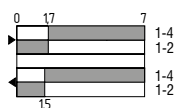
-  
 3.5 mm

-  
 7 mm

**M2S 6610-11-k-z**





**M2R 6610-11-k-z**



## 4. Micro switches

### Preferred types

Series		Connection	Actuator
M 610		Soldering terminal with hole	Actuator 1C Actuator 1E
		Soldering terminal with collar	Actuator 1A
		Screw terminals	Plunger Actuator 1A Actuator 1C
			Actuator 1E
M 630		Soldering terminals	Plunger Actuator F
		Plug-in connector	Actuator E17 Actuator E24
		Universal terminal	Plunger Actuator E17
M 6800		Flat plug-in connector	Actuator 80B9
M 6900		Soldering terminals	Actuator 80B9
		Flat plug-in connector	Plunger Actuator 80A Actuator 80B9
M 687		Screw terminals	Plunger
		Flat plug-in connector	Offset roller lever 8R Offset roller lever 8R
M/T 697		Screw terminals	Plunger Offset roller lever 8R
Z/T 6881		Screw terminals	Plunger Offset roller lever 80R
Z/T 232		Screw terminals	Plunger S
M 660/6600		Connecting cable 3 x 0.75 mm <sup>2</sup>	Basic component M Telescopic plunger 1S Telescopic plunger 2S Roller telescopic plunger 2R Basic component M Rubber dome S Telescopic plunger 1S Telescopic plunger 2S Roller telescopic plunger 2R
M 6610/6620		Connecting cable 3 x 0.75 mm <sup>2</sup>	Roller telescopic plunger 2R Telescopic plunger 2S Telescopic plunger 1S Rubber dome S

	Lever bearing	Special features	Type designation	Part number
	II	---	M 610-11-20-1C	101061367
	II	---	M 610-11-20-1E	101061368
	III	---	M 610-11-20-1E-III	101103324
	III	---	M 610-11-21-1A-III	101087693
	---	---	M 610-11-60	101088335
	III	---	M 610-11-60-1A-III	101091701
	II	---	M 610-11-60-1C	101061406
	II	---	M 610-11-60-1E	101061408
	III	---	M 610-11-60-1E-III	101089809
	---	---	M 630-11-2	101061417
	---	Magnetic arc quenching	M 630-11-2-C	101061418
	II	---	M 630-11-2-F-II	101087707
	II	---	M 630-11-3-E17-II	101088373
	I	---	M 630-11-3-E24	101061483
	---	---	M 630-11-5	101061493
	---	Magnetic arc quenching	M 630-11-5-C	101061494
	I	Magnetic arc quenching	M 630-11-5-C-E17	101061518
	---	Tandem design	M 6800-11-3-P3-80B9	101061884
	---	---	M 6900-11-2-80B9	101061897
	---	Latching in the limit positions	M 6900-11-3-P2	101061926
	---	---	M 6900-11-3-80A	101061903
	---	---	M 6900-11-3-80B9	101061904
	---	Tandem design	M 6900-11-3-P3-80B9	101061947
	---	---	M 687-11-1	101055253
	---	Gold contacts	M 687-11-1-AUNI	101055255
	---	---	M 687-11-1-8R	101055284
	---	---	M 687-11-3-8R	101055281
	---	Snap action	M 697-11-1	101055182
	---	Slow action	T 697-01-1	101055452
	---	Snap action	M 697-11-1-8R	101055185
	---	Slow action	T 6881-11-1	101138614
	---	Snap action	Z 6881-11-1	101138616
	---	Slow action	T 6881-11-1-80R	101138615
	---	Snap action	Z 6881-11-1-80R	101138617
	Snap action	1 NO / 1 NC	ZS 232-11	101113330
		2 NC	ZS 232-02	101113332
	Slow action	1 NO / 1 NC	TS 232-11	101113333
		1 NO / 1 NC	TS 232-11UE	101181513
		2 NC	TS 232-02	101113335
		2 NO	TS 232-20	101113334
	---	---	M 660-11-K-Y	101055325
	---	---	M1S 660-11-K-Y	101055425
	---	---	M2S 660-11-K-Y	101055373
	---	---	M2R 660-11-K-Y	101055396
	---	with mounting flange	M 6600-11-K-Y	101055341
	---	with mounting flange	MS 6600-11-K-Y	101055354
	---	with mounting flange	M1S 6600-11-K-Y	101055442
	---	with mounting flange	M2S 6600-11-K-Y	101055391
	---	with mounting flange	M2R 6600-11-K-Y	101055418
	Roller across the switch axis	with mounting flange	M2R 6600-11-K-Y-U	101086952
	---	---	M2R 6610-11-K-Z	101055457
	---	---	M2S 6610-11-K-Z	101055456
	---	---	M1S 6610-11-K-Z	101055455
	with mounting flange	---	MS 6620-11-K-Z	101055458

## 5. Magnetic reed switches

### Description

## Magnetic reed switches

Alongside mechanically operated limit switches, magnetic reed switches are enjoying an increase in importance. They are often used to complement limit switches with plungers, rollers and swivel levers and are considered an important link to non-contact and contactless limit switches.

Non-contact limit switches are ideally used where mechanically operated limit switches cannot function as they ideally should, due to unfavourable operating conditions such as:

- High or low operating speeds
- High or low switching frequency
- Strong influence of dirt and dust
- High humidity
- Chemical atmospheres
- Large fluctuations in actuating pre-travel






One type of non-contact limit switch is the magnetic reed switch (other types: inductive, capacitive and optical proximity switches, see series I).

In order to select the right switch, however, it is important to familiarise yourself with the general design, function, benefits and drawbacks of magnetic reed switches.

Magnetic reed switches of type series BN 2, BN 3, BN 6 and BN 8 comprises two units – the switch itself and the actuating magnet.

The switching tubes in our magnetic reed switches are filled with inert gas (nitrogen). The contact reeds, which are made from iron/nickel alloy, are melted into a glass body and coated with rhodium around the contact points. The gap between the contact reeds is just 0.2 - 0.3 mm, so that the magnetic force required for the switching process is minimal. The enclosed glass body keeps the contact points clean of dust, moisture and corrosion, helping to increase the contact reliability of magnetic reed switches to an extremely high level.

The design and precise calculation of the pre-loaded magnet determines the contact type:

	NO contact
	NC contact
	Toggle contact
	Bistable contact
	Bistable toggle contact



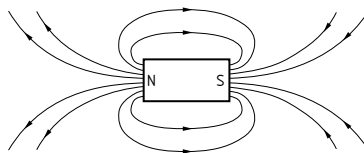


## Permanent magnets

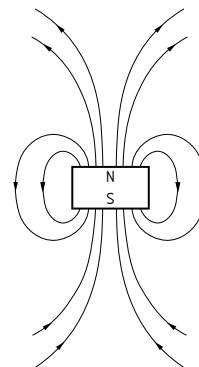
Both permanent magnets (with/without enclosure) and electromagnets are used for switch actuation. The switching magnet selected for side actuation is dependent on the switch type. For NC, NO and toggle contacts, this is a switching magnet with N-S pole; for bistable and bistable toggle contacts, this is a switching magnet with N-pole or S-pole.

The barium ferrite used as the magnet material in our permanent magnets is both resistant to ageing and resistant to external magnetic fields, which could impair its magnetic strength. Its temperature sensitivity of 0.2%/ °C with respect to switching point accuracy should, however, be borne in mind, as magnetic force will decrease by this factor as temperatures rise, and increase as temperatures fall. A permanent change in the -30 °C to +90 °C range is not to be expected.

**Magnetic field, N-S magnet**



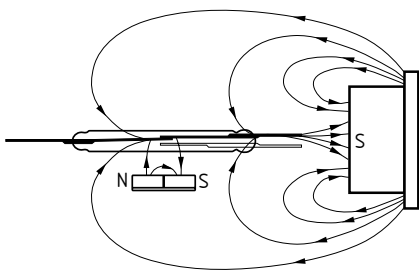
**Magnetic field, N-magnet or S-magnet**



## 5. Magnetic reed switches

### Description

#### Front side actuation



##### Front side actuation

To actuate the magnetic reed switches from the side with a magnet in the manner outlined above, some type series can be actuated from the side or front side (index V).

Switches with NO, NC and toggle contact types are actuated from the side with an N-S magnet, as is customary. All switches are marked in the same place with symbols to ensure the correct pairing and actuation direction of the switching magnets. The following applies: S/green to S/green and N/red to N/red.

Front side actuation for NO, NC and toggle contact types is only possible with S-poled magnets. A red symbol plate with direction arrows is mounted to the front.

Switches with bistable and bistable toggle contact types are actuated from the side with either an N-pole or S-pole magnet, depending on the function, as is customary. In this case too, coloured symbols are mounted to the side of the switch to indicate the actuation direction.

Front side actuation for bistable and bistable toggle contacts can only be effected in the direction specified on the front symbol plate with an N-S magnet. If the N-S magnet is rotated 180° around the magnet's axis, the bistability changes to the opposite direction.

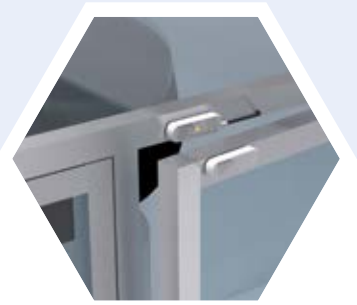
#### Resistance to vibration

Although the bistable switch requires a considerable setting accuracy when compared to NO and NC switches, these devices are extremely resistant to vibration. By embedding the switching tube troughs in foam rubber, the BN 20 type series has increased vibration strength. If the switches are under the influence of the switching magnets, even strong vibrations will not be capable of altering the switching condition. Caution should always be exercised when it comes to heavy shock loads, as too high a load can render a magnetic reed switch non-functional, irrespective of the contact type, due to permanent deformation of the contact reeds.

#### Life

It must be ensured that carefully harmonised devices are not damaged due to overload when being installed or tested.

Magnetic switch contacts have a tendency to stick if the maximum specified current strength is exceeded. Once re-opened, they continue to function, but lose accuracy, potentially turning a NC contact into a NO contact. If lamps or alternating current magnets are switched on, the current peaks that occur at the point of switch-on may be ten to twelve times the rated current. When switching off inductive circuits, excess voltages occur, which can quickly lead to complete destruction of devices. In such cases, it is essential that suitable spark suppression measures are introduced. In order to minimise excess voltages, VDR resistors may be switched in parallel with the inductive circuits.



Usual spark suppression with capacitors always involves use of a damping resistor, as otherwise there is a risk of welding from the charge and discharge processes of the capacitor. The optimum values for means of suppression (RC circuit) can, however, only be determined by means of tests on a case-by-case basis. It should be noted that incorrect adjustment may be more disadvantageous than no adjustment at all. In DC current circuits, we recommend switching a diode in parallel to the inductive circuit to help protect the contacts.

If magnetic reed switches are protected from overloads as outlined above, the life of an electrical contact may far exceed that of the device being switched. Non-contact switches actuated with minimal force are also exposed to no wear on the drive side, giving them an almost unlimited life.

---

## Switching hysteresis

Like mechanical snap-action switches, magnetic reed switches have a switching hysteresis, i.e. their switch-on and switch-off points do not coincide. This particular property is the result of the difference in response and drop-out excitation. Since this difference is also a measure of the contact pressure, and therefore the contact reliability, an ideal value of 0, i.e. switch-on and switch-off at the same point, cannot be achieved.

---

## Uses

Magnetic reed switches can be used in virtually all areas of control technology, and owing to their special characteristics, are often preferred over mechanically operated limit switches.

Some examples are:

1. High switching speed and large switching frequency: use in counting circuits.
2. Reliable contacting, even in the presence of aggressive media, as the contact point is located inside a protective tube: use in galvanic equipment.
3. No mechanical drives, low actuating force: use in motion sensors and standstill monitoring.
4. Low noise: use in lift construction.
5. Non-contact actuation, operated with non-magnetic materials: use as pressure monitors and float switches.

## 5. Magnetic reed switches

### Overview of the series



■ BN 80



■ BN 85 <sup>1)</sup>



■ BN 310

#### Key Features

<b>Switching distance max.</b>	60 mm	40 mm	60 mm
<b>Contact variants</b>	Bistable contact NC/NO	Bistable contact	Bistable contact NC/NO
<b>Actuation direction</b>	From side	front side	side or front available on request
<b>Design</b>	rectangular, flat	rectangular	rectangular, flat

#### Technical features

<b>Electrical characteristics</b>			
<b>Switching voltage</b>	250 VAC/DC	60 VAC/DC	250 VAC/DC
<b>Switching current</b>	0.5 A	1 A	3 A
<b>Switching capacity</b>	10 VA / 8 W	30 VA / W	120 VA / W
<b>Resistance to shock</b>	15 g, on sine wave oscillation	60 g, on sine wave oscillation	30 g / 11 ms
<b>Mechanical data</b>			
<b>Housing material</b>	Thermoplastic enclosure	Thermoplastic enclosure	Thermoplastic enclosure
<b>Connection</b>	LiYY cable, 1 m	2 single conductors LiY, 1 m	Cable H03VV-F
<b>Cable section:</b>	2 x 0.25 mm <sup>2</sup>	2 x 0.75 mm <sup>2</sup>	2 x 0.75 mm <sup>2</sup>
<b>Dimensions (W x D x H)</b>	44 x 13 x 9 mm	40 x 35 x 16.5 mm	88 x 25 x 13 mm
<b>Ambient conditions</b>			
<b>Ambient temperature</b>	-25 °C ... +75 °C	0 °C ... +75 °C	-25 °C ... +75 °C
<b>Protection class</b>	IP67	IP40	IP67
<b>Actuator heads</b>	refer to page 120	refer to page 120	refer to page 120

#### Safety classification

Certificates



(Exception: Index -R)

-



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ BN 325 <sup>2)</sup>



■ BN 20



■ BN 75



■ BN 120



■ BN 650

55 mm	50 mm	-	60 mm	60 mm
Bistable contact From side	Bistable contact NC/NO side or front	NC, NO Float switch	Bistable contact NC/NO side or front	Bistable contact NC/NO side or front
rectangular	rectangular	-	cylindrical, Ø 12 mm	cylindrical, Ø 13 mm
250 VAC/DC 3 A 120 VA / W 50 g / 11 ms	250 VAC/DC 3 A 120 VA / W -	220 VAC/DC 1 A 60 VA / W -	200 VAC/DC 1 A 30 VA / W 30 g / 11 ms	200 VAC/DC 1 A 30 VA / W 30 g / 11 ms
Thermoplastic enclosure Various terminations, see table on page 116	Metal enclosure Screw terminals	Thermoplastic enclosure M12 connector or pre-wired cable	Thermoplastic enclosure LiYY cable, 1 m	Thermoplastic enclosure LiYY cable, 1 m
-	-	-	2 x 0.25 mm <sup>2</sup>	2 x 0.25 mm <sup>2</sup>
85 x 26 x 24 mm	104 x 52 x 47 mm	80 x 99.5 x 55 mm	Ø12, 71 mm	Ø13, 103 mm
-25 °C ... +75 °C	-25 °C ... +90 °C	-25 °C ... +80 °C	-25 °C ... +70 °C	-25 °C ... +70 °C
IP40 / IP67	IP67	IP68, IP65 (connector) IP67 (cable)	IP67	IP67
refer to page 120	refer to page 120	refer to page 120	refer to page 120	refer to page 120
-	-	-	-	-

<sup>1)</sup> The magnetic switch BN 85-5 enables installing up to 5 BN 85 units in one enclosure.

Mutual interference can be avoided due to integrated shielded plates.

<sup>2)</sup> Because of its integrated shield and plug connector, BN 325 is especially suitable for installations close together.

Protection class: IP40 with insulated plug, IP67 with cable outlet on additional shielding plate.

## 5. Magnetic reed switches

### Preferred types

Series	Actuation	Connection	Switching distance	Contacts	Latching	Type designation	Material number	
BN 80	From side	pre-assembled cable, 1m	20 mm	1NC		BN 80-01Z	101082364	
			32 mm	1NO		BN 80-10Z	101055844	
			60 mm	1 bistable contact	■	BN 80-RZ	101139647	
BN 310	From side	pre-assembled cable, 1m	20 mm	1NO/1NC contact	■	BN 310-11RZ	101184486	
				2NC		BN 310-2RZ	101182138	
			50 mm	1NC		BN 310-01Z	101133844	
			60 mm	1NO		BN 310-10Z	101133842	
			60 mm	1 bistable contact	■	BN 310-RZ	101133843	
BN 325	Front side	Blade terminal 4.8 mm and 1 shielding plate	55 mm	1 bistable contact	■	BN 325-R	101147009	
		Blade terminal 4.8 mm and 2 shielding plates				BN 325-R-1239	101147090	
		Cable outlet left and 2 shielding plates				BN 325-R-1279	101147091	
		Cable outlet right and 2 shielding plates				BN 325-R-1279-2	101148084	
BN 20	From side	---	45 mm	1NC		BN 20-01Z	101172087	
				2NC		BN 20-02Z	101057005	
				1NO		BN 20-10Z	101172882	
				1NO/1NC		BN 20-11Z	101168014	
	From side	---	50 mm	2NO		BN 20-20Z	101057006	
				1NO/1NC	■	BN 20-11RZ	101165310	
				2 bistable contact		BN 20-2RZ	101172893	
				1 bistable contact		BN 20-RZ	101168090	
1 bistable contact	BN 20-RZ-ST	101155508						
BN 75	Float switch	---	---	1NC		BN 75-01Y	101055740	
				1NC		BN 75-01Z-1391	101055741	
				1NO		BN 75-10Y	101055743	
				1NO		BN 75-10Z-1391	101055744	
				1NO/1NC		BN 75-11Y	101055701	
				1NO/1NC		BN 75-11Z-1391	101055702	
BN 120	From side	Threaded flange M12	50 mm	1NC		BN 120-01Z	101186840	
				1NO		BN 120-10Z	101186839	
	Front side		60 mm	1 bistable contact	■	BN 120-RZ	101186843	
			45 mm			BN 120-RZ/V	101186844	
			55 mm			BN 120-01Z/V	101186842	
			55 mm	1NO		BN 120-10Z/V	101186841	
BN 650	From side	pre-assembled cable, 1m	50 mm	1NC		BN 650-01Z	101187280	
				1NO		BN 650-10Z	101187273	
	Front side		60 mm	1 bistable contact	■	BN 650-RZ	101187283	
						45 mm	BN 650-RZ/V	101187284
						55 mm	BN 650-01Z/V	101187282
			55 mm	1NO		BN 650-10Z/V	101187281	

## 5. Magnetic reed switches

### Ordering code

#### BN 120-10Z/V

##### Enclosure selection

80	rectangular, flat
310	rectangular, flat
325	rectangular
20	rectangular
75	Float switch
120	cylindrical, Ø 12 mm
650	cylindrical, Ø 13 mm

##### Contacts

01	1 NC
02	2 NC
10	1 NO
11	1 NO/1 NC
20	2 NO
R	1 bistable contact
2R	2 bistable contact

##### Termination on BN325

	Blade terminal 4.8 mm and 1 shielding plate
1239	Blade terminal 4.8 mm and 2 shielding plates
1279	Cable outlet left and 2 shielding plates
1279-2	Cable outlet right and 2 shielding plates

##### Actuation direction

	From side
V	front side

For technical reasons not all possible variations and/or combinations can be delivered.  
The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

## 5. Magnetic reed switches

### Selection of actuating magnets according to switch distances

Actuating magnet	BN 80			BN 85-r	BN 310	BN 310 with bistable contact		BN 325-r
	BN 80-10z	BN 80-01z	BN 80-rz			BN 310-rz	BN 310-2rz	
BP 6 S			4 - 18	2 - 12				
BP 7 S			6 - 22					
BP 8	3 - 8	0 - 5						
BP 8 S				2 - 10				
BP 10	6 - 12	2 - 9	2 - 9		5			
BP 10 N						15		10
BP 10 S			10 - 30	5 - 20		15		10
2 x BP 10	12 - 20	2 - 13	2 - 13		17			
2 x BP 10 N						20		15
2 x BP 10 S			12 - 36	6 - 27		20		15
BP 15	8 - 14	2 - 10			6			
BP 15 N								
BP 15 S								
2 x BP 15	12 - 22	2 - 15			17			
2 x BP 15S			13 - 38	7 - 28				
2 x BP 15/2					17			
2 x BP 15/2 N						22		17
2 x BP 15/2 S						22		17
BP 34					5 - 20			
BP 34 N						15 - 30		10 - 25
BP 34 S			20 - 50	10 - 40		15 - 30		10 - 25
2 x BP 34	12 - 26	5 - 18						
2 x BP 34 S			22 - 60					
BP 20	12 - 24	0 - 14			20			
BP 20 N						3 - 25		5 - 20
BP 20 S			10 - 38	3 - 28		3 - 25		5 - 20
BP 31	12 - 24	0 - 14			20			
BP 31 N						3 - 25		5 - 20
BP 31 S			12 - 40	4 - 30		3 - 25		5 - 20
BP 11								
BP 11 N						15		10
BP 11 S			10 - 30	4 - 23		15		10
2 x BP 11 N								
2 x BP 11 S								
BP 12	24 - 32	4 - 20			10 - 30			
BP 12 N						20		15
BP 12 S			10 - 34	5 - 27		20		15
2 x BP 12 N								
2 x BP 12 S								
BP 21								
BP 21 N						15 - 45		15 - 40
BP 21 S						15 - 45		15 - 40
2 x BP 21 N								
2 x BP 21 S								
BP 22 N								
BP 22 S								
2 x BP 22 N								
2 x BP 22 S								
BP 310-1S							0 - 10	
BP 310-1N							0 - 10	
BP 310-2S							0 - 15	
BP 310-2N							0 - 15	
BE 20					20			
BE 20 N						20		15
BE 20 S						20		15

The specified switching distances are applicable for the actuation of individually mounted components without ferromagnetic influence. A change to the distance, positive or negative, is possible due to ferromagnetic influences.



BN 20		BN 120		BN 120-../V		BN 650		BN 650-../V	
	with bistable contact		with bistable contact		with bistable contact		with bistable contact		with bistable contact
		5				5			
	5		15				15		
	5		15	5			15	5	
12		17			3	17			3
	10		20				20		
	10		20	10			20	10	
		6				6			
			17				17		
			17	6			17	6	
		17				17			
12		17				17			
	15		22				22		
	15		22				22		
		15 - 20			15	15 - 20			15
	10 - 25		15 - 30				10 - 30		
	10 - 25		15 - 30	20			15 - 30	20	
15		20			10	20			10
	15		25				25		
	15		25	15			25	15	
15		20			10	20			10
	15		25				25		
	15		25	15			25	15	
		20			15	20			15
	5		15				15		
	5		15	5			15	5	
			25				25		
			25	15			25	15	
25		10 - 30			20	10 - 30			20
	10		20				20		
	10		20	10			20	10	
			10 - 30				10 - 30		
			10 - 30	25			10 - 30	25	
		25 - 50			45	25 - 50			45
	10 - 35		15 - 45				15 - 45		
	10 - 35		15 - 45	30			15 - 45	30	
			20 - 60				20 - 60		
			20 - 60	20 - 55			20 - 60	20 - 55	
									35
				25				25	35
					35				
				15 - 55	35			15 - 55	
15					10				10
	10		20				20		
	10		20	6			20	6	

The mutual interference between multiple actuating magnets must be observed. (For special versions: diverging values possible)

## 5. Magnetic reed switches

### Actuating magnets

<b>BP 6</b> 101091837	<b>BP 7</b> 101125556	<b>BP 8</b> 101054816
 <ul style="list-style-type: none"> <li>■ Actuating magnet, unenclosed, N-S</li> <li>■ S pole: 90° lowered</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, unenclosed, N-S</li> <li>■ S-pole marked red</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, unenclosed, N-S</li> <li>■ S-pole marked red</li> </ul>
<b>BP 10</b> 101057531	<b>BP 11 N</b> 101059923	<b>BP 11 S</b> 101057533
 <ul style="list-style-type: none"> <li>■ Actuating magnet, unenclosed, N-S</li> <li>■ Colour coding of poles by labels</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, N</li> <li>■ N-pole marked green</li> <li>■ For mounting on ferrous material</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, S</li> <li>■ S-pole marked red</li> <li>■ For mounting on ferrous material</li> </ul>
<b>BP 12 N</b> 101059917	<b>BP 12 S</b> 101057532	<b>BP 15 SS</b> 101139818
 <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, N</li> <li>■ N-pole marked green</li> <li>■ For mounting on ferrous material</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, S</li> <li>■ S-pole marked red</li> <li>■ For mounting on ferrous material</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, N-S</li> <li>■ Stainless steel</li> <li>■ Suitable for food processing industry</li> </ul>

## 5. Magnetic reed switches

### Actuating magnets

<p><b>BP 15</b> 101060163</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, N-S</li> <li>■ S-pole marked red</li> <li>■ N-pole marked green</li> <li>■ Suitable for mounting on ferrous material with a distance of 18 mm</li> </ul>	<p><b>BP 34</b> 101057553</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, N-S</li> <li>■ S-pole marked red</li> <li>■ N-pole marked green</li> <li>■ Suitable for mounting on ferrous material with a distance of 25 mm</li> </ul>	<p><b>BP 34/2</b> 101195164</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, unenclosed, N-S</li> <li>■ S-pole marked red</li> </ul>
<p><b>BP 15/2</b> 101060165</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, unenclosed, N-S</li> <li>■ Polarity pressed</li> <li>■ Suitable for mounting on ferrous material with a distance of 18 mm</li> </ul>	<p><b>BP 21 N</b> 101057536</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, N</li> <li>■ N-pole marked green</li> <li>■ For mounting on ferrous material</li> </ul>	<p><b>BP 21 S</b> 101057534</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, S</li> <li>■ S-pole marked red</li> <li>■ For mounting on ferrous material</li> </ul>
<p><b>BP 20</b> 101057549</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, S</li> <li>■ S-pole marked red</li> <li>■ N-pole marked green</li> <li>■ Suitable for mounting on ferrous material with a distance of 20 mm</li> </ul>	<p><b>BP 20 N</b> 101057538</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, N</li> <li>■ N-pole marked green</li> <li>■ Suitable for mounting on ferrous material with a distance of 20 mm</li> </ul>	<p><b>BP 20 S</b> 101057541</p>  <ul style="list-style-type: none"> <li>■ Actuating magnet, metal enclosure Al, S</li> <li>■ S-pole marked red</li> <li>■ Suitable for mounting on ferrous material with a distance of 20 mm</li> </ul>

## 5. Magnetic reed switches

### Actuating magnets

<b>BP 22 N(S)</b> 101057432	<b>BP 22/2 N(S)</b> 101057544	<b>BP 31</b> 101057530
 <ul style="list-style-type: none"> <li>■ Actuating magnet; Zn metal enclosure</li> <li>■ S-pole marked red</li> <li>■ N-pole marked green</li> <li>■ For mounting on ferrous material</li> <li>■ Can be used as N or S magnet</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet; Zn metal enclosure</li> <li>■ S-pole marked red, N-pole marked green</li> <li>■ 33 % magnetic force</li> <li>■ For mounting on ferrous material</li> <li>■ Can be used as N or S magnet</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, N-S</li> <li>■ S-pole marked red</li> <li>■ N-pole marked green</li> <li>■ Suitable for mounting on ferrous material with a distance of 20 mm</li> </ul>
<b>BP 31 N</b> 101057520	<b>BP 31 S</b> 101057521	<b>BP 310-1 N</b> 101182160
 <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, N-S</li> <li>■ N-pole marked green</li> <li>■ Suitable for mounting on ferrous material with a distance of 20 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, S</li> <li>■ S-pole marked red</li> <li>■ Suitable for mounting on ferrous material with a distance of 20 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, N-S</li> <li>■ Switching distance 0 ... 10 mm</li> </ul>
<b>BP 310-1 S</b> 101182275	<b>BP 310-2 N</b> 101182284	<b>BP 310-2 S</b> 101182287
 <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, S</li> <li>■ Switching distance 0 ... 10 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, N-S</li> <li>■ Switching distance 0 ... 15 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuating magnet, with plastic enclosure, S</li> <li>■ Switching distance 0 ... 15 mm</li> </ul>

## 5. Magnetic reed switches

### Actuating magnets/Accessories

BE 20 24V 101057437	HOLDER H1/1 101068965	HOLDER H2 101068281
 <ul style="list-style-type: none"> <li>■ Electromagnet, with plastic enclosure</li> </ul>	 <ul style="list-style-type: none"> <li>■ For BN 650</li> <li>■ Metal holder with 2 elasticated bearing blocks</li> <li>■ Guarantees high vibration resistance</li> </ul>	 <ul style="list-style-type: none"> <li>■ For BN 650</li> <li>■ Metal holder with rubber discs</li> </ul>
CLAMP H 15 101068881	COMPENSATION COIL KS 1 101064997	COMPENSATION COIL KS 2 101065000
 <ul style="list-style-type: none"> <li>■ For BN 650</li> <li>■ Material: thermoplastic</li> </ul>	 <ul style="list-style-type: none"> <li>■ Temperature range <math>-25\text{ °C} \dots +90\text{ °C}</math></li> <li>■ For cable lengths up to 100 m</li> <li>■ Connecting cable H05V-K 1 mm<sup>2</sup>, Cable length 100 mm</li> <li>■ Position compensation coil in series with switching pipe</li> <li>■ Temperature-resistant design <math>-25\text{ °C}</math> to <math>+150\text{ °C}</math>, ordering suffix -T</li> </ul>	 <ul style="list-style-type: none"> <li>■ Temperature range <math>-25\text{ °C} \dots +90\text{ °C}</math></li> <li>■ For cable lengths up to 200 m or 2 x 100 m</li> <li>■ Connecting cable H05V-K 1 mm<sup>2</sup>, Cable length 100 mm</li> <li>■ Position compensation coil in series with switching pipe</li> </ul>

## 6. Pull-wire switches

### Description

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#### Area of application

Pull-wire switches are used on machinery and plants for signalling and/or for area monitoring. The switching command can be activated at arbitrary points on the wire run.

Areas of application range from issuing commands in a production process, to machinery startup and opening/closing electrically operated doors and gates.

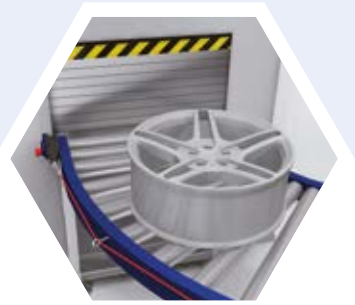
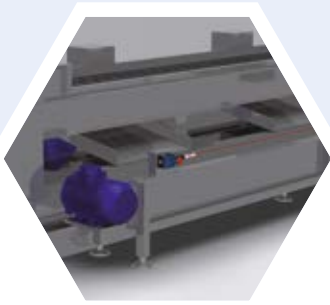
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#### Design and way of functioning

The way of functioning is dependent on the application and the type of pull-wire switch that has been selected.

Types with wire pull and wire breakage detection require the wire to be pre-tensioned so that the pull-wire switch is in the switching condition. The switching function is activated if the tensioned pull wire is pulled or in the event of wire breakage. In this case, the normally-closed contacts are opened and the normally-open contacts are closed.

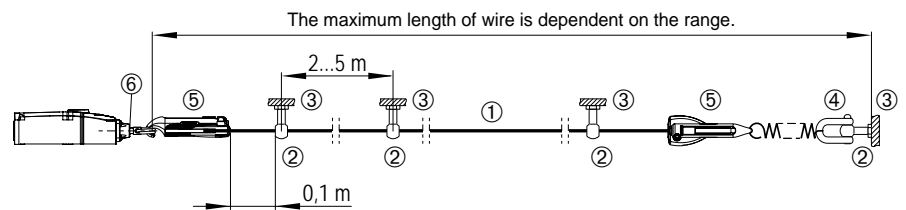
On types with wire pull function, the switching function is activated by a quick pull on the wire. In this case, the pull-wire switch must be fitted vertically. Types with varying pulling forces are available, depending on the application.



## Mounting instructions

### Pull-wire switch with wire pull and wire breakage detection - TQ 700/TQ 900/TQ 441

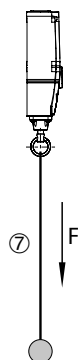
If the tensioned pull wire is pulled or in the event of wire breakage, the switching function of the pull-wire switch is activated.



### Pull-wire switch with wire pull function - TQ 700 S

The TQ 700 S pull-wire switch must be fitted vertically.

If the pull-wire is pulled, the switching function of the pull-wire switch is activated.



#### Key

- ① Wire rope
- ② Eyebolt
- ③ nut
- ④ shackle
- ⑤ Rope tensioner
- ⑥ Position indication
- ⑦ Pull wire with sphere (accessories available)

## 6. Pull-wire switches

### Overview of the series



■ TQ 700 S



■ TQ 700

#### Key Features

- Wire pull detection
- Maximum cable length 10 m
- 2 contacts

- Wire pull and breakage detection
- Maximum cable length 10 m
- 2 contacts

#### Technical features

Electrical characteristics		
Max. switching capacity U/I	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A
Mechanical data		
Actuating force	88 N (40 N)	17 N
Cable entry	1 x M20	1 x M20
Cable section <sup>1)</sup>	0.75 ... 2.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>
Dimensions (W x H x D)	40.5 x 160 x 51 mm	40.5 x 160 x 51 mm
Ambient conditions		
Ambient temperature	-25 °C ... +70 °C	-25 °C ... +70 °C
Protection class	IP67	IP67

#### Safety classification

##### Approvals



<sup>1)</sup> Including conductor ferrules



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ TQ 900



■ TQ 441

- Wire pull and breakage detection
- Maximum cable length 75 m
- 4 contacts

- Wire pull and breakage detection
- Maximum cable length 25 m
- 2 contacts

230 VAC / 4 A;  
24 VDC / 1 A

230 VAC / 4 A;  
24 VDC / 4 A

42 N

17 N (4 N)

3 x M20

2 x M20

0.75 ... 2.5 mm<sup>2</sup>

0.75 ... 4 mm<sup>2</sup>

71 x 220 x 69.7 mm

106 x 135 x 61 mm

-25 °C ... +70 °C  
IP67





-30 °C ... +90 °C  
IP65



## 6. Pull-wire switches

### Preferred types



Series	Enclosure	Operating principle	Possible wire length	Wire pull/wire breakage detection	Contacts	Special equipment	Type designation	Material number		
TQ 700		Thermoplastic	1-side operation	10 m	■	1 NO/1 NC		<b>TQ 700-11</b>	<b>101192479</b>	
					■	2NC		<b>TQ 700-02</b>	<b>101192480</b>	
					■	2NO		<b>TQ 700-20</b>	<b>101192481</b>	
TQ 700 S		Thermoplastic	1-side operation	10 m	Wire pull detection		1 NO/1 NC		<b>TQ 700-11 S</b>	<b>101217092</b>
							1 NO/1 NC	Reduced actuating force	<b>TQ 700-11S-40N</b>	<b>103003622</b>
							2NC		<b>TQ 700-02 S</b>	<b>101217791</b>
							2NO		<b>TQ 700-20 S</b>	<b>103000084</b>
TQ 900		Zinc die-cast/ thermoplastic	1-side operation	75 m	■	1 NO/1 NC	Indicator lamp see accessories	<b>TQ 900-11</b>	<b>101184478</b>	
					■	2 NO/2 NC		<b>TQ 900-22</b>	<b>101184479</b>	
					■	1 NO/3 NC		<b>TQ 900-13</b>	<b>101184481</b>	
					■	2NC		<b>TQ 900-02</b>	<b>101186145</b>	
TQ 441		Die-cast aluminium	1-side operation	25 m	■	1NC / 1NC		<b>TQ 441-01/01Y-UE</b>	<b>101160101</b>	
					■	1NC / 1NC	Reduced actuating force	<b>TQ 441-01/01Y-UE-1572</b>	<b>101062344</b>	

Other versions upon request.

To see a wide range of other types of pull-wire switch, visit [www.schmersal.net](http://www.schmersal.net).

## 6. Pull-wire switches

### Accessories



<p><b>Eyebolt</b></p>  <ul style="list-style-type: none"> <li>■ BM 10 x 40 <b>101084928</b></li> <li>■ BM 8 x 70 Niro <b>101192471</b></li> <li>■ Included in delivery: Eyebolt with nut</li> </ul>	<p><b>Wire clamp</b></p>  <ul style="list-style-type: none"> <li>■ Wire clamp <b>101203477</b></li> <li>■ 3 mm Niro <b>101203478</b></li> <li>■ 5 mm Niro</li> </ul>	<p><b>Duplex wire clamp</b> <b>101190917</b></p>  <ul style="list-style-type: none"> <li>■ Duplex wire clamp 3 mm (stainless steel)</li> </ul>
<p><b>Egg-shaped wire clamp</b> <b>101196043</b></p>  <ul style="list-style-type: none"> <li>■ Egg-shaped wire clamp, size 3</li> </ul>	<p><b>Wire thimbles</b></p>  <ul style="list-style-type: none"> <li>■ Wire thimble <b>101203472</b></li> <li>■ 3 mm Niro <b>101203476</b></li> <li>■ 5 mm Niro</li> </ul>	<p><b>Pulley</b> <b>101192433</b></p>  <ul style="list-style-type: none"> <li>■ Pulley (stainless steel) to guide the wire rope where the path is not a straight line</li> <li>■ According to ISO 13850, pulleys may only be mounted in such a way that the complete length of the pull-wire is visible.</li> </ul>
<p><b>Tensioning jack</b> <b>101087930</b></p>  <ul style="list-style-type: none"> <li>■ Tensioner M6</li> <li>■ For exact adjustment of the tension of the wire rope</li> <li>■ Adjustable 145 mm ... 225 mm</li> <li>■ To DIN 1480</li> </ul>	<p><b>Tension spring</b></p>  <ul style="list-style-type: none"> <li>■ Tension spring to maintain the reaction force</li> <li>■ RZ-2041 (only for TQ 900) <b>101186696</b></li> <li>■ ACC-700-RZ173I (only for TQ 700) <b>103005863</b></li> </ul>	<p><b>Shackle</b> <b>101186490</b></p>  <ul style="list-style-type: none"> <li>■ Shackle (stainless steel)</li> <li>■ For fixing the wire rope to the eyebolt</li> </ul>

For detailed information on selection, visit [www.schmersal.net](http://www.schmersal.net).

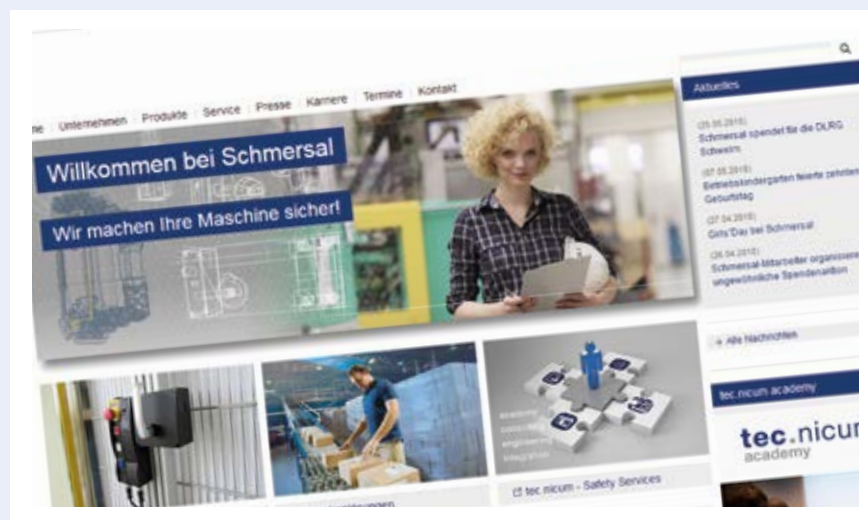
## 6. Pull-wire switches Accessories



<b>Wire rope</b>	<b>Wire unit complete</b>	<b>S 900 rope tensioner</b>	<b>101186704</b>
 <ul style="list-style-type: none"> <li>■ Wire rope</li> <li>■ With red PVC sheath</li> <li>■ Ø total 5 mm</li> <li>■ Ø of the steel core 3 mm</li> </ul> <p style="text-align: right;"><b>on request</b></p>	 <ul style="list-style-type: none"> <li>■ Wire unit complete</li> <li>■ Ready-to-fit</li> <li>■ Included in delivery: 1 Wire rope; 2 Wire clamps; 1 Duplex wire clamp; 1 Wire thimble; 1 Eyebolt</li> </ul> <p style="text-align: right;"><b>on request</b></p>	 <ul style="list-style-type: none"> <li>■ S 900 rope tensioner</li> <li>■ Straightforward, time-saving wire tension setting</li> </ul>	
<b>Cable gland</b>	<b>Cable gland</b>	<b>Screw plug</b>	<b>103006009</b>
 <ul style="list-style-type: none"> <li>■ M20 x 1,5 cable gland, metal</li> <li>■ For TQ 900 / TQ 441</li> <li>■ Brass, nickel-plated</li> <li>■ Authorised cable diameter: 6 ... 12 mm</li> <li>■ Tightening torque 8 Nm</li> </ul>	 <ul style="list-style-type: none"> <li>■ M20 x 1.5 cable gland, plastic</li> <li>■ For TQ 700</li> <li>■ Polyamide</li> <li>■ Authorised cable diameter: 6 ... 12 mm</li> <li>■ Tightening torque 4.5 Nm</li> </ul>	 <ul style="list-style-type: none"> <li>■ M20 x 1.5 screw plug, metal</li> <li>■ For TQ 900 / TQ 441</li> <li>■ Brass, nickel-plated</li> <li>■ Tightening torque 8 Nm</li> </ul>	
<b>Indicator lamp G24-M20</b>	<b>Pull wire with sphere - PR-B...</b>		
 <ul style="list-style-type: none"> <li>■ Indicator lamp G24-M20 for TQ 900 (LED 24 VDC – red/green)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Pull wire with sphere for TQ 700 S</li> <li>■ PR-B-1M <b>101218018</b></li> <li>■ PR-B-2M <b>101218019</b></li> <li>■ PR-B-3M <b>101218020</b></li> <li>■ PR-B-4M <b>101218021</b></li> </ul>		

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## 7. Foot switches

### Description

#### Area of application

Safety foot switches are mounted on machines and plants in cases where manual operation is not possible. They are used to initiate and shutdown work and production cycles.

Depending on the ambient conditions and mechanical load, there are different foot switch variants. The robust foot switches in a metal design are used generally in machine tools and plants, e.g. on presses, punches, bending and sheet metal machinery etc.

The plastic foot switches of the NKF series are used as signal generators for switching on and off process and production sequences. They are used in all industrial environments such as in the textile industry, logistics and material handling and also in the packaging industry.

#### Design and way of functioning

All foot switches in the range TF 232 are available both with protective cover (ordering suffix H) and without. The devices equipped with either slow action or snap action switch inserts are available as both single-pedal and double-pedal variants. Up to 4 contacts are available per pedal.

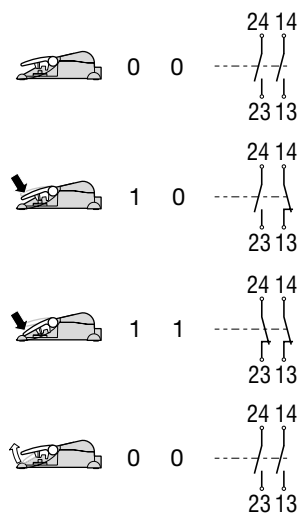
The additional contact staggering and bi-stable operating principles expand the wide range of possible uses.

The plastic foot switches in the range NKF offer solutions for up to three pedals with either NO contacts or change-over contacts. The pre-assembled variants are equipped as standard with a 2 meter pre-wired cable.



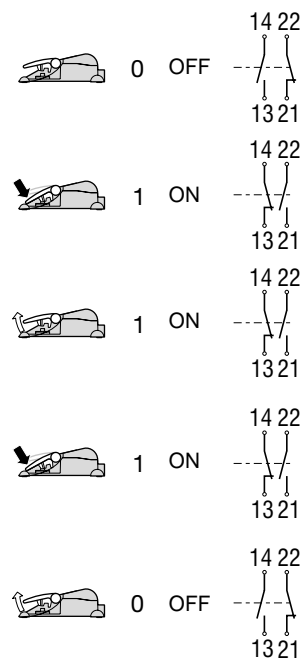
#### Staggered operating principle (ordering suffix -HD)

The staggering is realised by means of a pressure point, which is installed under the pedal. When the foot pedal is actuated as far as the pressure point, 1 NO contact is closed. If the pedal is actuated beyond the pressure point, the second NO contact is closed. The first pair of contacts remain enabled.



#### Bi-stable operating principle (ordering suffix -F)

Upon the first foot lever action, the switch insert is switched on (= ON). Upon the second foot lever action, the latching of the switching elements is neutralised, i.e. the switch insert is switched off by the spring in the switch insert (= OFF) (push/push function).



## 7. Foot switches

### Overview of the series



■ F 232



■ 2F 232



■ NK F

#### Key Features

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>• With 1 foot pedal</li> <li>• 2 or 4 contacts</li> <li>• Enclosure in Aluminium die-cast</li> </ul> | <ul style="list-style-type: none"> <li>• With 2 foot pedals</li> <li>• 4, 6 or 8 contacts</li> <li>• Enclosure in Aluminium die-cast</li> </ul> | <ul style="list-style-type: none"> <li>• 1, 2- or 3 foot pedals</li> <li>• max. 2 contacts per pedal</li> <li>• Plastic enclosure</li> </ul> |
|---|---|--|

#### Other versions

Staggered contacts	■	■	–
Bi-stable function	■	–	–

#### Technical features

<b>Electrical characteristics</b>			
Max. switching capacity U/I	230 VAC / 4 A; 24 VDC / 1 A	230 VAC / 4 A; 24 VDC / 1 A	240 VAC / 2.5 A; 24 VDC / 1 A
<b>Mechanical data</b>			
Execution of the electrical connection	Screw terminals	Screw terminals	connecting cable
Cable entry	1 x M20	2 x M25	–
Cable section <sup>1)</sup>	0.75 ... 2.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>
Dimensions (H x W x D)	170 x 189 x 274 mm	295 x 189 x 274 mm	depending on the version
<b>Ambient conditions</b>			
Ambient temperature	–25 °C ... +60 °C	–25 °C ... +60 °C	–25 °C ... +60 °C
Protection class	IP65	IP65	IP67

#### Safety classification

Standards	IEC/EN 60947-5-1	IEC/EN 60947-5-1	IEC/EN 60947-5-1
B <sub>10D</sub> NC contact	100,000	100,000	100,000
Certificates			

<sup>1)</sup> Including conductor ferrules



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



## 7. Foot switches

### Ordering details



Series	Protective cover	Pedals	Switching principle	Contacts / pedal	Special features	Type designation	Material number					
T/Z.. 232	TF 232	with 1 foot pedal	Slow action	1 NO/1 NC		TF 232-11	101181519					
				1 NO/1 NC	Bi-stable function	TF 232-11F	101182012					
				2 NO/2 NC		TF 232-22	101181525					
	1 NO/1 NC				TFH 232-11	101181529						
	1 NO/1 NC			Bi-stable function	TFH 232-11F	101182016						
	2 NO/2 NC				TFH 232-22	101181532						
	TFH 232	■	with 1 foot pedal	Slow action	2NO	Staggered contacts	TFH 232-20HD	101182013				
					1 NO/1 NC		ZF 232-11	101181537				
	ZF 232	■			with 2 foot pedals	Snap action	2 NO/2 NC		ZF 232-22	101181539		
	ZFH 232						1 NO/1 NC		ZFH 232-11	101181541		
	T2F 232	■					with 2 foot pedals	Slow action	2 NO/2 NC		ZFH 232-22	101181543
									1 NO/1 NC		T2F 232-11/11	101181578
	T2FH 232	■	with 2 foot pedals	Snap action	1 NO/1 NC				T2FH 232-11/11	101181584		
	Z2F 232				■	2 NO/2 NC				T2FH 232-22/22	101181587	
Z2FH 232		1 NO/1 NC							Z2F 232-11/11	101181590		
						1 NO/1 NC				Z2FH 232-11/11	101181594	
				2 NO/2 NC		Z2FH 232-22/22	101181596					
NKF	NKF	with 1 foot pedal	Snap action	1 change-over contact		NKF1-1PWZ-B-2M	103003074					
		with 2 foot pedals		1NO		NKF1-10Z-B-2M	103003077					
	NKF2			with 2 foot pedals	1 change-over contact		NKF2-1PW/1PWZ-B-2M	103003075				
		1NO				NKF2-10/10Z-B-2M	103003078					

Other versions upon request

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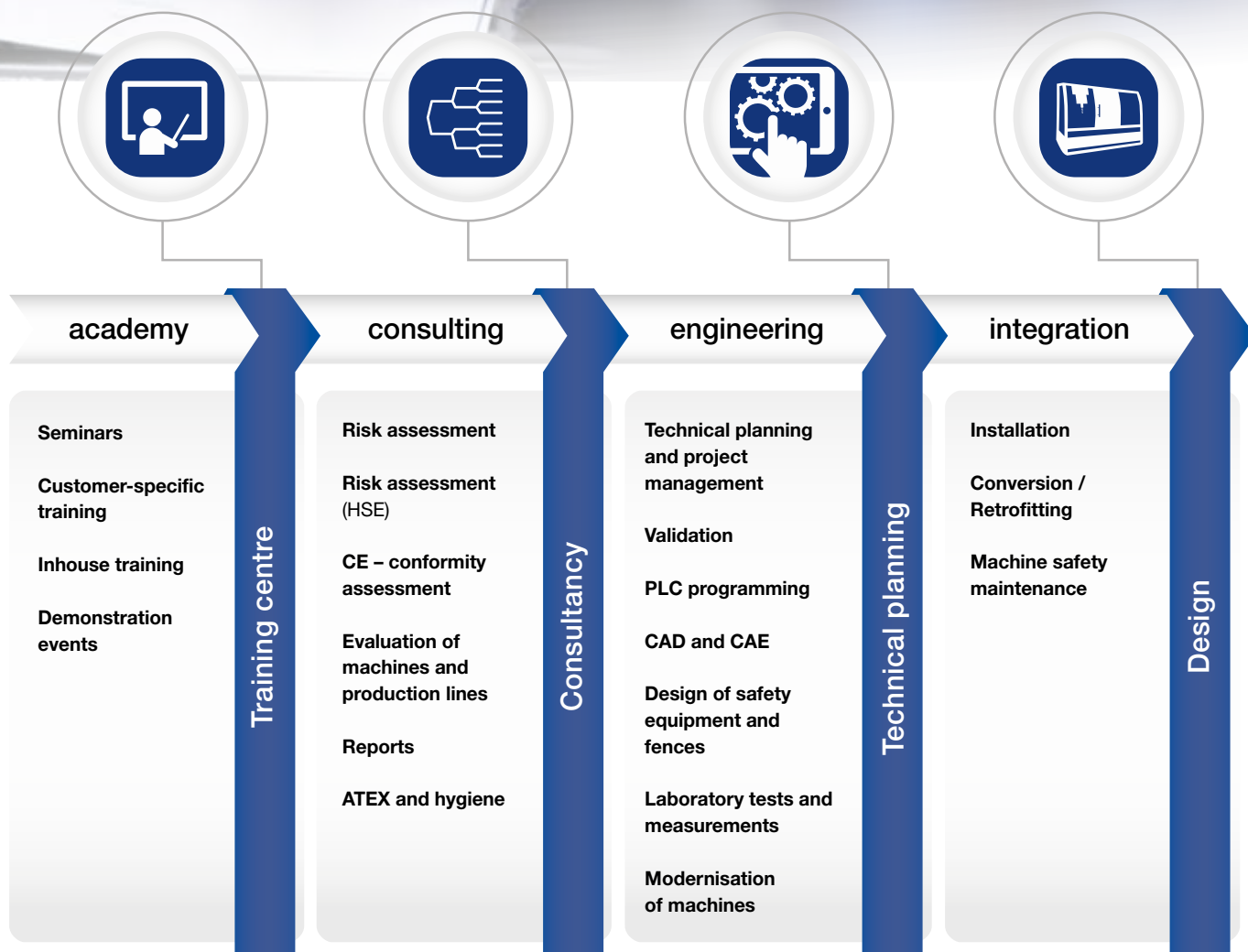
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**Contact:**

**tec.nicum**

K.A. Schmersal GmbH & Co. KG  
 Möddinghofe 30  
 42279 Wuppertal  
 Phone: +49 202 6474-932  
 Telefax: +49 202 6474-100  
 E-Mail: info-de@tecnicum.com  
 www.tecnicum.com



## Addresses

■ **Hauptsitz – Headquarters**  
**K.A. Schmersal GmbH & Co. KG**  
 Postfach 24 02 63,  
 42232 Wuppertal  
 Möddinghofe 30  
 42279 Wuppertal  
 Phone: +49 202 6474-0  
 Fax: +49 202 6474-100  
 info@schmersal.com  
 www.schmersal.com

### Germany

■ **Leipzig**  
**K.A. Schmersal GmbH & Co. KG**  
**Vertriebsbüro Leipzig**  
 Servicepark  
 Druckereistraße 4  
 04159 Leipzig  
 Phone: +49 341 48734-50  
 Fax: +49 341 48734-51  
 vbleipzig@schmersal.com

■ **Berlin**  
**KSA Komponenten der Steuerungs-  
 und Automatisierungstechnik GmbH**  
 Pankstraße 8-10 / Aufg. L  
 13127 Berlin  
 Phone: +49 30 474824-00  
 Fax: +49 30 474824-05  
 info@ksa-gmbh.de  
 www.ksa-gmbh.de

■ **Hamburg / Münster**  
**K.A. Schmersal GmbH & Co. KG**  
**Vertriebsbüro Hamburg**  
 Innungsstraße 3  
 21244 Buchholz i.d.N.  
 Phone: +49 41 81 9220-0  
 Fax: +49 41 81 9220-20  
 vbhamburg@schmersal.com

■ **Hannover**  
**ELTOP GmbH**  
 Robert-Bosch-Straße 8  
 30989 Gehrden  
 Phone: +49 51 089273-20  
 Fax: +49 51 089273-21  
 eltop@eltop.de  
 www.eltop.de

■ **Wettenberg**  
**K.A. Schmersal GmbH & Co. KG**  
**Vertriebsbüro Wettenberg**  
 Im Ostpark 2  
 35435 Wettenberg  
 Phone: +49 641 9848-575  
 Fax: +49 641 9848-577  
 vbwettenberg@schmersal.com

■ **Köln**  
**Stollenwerk**  
**Technisches Büro GmbH**  
 Scheuermühlenstraße 40  
 51147 Köln  
 Phone: +49 2203 96620-0  
 Fax: +49 2203 96620-30  
 info@stollenwerk.de  
 www.stollenwerk.de

■ **Siegen**  
**Siegfried Klein**  
**Elektro-Industrie-Vertretungen**  
 In der Steinwiese 46  
 57074 Siegen  
 Phone: +49 271 6778  
 Fax: +49 271 6770  
 info@sk-elektrotechnik.de  
 www.sk-elektrotechnik.de

■ **Saarland**  
**Herbert Neundörfer Werks-  
 vertretungen GmbH & Co. KG**  
 Am Campus 5  
 66287 Göttelborn  
 Phone: +49 6825 9545-0  
 Fax: +49 6825 9545-99  
 info@herbert-neundoerfer.de  
 www.herbert-neundoerfer.de

■ **Bietigheim**  
**K.A. Schmersal GmbH & Co. KG**  
**Technologiezentrum**  
 Pleidelsheimer Straße 15  
 74321 Bietigheim-Bissingen  
 Phone: +49 7142 91028-0  
 Fax: +49 7142 91028-28  
 tzbw@schmersal.com

■ **Bayern Süd**  
**INGAM Ing. Adolf Müller GmbH**  
**Industrievertretungen**  
 Elly-Staegmeyer-Straße 15  
 80999 München  
 Phone: +49 89 8126044  
 Fax: +49 89 8126925  
 info@ingam.de  
 www.ingam.de

■ **Nürnberg**  
**K.A. Schmersal GmbH & Co. KG**  
**Vertriebsbüro Nürnberg**  
 Lechstraße 21  
 90451 Nürnberg  
 Phone: +49 911 6496053  
 Fax: +49 911 63290729  
 vbnuernberg@schmersal.com

### Europe

■ **Austria – Österreich**  
**AVS-Schmersal Vertriebs Ges.m.b.H.**  
 Biróstraße 17  
 1232 Wien  
 Phone: +43-1-6 10 28  
 Fax: +43-1-6 10 28-1 30  
 info@avs-schmersal.at  
 www.avs-schmersal.at

■ **Belgium – Belgien**  
**Schmersal Belgium NV/SA**  
 Nieuwlandlaan 73  
 Industriezone B413  
 3200 Aarschot  
 Phone: +32-16-57 16 18  
 Fax: +32-16-57 16 20  
 info@schmersal.be  
 www.schmersal.be

■ **Bosnia and Herzegovina**  
**Tipteh d.o.o. Sarajevo**  
 Ulica Ramiza Salčina 246  
 71000 Sarajevo  
 Phone: +387-61 92 36 23  
 nadir.durmic@tipteh.ba  
 www.tipteh.ba

■ **Bulgaria – Bulgarien**  
**CDL Sensorik Ltd.**  
 Chavdar Voivoda Str, No.12, Office 1  
 7002 Ruse City  
 Phone: +359 82 82 00 52  
 office@cdlsensorik.com  
 www.cdlsensorik.com

■ **Croatia – Kroatien**  
**Tipteh Zagreb d.o.o.**  
 Ratarska 35  
 10000 Zagreb  
 Phone: +385 1-3 81 65 74  
 Fax: +385 1-3 81 65 77  
 tipteh@tipteh.hr  
 www.tipteh.hr

■ **Czech Republic – Tschech. Republik**  
**MERCOM COMPONENTA s.r.o.**  
 Bechyňská 640  
 199 00 Praha 9 – Letňany  
 Phone: +4 20-267 31 46 40-2  
 mercom@mercom.cz  
 www.mercom.cz  
 www.schmersal.cz

■ **Denmark – Dänemark**  
**Schmersal Danmark A/S**  
 Lautruphøj 1-3  
 2750 Ballerup  
 Phone: +45-70 20 90 27  
 Fax: +45-70 20 90 37  
 info@schmersal.dk  
 www.schmersal.dk

■ **Finland – Finnland**  
**Advancetec Oy**  
 Äyritie 12 B  
 01510 Vantaa  
 Phone: +3 58-2 07 19 94 30  
 Fax: +3 58-9 35 05 26 60  
 advancetec@advancetec.fi  
 www.schmersal.fi

■ **France – Frankreich**  
**Schmersal France**  
 BP 18 – 38181 Seyssins Cedex  
 8, rue Raoul Follereau  
 38180 Seyssins  
 Phone: +33-4 76 84 23 20  
 technique@schmersal.com  
 info-fr@schmersal.com  
 www.schmersal.fr

■ **Greece – Griechenland**  
**Kalamarakis Sapounas S.A.**  
**Ionias & Neromilou**  
 PO Box 46566 Athens  
 13671 Chamomilos Acharnes  
 Athens  
 Phone: +30-210-2 40 60 00-6  
 Fax: +30-210-2 40 60 07  
 ksa@ksa.gr  
 www.ksa.gr

■ **Hungary – Ungarn**  
**NTK Ipari-Elektronikai és**  
**Kereskedelmi Kft**  
 Gesztenyefa u. 4.  
 9027 Győr  
 Phone: +36-96-52 32 68  
 Fax: +36-96-43 00 11  
 info@ntk-kft.hu  
 www.ntk-kft.hu

■ **Iceland – Island**  
**Reykjafell Ltd.**  
 Skipholt 35  
 125 Reykjavik  
 Phone: +354-5 88 60 10  
 Fax: +354-5 88 60 88  
 reykjafell@reykjafell.is

■ **Italy – Italien**  
**Schmersal Italia s.r.l.**  
 Via Molino Vecchio, 206  
 25010 Borgosatollo, Brescia  
 Phone: +39-0 30-2 50 74 11  
 Fax: +39-0 30-2 50 74 31  
 info@schmersal.it  
 www.schmersal.it

■ **Lithuania/Estonia/Latvia -  
 Litauen/Estland/Lettland**  
**BOPLALIT**  
 Mus galite rasti:  
 Baltų pr. 145, LT-47125, Kaunas  
 Phone: +370 37 298989  
 Phone: +370 37 406718  
 info@boplalit.lt  
 www.boplalit.lt

■ **Macedonia – Mazedonien**  
**Tipteh d.o.o. Skopje**  
 Bul Partizanski odredi br:80, Lok:5  
 1000 Skopje  
 Phone: +389-70-39 94 74  
 Fax: +389-23-17 41 97  
 info@tipteh.mk  
 www.tipteh.mk

■ **Netherlands – Niederlande**  
**Schmersal Nederland B.V.**  
 Lorentzstraat 31  
 3846 AV Harderwijk  
 Phone: +31-3 41-43 25 25  
 Fax: +31-3 41-42 52 57  
 info-nl@schmersal.com  
 www.schmersal.nl

■ **Norway – Norwegen**  
**Schmersal Norge**  
 Hoffsvveien 92  
 0377 Oslo  
 Phone: +47-22 06 00 70  
 Fax: +47-22 06 00 80  
 info-no@schmersal.com  
 www.schmersal.no

■ **Poland – Polen**  
**Schmersal - Polska Sp.j.**  
 ul. Baletowa 29  
 02-867 Warszawa  
 Phone: +48-22-8 16 85 78  
 Fax: +48-22-8 16 85 80  
 info@schmersal.pl  
 www.schmersal.pl

■ **Portugal – Portugal**  
**Schmersal Ibérica, S.L.**  
 Apartado 30  
 2626-909 Póvoa de Sta. Iria  
 Phone: +351-219 593 835  
 info-pt@schmersal.com  
 www.schmersal.pt

■ **Romania – Rumänien**  
**CD SENSORIC SRL**  
 Str. George Enescu 21  
 550248 Sibiu  
 Phone: +40-2 69-25 33 33  
 Fax: +40-2 69-25 33 44  
 proiecte@cdl.ro  
 www.cdl.ro

■ **Russia – Russland**  
**OOO AT electro Moskau**  
 ul. Avtosavodskaya 16-2  
 109280 Moskau  
 Phone: +7-49 5-9 21 44 25  
 Fax: +7-49 5-9 26 46 45  
 info@at-e.ru  
 www.at-e.ru

**OOO AT electro Petersburg**  
 Polytechniskaya str, d.9,B  
 194021 St. Petersburg  
 Phone: +7-81 2-7 03 08 17  
 Fax: +7-81 2-7 03 08 34  
 spb@at-e.ru

**AT-Electronics Ekaterinburg**  
 Bebelya str. 17, room 405  
 620034 Ekaterinburg  
 Phone: +7-34 3-2 45 22 24  
 Fax: +7-34 3-2 45 98 22  
 ural@at-e.ru

■ **Serbia – Serbien**  
**Tipteh d.o.o. Beograd**  
 Moše Pijade 17A  
 11070 Vrčin, Belgrade  
 Phone: +3 81 (0)11 – 8053 628  
 Fax: +3 81 (0)11 – 8053 045  
 office@tipteh.rs  
 www.tipteh.rs

■ **Slovakia – Slowakei**  
**MERCOM COMPONENTA s.r.o.**  
 Bechyňská 640  
 199 00 Praha 9 – Letňany  
 Phone: +4 20-267 31 46 40-2  
 mercom@mercom.cz  
 www.mercom.cz  
 www.schmersal.cz

■ **Slovenia – Slowenien**  
**Tipteh d.o.o.**  
 Ulica Ivana Roba 21  
 1000 Ljubljana  
 Phone: +386-1-2 00 51 50  
 Fax: +386-1-2 00 51 51  
 info@tipteh.si  
 www.tipteh.si

■ **Spain – Spanien**  
**Schmersal Ibérica, S.L.**  
 Rambla P. Catalanes, 12  
 08800 Vilanova i la Geltrú  
 Phone: +34-902 56 64 57  
 info-es@schmersal.com  
 www.schmersal.es

■ **Sweden – Schweden**  
**Schmersal Nordiska AB**  
 F O Petersons gata 28  
 421 31 Västra Frölunda  
 Phone: +46-31-3 38 35 00  
 Fax: +46-31-3 38 35 39  
 info-se@schmersal.com  
 www.schmersal.se

## Addresses

- **Switzerland – Schweiz**  
**Schmersal Schweiz AG**  
 Moosmattstraße 3  
 8905 Arni  
 Phone: +41-43-3 11 22 33  
 Fax: +41-43-3 11 22 44  
 info-ch@schmersal.com  
 www.schmersal.ch
- **Turkey – Türkei**  
**Entek Otomasyon Urunleri San. ve Tic. A.S.**  
 Mahmutbey Mah.  
 Tasocagi Yolu Cad. No: 9 Entek Plaza  
 34218 Bagcilar / Istanbul  
 Phone: +90 850 201 4141  
 Fax: +90 212 320 1188  
 info@entek.com.tr  
 www.entek.com.tr
- **Ukraine – Ukraine**  
**VBR Ltd.**  
 41, Demiyivska Str.  
 03040 Kyiv Ukraine  
 Phone: +38 (044) 259 09 55  
 Fax: +38 (044) 259 09 55  
 office@vbr.com.ua  
 www.vbr-electric.com.ua/schmersal
- **United Kingdom – Großbritannien**  
**Schmersal Ltd.**  
 Sparrowhawk Close  
 Enigma Business Park  
 Malvern Worcestershire WR14 1GL  
 Phone: +44-16 84-57 19 80  
 Fax: +44-16 84-56 02 73  
 uksupport@schmersal.com  
 www.schmersal.co.uk
- **Canada – Kanada**  
**Schmersal Canada LTD.**  
 15 Regan Road Unit #3  
 Brampton, Ontario L7A 1E3  
 Phone: +1 905 495-7540  
 Fax: +1 905 495-7543  
 Info-ca@schmersal.com  
 www.schmersal.ca
- **Chile – Chile**  
**Vitel S.A.**  
 francisco@vitel.cl  
 www.vitel.cl  
**SOLTEX**  
 central@soltext.cl  
 www.soltext.com.cl  
**INSTRUTEC**  
 gcaceres@instrutec.cl  
 www.instrutec.cl  
**OEG**  
 jmp@oegggroup.com  
 www.oegggroup.cl  
**ECOL INDUSTRIAL ELECTRIC**  
 ventas@eocol.cl  
 www.eocol.cl
- **PR China – VR China**  
**Schmersal Industrial Switchgear (Shanghai) Co. Ltd.**  
 Cao Ying Road 3336  
 201712 Shanghai / Qingpu  
 Phone: +86-21-63 75 82 87  
 Fax: +86-21-63 75 82 97  
 sales@schmersal.com.cn  
 www.schmersal.com.cn
- **Colombia – Kolumbien**  
**EQUIPELCO**  
 aospina@equipelco.com  
 www.equipelco.com  
**SAMCO**  
 jvargas@samcoingenieria.com  
 www.samcoingenieria.com
- **Ecuador – Ecuador**  
**SENSORTEC S.A**  
 AV. Napo y Pinto Guzmán  
 Quito  
 Phone: +593 091 40 27 65  
 +593 095 04 86 11  
 infogy@sensortecsa.com  
 www.sensortecsa.com
- **Guatemala – Guatemala**  
**PRESTELECTRO**  
 AV Petapa 44-22,  
 Zona 12; Cent. Com Florencia 01012  
 Phone: +502 24 42-33 46  
 Anabella.Barrios@prestelectro.com  
 www.prestelectro.com
- **India – Indien**  
**Schmersal India Private Limited**  
 Plot No G 7/1,  
 Ranjangaon MIDC,  
 Taluka Shirur,  
 District Pune 412220, India  
 Phone: +91 21 38 61 47 00  
 Fax: +91 20 66 86 11 14  
 info-in@schmersal.com  
 www.schmersal.in
- **Indonesia – Indonesien**  
**PT. Wiguna Sarana Sejahtera**  
 Jl. Daan Mogot Raya No. 47  
 Jakarta Barat 11470  
 Phone: +62-21-5 63 77 70-2  
 Fax: +62-21-5 66 69 79  
 email@ptwiguna.com  
 www.ptwiguna.com
- **Iran – Iran**  
**Omid Electric**  
 No. 1-5, 1st Floor, Azizi passage,  
 Southern Lalehzar Str. Tehran  
 ZIP: 1144944181  
 Phone: +98 21 33924027  
 +98 21 33911022  
 Fax: +98 21 33936635  
 sales@omidelectric.com  
 www.omidelectric.com
- **Israel – Israel**  
**A.U. Shay Ltd.**  
 23 Imber St. Kiriat. ArieH.  
 P.O. Box 10049  
 Petach Tikva 49222 Israel  
 Phone: +9 72-3-9 23 36 01  
 Fax: +9 72-3-9 23 46 01  
 shay@uriel-shay.com  
 www.uriel-shay.com
- **Japan – Japan**  
**Schmersal Japan KK**  
 3-39-8 Shoaen, Suginami-ku  
 Tokyo 167-0054  
 Phone: +81-3-3247-0519  
 Fax: +81-3-3247-0537  
 safety@schmersaljp.com  
 www.schmersal.jp
- **Korea – Korea**  
**Mahani Electric Co. Ltd.**  
 20, Gungmal-ro, Gwacheon-si,  
 Gyeonggi-do 427-060, Korea  
 Phone: +82-2-21 94-33 00  
 Fax: +82-2-21 94-33 97  
 yskim@mec.co.kr  
 www.mec.co.kr
- **Malaysia – Malaysien**  
**Ingermark (M) SDN.BHD**  
 No. 29, Jalan KPK 1/8  
 Kawasan Perindustrian Kundang  
 48020 Rawang, Selangor Darul Ehsan  
 Phone: +6 03-60-34 27 88  
 Fax: +6 03-60-34 21 88  
 enquiry@ingermark.com
- **Mexico – Mexiko**  
**ISEL SA de CV**  
 mario.c@isel.com.mx  
 www.isel.com.mx  
**INNOVATIVE AUTOMOTION SOLUTIONS**  
 ias@iasmx.com  
 www.iasautomation.com.mx  
**EASA ENERGIA Y AUTOMATIZACIÓN**  
 ias@iasmx.com  
 www.iasautomation.com.mx  
**DINAMICA S.A de C.V**  
 ias@iasmx.com  
 www.iasautomation.com.mx  
**SIGRAMA S.A de C.V**  
 ias@iasmx.com  
 www.iasautomation.com.mx  
**VGR TECHNOLOGIES**  
 ias@iasmx.com  
 www.iasautomation.com.mx
- **New Zealand – Neuseeland**  
**Hamer Automation**  
 85A Falsgrave Street  
 Philipstown  
 Christchurch, New Zealand  
 Phone: +64-33 66 24 83  
 Fax: +64-33 79 13 79  
 sales@hamer.co.nz  
 www.hamer.co.nz
- **Pakistan – Pakistan**  
**Schmersal India Private Limited**  
 Plot No G 7/1,  
 Ranjangaon MIDC,  
 Taluka Shirur,  
 District Pune 412220, India  
 Phone: +91 21 38 61 47 00  
 Fax: +91 20 66 86 11 14  
 info-in@schmersal.com  
 www.schmersal.in
- **Paraguay – Paraguay**  
**Brasguay S.R.L.**  
 R. Internacional 07  
 KM 14 ; Minga Guazu  
 Phone: +595 (61) 583-418 218 577  
 brasguay@brasguay.com.py  
 www.brasguay.com.py
- **Peru – Peru**  
**Fametal S.A.**  
 fametal@fametal.com  
 www.fametal.com  
**AYD**  
 informes@ayd.com.pe  
 www.ayd.com.pe
- **Singapore – Singapur**  
**AZAREL International Pte Ltd.**  
 Empire Techno Centre  
 30 Kaki Bukit Road 3 #01-10  
 Singapore 417819  
 Phone: +65-67 42 29 88  
 Fax: +65-67 42 26 28  
 sales@azarel.com.sg  
 www.azarel.com.sg
- **South Africa – Südafrika**  
**A+A Dynamic Distributors (Pty) Ltd.**  
 20-24 Augusta Road  
 Regents Park  
 2197 Booysens  
 Phone: +27-11-6 81 59 00  
 Fax: +27-11-4 35 13 18  
 awkayser@iafrika.com
- **Taiwan – Taiwan**  
**Golden Leader Camel Ent. Co., Ltd.**  
 No. 453-7, Pei Tun Rd.  
 Taichung City 40648, Taiwan  
 Phone: +886-4-22 41 29 89  
 Fax: +886-4-22 41 29 23  
 camel88@ms46.hinet.net  
 www.leadercamel.com.tw
- **Thailand – Thailand**  
**Isensor Co. Ltd.**  
 57/65 Soi Song Sa-ard  
 Vibhavadirangsit Road  
 Chomphon, Chatuchak  
 Bangkok 10900  
 Phone: +66 - 2 - 276 8783  
 Fax: +66 - 2 - 275 5875  
 info@isensor.co.th  
 www.isensor.co.th
- **United Arab Emirates – Vereinigte Arabische Emirate**  
**Kempston Controls LLC**  
 PO Box: 60998  
 St. 13, Umm Ramool,  
 Dubai, U.A.E.  
 Tel: +971 4 2987 111  
 Fax: +971 4 2987 113  
 Email: sales@kempstoncontrols.ae  
 www.kempstoncontrols.ae
- **Uruguay – Uruguay**  
**Gliston S.A.**  
 Pedernal 1896 – Of. 203  
 Montevideo  
 Phone: +598 (2) 2 00 07 91  
 colmedo@gliston.com.uy  
 www.gliston.com.uy
- **USA – USA**  
**Schmersal Inc.**  
 15 Skyline Drive  
 Hawthorne, NY 10532  
 Phone: +1 8 88-4 96-51 43  
 Fax: +1 9 14-3 47-15 67  
 infousa@schmersal.com  
 www.schmersalusa.com
- **Venezuela – Venezuela**  
**EMI Equipos y Sistemas C.A.**  
 Calle 10, Edf. Centro Industrial  
 Martinisi, Piso 3, La Urbina, Caracas  
 Phone: +58 (212) 2 43 50 72  
 ventas@emi-ve.com  
 www.emi-ve.com
- **Vietnam – Vietnam**  
**Ingermark (M) Sdn Bhd, Rep Office**  
 Unit 208, C6 Bldg., Block 1  
 My Dinh 1, New Urban Area  
 Tu Liem District, Hanoi  
 Phone: +84-4 287 2638  
 Fax: +84-4 287 2639  
 ingvietn18@yemail.com

## Worldwide



# The Schmersal Group

In the demanding field of machine safety, the owner-managed Schmersal Group is one of the international market leaders. The company, which was founded in 1945, has a workforce of about 2000 people and seven manufacturing sites on three continents along with its own companies and sales partners in more than 60 nations.

Customers of the Schmersal Group include global players from the area of mechanical engineering and plant manufacturing as well as operators of machinery. They profit from the company's extensive expertise as a provider of systems and solutions for machine safety. Furthermore, Schmersal specialises in various areas including foodstuff production, the packaging industry, machine tool industry, lift switchgear, heavy industry and the automotive industry.

A major contribution to the systems and solutions offered by the Schmersal Group is made by tec.nicum with its comprehensive range of services: certified Functional Safety Engineers advise machinery manufacturers and machinery operators in all aspects relating to machinery and occupational safety – and do so with product and manufacturer neutrality. Furthermore, they plan and realise complex solutions for safety around the world in close collaboration with the clients.

## Safety Products



Safety switches and sensors,  
solenoid interlocks  
Safety controllers and safety  
relay modules, safety bus systems  
Optoelectronic and tactile  
safety devices  
Automation technology:  
position switches, proximity switches

## Safety Systems



Complete solutions for  
safeguarding hazard areas  
Individual parametrisation and  
programming of safety controllers  
Tailor-made safety technology –  
be it for individual machines or  
a complex production line  
Industry-specific safety solutions

## Safety Services



tec.nicum academy –  
Seminars and training  
tec.nicum consulting –  
Consultancy services  
tec.nicum engineering –  
Design and technical planning  
tec.nicum integration –  
Execution and installation

The details and data referred to have been carefully checked.  
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