Safety in system: Protection for man and machine

Main catalogue Automation technology | Edition 01














SCHMERSAL

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Welcome to Schmersal.
Thank you for choosing our products!
We present our extensive program in two brand new main catalogues:

Main catalogue
Automation Technology
The Main Catalogue Automation Technology gives an overview of electrical switchgear for automation technology.
The Schmersal program includes, amongst others, inductive, capacitive and magnetic proximity switches.

Main catalogue
Safety technology
Our Main Catalogue Safety technology presents our program of industrial safety switchgear – from A to Z – including all relevant technical data.

Furthermore, catalogues are available for the following product groups and application fields: switchgear for Ex zones, lift switchgear and medical switchgear.

The data and values in this catalogue have been checked thoroughly.
Technical modifications and errors excepted.

New products and program extensions
New developments are presented as of page I-6 under the heading “Innovations and new products”. Since our main catalogue impossibly could contain the entire program from the Schmersal Group, special executions as well as complementary products and solutions are highlighted in the “Program extensions” at the end of each chapter.

Content

Automation technology

Position detection

Position detection

Position detection in automation technology – a traditional application field for Schmersal. In the early fifties, during the post-war reconstruction, a limit switch program suitable for heavy-duty application, amongst others, in construction site engines was created. Soon after that, a variety of position switches for stationary applications for machinery and process plant engineering was introduced because of the increasing automation activities of miscellaneous industries. Schmersal was also one of the pioneers when it comes to developing non-contact proximity switches as an alternative to the electromechanical switchgears.

Nowadays, Schmersal offers a large program of switchgears for automation technology: position switches with a large variety of actuators, gear switches, pull-wire switches, foot switches, micro switches, magnetic reed switches, inductive, capacitive and optoelectronic proximity switches...

As different as the switchgears and sensors in this catalogue might be, there is one common factor: they all were developed for automation technology applications. One of the requirements of this sector is an extremely high availability. Because of their reliability and long life, the Schmersal position switches and proximity switches are generally accepted and frequently used by numerous machine constructors and important end users of automated plants, for instance in automotive.

The extremely wide product range for position detection from Schmersal finds its roots in the customer orientation of our development and product team:
Many products were developed on request of our customers or adapted to the specifications for a specific application, such as our magnetic reed switches detecting multiple independent signals using one single device or fully electronic travel end switches for mobile cranes.

Since the machinery and devices, for which the Schmersal position switches and proximity switches are developed and manufactured, are used all over the world, Schmersal is worldwide at its customers' disposal.
Our international subsidiaries and qualified sales partners take care of the sales, consultancy and service at all industrial markets.


SCHMERSAL

The Schmersal Group

The Schmersal Group offers the largest program of safety switchgears and safety switching systems in the world. The individual development and production units of the group are concentrating on specific product groups. Our sales offices and partners provide a competent consultancy and service to the major industries – worldwide.

K.A. Schmersal GmbH
Safety control systems

K.A. Schmersal, the parent company of the Schmersal Group, was founded at Wuppertal in 1945 by the fathers of the current generation of shareholders.

Initially, the company concentrated on the development and production of mechanically operated switchgears for mechanical engineering and lift technology. The product portfolio was continuously extended with mechanically operated safety switchgears and non-contact functioning safety sensors.

In the early nineties, the Machinery Directive has been implemented. Schmersal began to develop safety switchgears, enabling the machine and plant builders to comply with the stringent safety requirements for machine safety.

The conversion from industrial safety switchgear manufacturer to expert in safety technology became essential for the company's growth and the company's expansion to a worldwide present company group.

At the Wuppertal plant, some 540 employees are currently employed.

Elan Schaltelemente
GmbH & Co. KG

Founded originally in Düsseldorf in 1952, Elan moved to Wettenberg in the Mittelhessen district in 1988.

Elan's focal business emphasis is placed on industrial low-voltage switchgears.
Elan develops and manufactures switchgears, which distinguish from the conventional devices, by their mechanical, electrical and functional features.

Elan is one of the pioneers of safety technology: in the eighties, the company has already developed safety switchgear and systems for human protection.

Since 1997, Elan belongs to the Schmersal Group, where it has become the competence centre of the group for
- Command and signalling devices;
- Two-hand control panels,
- Safety relay modules and similar modules,
- Proprietary programmable electronic systems with safety function

In 2001, the company moved to a completely new production and administrative building at the same location, where currently 170 employees are working.

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steute Schaltgeräte GmbH & Co. KG

As of 2004.1.1, the Company steute Schaltgeräte GmbH & Co.KG has parted from the Schmersal Group. The company steute continues to have full access to the sales network of the Schmersal Group.

ACE Schmersal Eletroeletrônica Industrial Ltda.

Schmersal founded a subsidiary company in Brazil as early as 1974. The production facility located in Boituva (São Paulo) today has about 300 employees.

ACE offers a wide range of electromechanical and electronic products such as safety switchgears, command and signalling devices, foot switches and proximity switches.

Furthermore thermoplastic housings are manufactured which are partly assembled with command and signalling devices according to the customers's request. Application fields are inspection control panels for the lift technology, for which door contacts are also produced.

The ACE program is mainly distributed on the South American and Mexican market.

Schmersal Industrial Switchgear Co. Ltd

Schmersal has its own manufacturing plant in China since 1999. Here, about 60 employees produce – to the same quality standards as in the European factories – position switches, safety switches and lift switchgears for the South-East Asian market.

Our sales office located in the centre of Shanghai supervises and co-ordinates four subsidiaries with offices in the major industrial centres of China.

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Innovations and new products

**Position switches with insulation displacement connectors.
Save time when fitting**

For years already, switches to the DIN EN 50047 standard, such as for instance the Z/T 236 series from Schmersal, are used for a diversity of positioning applications in industrial automation. For safety applications, they are often used as type-1 safety switches, especially for guard-door monitoring.

Although these well-known switches being extremely reliable and polyvalent, they still are subject to improvement: the series Z/T 236 is now available with insulation displacement connectors. As a consequence, the work required in fitting the position switching is reduced: the user only needs to remove the outer cable insulation, place the wires into the slots and press the cover down – the switch is then connected. No stripping and cutting of the wires is required. The unique termination saves time and money, especially in large plants with many switches. Each switch saves up to two minutes of time upon fitting.

The versions with insulation displacement connectors are fully compatible with the traditional variants of the Z/T 236 series.

A large number of actuating elements are available – plungers, roller levers, angular levers, roller swivel levers, bar swivel levers… The user has the choice between versions with snap and slow action, slow action with contact overlapping or staggering. As the contacts are regarded, the user can choose between 1 NO/1 NC contact, 2 NC or 2 NO contacts.

More information can be found on **page 1-4**

**Series N command and signalling devices
Hygiene-compliant command and signalling devices**

This program of hygiene-compliant command and signalling devices has been developed in accordance with the basic principles of hygienic design, laid down in the requirements of EN 1672-1 and EN 1672-2 for machines used in the dairy, meat, poultry and fish processing industries. They feature special sealing to extensively prevent the ingress of dirt and bacteria in the gaps between the fixed and moving device components.

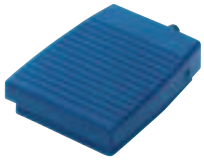
The special-shaped devices are easy to clean and avoid corners and edges or create smooth surfaces, so that dirt and bacteria cannot deposit or accumulate. Furthermore, the devices feature a special selection of materials and colour design.

This new range for mounting holes of 22.3 mm diameter consists of push buttons, illuminated push buttons with LEDs, selector switches with 2 and 3 positions and short and long knobs and levers, mushroom buttons, high and flat indicator lights with LEDs, emergency-stop control devices, blanking plugs, lockable selector switch covers and adapter rings D-30/ D-22 mm.

The devices all have protection class IP 67.

The contact and light element system used is the tried and tested EF/EL system using screw terminals, flat-pin plugs and WAGO cage clamps.

More information can be found in the
Catalogue N from Elan



**Compact and user-friendly foot switches.
LKF/LKFS Series**

The foot switches of the LKF/ LKFS series are suitable for ”light duty” applications, e.g. for office technology, in laboratories or at conveyor belt of cash desks.

The housing of the switches is made of shock-resistant thermoplastic and has a very flat design, so that the operator only has to lift up his foot very little: an important condition for ergonomic, non-tiring operation of foot-operated machines and devices.

As an option, the LKF switches are also available with a protective shield.

More information can be found on **page 3-10**

**Foot switches GFI/GFSI –
Optimal functioning and ergonomics**

The design of the new foot switches of the GFI/GFIS series, an extension of the well-known foot switches range GF/GFS, is extremely well-considered.

This foot switch, which was developed in collaboration with ergonomics specialists and industrial designers, is fully adapted to rough industrial operating conditions and simultaneously enables a non-tiring, safe operation.

The external components of the new foot switch are made of aluminium die-cast. The protective shield has a large wide opening, enabling a smooth operation of the pedal, even with safety shoes. On the inside, the protective shield features a bead, allowing for a better positioning of the switch.

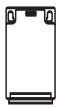
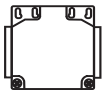
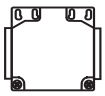
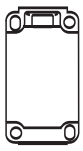
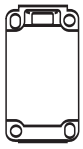
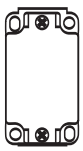
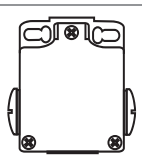
More information can be found on **page 3-7**

The application field of electromechanical and non-contact position switches from the Schmersal Group ranges from high-precision mechanics to heavy-duty machine construction.

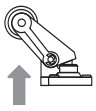
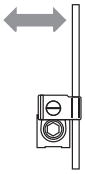
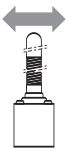
A large range of actuating elements enables an optimal adaptation of the switches to the specific application.

Selection table: Position switches to EN 50041/EN 50047

Actuator

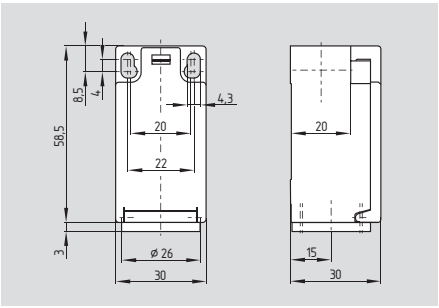
Position switch ranges	Position switch actuating elements						
							
Range 95 as of page 1-14 • Thermoplastic housing • 1 cable entry • Design according to DIN EN 50 047 						**WHLM**	
Range 236 as of page 1-4 • Thermoplastic housing • 1 cable entry • Design according to DIN EN 50 047 	**S**	**R**	**4S**	**4R**	**1R**		**K**
Range 256 as of page 1-4 • Thermoplastic housing • 2 cable entries • Size and switching points according to DIN EN 50047 	**S**	**R**	**4S**	**4R**	**1R**		**K**
Range 235 as of page 1-5 • Metal housing • 1 cable entry • Design according to DIN EN 50047 	**S**	**R**	**4S**	**4R**	**1R**		**K**
Range 255 as of page 1-5 • Metal housing • 3 cable entry • Design according to DIN EN 50047 	**S**	**R**	**4S**	**4R**	**1R**		**K**
Range 332 as of page 1-18 • Metal housing • 1 cable entry • Design according to DIN EN 50041 	**S**	**R**					
Range 336 as of page 1-22 • Thermoplastic housing • 1 cable entry • Design according to DIN EN 50041 	**S**	**R**				**1K**	
Range 335 as of page 1-27 • Metal housing • 1 cable entry • Design according to DIN EN 50041 	**S**	**R**				**1K**	
Range 355 as of page 1-27 • Metal housing • 3 cable entries • Size and switching points according to EN 50041 	**S**	**R**				**1K**	

Note: The technical data of the individual ranges can be found on the above-mentioned pages.
Information regarding the actuators, such as dimensions, travel and contact diagrams, etc. can be found behind the description of the range.

							* 	* 	* 	* 
								DD	WHKM	TK TL DF
3K	4K	K4		V1H	V12H	V14H	V7H	V10H		
3K	4K	K4		V1H	V12H	V14H	V7H V10H			
3K	4K	K4		V1H	V12H	V14H	V7H V10H			
3K	4K	K4		V1H	V12H	V14H	V7H V10H			
			4VH				4V7H V10H			
3K			4VH				4V7H V10H			
3K			4VH				4V7H V10H			
3K			4VH				4V7H	V10H		

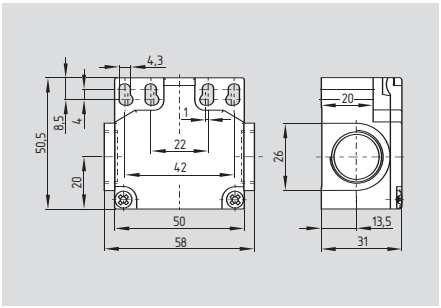
* These actuators are only suitable for positioning tasks!

Z/T 236



- Thermoplastic enclosure
- Double insulated ⧈
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20 x 1.5
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit

Z/T 256



- Mounting details to EN 50047
- 2 cable entries from sides M20 x 1.5

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	fixings to EN 50047
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Protection class:	IP 67 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm², min. 1.5 mm² (incl. conductor ferrules)
Cable entry:	Z/T 236: 1 x M20 x 1.5 Z/T 256: 2 x M20 x 1.5
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	4 A / 230 VAC 1 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	20 million operations
Switching frequency:	max. 5000/h
Bounce duration:	snap action: < 3 ms; slow action: in accordance with actuating speed
Switchover time:	snap action: > 5.5 ms; slow action: in accordance with actuating speed

Approvals

cULus CCC CE

Approvals

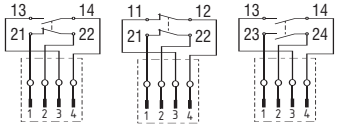
cULus CCC CE

Ordering details

①② **2③6-④Z⑤-⑥-⑦-⑧-⑨**

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 1-6	
③	3	Slim design
	5	Large design
④	02	2 NC
	11	1 NO / 1 NC
	20	2 NO *
⑤	H	Slow action with staggered contacts
	UE	with overlapping contacts
⑥		Cable entry M20
	ID	Cut clamp
	NPT	Cable entry NPT 1/2“
	ST	Connector M12 (A-Coding)
	2310	(B-Coding)
⑦	1297	Enclosure with transversely slotted mounting holes
⑧	2138	Roller lever 7H for safety duties
⑨	1637	Gold-plated contacts

Connector



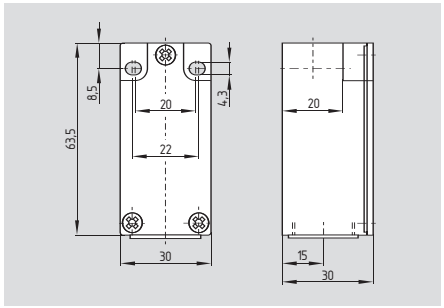
Other product variants:

- 3-pole NC/NO contact combinations
- Change-over contacts, etc.

List S-IP ELAN, Wettenberg

* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Z/T 235

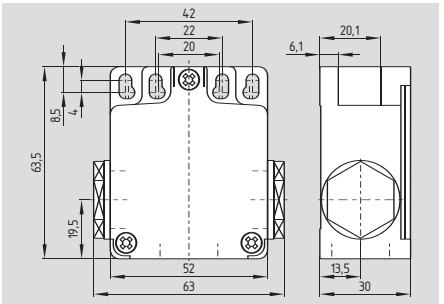


- Metal enclosure
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- Wiring compartment
- 1 cable entry M20 x 1.5
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- EX version available
- AS-Interface Safety at Work available, see chapter 5

Approvals

cULus

Z/T 255



- Mounting details to EN 50047
- 3 cable entries M20 x 1.5

Approvals

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	fixings to EN 50047
Enclosure:	Z/T 235: zinc die-cast, enamel finish Z/T 255: aluminium die-cast, enamel finish
Protection class:	IP 67 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
Cable entry:	Z/T 235: 1 x M20 x 1.5 Z/T 255: 3 x M20 x 1.5
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	4 A / 230 VAC 1 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	20 million operations
Switching frequency:	max. 5000/h
Bounce duration:	snap action: < 3 ms; slow action: in accordance with actuating speed
Switchover time:	snap action: > 5.5 ms; slow action: in accordance with actuating speed

Ordering details

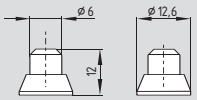
①② **2③5-④Z⑤-⑥-⑦-⑧-⑨**

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 1-6	
③	3	Slim design
	5	Large design
④	02	2 NC
	11	1 NO / 1 NC
	20	2 NO *
⑤	H	Slow action with staggered contacts
	UE	with overlapping contacts
⑥		Cable entry M20
	ID	Cut clamp
	NPT	Cable entry NPT 1/2“
⑦	1297	Enclosure with transversely slotted mounting holes
⑧	2138	Roller lever 7H for safety duties
⑨	1637	Gold-plated contacts

Note

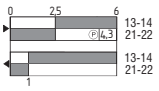
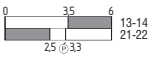
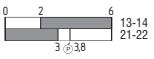
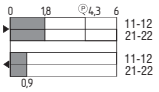
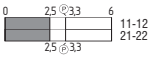
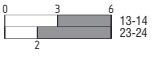
* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Plunger S

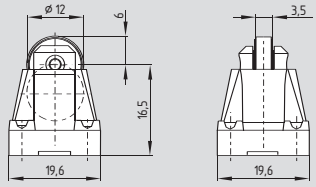


- Actuator type B to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis
  Snap action: Min. 10 mm/min, max. 1 m/s
  Slow action: Min. 60 mm/min, max. 1 m/s

Contact variants

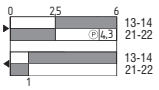
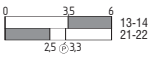
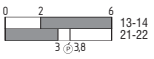
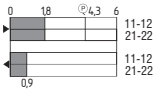
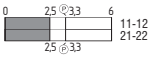
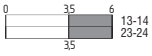
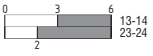
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZS 2..-11Z** 	**TS 2..-11Z** 	**TS 2..-11ZUE** 	
2 NC	**ZS 2..-02Z** 	**TS 2..-02Z** 		**TS 2..-02ZH** 
2 NO		**TS 2..-20Z** 		**TS 2..-20ZH** 

Roller plunger R

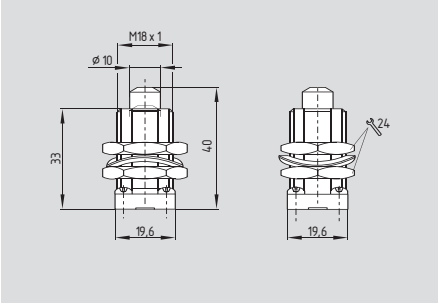


- Actuator type C to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 20 mm/min, max. 1 m/s
  Slow action: Min. 120 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZR 2..-11Z** 	**TR 2..-11Z** 	**TR 2..-11ZUE** 	
2 NC	**ZR 2..-02Z** 	**TR 2..-02Z** 		**TR 2..-02ZH** 
2 NO		**TR 2..-20Z** 		**TR 2..-20ZH** 

Plunger 4S

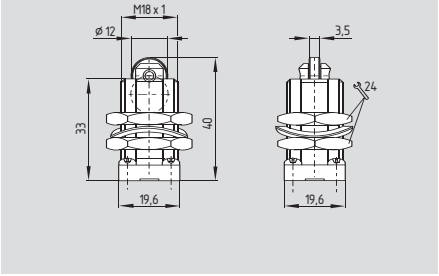


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis
  Snap action: Min. 10 mm/min, max. 1 m/s
  Slow action: Min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4S 2..-11Z**	**T4S 2..-11Z**	**T4S 2..-11ZUE**	
2 NC	**Z4S 2..-02Z**	**T4S 2..-02Z**		**T4S 2..-02ZH**
2 NO		**T4S 2..-20Z**		**T4S 2..-20ZH**

Roller plunger 4R

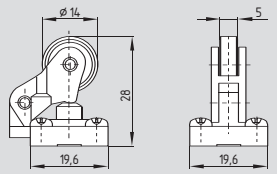


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 20 mm/min, max. 1 m/s
  Slow action: Min. 120 mm/min, max. 1 m/s

Contact variants

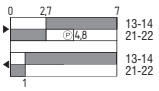
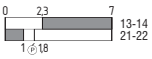
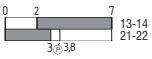
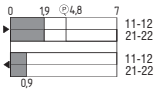
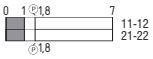
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4R 2..-11Z**	**T4R 2..-11Z**	**T4R 2..-11ZUE**	
2 NC	**Z4R 2..-02Z**	**T4R 2..-02Z**		**T4R 2..-02ZH**
2 NO		**T4R 2..-20Z**		**T4R 2..-20ZH**

Offset roller lever 1R

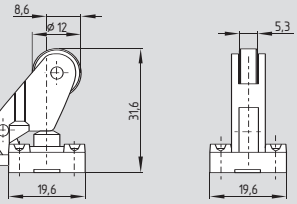


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 27 mm/min, max. 1 m/s
  Slow action: Min. 160 mm/min, max. 1 m/s

Contact variants

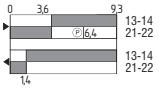
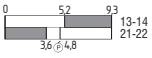
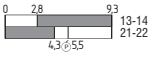
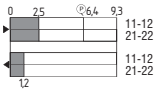
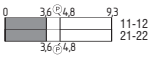
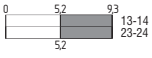
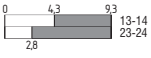
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	**Z1R 2..-11Z** 	**T1R 2..-11Z** 	**T1R 2..-11ZUE** 
2 NC	**Z1R 2..-02Z** 	**T1R 2..-02Z** 	
2 NO		**T1R 2..-20Z** 	

Offset roller lever K

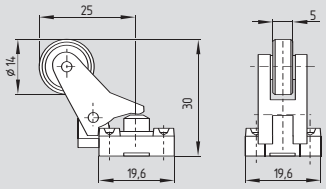


- Actuator type E to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 24 mm/min, max. 1 m/s
  Slow action: Min. 240 mm/min, max. 1 m/s

Contact variants

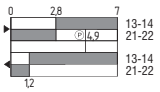
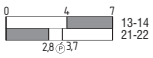
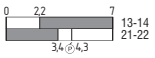
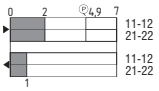
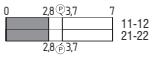
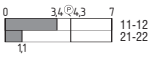
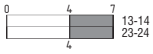
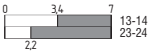
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZK 2..-11Z** 	**TK 2..-11Z** 	**TK 2..-11ZUE** 	
2 NC	**ZK 2..-02Z** 	**TK 2..-02Z** 		**TK 2..-02ZH** 
2 NO		**TK 2..-20Z** 		**TK 2..-20ZH** 

Angle roller lever 3K

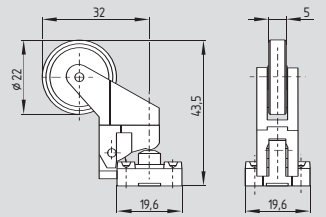


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 27 mm/min, max. 1 m/s
  Slow action: Min. 160 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

Contact variants

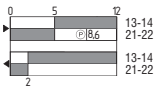
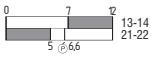
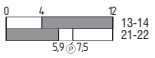
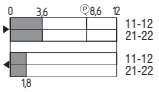
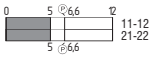
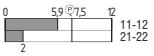
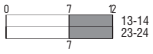
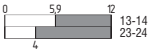
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z3K 2..-11Z** 	**T3K 2..-11Z** 	**T3K 2..-11ZUE** 	
2 NC	**Z3K 2..-02Z** 	**T3K 2..-02Z** 		**T3K 2..-02ZH** 
2 NO		**T3K 2..-20Z** 		**T3K 2..-20ZH** 

Angle roller lever 4K

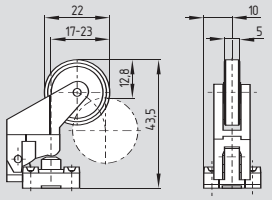


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 44 mm/min, max. 1 m/s
  Slow action: Min. 264 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4K 2..-11Z** 	**T4K 2..-11Z** 	**T4K 2..-11ZUE** 	
2 NC	**Z4K 2..-02Z** 	**T4K 2..-02Z** 		**T4K 2..-02ZH** 
2 NO		**T4K 2..-20Z** 		**T4K 2..-20ZH** 

Angle roller lever K4

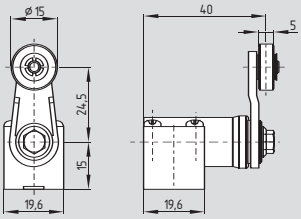


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 56 mm/min, max. 1 m/s
  Slow action: Min. 336 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZK4 2..-11Z**	**TK4 2..-11Z**	**TK4 2..-11ZUE**	
2 NC	**ZK4 2..-02Z**	**TK4 2..-02Z**		**TK4 2..-02ZH**
2 NO		**TK4 2..-20Z**		**TK4 2..-20ZH**

Roller lever 1H

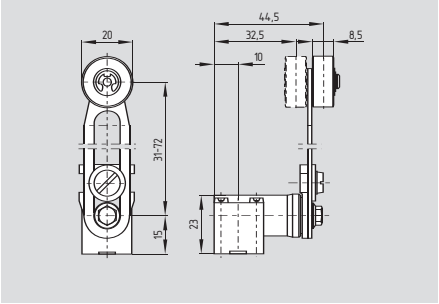


- Plastic lever
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 92 mm/min, max. 1 m/s
  Slow action: Min. 492 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZV1H 2..-11Z**	**TV1H 2..-11Z**	**TV1H 2..-11ZUE**	
2 NC	**ZV1H 2..-02Z**	**TV1H 2..-02Z**		**TV1H 2..-02ZH**
2 NO		**TV1H 2..-20Z**		**TV1H 2..-20ZH**

Roller lever 7H

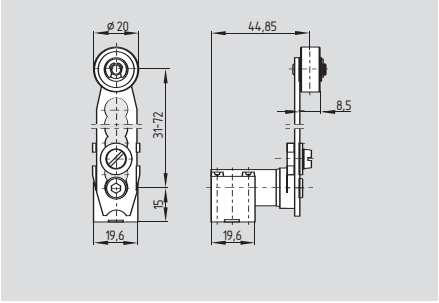


- **Only for positioning tasks**
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 240 mm/min, max. 1 m/s
  Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZV7H 2...-11Z**	**TV7H 2...-11Z**	**TV7H 2...-11ZUE**	
2 NC	**ZV7H 2...-02Z**	**TV7H 2...-02Z**		**TV7H 2...-02ZH**
2 NO		**TV7H 2...-20Z**		**TV7H 2...-20ZH**

Roller lever 7H-2138

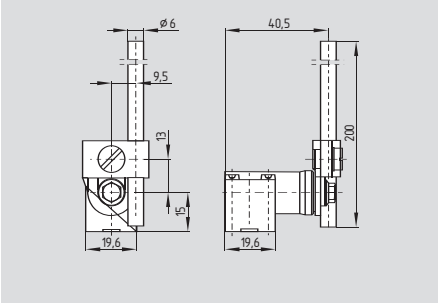


- For safety tasks ⊖, positive break, ordering suffix -2138
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 240 mm/min, max. 1 m/s
  Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZV7H 2..-11Z -2138**	**TV7H 2..-11Z -2138**	**TV7H 2..-11ZUE -2138**	
2 NC	**ZV7H 2..-02Z -2138**	**TV7H 2..-02Z -2138**		**TV7H 2..-02ZH -2138**
2 NO		**TV7H 2..-20Z -2138**		**TV7H 2..-20ZH -2138**

Rod lever 10H

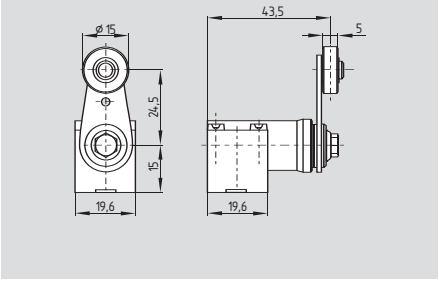


- **Only for positioning tasks**
- Lever angle adjustable in 10° steps
- Plastic rod
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 687 mm/min, max. 1 m/s
  Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z
- Aluminium rod, ordering suffix -1183

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZV10H 2..-11Z**	**TV10H 2..-11Z**	**TV10H 2..-11ZUE**	
2 NC	**ZV10H 2..-02Z**	**TV10H 2..-02Z**		**TV10H 2..-02ZH**
2 NO		**TV10H 2..-20Z**		**TV10H 2..-20ZH**

Roller lever 12H

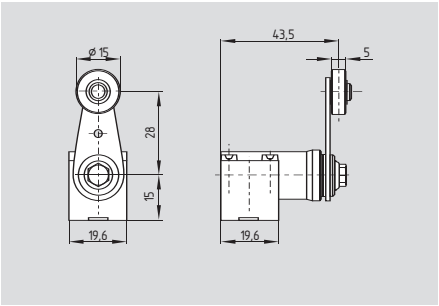


- Metal lever with plastic roller
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 687 mm/min, max. 1 m/s
  Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z
- Available with metal roller, ordering suffix –RMS

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZV12H 2..-11Z**	**TV12H 2..-11Z**	**TV12H 2..-11ZUE**	
2 NC	**ZV12H 2..-02Z**	**TV12H 2..-02Z**		**TV12H 2..-02ZH**
2 NO		**TV12H 2..-20Z**		**TV12H 2..-20ZH**

Roller lever 14H

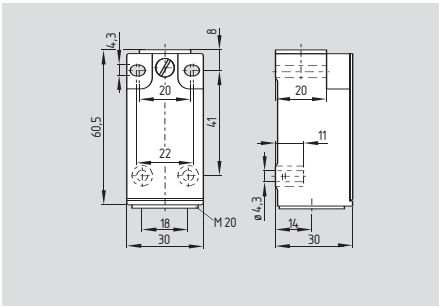


- Metal lever with plastic roller
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 687 mm/min, max. 1 m/s
  Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z
- Available with metal roller, ordering suffix –RMS

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZV14H 2..-11Z**	**TV14H 2..-11Z**	**TV14H 2..-11ZUE**	
2 NC	**ZV14H 2..-02Z**	**TV14H 2..-02Z**		**TV14H 2..-02ZH**
2 NO		**TV14H 2..-20Z**		**TV14H 2..-20ZH**

ES/EM 95

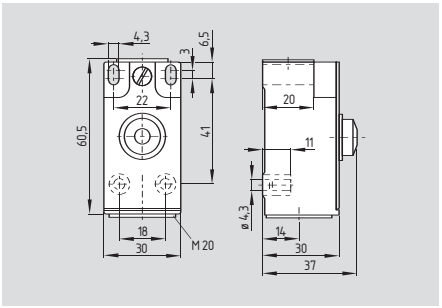


- Thermoplastic enclosure
- Transverse slotted mounting holes
- Double insulated ⧈
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping contacts
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- 1 cable entry M20 x 1.5
- Good resistance to oil and petroleum spirit
- Knockouts for additional mounting holes if required

Approvals

CE

ES/EM 95 V



- Slow action with mechanical locking and blue unlocking button available, ordering suffix -V
- Enclosure with longitudinal slotted mounting holes, ordering suffix LL

Approvals

CE

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	DIN EN 50047
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Protection class:	IP 67 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm^2 (incl. conductor ferrules)
Cable entry:	1 x M20 x 1.5
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	6 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	0.275 A / 250 VDC 1 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Mechanical life:	> 1 million operations
Switching frequency:	1800/h
Ambient temperature:	– 20 °C … + 80 °C
Actuating speed referring to the plunger:	snap action: min. 10 mm/min; slow action: min. 60 mm/min
Bounce duration:	snap action: < 3 ms; slow action: in accordance with actuating speed
Switchover time:	snap action: > 5.5 ms; slow action: in accordance with actuating speed

Ordering details

E① 95 ②-③-④-⑤-⑥

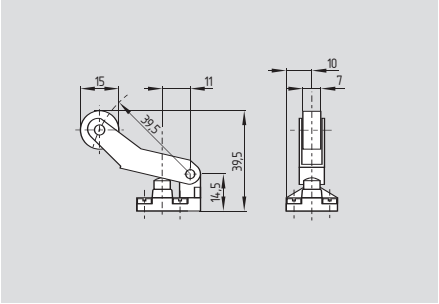
No.	Option	Description
①	M	Snap action ⊖
	S	Slow action ⊖
②	For the appropriate actuator: see as of page 1-15	
③	1OE/1S	1 NC / 1 NO
	UE	1 NC / 1 NO with overlapping contacts
	2OE	2 NC
	2S	2 NO *

No.	Option	Description
④	V	Mechanical locking and unlocking push button
⑤		Cable entry M20
	M16	Cable entry M16
⑥		Transverse slotted holes
	LL	Longitudinal slotted holes

Note

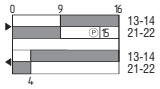
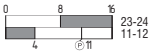
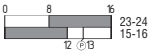
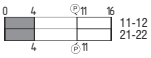
* Switches with 2 NO contacts (2S) are only suitable for positioning tasks!

Long offset roller lever

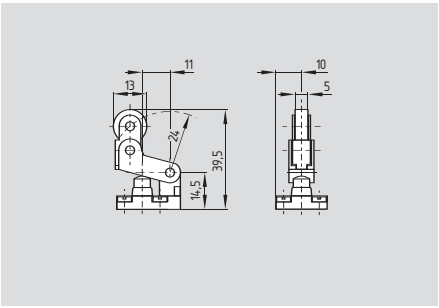


- Plunger with watertight collar
- Wear-restistant thermoplastic roller
- Actuator heads can be repositioned by 4 x 90°
- Metal roller available on request

Contact variants

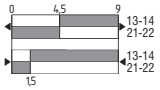
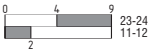
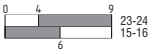
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	**EM 95 WHLM 1OE/1S** 	**ES 95 WHLM 1OE/1S** 	**ES 95 WHLM UE** 
2 NC		**ES 95 WHLM 2OE** 	
2 NO		**ES 95 WHLM 2S** 	

Rocking offset roller lever

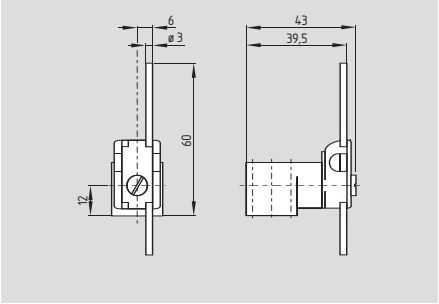


- **Only for positioning tasks**
- Plunger with watertight collar
- Actuator heads can be repositioned by 4 x 90°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Metal roller available on request

Contact variants

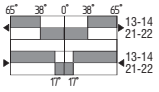
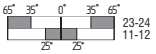
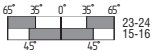
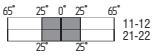
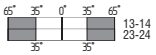
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	**EM 95 WHKM 1OE/1S** 	**ES 95 WHKM 1OE/1S** 	**ES 95 WHKM UE** 
2 NC		**ES 95 WHKM 2OE** 	
2 NO		**ES 95 WHKM 2S** 	

Wire lever DD

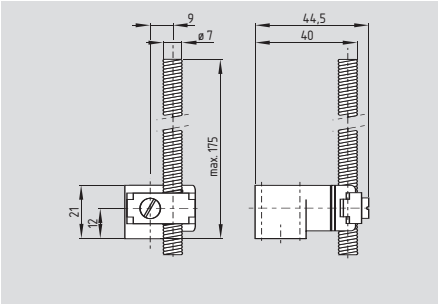


- **Only for positioning tasks**
- Lever angle adjustable in 10° steps
- Actuator heads can be repositioned by 4 x 90°

Contact variants

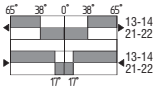
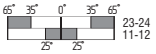
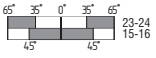
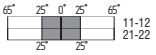
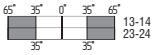
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO **1 NC**	**EM 95 DD** **1OE/1S** 	**ES 95 DD** **1OE/1S** 	**ES 95 DD** **UE** 
2 NC		**ES 95 DD 2OE** 	
2 NO		**ES 95 DD 2S** 	

Spring-rod lever DF

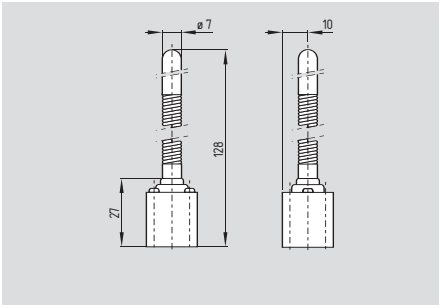


- **Only for positioning tasks**
- Lever angle adjustable in 10° steps
- Actuator heads can be repositioned by 4 x 90°

Contact variants

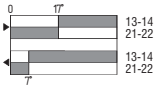
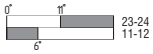
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO **1 NC**	**EM 95 DF** **1OE/1S** 	**ES 95 DF** **1OE/1S** 	**ES 95 DF** **UE** 
2 NC		**ES 95 DF 2OE** 	
2 NO		**ES 95 DF 2S** 	

Spring rod TK

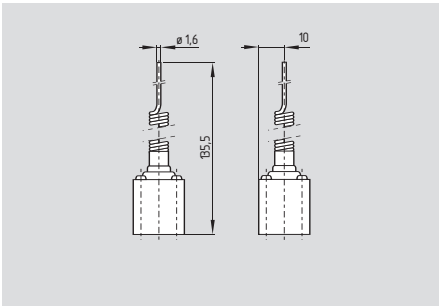


- **Only for positioning tasks**
- Wear-restistant thermoplastic tip
- Spring rod can be actuated from any direction

Contact variants

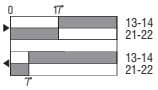
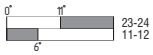
Contacts/ Switch travel	Snap action	Slow action
1 NO 1 NC	**EM 95 TK 1OE/1S** 	**ES 95 TK 1OE/1S** 

Long spring wire TL

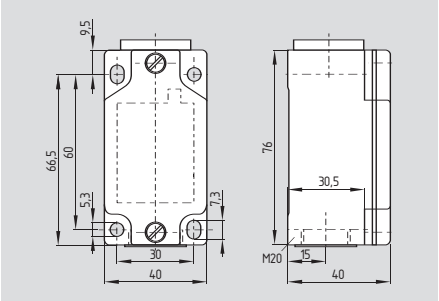


- **Only for positioning tasks**
- Spring rod can be actuated from any direction

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO 1 NC	**EM 95 TL 1OE/1S** 	**ES 95 TL 1OE/1S** 

Z 332



- Metal enclosure
- Gold-plated solid silver contacts
- Magnetic-storage snap action system
- Wiring compartment
- Short contact-bounce duration
- Switching system separated from snap action system, providing constant switching point independent of conatct wear
- Large contact break
- High repeat accuracy of switching point position
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	DIN EN 50041
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm²
	(incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	2.5 A / 230 VAC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	30 million operations
Switching frequency:	3000/h
Switching-point accuracy:	± 0.02 mm
Actuating speed snap action:	min. 10 mm/min
Contakt break for complete stroke:	> 2 x 1.25 mm
Bounce duration:	< 2.5 ms
Switchover time snap action:	> 1,5 ms

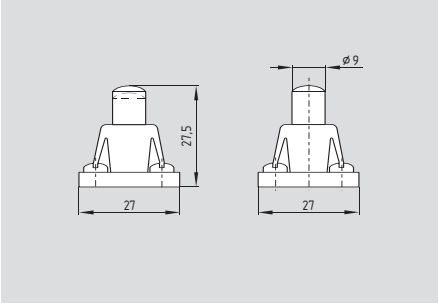
Approvals

Ordering details

Z ① 332-11Y-②-③

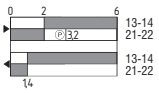
No.	Option	Description
①		For the appropriate actuator: see as of page 1-19
②	2138	Roller lever 7H for safety duties

Plunger S

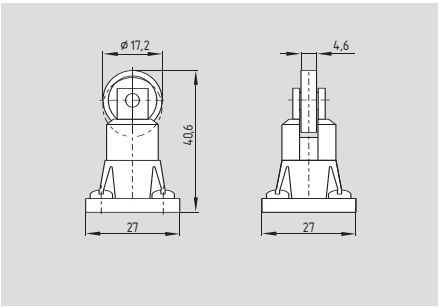


- Actuator type B to EN 50041
- Actuating force: Min. 31 N

Contact variants

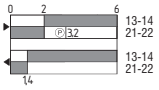
Contacts/ Switch travel	Snap action
1 NO 1 NC	**ZS 332-11Y** 

Roller plunger R

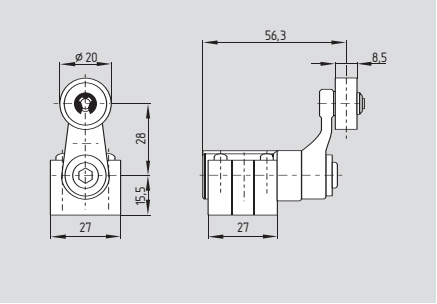


- Actuator type C to EN 50041
- Actuating force: Min. 31 N
- Brass actuator roller

Contact variants

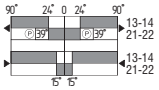
Contacts/ Switch travel	Snap action
1 NO 1 NC	**ZR 332-11Y** 

Roller lever H

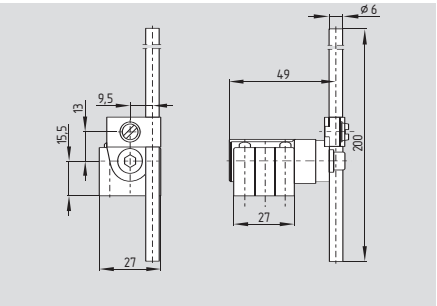


- Actuator type A to EN 50041
- Actuating torque: Min. 35 Ncm

Contact variants

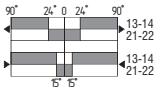
Contacts/ Switch travel	Snap action
1 NO 1 NC	**Z4VH 332-11Y** 

Roller lever 10H

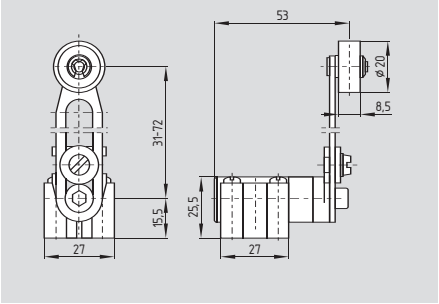


- **Only for positioning tasks**
- Actuator type D to EN 50041
- Plastic rod
- Actuating torque: Min. 35 Ncm
- Aluminium rod, ordering suffix -1183

Contact variants

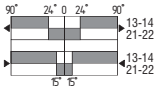
Contacts/ Switch travel	Snap action
1 NO 1 NC	**Z4V10H 332-11Y** 

Roller lever 7H

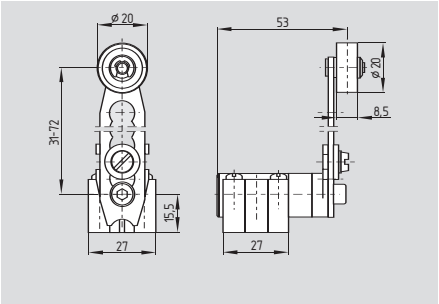


- **Only for positioning tasks**
- Actuating torque: Min. 35 Ncm

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	**Z4V7H 332-11Y** 

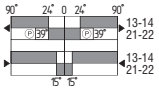
Roller lever 7H-2138



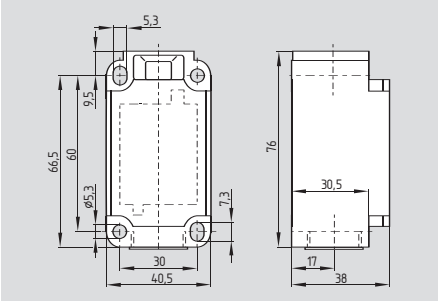
- For safety tasks ⊖, positive break, ordering suffix -2138
- Actuating torque: Min. 35 Ncm

Positve break angle Ⓟ only valid with ordering suffix -2138

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	**Z4V7H 332-11Y -2138** 

Z/T 336



- Thermoplastic enclosure
- Double insulated ⧈
- Available with positive break NC contacts to EN 60947-5-1
- Snap action with constant contact pressure up to switching point
- Slow action available with 2 positive break NC contacts
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20 x 1.5
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	DIN EN 50041
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Protection class:	IP 67 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	1 x M20 x 1.5
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	4 A / 230 VAC 4 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	30 million operations
Switching frequency:	max. 5000/h
Bounce duration:	snap action: in accordance with actuating speed; slow action: < 2ms
Switchover time:	snap action: < 2 ms; slow action: in accordance with actuating speed

Approvals

cULus CCC CE

Ordering details

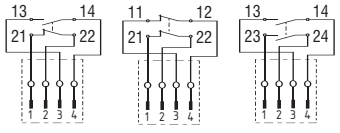
①② **336-**③**Z**④**-**⑤**-**⑥**-**⑦

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 1-23	
③	11	1 NO / 1 NC
	02	2 NC
	20	2 NO *
	01/01	1 NC left / 1 NC right
④	H	Slow action with staggered contacts
	UE	with overlapping contacts

Ordering details

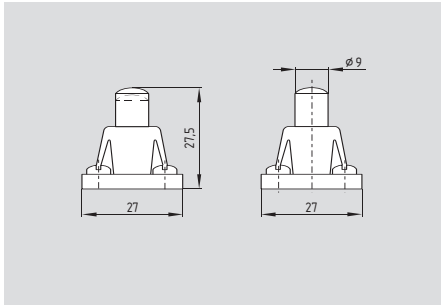
No.	Option	Description
⑤		Cable entry M20
	NPT	Cable entry NPT 1/2“
	ST	Connector M12 (A-Coding)
	2310	(B-Coding)
⑥	2138	Roller lever 7H for safety duties
⑦	1637	Gold-plated contacts

Connector



* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Plunger S

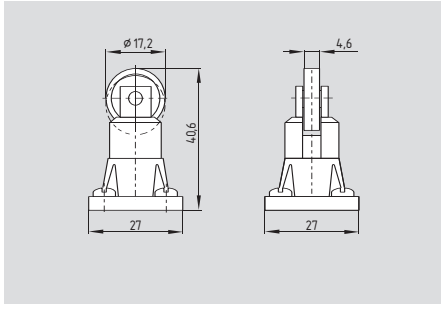


- Actuator type B to EN 50041
- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 0° to switch axis, max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZS 336-11Z**	**TS 336-11Z**	**TS 336-11ZUE**	
2 NC	**ZS 336-02Z**	**TS 336-02Z**		**TS 336-02ZH**
2 NO		**TS 336-20Z**		**TS 336-20ZH**

Roller plunger R

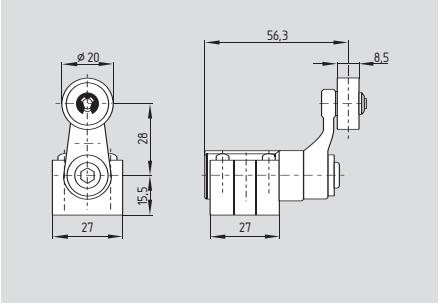


- Actuator type C to EN 50041
- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZR 336-11Z**	**TR 336-11Z**	**TR 336-11ZUE**	
2 NC	**ZR 336-02Z**	**TR 336-02Z**		**TR 336-02ZH**
2 NO		**TR 336-20Z**		**TR 336-20ZH**

Roller lever H



- Actuator type A to EN 50041
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

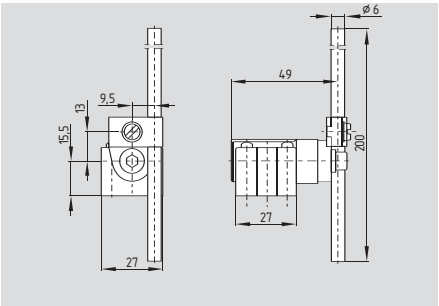
The positioning of the head on version “1 NC left/1 NC right” must be carried out in factory.

On version TVH 336-01/01z positive break only to one side.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4VH 336-11Z**	**T4VH 336-11Z**	**T4VH 336-11ZUE**	
2 NC	**Z4VH 336-02Z**	**T4VH 336-02Z**		**T4VH 336-02ZH**
2 NO		**T4VH 336-20Z**		**T4VH 336-20ZH**
1 NC left 1 NC right		**TVH 336-01/01Z**		

Rod lever 10H



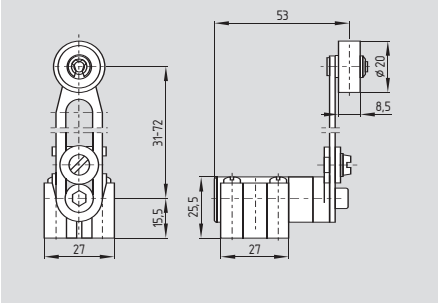
- **Only for positioning tasks**
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s
- Aluminium rod, ordering suffix -1183

The positioning of the head on version “1 NC left/1 NC right” must be carried out in factory.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4V10H 336-11Z**	**T4V10H 336-11Z**	**T4V10H 336-11ZUE**	
2 NC	**Z4V10H 336-02Z**	**T4V10H 336-02Z**		**T4V10H 336-02ZH**
2 NO		**T4V10H 336-20Z**		**T4V10H 336-20ZH**
1 NC left 1 NC right		**TV10H 336-01/01Z**		

Roller lever 7H



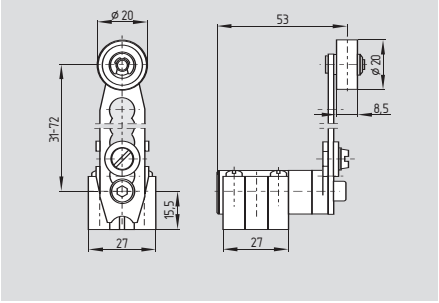
- **Only for positioning tasks**
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

The positioning of the head on version “1 NC left/1 NC right” must be carried out in factory.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4V7H 336-11Z**	**T4V7H 336-11Z**	**T4V7H 336-11ZUE**	
2 NC	**Z4V7H 336-02Z**	**T4V7H 336-02Z**		**T4V7H 336-02ZH**
2 NO		**T4V7H 336-20Z**		**T4V7H 336-20ZH**
1 NC left 1 NC right		**TV7H 336-01/01Z**		

Roller lever 7H-2138



- For safety tasks ⊖, positive break, ordering suffix -2138
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

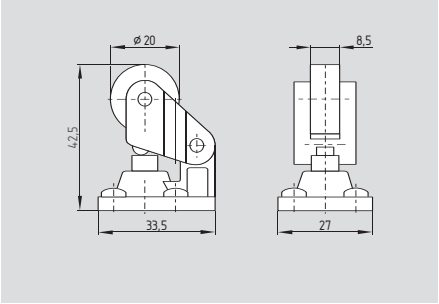
The positioning of the head on version “1 NC left/1 NC right” must be carried out in factory.

On version TV7H 336-01/01z-2138 positive break only to one side.

Contact variants

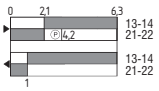
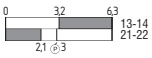
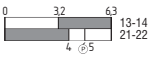
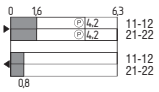
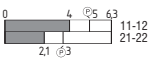
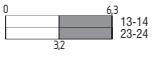
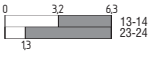
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4V7H 336-11Z -2138**	**T4V7H 336-11Z -2138**	**T4V7H 336-11ZUE -2138**	
2 NC	**Z4V7H 336-02Z -2138**	**T4V7H 336-02Z -2138**		**T4V7H 336-02ZH -2138**
2 NO		**T4V7H 336-20Z -2138**		**T4V7H 336-20ZH -2138**
1 NC left 1 NC right		**TV7H 336-01/01Z -2138**		

Offset roller lever 1K

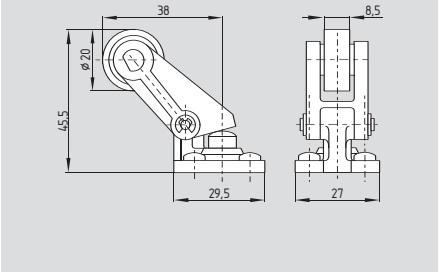


- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

Contact variants

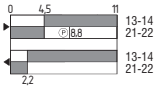
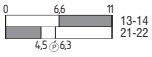
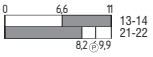
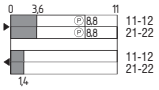
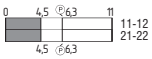
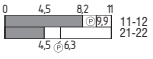
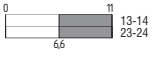
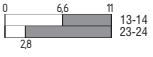
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z1K 336-11Z** 	**T1K 336-11Z** 	**T1K 336-11ZUE** 	
2 NC	**Z1K 336-02Z** 	**T1K 336-02Z** 		**T1K 336-02ZH** 
2 NO		**T1K 336-20Z** 		**T1K 336-20ZH** 

Angle roller lever 3K



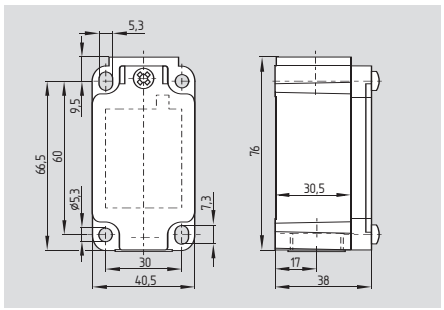
- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z3K 336-11Z** 	**T3K 336-11Z** 	**T3K 336-11ZUE** 	
2 NC	**Z3K 336-02Z** 	**T3K 336-02Z** 		**T3K 336-02ZH** 
2 NO		**T3K 336-20Z** 		**T3K 336-20ZH** 

Position switches to EN 50041

Z/T 335

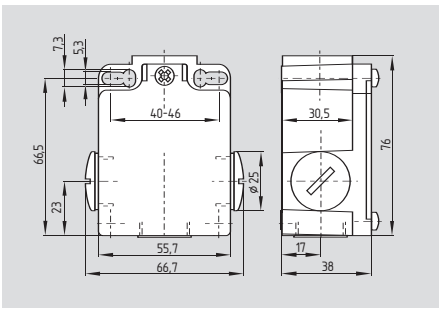


- Metal enclosure
- Snap action with constant contact pressure up to switching point
- Slow or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20 x 1.5
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- EX version available

Approvals

cULus, CCC, CE

Z/T 355



- Mountings and switching points to EN 50041
- 3 cable entries M20 x 1.5
- EX version available

Approvals

cULus, CCC, CE

Technical data

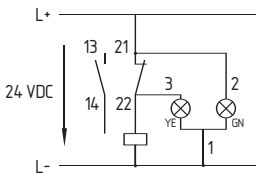
Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	DIN EN 50041
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP 67 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	Z/T 335: 1 x M20 x 1.5 Z/T 355: 3 x M20 x 1.5
U_{imp}:	6 kV -03z, -12z: 4kV
U_i:	500 V -03z, -12z: 250 V
I_{the}:	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	4 A / 230 VAC 4 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	30 million operations
Switching frequency:	max. 5000/h
Bounce duration:	snap action: in accordance with actuating speed; slow action: < 2ms
Switchover time:	snap action: < 2 ms; slow action: in accordance with actuating speed

Ordering details

①② **3**③**5-**④**Z**⑤**-**⑥**-**⑦**-**⑧**-**⑨

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 1-28	
③	3	Slim design
	5	Large design
④	11	1 NO / 1 NC
	02	2 NC
	20	2 NO *
	01/01	1 NC left / 1 NC right
	12	1 NO / 2 NC
	03	3 NC
⑤	H	Slow action with staggered contacts
	UE	with overlapping contacts
⑥	G24	With LED
⑦		Cable entry M20
	NPT	Cable entry NPT 1/2“
⑧	2138	Roller lever 7H for safety duties
⑨	1637	Gold-plated contacts

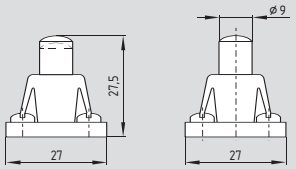
Note



LED version
Ordering suffix G24, Protected against incorrect polarity and voltage spikes.

* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Plunger S

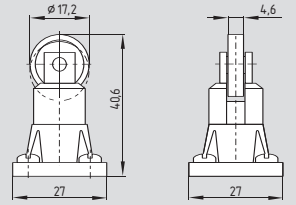


- Actuator type B to EN 50041
- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 0° to switch axis, max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZS 3..-11Z**	**TS 3..-11Z**	**TS 3..-11ZUE**	
2 NC	**ZS 3..-02Z**	**TS 3..-02Z**		**TS 3..-02ZH**
2 NO		**TS 3..-20Z**		**TS 3..-20ZH**
1 NO 2 NC		**TS 3..-12Z**	**TS 3..-12ZUE**	
3 NC		**TS 3..-03Z**		**TS 3..-03ZH**

Roller plunger R

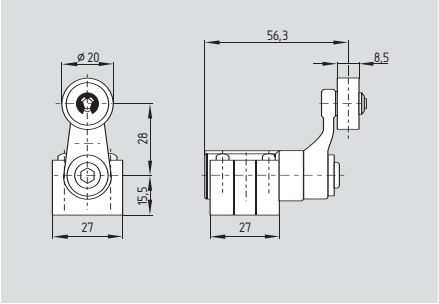


- Actuator type C to EN 50041
- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**ZR 3..-11Z**	**TR 3..-11Z**	**TR 3..-11ZUE**	
2 NC	**ZR 3..-02Z**	**TR 3..-02Z**		**TR 3..-02ZH**
2 NO		**TR 3..-20Z**		**TR 3..-20ZH**
1 NO 2 NC		**TR 3..-12Z**	**TR 3..-12ZUE**	
3 NC		**TR 3..-03Z**		**TR 3..-03ZH**

Roller lever H



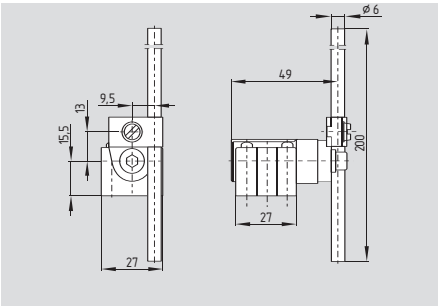
- Actuator type A to EN 50041
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TVH ...-01/01z positive break only to one side.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4VH 3..-11Z**	**T4VH 3..-11Z**	**T4VH 3..-11ZUE**	
2 NC	**Z4VH 3..-02Z**	**T4VH 3..-02Z**		**T4VH 3..-02ZH**
2 NO		**T4VH 3..-20Z**		**T4VH 3..-20ZH**
1 NC left 1 NC right		**TVH 3..-01/01Z**		
1 NO 2 NC		**T4VH 3..-12Z**	**T4VH 3..-12ZUE**	
3 NC		**T4VH 3..-03Z**		**T4VH 3..-03ZH**

Rod lever 10H

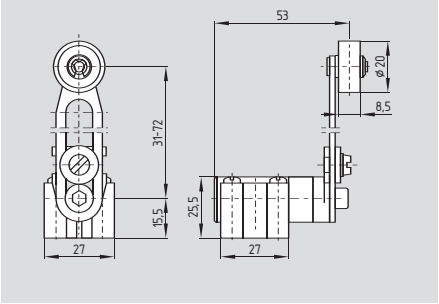


- **Only for positioning tasks**
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s
- Aluminium rod, ordering suffix -1183

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4V10H 3..-11Z**	**T4V10H 3..-11Z**	**T4V10H 3..-11ZUE**	
2 NC	**Z4V10H 3..-02Z**	**T4V10H 3..-02Z**		**T4V10H 3..-02ZH**
2 NO		**T4V10H 3..-20Z**		**T4V10H 3..-20ZH**
1 NC left 1 NC right		**TV10H 3..-01/01Z**		
1 NO 2 NC		**T4V10H 3..-12Z**	**T4V10H 3..-12ZUE**	
3 NC		**T4V10H 3..-03Z**		**T4V10H 3..-03ZH**

Roller lever 7H

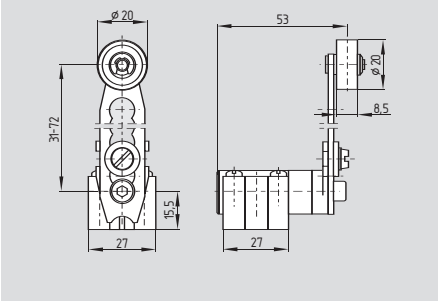


- **Only for positioning tasks**
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4V7H 3..-11Z**	**T4V7H 3..-11Z**	**T4V7H 3..-11ZUE**	
2 NC	**Z4V7H 3..-02Z**	**T4V7H 3..-02Z**		**T4V7H 3..-02ZH**
2 NO		**T4V7H 3..-20Z**		**T4V7H 3..-20ZH**
1 NC left 1 NC right		**TV7H 3..-01/01Z**		
1 NO 2 NC		**T4V7H 3..-12Z**	**T4V7H 3..-12ZUE**	
3 NC		**T4V7H 3..-03Z**		**T4V7H 3..-03ZH**

Roller lever 7H-2138



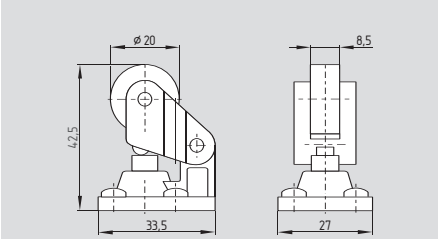
- For safety tasks ⊖, positive break, ordering suffix -2138
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TV7H ...-01/01z-2138 positive break only to one side.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z4V7H 3..-11Z-2138**	**T4V7H 3..-11Z-2138**	**T4V7H 3..-11ZUE-2138**	
2 NC	**Z4V7H 3..-02Z-2138**	**T4V7H 3..-02Z-2138**		**T4V7H 3..-02ZH-2138**
2 NO		**T4V7H 3..-20Z-2138**		**T4V7H 3..-20ZH-2138**
1 NC left 1 NC right		**TV7H 3..-01/01Z-2138**		
1 NO 2 NC		**T4V7H 3..-12Z-2138**	**T4V7H 3..-12ZUE-2138**	
3 NC		**T4V7H 3..-03Z-2138**		**T4V7H 3..-03ZH-2138**

Offset roller lever 1K

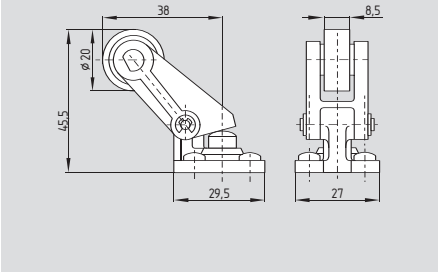


- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z1K 3..-11Z**	**T1K 3..-11Z**	**T1K 3..-11ZUE**	
2 NC	**Z1K 3..-02Z**	**T1K 3..-02Z**		**T1K 3..-02ZH**
2 NO		**T1K 3..-20Z**		**T1K 3..-20ZH**
1 NO 2 NC		**T1K 3..-12Z**	**T1K 3..-12ZUE**	
3 NC		**T1K 3..-03Z**		**T1K 3..-03ZH**

Angle roller lever 3K



- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**Z3K 3..-11Z**	**T3K 3..-11Z**	**T3K 3..-11ZUE**	
2 NC	**Z3K 3..-02Z**	**T3K 3..-02Z**		**T3K 3..-02ZH**
2 NO		**T3K 3..-20Z**		**T3K 3..-20ZH**
1 NO 2 NC		**T3K 3..-12Z**	**T3K 3..-12ZUE**	
3 NC		**T3K 3..-03Z**		**T3K 3..-03ZH**

Contact combinations

Enclosures - models		Default contacts	Image	Page
		Ordering suffix		
		Contact NO		
		Contact NC		
 1	Light limit switches	M 660/6600	1	1-34
 2	Light limit switches	M 6610/6620	2	1-38
 3	Light limit switches	EM 14	3	1-42
 4	Light limit switches	ES 14	3	1-42
 5	Light limit switches	ES13	4	1-52
 6	Light limit switches	E 12	5	1-63
 7	Light limit switches	ES 51	6	1-74
 8	Light limit switches	ES/EM 41/411	7	1-86
 9	Light limit switches	M 330	8	1-100
	Light limit switches	ES/EM 61	9	1-107
 10	Medium heavy limit switches	T/M 015	10	1-114
 11	Medium heavy limit switches	T 016	11	1-114
 12	Medium heavy limit switches	T/M 017	12	1-114
 13	Medium heavy limit switches	U 431	13	1-120
 14	Medium heavy limit switches	U 432	14	1-121
 15	Medium heavy limit switches	U 433	15	1-121
	Medium heavy limit switches	U 434	16	1-121
 16	Medium heavy limit switches	T 422	17	1-124
 17	Medium heavy limit switches	T/M 441	18	1-124
 18	Medium heavy limit switches	T 452	19	1-124
 19	Medium heavy limit switches	T/M 461	20	1-125
 20	Medium heavy limit switches	T 470	21	1-125
 21	Heavy limit switches	T/M 035	22	1-130
 22	Heavy limit switches	T/M 250	23	1-131
 23	Heavy limit switches	TS 064	24	1-132
 24	Heavy limit switches	MS 064	24	1-133
 25	Heavy limit switches	T. 064	25	1-135
 26	Heavy limit switches	M. 064 L	25	1-137
	Heavy limit switches	M. 064 R	25	1-136
	Heavy limit switches	T. 067	26	1-138
 27	Heavy limit switches	M. 471 R	27	1-141
 28	Heavy limit switches	T 130	28	1-142
 29	Heavy limit switches	T 136	29	1-144
 30	Heavy limit switches	T 240	30	1-143

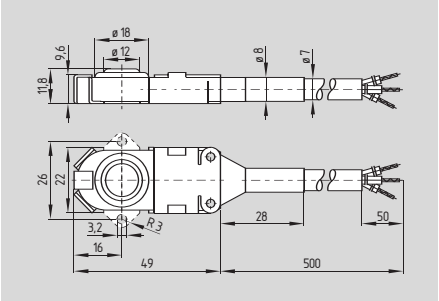
Contact configuration right/left		Image	Page	2 contacts		3 contacts			
Ordering suffix				10/10	01/01	10/11	11/01	10/02	20/01
Contact NO				2		2	1	1	2
Contact C N					2	1	2	2	1
T 250		23	1-131	T	T	T	T	T	T
T. 064		24	1-135						
T. 067		26	1-138	T	T				
T. 471		27	1-139						
M. 471		27	1-140						
T 246		30	1-145						

M = snap action
T = slow action
[1] = by default 1-pole change-over contact
* = all contact combinations possible (apart from only NC contact or only NO contact)

	1 contact		2 contacts			3 contacts				4 contacts					6 – 10 contacts	
	10	01	11	20	02	21	12	30	03	22	31	13	40	04	33	55
	1		1	2		2	1	3		2	3	1	4		3	5
		1	1		2	1	2		3	2	1	3		4	3	5
			M													
			M													
			M [1)]													
			T													
			T													
			M [1)]													
			T													
			T/M		T											
			M													
			T/M													
			T/M	T	T											
						T	T	T	T							
										T/M	T	T				
	T	T														
			T	T	T											
						T	T	T	T							
										T	T	T	T	T		
	T	T														
			T/M													
				T	T	T	T									
								T	T	T/M	T	T				
															T*	
			T/M	T	T											
			T/M	T	T	T	T	T	T	T/M	T	T				
						T	T	T	T	T	T	T	T	T		
						M	M	M	M	M	M	M	M	M		
						T	T	T	T							
						M	M	M		M	M		M			
						M	M		M	M		M		M		
			T	T	T											
						M	M			M						
															T*	
								T	T							
																T*

				4 contacts									6 contacts			
10/20	10/20	02/01	01/02	11/11	11/20	11/02	11/11	21/10	30/10	01/03	20/20	02/02	21/21	12/12	30/30	03/03
3	3			2	3	1	2	3	4		4		4	2	6	
		3	3	2	1	3	2	1		4		4	2	4		6
				T	T	T	T	T	T	T						
T	T	T	T													
											T	T	T	T	T	T
											M	M	M	M		M
															T	T

M 660 and 6600



- Rubber enclosure
- Stainless steel case pre-wired cable
- Double-insulated ⧈
- M 660 without mounting flange, M 6600 with mounting flange
- Snap action, change-over contact with single break
- Gold-plated contacts
- Snap action with self-cleaning contacts
- With pre-wired cable 3 x 0.75 mm²
- Protection class IP 65
- Suitable for aggressive environmental conditions
- Good resistance to petroleum spirit and oil
- Flange or central mounting
- Cable length 0.5 m
  Other lengths on request.

Approvals

CE

Ordering details

M① 660②-11-k-y- ③

No.	Replace	Description
①		For the appropriate actuator: see page 1-35 and following
②		Without mounting flange
	0	With mounting flange
③		With roller turned 90° to axis of switch body (only for 2R)

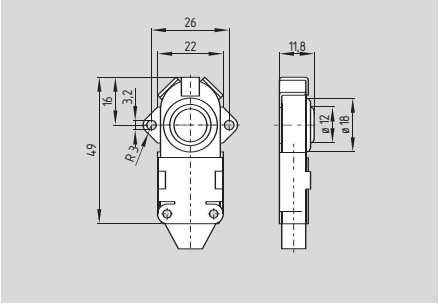
Technical data

Standards:	IEC/EN 60947-5-1
Switch insert:	M 660-11-2-e
Enclosure:	rubber body with stainless-steel casing
Hexagon nuts:	–
	Telescopic plunger: M 16 x 1, nickel-plated steel
Protection class:	IP 65 to EN 60529
Contact material:	gold-plated silver
Switching system:	snap action, self-cleaning contacts
Contact type:	change-over contact, single break
Termination:	cable H05VV-F
Cable section:	3 x 0.75 mm²
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	4 A
I_e/U_e:	1 A / 230 VAC
Utilisation category:	AC-15
Voltage withstand across contacts:	1200 VAC, 50 Hz
Test voltage (enclosed):	2500 VAC, 50 Hz
Max. fuse rating:	4 A gG D-fuse
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	3 million operations
Switching frequency:	30000/h
Actuating speed:	min. 1 mm/min

Contact variants

Change-over contact with double break

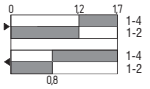
Basic unit M



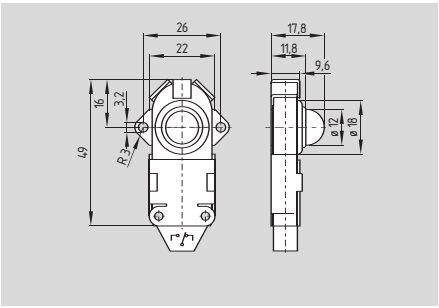
- Rubber enclosure
- Stainless steel case pre-wired cable

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**M 660-11-k-y** **M 6600-11-k-y**



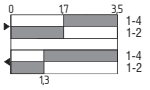
Rubber collar S



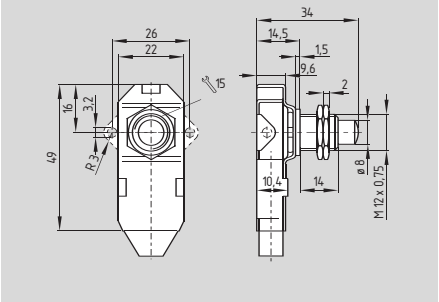
- Rubber enclosure
- Stainless steel case pre-wired cable

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**MS 660-11-k-y** **MS 6600-11-k-y**



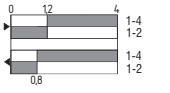
Telescopic plunger 1S



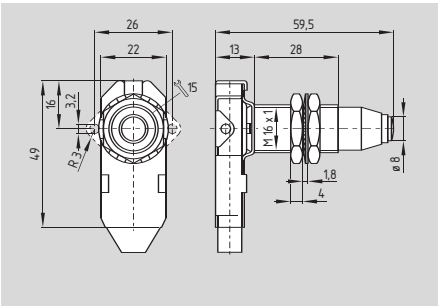
- Threaded tube: Nickel-plated brass
- Simple mounting with hexagonal steel nuts
- Large after-travel
- Good adjustment of switching point

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**M1S 660-11-k-y** **M1S 6600-11-k-y**



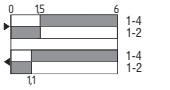
Telescopic plunger 2S



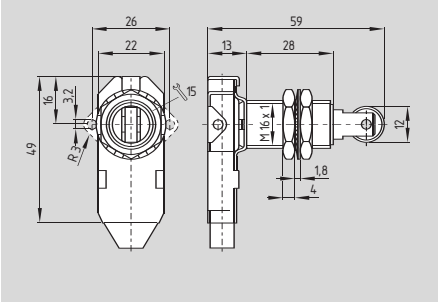
- Threaded tube: Nickel-plated brass
- Simple mounting with hexagonal steel nuts
- Large after-travel
- Good adjustment of switching point
- Bellows to protect plunger against soiling

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**M2S 660-11-k-y** **M2S 6600-11-k-y**



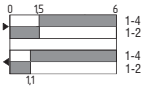
Telescopic roller-plunger 2R



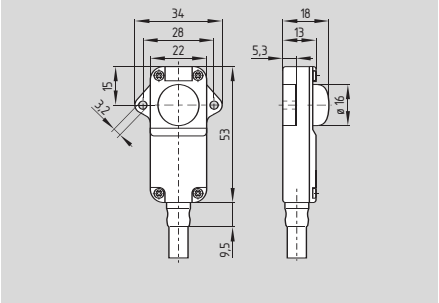
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s
- Threaded tube: Nickel-plated brass
- Simple mounting with hexagonal steel nuts
- Large after-travel
- Good adjustment of switching point
- Also available with roller turned 90° to axis of switch body, ordering suffix -u

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**M2R 660-11-k-y** **M2R 6600-11-k-y**



M 6610 and 6620



- Thermoplastic enclosure
- Double-insulated ⧈
- M 6610 without mounting flange, M 6620 with mounting flange
- Snap action, change-over contact with single break
- Gold-plated contacts
- Snap action with self-cleaning contacts
- With pre-wired cable 3 x 0.75 mm²
- Protection class IP 67
- Suitable for aggressive environmental conditions
- Good resistance to petroleum spirit and oil
- Flange or central mounting
- Cable length 0.5 m
  Other lengths on request.

Approvals

CE

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	glass-fibre reinforced thermoplastic with perbunan gaskets
Hexagon nuts:	M 16 x 1, nickel-plated steel
Protection class:	IP 67 to EN 60529
Contact material:	gold-plated silver
Switching system:	snap action, self-cleaning contacts
Contact type:	change-over contact, single break
Pre-wired cable:	H05VV-F 3 x 0.75 mm²
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	4 A
I_e/U_e:	1 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	4 A gG D-fuse
Contact opening:	0.35 mm
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	3 million operations
Switching frequency:	30000/h
Actuating speed:	min. 10 mm/min
Repeat accuracy of switching points:	± 0.05 mm

Contact variants

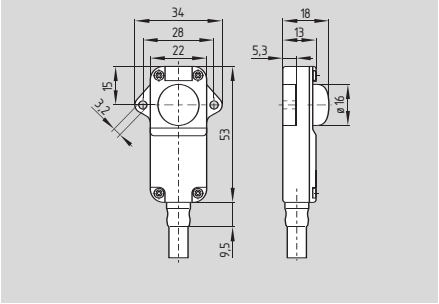
Change-over contact with double break

Ordering details

M① 66②0-11-k-z-③

No.	Replace	Description
①	For the appropriate actuator: see page 1-39 and following	
②	1	Without mounting flange
	2	With mounting flange (only for S)
③	u	With roller turned 90° to axis of switch body (only for 2R)

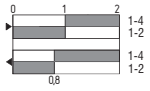
Rubber collar S



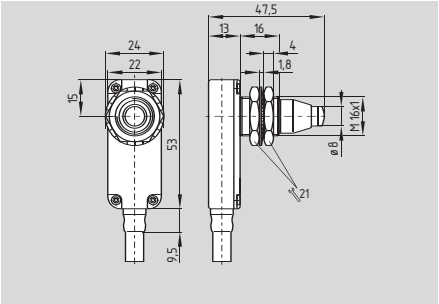
- Thermoplastic enclosure
- M 6610 without mounting flange, M 6620 with mounting flange

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**MS 6610-11-k-z** **MS 6620-11-k-z**



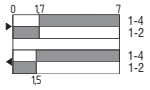
Telescopic plunger 1S



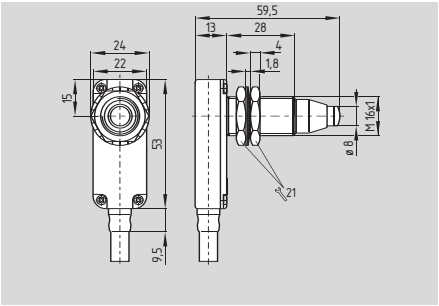
- Simple mounting with hexagonal steel nuts
- Large after-travel
- Good adjustment of switching point
- Bellows to protect plunger against soiling

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**M1S 6610-11-k-z**

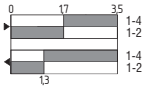


Telescopic plunger 2S

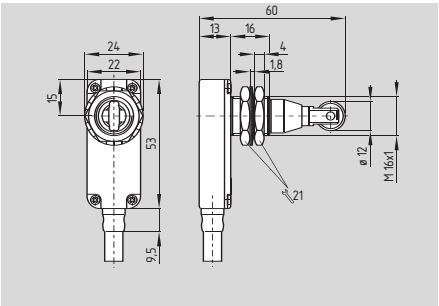


- Simple mounting with hexagonal steel nuts
- Large after-travel
- Good adjustment of switching point
- Bellows to protect plunger against soiling

Contact variants

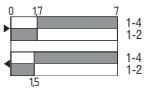
Contacts/ Switch travel	Snap action
Change-over contact with double break	**M2S 6610-11-k-z** 

Telescopic roller-plunger 2R



- Simple mounting with hexagonal steel nuts
- Large after-travel
- Good adjustment of switching point
- Also available with roller turned 90° to axis of switch body, ordering suffix -u

Contact variants

Contacts/ Switch travel	Snap action
Change-over contact with double break	**M2R 6610-11-k-z** 

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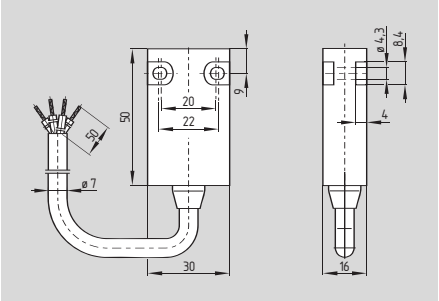
Data sheets, mounting and wiring instructions, declaration of conformity and other information at:
www.schmersal.com

ES/EM 14



- Thermoplastic enclosure
- Double-insulated ⧈
- Slow action ⊖, change-over or 2 NC with double break
- Snap action, change-over contact with single break
- Overlapping contacts available
- Mounting details to EN 50047
- Suitable for in-line mounting
- Pre-wired cable available, cable length 1 m
- Protection class IP 67
- Ex version available

Approvals

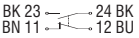
CE

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	thermoplastic, self-extinguishing UL 94-VO
Protection class:	IP 67 to EN 60529
Contact material:	silver
Switching system:	slow or snap action, positive break NC contacts ⊖
Contact type:	ES 14: change-over contact, double break, galvanically separated contact bridges EM 14: change-over contact, single break
Termination:	cable H05VV-F
Cable section:	ES 14: 4 x 0.75mm^2 EM 14: 3 x 0.75 mm^2
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	ES 14: 6 A EM 14: 5 A
I_e/U_e:	ES 14: 6 A / 250 VAC 0.25 A / 230 VDC EM 14: 5 A / 250 VAC 0.16 A / 230 VDC
Utilisation category:	AC-15, DC-13
Max. fuse rating:	ES 14: 6 A gG D-fuse EM 14: 5 A gG D-fuse
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	> 1 million operations
Switching frequency:	1800/h
Repeat accuracy of switching points:	ES 14: ± 0.1 mm EM 14: ± 0.2 mm
Impact resistance/ resistance to shock:	50 g / 6 ms

Contact variants

Slow action, 1 NO / 1 NC



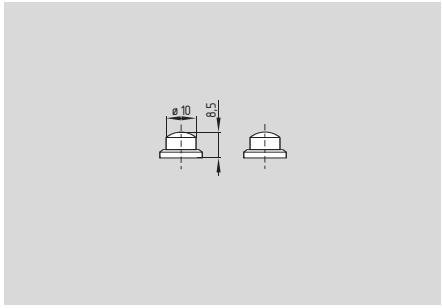
Snap action, Change-over contact

Ordering details

E① 14 ②-③-④-⑤

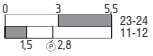
No.	Replace	Description
①	S	Slow action ⊖
	M	Snap action
②	For the appropriate actuator: see page 1-43 and following	
③	1Ö/1S	1 NO/1 NC
	1S/1Ö UE	Overlapping contacts on request
	2Ö	2 NC
④	ST	Plug-in connector M12 (A-Coding)
	s	Cable output from side
⑤		Cable length 1 m
	2m	2 m
	5m	5 m
	10m	10 m

Plunger

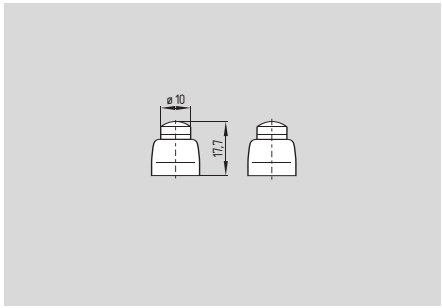


- Actuating speed 0.5 m/s with an actuating angle of 0°

Contact variants

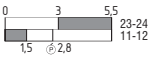
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14** 
Change-over	**EM 14** 	

Plunger W

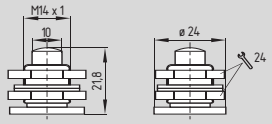


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Collar to protect against the entry of foreign bodies

Contact variants

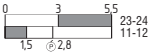
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 W** 
Change-over	**EM 14 W** 	

Plunger F

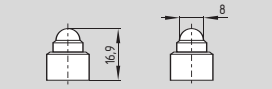


- Actuating speed 0.5 m/s with an actuating angle of 0°

Contact variants

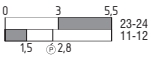
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		ES 14 F 
Change-over	EM 14 F 	

Ball plunger KU

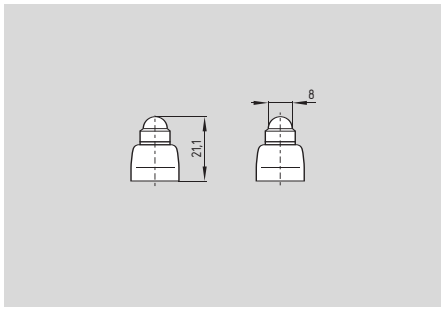


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		ES 14 KU 
Change-over	EM 14 KU 	

Ball plunger WKU

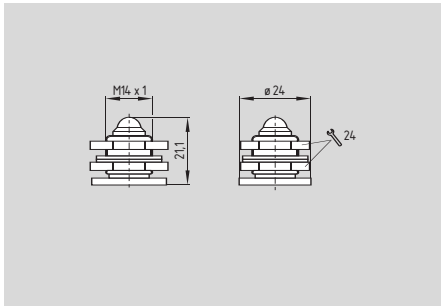


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 WKU** 0 3 5,5 23-24 11-12 1,5 ⌀2,8
Change-over	**EM 14 WKU** 0 1,5 5,5 1-4 1-2	

Ball plunger FKU

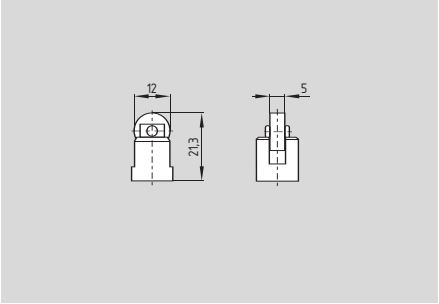


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

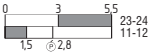
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 FKU** 0 3 5,5 23-24 11-12 1,5 ⌀2,8
Change-over	**EM 14 FKU** 0 1,5 5,5 1-4 1-2	

Roller plunger R

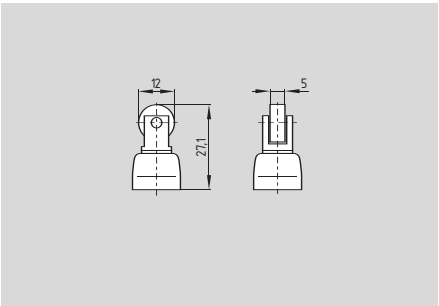


- Actuating speed 0.5 m/s with an actuating angle of 30°
- Metal rollers
- Can be supplied with actuator turned 90°

Contact variants

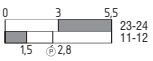
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 R** 
Change-over	**EM 14 R** 	

Roller plunger WR

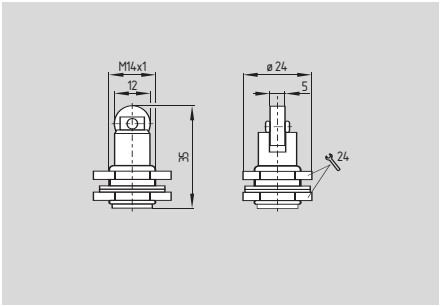


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Can be supplied with actuator turned 90°
- Collar to protect against the entry of foreign bodies

Contact variants

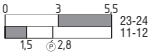
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 WR** 
Change-over	**EM 14 WR** 	

Roller plunger FR

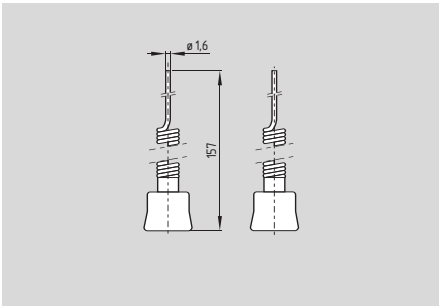


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Can be supplied with actuator turned 90°

Contact variants

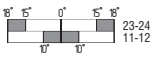
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 FR** 
Change-over	**EM 14 FR** 	

Long spring wire TL

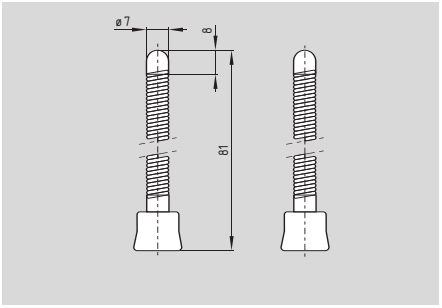


- Spring rod can be actuated from any direction
- Wire can be shortened 30 mm in actuating area
- Exact linear actuation not necessary
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

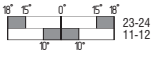
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 TL** 
Change-over	**EM 14 TL** 	

Spring rod TF

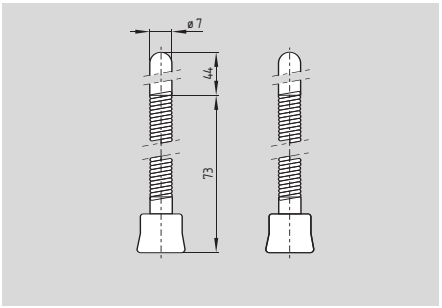


- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

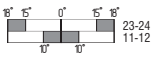
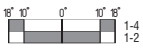
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 TF** 
Change-over	**EM 14 TF** 	

Spring rod TK

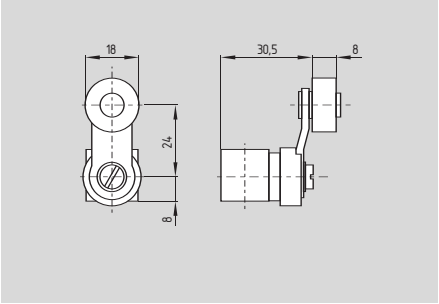


- Wear-restistant plastic rod
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

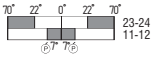
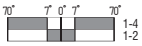
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 TK** 
Change-over	**EM 14 TK** 	

Roller lever D

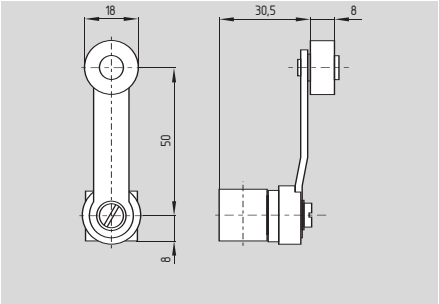


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

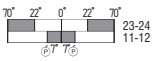
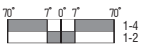
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 D** 
Change-over	**EM 14 D** 	

Long roller lever DL

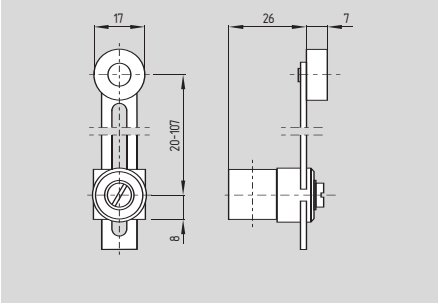


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

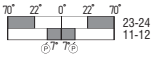
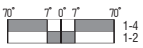
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 DL** 
Change-over	**EM 14 DL** 	

Roller lever DS

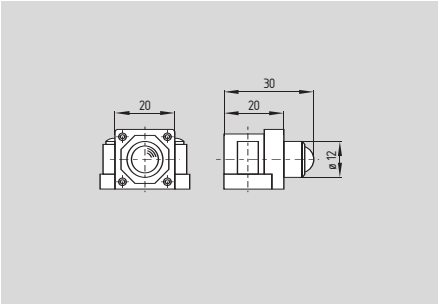


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

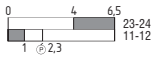
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 DS** 
Change-over	**EM 14 DS** 	

Ball plunger at front VKU

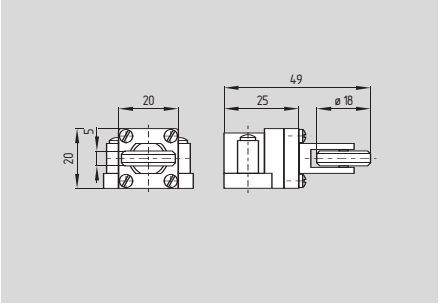


- Actuation from any direction
- Actuator head with captive stainless steel ball actuator

Contact variants

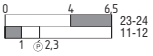
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 VKU** 
Change-over	**EM 14 VKU** 	

Roller plunger at front VR

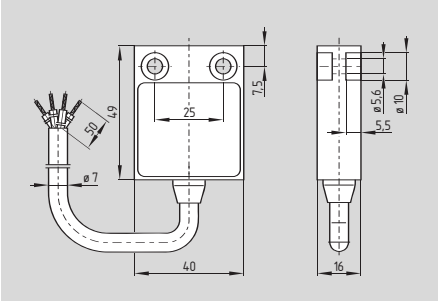


- Actuator can be transposed by 90°
- Wear-restistant thermoplastic roller

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC		**ES 14 VR** 
Change-over	**EM 14 VR** 	

ES 13



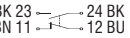
- Thermoplastic enclosure
- Double-insulated ⧈
- Slow action ⊖, change-over with double break
- Version with 3 contacts has cable on left-hand side
- Overlapping contacts available
- Suitable for in-line mounting
- Pre-wired cable available, cable length 1 m
- Protection class IP 67
- Ex version available

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	thermoplastic, self-extinguishing UL 94-VO
Protection class:	IP 67 to EN 60529
Contact material:	silver
Switching system:	slow action, positive break NC contacts ⊖
Contact type:	change-over contact, double break with 2 separate contact bridges
Termination:	cable H05VV-F
Cable section:	4 x 0.75 mm^2
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
I_e/U_e:	6 A / 250 VAC 0.25 A / 230 VDC
Utilisation category:	AC-15, DC-13
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	> 1 million operations
Switching frequency:	1800/h
Repeat accuracy of switching points:	± 0.1 mm
Impact resistance/ resistance to shock:	50 g / 6 ms

Contact variants

1 NO / 1 NC



Approvals

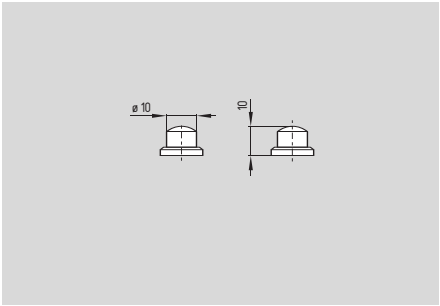
CE

Ordering details

ES 13 ① ②-③-④

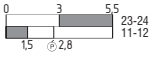
No.	Replace	Description
①		For the appropriate actuator: see page 1-53 and following
②	1Ö/1S	1 NO/1 NC (3 contacts on request)
③	ST	Plug-in connector M12 (A-Coding)
	s	Cable output from side
	B	Cable entry M16 bottom
	SB	from side
④		Cable length 1 m
	2m	2 m
	5m	5 m
	10m	10 m

Plunger

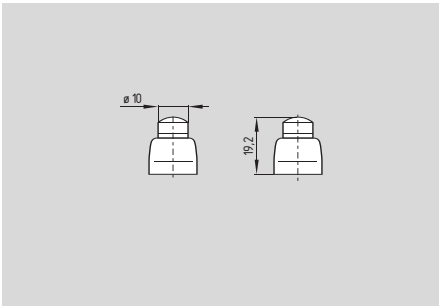


- Actuating speed 0.5 m/s with an actuating angle of 0°

Contact variants

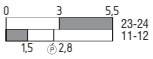
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 1Ö/1S** 

Plunger W

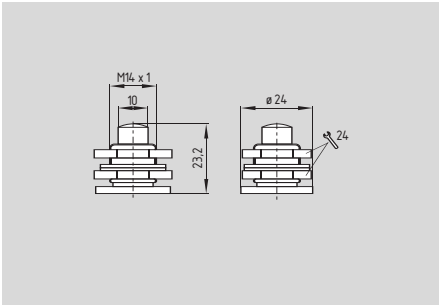


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Collar to protect against the entry of foreign bodies

Contact variants

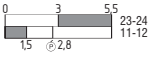
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 W 1Ö/1S** 

Plunger F

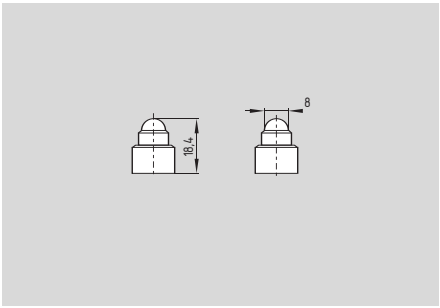


- Actuating speed 0.5 m/s with an actuating angle of 0°

Contact variants

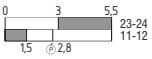
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 F 1Ö/1S** 

Ball plunger KU

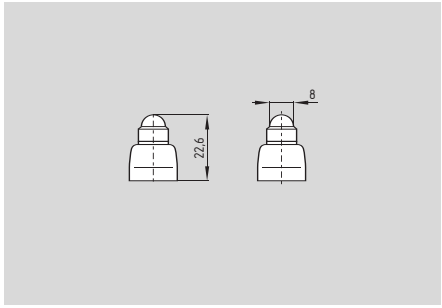


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

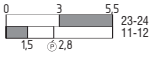
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 KU 1Ö/1S** 

Ball plunger WKU

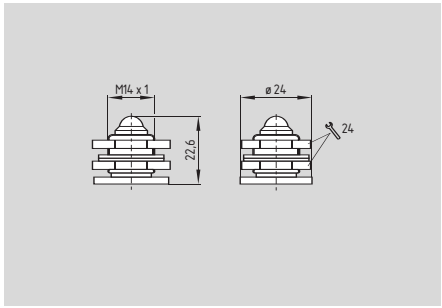


- Actuating speed 0.5 m/s with an actuating angle of 15°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point
- Collar to protect against the entry of foreign bodies

Contact variants

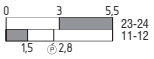
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 WKU 1Ö/1S** 

Ball plunger FKU

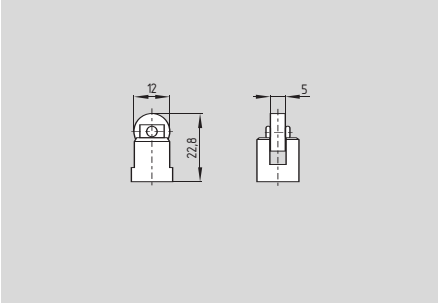


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Ball Ø 8 mm
- Exact repeatability of switching point

Contact variants

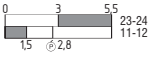
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 FKU 1Ö/1S** 

Roller plunger R

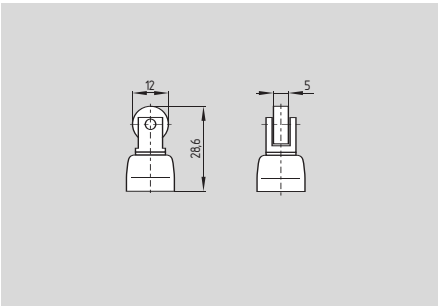


- Actuating speed 0.5 m/s with an actuating angle of 30°
- Metal rollers
- Can be supplied with actuator turned 90°

Contact variants

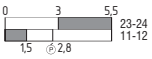
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 R 1Ö/1S** 

Roller plunger WR

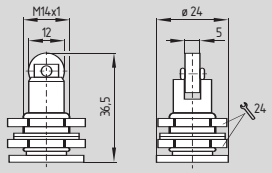


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Can be supplied with actuator turned 90°
- Collar to protect against the entry of foreign bodies

Contact variants

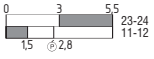
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 WR 1Ö/1S** 

Roller plunger FR

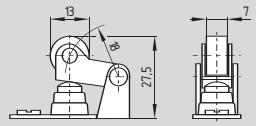


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Can be supplied with actuator turned 90°

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 FR 1Ö/1S** 

Offset roller lever WH

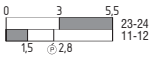


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 25°
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

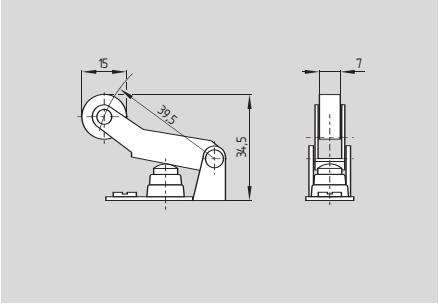
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 WH 1Ö/1S** 

Offset roller lever WHL

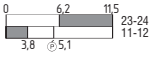


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 30°
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

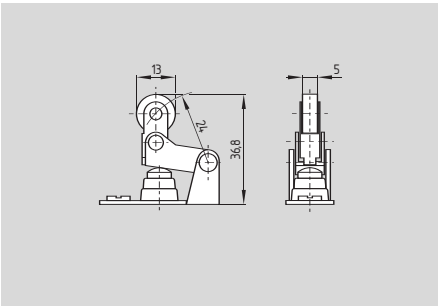
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 WHL 1Ö/1S** 

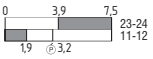
Roller lever WHK



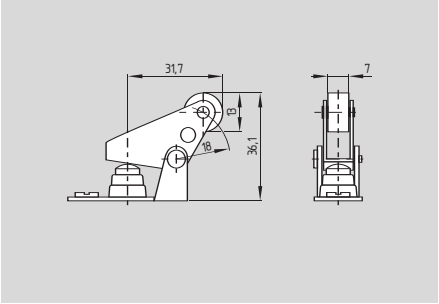
- Actuating speed 0.5 m/s with an actuating angle of α = 40°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

Legend
α: Actuating angle from right of switch axis

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 WHK 1Ö/1S** 

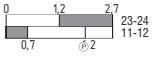
Roller lever WPH



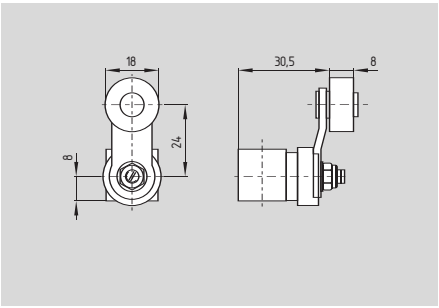
- Actuating speed 0.5 m/s with actuating angle of α = 30° to switch axis
- Actuation parallel to axis of switch from below
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

Legend
α: Actuating angle from below

Contact variants

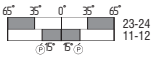
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 WPH 1Ö/1S** 

Roller lever D

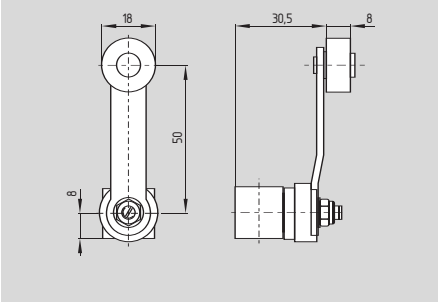


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

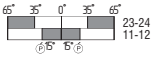
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 D 1Ö/1S** 

Long roller lever DL

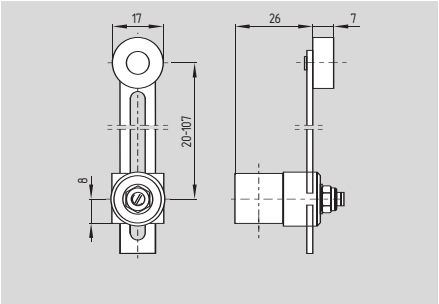


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

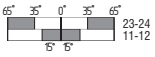
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 DL 1Ö/1S** 

Roller lever DS

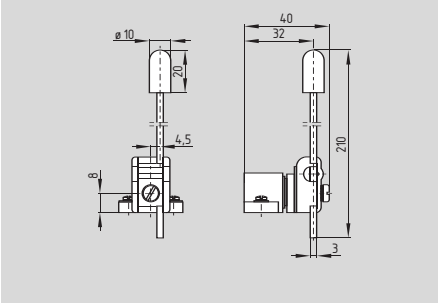


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

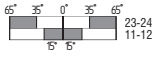
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 DS 1Ö/1S** 

Wire lever DD

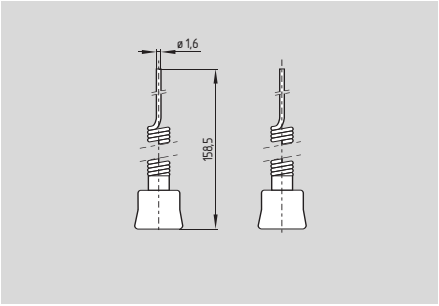


- Wear-restistant thermoplastic tip
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°

Contact variants

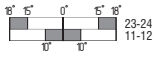
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 DD 1Ö/1S** 

Long spring wire TL

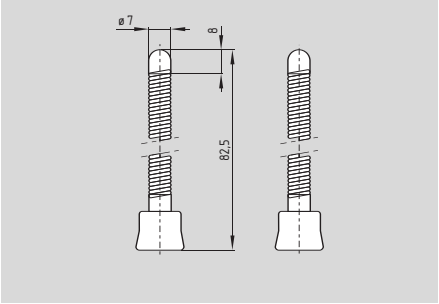


- Spring rod can be actuated from any direction
- Wire can be shortened 30 mm in actuating area
- Exact linear actuation not necessary
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

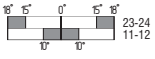
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 TL 1Ö/1S** 

Spring rod TF

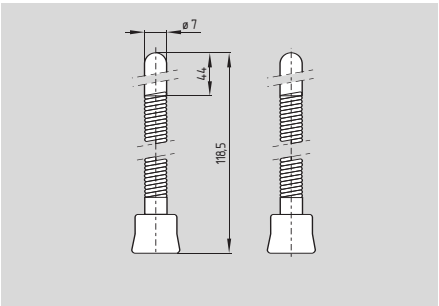


- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

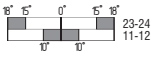
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 TF 1Ö/1S** 

Spring rod TK

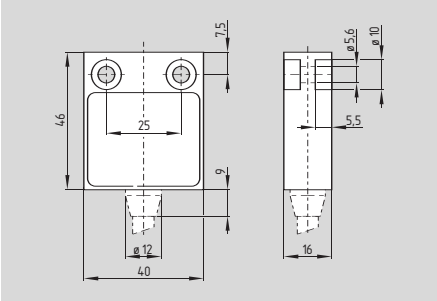


- Wear-restistant plastic rod
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 13 TK 1Ö/1S** 

E 12



- Metal enclosure
- Snap action, change-over contact with single break
- Suitable for in-line mounting
- Pre-wired cable available, cable length 1 m
- Protection class IP 67
- Ex version available

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	pressure die cast Al alloy
Protection class:	IP 67 to EN 60529
Contact material:	silver
Switching system:	snap action
Contact type:	change-over contact, single break
Termination:	cable H05VV-F
Cable section:	4 x 0.75 mm^2
U_i:	250 V
I_{the}:	5 A
I_e/U_e:	5 A / 250 VAC 0.16 A / 230 VDC
Utilisation category:	AC-15, DC-13
Max. fuse rating:	5 A gG D-fuse
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	1 million operations
Repeat accuracy of switching points:	± 0.1 mm
Impact resistance/ resistance to shock:	50 g / 6 ms

Contact variants

1-pole change-over contact

Approvals

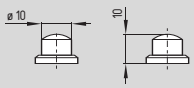
CE

Ordering details

E 12 ①-②-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-64 and following
②	s	Cable output from side
	B	Cable entry M16 bottom
	SB	from side
③		Cable length 1 m
	2m	2 m
	5m	5 m
	10m	10 m

Plunger

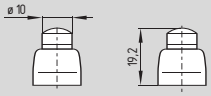


- Actuating speed 0.5 m/s with an actuating angle of 0°

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12** 

Plunger W

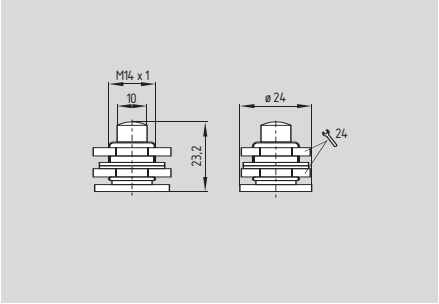


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 W** 

Plunger F

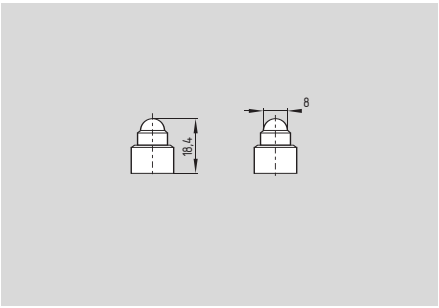


- Actuating speed 0.5 m/s with an actuating angle of 0°

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 F** 

Ball plunger KU

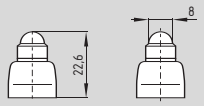


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 KU** 

Ball plunger WKU

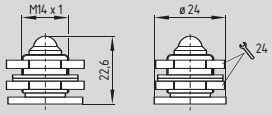


- Actuating speed 0.5 m/s with an actuating angle of 15°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 WKU** 

Ball plunger FKU

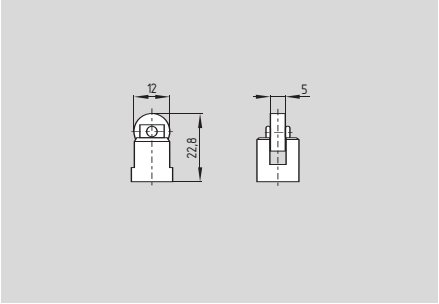


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Ball Ø 8 mm
- Exact repeatability of switching point

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 FKU** 

Roller plunger R

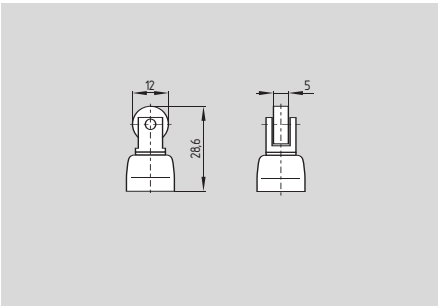


- Actuating speed 0.5 m/s with an actuating angle of 30°
- Metal rollers
- Can be supplied with actuator turned 90°

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 R** 

Roller plunger WR

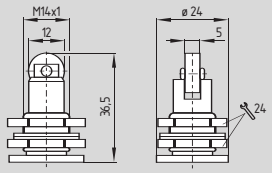


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Can be supplied with actuator turned 90°
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 WR** 

Roller plunger FR

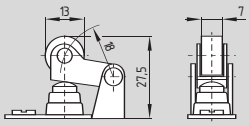


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Can be supplied with actuator turned 90°

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 FR** 

Offset roller lever WH



- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 25°
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

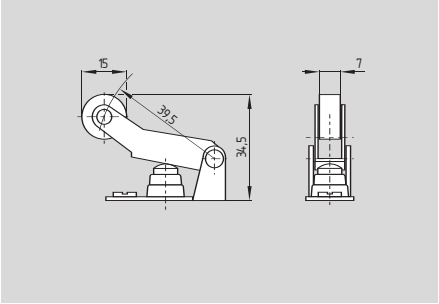
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 WH** 

Offset roller lever WHL



- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 30°
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

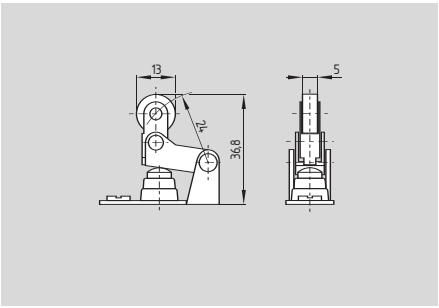
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 WHL** 

Roller lever WHK



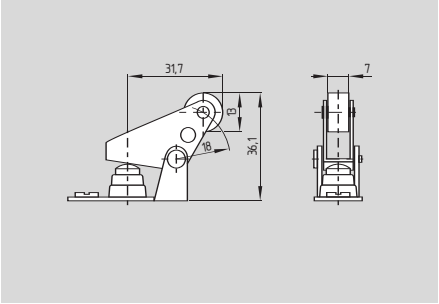
- Actuating speed 0.5 m/s with an actuating angle of α = 40°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

Legend
α: Actuating angle from right of switch axis

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 WHK** 

Roller lever WPH



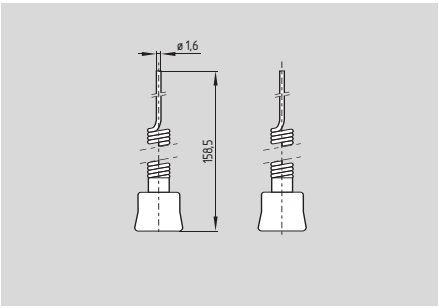
- Actuating speed 0.5 m/s with actuating angle of α = 30° to switch axis
- Actuation parallel to axis of switch from below
- Metal rollers
- Can be supplied with actuator turned 180°
- Collar to protect against the entry of foreign bodies
- With plastic roller available on request

Legend
α: Actuating angle from below

Contact variants

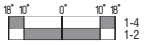
Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 WPH** 

Long spring wire TL

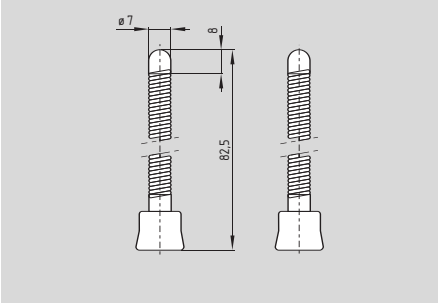


- Spring rod can be actuated from any direction
- Wire can be shortened 30 mm in actuating area
- Exact linear actuation not necessary
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 TL** 

Spring rod TF

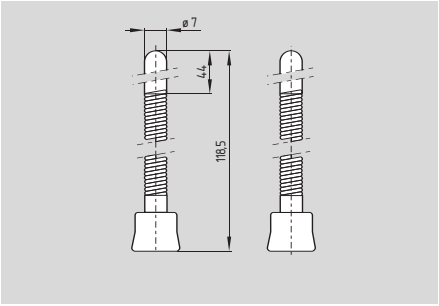


- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 TF** 

Spring rod TK

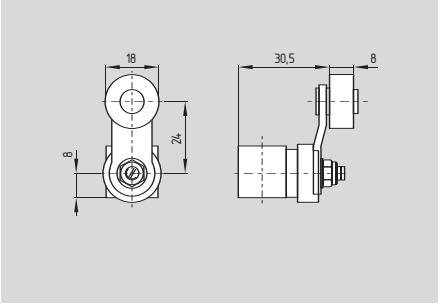


- Wear-restistant plastic rod
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 18°

Contact variants

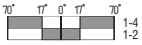
Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 TK** 

Roller lever D

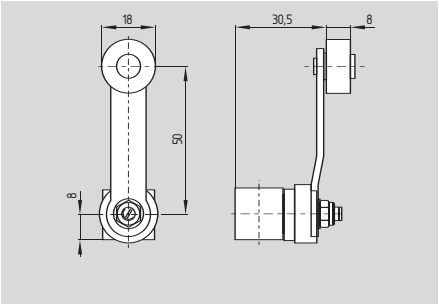


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

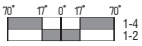
Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 D** 

Long roller lever DL

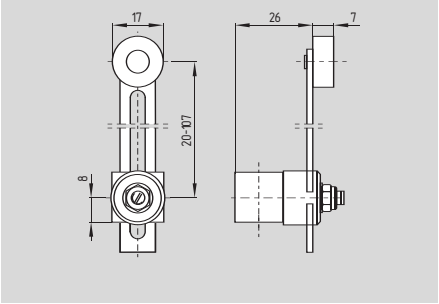


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

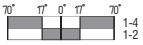
Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 DL** 

Roller lever DS

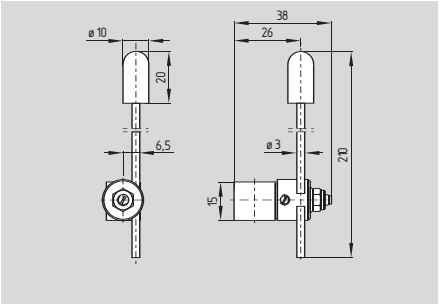


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

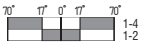
Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 DS** 

Wire lever DD

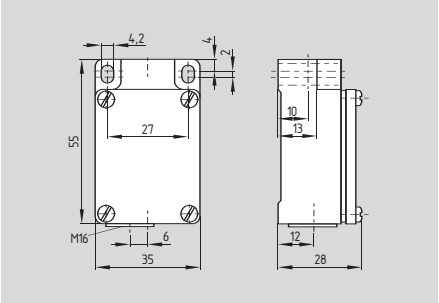


- Wear-restistant thermoplastic tip
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°

Contact variants

Contacts/ Switch travel	Snap action
1-pole change-over contact	**E 12 DD** 

ES 51



- Metal enclosure
- Slow action ⊖,
  change-over with double break
- 1 cable entry M16 x 1.5
- Protection class IP 65

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action
Contact type:	change-over contact, double break with 2 separate contact bridges
Termination:	screw terminals M 3
Cable section:	max. 1.5 mm^2 (incl. conductor ferrules)
U_i:	400 V
I_{the}:	4 A
I_e/U_e:	4 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	4 A gG D-fuse
Ambient temperature:	– 20 °C ... + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	3600/h
Actuating speed:	≥ 0.2 m/s

Contact variants

1 NO / 1 NC

Approvals

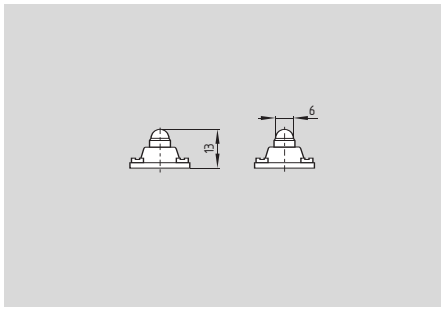
CE

Ordering details

ES 51 ① 1Ö/1S

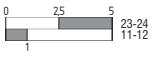
No.	Replace	Description
①		For the appropriate actuator: see page 1-75 and following

Plunger

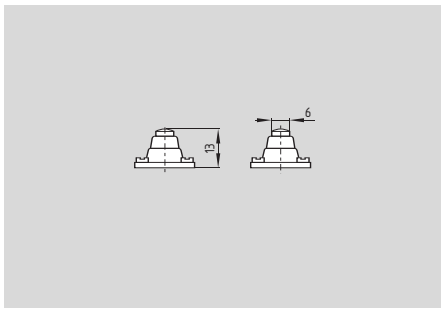


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

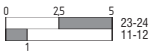
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 1Ö/1S** 

Plunger W

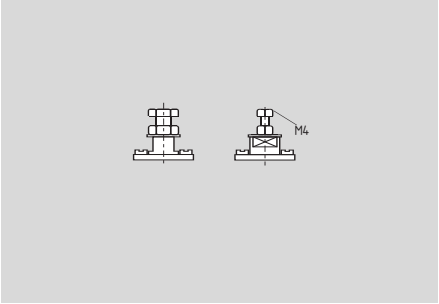


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Exact repeatability of switching point
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 W 1Ö/1S** 

Adjustable plunger ST

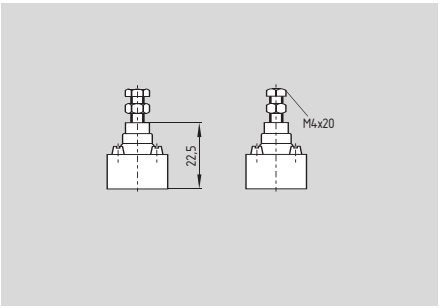


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Projection of plunger adjustable for fine setting of switching point

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 ST 1Ö/1S** 

Adjustable plunger WST

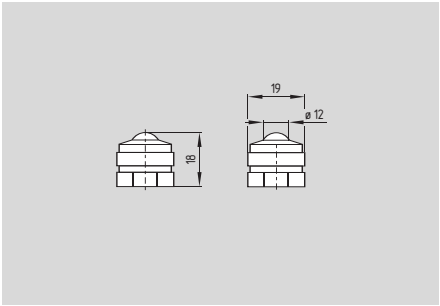


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Projection of plunger adjustable for fine setting of switching point
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 WST 1Ö/1S** 

Ball plunger KU

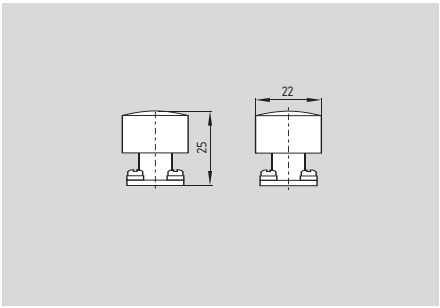


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 KU 1Ö/1S** 

Plunger WK

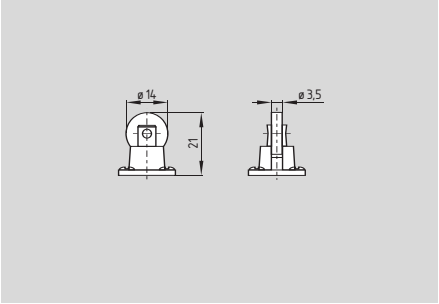


- Large actuating surface
- Safe switching even with imprecise actuation
- Suitable for manual operation
- Collar to protect against the entry of foreign bodies

Contact variants

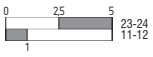
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 WK 1Ö/1S** 

Roller plunger R

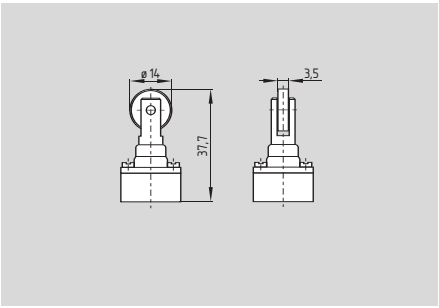


- Actuating speed 0.5 m/s with an actuating angle of 30°
- Metal rollers
- Actuator heads can be repositioned in steps 4 x 90°

Contact variants

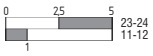
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 R 1Ö/1S** 

Roller plunger WR

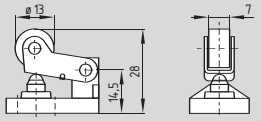


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Can be supplied with actuator turned 90°
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 WR 1Ö/1S** 

Roller lever H

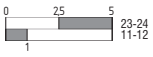


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 25°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

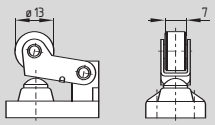
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 H 1Ö/1S** 

Offset roller lever WH

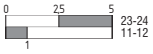


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 25°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

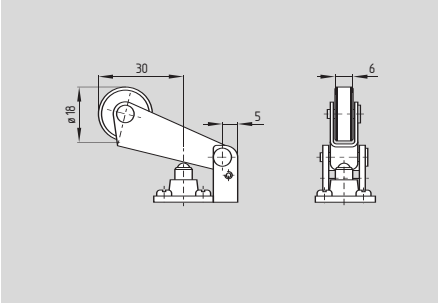
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 WH 1Ö/1S** 

Offset roller lever HL

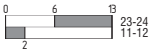


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 30°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

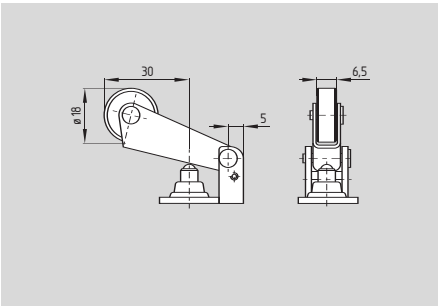
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 HL 1Ö/1S** 

Offset roller lever WHL

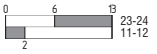


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 30°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

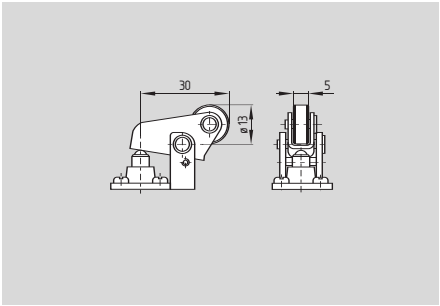
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 WHL 1Ö/1S** 

Roller lever PH



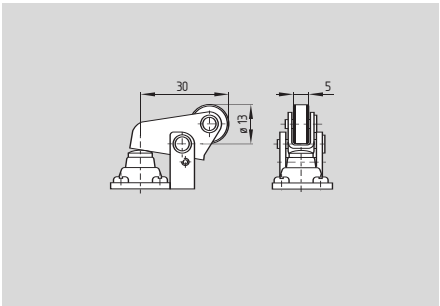
- Actuating speed 0.5 m/s with actuating angle of α = 30° to switch axis
- Actuation parallel to axis of switch from below
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Legend
α: Actuating angle from below

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 PH 1Ö/1S** 

Roller lever WPH



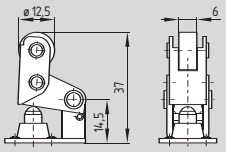
- Actuating speed 0.5 m/s with actuating angle of α = 30° to switch axis
- Actuation parallel to axis of switch from below
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

Legend
α: Actuating angle from below

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 WPH 1Ö/1S** 

Roller lever HK



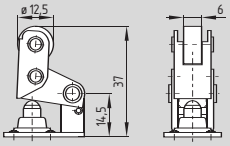
- Actuating speed 0.5 m/s with an actuating angle of α = 40°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Legend
α: Actuating angle from right of switch axis

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 HK 1Ö/1S** 

Roller lever WHK



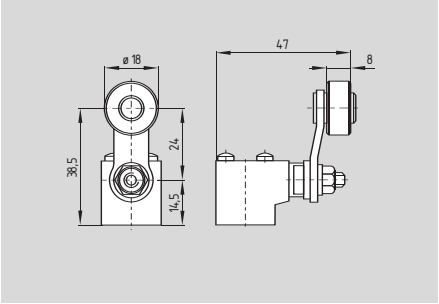
- Actuating speed 0.5 m/s with an actuating angle of α = 40°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

Legend
α: Actuating angle from right of switch axis

Contact variants

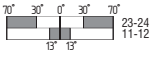
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 WHK 1Ö/1S** 

Roller lever D

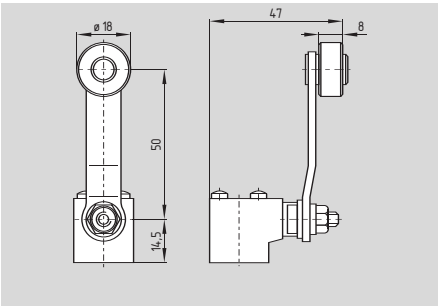


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

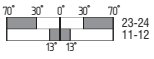
Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 D 1Ö/1S** 

Long roller lever DL

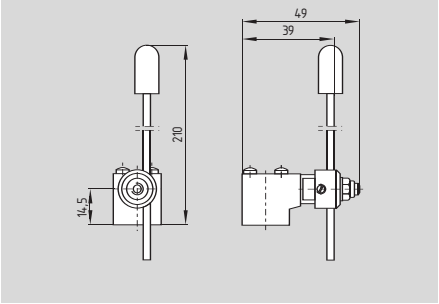


Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 DL 1Ö/1S** 

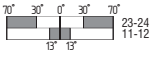
- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Wire lever DD

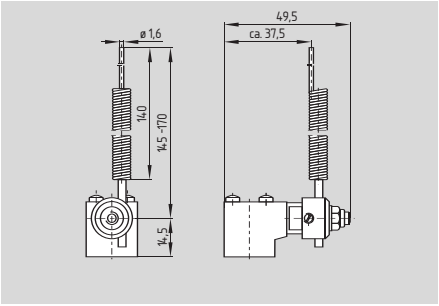


- Wear-restistant thermoplastic tip
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°

Contact variants

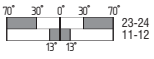
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 DD 1Ö/1S** 

Spring-rod lever DF

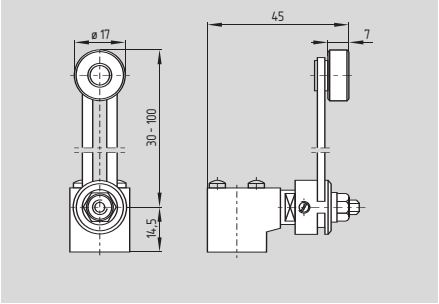


- Spring rod can be actuated from any direction
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°

Contact variants

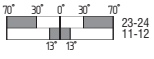
Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 DF 1Ö/1S** 

Roller lever DS

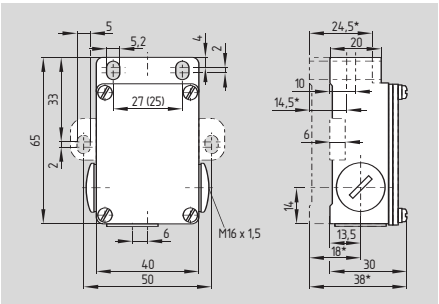


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

Contacts/ Switch travel	Slow action
1 NO / 1 NC	**ES 51 DS 1Ö/1S** 

ES/EM 41 and ES/EM 411



* Dimensions only for ES/EM 411

- Metal enclosure
- Slow action ⊖, change-over or 2 NC with double break
- Snap action, change-over contact with double break
- Overlapping contacts available
- ES/EM 411: with 25 mm mounting centres
- 3 cable entries M16 x 1.5
- Protection class IP 65
- Available with interlocking
- For temperatures up to 180 °C on request

Approvals

CE

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow or snap action
Contact type:	change-over contact, double break with 2 separate contact bridges
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	400 V
I_{the}:	6 A
I_e/U_e:	6 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	6 A gG D-fuse
Contact opening:	slow action: 2 x 5 mm snap action: 2 x 1 mm
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	3600/h
Actuating speed:	≥ 0.2 m/s
Repeat accuracy of switching points:	± 0.05 mm
Impact resistance/ resistance to shock:	50 g / 6 ms

Contact variants

Snap action
1 NO / 1 NC

Slow action
1 NO / 1 NC

2 NC

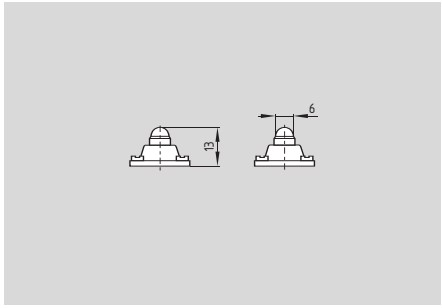
Slow action with overlapping contacts
1 NO / 1 NC

Ordering details

E① ② ③ ④-⑤

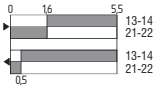
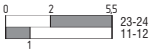
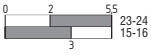
No.	Replace	Description
①	S	Slow action ⊖
	M	Snap action
②	41	Standard housing
	411	Housing with 25 mm mounting centres
③	For the appropriate actuator: see page 1-87 and following	
④	1Ö/1S	1 NO/1 NC
	1S/1Ö UE	Overlapping contacts on request
	2Ö	2 NC
⑤	BL	Mounting straps on side
	RL5,3	Enclosure with circular mounting holes

Plunger

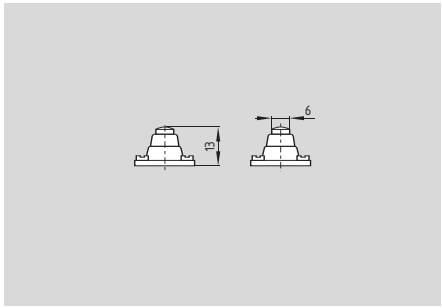


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

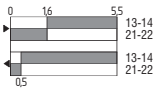
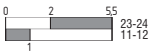
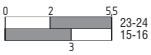
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. 1Ö/1S** 	**ES 4.. 1Ö/1S** 	**ES 4.. UE** 
2 NC		**ES 4.. 2Ö** 	

Plunger W

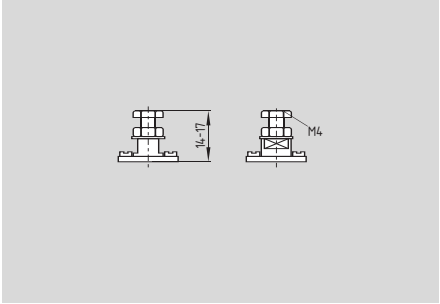


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Exact repeatability of switching point
- Collar to protect against the entry of foreign bodies

Contact variants

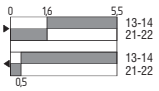
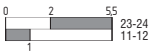
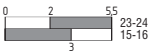
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. W 1Ö/1S** 	**ES 4.. W 1Ö/1S** 	**ES 4.. W UE** 
2 NC		**ES 4.. W 2Ö** 	

Adjustable plunger ST

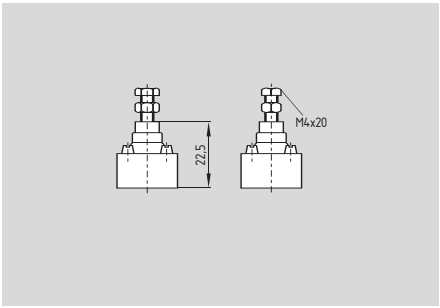


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Length of plunger adjustable by means of M 4 setting screw
- For fine setting of switch travel

Contact variants

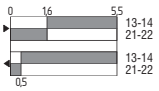
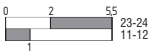
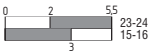
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. ST 1Ö/1S** 	**ES 4.. ST 1Ö/1S** 	**ES 4.. ST UE** 
2 NC		**ES 4.. ST 2Ö** 	

Adjustable plunger WST

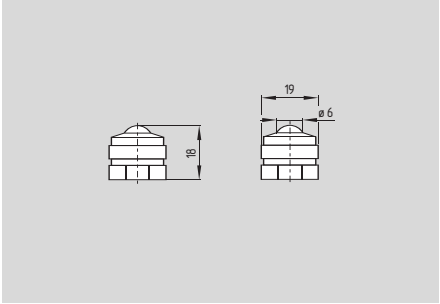


- Actuating speed 0.5 m/s with an actuating angle of 0°
- Length of plunger adjustable by means of M 4 setting screw
- For fine setting of switch travel
- Collar to protect against the entry of foreign bodies

Contact variants

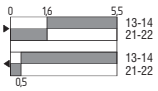
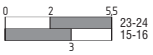
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. WST 1Ö/1S** 	**ES 4.. WST 1Ö/1S** 	**ES 4.. WST UE** 
2 NC		**ES 4.. WST 2Ö** 	

Ball plunger KU

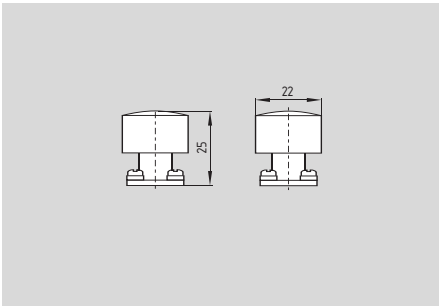


- Actuating speed 0.5 m/s with an actuating angle of 20°
- Can be actuated in line with or from side of switch axis
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point

Contact variants

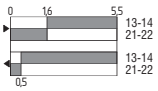
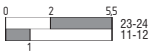
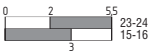
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. KU 1Ö/1S** 	**ES 4.. KU 1Ö/1S** 	**ES 4.. KU UE** 
2 NC		**ES 4.. KU 2Ö** 	

Plunger WK

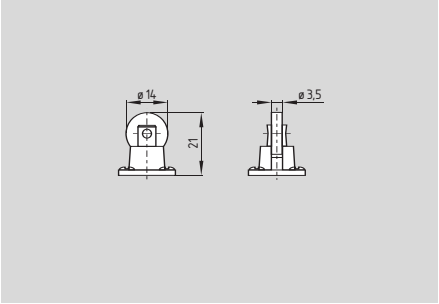


- Large actuating surface
- Safe switching even with imprecise actuation
- Suitable for manual operation
- Collar to protect against the entry of foreign bodies

Contact variants

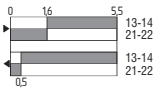
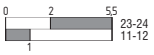
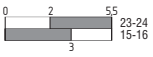
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. WK 1Ö/1S** 	**ES 4.. WK 1Ö/1S** 	**ES 4.. WK UE** 
2 NC		**ES 4.. WK 2Ö** 	

Roller plunger R

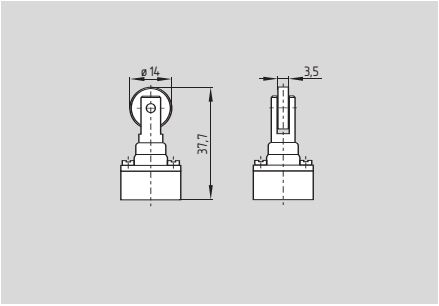


- Actuating speed 0.5 m/s with an actuating angle of 30°
- Metal rollers
- Actuator can be repositioned by 90°

Contact variants

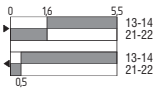
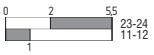
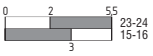
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. R 1Ö/1S** 	**ES 4.. R 1Ö/1S** 	**ES 4.. R UE** 
2 NC		**ES 4.. R 2Ö** 	

Roller plunger WR

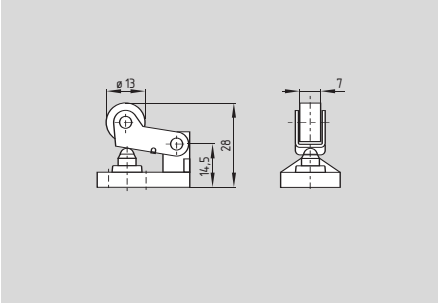


- Actuating speed 0.5 m/s with an actuating angle of 25°
- Metal rollers
- Actuator can be repositioned by 90°
- Collar to protect against the entry of foreign bodies

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. WR 1Ö/1S** 	**ES 4.. WR 1Ö/1S** 	**ES 4.. WR UE** 
2 NC		**ES 4.. WR 2Ö** 	

Offset roller lever H

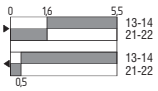
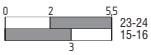


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 25°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

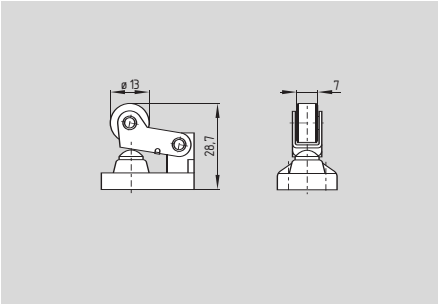
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. H 1Ö/1S** 	**ES 4.. H 1Ö/1S** 	**ES 4.. H UE** 
2 NC		**ES 4.. H 2Ö** 	

Offset roller lever WH

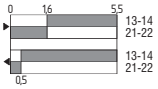
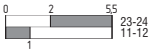
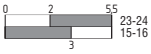


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 25°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

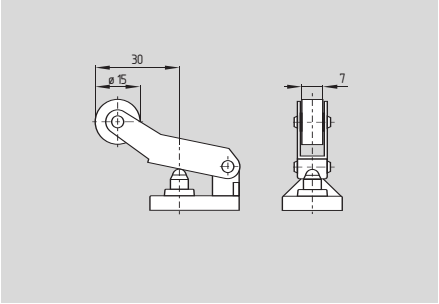
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. WH 1Ö/1S** 	**ES 4.. WH 1Ö/1S** 	**ES 4.. WH UE** 
2 NC		**ES 4.. WH 2Ö** 	

Offset roller lever HL

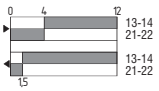
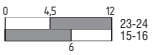


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 30°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

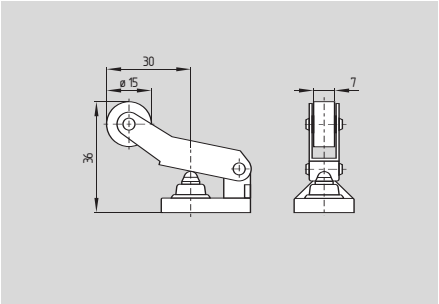
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. HL 1Ö/1S** 	**ES 4.. HL 1Ö/1S** 	**ES 4.. HL UE** 
2 NC		**ES 4.. HL 2Ö** 	

Offset roller lever WHL

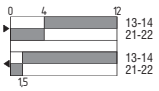
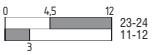
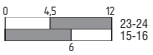


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 30°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

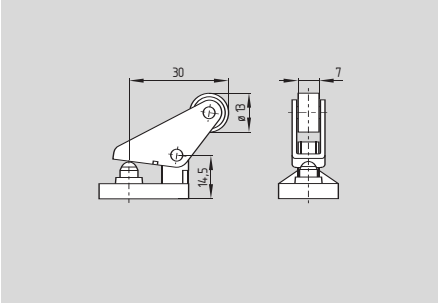
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. WHL 1Ö/1S** 	**ES 4.. WHL 1Ö/1S** 	**ES 4.. WHL UE** 
2 NC		**ES 4.. WHL 2Ö** 	

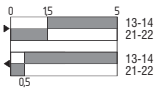
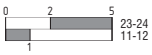
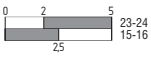
Roller lever PH



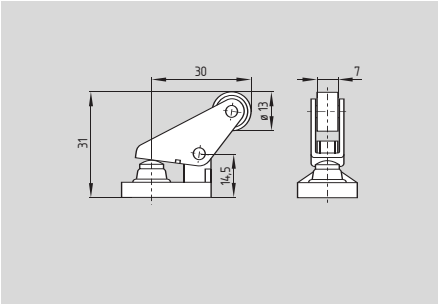
- Actuating speed 0.5 m/s with an actuating angle of α = 30°
- Actuation parallel to axis of switch from below
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Legend
α: Actuating angle from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. PH 1Ö/1S** 	**ES 4.. PH 1Ö/1S** 	**ES 4.. PH UE** 
2 NC		**ES 4.. PH 2Ö** 	

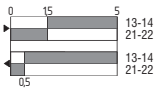
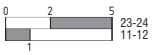
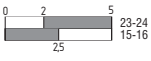
Roller lever WPH



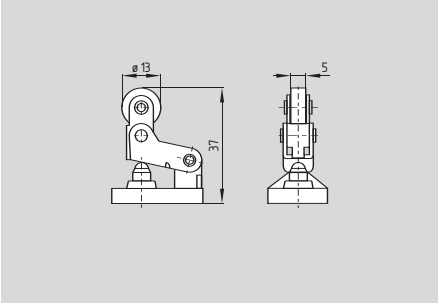
- Actuating speed 0.5 m/s with an actuating angle of α = 30°
- Actuation parallel to axis of switch from below
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

Legend
α: Actuating angle from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. WPH 1Ö/1S** 	**ES 4.. WPH 1Ö/1S** 	**ES 4.. WPH UE** 
2 NC		**ES 4.. WPH 2Ö** 	

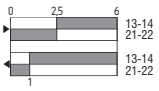
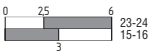
Roller lever HK



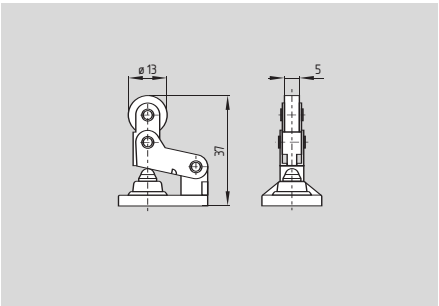
- Actuating speed 0.5 m/s with an actuating angle of α = 40°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Legend
α: Actuating angle from right of switch axis

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. HK 1Ö/1S** 	**ES 4.. HK 1Ö/1S** 	**ES 4.. HK UE** 
2 NC		**ES 4.. HK 2Ö** 	

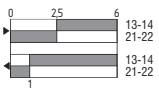
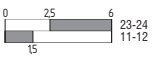
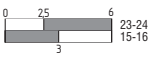
Roller lever WHK



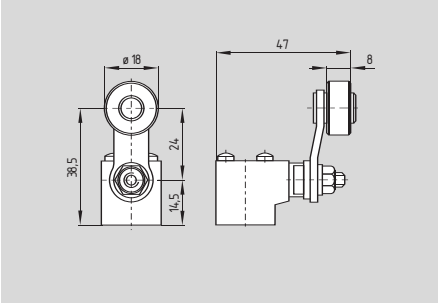
- Actuating speed 0.5 m/s with an actuating angle of α = 40°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

Legend
α: Actuating angle from right of switch axis

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. WHK 1Ö/1S** 	**ES 4.. WHK 1Ö/1S** 	**ES 4.. WHK UE** 
2 NC		**ES 4.. WHK 2Ö** 	

Roller lever D

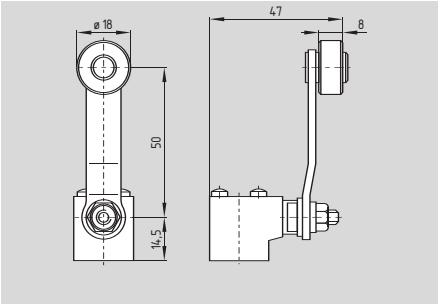


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. D 1Ö/1S**	**ES 4.. D 1Ö/1S**	**ES 4.. D UE**
2 NC		**ES 4.. D 2Ö**	

Long roller lever DL

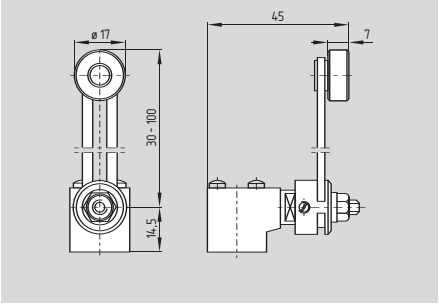


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

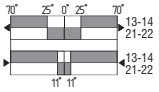
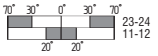
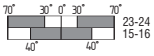
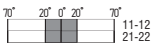
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. DL 1Ö/1S**	**ES 4.. DL 1Ö/1S**	**ES 4.. DL UE**
2 NC		**ES 4.. DL 2Ö**	

Roller lever DS

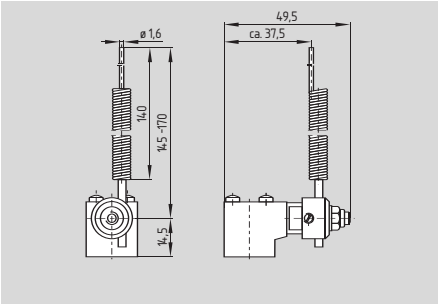


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

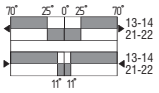
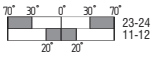
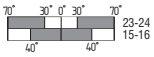
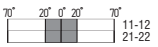
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. DS 1Ö/1S** 	**ES 4.. DS 1Ö/1S** 	**ES 4.. DS UE** 
2 NC		**ES 4.. DS 2Ö** 	

Spring-rod lever DF

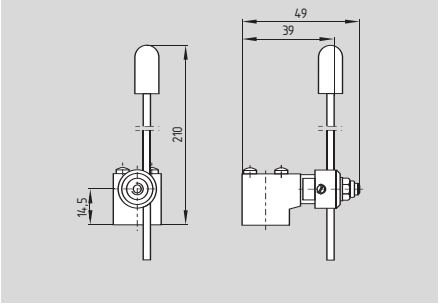


- Actuating speed 0.5 m/s
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°

Contact variants

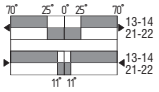
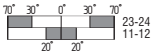
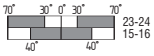
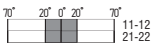
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. DF 1Ö/1S** 	**ES 4.. DF 1Ö/1S** 	**ES 4.. DF UE** 
2 NC		**ES 4.. DF 2Ö** 	

Wire lever DD

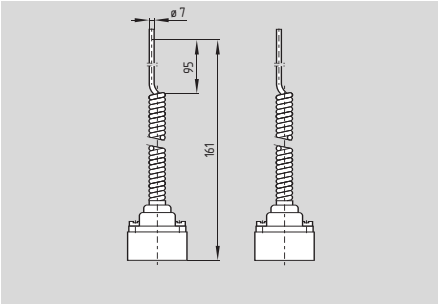


- Actuating speed 0.5 m/s
- Wear-restistant thermoplastic tip
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°

Contact variants

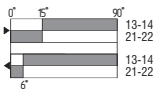
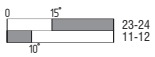
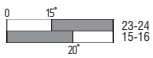
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. DD 1Ö/1S** 	**ES 4.. DD 1Ö/1S** 	**ES 4.. DD UE** 
2 NC		**ES 4.. DD 2Ö** 	

Long spring wire TL

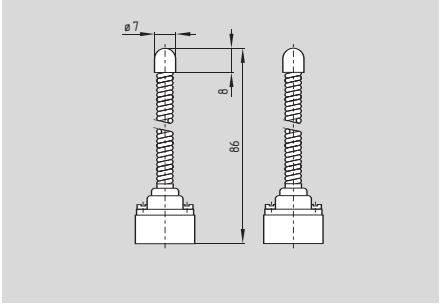


- Spring rod can be actuated from any direction
- Wire can be shortened 30 mm in actuating area
- Exact linear actuation not necessary
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

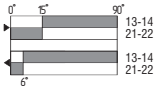
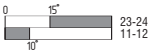
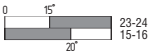
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. TL 1Ö/1S** 	**ES 4.. TL 1Ö/1S** 	**ES 4.. TL UE** 
2 NC		**ES 4.. TL 2Ö** 	

Spring rod TF

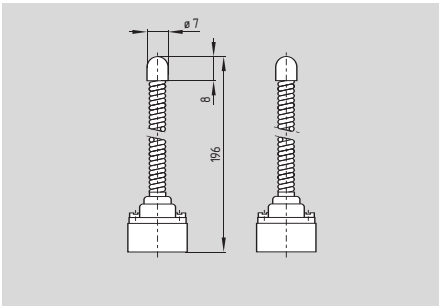


- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

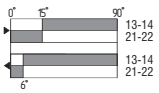
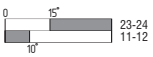
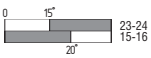
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. TF 1Ö/1S** 	**ES 4.. TF 1Ö/1S** 	**ES 4.. TF UE** 
2 NC		**ES 4.. TF 2Ö** 	

Long spring wire TFL

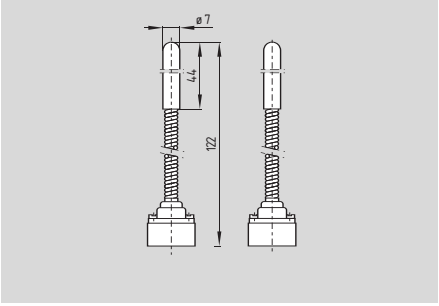


- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

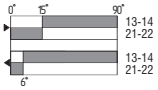
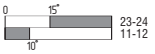
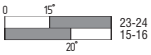
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. TFL 1Ö/1S** 	**ES 4.. TFL 1Ö/1S** 	**ES 4.. TFL UE** 
2 NC		**ES 4.. TFL 2Ö** 	

Spring rod TK

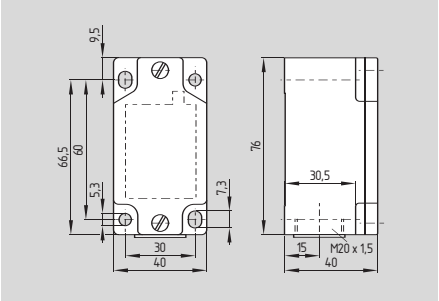


- Wear-restistant thermoplastic tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 4.. TK 1Ö/1S** 	**ES 4.. TK 1Ö/1S** 	**ES 4.. TK UE** 
2 NC	**ES 4.. TK 2Ö** 		

M 330



- Metal enclosure
- Snap action, self-cleaning contacts, change-over contact, double break, silver contacts
- Galvanically separated contact bridges
- Mountings and switching points to EN 50041
- Particularly long life
- Suitable for low actuating speeds
- Free of silicon
- Proved in power station applications
- 1 cable entry M20 x 1.5
- Protection class IP 65
- Min. actuating speed 1 mm/min with reference to the plunger
- Available with plug-in connection

Approvals

CE

Technical data

Standards:	IEC/EN 60947-5-1 DIN EN 50041
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action
Contact type:	change-over contact, double break, same potential
Termination:	screw terminals
Cable section:	max. 2.5 mm^2 (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
I_e/U_e:	2.5 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	6 A gG D-fuse
Contact opening:	2 x 0.5 mm
Switchover time:	≤ 10 ms (with actuating speed 10 mm/min on plunger)
Bounce duration:	≤ 1.5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	> 30 million operations
Switching frequency:	5000/h
Repeat accuracy of switching points:	± 0.02 mm on plunger
Impact resistance/ resistance to shock:	50 g / 6 ms

Contact variants

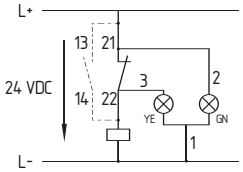
1 NO / 1 NC

Ordering details

M① 330-11y-②-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-101 and following
②		Without LED
	G24	With LED
③	AuNi	Gold-nickle alloy contacts
	1164	Splined shaft and lever with 10° toothing
	1366	Version for high temperature up to + 160 °C

Note

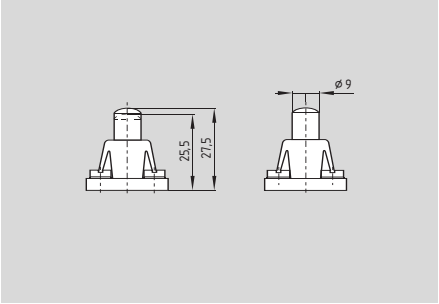


LED version

Ordering suffix G24, protected against incorrect polarity and voltage spikes.

- Supply voltage indication: Green (GN)
- Switching position indication: Yellow (YE)

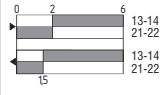
Plunger S



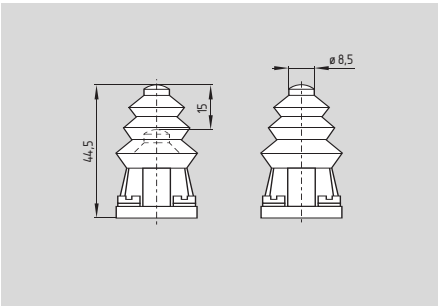
- Required actuating force 17.5 N
- To DIN EN 50041
- Version for high temperature up to + 160 °C, ordering suffix -1366

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

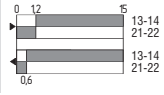
Contacts/ Switch travel	Snap action
1 NO / 1 NC	**MS 330-11y** 

Telescopic plunger 2S

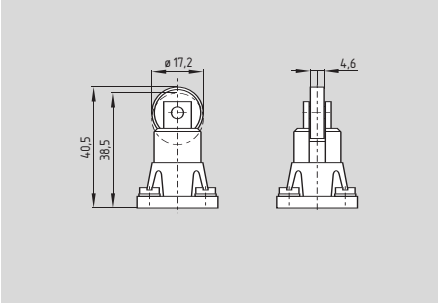


- Required actuating force 45 N
- Collar to protect against the entry of foreign bodies

Contact variants

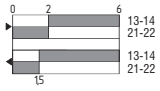
Contacts/ Switch travel	Snap action
1 NO / 1 NC	**M2S 330-11y** 

Roller plunger R

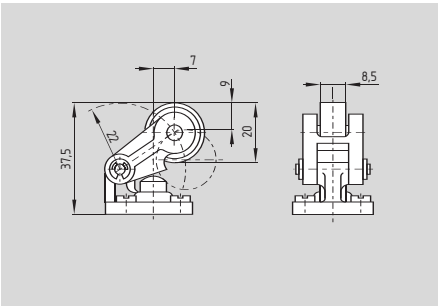


- Required actuating force 17.5 N
- Plastic roller
- Actuator head can be transposed by 90°
- To DIN EN 50041
- Metal roller available on request
- Version for high temperature up to + 160 °C, ordering suffix -1366

Contact variants

Contacts/ Switch travel	Snap action
1 NO / 1 NC	**MR 330-11y** 

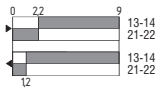
Offset roller lever K



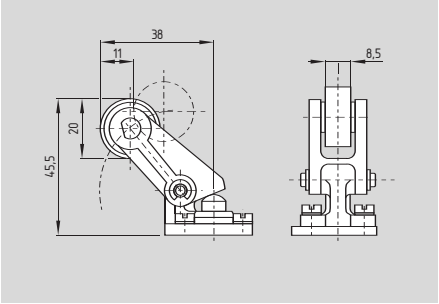
- Required actuating force 19 N
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Actuation from the right should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

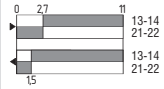
Contacts/ Switch travel	Snap action
1 NO / 1 NC	**MK 330-11y** 

Angle roller lever 3K

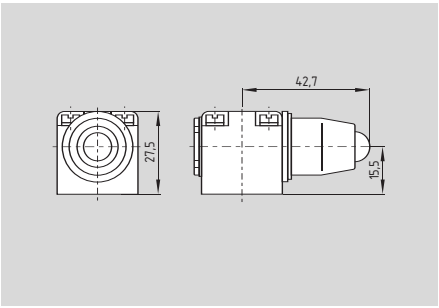


- Required actuating force 16 N
- Actuation parallel to axis of switch from below
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Contact variants

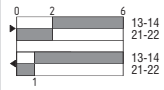
Contacts/ Switch travel	Snap action
1 NO / 1 NC	**M3K 330-11y** 

Side plunger 3S

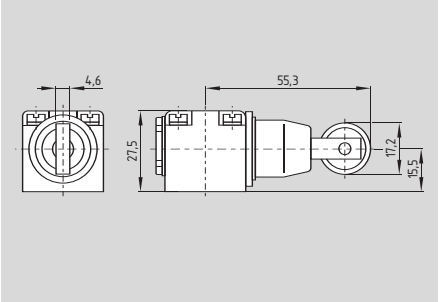


- Required actuating force 17 N
- Collar to protect against the entry of foreign bodies
- Actuator head can be repositioned in steps 4 x 90°

Contact variants

Contacts/ Switch travel	Snap action
1 NO / 1 NC	**M3S 330-11y** 

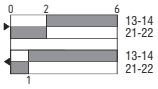
Side roller plunger 3R



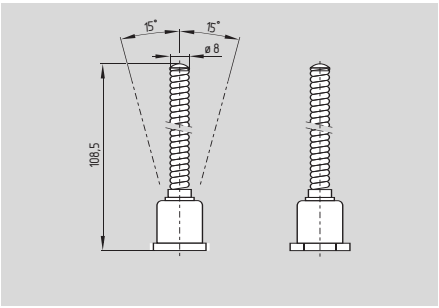
- Required actuating force 17 N
- Collar to protect against the entry of foreign bodies
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Contact variants

Contacts/ Switch travel	Snap action
1 NO / 1 NC	**M3R 330-11y**



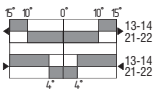
Spring rod lever AF



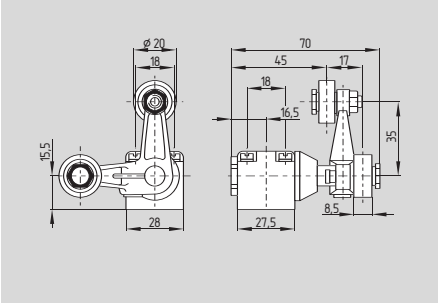
- Required actuating force 9.0 N
- Can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 15°

Contact variants

Contacts/ Switch travel	Snap action
1 NO / 1 NC	**MAF 330-11y**



Forked roller lever 4D

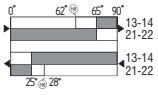


- With latching end position
- Actuator head with 90° end position latching
- Required actuating torque 50.5 Ncm
- Plastic rollers
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

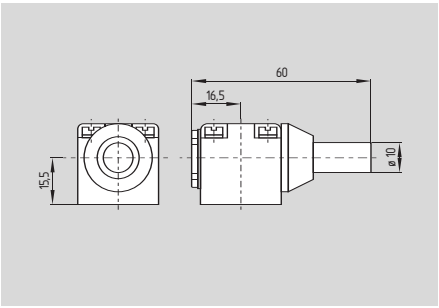
Legend
Ⓗ8: Snap action point

Contact variants

Contacts/ Switch travel	Snap action
1 NO / 1 NC	**M3V4D 330-11y**



Actuator head for lever V.

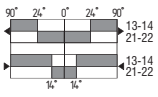


- Required actuating torque 50.5 Ncm
- Actuator head can be repositioned in steps 4 x 90°
- Patented low-wear actuator head
- Version for high temperature up to + 160 °C, ordering suffix -1366
- Splined shaft and lever available with 10° toothing, ordering suffix -1164

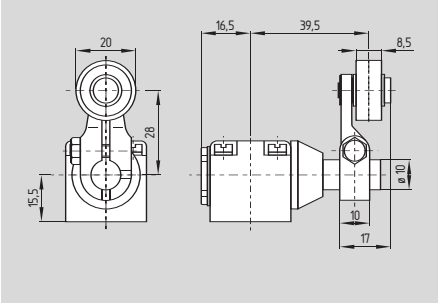
The range of turning levers is presented on the next page.

Contact variants

Contacts/ Switch travel	Snap action
1 NO / 1 NC	**MV. 330-11y**

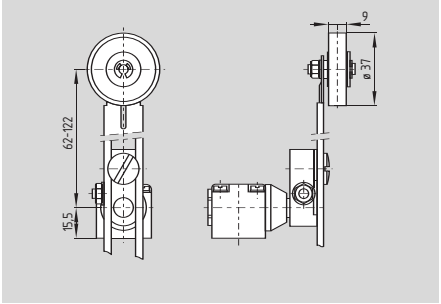


Roller lever 8H



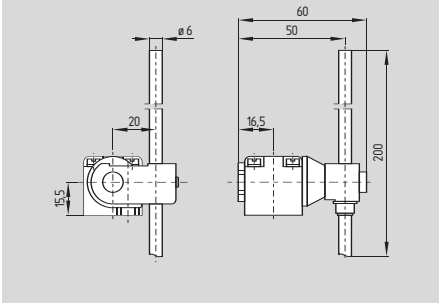
- Required actuating torque
  24 Ncm, ordering suffix -A
  50.5 Ncm, without ordering suffix -A
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Lever with 10° toothing, ordering suffix -1164

Roller lever 7H



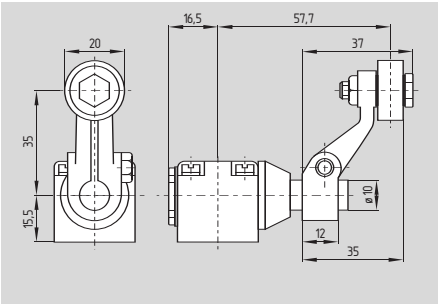
- Required actuating torque 50.5 Ncm
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Rod lever 10H



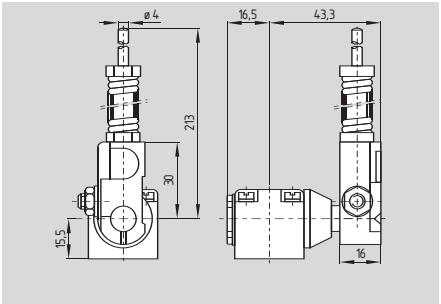
- Required actuating torque 50.5 Ncm
- Plastic rod
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Aluminium or stainless steel rod also available

Roller lever H



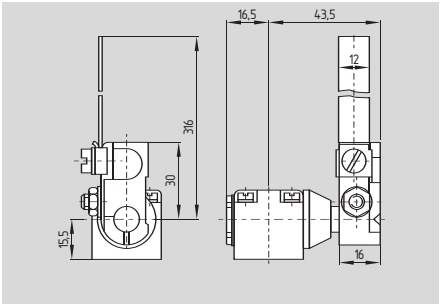
- Required actuating torque 50.5 Ncm
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Lever with 10° toothing, ordering suffix -1164

Spring rod lever on shaft 4H



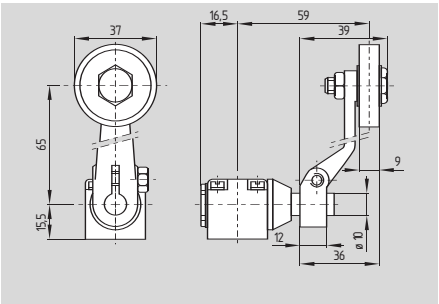
- Required actuating torque 50.5 Ncm
- Spring with projecting rod
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

Leaf-spring lever 2H



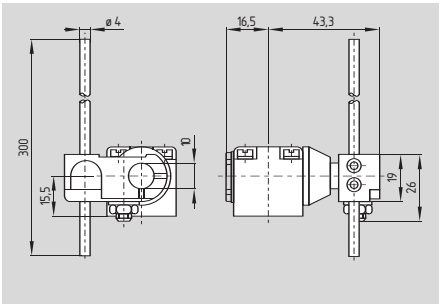
- Required actuating torque 50.5 Ncm
- Leaf spring 2.5 mm thick
- Epoxy-resin leaf spring
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

Roller lever 3H



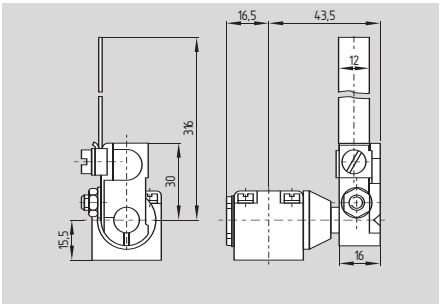
- Required actuating torque 50.5 Ncm
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Lever with 10° toothing, ordering suffix -1164

Rod lever 9H



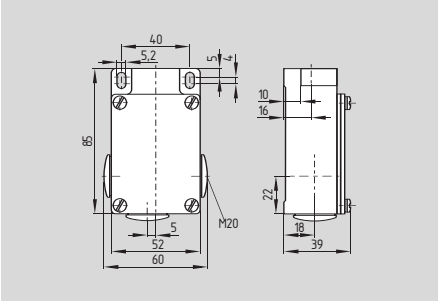
- Required actuating torque 50.5 Ncm
- Stainless steel rod
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

Leaf-spring lever 6H



- Required actuating torque 50.5 Ncm
- Leaf spring 0.8 mm thick
- Spring-steel leaf spring
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

ES/EM 61



- Metal enclosure
- Slow action ⊖, change-over or 2 NC with double break
- Snap action, change-over contact with double break
- Available with overlapping contacts
- 3 cable entries M20 x 1.5
- Protection class IP 65
- Actuator head can be repositioned in steps 4 x 90°
- Ex version available

Approvals

CE

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow or snap action
Contact type:	change-over contact, double break with 2 separate contact bridges
Termination:	screw terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	400 V
I_{the}:	6 A
I_e/U_e:	ES 61: 16 A / 400 VAC EM 61: 6 A / 400 VAC ES 61 2Ö: 6 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	≤ 7000/h
Actuating speed:	≥ 0.2 m/s
Impact resistance/ resistance to shock:	50 g / 6 ms

Contact variants

Snap action
1 NO / 1 NC

Slow action
1 NO / 1 NC

2 NC

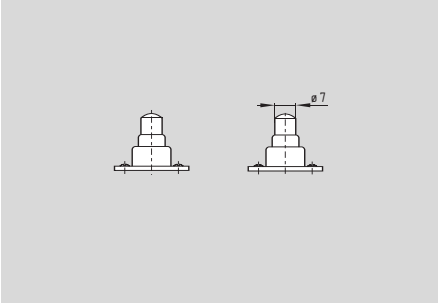
Slow action with overlapping contacts
1 NO / 1 NC

Ordering details

E① 61 ② ③

No.	Replace	Description
①	S	Slow action ⊖
	M	Snap action
②	For the appropriate actuator: see page 1-108 and following	
③	1Ö/1S	1 NO/1 NC
	1S/1Ö UE	Overlapping contacts on request
	2Ö	2 NC

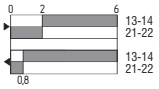
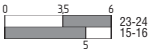
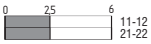
Plunger W



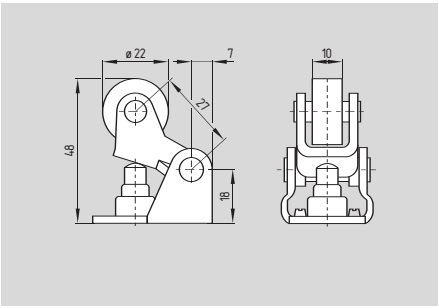
- Actuating speed 0.5 m/s with an actuating angle of 15°
- Exact repeatability of switching point
- Collar to protect against the entry of foreign bodies

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 W 1Ö/1S** 	**ES 61 W 1Ö/1S** 	**ES 61 W UE** 
2 NC		**ES 61 W 2Ö** 	

Offset roller lever WH

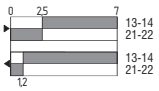
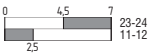
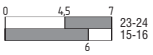


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 25°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

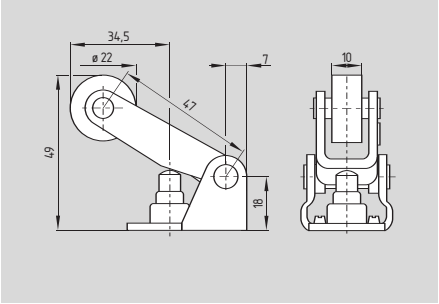
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 WH 1Ö/1S** 	**ES 61 WH 1Ö/1S** 	**ES 61 WH UE** 
2 NC		**ES 61 WH 2Ö** 	

Offset roller lever WHL

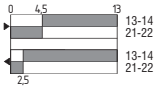
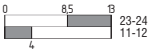
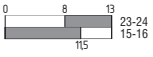


- Actuating speed 0.5 m/s with an actuating angle of α = 40° und β = 30°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

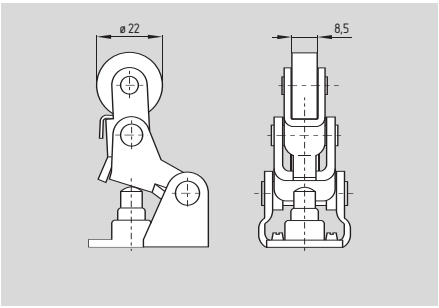
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the left should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 WHL 1Ö/1S** 	**ES 61 WHL 1Ö/1S** 	**ES 61 WHL UE** 
2 NC		**ES 61 WHL 2Ö** 	

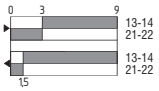
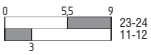
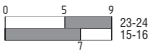
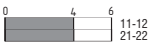
Roller lever WHK



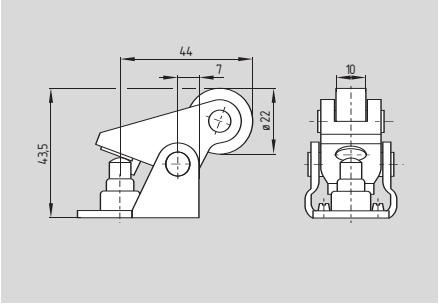
- Actuating speed 0.5 m/s with an actuating angle of α and β = 40°
- Actuation only possible from one side (R.H.S. in illustration)
- Free movement of actuator from other side
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 WHK 1Ö/1S** 	**ES 61 WHK 1Ö/1S** 	**ES 61 WHK UE** 
2 NC		**ES 61 WHK 2Ö** 	

Roller lever WPH



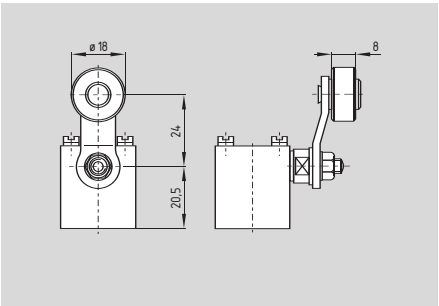
- Actuating speed 0.5 m/s with an actuating angle of α = 30°
- Actuation parallel to axis of switch from below
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Collar to protect against the entry of foreign bodies
- Metal roller available on request

Legend
α: Actuating angle from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 WPH 1Ö/1S**	**ES 61 WPH 1Ö/1S**	**ES 61 WPH UE**
2 NC		**ES 61 WPH 2Ö**	

Roller lever D

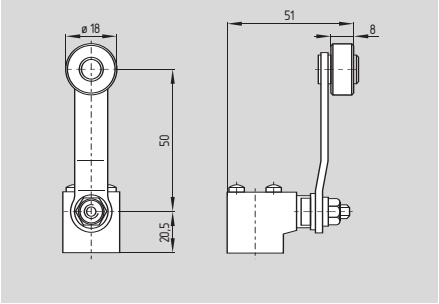


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

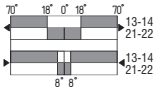
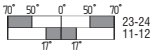
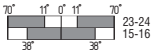
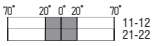
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 D 1Ö/1S**	**ES 61 D 1Ö/1S**	**ES 61 D UE**
2 NC		**ES 61 D 2Ö**	

Long roller lever DL

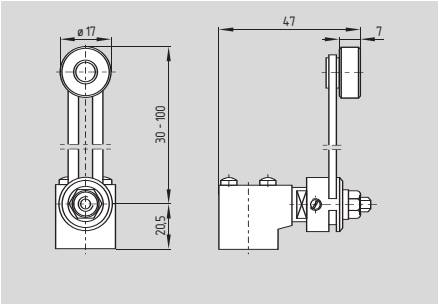


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

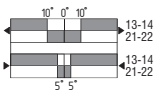
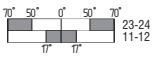
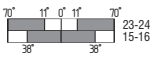
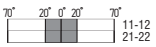
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 DL 1Ö/1S** 	**ES 61 DL 1Ö/1S** 	**ES 61 DL UE** 
2 NC		**ES 61 DL 2Ö** 	

Roller lever DS

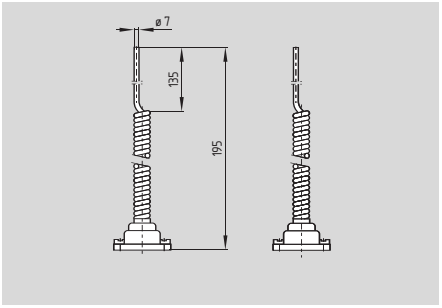


- Actuating speed 0.5 m/s with an actuating angle of 45°
- Wear-restistant thermoplastic roller
- Lever can be repositioned 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- Metal roller available on request

Contact variants

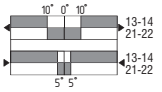
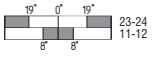
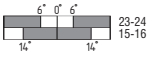
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 DS 1Ö/1S** 	**ES 61 DS 1Ö/1S** 	**ES 61 DS UE** 
2 NC		**ES 61 DS 2Ö** 	

Long spring wire TL

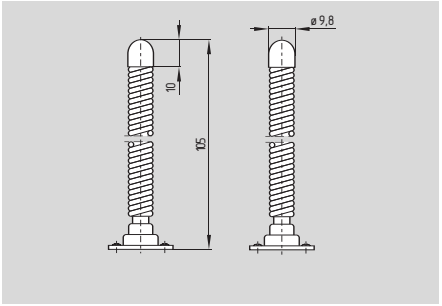


- Spring rod can be actuated from any direction
- Wire can be shortened 30 mm in actuating area
- Exact linear actuation not necessary
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

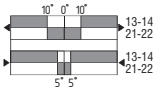
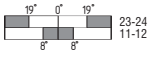
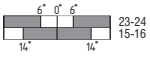
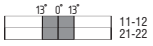
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 TL 1Ö/1S** 	**ES 61 TL 1Ö/1S** 	**ES 61 TL UE** 
2 NC		**ES 61 TL 2Ö** 	

Spring rod TF

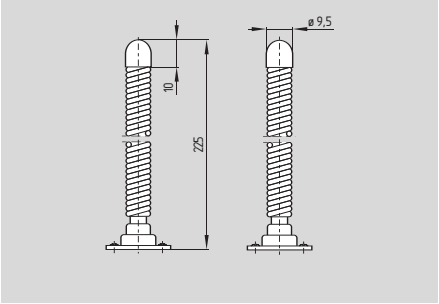


- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

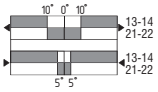
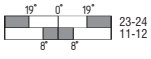
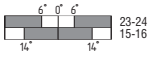
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 TF 1Ö/1S** 	**ES 61 TF 1Ö/1S** 	**ES 61 TF UE** 
2 NC		**ES 61 TF 2Ö** 	

Long spring wire TFL

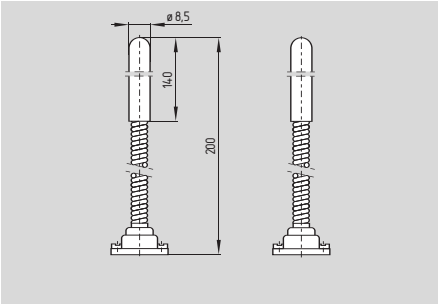


- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

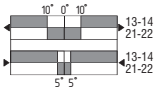
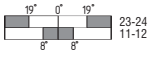
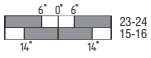
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 TFL 1Ö/1S** 	**ES 61 TFL 1Ö/1S** 	**ES 61 TFL UE** 
2 NC		**ES 61 TFL 2Ö** 	

Spring rod TK

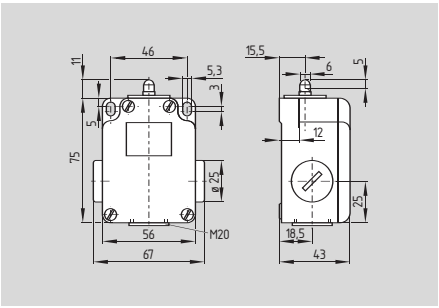


- Wear-restistant plastic rod
- Spring rod can be actuated from any direction
- Elasticity of the spring allows for deflection above the max. switching angle

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO / 1 NC	**EM 61 TK 1Ö/1S** 	**ES 61 TK 1Ö/1S** 	**ES 61 TK UE** 
2 NC		**ES 61 TK 2Ö** 	

T/M 015



- Metal enclosure
- Slow action ⊖, change-over or 2 NC or 2 NO with double break
- Snap action, change-over contact with double break
- Snap action with galvanically separated moving contacts
- Blow-out magnets available to switch high DC currents
- 3 cable entries
- Protection class IP 65

Approvals

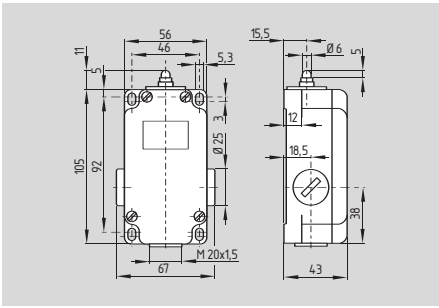
CE

Ordering details

①② **015-**③**y-**④

No.	Replace	Description
①	T	Slow action ⊖
	M	Snap action
②	For the appropriate actuator: see page 1-116 and following	
③	11	1 NO/1 NC
	02	2 NC
	20	2 NO
④	ü	Slow action with overlapping contacts
	h	with staggered contacts
	c	Magnetic blow-out

T 016



- Metal enclosure
- 3 contact, slow action ⊖
- Blow-out magnets available to switch high DC currents
- 3 cable entries
- Protection class IP 65

The switch travel of the contacts complies with the T/M 015 series (see page 1-116).

Approvals

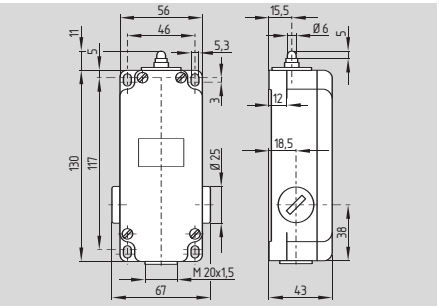
CE

Ordering details

T① **016-**②**y-**③

No.	Replace	Description
①	For the appropriate actuator: see page 1-116 and following	
②	12	1 NO/2 NC
	21	2 NO/1 NC
	03	3 NC
	30	3 NO
③	ü	Slow action with overlapping contacts
	h	with staggered contacts
	c	Magnetic blow-out

T/M 017



- Metal enclosure
- 4 contacts, (NC) ⊖
- Snap action, change-over contact with double break
- Snap action with galvanically separated moving contacts
- Blow-out magnets available to switch high DC currents
- 3 cable entries
- Protection class IP 65

The switch travel of the contacts complies with the T/M 015 series (see page 1-116).

Approvals

CE

Ordering details

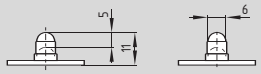
①② **017-**③**y-**④

No.	Replace	Description
①	T	Slow action ⊖
	M	Snap action
②	For the appropriate actuator: see page 1-116 and following	
③	22	2 NO/2 NC
	13	1 NO/3 NC
	31	3 NO/1 NC
④	ü	Slow action with overlapping contacts
	h	with staggered contacts
	c	Magnetic blow-out

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	light alloy, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow or snap action, double break
Contact type:	change-over contact, double break with 2 separate contact bridges slow action, positive break NC contacts ⊖
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm^2 (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	change-over contact: 500 V only NC or NO contacts: 400 V
I_{the}:	10 A
I_e/U_e:	Snap action: 2.5 A / 400 VAC Slow action: 4 A / 400 VAC with magnetic blow-out (ordering suffix -c): 1 A / 220 VDC, 4 A / 24 VDC
Utilisation category:	AC-15, DC-13
Max. fuse rating:	20 A gG D-fuse
Contact opening:	snap action: max. 2 x 1.2 mm slow action: max. 2 x 2.5 mm
Switchover time:	snap action: ≤ 40 ms
Bounce duration:	snap action: ≤ 2.5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	snap action: 10 million operations slow action: 5 million operations
Switching frequency:	max. 3000/h
Actuating speed:	max. 1 m/s, min. 1 mm/s on plunger

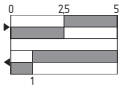
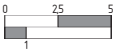
Plunger S



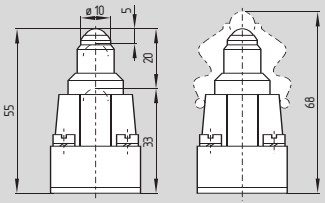
- Actuating speed 1 m/s with an actuating angle of max. 20°

Actuation from the side of the plunger should be avoided, since this appreciably reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MS 015-11y** 	**TS 015-11y** 
2 NC		**TS 015-02y** 
2 NO		**TS 015-20y** 

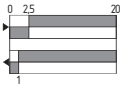
Telescopic plunger 2S



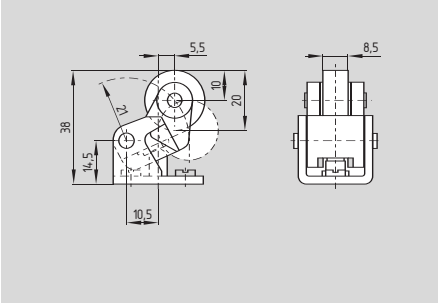
- Actuating speed 1 m/s with an actuating angle of max. 20°
- With large after-travel
- Actuator head with captive stainless steel ball actuator
- Available with bellows to protect against heavy soiling, ordering suffix -q

Actuation from the side of the plunger should be avoided, since this appreciably reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**M2S 015-11y** 	**T2S 015-11y** 
2 NC		**T2S 015-02y** 
2 NO		**T2S 015-20y** 

Offset roller lever K

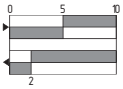
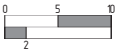
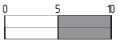


- Actuating speed max. 0.5 m/s with an actuating angle of α = 30° and β = 45°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

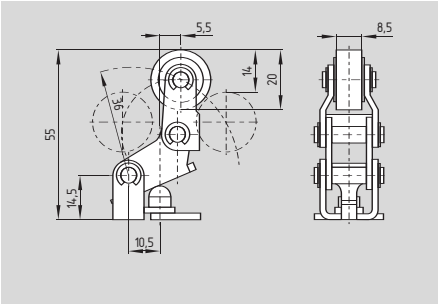
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the right should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MK 015-11y** 	**TK 015-11y** 
2 NC		**TK 015-02y** 
2 NO		**TK 015-20y** 

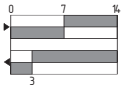
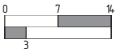
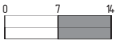
Offset roller lever 2K



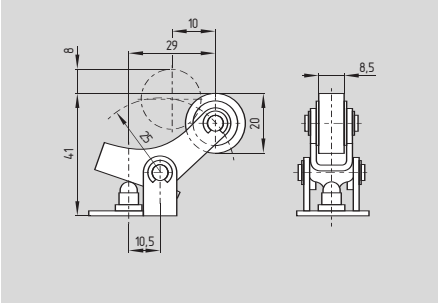
- Actuating speed max. 0.5 m/s with an actuating angle of α = 60° and β = 45°
- Actuation only possible from one side (L.H.S. in illustration)
- Free movement of actuator from other side
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**M2K 015-11y** 	**T2K 015-11y** 
2 NC		**T2K 015-02y** 
2 NO		**T2K 015-20y** 

Angle roller lever 3K

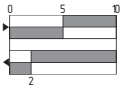
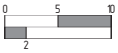
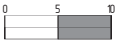


- Actuating speed 0.5 m/s with an actuating angle of α = 45°
- Actuation parallel to axis of switch from below
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

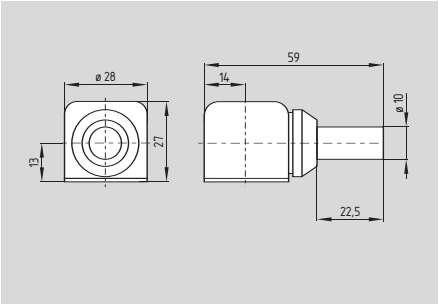
Legend
α: Actuating angle from below

Top-side actuation should be avoided, such actuation reducing the life of the position switch

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**M3K 015-11y** 	**T3K 015-11y** 
2 NC		**T3K 015-02y** 
2 NO		**T3K 015-20y** 

Actuator head for lever V.

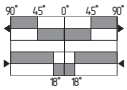
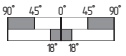
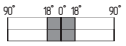


- Actuating speed max. 3 m/s with an actuating angle of α and β = 30° with lever fitted
- Actuator head can be repositioned in steps 4 x 90°
- Splined shaft and lever available

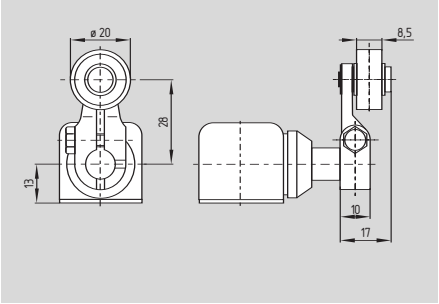
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

The range of turning levers is presented on the next page.

Contact variants

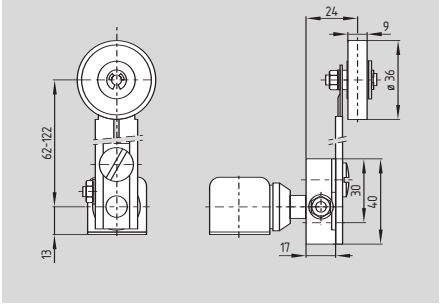
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MV. 015-11y** 	**TV. 015-11y** 
2 NC		**TV. 015-02y** 
2 NO		**TV. 015-20y** 

Roller lever 8H



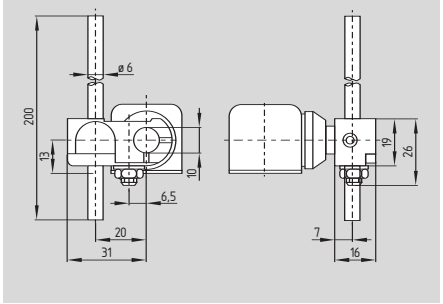
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Splined shaft and lever available

Roller lever 7H



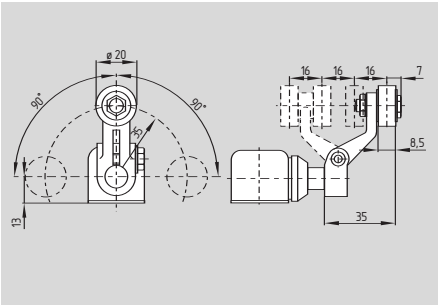
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

Rod lever 10H



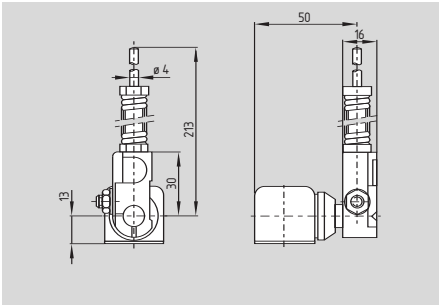
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Epoxy resin rod
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

Roller lever H



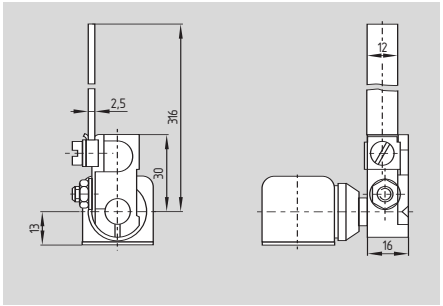
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Splined shaft and lever available

Spring rod lever on shaft 4H



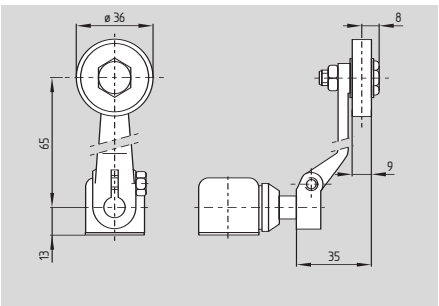
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Elasticity of spring allows for inexact movement of actuator
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

Leaf-spring lever 2H



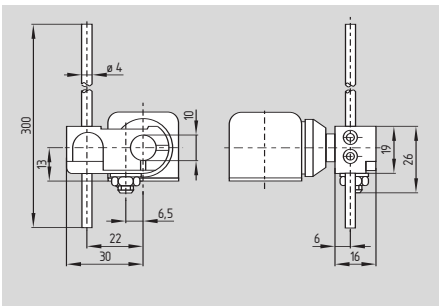
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Leaf spring 2.5 mm thick
- Epoxy-resin leaf spring
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

Roller lever 3H



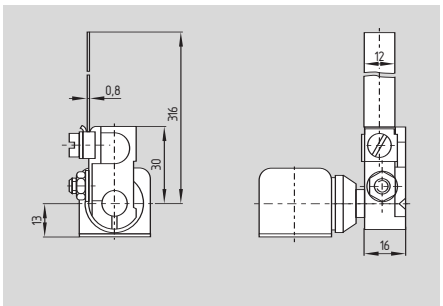
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Splined shaft and lever available

Rod lever 9H



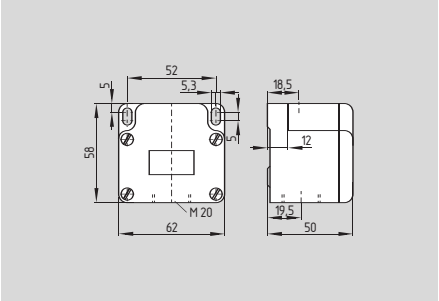
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Steel rod
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

Leaf-spring lever 6H



- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Leaf spring 0.8 mm thick
- Spring-steel leaf spring
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°

U 431



- Metal enclosure
- Switching points and contact function adjustable
- Slow action: one contact
- 1 cable entry
- Protection class IP 65

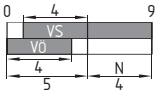
In the absence of other details in order, these single-pole switches are supplied with **one NC contact**

Technical data

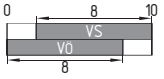
Standards:	IEC/EN 60947-5-1
Enclosure:	light alloy die-casting, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action
Termination:	screw terminals M 4
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	16 A
I_e/U_e:	6 A / 400 VAC
Max. fuse rating:	16 A gG D-fuse
Contact opening:	max. 2 x 1.5 mm
Ambient temperature:	– 20 °C … + 60 °C
Mechanical life:	10 million operations
Contact life:	2 million operations at 6 A / 400 V, cos φ = 0,4
Switching frequency:	max. 3000/h
Actuating speed:	max. 1 m/s, min. 1 mm/s on plunger

Contact variants

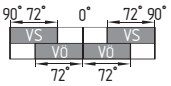
Plunger



Offset roller lever



Roller lever



Approvals

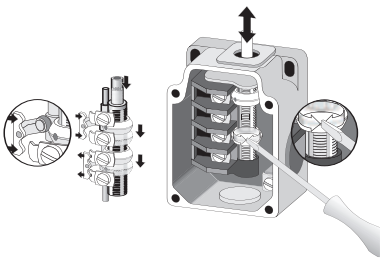
CE

Ordering details

U① 431y-②-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-122 and following
②		1 NC
	1S	1 NO
③	1272	Version for low temperatures to – 30 °C

Note



Contact adjustment:

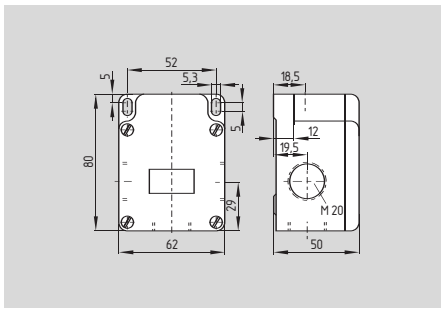
- Contact function, i. e. NC or NO contact, and switching points can be adjusted using a screwdriver
- Type of contact and switching points can be factory set to order.
- On lever-type actuator heads, the contact setting applies to both directions of actuation.

Note

Legend

VS: adjustable range of NO contact
VÖ: adjustable range of NC contact
N: after travel

U 432



- Metal enclosure
- Switching points and contact function adjustable
- Slow action: two contacts
- 3 cable entries
- Protection class IP 65

In the absence of other details in order, these double-pole switches are supplied with **two NC contacts**

Approvals

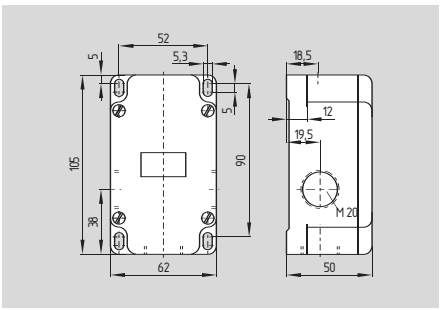
CE

Ordering details

U① 432y-②-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-122 and following
②		2 NC
	2S	2 NO
	1S/1Ö	1 NO/1 NC
③	1272	Version for low temperatures to – 30 °C

U 433



- Metal enclosure
- Switching points and contact function adjustable
- Slow action: three contacts
- 3 cable entries
- Protection class IP 65

In the absence of other details in order, these triple-pole switches are supplied with **three NC contacts**

Approvals

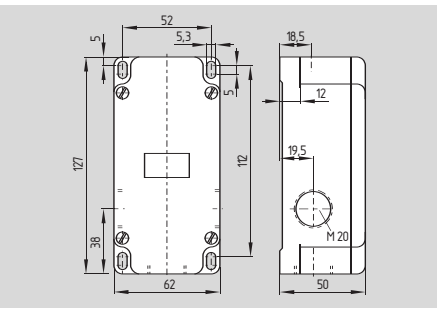
CE

Ordering details

U① 433y-②-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-122 and following
②		3 NC
	3S	3 NO
	1S/2Ö	1 NO/2 NC
	2S/1Ö	2 NO/1 NC
③	1272	Version for low temperatures to – 30 °C

U 434



- Metal enclosure
- Switching points and contact function adjustable
- Slow action: four contact
- 3 cable entries
- Protection class IP 65

In the absence of other details in order, these four-pole switches are supplied with **two NO and two NC contacts**

Approvals

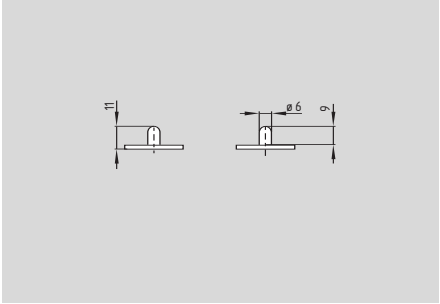
CE

Ordering details

U① 434y-②-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-122 and following
②		2 NO/2 NC
	4Ö	4 NC
	4S	4 NO
	1S/3Ö	1 NO/3 NC
	3S/1Ö	3 NO/1 NC
③	1272	Version for low temperatures to – 30 °C

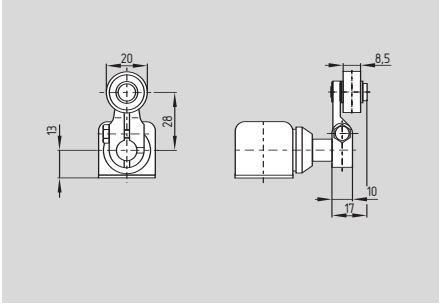
Plunger S



- Actuating speed 0.5 m/s with an actuating angle of max. 20°

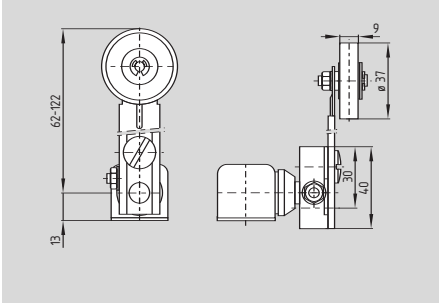
Actuation from the side of the plunger should be avoided, since this appreciably reduces the mechanical life of the position switch.

Roller lever 8H



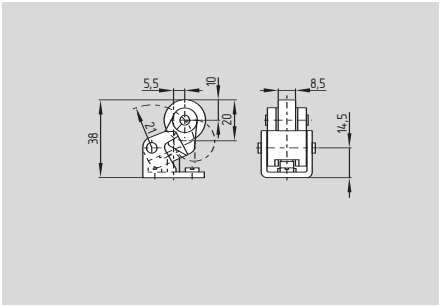
- Weight of actuator 25 g
- Plastic roller
- Splined shaft and lever available
- Available with metal roller, ordering suffix -RMS

Roller lever 7H



- Weight of actuator 105 g
- Plastic roller
- Available with metal roller, ordering suffix -RMS

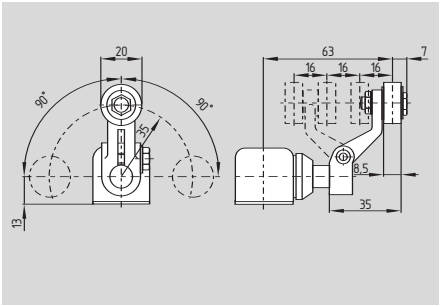
Offset roller lever K



- Actuating speed max. 0.5 m/s with an actuating angle of α = 30° and β = 45°
- Plastic roller
- Metal roller available on request

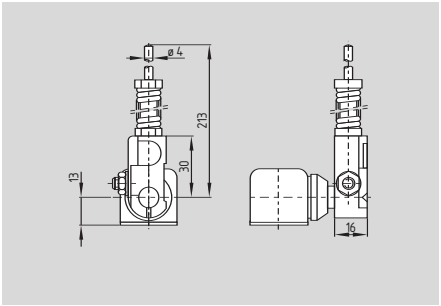
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Roller lever H



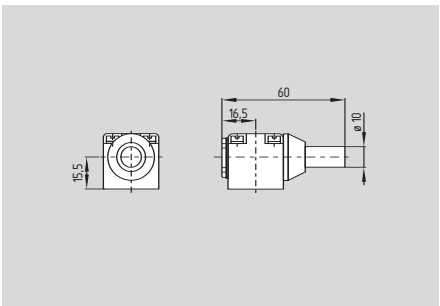
- Weight of actuator 45 g
- Plastic roller
- Splined shaft and lever available
- Available with metal roller, ordering suffix -RMS

Spring rod lever on shaft 4H



- Weight of actuator 105 g

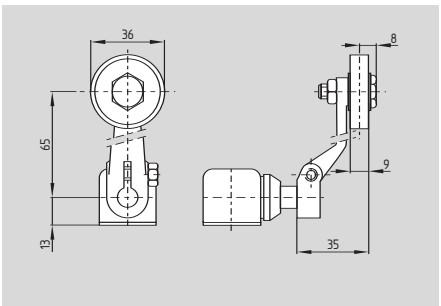
Actuator head for lever V.



- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Splined shaft and lever available

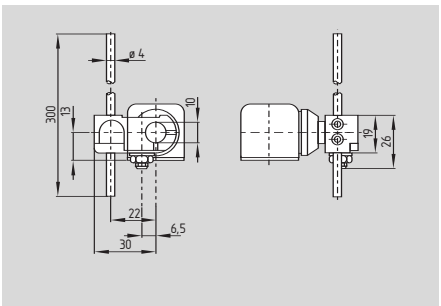
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Roller lever 3H



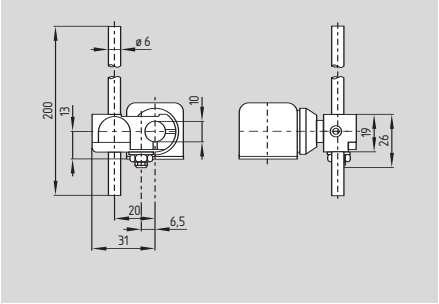
- Weight of actuator 95 g
- Plastic roller
- Splined shaft and lever available
- Available with metal roller, ordering suffix -RMS

Rod lever 9H



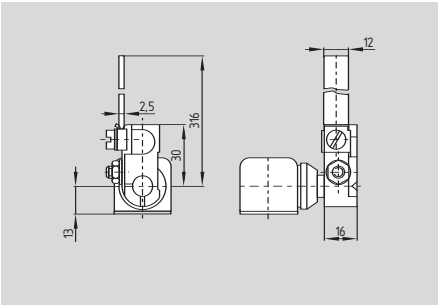
- Weight of actuator 90 g
- Steel rod

Rod lever 10H



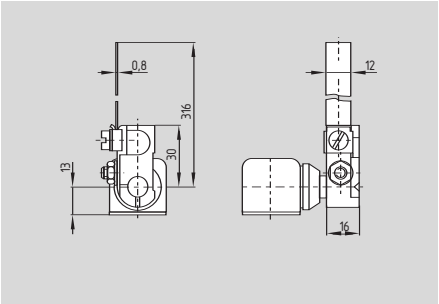
- Weight of actuator 75 g
- Plastic rod

Leaf-spring lever 2H



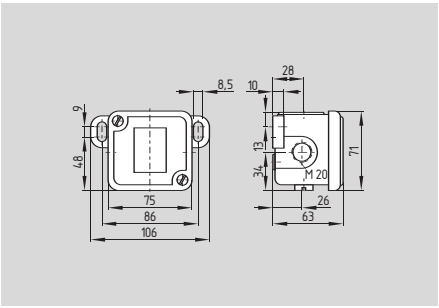
- Weight of actuator 85 g
- Leaf spring 2.5 mm thick
- Epoxy-resin leaf spring

Leaf-spring lever 6H



- Weight of actuator 85 g
- Leaf spring 0.8 mm thick
- Spring-steel leaf spring

T 422



- Metal enclosure
- 1 contact, slow action ⊖
- 2 cable entries
- Protection class IP 65

Approvals

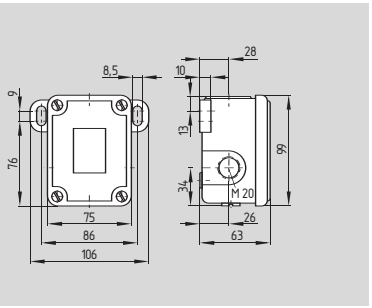
CE

Ordering details

T① 422-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-126 and following
②	01	1 NC
	10	1 NO
③	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version – 40 °C … + 200 °C
	1276-2	Gold-plated contacts

T/M 441



- Metal enclosure
- 2 contact, slow action ⊖
- Slow action available with overlapping contacts
- Snap action, change-over contact with double break
- 2 cable entries
- Protection class IP 65

Approvals

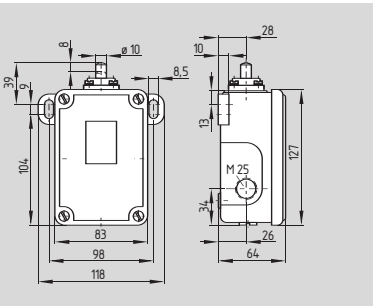
CE

Ordering details

①② 441-11y③-④-⑤

No.	Replace	Description
①	T	Slow action ⊖
	M	Snap action
②		For the appropriate actuator: see page 1-126 and following
③	ü	Slow action with overlapping contacts
④		Cast iron enclosure
	a	Aluminium enclosure
⑤	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version – 40 °C … + 200 °C
	1276-2	Gold-plated contacts

T 452



- Metal enclosure
- 2 or 3 contact, slow action ⊖
- Slow action available with overlapping or staggered contacts
- 2 cable entries
- Protection class IP 65

The switch travel of the contacts complies with the T/M 441 or T 422 series (see page 1-126).

Approvals

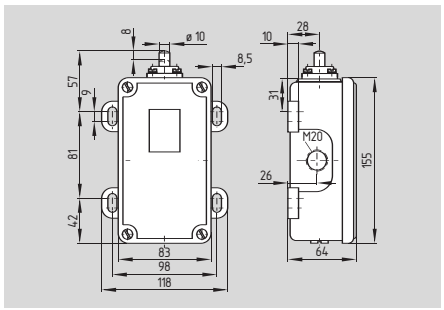
CE

Ordering details

T① 452-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-126 and following
②	02	2 NC
	12	1 NO/2 NC
	20	2 NO
	21	2 NO/1 NC
③	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version – 40 °C … + 200 °C
	1276-2	Gold-plated contacts

T/M 461



- Metal enclosure
- 3 or 4 contact, slow action ⊖
- Slow action available with overlapping or staggered contacts
- Snap action, change-over contact with double break
- 2 cable entries
- Protection class IP 65

The switch travel of the contacts complies with the T/M 441 or T 422 series (see page 1-126).

Approvals

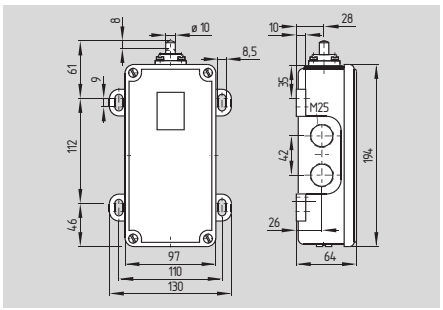
CE

Ordering details

①② **461-**③**y-** ④

No.	Replace	Description
①	T	Slow action ⊖
	M	Snap action (only for -22y)
②	For the appropriate actuator: see page 1-126 and following	
③	03	3 NC
	13	1 NO/3 NC
	22	2 NC/2 NC
	30	3 NO
	31	3 NO/1 NC
④	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version – 40 °C … + 200 °C
	1276-2	Gold-plated contacts

T 470



- Metal enclosure
- 6 contact, slow action ⊖
- Slow action available with overlapping or staggered contacts
- 4 cable entries
- Protection class IP 65

The switch travel of the contacts complies with the T/M 441 or T 422 series (see page 1-126).

Approvals

CE

Ordering details

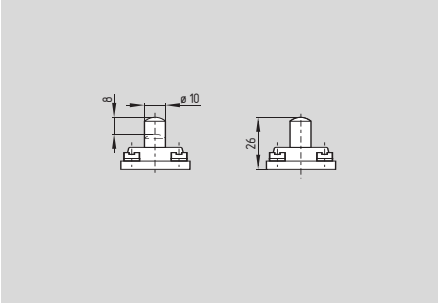
T① **470-**②**y-**③

No.	Replace	Description
①	For the appropriate actuator: see page 1-126 and following	
②	33	3 NO/3 NC (every other contact combination is possible, except 6 NO contacts or 6 NC contacts)
③	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version – 40 °C … + 200 °C
	1276-2	Gold-plated contacts

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow or snap action, double break
Contact type:	snap action: change-over contact up to 250 V, with galvanically separated contact bridges slow action: positive break NC contacts ⊖
Termination:	screw terminals M 4
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	snap action: 4 kV slow action: 6 kV
U_i:	snap action: 250 V slow action: 400 V suffix -k or -t: 500 V
I_{the}:	16 A
I_e/U_e:	snap action: 4 A / 230 V slow action: 4 A / 400 V
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Contact opening:	snap action: max. 2 x 2.5 mm slow action: max. 2 x 6.0 mm
Switchover time:	snap action: ≤ 35 ms
Bounce duration:	snap action: ≤ 5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	snap action: 5 million operations slow action: 10 million operations
Contact life:	10 million operations at 1 A / 400 V, cos φ = 0,4
Switching frequency:	max. 3000/h
Actuating speed:	max. 1 m/s, min. 1 mm/s on plunger

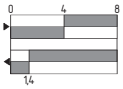
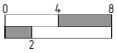
Plunger S



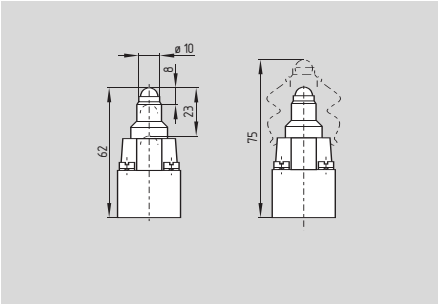
- Actuating speed 1 m/s with an actuating angle of max. 20°

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MS 441-11y** 	**TS 441-11y** 
1 NC		**TS 422-01y** 
1 NO		**TS 422-10y** 

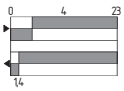
Telescopic plunger 2S



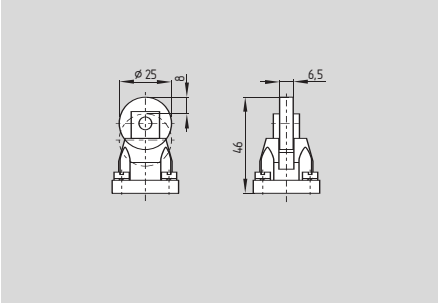
- Actuating speed 1 m/s with an actuating angle of max. 20°
- Large after travel
- Actuator head with captive metal ball actuator
- Available with bellows to protect against heavy soiling, ordering suffix -q

Actuation from the side of the plunger should be avoided, since this appreciably reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**M2S 441-11y** 	**T2S 441-11y** 
1 NC		**T2S 422-01y** 
1 NO		**T2S 422-10y** 

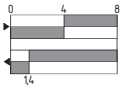
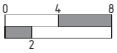
Roller plunger R



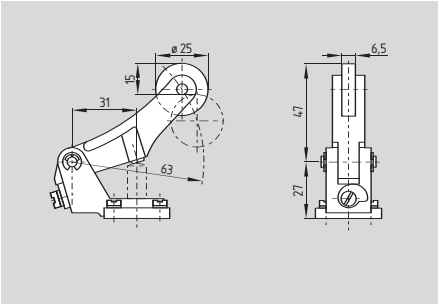
- Actuating speed 0.5 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Actuator can be repositioned by 90°
- Metal roller available on request

Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MR 441-11y** 	**TR 441-11y** 
1 NC		**TR 422-01y** 
1 NO		**TR 422-10y** 

Offset roller lever K

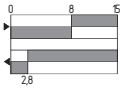
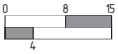


- Actuating speed max. 0.5 m/s with an actuating angle of α = 30° and β = 45°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

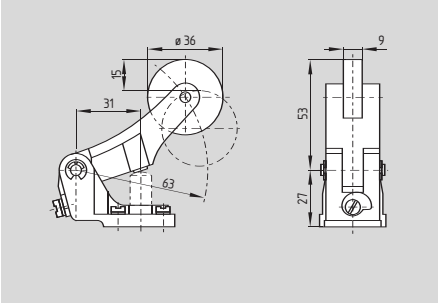
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the right should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MK 441-11y** 	**TK 441-11y** 
1 NC		**TK 422-01y** 
1 NO		**TK 422-10y** 

Offset roller lever J

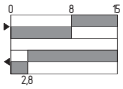
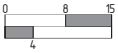


- Actuating speed max. 0.5 m/s with an actuating angle of α = 30° and β = 45°
- Plastic roller
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request

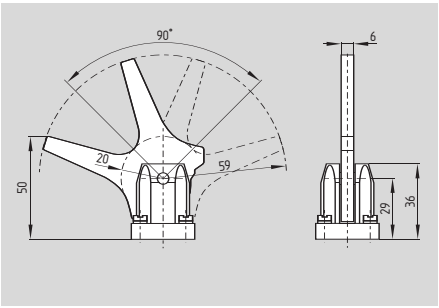
Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Actuation from the right should be avoided, since this reduces the mechanical life of the position switch.

Contact variants

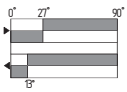
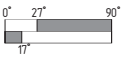
Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MJ 441-11y** 	**TJ 441-11y** 
1 NC		**TJ 422-01y** 
1 NO		**TJ 422-10y** 

Fork lever 2C

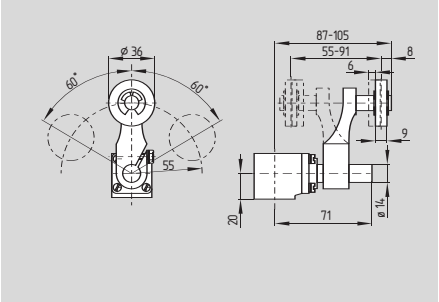


- With latching end position
- Actuating speed max. 0.5 m/s
- Actuator head can be repositioned in steps 4 x 90°
- Change in actuating direction by repositioning actuator head
- Case-hardened lever

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**M2C 441-11y** 	**T2C 441-11y** 
1 NC		**T2C 422-01y** 
1 NO		**T2C 422-10y** 

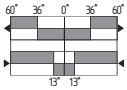
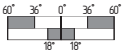
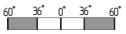
Roller lever L



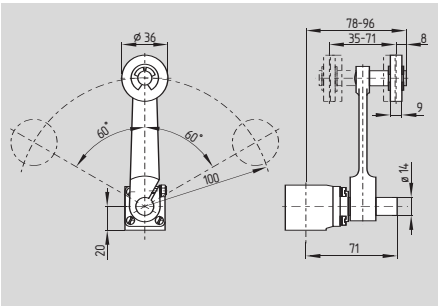
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- In temperature-resistant version, the roller can be mounted in two different positions on the shaft
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Splined shaft and lever available, ordering suffix -1801

Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**ML 441-11y** 	**TL 441-11y** 
1 NC		**TL 422-01y** 
1 NO		**TL 422-10y** 

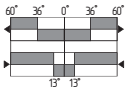
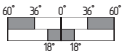
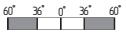
Roller lever D



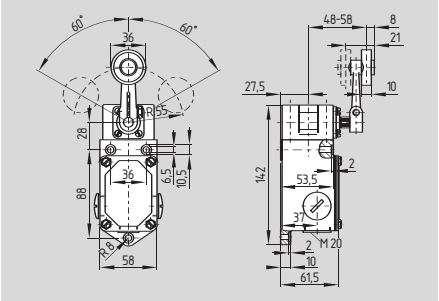
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- In temperature-resistant version, the roller can be mounted in two different positions on the shaft
- Continuous adjustment of lever position 360°
- Lever can be transposed by 180°
- Actuator head can be repositioned in steps 4 x 90°
- Metal roller available on request
- Splined shaft and lever available, ordering suffix -1801

Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

Contact variants

Contacts/ Switch travel	Snap action	Slow action
1 NO / 1 NC	**MD 441-11y** 	**TD 441-11y** 
1 NC		**TD 422-01y** 
1 NO		**TD 422-10y** 

T/M 035



- Metal enclosure
- Snap or slow action, change over or 2 NC with double break or 2 NO
- Slow action, 1 NC positive break ⊖
- Operating shaft with ball bearings
- Blow-out magnets available to switch high DC currents
- 3 cable entries
- Protection class IP 67

Approvals

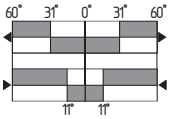
CE

Technical data

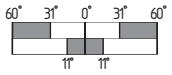
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 67 to EN 60529
Contact material:	silver
Switching system:	slow and snap action, double break
Contact type:	snap action: change-over contact, with 2 galvanically separated contact bridges slow action: positive break NC contacts ⊖
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	400 V
I_{the}:	10 A
I_e/U_e:	snap action: 2.5 A / 400 VAC slow action: 4 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	20 A gG D-fuse
Contact opening:	snap action: max. 2 x 1.2 mm slow action: max. 2 x 2.5 mm
Switchover time:	snap action: ≤ 10ms
Bounce duration:	snap action: ≤ 2.5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	snap action: 10 million operations slow action: 5 million operations
Switching frequency:	max. 3000/h
Actuating speed:	max. 1 m/s, min. 1 mm/s on plunger

Contact variants

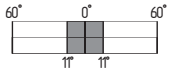
Snap action
1 NO / 1 NC



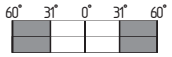
Slow action
1 NO / 1 NC



2 NC



2 NO

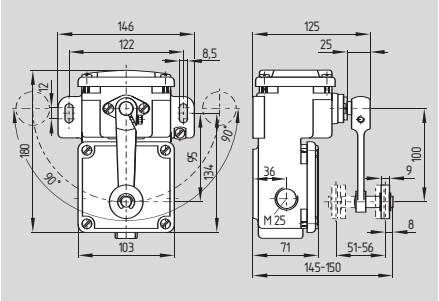


Ordering details

①**2L 035-**②**z**③**-**④

No.	Replace	Description
①	T	Slow action ⊖
	M	Snap action
②	11	1 NO/1 NC
	02	2 NC
	20	2 NO
③	ü	Slow action with overlapping contacts
	h	with staggered contacts
④	c	Magnetic blow-out

T/M 250



- Metal enclosure
- Slow action ⊖, change-over, 2 NC with double break or 4 NC
- Snap action, change-over contact with double break
- Switching mechanism can be set for switching to right, left or in both directions
- Blow-out magnets available to switch high DC currents
- 2 cable entries
- Protection class IP 67
- Actuating speed max. 3 m/s with an actuating angle of 30°
  Snap action: Min. 0.05 m/s
  Slow action: Min. 0.005 m/s

Approvals

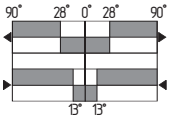
CE

Technical data

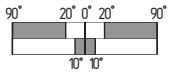
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 67 to EN 60529
Contact material:	silver
Switching system:	slow and snap action, double break
Contact type:	snap action: change-over contact, up to 250 V, with 2 galvanically separated contact bridges slow action: change-over contact, up to 250 V, with 2 galvanically separated contact bridges, positive break NC contacts ⊖
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	16 A
I_e/U_e:	4 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Contact opening:	snap action: max. 2 x 2.5 mm slow action: max. 2 x 2 mm
Switchover time:	snap action: ≤ 35 ms
Bounce duration:	snap action: ≤ 5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	snap action: 10 million operations slow action: 5 million operations
Contact life:	10 million operations at 1 A / 400 V, cos φ = 0,4
Switching frequency:	max. 3000/h
Actuating speed:	max. 3 m/s at 30° snap action: 2-pole: min. 0.05 m/s, 1-pole: min. 0.005 m/s slow action: min. 0.005 m/s

Contact variants

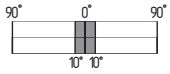
Snap action
1 NO / 1 NC



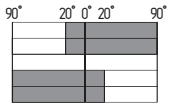
Slow action
1 NO / 1 NC



2 NC



2 NC left
2 NC right

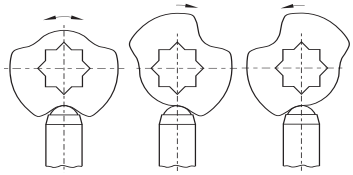


Ordering details

①**D 250-**②**z**③-④-⑤

No.	Replace	Description
①	T	Slow action ⊖
	M	Snap action
②	11	1 NO/1 NC
	02	2 NC
	02/02	4 NC (2 right/2 left)
③	ü	Slow action with overlapping contacts
④	c	Magnetic blow-out
	r	Position latching 2 x 45°
⑤	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version – 40 °C … + 200 °C
	1276-2	Gold-plated contacts

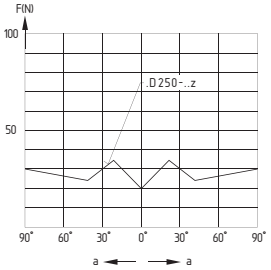
Note



Switching mechanism can be set
for switching to right, left or in both directions

Position latching
Available with 2 x 45° position latching, suffix -r
Also possible with position latching: 2 x 30°, 2 x 60°, 2 x 90°, 1 x 45°, 1 x 60° and 1 x 90°

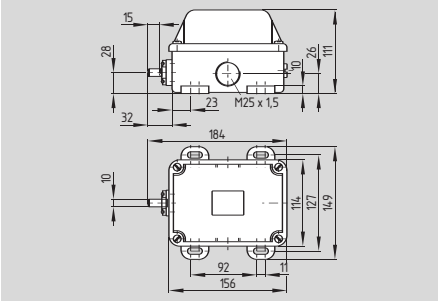
Force-travel diagram



Legend
F: actuating force
a: actuating travel

It is not possible to combine version with magnetic blow-out (Ordering suffix c) and temperature-restistant and tropical version (Ordering suffix t)

TS 064



- Metal enclosure
- 3 or 4 contact, slow action ⊖
- Roller levers J and X can be subsequently fitted at plunger S
- Actuator head can be repositioned in steps 4 x 90°
- 2 cable entries M25 x 1.5
- Protection class IP 65

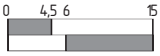
Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch. Recommendation: use roller lever

Technical data

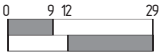
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 1 m/s, min. 0,01 m/s on plunger
Actuating angle:	max. 20°
Weight:	approx. 3.2 kg

Contact variants

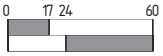
Plunger S



Angle roller lever J



Angle roller lever X



Approvals

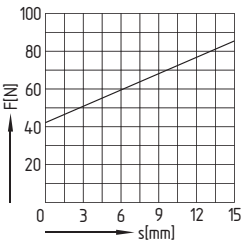
CE

Ordering details

T① 064-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-134
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	04	4 NC
	13	1 NO/3 NC
	22	2 NO/2 NC
	31	3 NO/1 NC
	40	4 NO
③	ü	Slow action with overlapping contacts
	h	with staggered contacts
	r	Position latching 2 x 45°

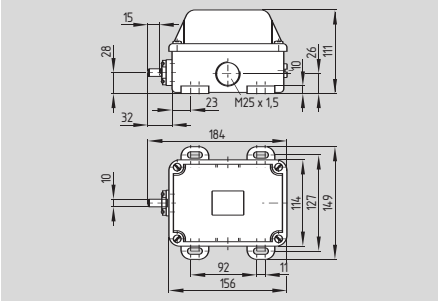
Force-travel diagram



Note

The contact combinations can be found in the table on page 1-32.

MS 064



- Metal enclosure
- 3 or 4 contact, snap action with double break
- Roller levers J and X can be subsequently fitted at plunger S.
- Actuator head can be repositioned in steps 4 x 90°
- 2 cable entries M25 x 1.5
- Protection class IP 65

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch. Recommendation: use roller lever

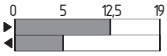
Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	30000 operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 1 m/s, min. 0,01 m/s on plunger
Actuating angle:	max. 20°
Weight:	approx. 3.6 kg

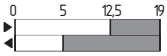
Contact variants

Plunger S

1 NC contact

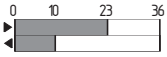


1 NO contact

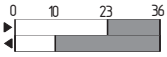


Angle roller lever J

1 NC contact

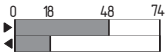


1 NO contact

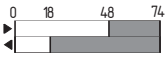


Angle roller lever X

1 NC contact



1 NO contact



Approvals

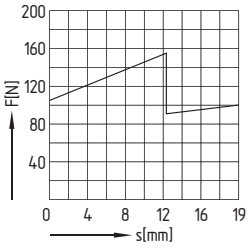
CE

Ordering details

M① 064-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-134
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	04	4 NC
	13	1 NO/3 NC
	22	2 NO/2 NC
	31	3 NO/1 NC
	40	4 NO
③	r	Position latching 2 x 45°

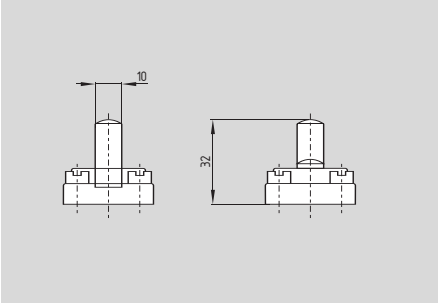
Force-travel diagram



Note

The contact combinations can be found in the table on page 1-32.

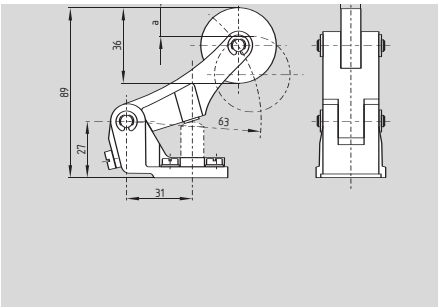
Plunger S



- Actuating speed 1 m/s with an actuating angle of max. 20°
- Roller levers J and X can be subsequently fitted at plunger S.

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch.
Recommendation: use roller lever

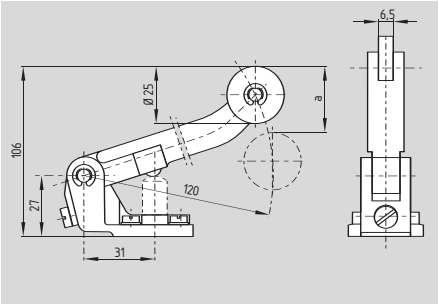
Offset roller lever J



- Actuating speed max. 0.5 m/s with an actuating angle of α = 45° and β = 30°
- Plastic roller (metal roller on request)
- Actuator head can be repositioned in steps 4 x 90°
- Available with rubber roller, ordering suffix -1

Actuation from the right should be avoided, since this reduces the mechanical life of the position switch.

Offset roller lever X

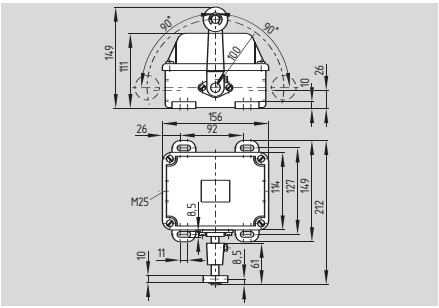


- Actuating speed max. 0.5 m/s with an actuating angle of α = 45° and β = 30°
- Plastic roller (metal roller on request)
- Actuator head can be repositioned in steps 4 x 90°

Actuation from the right should be avoided, since this reduces the mechanical life of the position switch.

Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

T. 064



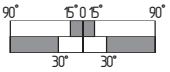
- Metal enclosure
- 3 contact, slow action ⊖
- Actuating direction, each time 90° right-hand side and left-hand side rotation
- 2 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

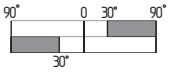
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 3.5 kg

Contact variants

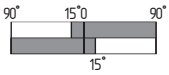
Roller lever
1 NO / 1 NC



only NO



only NC



Approvals

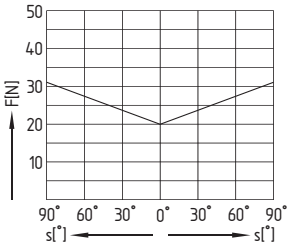
CE

Ordering details

T① 064-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	01/02	1 NC left/2 NC right
	02/01	2 NC left/1 NC right
	10/20	1 NO left/2 NO right
	20/10	2 NO left/1 NO right
③	ü	Slow action with overlapping contacts
	h	with staggered contacts
	r	Position latching 2 x 45°

Force-travel diagram

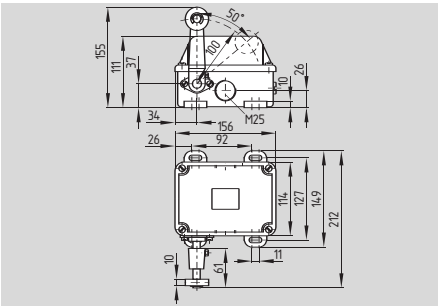


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

M. 064 R



- Metal enclosure
- 3 or 4 contact, snap action with double break
- Actuating direction always **50° right-hand side rotation**
- 2 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

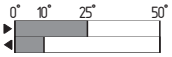
Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	30000 operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 3.7 kg

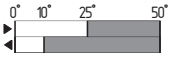
Contact variants

Roller lever

1 NC



1 NO



Approvals

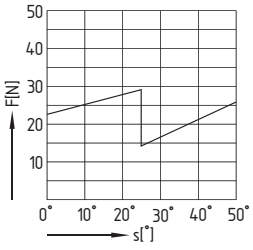
CE

Ordering details

M① 064-②y-③-R

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	22	2 NO/2 NC
	31	3 NO/1 NC
	40	4 NO
③	r	Position latching 2 x 45°

Force-travel diagram

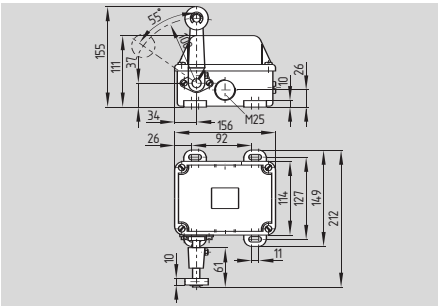


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

M. 064 L



- Metal enclosure
- 3 or 4 contact, snap action with double break
- Actuating direction always **55° left-hand side rotation**
- 2 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

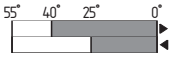
Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm^2 (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	30000 operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 3.7 kg

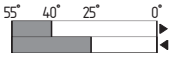
Contact variants

Roller lever

1 NC



1 NO



Approvals

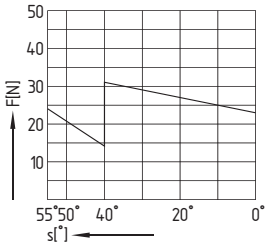
CE

Ordering details

M① 064-②y-③-L

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	04	4 NC
	13	1 NO/3 NC
	22	2 NO/2 NC
③	r	Position latching 2 x 45°

Force-travel diagram

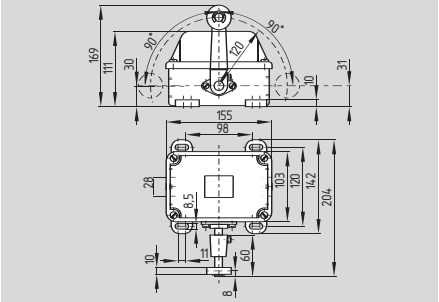


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

T. 067



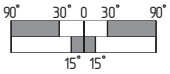
- Metal enclosure
- 2 contact, slow action ⊖
- Actuating direction, each time **90° right-hand side and left-hand side rotation**
- 4 cable entries M20 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

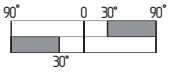
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	10 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 3.4 kg

Contact variants

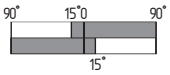
Roller lever
1 NO / 1 NC



2 NO



2 NC



Approvals

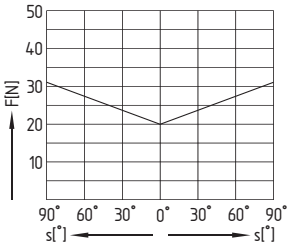
CE

Ordering details

T① 067-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	02	2 NC
	11	1 NO/1 NC
	20	2 NO
	01/01	1 NC left/1 NC right
	10/10	1 NO left/1 NO right
③	ü	Slow action with overlapping contacts
	h	with staggered contacts

Force-travel diagram

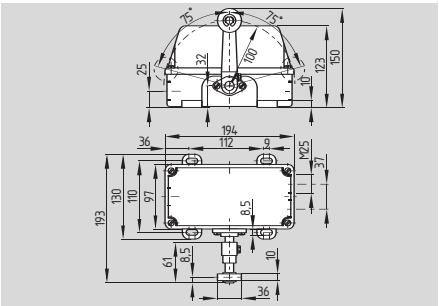


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

T. 471



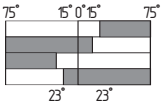
- Metal enclosure
- 4 or 6 contact, slow action ⊖
- Actuating direction, each time **75° right-hand side and left-hand side rotation**
- 3 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	10 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°

Contact variants

Roller lever
1 NO / 1 NC



Approvals

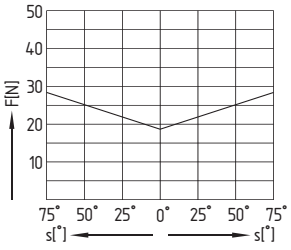
CE

Ordering details

T① 471-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	02/02	2 NC left/2 NC right
	20/20	2 NO left/2 NO right
	03/03	3 NC left/3 NC right
	12/12	1NO/2NC left/ 1NO/2NC right
	21/21	2NO/1NC left/ 2NO/1NC right
	30/30	3 NO left/3 NO right
③	ü	Slow action with overlapping contacts
	h	with staggered contacts

Force-travel diagram

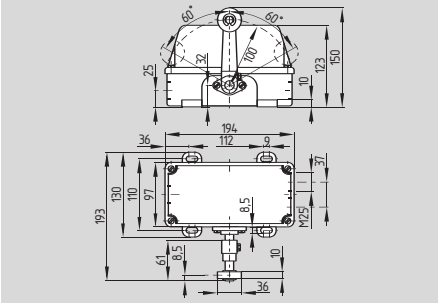


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

M. 471



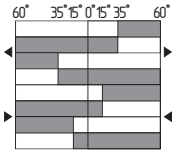
- Metal enclosure
- 4 or 6 contact, snap action with double break
- Actuating direction, each time **60° right-hand side and left-hand side rotation**
- 3 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm^2 (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	10 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	30000 operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°

Contact variants

Roller lever
1 NO / 1 NC



Approvals

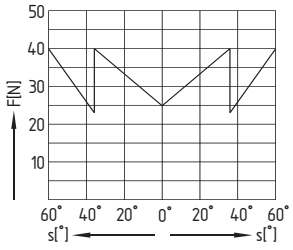
CE

Ordering details

M① 471-②y

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	02/02	2 NC left/2 NC right
	20/20	2 NO left/2 NO right
	03/03	3 NC left/3 NC right
	12/12	1NO/2NC left/ 1NO/2NC right
	21/21	2NO/1NC left/ 2NO/1NC right

Force-travel diagram

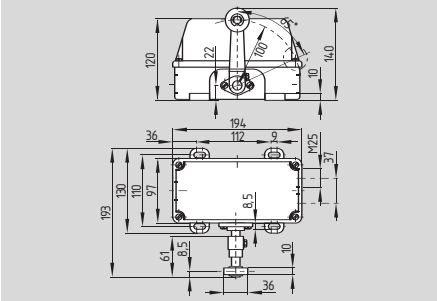


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

M. 471 R



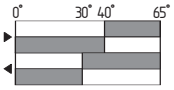
- Metal enclosure
- 3, 4 or 6 contact, snap action with double break
- Actuating direction always **65° right-hand side rotation**
- 3 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm^2 (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	10 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	30000 operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°

Contact variants

Roller lever
1 NO / 1 NC



Approvals

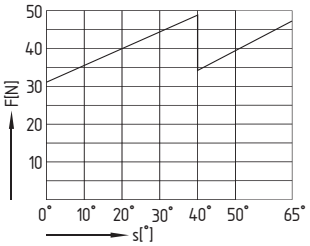
CE

Ordering details

M① 471-②y-③-④

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	12	1 NO/2 NC
	21	2 NO/1 NC
	22	2 NO/2 NC
	33	3 NO/3 NC
③	R	right-hand side rotation
	L	left-hand side rotation (on request)
④	r	Position latching 2 x 45°

Force-travel diagram



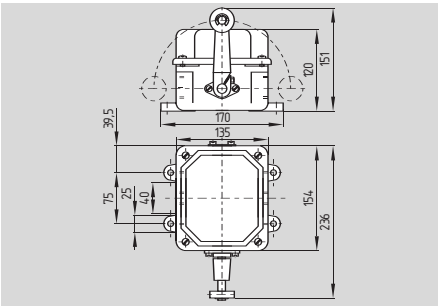
Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

Same switching points for left-hand execution (switch travel mirrored in the neutral point).

T 130



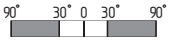
- Metal enclosure
- Up to 6 contact, slow action ⊖
- 4 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	10 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 4.5 kg

Contact variants

Roller lever
NO contact



NC contact

Approvals

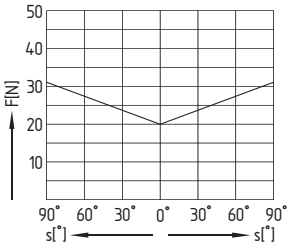
CE

Ordering details

T① 130-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	33	3 NO/3 NC (all contact combinations are possible, except for only NO or NC contact)
③	ü	Slow action with overlapping contacts
	h	with staggered contacts
	r	Position latching 2 x 45°

Force-travel diagram

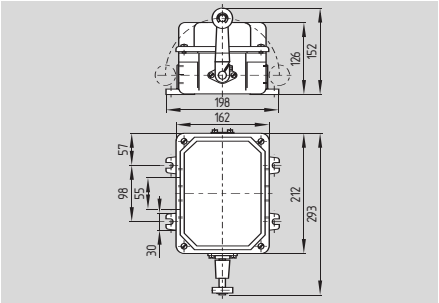


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

T 240



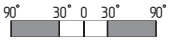
- Metal enclosure
- Up to 10 contact, slow action ⊖
- 4 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	10 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 6.8 kg

Contact variants

Roller lever
NO contact



NC contact

Approvals

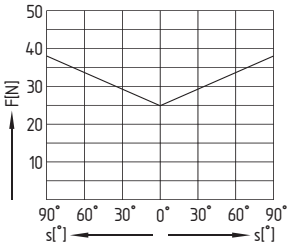
CE

Ordering details

T① 240-②y-③

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	55	5 NO/5 NC (all contact combinations are possible, except for only NO or NC contact)
③	ü	Slow action with overlapping contacts
	h	with staggered contacts
	r	Position latching 2 x 45°

Force-travel diagram

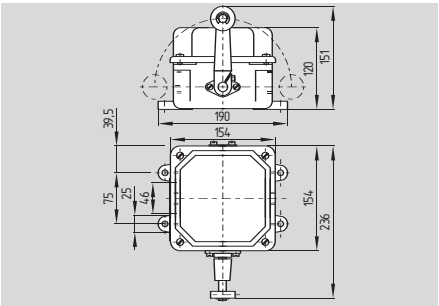


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

T 136



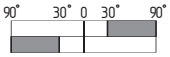
- Metal enclosure
- 3 or 4 contact, slow action ⊖
- 4 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

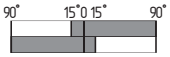
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 6
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	60 A
I_e/U_e:	20 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	20 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 15 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 3 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 50/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 5.9 kg

Contact variants

Roller lever
NO contact



NC contact



Approvals

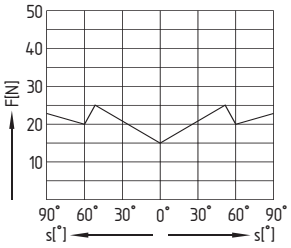
CE

Ordering details

T① 136-②y

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	03	3 NC
	30	3 NO

Force-travel diagram

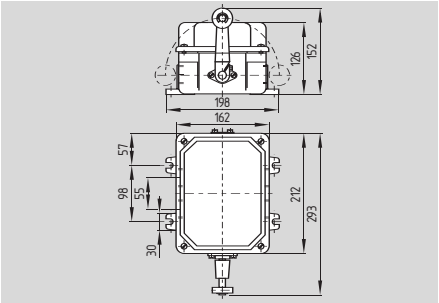


Note

The contact combinations can be found in the table on page 1-32.

A selection of turning levers can be found on page 1-146.

T 246



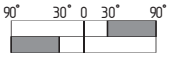
- Metal enclosure
- Up to 6 contact, slow action ⊖
- 4 cable entries M25 x 1.5
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

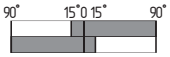
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 6
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	60 A
I_e/U_e:	20 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	20 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 15 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 3 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 50/h
Actuating speed:	max. 3 m/s, min. 0.05 m/s
Actuating angle:	max. 30°
Weight:	approx. 7.1 kg

Contact variants

Roller lever
NO contact



NC contact



Approvals

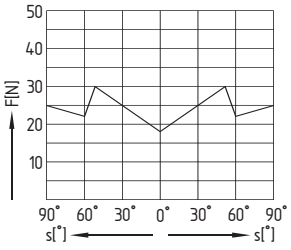
CE

Ordering details

T① 246-②y

No.	Replace	Description
①		For the appropriate actuator: see page 1-146
②	03/03	3 NC right/3 NC left
	30/30	3 NO right/3 NO left

Force-travel diagram

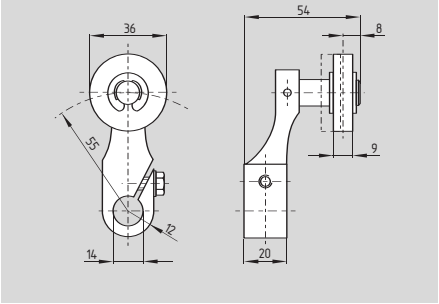


Note

The contact combinations can be found in the table on page 1-32.

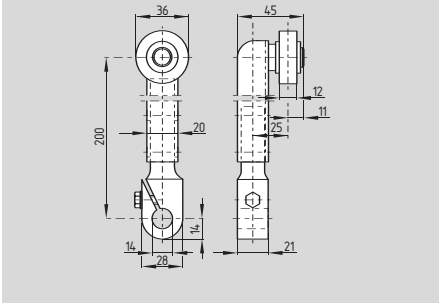
A selection of turning levers can be found on page 1-146.

Roller lever L



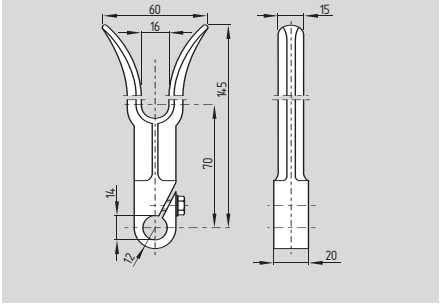
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

Roller lever V



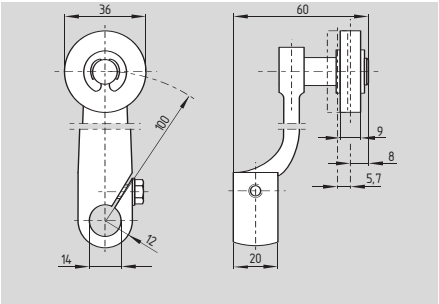
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

Fork lever C



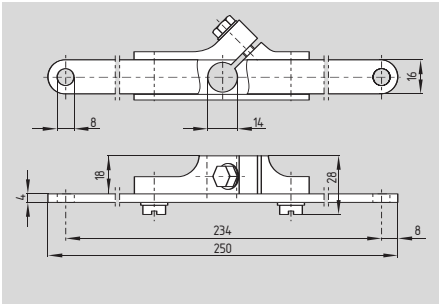
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever A



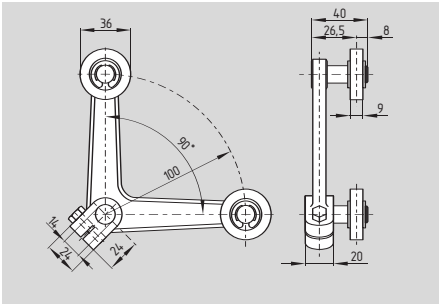
- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

Pull lever Z



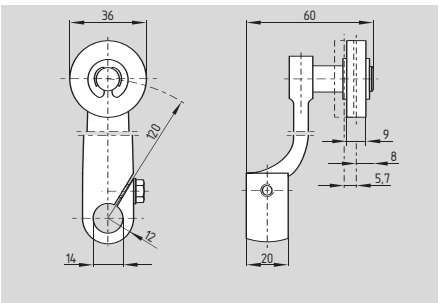
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Offset roller lever 4D



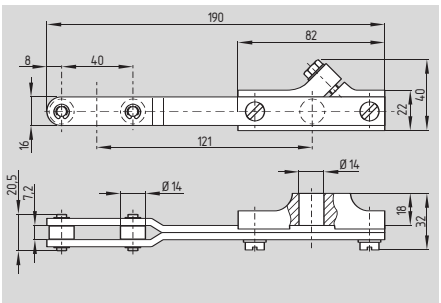
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever 2A



- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

Pull lever 2Z



- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Legend

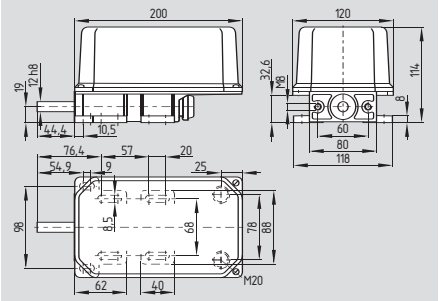
α: Actuating angle from right of switch axis

β: Actuating angle from left of switch axis

More Details

Detailed technical information at:
www.schmersal.com

G 50/150



- Snap or slow action
- Metal enclosure with impact-resistant plastic hood
- Version G 50-2047, safety gear-switch for stage and studios to VBG 70
- Various cam shapes for varying switch travel
- Available for easy adjustment of switching points by setting disk cams from front
- Connecting flange available
- 2 cable entries M20 x 1.5
- Protection class IP 65

Only type G 50 is approved to VBG 70 as safety gear-switch for stages and studios, ordering suffix -2047

Approvals

CE

Technical data

Standards:	DIN VDE 0660-200 VBG 70
Enclosure:	light alloy die-casting
Cover:	polyester
Protection class:	IP 65 to EN 60529
Contact material:	silver
Rough switching point setting:	standard: 4° steps to 360° on the disk cams front setting: 3.4° steps
Fine switching point setting:	max. 0.5 turns
Gear ratio:	
G 50:	1:50, 1:35, 1:25, 1:17
G 150:	1:150, 1:75, 1:100, 1:220, 1:300, 1:450
Contact blocks:	max. 8: on T/M 697 max. 4 with cams Ø 36 mm G 50-050 and G 150-150: Z/T 6881 (otherwise additional 1:1 ratio required)
Contact type:	M 697: 1 change-over contact, T 697: 1 NC, double break, Z/T 6881: change-over contact with galvanically separated contact bridges ⊖
Switching system:	slow and snap action
Termination:	T/M 697: screw terminals M 3 Z/T 6881: screw terminals M 3.5
Cable section:	max. 2.5 mm²
	(incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	T/M 697: 6 A Z/T 6881: 10 A
I_e/U_e:	T/M 697: 4 A / 230 VAC Z/T 6881: 2.5 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	6 A gL/gG D-fuse
Switchover time:	M 697: ≤ 10 ms Z 6881: ≤ 5 ms
Bounce duration:	–
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	T/M 697: 30 million operations Z/T 6881: > 1 million operations
Switching frequency:	T/M 697: 10.000/h Z/T 6881: 3.000/h

Note

Range of application
Gear switches are fit for multiple applications: motorisation of theatre scenes, controlling and positioning of lifts, and platforms, gate control, etc. Depending on the contact type, they are used for switching-off or positioning movement cycles. They are geared by means of an axle.

Operating principle
In the base models with transmission ratios of i = 1:50 (G 50) or 1:150 (G 150), the gear revolutions are directly transmitted to the disc cam by the worm and the worm wheel, i.e. for every 50 or 150 axle revolutions, the disc cams are rotated once over 360°.
For the switching point set-up of the contacts, the central screw must be loosened. Each disc cam can be set from 4° to 4°; they all have gearing as well as a positive drive with the worm wheel. After the set-up has been carried out, the central screw must be firmly retightened.

For disc cams with front setting, “index 1600”, the dowel of the disc cam must be pushed in using the screwdriver, which is located inside switch.

Ordering details

G ①-②-③④⑤/③④⑤/...y-⑥

No.	Replace	Description
①	50	Transmission ratio ≤ 1:50
	150	Transmission ratio ≥ 1:50
②	100	Gear ratio
		For example: 1:100
		Refer to selection table page 1-150
③	M	Snap action M
	Z	Snap action Z ⊖
	T	Slow action T ⊖
④	1 to 4	Number of NO (max. 4)
⑤	1 to 4	Number of NC (max. 4)

No.	Replace	Description
⑥	FL1	With flange FL1
	1600-1	With front-setting pointed cam
	1368-2	With bowex coupling
	1368-3	With shaft with slot and key
	2047	For stages and studios to VBG 70 (only for G 50)

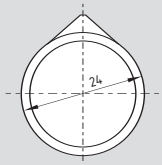
Note

Setting disk cams from front:
- Possible on all ø 24 mm cams
- Min. adjustment 3.4°
- Max. adjustment 360°
- Other cam combinations on request

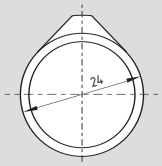
Do not adjust against the switch plunger!

- Max. 4 contact blocks possible with contact block Z 6881, ordering suffix Z and T 6881, ordering suffix T11
- Max. 8 contact blocks possible with contact block M 697, ordering suffix M and T 697, ordering suffix T01

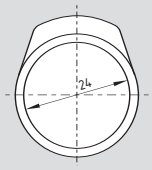
System components



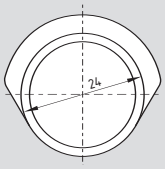
Pointed cam 24 mm Ø



30° cam 24 mm Ø

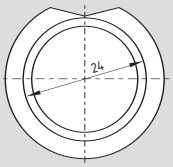


90° cam 24 mm Ø

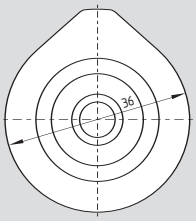


180° cam 24 mm Ø

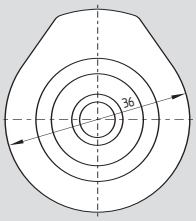
System components



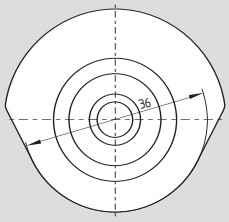
360° full cam 24 mm Ø



Pointed cam 36 mm Ø

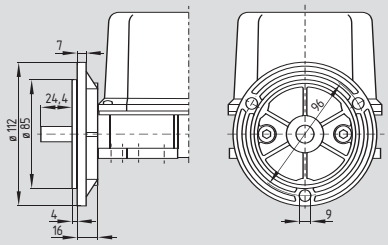


60° cam 36 mm Ø

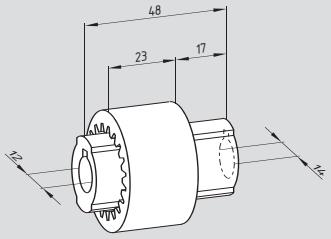


180° cam 36 mm Ø

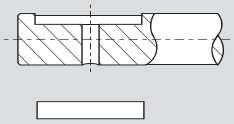
System components



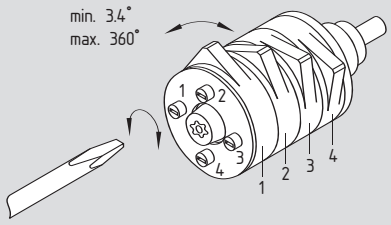
Flange FL1



Bowex coupling



Shaft with slot and key -1368-3



Teardrop cam with front setting -1600-1

Ordering details

Pointed cam Ø 24 mm	**ordering suffix 1600-**
30° cam Ø 24 mm	**ordering suffix 2281-**
90° cam Ø 24 mm	**ordering suffix 1601-**
180° cam Ø 24 mm	**ordering suffix 2269-**
360° full cam Ø 24 mm	**ordering suffix 1905-**

Cam forms ø 24mm:
- Standard cam forms:
  Pointed, 30°, 90°, 180° and 360° cam
- max. 8 contact blocks possible
- Suitable for setting from front

For further details see table on page 1-150.

Ordering details

Pointed cam Ø 36 mm	**ordering suffix 1582-***
60° cam Ø 36 mm	**ordering suffix 1582-***
180° cam Ø 36 mm	**ordering suffix 1739-***

* Different combinations possible on request.

Cam forms:
- Standard cam forms:
  Pointed, 60°and 180° cam
- Max. 4 contact blocks possible

Ordering details

Flange FL1	**ordering suffix -FL1**
Bowex coupling with shaft diameters	
12 and 14 mm	**ordering suffix -1368-2**
12 and 12 mm	**ordering suffix -1368-4**
Shaft with slot and key	**ordering suffix -1368-3**
Teardrop cam with front setting	**ordering suffix -1600-1***

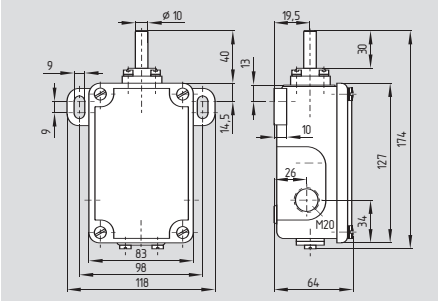
(Example with 4 pointed cams)

Cams Ø 24

Pointed cam Type/ Trans- misssion ratio Switching element		Usable revolutions M	Z	T11	T01	Run-on revolutions M	Z	T11	T01	Hysteresis revolutions M	Z	Cam travel per shaft rotation	Shaft rotation with 1° cam travel	Shaft revolution min.	max.
G 50	1:17	16.1	15.4	15.9	16.1	0.9	1.6	1.1	0.9	0.14	0.2	21.20°	17°	0.6	600
G 50	1:25	23.6	22.8	23.4	23.6	1.4	2.2	1.6	1.4	0.2	0.3	14.40°	25°	0.9	600
G 50	1:35	33.1	31.7	32.8	33.1	1.9	3.3	2.2	1.9	0.3	0.5	10.30°	35°	1.2	600
G 50	1:50	47.3	45.3	46.8	47.3	2.7	4.7	3.2	2.7	0.4	0.7	7.20°	50°	1.7	600
G 150	1:75	71.0	68.0	70.2	71.0	4.0	7.0	4.8	4.0	0.6	1.0	4.80°	75°	2.5	600
G 150	1:100	94.5	90.6	93.6	94.5	5.5	9.4	6.4	5.5	0.8	1.3	3.60°	100°	3.4	600
G 150	1:150	141.7	136.0	140.4	141.7	8.3	14.0	9.6	8.3	1.2	2.0	2.40°	150°	5.0	600
G 150	1:220	208.0	199.4	206.0	208.0	12.0	20.6	14.0	12.0	1.8	3.0	1.64°	220°	7.3	600
G 150	1:300	283.5	272.0	280.8	283.5	16.5	28.0	19.2	16.5	2.4	4.0	1.20°	300°	10.0	600
G 150	1:450	425.2	407.9	421.2	425.2	24.8	42.1	28.8	24.8	3.6	6.0	0.80°	450°	15.0	600
90° cam															
G 50	1:17	13.2	12.5	13.0	13.2	3.8	4.6	4.0	3.9	0.14	0.2	21.20°	17°	0.6	600
G 50	1:25	19.4	18.4	19.2	19.4	5.6	6.7	5.9	5.8	0.2	0.3	14.40°	25°	0.9	600
G 50	1:35	27.2	25.8	26.9	27.2	7.9	9.4	8.2	8.0	0.3	0.5	10.30°	35°	1.2	600
G 50	1:50	38.9	36.9	38.4	38.9	11.3	13.4	11.7	11.6	0.4	0.7	7.20°	50°	1.7	600
G 150	1:75	58.3	55.3	57.6	58.3	16.9	20.0	17.6	17.4	0.6	1.0	4.80°	75°	2.5	600
G 150	1:100	77.7	73.8	76.8	77.7	22.6	26.8	23.5	23.2	0.8	1.3	3.60°	100°	3.4	600
G 150	1:150	116.6	110.7	115.2	116.6	34.0	40.0	35.0	34.0	1.2	2.0	2.40°	150°	5.0	600
G 150	1:220	171.0	162.3	169.0	171.0	50.0	59.0	52.0	51.0	1.8	3.0	1.64°	220°	7.3	600
G 150	1:300	233.0	221.3	230.4	233.0	68.0	80.0	71.0	70.0	2.4	4.0	1.20°	300°	10.0	600
G 150	1:450	349.7	332.0	345.6	349.7	102.0	121.0	106.0	105.0	3.6	6.0	0.80°	450°	15.0	600
180° cam															
G 50	1:17	8.5	7.9	8.4	8.5	8.5	9.1	8.6	8.5	0.14	0.2	21.20°	17°	0.6	600
G 50	1:25	12.6	11.6	12.3	12.6	12.4	13.4	12.7	12.4	0.2	0.3	14.40°	25°	0.9	600
G 50	1:35	17.6	16.2	17.3	17.6	17.4	18.8	17.7	17.4	0.3	0.5	10.30°	35°	1.2	600
G 50	1:50	25.1	23.2	24.7	25.1	24.9	26.8	25.3	24.9	0.4	0.7	7.20°	50°	1.7	600
G 150	1:75	37.7	34.7	37.0	37.7	37.3	40.3	38.0	37.3	0.6	1.0	4.80°	75°	2.5	600
G 150	1:100	50.2	46.3	49.3	50.2	49.8	53.7	50.7	49.8	0.8	1.3	3.60°	100°	3.4	600
G 150	1:150	75.4	69.5	74.0	75.4	74.6	80.5	76.0	74.6	1.2	2.0	2.40°	150°	5.0	600
G 150	1:220	110.5	101.9	108.5	110.5	109.5	118.1	111.5	109.5	1.8	3.0	1.64°	220°	7.3	600
G 150	1:300	150.7	139.0	148.0	150.7	149.3	161.0	152.0	149.3	2.4	4.0	1.20°	300°	10.0	600
G 150	1:450	226.1	208.4	221.9	226.1	223.9	241.6	228.1	223.9	3.6	6.0	0.80°	450°	15.0	600
360° cam															
G 50	1:17	1.6	1.0	1.5	1.6	15.4	16.0	15.5	15.4	0.14	0.2	21.20°	17°	0.6	600
G 50	1:25	2.4	1.5	2.2	2.4	22.6	23.5	22.8	22.6	0.2	0.3	14.40°	25°	0.9	600
G 50	1:35	3.4	2.1	3.1	3.4	31.6	32.9	31.9	31.6	0.3	0.5	10.30°	35°	1.2	600
G 50	1:50	4.8	3.0	4.4	4.8	45.2	47.0	45.6	45.2	0.4	0.7	7.20°	50°	1.7	600
G 150	1:75	7.3	4.5	6.6	7.3	67.7	70.5	68.4	67.7	0.6	1.0	4.80°	75°	2.5	600
G 150	1:100	9.7	6.0	8.8	9.7	90.3	94.0	91.2	90.3	0.8	1.3	3.60°	100°	3.4	600
G 150	1:150	14.5	9.0	13.2	14.5	135.5	141.0	136.8	135.5	1.2	2.0	2.40°	150°	5.0	600
G 150	1:220	21.3	13.1	19.4	21.3	198.7	206.9	200.6	198.7	1.8	3.0	1.64°	220°	7.3	600
G 150	1:300	29.0	17.9	26.5	29.0	271.0	282.1	273.5	271.0	2.4	4.0	1.20°	300°	10.0	600
G 150	1:450	43.5	26.9	39.7	43.5	406.5	423.1	410.3	406.5	3.6	6.0	0.80°	450°	15.0	600

Rotating spindle limit switch

MSP 452



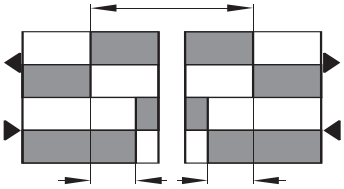
- Metal enclosure
- 4 contacts (NO)
- 2 cable entries
- Protection class IP 65

Technical data

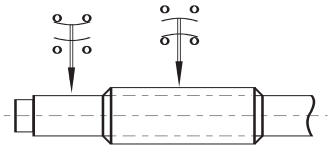
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 3
Cable section:	max. 2.5 mm^2 (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
I_e/U_e:	2.5 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	10 A (slow blow), 16 A (quick blow)
Contact opening:	max. 2 x 0.5 mm
Switchover time:	≤ 10 ms (with actuating speed 10 mm/min on plunger)
Bounce duration:	≤ 1.5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	3 million operations
Max. turning speed of the spindle:	max. 200 rpm min. 0.5 rpm
Actuating torque:	20 Ncm
Load on spindle:	max. 500 N
Weight:	1.7 kg

Contact variants

Adjustment range 4…55 rotations



Differential travel max. 1.25 rotations



Approvals

CE

Ordering details

MSP 452-11/11y

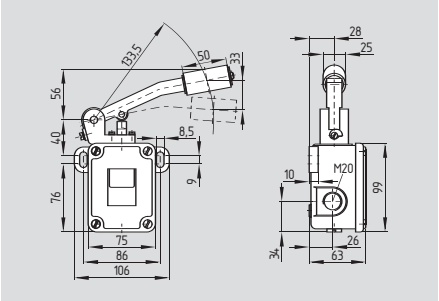
Note

This rotating spindle limit switch with snap action insert is only fit for use in normal to average operating conditions, e.g. for machine tools, cranes and conveyors. Protection class IP 65 to EN 60529.

Note

By reversing the contacts, the spindle revolutions can be set between 4 and 55 revolutions. The run-out towards each side is at least 5 revolutions.

T/M 441



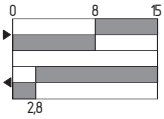
- Metal enclosure
- Slow action, change-over with double break
- Snap action, change-over contact with double break
- 2 cable entries
- Protection class IP 65
- Suitable for heavy duty

Technical data

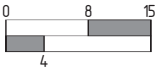
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow and snap action, double break
Contact type:	snap action: change-over contact, slow action: positive break NC contact ⊖ double break with 2 separate contact bridges
Termination:	screw terminals M 4
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	snap action: 4 kV slow action: 6 kV
U_i:	snap action: 250 V slow action: 400 V suffix -k or -t: 500 V
I_{the}:	16 A
I_e/U_e:	snap action: 4 A / 230 V slow action: 4 A / 400 V
Utilisation category:	AC-15
Max. fuse rating:	16 A gL/gG D-fuse
Contact opening:	snap action: max. 2 x 2.5 mm slow action: max. 2 x 6.0 mm
Switchover time:	snap action: ≤ 35 ms
Bounce duration:	snap action: ≤ 5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	10 million operations
Switching frequency:	max. 3000/h

Contact variants

Snap action
1 NO / 1 NC



Slow action
1 NO / 1 NC



Approvals

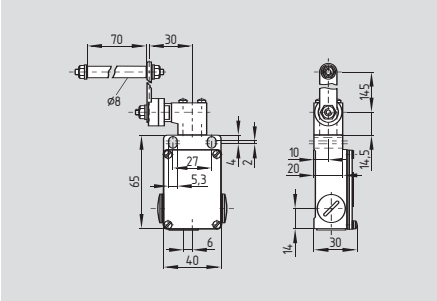
CE

Ordering details

① **441-11y②-14-③**

No.	Replace	Description
①	M.	Snap action
	T.	Slow action
②	ü	Slow action with overlapping contacts
③	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version - 40 °C … + 200 °C
	1276	Gold-plated contacts

ES/EM 41 DB



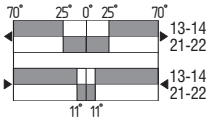
- Metal enclosure
- Slow action: two contacts
- Snap action: 2 contacts
- 3 cable entries M20 x 1.5
- Protection class IP 65
- Plastic cover available
- Different actuating rollers available

Technical data

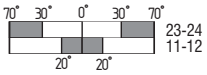
Standards:	IEC/EN 60947-5-1 EN 60204-1
Enclosure:	light-alloy diecast, paint finish
Cover:	steel, painted
Protection class:	IP 65 to EN 60529
Contact material:	silver
Contact type:	change-over contact, double break with 2 separate contact bridges, positive break NC contacts ⊖
Switching system:	slow or snap action
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm²
	(incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	400 V
I_{the}:	6 A
I_e/U_e:	6 A / 400 V
Utilisation category:	AC-15
Max. fuse rating:	6 A gL/gG D-fuse
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	max. 1800/h

Contact variants

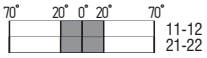
Snap action
1 NO / 1 NC



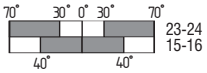
Slow action
1 NO / 1 NC



2 NC contacts



Slow action with overlapping contacts
1 NO / 1 NC



Approvals

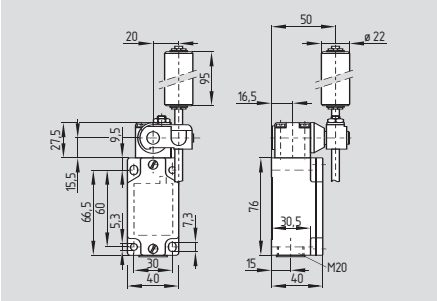
CE

Ordering details

E① 41 DB ②

No.	Replace	Description
①	S	Slow action
	M	Snap action
②	1Ö/1S	1 NO/1 NC
	1S/1Ö UE	with overlapping contacts
	2Ö	2 NC

M 330



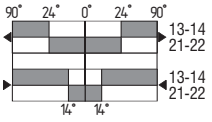
- Metal enclosure
- 2 contacts
- Snap action with self-cleaning contacts
- Mounting details to EN 50041
- Adjustable-length rod lever with nylon roller
- LED version available
- 1 cable entry M20 x 1.5
- Protection class IP 65
- For light to medium duty
- Patented low-wear actuator head

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure and cover material:	light alloy die-casting, painted
Protection class:	IP 65 to EN 60529
Contact material:	silver
Contact type:	change-over contact, double break with 2 separate contact bridges, same potential
Switching system:	snap action, self-cleaning contacts
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
I_e/U_e:	2.5 A / 230 VAC
Utilisation category:	AC-15
Max. fuse rating:	6 A gL/gG D-fuse
Contact opening:	max. 2 x 0.5 mm
Switchover time:	≤ 10 ms (with actuating speed 10 mm/min on plunger)
Bounce duration:	≤ 1.5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	> 30 million operations
Switching frequency:	max. 3000/h
Repeat accuracy of switching points:	± 0.02 mm on plunger

Contact variants

1 NO / 1 NC



Approvals

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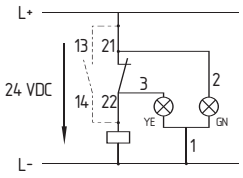
Ordering details

MV10H 330-11y-1348-①

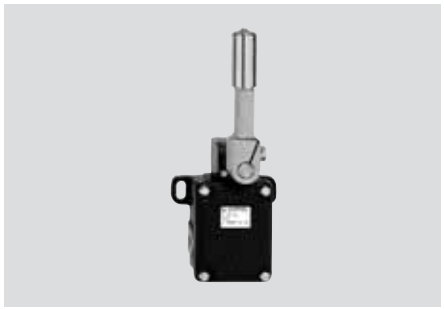
No.	Replace	Description
①		Without LED
	G24	With LED

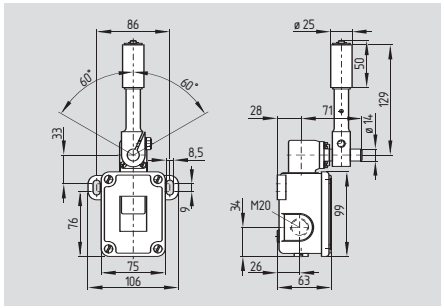
Note



LED version:
Ordering suffix G24, protected against incorrect polarity and voltage spikes.
- Supply voltage indication: Green (GN)
- Switching position indication: Yellow (YE)

T/M 441





- Metal enclosure
- Slow action, change-over contact with double break
- Snap action, change-over contact with double break
- 2 cable entries
- Lever available with various lengths of roller
- Protection class IP 65
- Suitable for heavy duty

Approvals

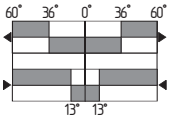
CE

Technical data

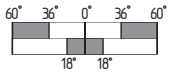
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow and snap action, double break
Contact type:	snap action: change-over contact, slow action: positive break NC contact ⊖ double break with 2 separate contact bridges
Termination:	screw terminals M 4
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	snap action: 4 kV slow action: 6 kV
U_i:	snap action: 250 V slow action: 400 V suffix -k or -t: 500 V
I_{the}:	16 A
I_e/U_e:	snap action: 4 A / 230 V slow action: 4 A / 400 V
Utilisation category:	AC-15
Max. fuse rating:	16 A gL/gG D-fuse
Contact opening:	snap action: max. 2 x 2.5 mm slow action: max. 2 x 6.0 mm
Switchover time:	snap action: ≤ 35 ms
Bounce duration:	snap action: ≤ 5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	10 million operations
Switching frequency:	max. 3000/h
Repeat accuracy of switching points:	–

Contact variants

Snap action
1 NO / 1 NC



Slow action
1 NO / 1 NC

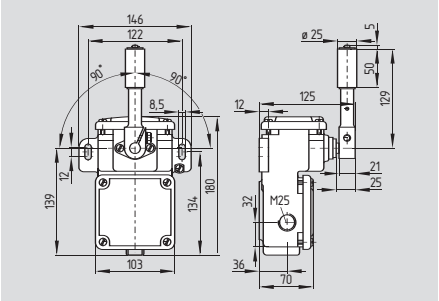


Ordering details

① **441-11y-②-③-④**

No.	Replace	Description
①	M.	Snap action
	T.	Slow action
②	For the appropriate actuator: see page 1-157	
③	ü	Slow action with overlapping contacts
④	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version - 40 °C … + 200 °C
	1276	Gold-plated contacts

T/M 250



- Metal enclosure
- Slow action, change-over contact with double break
- Slow action available with overlapping or staggered contacts
- Snap action, change-over contact with double break
- 2 cable entries M25 x 1.5
- Lever available with various lengths of roller
- Protection class IP 65
- Suitable for heavy duty

Approvals

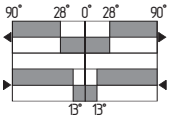
CE

Technical data

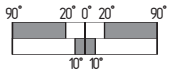
Standards:	IEC/EN 60947-5-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 67 to EN 60529
Contact material:	silver
Contact type:	snap action: change-over contact, with 2 galvanically separated contact bridges slow action: positive break NC contacts ⊖
Switching system:	slow and snap action
Termination:	screw terminals M 4
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	16 A
I_e/U_e:	4 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gL/gG D-fuse
Contact opening:	snap action: max. 2 x 2.5 mm slow action: max. 2 x 2 mm
Switchover time:	≤ 35 ms
Bounce duration:	≤ 5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	10 million operations
Switching frequency:	max. 3000/h

Contact variants

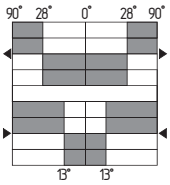
Snap action
1 NO / 1 NC



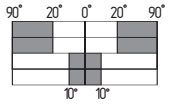
Slow action
1 NO / 1 NC



Snap action
2 NO / 2 NC



Slow action
2 NO / 2 NC

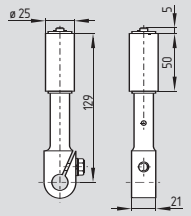


Ordering details

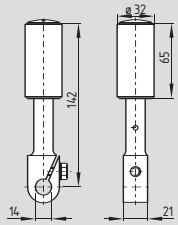
① **250-**②**z-**③**-**④

No.	Replace	Description
①	M.	Snap action
	T.	Slow action
②	11	1 NO/1 NC
	22	2 NO/2 NC
③	For the appropriate actuator: see page 1-157	
④	k	Tropical version with ceramic insulation
	t	Tropical and temperature-resistant version - 40 °C … + 200 °C
	1276	Gold-plated contacts

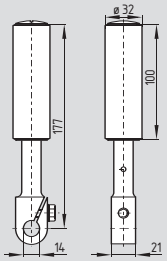
System components



Belt alignment lever 243



Belt alignment lever 966



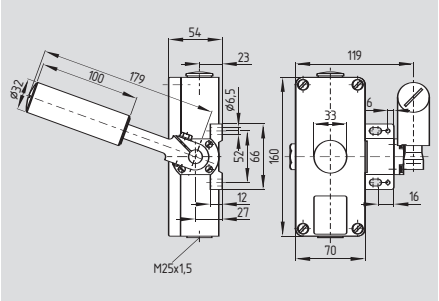
Belt alignment lever 1224

Ordering details

Belt alignment levers

243	**ordering suffix -243**
966	**ordering suffix -966**
1224	**ordering suffix -1224**

ZS 75 SR



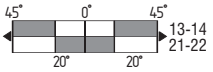
- To IEC 60947-5-1
- Metal enclosure
- 2 or 4 contacts
- 2 cable entries M25 x 1.5
- Reset by push button or key possible
- Signalling lamp available on request for various voltage
- Ex version available

Technical data

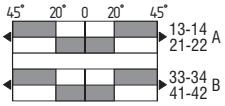
Standards:	IEC/EN 60947-5-1
Enclosure:	cast aluminium, enamel finish
Cover:	cast aluminium, enamel finish
Protection class:	IP 65 push button reset IP 54 key reset to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break or 2 NO and 2 NC or 4 NC contacts
Switching system:	⊖ IEC 60947-5-1 snap action with positive break NC contacts
Termination:	screw terminals
Cable section:	max. 2.5 mm²
	(incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	400 V
I_{the}:	6 A
Utilisation category:	AC-15
I_e/U_e:	6 A / 400 VAC
Max. fuse rating:	6 A gL/gG D-fuse
Ambient temperature:	– 25 °C … + 70 °C
Mechanical life:	> 1 million operations
Indicator lamp:	on request

Contact variants

1 NO / 1 NC



2 NO / 2 NC



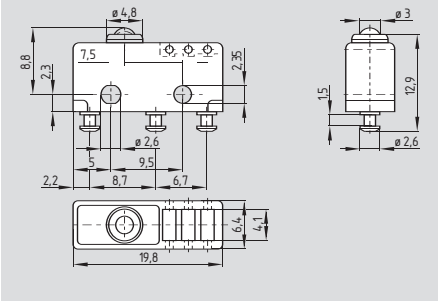
Approvals

Ordering details

ZS 75 SR ① ②

No.	Replace	Description
①	1Ö/1S	1 NO/1 NC
	2Ö/2S	2 NO/2 NC
	4Ö	4 NC
②	VD	Push button reset
	VS	Key reset

M 610



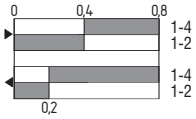
- Thermoplastic enclosure
- Very long life
- Change-over contact, single break
- Snap action with self-cleaning contacts
- Enclosure dimensions to DIN 41635-B
- Soldering, plug or screw terminals
- Telescopic head available
- Various actuators available

Technical data

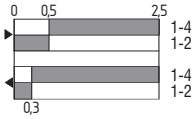
Standards:	IEC/EN 60947-5-1
Enclosure:	glass-fibre reinforced thermoplastic
Actuator:	thermoplastic
Protection class:	IP 40, terminals IP 00 to EN 60529
Degree of pollution:	2
Contact material:	gold-plated silver
Contact type:	change-over contact, single break
Switching system:	snap action, self-cleaning contacts
Termination:	soldering, plug or screw terminals
Cable section:	max. 1.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	4 A
Utilisation category:	AC-15
I_e/U_e:	2.5 A / 230 VAC
Max. fuse rating:	6 A gL/gG D-fuse
Actuating force:	approx 1.2 N
Ejection force:	min. 0.3 N
Contact opening:	0.3 mm
Switchover time:	≤ 10 ms (with actuating speed 10 mm/min on plunger)
Bounce duration:	≤ 1.5 ms
Ambient temperature:	– 30 °C … + 85 °C
Mechanical life:	≥ 10 million operations
Switching frequency:	max. 10000/h
Actuating speed:	min. 1 mm/min
Repeat accuracy of switching points:	–

Contact variants

Change-over contact with double break
Actuator 1A...1D



Telescopic plunger 2S



Approvals

CE

Ordering details

M 610-11-①-②-③

No.	Replace	Description
①	20	Soldering terminal with hole
	21	with collar
	30	Plug terminals
	60	Screw terminals
②	1006	Reduced actuating force 0.8 N
③	AuNi	Gold-nickel contact tips for low DC votages

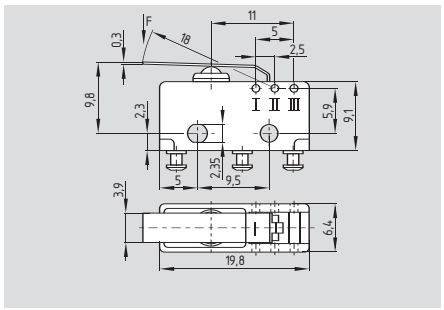
Note

When mounting the switches, care must be taken to maintain electrical clearances to adjacent devices and metal parts.

The lever bearing position can be changed subsequently.

The contact/switch travel diagram relates to the plunger travel.

Actuator 1A



Lever bearing	I	II	III
Total travel [mm]	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]	0.36	0.52	0.68
Min. return force [N]	0.10	0.14	0.18

Approvals

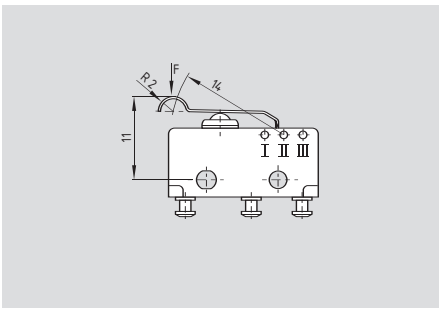
CE

Ordering details

M 610-11-①-1A-②-③-④

No.	Replace	Description
①	20	Soldering terminal with hole
	21	with collar
	30	Plug terminals
	60	Screw terminals
②		Lever bearing II
	I	Lever bearing I
	III	Lever bearing III
③	1006	Reduced actuating force 0.8 N
④	AuNi	Gold-nickel contact tips for low DC votages

Actuator 1C



Lever bearing	I	II	III
Total travel [mm]	2.10	1.50	1.20
Pre-travel [mm]	1.20	0.80	0.65
Max. differential [mm]	0.50	0.35	0.25
Actuating force [N]	0.47	0.67	0.87
Min. return force [N]	0.13	0.18	0.23

Approvals

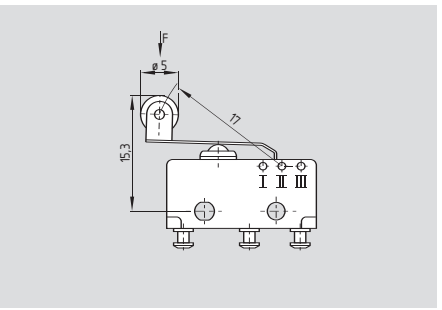
CE

Ordering details

M 610-11-①-1C-②-③-④

No.	Replace	Description
①	20	Soldering terminal with hole
	21	with collar
	30	Plug terminals
	60	Screw terminals
②		Lever bearing II
	I	Lever bearing I
	III	Lever bearing III
③	1006	Reduced actuating force 0.8 N
④	AuNi	Gold-nickel contact tips for low DC votages

Actuator 1E



Lever bearing	I	II	III
Total travel [mm]	2.60	1.80	1.40
Pre-travel [mm]	1.45	1.00	0.75
Max. differential [mm]	0.55	0.40	0.30
Actuating force [N]	0.38	0.54	0.70
Min. return force [N]	0.11	0.15	0.19

• Roller 2.7 mm wide

Approvals

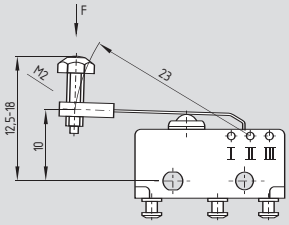
CE

Ordering details

M 610-11-①-1E-②-③-④

No.	Replace	Description
①	20	Soldering terminal with hole
	21	with collar
	30	Plug terminals
	60	Screw terminals
②		Lever bearing II
	I	Lever bearing I
	III	Lever bearing III
③	1006	Reduced actuating force 0.8 N
④	AuNi	Gold-nickel contact tips for low DC votages

Actuator 1D



Lever bearing	I	II	III
Total travel [mm]	3.50	2.50	1.90
Pre-travel [mm]	1.90	1.40	1.00
Max. differential [mm]	0.80	0.55	0.40
Actuating force [N]	0.28	0.40	0.52
Min. return force [N]	0.08	0.11	0.14

Approvals

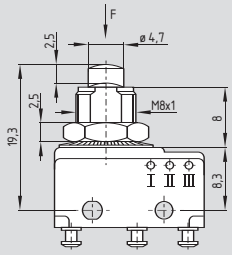
CE

Ordering details

M 610-11-①-1D-②-③-④

No.	Replace	Description
①	20	Soldering terminal with hole
	21	with collar
	30	Plug terminals
	60	Screw terminals
②		Lever bearing II
	I	Lever bearing I
	III	Lever bearing III
③	1006	Reduced actuating force 0.8 N
④	AuNi	Gold-nickel contact tips for low DC votages

Telescopic plunger 2S



Total travel [mm]	2.50
Pre-travel [mm]	0.50
Max. differential [mm]	0.20
Actuating force [N]	2.10
Min. return force [N]	0.30

Approvals

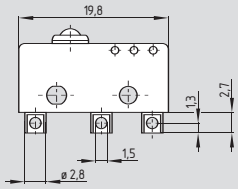
CE

Ordering details

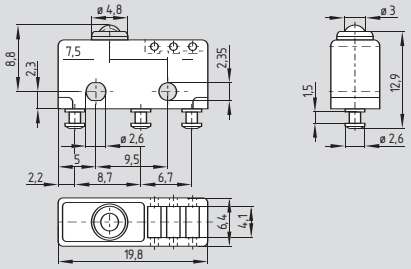
M 610-11-①-2S-②-③

No.	Replace	Description
①	20	Soldering terminal with hole
	21	with collar
	30	Plug terminals
	60	Screw terminals
②	1006	Reduced actuating force 0.8 N
③	AuNi	Gold-nickel contact tips for low DC votages

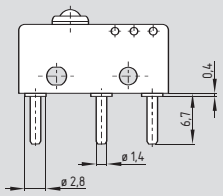
System components



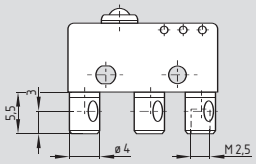
Soldering terminal with hole



Soldering terminal with collar



Plug terminal

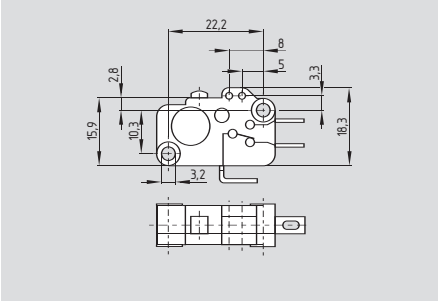


Screw terminals

Ordering details

Soldering terminal	
with hole	**ordering suffix -20**
with collar	**ordering suffix -21**
Plug terminal	**ordering suffix -30**
Screw terminals	**ordering suffix -60**

M 630



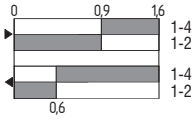
- Thermoplastic enclosure
- Very long life
- Change-over contact, single break
- Snap action with self-cleaning contacts
- Robust design
- High switching capacity
- Temperature resistant up to + 120 °C
- Soldering, spade or universal terminals
- Various actuators available

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	glass-fibre reinforced thermoplastic
Actuator:	thermoplastic
Protection class:	IP 40, terminals IP 00 to EN 60529
Degree of pollution:	2
Contact material:	silver
Contact type:	change-over contact, single break
Switching system:	snap action, self-cleaning contacts
Termination:	soldering, plug or screw terminals
Cable section:	max. 1.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	10 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 230 VAC
Max. fuse rating:	10 A gL/gG D-fuse
Actuating force:	approx. 1.2 N ordering suffix -934: 0.4 N
Ejection force:	min. 1.2 N
Contact opening:	0.9 mm
Switchover time:	≦30 ms (with actuating speed of 10 mm/min at plunger)
Bounce duration:	≦5 ms
Ambient temperature:	– 30 °C … + 120 °C
Mechanical life:	≧30 million operations
Switching frequency:	max. 10000/h
Actuating speed:	min. 1 mm/min
Repeat accuracy of switching points:	± 0.05 mm

Contact variants

Change-over contact with double break



Approvals

CE

Ordering details

M 630-11-①-②-③

No.	Replace	Description
①	2	Soldering terminal
	3	Plug terminals
	5	Universal terminal
②	934	Reduced actuating force 0.4 N
③	c	With magnetic arc extinguishing to switch DC circuits

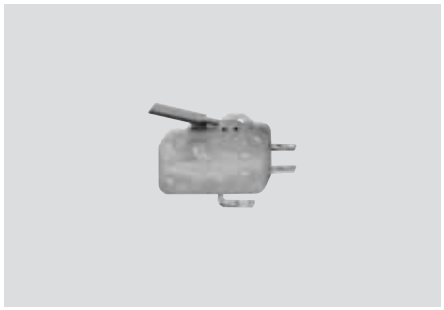
Note

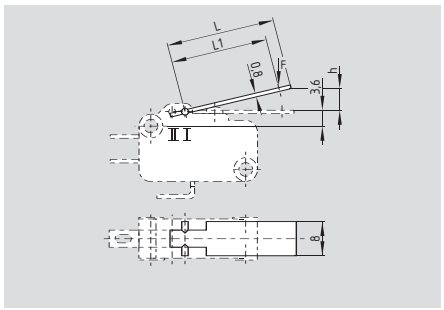
When mounting the switches, care must be taken to maintain electrical clearances to adjacent devices and metal parts. When using for DC circuits with arc extinguishing, this switch can be only used as NO or NC contact. Observe polarity!

The lever bearing position can be changed subsequently.

The contact/switch travel diagram relates to the plunger travel.

Actuator A





Actuator	Length L1 [mm]	Total length L [mm]
A17	17	20
A24	24	27
A30	30	33
A40	40	43
A50	50	53

Approvals

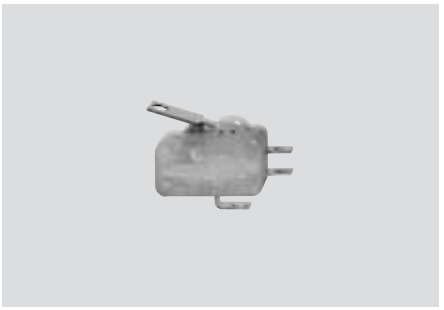
CE

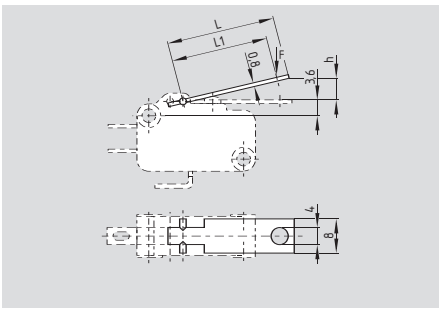
Ordering details

M 630-11-①-A ②-③-④-⑤

No.	Replace	Description
①	2	Soldering terminal
	3	Plug terminals
	5	Universal terminal
②	xx	Length L1 (mm) see table at the top
③		Lever bearing I
	II	Lever bearing II
④	934	Reduced actuating force 0.4 N
⑤	c	With magnetic arc extinguishing to switch DC circuits

Actuator B





Actuator	Length L1 [mm]	Total length L [mm]
B17	17	20
B24	24	27
B30	30	33
B40	40	43
B50	50	53

Approvals

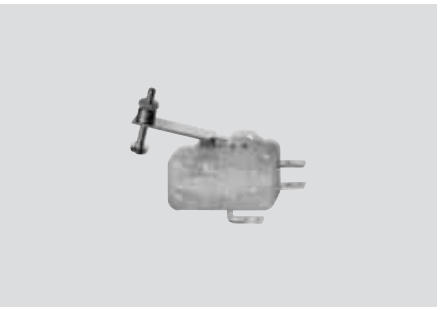
CE

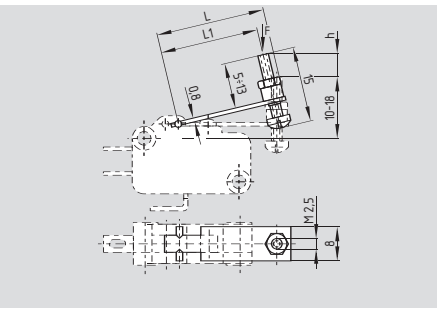
Ordering details

M 630-11-①-B ②-③-④-⑤

No.	Replace	Description
①	2	Soldering terminal
	3	Plug terminals
	5	Universal terminal
②	xx	Length L1 (mm) see table at the top
③		Lever bearing I
	II	Lever bearing II
④	934	Reduced actuating force 0.4 N
⑤	c	With magnetic arc extinguishing to switch DC circuits

Actuator D





Actuator	Length L1 [mm]	Total length L [mm]
D24	24	27
D30	30	33
D40	40	43
D50	50	53

Approvals

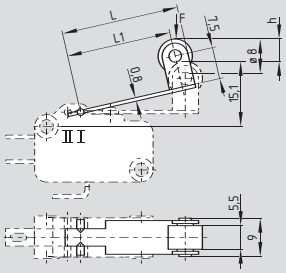
CE

Ordering details

M 630-11-①-D ②-③-④-⑤

No.	Replace	Description
①	2	Soldering terminal
	3	Plug terminals
	5	Universal terminal
②	xx	Length L1 (mm) see table at the top
③		Lever bearing I
	II	Lever bearing II
④	934	Reduced actuating force 0.4 N
⑤	c	With magnetic arc extinguishing to switch DC circuits

Actuator E



Actuator	Length L1 [mm]	Total length L [mm]
E17	17	20
E24	24	27
E30	30	33
E40	40	43
E50	50	53

Approvals

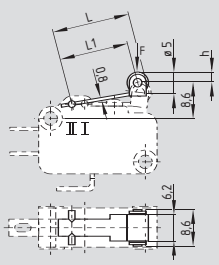
CE

Ordering details

M 630-11-①-E ②-③-④-⑤

No.	Replace	Description
①	2	Soldering terminal
	3	Plug terminals
	5	Universal terminal
②	xx	Length L1 (mm) see table at the top
③		Lever bearing I
	II	Lever bearing II
④	934	Reduced actuating force 0.4 N
⑤	c	With magnetic arc extinguishing to switch DC circuits

Actuator F



Actuator	Length L1 [mm]	Total length L [mm]
F	16.2	18.2

Approvals

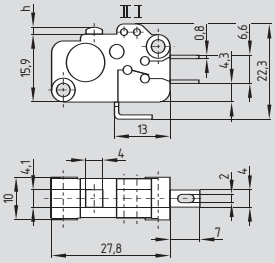
CE

Ordering details

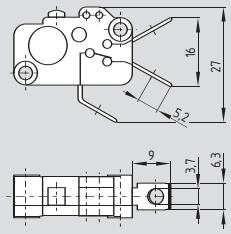
M 630-11-①-F-②-③-④

No.	Replace	Description
①	2	Soldering terminal
	3	Plug terminals
	5	Universal terminal
②		Lever bearing I
	II	Lever bearing II
③	934	Reduced actuating force 0.4 N
④	c	With magnetic arc extinguishing to switch DC circuits

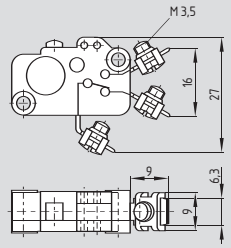
System components



Soldering terminal



Plug terminal

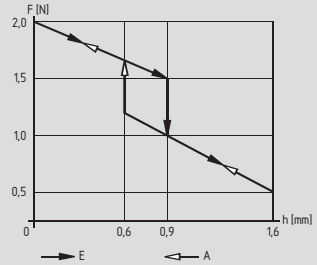


Universal terminals

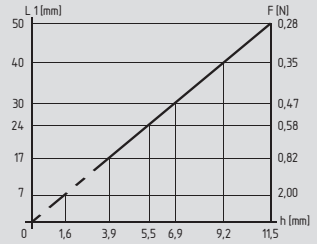
Ordering details

Soldering terminal	**ordering suffix -2**
Plug terminal	**ordering suffix -3**
Universal terminals	**ordering suffix -5**

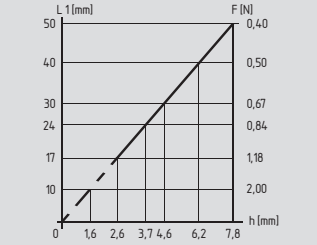
Force-Travel diagrams



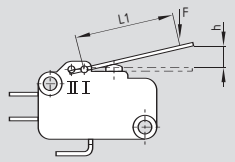
Force-Travel on plunger



Force-Travel on lever bearing I



Force-Travel on lever bearing II

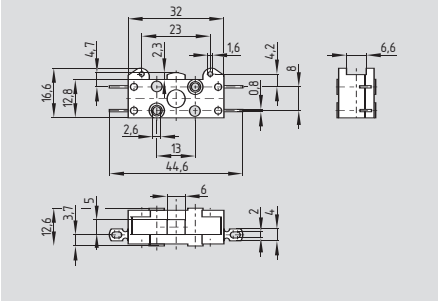


Lever bearing I or II

Legend

L1: Actuating distance
h: Travel at actuator/plunger
F: Actuating force at actuator/plunger
E: Switch-on travel
A: Switch-off travel
S: Switching point = h / 1.78
Δh: Differential travel = h / 5.33

M 6800 / M 6900



- Thermoplastic enclosure
- Very long life
- Change-over contact, double break
- Snap action
- Soldering, spade or universal terminals
- Suitable for low actuating speeds
- Available with end-position latching and in tandem version
- Various actuators available

Approvals

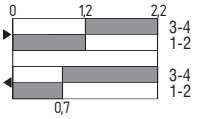
CE

Technical data

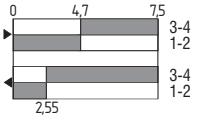
Standards:	IEC/EN 60947-5-1
Enclosure:	thermoplastic
Actuator:	thermoplastic
Protection class:	IP 40, terminals IP 00 to EN 60529
Degree of pollution:	2
Contact material:	silver
Contact type:	M 6800: change-over contact, double break, with galvanically separated contact bridges, same potential M 6900: change-over contact, double break, type Za
Switching system:	snap action, self-cleaning contacts
Termination:	soldering, spade or universal terminals
Cable section:	max. 1.5 mm² (incl. conductor ferrules)
U_{imp}:	2.5 kV
U_i:	250 V
I_{the}:	6 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 230 VAC
Max. fuse rating:	10 A gL/gG D-fuse
Actuating force:	approx. 4 N
Ejection force:	M 6800: min. 0.8 N M 6900: min. 1.3 N
Contact opening:	2 x 0.5 mm
Switchover time:	≤ 10 ms (with actuating speed 10 mm/min on plunger)
Bounce duration:	M 6800: ≤ 1.5 ms M 6900: ≤ 3.0 ms
Ambient temperature:	– 30 °C … + 85 °C
Mechanical life:	≥ 30 million operations
Switching frequency:	max. 10000/h
Actuating speed:	M 6800: min. 1 mm/min M 6900: min. 10 mm/min
Repeat accuracy of switching points:	M 6800: ± 0.02 mm at plunger M 6900: ± 0.05 mm at plunger

Contact variants

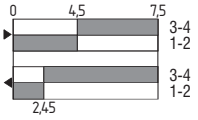
Plunger



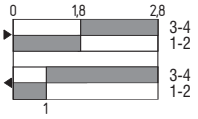
Actuator 80 A



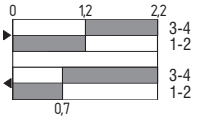
Actuator 80 E



Actuator 80 M



Actuator 80 B 9



Ordering details

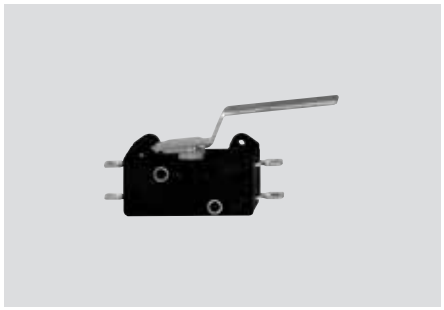
M ①-11-②-③

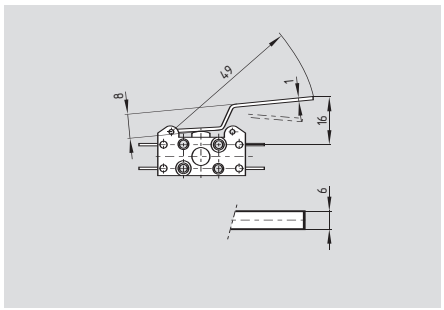
No.	Replace	Description
①	6800	Double leaf-spring system
	6900	C spring system
②	2	Soldering terminal
	3	Spade terminals 6.3 mm
	5	Universal terminal
③		Standard
	P2	At rest in end positions
	P3	Tandem version

Note

Further actuators available on request.

Actuator 80 A





• Actuating force approx. 0.9 N

Approvals

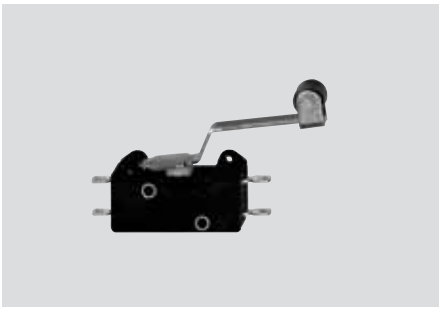
CE

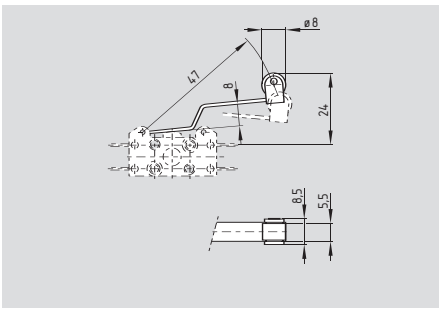
Ordering details

M ①-11-②-③-80 A

No.	Replace	Description
①	6800	Double leaf-spring system
	6900	C spring system
②	2	Soldering terminal
	3	Spade terminals 6.3 mm
	5	Universal terminal
③		Standard
	P2	At rest in end positions
	P3	Tandem version

Actuator 80 E





• Actuating force approx. 0.95 N

Approvals

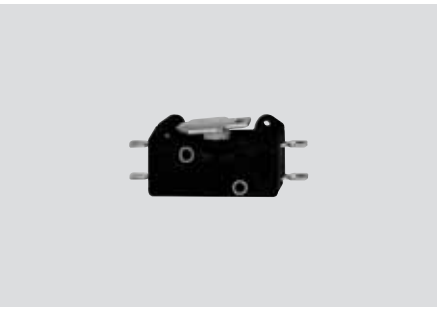
CE

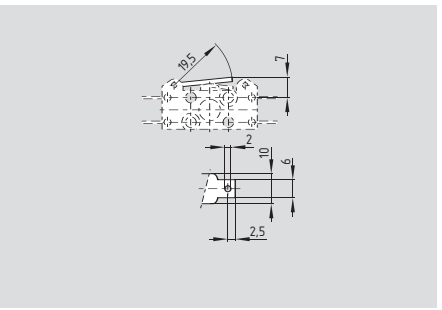
Ordering details

M ①-11-②-③-80 E

No.	Replace	Description
①	6800	Double leaf-spring system
	6900	C spring system
②	2	Soldering terminal
	3	Spade terminals 6.3 mm
	5	Universal terminal
③		Standard
	P2	At rest in end positions
	P3	Tandem version

Actuator 80 M





• Actuating force approx. 2.4 N

Approvals

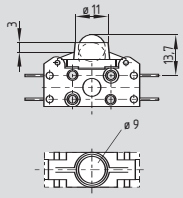
CE

Ordering details

M ①-11-②-③-80 M

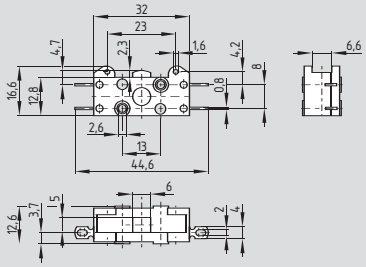
No.	Replace	Description
①	6800	Double leaf-spring system
	6900	C spring system
②	2	Soldering terminal
	3	Spade terminals 6.3 mm
	5	Universal terminal
③		Standard
	P2	At rest in end positions
	P3	Tandem version

Actuator 80 B 9

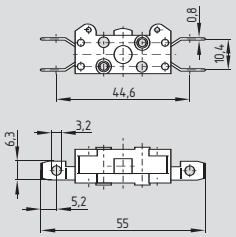


- Actuating force approx. 3.8 N
- Captive stainless steel ball

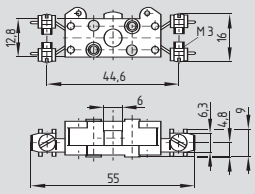
System components



Soldering terminal

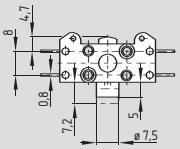


Spade terminals

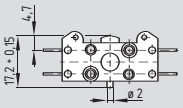


Universal terminals

System components



Latching in end position



Tandem version

Approvals

CE

Ordering details

M ①-11-②-③-80 B 9

No.	Replace	Description
①	6800	Double leaf-spring system
	6900	C spring system
②	2	Soldering terminal
	3	Spade terminals 6.3 mm
	5	Universal terminal
③		Standard
	P2	At rest in end positions
	P3	Tandem version

Ordering details

Soldering terminal	**ordering suffix -2**
Spade terminals	**ordering suffix -3**
Universal terminals	**ordering suffix -5**

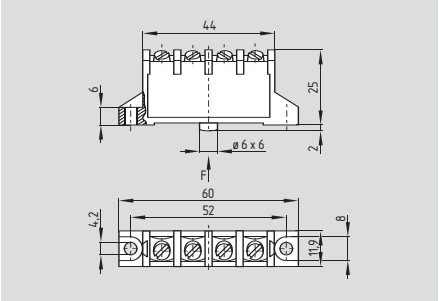
Ordering details

Latching in end position	**ordering suffix P2**
Tandem version	**ordering suffix P3**

Around the clock

Always there for you, the Online Catalogue at:
www.schmersal.com

M 687



- Thermoplastic enclosure
- Flat design
- Very long life
- Change-over contact, double break
- Galvanically separated contact bridges
- Snap action with self-cleaning contacts
- Temperature resistant up to + 120 °C
- Screw or spade terminals
- Suitable for low actuating speeds

Approvals

CE

Ordering details

M 687-11-①-②-③

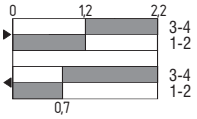
No.	Replace	Description
①	1	Screw terminals
	3	Spade terminals
②		Without terminal cover
	i	With terminal cover
③	AuNi	Gold-nickel contacts

Technical data

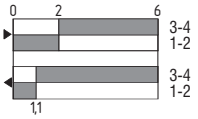
Standards:	IEC/EN 60947-5-1
Enclosure:	body: pressure-setting plastic cover: glass-fibre reinforced thermoplastic
Actuator:	thermoplastic
Protection class:	IP 40, terminals IP 00 to EN 60529
Degree of pollution:	2
Contact material:	silver, 0.3 µm gold flashed
Contact type:	change-over contact, double break, with g alvanically separated contact bridges, same potential
Switching system:	snap action, self-cleaning contacts
Termination:	screw or spade terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
Utilisation category:	AC-15
I_e/U_e:	2.5 A / 230 VAC
Max. fuse rating:	10 A gL/gG D-fuse
Actuating force:	approx. 4 N
Ejection force:	min. 0.8 N
Contact opening:	2 x 0.5 mm
Switchover time:	≤ 10 ms (with actuating speed 10 mm/min on plunger)
Bounce duration:	≤ 1.5 ms
Ambient temperature:	– 30 °C ... + 120 °C
Mechanical life:	≥ 30 million operations
Switching frequency:	10000/h
Actuating speed:	min. 1 mm/min
Repeat accuracy of switching points:	± 0.02 mm at plunger

Contact variants

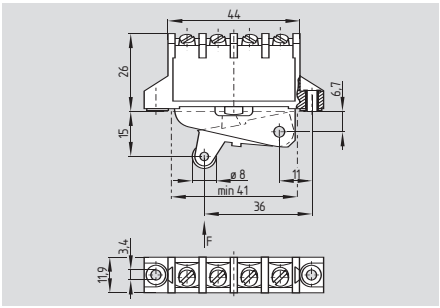
Change-over contact with double break
Plunger



Offset roller lever 8 R



Offset roller lever 8 R



- Plastic roller
- Roller 6.4 mm wide

The roller lever cannot be dismantled. On versions with slow action contacts, a minimum play of 0.5 mm is provided between the plunger and operating lever to allow for possible contact wear.

Approvals

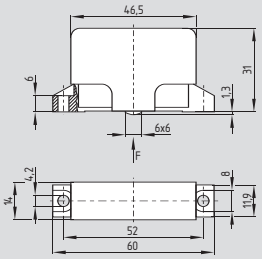
CE

Ordering details

M 687-11-①-②-8 R-③

No.	Replace	Description
①	1	Screw terminals
	3	Spade terminals
②		Without terminal cover
	i	With terminal cover
③	AuNi	Gold-nickel contacts

System components



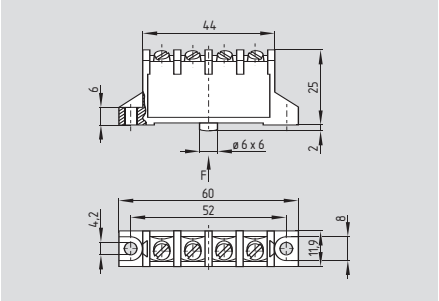
Terminal cover

Ordering details

Terminal cover **ordering suffix -i**

- Prevents contact with live parts
- Hand and finger guard to VDE 0106-100
- Clips into position

M/T 697



- Thermoplastic enclosure
- Flat design
- Very long life
- Snap action, change-over contact with double break
- Slow action, 1 NC with double break, positive break ⊖
- Temperature resistant up to + 120 °C
- Screw or spade terminals

Approvals

CE

Ordering details

① **697-**②**-**③**-**④

No.	Replace	Description
①	M	Snap action
	T	Slow action
②	11	Change-over contact with double break
	01	1 NC contact (only for T)
③	1	Screw terminals
	3	Spade terminals
④		Without terminal cover
	i	With terminal cover

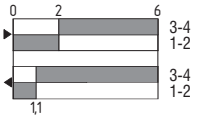
Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	body: pressure-setting plastic cover: glass-fibre reinforced thermoplastic
Actuator:	thermoplastic
Protection class:	IP 40, terminals IP 00 to EN 60529
Degree of pollution:	2
Contact material:	silver
Contact type:	M 697: change-over contact, double break, type Za T 697: 1 positive break NC contact, double break, type Y
Switching system:	M 697: snap action T 697: slow action, positive break NC contact ⊖
Termination:	screw or spade terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
Utilisation category:	AC-15
I_e/U_e:	2.5 A / 230 VAC
Max. fuse rating:	10 A gL/gG D-fuse
Actuating force:	approx. 4 N
Ejection force:	M 697: min. 1,3 N T 697: –
Contact opening:	2 x 0.5 mm
Switchover time:	M 697: ≦ 10 ms (with actuating speed of 10 mm/min at plunger) T 697: –
Bounce duration:	M 697: ≦ 3 ms T 697: –
Ambient temperature:	– 30 °C … + 120 °C
Mechanical life:	≧ 30 million operations
Switching frequency:	10000/h
Actuating speed:	M 697: min. 10 mm/min T 697: min. 60 mm/min
Repeat accuracy of switching points:	M 697: ± 0,05 mm at plunger T 697: ± 0,05 mm

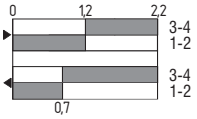
Contact variants

1 NC contact

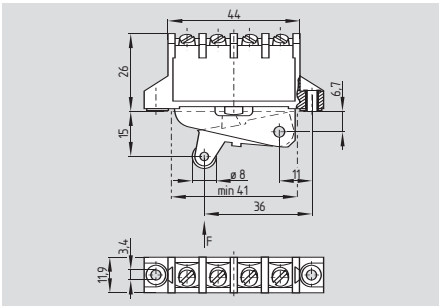
Change-over contact with double break Plunger



Offset roller lever 8 R



Offset roller lever 8 R



- Plastic roller
- Roller 6.4 mm wide

The roller lever cannot be dismantled. On versions with slow action contacts, a minimum play of 0.5 mm is provided between the plunger and operating lever to allow for possible contact wear.

Approvals

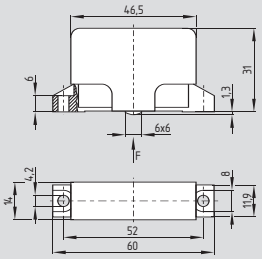
CE

Ordering details

① **697-**②**-**③**-8 R-**④

No.	Replace	Description
①	M	Snap action
	T	Slow action
②	11	Change-over contact with double break
	01	1 NC contact (only for T)
③	1	Screw terminals
	3	Spade terminals
④		Without terminal cover
	i	With terminal cover

System components



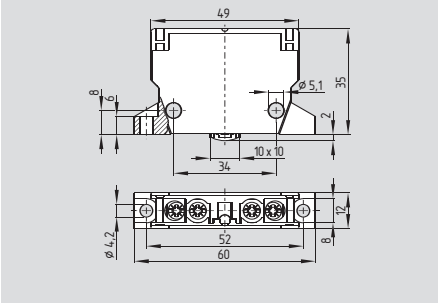
Terminal cover

Ordering details

Terminal cover **ordering suffix -i**

- Prevents contact with live parts
- Hand and finger guard to VDE 0106-100
- Clips into position

Z/T 6881



- Thermoplastic enclosure
- Long life
- 2 contacts
- Snap action, change-over contact with double break, positive break ⊖
- Slow action, change over with double break, positive break ⊖
- Galvanically separated contact bridges
- Large contact break
- Highly resistant to vibration
- Constant contact pressure up to switching point
- Short contact-bounce duration
- Screw terminals

Approvals

cULus CE

Ordering details

① **6881-11-1-**②**-**③

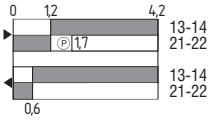
No.	Replace	Description
①	Z	Snap action
	T	Slow action
②		Without plunger extended 4 mm
	P7	With plunger extended 4 mm
③		Without terminal cover
	i	With terminal cover

Technical data

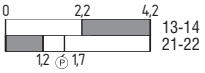
Standards:	IEC/EN 60947-5-1
Enclosure:	glass-fibre reinforced thermoplastic
Actuator:	thermoplastic
Protection class:	IP 40, terminals: IP 00, finger guard to VDE 0106-100, ordering suffix i: IP 20 to EN 60529
Degree of pollution:	3
Contact material:	silver, contact bridges gold-plated
Contact type:	change-over contact, double break, galvanically separated contact bridges
Switching system:	slow or snap action, positive break NC contacts ⊖
Termination:	screw terminals
Cable section:	max. 2 x 1.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	2,5 A/230 VAC 6 A/24 VDC at min. 600 mm/min
Max. fuse rating:	6 A gL/gG D-fuse
Actuating force:	Z 6881-11-1: 20 N, Z 6881-11-1-80R: 12 N T 6881-11-1: 7 N, T 6881-11-1-80R: 4 N
Contact opening:	Z 6881: 2 x 1.25 mm immediately beyond switching point, 2 x 3.0 mm at full travel T 6881:2 x 3.3 mm at full travel
Switchover time:	Z 6881: ≤ 5 ms T 6881: –
Bounce duration:	Z 6881: ≤ 3 ms T 6881: –
Ambient temperature:	– 25 °C … + 85 °C
Mechanical life:	Z 6881: ≥ 1 million operations T 6881: ≥ 30 million operations
Switching frequency:	Z 6881: 10000/h T 6881: 3000/h
Actuating speed:	Z 6881: min. 1 mm/min T 6881: min. 60 mm/min
Repeat accuracy of switching points:	± 0.02 mm at plunger
Switching of low voltages:	5 mA/24 VDC

Contact variants

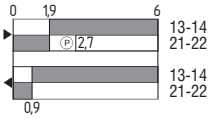
Plunger
Snap action



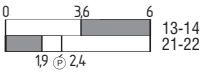
Slow action



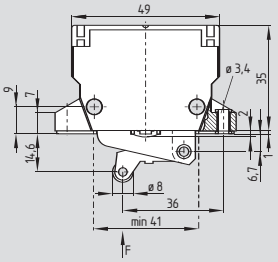
Offset roller lever 80 R
Snap action



Slow action

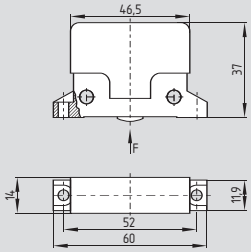


Offset roller lever 80 R



- Plastic roller
- Roller 6.4 mm wide

System components



Terminal cover

Approvals

CE

Ordering details

① **6881-11-1-80 R-**②

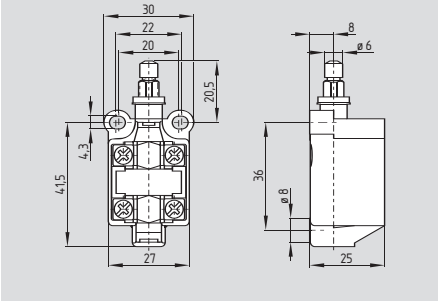
No.	Replace	Description
①	Z	Snap action
	T	Slow action
②		Without terminal cover
	i	With terminal cover

Ordering details

Terminal cover **ordering suffix -i**

- Prevents contact with live parts
- Hand and finger guard to VDE 0106-100
- Clips into position

Z/T 232



- Thermoplastic enclosure
- 2 contacts
- Snap action, change-over contact with double break, positive break ⊖
- Slow action, change over with double break, positive break ⊖
- Galvanically separated contact bridges
- Screw terminal

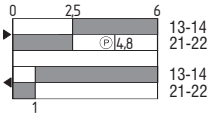
Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	glass-fibre reinforced thermoplastic
Actuator:	glass-fibre reinforced thermoplastic plunger: stainless steel
Protection class:	IP 40, terminals IP 00 to EN 60529
Degree of pollution:	3
Contact material:	silver
Contact type:	change-over contact, double break, galvanically separated contact bridges
Switching system:	slow or snap action, positive break NC contacts ⊖
Termination:	screw terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	10 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 230 V
	2.5 A / 400 V
	1 A / 500 V
Max. fuse rating:	6 A gG D-fuse
Actuating force:	9 N
Ejection force:	–
Contact opening:	Z 232 = 2 x 2 mm T 232 = 2 x 3.5 mm
Switchover time:	Z 232: ≤ 5 ms T 232: -
Bounce duration:	Z 232: ≤ 3 ms T 232: -
Ambient temperature:	– 30 °C … + 80 °C
Mechanical life:	≥ 20 million operations
Switching frequency:	max. 5000/h
Actuating speed:	Z 232: 10 mm/min T 232: min. 60 mm/min
Repeat accuracy of switching points:	–

Contact variants

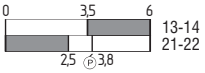
Snap action

1 NO / 1 NC

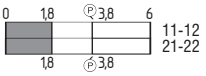


Slow action

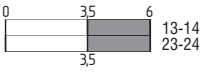
1 NO / 1 NC



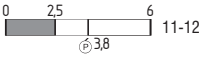
2 NC



2 NO



1 NC



1 NO

Approvals

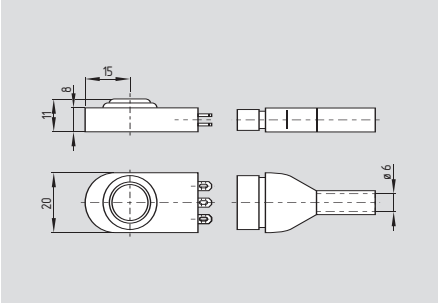
CE

Ordering details

①**S 232-**②

No.	Replace	Description
①	Z	Snap action (only for -11)
	T	Slow action
②	11	1 NO / 1 NC
	01	1 NC
	02	2 NC
	10	1 NO
	20	2 NO

M 660-11-2-y



- Rubber enclosure (perbunan)
- Change-over contact, single break
- Snap action with self-cleaning contacts
- – 30 °C … + 80 °C temperature resistant
- Protection class IP 65

Approvals

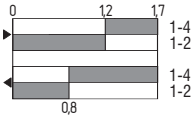
CE

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	rubber
Actuator:	thermoplastic
Protection class:	IP 00 to EN 60529
Degree of pollution:	–
Contact material:	silver, 0.3 µm gold flashed
Contact type:	change-over contact, single break
Switching system:	snap action, self-cleaning contacts
Termination:	soldering terminals and 2.8 mm spade terminals
Cable section:	max. 2.5 mm^2 (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	4 A
Utilisation category:	AC-15
I_e/U_e:	1 A / 230 VAC
Max. fuse rating:	4 A gL/gG D-fuse
Actuating force:	approx. 2.5 N
Ejection force:	min. 1.3 N
Contact opening:	2 x 0.5 mm
Switchover time:	–
Bounce duration:	–
Ambient temperature:	– 30 °C … + 120 °C
Mechanical life:	≥ 3 million operations
Switching frequency:	10000/h
Actuating speed:	min. 1 mm/min
Repeat accuracy of switching points:	–

Contact variants

Change-over contact with single break



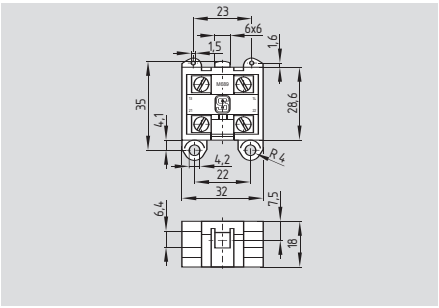
Ordering details

M 660-11-2-y

Note

Version with metal casing, cable and various actuators, see page 1-34.

M 689



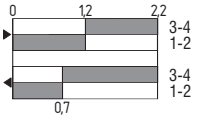
- Thermoplastic enclosure
- Change-over contact, double break
- Snap action with self-cleaning contacts
- Galvanically separated contact bridges
- Screw terminal
- Suitable for low actuating speeds

Technical data

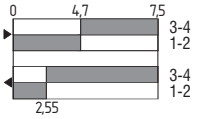
Standards:	IEC/EN 60947-5-1
Enclosure:	plastic, anti-tracking
Actuator:	thermoplastic
Protection class:	IP 40, terminals IP 00 to EN 60529
Degree of pollution:	2
Contact material:	silver
Contact type:	change-over contact, double break with 2 separate contact bridges, same potential
Switching system:	snap action, self-cleaning contacts
Termination:	screw terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
Utilisation category:	AC-15
I_e/U_e:	2.5 A / 230 VAC
Max. fuse rating:	10 A gL/gG D-fuse
Actuating force:	approx. 4 N
Ejection force:	min. 0.8 N
Contact opening:	2 x 0.5 mm
Switchover time:	≤ 10 ms (with actuating speed 10 mm/min on plunger)
Bounce duration:	≤ 1.5 ms
Ambient temperature:	– 30 °C … + 120 °C
Mechanical life:	≥ 30 million operations
Switching frequency:	10000/h
Actuating speed:	min. 1 mm/min
Repeat accuracy of switching points:	± 0.02 mm at plunger

Contact variants

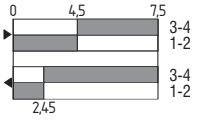
Plunger and actuator 8 B 9



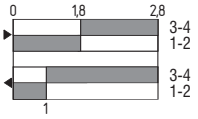
Actuator 8 A



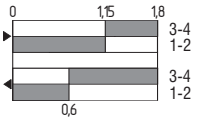
Actuator 8 E and 8 F



Actuator 8 M



Actuator 8 V



Approvals

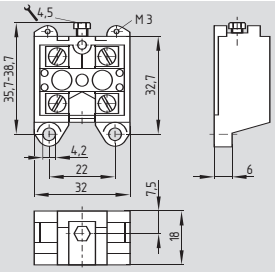
CE

Ordering details

M 689-11-1-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Plunger P4



- **Plunger with setting screw**
- Actuating force approx. 4 N

Approvals

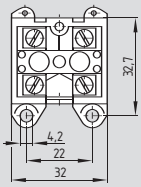
CE

Ordering details

M 689-11-1-P4-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Plunger P5



- **Actuator flush with housing**
- Actuating force approx. 4 N

Approvals

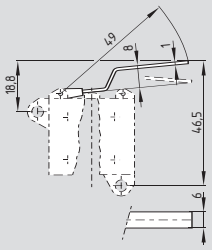
CE

Ordering details

M 689-11-1-P5-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Actuator 8 A



- Actuating force approx. 0.9 N

Approvals

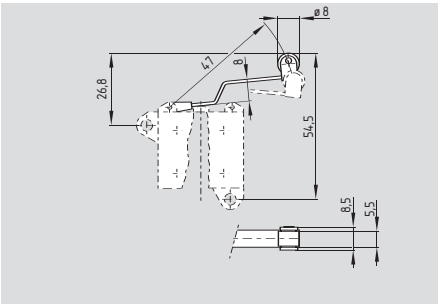
CE

Ordering details

M 689-11-1-8 A-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Actuator 8 E



- Actuating force approx. 0.95 N

Approvals

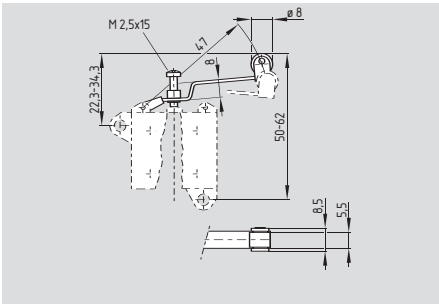
CE

Ordering details

M 689-11-1-8 E-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Actuator 8 F



- Actuating force approx. 0.95 N
- Adjustable actuator

Approvals

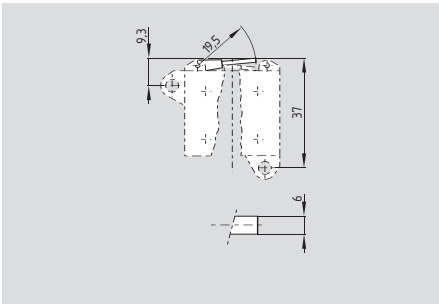
CE

Ordering details

M 689-11-1-8 F-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Actuator 8 M



- Actuating force approx. 2.4 N

Approvals

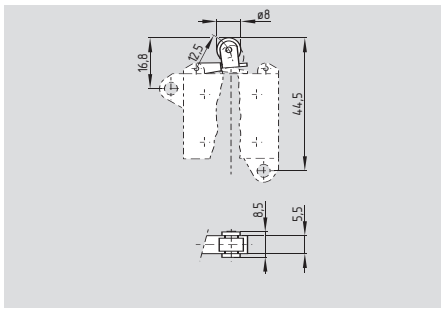
CE

Ordering details

M 689-11-1-8 M-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Actuator 8 V



- Actuating force approx. 4 N

Approvals

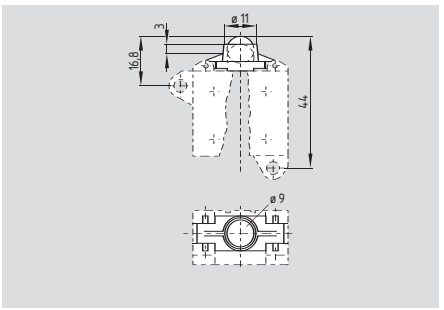
CE

Ordering details

M 689-11-1-8 V-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

Actuator 8 B 9



- Actuating force approx. 4 N
- Actuator head with captive metal ball actuator
- Ball Ø 9 mm

Approvals

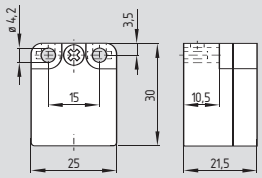
CE

Ordering details

M 689-11-1-8 B 9-①

No.	Replace	Description
①		Without terminal cover
	i	With terminal cover

C 50



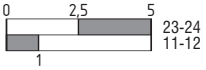
- Thermoplastic enclosure
- Change-over contact, double break ⊖
- Galvanically separated contact bridges
- Temperature range – 20 °C … + 80 °C
- Protection class IP 30
- Available for top mounting with 2 x M 3 tapped holes

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	thermoplastic
Actuator:	plunger: brass
Protection class:	IP 30 to EN 60529
Degree of pollution:	3
Contact material:	silver
Contact type:	change-over contact with double break, type Zb
Switching system:	slow action, positive break NC contacts ⊖
Termination:	screw terminal
Cable section:	max. 1.5 mm^2
U_{imp}:	4 kV
U_i:	400 V
I_{the}:	4 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 400 VAC
Max. fuse rating:	4 A gL/gG D-fuse
Contact opening:	2 x 4 mm at full travel
Switchover time:	in accordance with actuating speed
Bounce duration:	in accordance with actuating speed
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	max. 1800/h
Actuating speed:	–
Repeat accuracy of switching points:	± 0.05 mm at plunger

Contact variants

Change-over contact with double break



Approvals

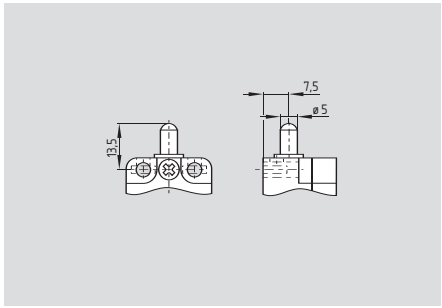
cULus CSA CE

Ordering details

C 50 ① 1Ö/1S

No.	Replace	Description
①		For the appropriate actuator: see page 1-183 and following

Plunger



v [m/s]	0,5	1	2	5
α=	20°	10°	5°	-
β=	20°	10°	5°	-

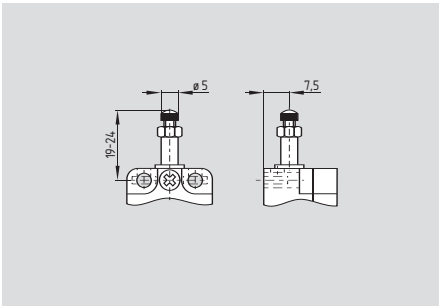
Legend
v: actuating speed
α: angle for actuation from right
β: angle for actuation from left

Approvals

Ordering details

C 50 1Ö/1S

Plunger ST



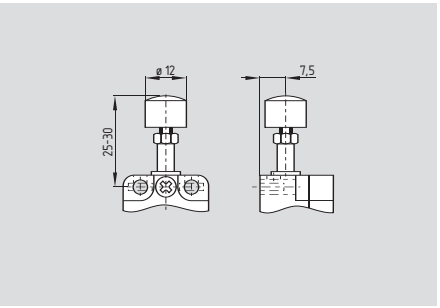
- **Plunger with knurled-head setting screw**
- Actuating speed 5 m/s at 0° to plunger axis
- Projection of plunger adjustable for fine setting of switching point

Approvals

Ordering details

C 50 ST 1Ö/1S

Plunger K



- **Adjustable plunger with plastic cap**
- Large actuating surface
- Safe switching even with imprecise actuation

v [m/s]	0,5	1	2	5
α=	20°	10°	5°	-
β=	20°	10°	5°	-

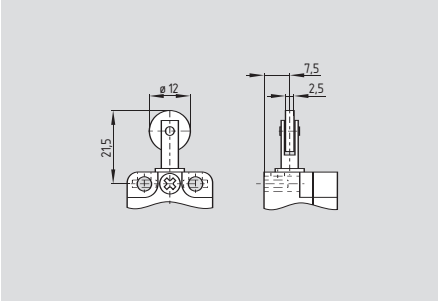
Legend
v: actuating speed
α: angle for actuation from right
β: angle for actuation from left

Approvals

Ordering details

C 50 K 1Ö/1S

Roller plunger R



• Available with roller plunger turned 90°

v [m/s]	0,5	1	2	5
α=	30°	20°	10°	5°
β=	30°	20°	10°	5°

Legend
v: actuating speed
α: angle for actuation from right
β: angle for actuation from left

Approvals

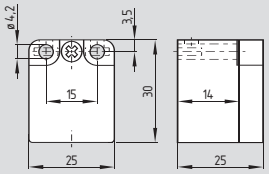
Ordering details

C 50 R 1Ö/1S

Up to Date

The latest product information and news at:
www.schmersal.com

C 500



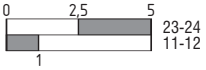
- Thermoplastic enclosure
- Change-over contact, double break ⊖
- Galvanically separated contact bridges
- Temperature range – 20 °C … + 80 °C
- Protection class IP 30
- Available for top mounting with 2 x M 3 tapped holes

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	thermoplastic
Actuator:	plunger: brass
Protection class:	IP 30 to EN 60529
Degree of pollution:	3
Contact material:	silver
Contact type:	change-over contact with double break, type Zb
Switching system:	slow action, positive break NC contacts ⊖
Termination:	screw terminal
Cable section:	max. 1.5 mm^2
U_{imp}:	4 kV
U_i:	400 V
I_{the}:	4 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 400 VAC
Max. fuse rating:	4 A gL/gG D-fuse
Contact opening:	2 x 4 mm at full travel
Switchover time:	in accordance with actuating speed
Bounce duration:	in accordance with actuating speed
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	max. 1800/h
Actuating speed:	–
Repeat accuracy of switching points:	± 0.05 mm at plunger

Contact variants

Change-over contact with double break



Approvals

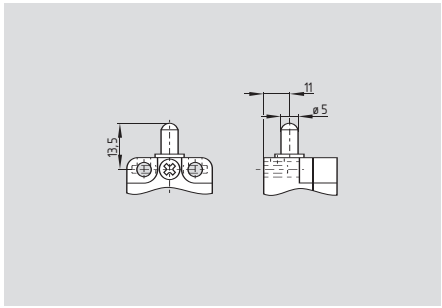
cULus CSA CE

Ordering details

C 500 ① 1Ö/1S

No.	Replace	Description
①		For the appropriate actuator: see page 1-187

Plunger



v [m/s]	0,5	1	2	5
α=	20°	10°	5°	-
β=	20°	10°	5°	-

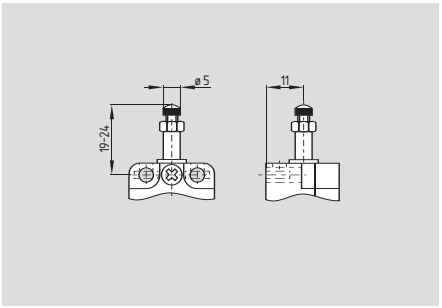
Legend
v: actuating speed
α: angle for actuation from right
β: angle for actuation from left

Approvals

Ordering details

C 500 1Ö/1S

Plunger ST



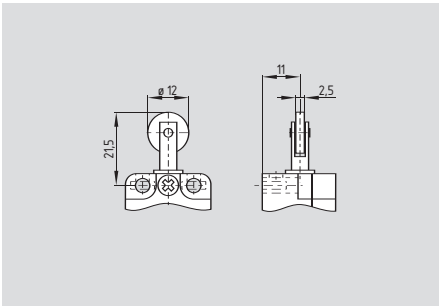
- **Plunger with knurled-head setting screw**
- Actuating speed 5 m/s at 0° to plunger axis
- Projection of plunger adjustable for fine setting of switching point

Approvals

Ordering details

C 500 ST 1Ö/1S

Roller plunger R



- Available with roller plunger turned 90°

v [m/s]	0,5	1	2	5
α=	30°	20°	10°	5°
β=	30°	20°	10°	5°

Legend
v: actuating speed
α: angle for actuation from right
β: angle for actuation from left

Approvals

Ordering details

C 500 R 1Ö/1S

Mechanical position detection: other products and program extensions

SES press-on position switches with safety function

The mounting size complies with EN 50047. These position switches have a plastic housing and are equipped with a push-on spade in accordance with EN 46224 (AMP).

Several switching travel and actuating elements as well as snap action or slow action contacts available.

More information can be found in the **“S-IP“ List from Elan**

Position switches for series wiring to DIN 43697

The position switches for series wiring can be supplied with 2 to 16 roller or ball plungers with an intermediate distance of 12 or 16 mm.

Depending on the application, the user can choose between snap action and slow action contacts.

An extensive range of accessories such as mounting rails and cams with T blocking in accordance with DIN 69638 is available.

More information can be found in the **“R“, “N-NT“ and “NT-R“ Lists from Elan**

EEx 335 series: Safety switches with ATEX certification

The robust die-cast zinc enclosure of the switch resists to mechanical loads and is, amongst others, suitable for safety applications in the lift industry, conveying technology and general machine and installation assembly.

More information can be found in the catalogue **„EEx switching components“ from steute**

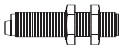
The field of application of non-contacting sensors of the Schmersal Group ranges from precision mechanics to heavy-duty machinery.

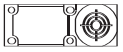
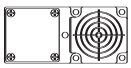
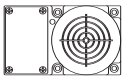
Magnetic reed switches and inductive, optical and capacitive proximity switches all are non-contacting switches.

Selection tables: Inductive proximity switches

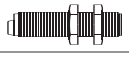
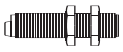
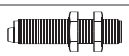
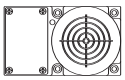
Models and voltage variants

Cylindrical models	Dimensions [mm]	Reference	2-wire AC	2-wire DC	3-wire DC	4-wire DC	AC/DC
	Ø 4	IFL(-N-) ...-4-...			Page 2-19		
	Ø 6.5	IFL(-N-) ...-6,5-...			Page 2-20		
	Ø 20	IFL ...-200-...	Page 2-3			Page 2-50	
	Ø 40	IFL ...-400-...	Page 2-3			Page 2-51	

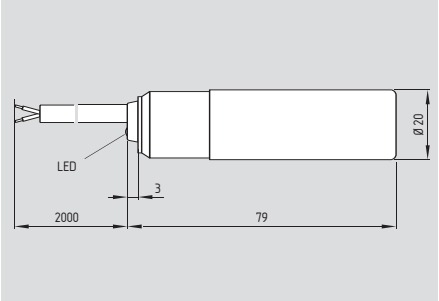
Threaded models	Dimensions [mm]	Reference	2-wire AC	2-wire DC	3-wire DC	4-wire DC	AC/DC
	M 8	IFL(-N-) ...-8-...			Page 2-22		
	M 12	IFL(-N-) ...-12(0)-...	Page 2-4		Page 2-25		
	M 18	IFL(-N-) ...-18(0)-...	Page 2-7	Page 2-16	Page 2-36	Page 2-52	Page 2-59
	M 30	IFL ...-30(0)-...	Page 2-10	Page 2-16	Page 2-44	Page 2-54	

Rectangular models	Dimensions [mm]	Reference	2-wire AC	2-wire DC	3-wire DC	4-wire DC	AC/DC
	40 x 25 x 12	IFL ...-250-...	Page 2-12	Page 2-17	Page 2-48		
	40 x 26 x 26	IFL ...-255-...				Page 2-55	
	88 x 25 x 13	IFL ...-310-...	Page 2-13				
	36.5 x 36.5 x 36.5	IFL ...-333E-...	Page 2-13			Page 2-56	
	112 x 40 x 40	IFL ...- 333-...	Page 2-14	Page 2-17		Page 2-56	Page 2-59
	120 x 55 x 40	IFL ...-384-...	Page 2-14	Page 2-18		Page 2-57	
	135 x 80 x 40	IFL ...-385-...	Page 2-15			Page 2-57	

Sensors with increased temperature resistance

Models	Dimensions [mm]	Reference	2-wire AC	2-wire DC	3-wire DC	4-wire DC	AC/DC
	M 18	IFL …-18L-…-2130			Page 2-41		
	M 30	IFL 15-30L-…-2130			Page 2-46		
	M 30	IFL …-30L-…-1766				Page 2-54	
	M 30	IFL …-30-…T-1310	Page 2-11				
	135 x 80 x 40	IFL 50-385-…-2130				Page 2-58	

IFL Ø 20 mm



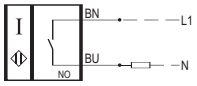
- Thermoplastic enclosure
- Design Ø 20 mm
- Cable
- AC 2-wire
- Clamp H 20 is included in delivery, see accessories

Technical data

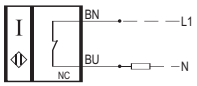
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and clamp H 20: thermoplastic
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m

Contact variants

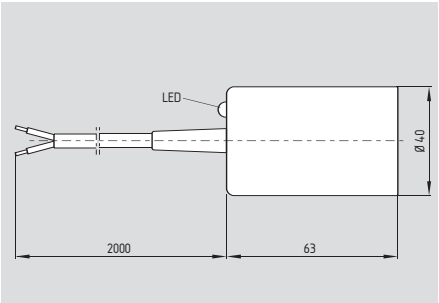
IFL 10-200-10



IFL 10-200-01



IFL Ø 40 mm



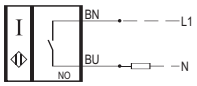
- Thermoplastic enclosure
- Design Ø 40 mm
- Cable with strain relief
- AC 2-wire
- Clamp H 40 is included in delivery, see accessories

Technical data

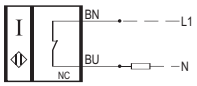
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	20 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and clamp H 40: thermoplastic
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m, with strain relief

Contact variants

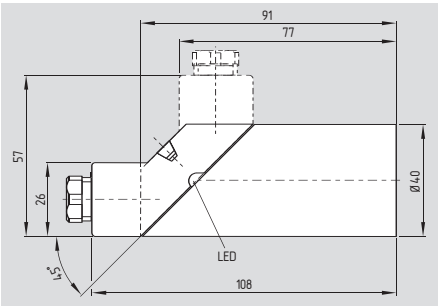
IFL 20-400-10T



IFL 20-400-01T



IFL Ø 40 mm



- Thermoplastic enclosure
- Design Ø 40 mm
- Wiring compartment
- AC 2-wire
- Clamp H 40 is included in delivery, see accessories

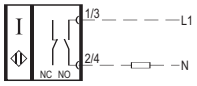
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

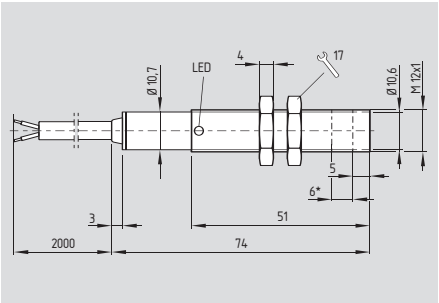
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	20 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing and clamp H 40: thermoplastic
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entry M16 x 1.5

Contact variants

IFL 20-400-10/01



IFL M 12



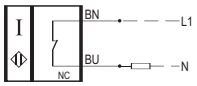
- Metal enclosure
- Design M 12 x 1
- Cable
- AC 2-wire

Technical data

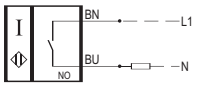
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	200 mA
I_m:	8 mA
I_r:	1 mA
U_d:	approx. 3.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

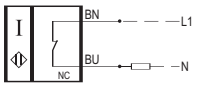
IFL 2-12-01



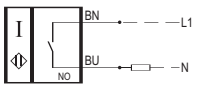
IFL 2-12-10



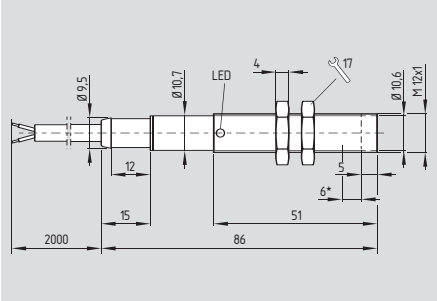
IFL 4-12-01



IFL 4-12-10



IFL M 12



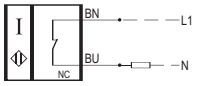
- Metal enclosure
- Design M 12 x 1
- Cable with strain relief
- AC 2-wire

Technical data

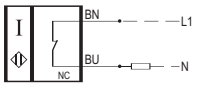
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	200 mA
I_m:	8 mA
I_r:	1 mA
U_d:	approx. 3.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

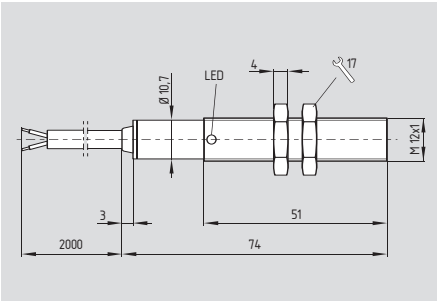
IFL 2-12-01T



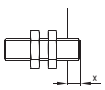
IFL 4-12-01T



IFL M 12



- Metal enclosure
- Design M 12 x 1
- Cable
- AC 2-wire
- High switching distance
- Quasi-embeddable
  (steel: x ≥ 2.4 mm
  other metal: x ≥ 1.2 mm)

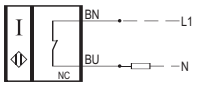


Technical data

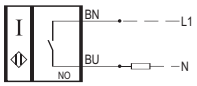
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, quasi-embeddable (steel: x ≥ 2.4 mm other metal: x ≥ 1.2 mm)
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	200 mA
I_m:	8 mA
I_r:	1 mA
U_d:	approx. 3.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

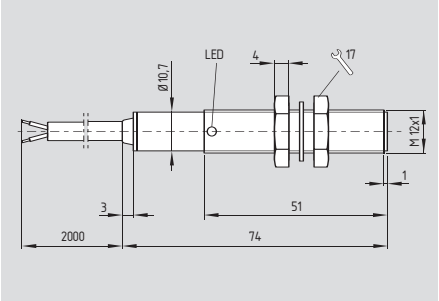
IFL 4B-12-01



IFL 4B-12-10



IFL M 12



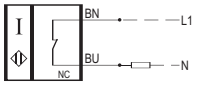
- Thermoplastic enclosure
- Design M 12 x 1
- Cable
- AC 2-wire

Technical data

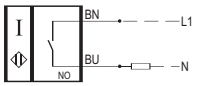
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	200 mA
I_m:	8 mA
I_r:	1 mA
U_d:	approx. 3.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 17 max. 90 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

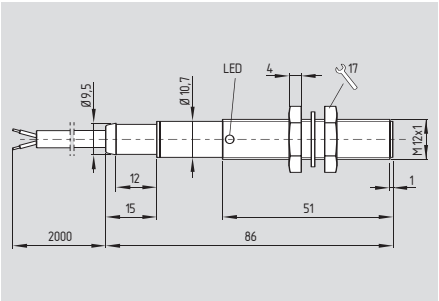
IFL 4-120-01



IFL 4-120-10



IFL M 12



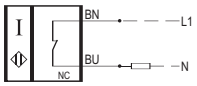
- Thermoplastic enclosure
- Design M 12 x 1
- Cable with strain relief
- AC 2-wire

Technical data

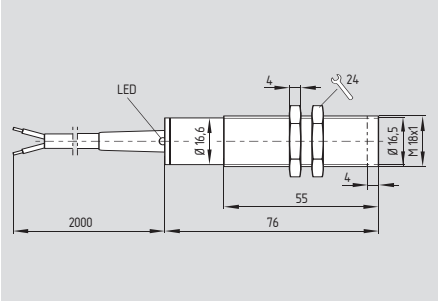
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	200 mA
I_m:	8 mA
I_r:	1 mA
U_d:	approx. 3.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 17 max. 90 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 4-120-01T



IFL M 18



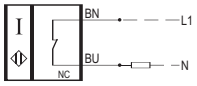
- Metal enclosure
- Design M 18 x 1
- Cable
- AC 2-wire

Technical data

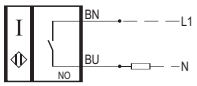
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

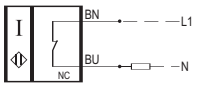
IFL 5-18-01



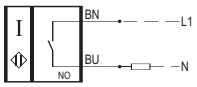
IFL 5-18-10



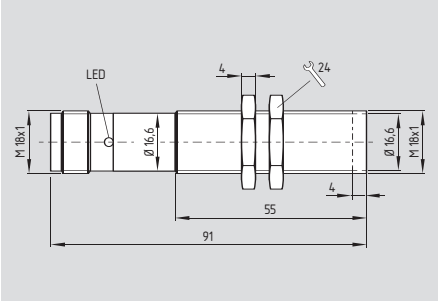
IFL 8-18-01



IFL 8-18-10



IFL M 18



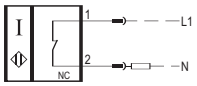
- Metal enclosure
- Design M 18 x 1
- Plug-in connector
- AC 2-wire

Technical data

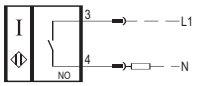
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	plug-in connector M18 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

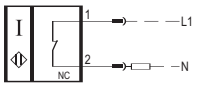
IFL 5-18-01ST



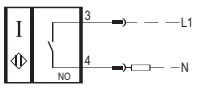
IFL 5-18-10ST



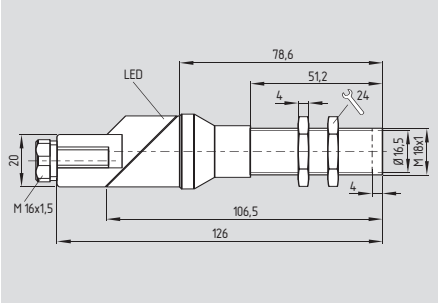
IFL 8-18-01ST



IFL 8-18-10ST



IFL M 18



- Metal enclosure
- Design M 18 x 1
- Wiring compartment
- AC 2-wire

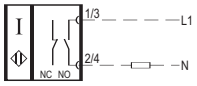
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

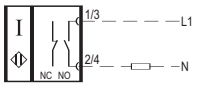
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

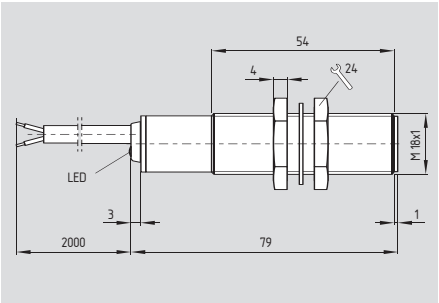
IFL 5-18-10/01



IFL 8-18-10/01



IFL M 18



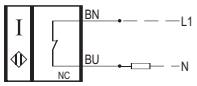
- Thermoplastic enclosure
- Design M 18 x 1
- Cable
- AC 2-wire

Technical data

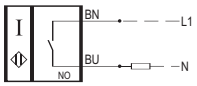
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

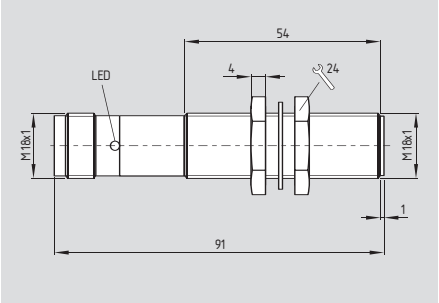
IFL 10-180-01



IFL 10-180-10



IFL M 18



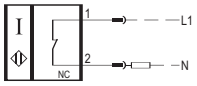
- Thermoplastic enclosure
- Design M 18 x 1
- Plug-in connector
- AC 2-wire

Technical data

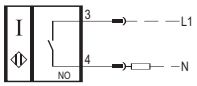
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	plug-in connector M18 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

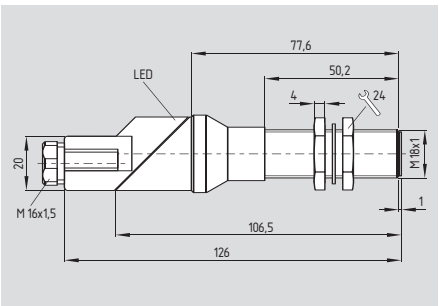
IFL 10-180-01ST



IFL 10-180-10ST



IFL M 18



- Thermoplastic enclosure
- Design M 18 x 1
- Wiring compartment
- AC 2-wire

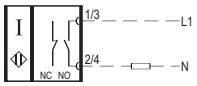
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

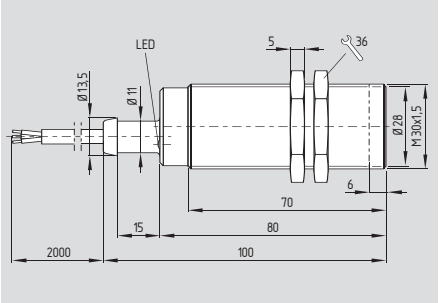
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 10-180-10/01



IFL M 30



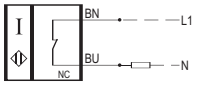
- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- AC 2-wire

Technical data

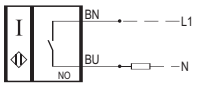
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

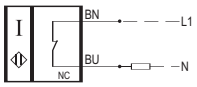
IFL 10-30-01T



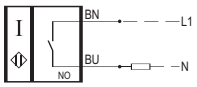
IFL 10-30-10T



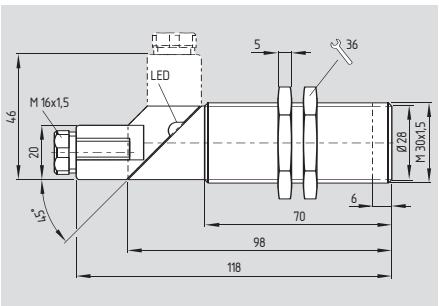
IFL 15-30-01T



IFL 15-30-10T



IFL M 30



- Metal enclosure
- Design M 30 x 1.5
- Wiring compartment
- AC 2-wire

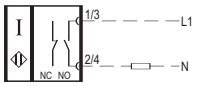
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

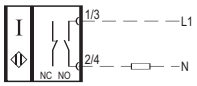
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

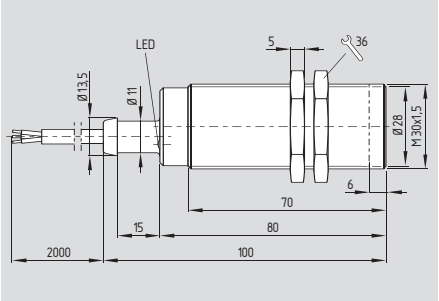
IFL 10-30-10/01



IFL 15-30-10/01



IFL M 30



- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- AC 2-wire
- Max. + 110 °C (230 °F)

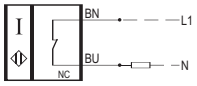
LED may become defective when operated above 90 °C. Operation of the switch, however, is not affected.

Technical data

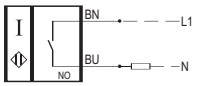
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	90 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	≤ 70 °C: max. 200 mA > 70 °C: max. 50 mA
I_r:	5 mA (220 V)
U_d:	approx. 8 V
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	0 °C ... + 110 °C (dry heat)
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	silicone cable 2 x 0.5 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

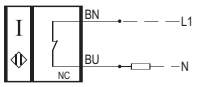
IFL 10-30-01T-1310



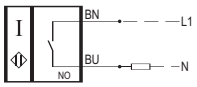
IFL 10-30-10T-1310



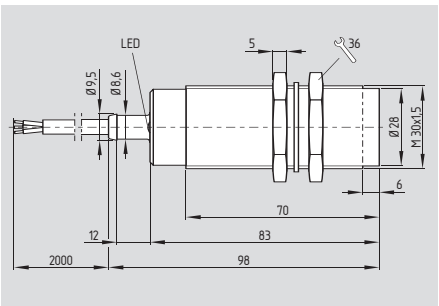
IFL 15-30-01T-1310



IFL 15-30-10T-1310



IFL M 30



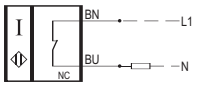
- Thermoplastic enclosure
- Design M 30 x 1.5
- Cable with strain relief
- AC 2-wire

Technical data

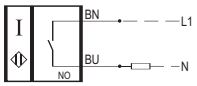
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

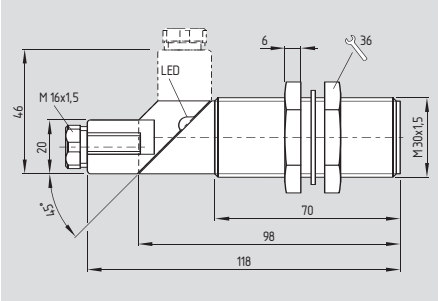
IFL 15-300-01T



IFL 15-300-10T



IFL M 30



- Thermoplastic enclosure
- Design M 30 x 1.5
- Wiring compartment
- AC 2-wire

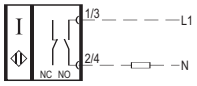
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

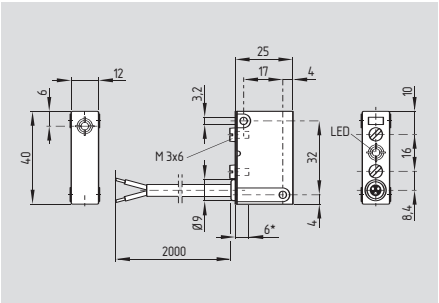
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 15-300-10/01



IFL 40 x 25 x 12 mm



- Thermoplastic enclosure
- Rectangular design 250 (40 x 25 x 12 mm)
- Cable
- AC 2-wire

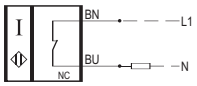
[1] Switches can be mounted adjacent to each other without interference.

Technical data

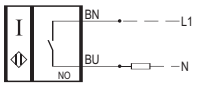
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	200 mA
I_m:	8 mA
I_r:	1 mA
U_d:	approx. 3.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP), with 2 screws M3 x 6 for rear mounting
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m

Contact variants

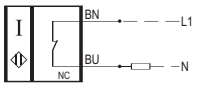
IFL 2-250-01 [1]



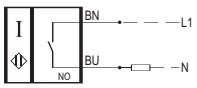
IFL 2-250-10 [1]



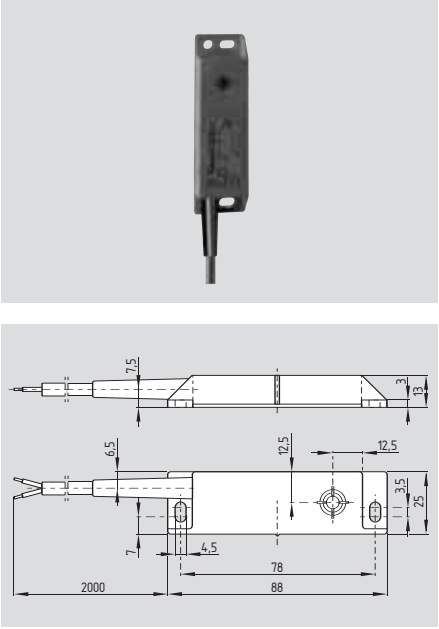
IFL 4-250-01



IFL 4-250-10



IFL 88 x 25 x 13 mm



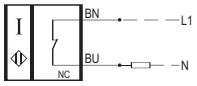
- Thermoplastic enclosure
- Rectangular design 310 (88 x 25 x 13 mm)
- Cable
- AC 2-wire

Technical data

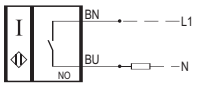
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, on metal mountable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	200 mA
I_m:	8 mA
I_r:	1 mA
U_d:	approx. 3.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl)
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m

Contact variants

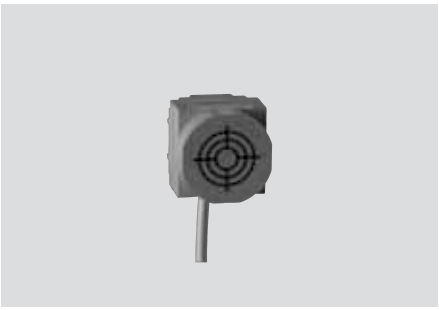
IFL 4-310-01

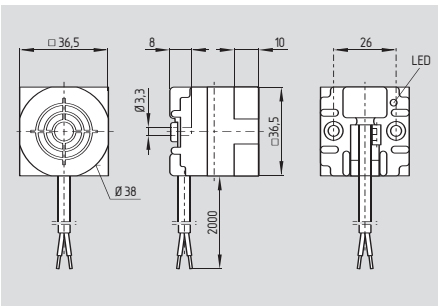


IFL 4-310-10



IFL 36.5 x 36.5 x 36.5 mm





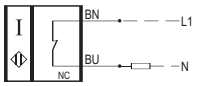
- Thermoplastic enclosure
- Rectangular design 333E (36.5 x 36.5 x 36.5 mm)
- Cable
- AC 2-wire
- Mounting bracket HWE-1 to simplify mounting available

Technical data

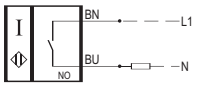
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 15-...: 16.5 mm, embeddable IFL 20-...: 21.5 mm, non-embeddable (36.5 x 36.5 mm opening)
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP)
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m

Contact variants

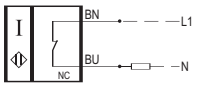
IFL 15-333E-01



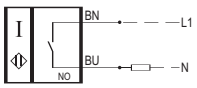
IFL 15-333E-10



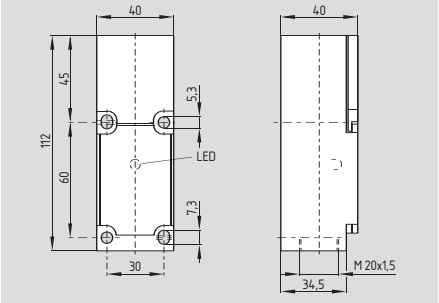
IFL 20-333E-01



IFL 20-333E-10



IFL 112 x 40 x 40 mm



- Thermoplastic enclosure
- Rectangular design 333 (112 x 40 x 40 mm)
- Wiring compartment
- AC 2-wire

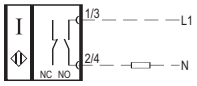
By repositioning the switch five different actuating directions can be selected. The selected actuating direction can be marked with a sticker.

Technical data

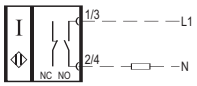
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 15-...: 15 mm, embeddable IFL 20-...: 20 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP) cover: Luran
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entry M20 x 1.5

Contact variants

IFL 15-333-10/01

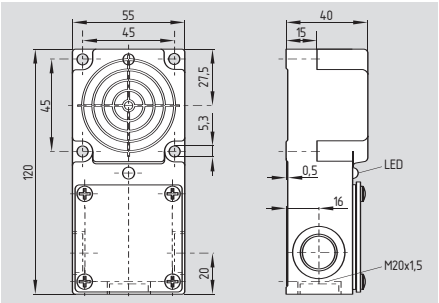


IFL 20-333-10/01



Programmable by repositioning the plug-in jumper at the terminal screws

IFL 120 x 55 x 40 mm



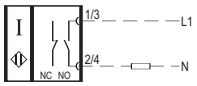
- Thermoplastic enclosure
- Rectangular design 384 (120 x 55 x 40 mm)
- Wiring compartment
- AC 2-wire

Technical data

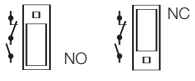
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	30 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl)
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entries 3 x M20 x 1.5 (break-out)

Contact variants

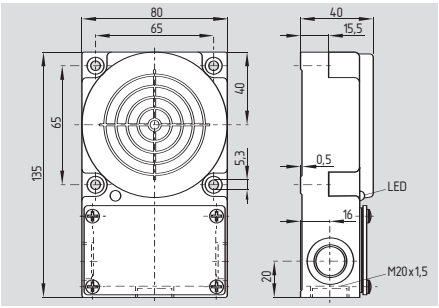
IFL 30-384-10/01



Programmable by repositioning the plug-in jumper at the terminal screws



IFL 135 x 80 x 40 mm



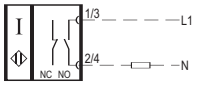
- Thermoplastic enclosure
- Rectangular design 385 (135 x 80 x 40 mm)
- Wiring compartment
- AC 2-wire
- Mounting bracket HW 385-1 to simplify mounting available

Technical data

Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	50 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	1 mA
U_d:	approx. 4.5 V (250 V/200 mA)
Protection circuit:	inductive interference protection, on request: Short-circuit and overload-proof (ordering suffix -1522) Ie = max. 150 mA, Ud = approx. 7.5 V (150 mA)
U_{imp}:	4 kV
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 10 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl)
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entries 3 x M20 x 1.5 (break-out)

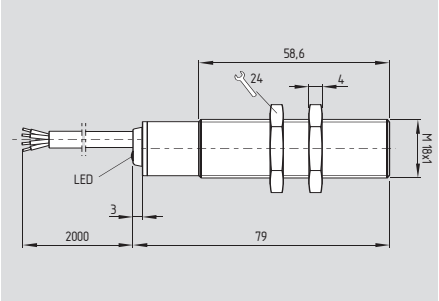
Contact variants

IFL 50-385-10/01



Programmable by repositioning the plug-in jumper at the terminal screws

IFL M 18



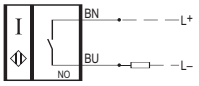
- Metal enclosure
- Design M 18 x 1
- Cable
- DC 2-wire

Technical data

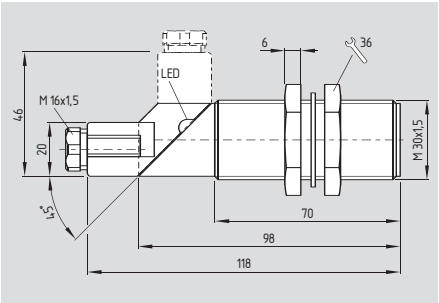
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	5 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	D: 2-wire DC
U_b:	10 ... 40 VDC
I_e:	200 mA
I_m:	5 mA
I_r:	approx. 0.5 mA
U_d:	≤ 6 V (200 mA) ≤ 5.5 V (100 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 500 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 5-18L-10D

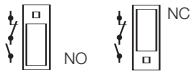


IFL M 30



- Thermoplastic enclosure
- Design M 30 x 1.5
- Wiring compartment
- DC 2-wire

Programmable by repositioning the plug-in jumper at the terminal screws

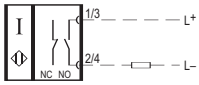


Technical data

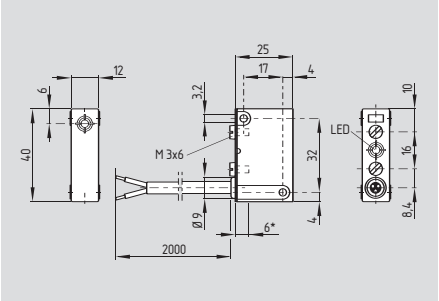
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	D: 2-wire DC
U_b:	10 ... 40 VDC
I_e:	200 mA
I_m:	5 mA
I_r:	approx. 0.5 mA
U_d:	≤ 6 V (200 mA) ≤ 5.5 V (100 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 15-300-10/01D



IFL 40 x 25 x 12 mm



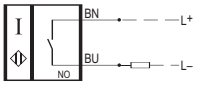
- Thermoplastic enclosure
- Rectangular design 250 (40 x 25 x 12 mm)
- Cable
- DC 2-wire

Technical data

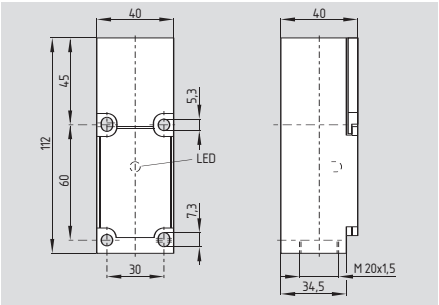
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	D: 2-wire DC
U_b:	10 ... 40 VDC
I_e:	200 mA
I_m:	5 mA
I_r:	approx. 0.5 mA
U_d:	≤ 6 V (200 mA) ≤ 5.5 V (100 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 1 kHz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP), with 2 screws M3 x 6 for rear mounting
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m

Contact variants

IFL 4-250-10D



IFL 112 x 40 x 40 mm



- Thermoplastic enclosure
- Rectangular design 333 (112 x 40 x 40 mm)
- Wiring compartment
- DC 2-wire

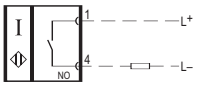
By repositioning the switch five different actuating directions can be selected. The selected actuating direction can be marked with a sticker.

Technical data

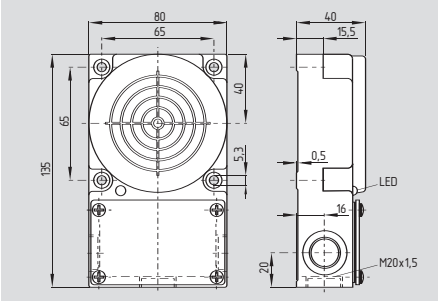
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	20 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	D: 2-wire DC
U_b:	15 ... 150 VDC
I_e:	200 mA
I_m:	5 mA
I_r:	approx. 1 mA
U_d:	approx. 8.5 V (200 mA)
Protection circuit:	wrong polarity and inductive interference protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 40 Hz
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP) cover: Luran
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entry M20 x 1.5

Contact variants

IFL 20-333-10D



IFL 135 x 80 x 40 mm



- Thermoplastic enclosure
- Rectangular design 385 (135 x 80 x 40 mm)
- Wiring compartment
- DC 2-wire
- Mounting bracket HW 385-1 to simplify mounting available

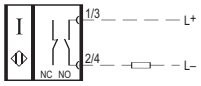
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

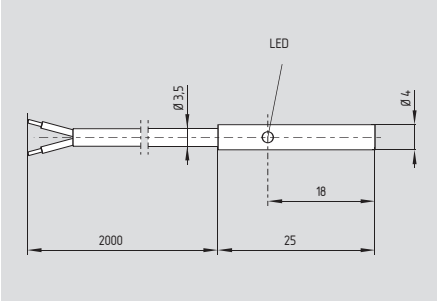
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	50 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	D: 2-wire DC
U_b:	10 ... 40 VDC
I_e:	200 mA
I_m:	5 mA
I_r:	approx. 0.5 mA
U_d:	≤ 6 V (200 mA) ≤ 5.5 V (100 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 50 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl)
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entries 3 x M20 x 1.5 (break-out)

Contact variants

IFL 50-385-10/01D



IFL Ø 4 mm



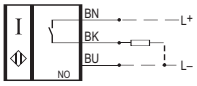
- Metal enclosure
- Design Ø 4 mm
- Cable
- DC 3-wire

Technical data

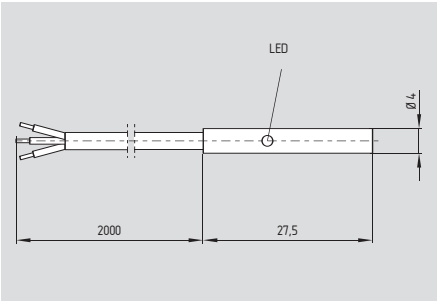
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	0.8 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	< 10 mA
U_d:	approx. 2 V (200 mA)
Protection circuit:	suppressed switch-on fault impulse, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	5000 Hz
Protection class:	IP 67 to EN 60529
Material:	stainless steel
Connection:	cable PUR 3 x 0.14 mm², length 2 m

Contact variants

IFL-N-0,8-4-10P



IFL Ø 4 mm



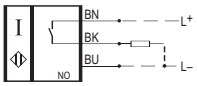
- Metal enclosure
- Design Ø 4 mm
- Cable
- DC 3-wire
- Clamp H 4 is included in delivery, see accessories

Technical data

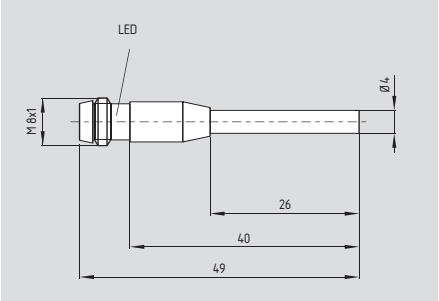
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	0.8 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	7 ... 35 VDC
I_e:	100 mA
I_0:	< 2.5 mA
U_d:	≤ 2 V (100 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection (pulsed)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 1 kHz
Protection class:	IP 65 to EN 60529
Material:	housing: stainless steel and clamp H 4: thermoplastic
Connection:	cable LiYY 3 x 0.14 mm², length 2 m

Contact variants

IFL 0,8-4-10P



IFL Ø 4 mm



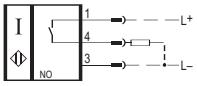
- Metal enclosure
- Design Ø 4 mm
- Plug-in connector
- DC 3-wire
- Clamp H 4 is included in delivery, see accessories

Technical data

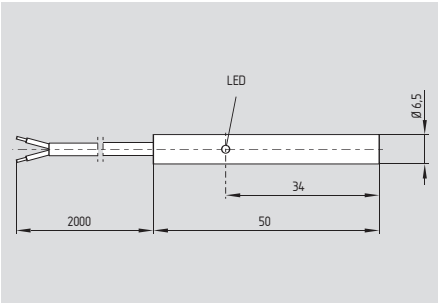
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	0.8 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	7 ... 35 VDC
I_e:	100 mA
I_0:	< 2.5 mA
U_d:	≤ 2 V (100 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection (pulsed)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 1 kHz
Protection class:	IP 65 to EN 60529
Material:	housing: stainless steel and clamp H 4: thermoplastic
Connection:	plug-in connector M8 x 1, Ø = 6.5 mm

Contact variants

IFL 0,8-4-10ST2P



IFL Ø 6.5 mm



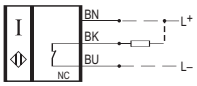
- Metal enclosure
- Design Ø 6.5 mm
- Cable
- DC 3-wire

Technical data

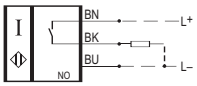
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	1.5 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 1500 Hz
Protection class:	IP 67 to EN 60529
Material:	stainless steel
Connection:	cable PUR 3 x 0.25 mm², length 2 m

Contact variants

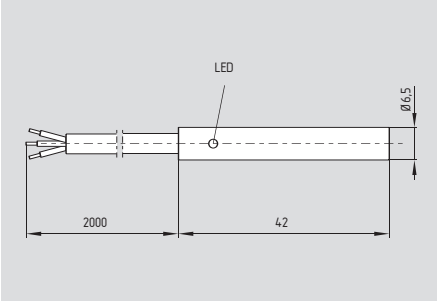
IFL-N-2-6,5M-10N



IFL-N-2-6,5M-10P



IFL Ø 6.5 mm



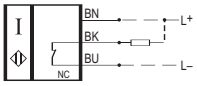
- Metal enclosure
- Design Ø 6.5 mm
- Cable
- DC 3-wire
- Clamp H 6.5 is included in delivery, see accessories

Technical data

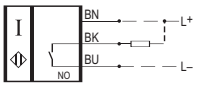
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.4 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 3 kHz
Protection class:	IP 67 to EN 60529
Material:	housing: nickel plated brass clamp H 6.5: thermoplastic
Connection:	cable LiYY 3 x 0.14 mm², length 2 m

Contact variants

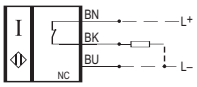
IFL 2-6,5M-01N



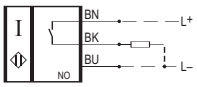
IFL 2-6,5M-10N



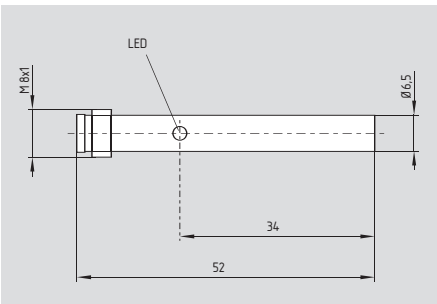
IFL 2-6,5M-01P



IFL 2-6,5M-10P



IFL Ø 6.5 mm



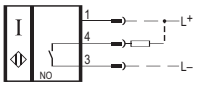
- Metal enclosure
- Design Ø 6.5 mm
- Plug-in connector
- DC 3-wire

Technical data

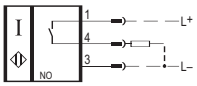
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	1.5 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 1500 Hz
Protection class:	IP 67 to EN 60529
Material:	stainless steel
Connection:	plug-in connector M8 x 1, Ø = 6.5 mm

Contact variants

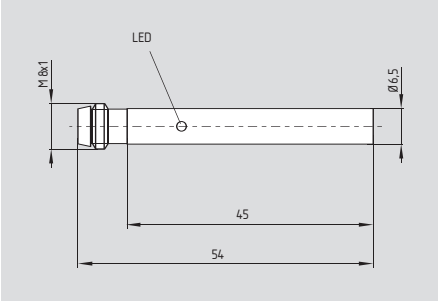
IFL-N-2-6,5M-10ST2N



IFL-N-2-6,5M-10ST2P



IFL Ø 6.5 mm



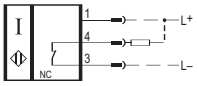
- Metal enclosure
- Design Ø 6.5 mm
- Plug-in connector
- DC 3-wire
- Clamp H 6.5 is included in delivery, see accessories

Technical data

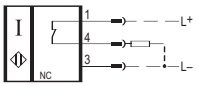
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.4 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 3 kHz
Protection class:	IP 67 to EN 60529
Material:	housing: nickel plated brass clamp H 6.5: thermoplastic
Connection:	plug-in connector M8 x 1, Ø = 6.5 mm

Contact variants

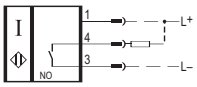
IFL 2-6,5M-01ST2N



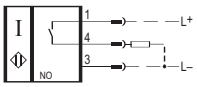
IFL 2-6,5M-01ST2P



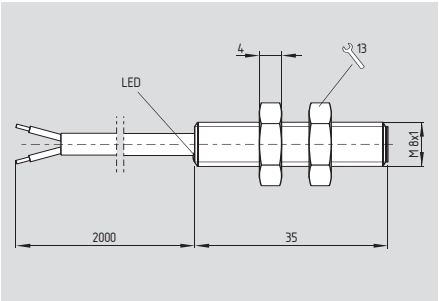
IFL 2-6,5M-10ST2N



IFL 2-6,5M-10ST2P



IFL M 8



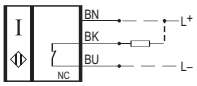
- Metal enclosure
- Design M 8 x 1
- Cable
- DC 3-wire

Technical data

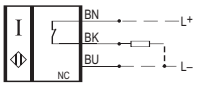
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 600 Hz
Protection class:	IP 67 to EN 60529
Material:	stainless steel
Connection:	cable PUR 3 x 0.25 mm², length 2 m

Contact variants

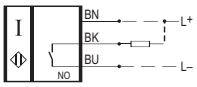
IFL-N-2-8M-01N



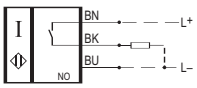
IFL-N-2-8M-01P



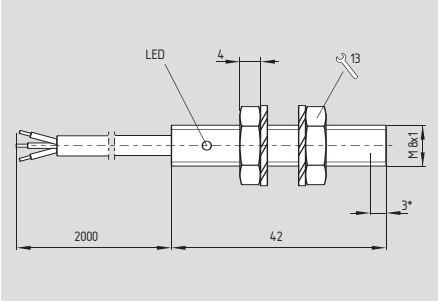
IFL-N-2-8M-10N



IFL-N-2-8M-10P



IFL M 8



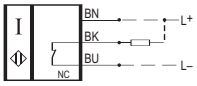
- Metal enclosure
- Design M 8 x 1
- Cable
- DC 3-wire

Technical data

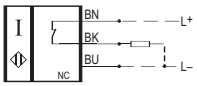
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.4 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 3 kHz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 13 max. 600 Ncm * May not be charged in this area!
Connection:	cable LiYY 3 x 0.14 mm², length 2 m

Contact variants

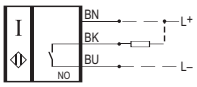
IFL 2-8M-01N



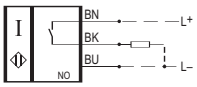
IFL 2-8M-01P



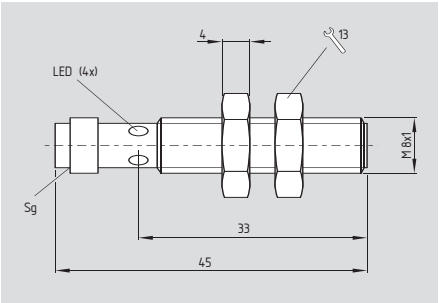
IFL 2-8M-10N



IFL 2-8M-10P



IFL M 8



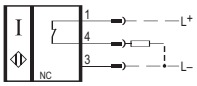
- Metal enclosure
- Design M 8 x 1
- Plug-in connector
- DC 3-wire

Technical data

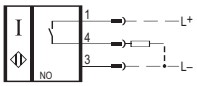
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 600 Hz
Protection class:	IP 67 to EN 60529
Material:	stainless steel
Connection:	plug-in connector M8 x 1, Ø = 6.5 mm

Contact variants

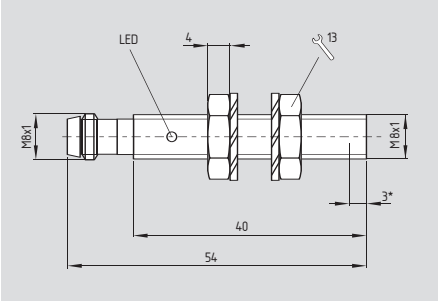
IFL-N-2-8M-01ST2P



IFL-N-2-8M-10ST2P



IFL M 8



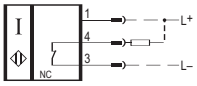
- Metal enclosure
- Design M 8 x 1
- Plug-in connector
- DC 3-wire

Technical data

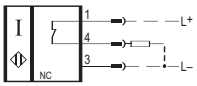
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.4 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 3 kHz
Protection class:	IP 67 to EN 60529 (only with screw-on plug)
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 13 max. 600 Ncm * May not be charged in this area!
Connection:	plug-in connector M8 x 1, Ø = 6.5 mm

Contact variants

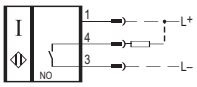
IFL 2-8M-01ST2N



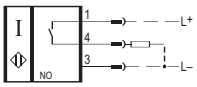
IFL 2-8M-01ST2P



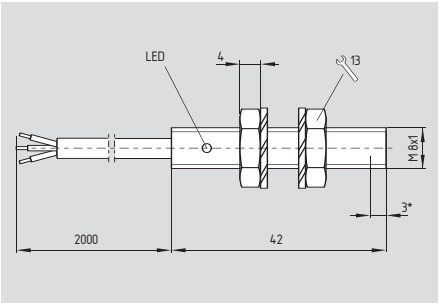
IFL 2-8M-10ST2N



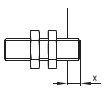
IFL 2-8M-10ST2P



IFL M 8



- Metal enclosure
- Design M 8 x 1
- Cable
- DC 3-wire
- High switching distance
- Quasi-embeddable (x = 0.6 mm)

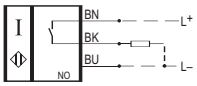


Technical data

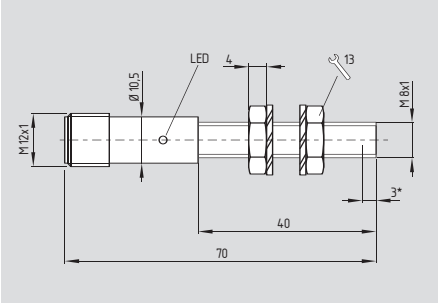
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	3 mm, quasi-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 1.7 mA (10 V) approx. 4 mA (24 V) approx. 5 mA (30 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 10 °C ... + 70 °C
Switching frequency f:	approx. 1500 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 13 max. 600 Ncm * May not be charged in this area!
Connection:	cable LiYY 3 x 0.14 mm^2, length 2 m

Contact variants

IFL 3B-8M-10P



IFL M 8



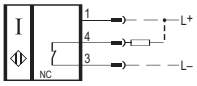
- Metal enclosure
- Design M 8 x 1
- Plug-in connector
- DC 3-wire

Technical data

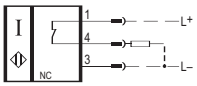
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.4 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 3 kHz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 13 max. 600 Ncm
Connection:	Plug-in connector M12 x 1

Contact variants

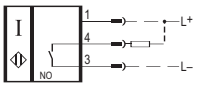
IFL 2-8-01STN



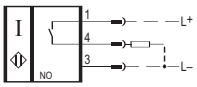
IFL 2-8-01STP



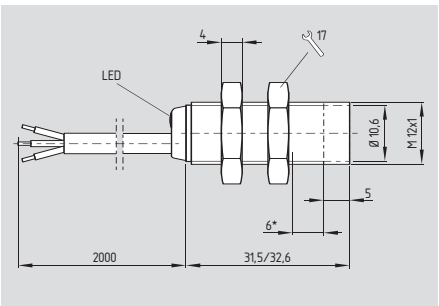
IFL 2-8-10STN



IFL 2-8-10STP



IFL M 12



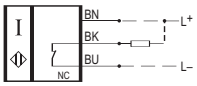
- Metal enclosure
- Design M 12 x 1
- Cable
- DC 3-wire

Technical data

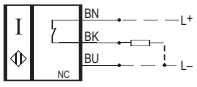
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz (embeddable); P: approx. 500 Hz, N: approx. 330 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	cable LiYY 3 x 0.14 mm^2, length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

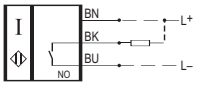
IFL 2-12M-01N
IFL 4-12M-01N



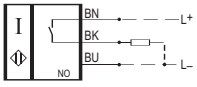
IFL 2-12M-01P
IFL 4-12M-01P



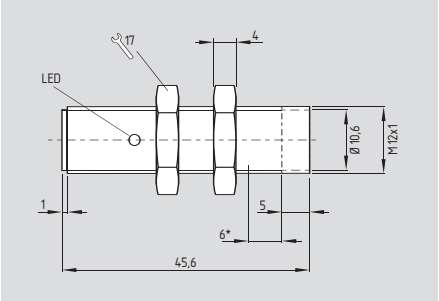
IFL 2-12M-10N
IFL 4-12M-10N



IFL 2-12M-10P
IFL 4-12M-10P



IFL M 12



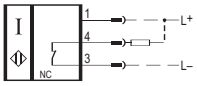
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

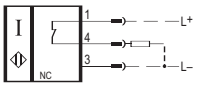
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz (embeddable); P: approx. 500 Hz, N: approx. 330 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

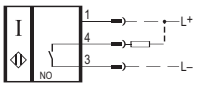
IFL 2-12M-01STN
IFL 4-12M-01STN



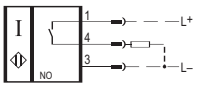
IFL 2-12M-01STP
IFL 4-12M-01STP



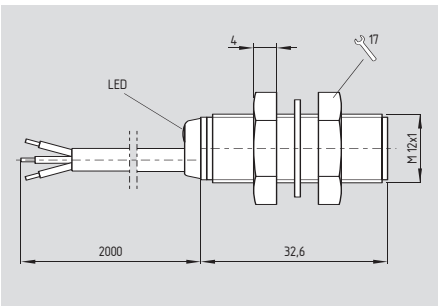
IFL 2-12M-10STN
IFL 4-12M-10STN



IFL 2-12M-10STP
IFL 4-12M-10STP



IFL M 12



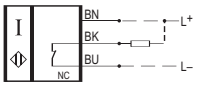
- Thermoplastic enclosure
- Design M 12 x 1
- Cable
- DC 3-wire

Technical data

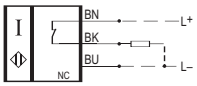
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 17 max. 90 Ncm
Connection:	cable LiYY 3 x 0.14 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

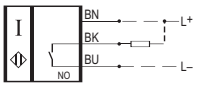
IFL 4-120M-01N



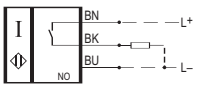
IFL 4-120M-01P



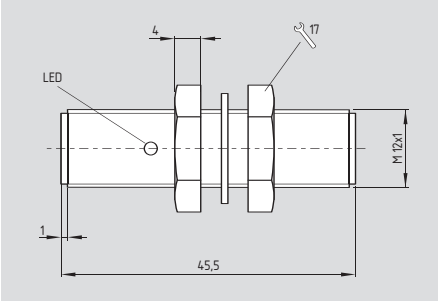
IFL 4-120M-10N



IFL 4-120M-10P



IFL M 12



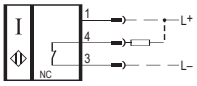
- Thermoplastic enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

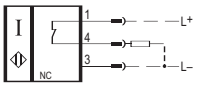
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 17 max. 90 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

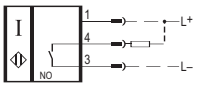
IFL 4-120M-01STN



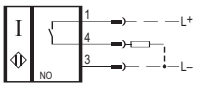
IFL 4-120M-01STP



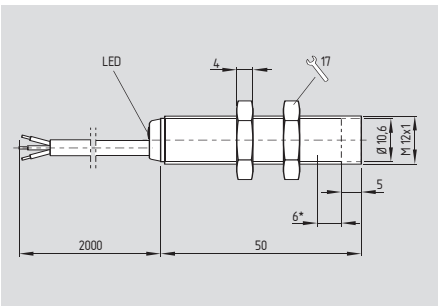
IFL 4-120M-10STN



IFL 4-120M-10STP



IFL M 12



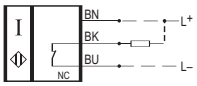
- Metal enclosure
- Design M 12 x 1
- Cable
- DC 3-wire

Technical data

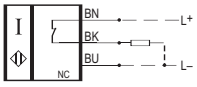
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz (embeddable); P: approx. 500 Hz, N: approx. 330 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	cable LiYY 3 x 0.14 mm^2, length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

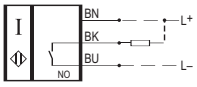
IFL 2-12-01N
IFL 4-12-01N



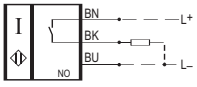
IFL 2-12-01P
IFL 4-12-01P



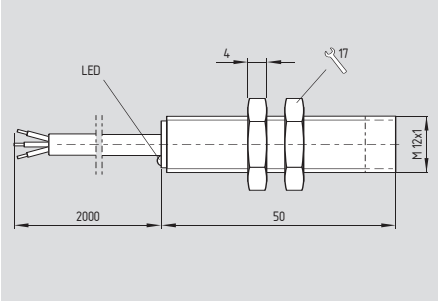
IFL 2-12-10N
IFL 4-12-10N



IFL 2-12-10P
IFL 4-12-10P



IFL M 12



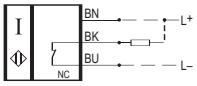
- Metal enclosure
- Design M 12 x 1
- Cable
- DC 3-wire

Technical data

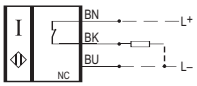
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 1200 Hz (embeddable) approx. 800 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Connection:	cable PUR 3 x 0.25 mm², length 2 m

Contact variants

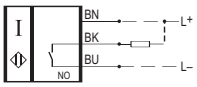
IFL-N-2-12-01N
IFL-N-4-12-01N



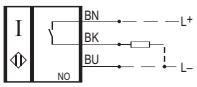
IFL-N-2-12-01P
IFL-N-4-12-01P



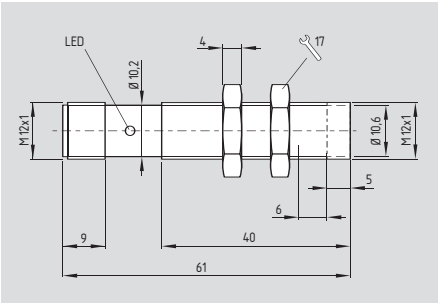
IFL-N-2-12-10N
IFL-N-4-12-10N



IFL-N-2-12-10P
IFL-N-4-12-10P



IFL M 12



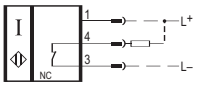
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

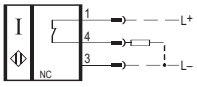
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

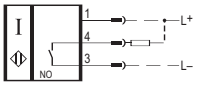
IFL 2-12-01STN



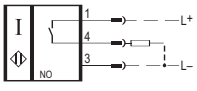
IFL 2-12-01STP



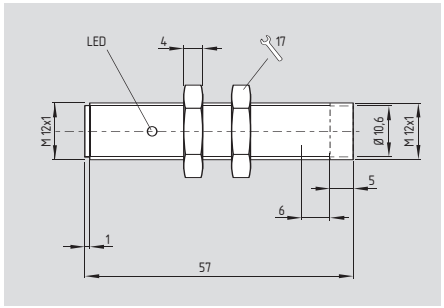
IFL 2-12-10STN



IFL 2-12-10STP



IFL M 12



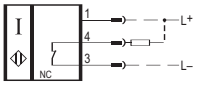
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

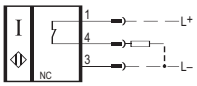
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 500 Hz, N: approx. 330 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

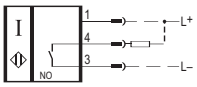
IFL 4-12-01STN



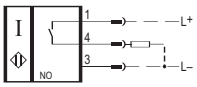
IFL 4-12-01STP



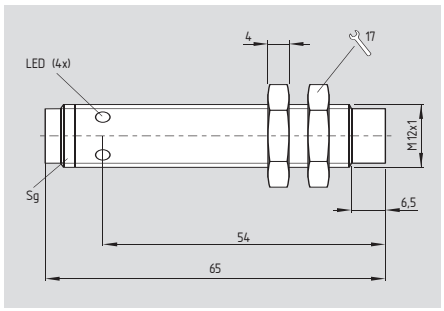
IFL 4-12-10STN



IFL 4-12-10STP



IFL M 12



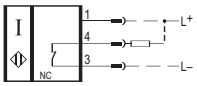
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

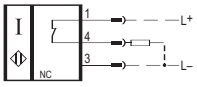
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 1200 Hz (embeddable) approx. 800 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Connection:	Plug-in connector M12 x 1

Contact variants

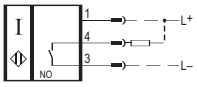
IFL-N-2-12-01STN
IFL-N-4-12-01STN



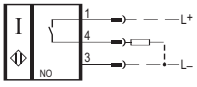
IFL-N-2-12-01STP
IFL-N-4-12-01STP



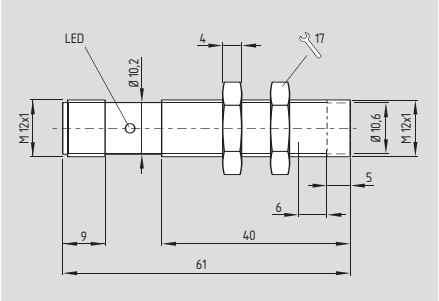
IFL-N-2-12-10STN
IFL-N-4-12-10STN



IFL-N-2-12-10STP
IFL-N-4-12-10STP



IFL M 12



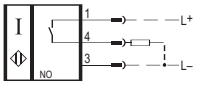
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire
- Stainless steel

Technical data

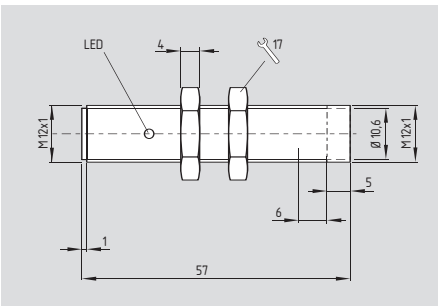
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 1 kHz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: stainless steel
Tightening torque for nuts:	A/F 17 max. 1500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 2-12-10STP-2033



IFL M 12



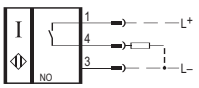
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire
- Stainless steel

Technical data

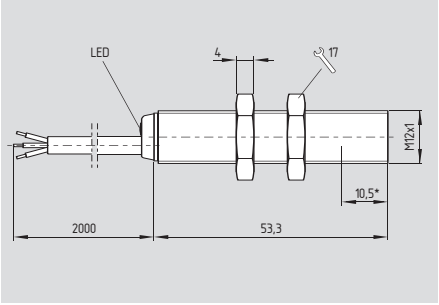
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 500 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: stainless steel
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

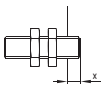
IFL 4-12-10STP-2033



IFL M 12



- Metal enclosure
- Design M 12 x 1
- Cable
- DC 3-wire
- High switching distance
- Quasi-embeddable
  (steel: x ≥ 2.4 mm
  other metal: x ≥ 1.2 mm)

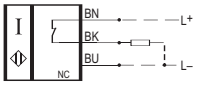


Technical data

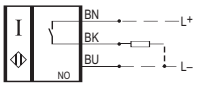
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, quasi-embeddable (steel: x ≥ 2.4 mm other metal: x ≥ 1.2 mm)
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC
U_b:	5 ... 40 VDC
I_e:	200 mA
I_0:	approx. 0.5 mA (24 V)
U_d:	approx. 1.3 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection (pulsed)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 600 Hz (NO contact) approx. 550 Hz (NC contact)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	cable LiYY 3 x 0.14 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

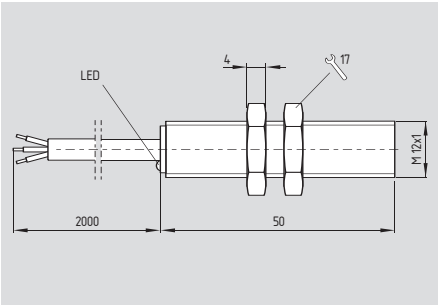
IFL 4B-12-01PK1



IFL 4B-12-10PK1



IFL M 12



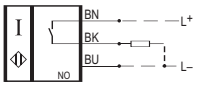
- Metal enclosure
- Design M 12 x 1
- Cable
- DC 3-wire
- High switching distance

Technical data

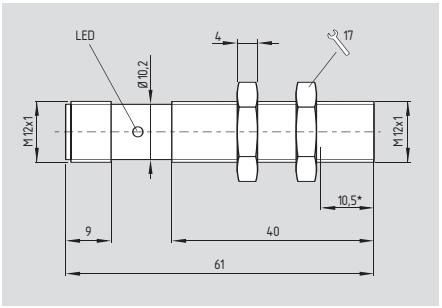
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 800 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Connection:	cable PUR 3 x 0.25 mm², length 2 m

Contact variants

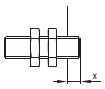
IFL-N-4B-12-10PK1



IFL M 12



- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire
- High switching distance
- Quasi-embeddable
  (steel: x ≥ 2.4 mm
  other metal: x ≥ 1.2 mm)

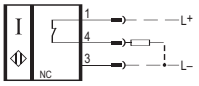


Technical data

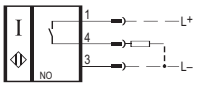
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, quasi-embeddable (steel: x ≥ 2.4 mm other metal: x ≥ 1.2 mm)
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC
U_b:	5 ... 40 VDC
I_e:	200 mA
I_0:	approx. 0.5 mA (24 V)
U_d:	approx. 1.3 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection (pulsed)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 600 Hz (NO contact) approx. 550 Hz (NC contact)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

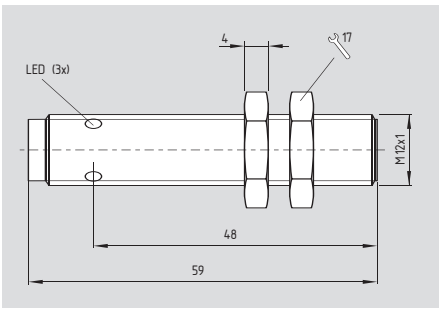
IFL 4B-12-01STPK1



IFL 4B-12-10STPK1



IFL M 12



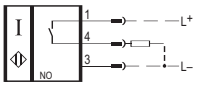
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire
- High switching distance

Technical data

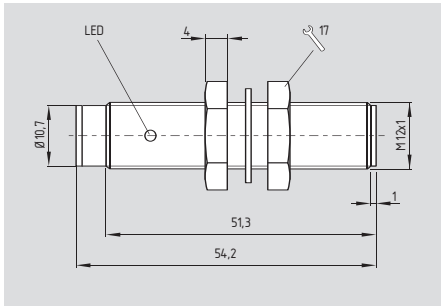
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 800 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Connection:	Plug-in connector M12 x 1

Contact variants

IFL-N-4B-12-10STPK1



IFL M 12



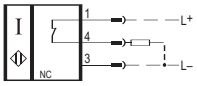
- Thermoplastic enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

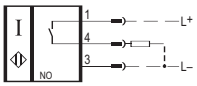
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 700 Hz, N: approx. 440 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 17 max. 90 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

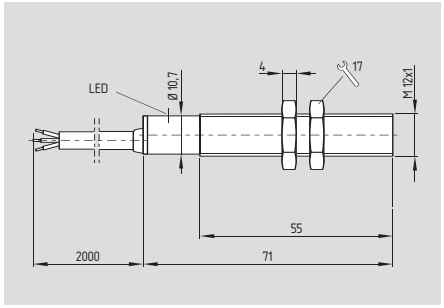
IFL 4-120-10STN



IFL 4-120-10STP



IFL M 12



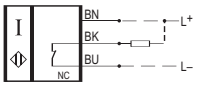
- Metal enclosure
- Design M 12 x 1
- Cable
- DC 3-wire

Technical data

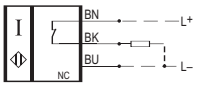
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm
Connection:	cable LiYY 3 x 0.34 mm^2, length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

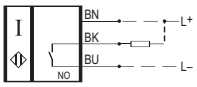
IFL 2-12L-01N



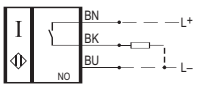
IFL 2-12L-01P



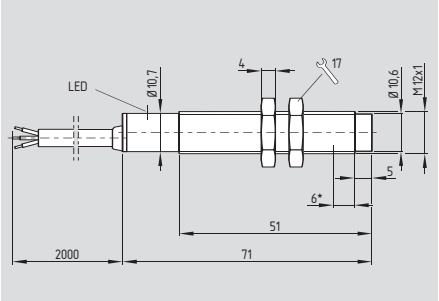
IFL 2-12L-10N



IFL 2-12L-10P



IFL M 12



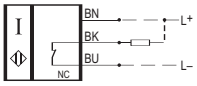
- Metal enclosure
- Design M 12 x 1
- Cable
- DC 3-wire

Technical data

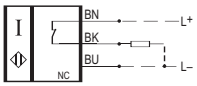
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 500 Hz, N: approx. 330 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

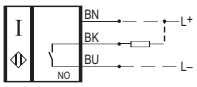
IFL 4-12L-01N



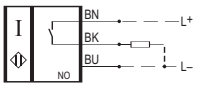
IFL 4-12L-01P



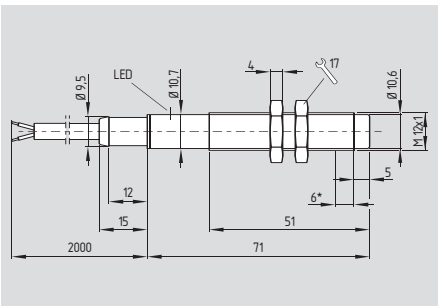
IFL 4-12L-10N



IFL 4-12L-10P



IFL M 12



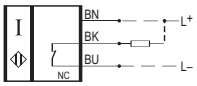
- Metal enclosure
- Design M 12 x 1
- Cable with strain relief
- DC 3-wire

Technical data

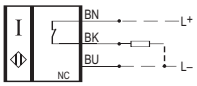
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 500 Hz, N: approx. 330 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

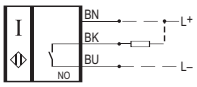
IFL 4-12L-01TN



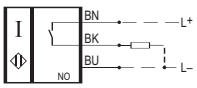
IFL 4-12L-01TP



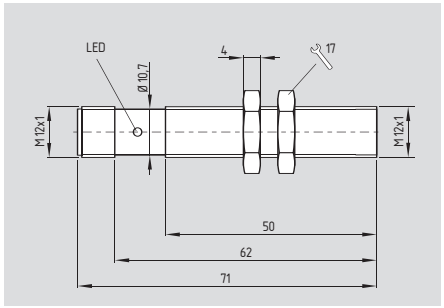
IFL 4-12L-10TN



IFL 4-12L-10TP



IFL M 12



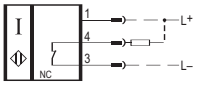
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

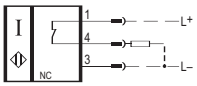
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

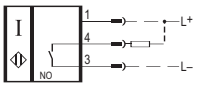
IFL 2-12L-01STN



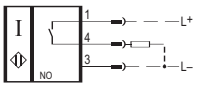
IFL 2-12L-01STP



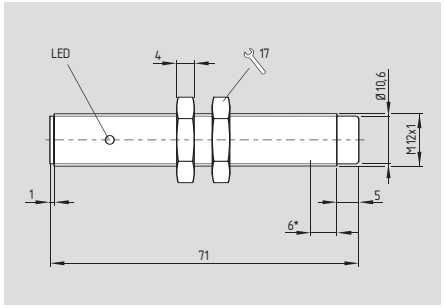
IFL 2-12L-10STN



IFL 2-12L-10STP



IFL M 12



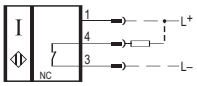
- Metal enclosure
- Design M 12 x 1
- Plug-in connector
- DC 3-wire

Technical data

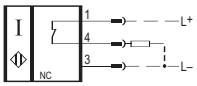
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 500 Hz, N: approx. 330 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 17 max. 1500 Ncm * in the shell core area: max. 500 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

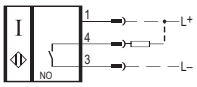
IFL 4-12L-01STN



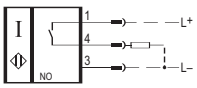
IFL 4-12L-01STP



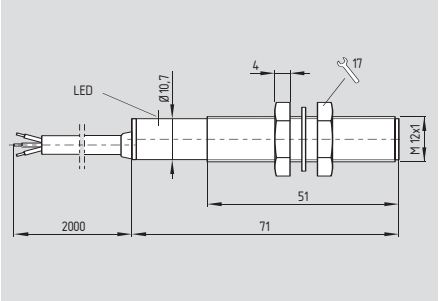
IFL 4-12L-10STN



IFL 4-12L-10STP



IFL M 12



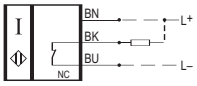
- Thermoplastic enclosure
- Design M 12 x 1
- Cable
- DC 3-wire

Technical data

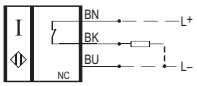
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	4 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 700 Hz, N: approx. 400 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 17 max. 90 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

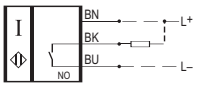
IFL 4-120L-01N



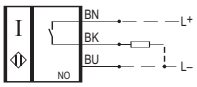
IFL 4-120L-01P



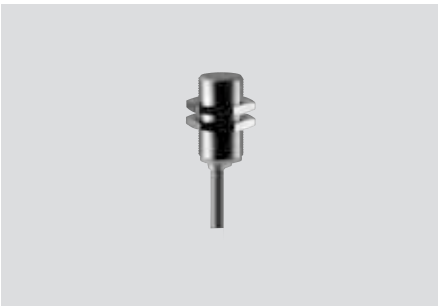
IFL 4-120L-10N

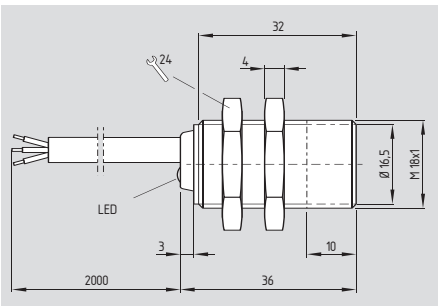


IFL 4-120L-10P



IFL M 18





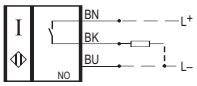
- Metal enclosure
- Design M 18 x 1
- Cable
- DC 3-wire

Technical data

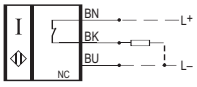
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 700 Hz (embeddable) approx. 400 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

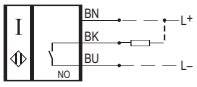
IFL 5-18M-01N
IFL 8-18M-01N



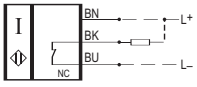
IFL 5-18M-01P
IFL 8-18M-01P



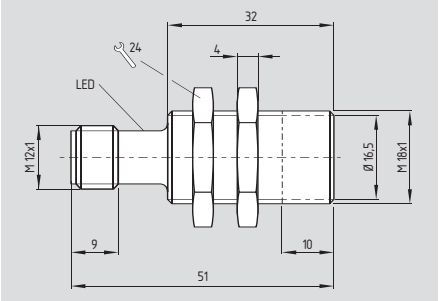
IFL 5-18M-10N
IFL 8-18M-10N



IFL 5-18M-10P
IFL 8-18M-10P



IFL M 18



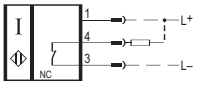
- Metal enclosure
- Design M 18 x 1
- Plug-in connector
- DC 3-wire

Technical data

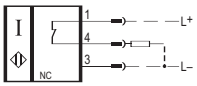
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 700 Hz (embeddable) approx. 400 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

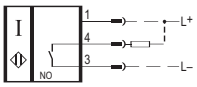
IFL 5-18M-01STN
IFL 8-18M-01STN



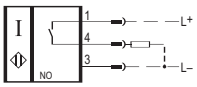
IFL 5-18M-01STP
IFL 8-18M-01STP



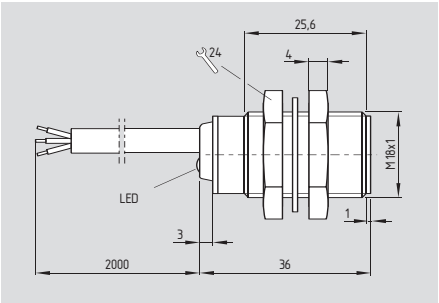
IFL 5-18M-10STN
IFL 8-18M-10STN



IFL 5-18M-10STP
IFL 8-18M-10STP



IFL M 18



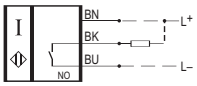
- Thermoplastic enclosure
- Design M 18 x 1
- Cable
- DC 3-wire

Technical data

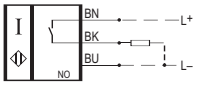
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	8 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	cable LiYY 3 x 0.34 mm^2, length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

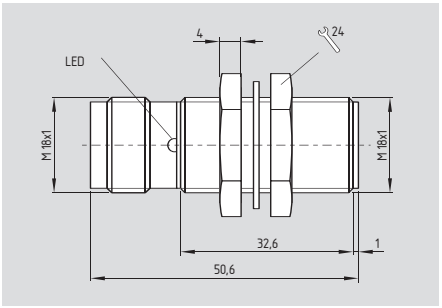
IFL 8-180M-10N



IFL 8-180M-10P



IFL M 18



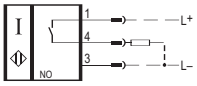
- Thermoplastic enclosure
- Design M 18 x 1
- Plug-in connector
- DC 3-wire

Technical data

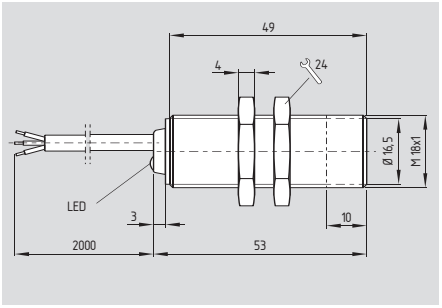
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	8 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	Plug-in connector M18 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 8-180M-10STP



IFL M 18



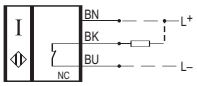
- Metal enclosure
- Design M 18 x 1
- Cable
- DC 3-wire

Technical data

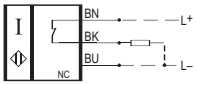
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable LiYY 3 x 0.14 mm^2, length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

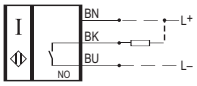
IFL 5-18-01N
IFL 8-18-01N



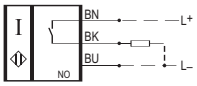
IFL 5-18-01P
IFL 8-18-01P



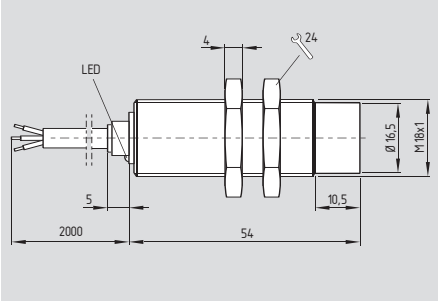
IFL 5-18-10N
IFL 8-18-10N



IFL 5-18-10P
IFL 8-18-10P



IFL M 18



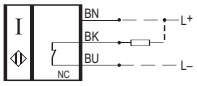
- Metal enclosure
- Design M 18 x 1
- Cable
- DC 3-wire

Technical data

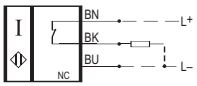
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 800 Hz (embeddable) approx. 500 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Connection:	cable PUR 3 x 0.25 mm², length 2 m

Contact variants

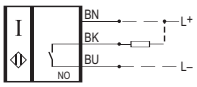
IFL-N-5-18-01N
IFL-N-8-18-01N



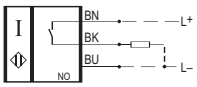
IFL-N-5-18-01P
IFL-N-8-18-01P



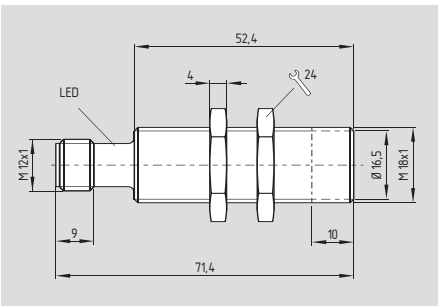
IFL-N-5-18-10N
IFL-N-8-18-10N



IFL-N-5-18-10P
IFL-N-8-18-10P



IFL M 18



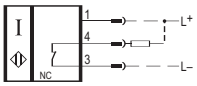
- Metal enclosure
- Design M 18 x 1
- Plug-in connector
- DC 3-wire

Technical data

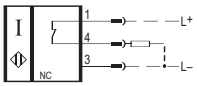
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

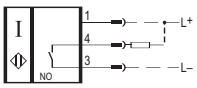
IFL 5-18-01STN
IFL 8-18-01STN



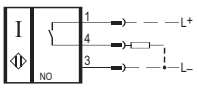
IFL 5-18-01STP
IFL 8-18-01STP



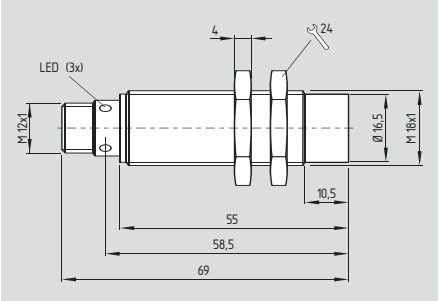
IFL 5-18-10STN
IFL 8-18-10STN



IFL 5-18-10STP
IFL 8-18-10STP



IFL M 18



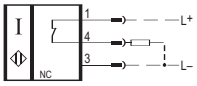
- Metal enclosure
- Design M 18 x 1
- Plug-in connector
- DC 3-wire

Technical data

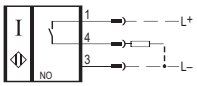
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC
U_b:	15 ... 34 VDC
I_e:	200 mA (up to 50 °C) 150 mA (up to 85 °C)
I_0:	≤ 17 mA (24 VDC) ≤ 30 mA (34 VDC)
U_d:	approx. 2.5 V
Protection circuit:	suppressed switch-on fault impulse, wire-breakage monitoring, wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 85 °C
Switching frequency f:	approx. 800 Hz (embeddable) approx. 500 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Connection:	Plug-in connector M12 x 1

Contact variants

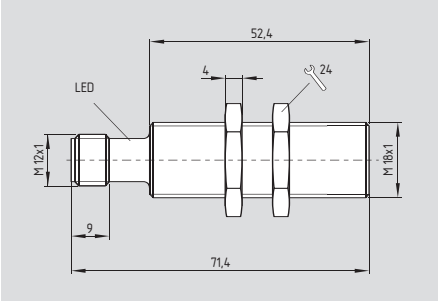
IFL-N-5-18-01STP
IFL-N-8-18-01STP



IFL-N-5-18-10STP
IFL-N-8-18-10STP



IFL M 18



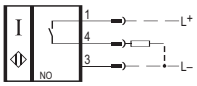
- Metal enclosure
- Design M 18 x 1
- Plug-in connector
- DC 3-wire
- Stainless steel

Technical data

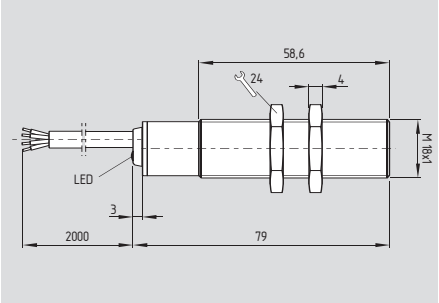
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	5 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 600 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: stainless steel
Tightening torque for nuts:	A/F 24 max. 5000 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 5-18-10STP-2033



IFL M 18



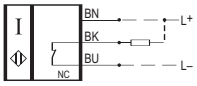
- Metal enclosure
- Design M 18 x 1
- Cable
- DC 3-wire

Technical data

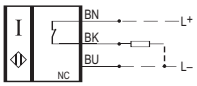
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	5 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

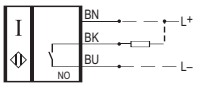
IFL 5-18L-01N



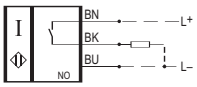
IFL 5-18L-01P



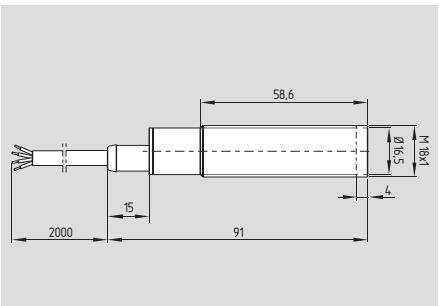
IFL 5-18L-10N



IFL 5-18L-10P



IFL M 18



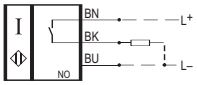
- Metal enclosure
- Design M 18 x 1
- Cable with strain relief
- DC 3-wire
- Max. + 130 °C
- Without LED
- Clamp H 18 is included in delivery, see accessories

Technical data

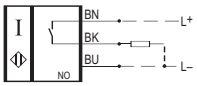
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 1.8 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity and inductive interference protection
Ambient temperature:	– 25 °C ... + 130 °C (dry heat) Index -2130-1: with silicon cable for humid environments
Switching frequency f:	approx. 200 Hz
Protection class:	IP 67 to EN 60529
Material:	housing: nickel plated brass clamp H 18: thermoplastic
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	silicone cable 155 3 x 0.34 mm², length 2 m, with strain relief
Note:	Normally supplied with clamp (version with nuts: ordering suffix -2130-2).

Contact variants

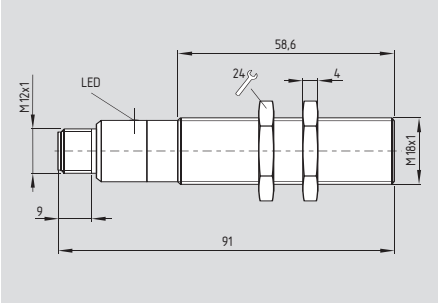
IFL 5-18L-10TP-2130



IFL 8-18L-10TP-2130



IFL M 18



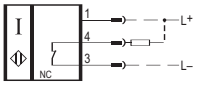
- Metal enclosure
- Design M 18 x 1
- Plug-in connector
- DC 3-wire

Technical data

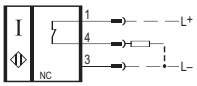
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	5 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.5 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

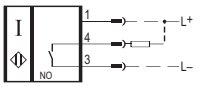
IFL 5-18L-01STN



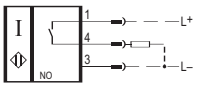
IFL 5-18L-01STP



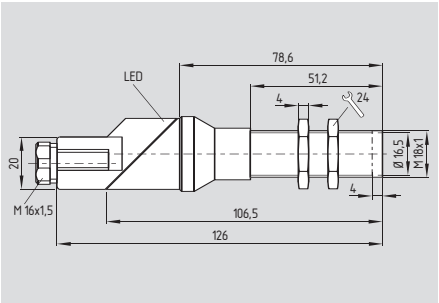
IFL 5-18L-10STN



IFL 5-18L-10STP



IFL M 18



- Metal enclosure
- Design M 18 x 1
- Wiring compartment
- DC 3-wire

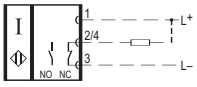
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

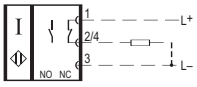
Standards:	IEC/EN 60947-5-2, VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	P: 3-wire DC, N: 3-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 500 Hz (embeddable) approx. 350 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	Terminal screws for max. 1.5 mm^2, with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

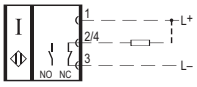
IFL 5-18L-10/01N



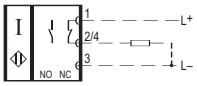
IFL 5-18L-10/01P



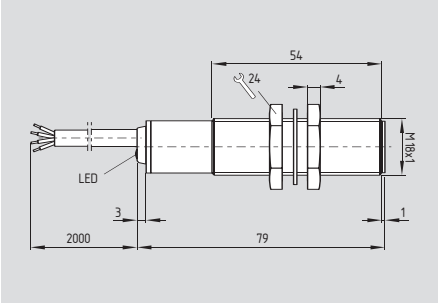
IFL 8-18L-10/01N



IFL 8-18L-10/01P



IFL M 18



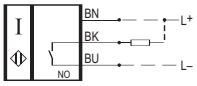
- Thermoplastic enclosure
- Design M 18 x 1
- Cable
- DC 3-wire

Technical data

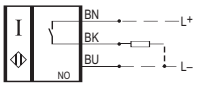
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	8 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.5 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

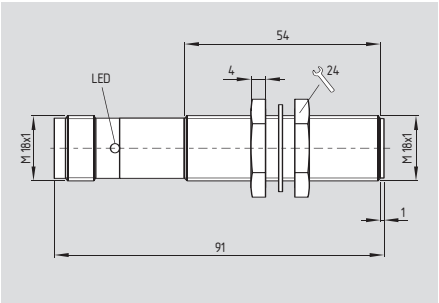
IFL 8-180L-10N



IFL 8-180L-10P



IFL M 18



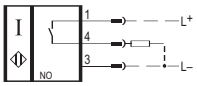
- Thermoplastic enclosure
- Design M 18 x 1
- Plug-in connector
- DC 3-wire

Technical data

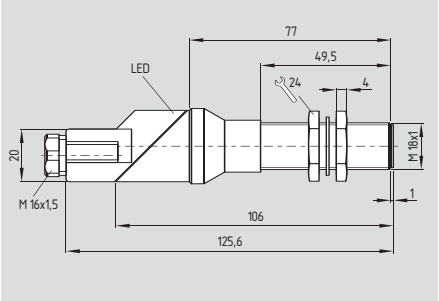
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	8 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.5 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 400 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	Plug-in connector M18 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 8-180L-10STP



IFL M 18



- Thermoplastic enclosure
- Design M 18 x 1
- Wiring compartment
- DC 3-wire

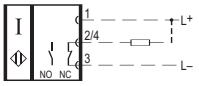
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

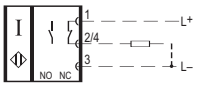
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 350 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

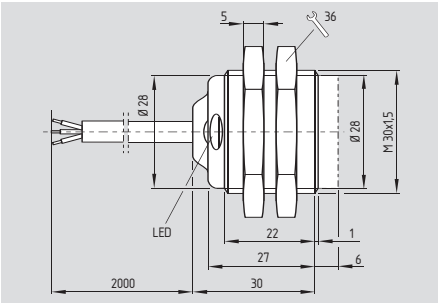
IFL 10-180L-10/01N



IFL 10-180L-10/01P



IFL M 30



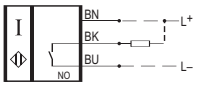
- Metal enclosure
- Design M 30 x 1.5
- Cable
- DC 3-wire

Technical data

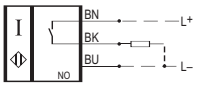
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.5 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 200 Hz (embeddable) approx. 100 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

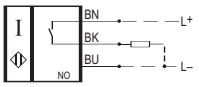
IFL 10-30M-10N



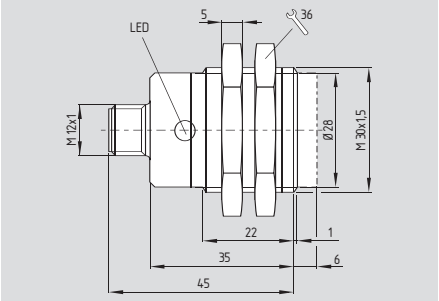
IFL 10-30M-10P



IFL 15-30M-10P



IFL M 30



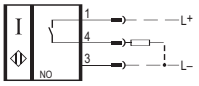
- Metal enclosure
- Design M 30 x 1.5
- Plug-in connector
- DC 3-wire

Technical data

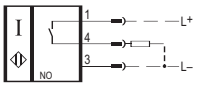
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.5 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 200 Hz (embeddable) approx. 100 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

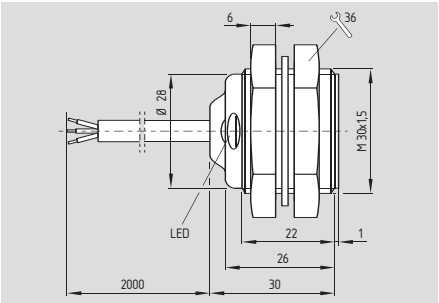
IFL 10-30M-10ST1P



IFL 15-30M-10ST1P



IFL M 30



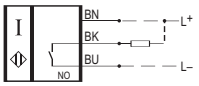
- Thermoplastic enclosure
- Design M 30 x 1.5
- Cable
- DC 3-wire

Technical data

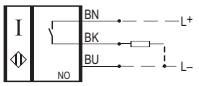
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.5 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	cable LiYY 3 x 0.34 mm^2, length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

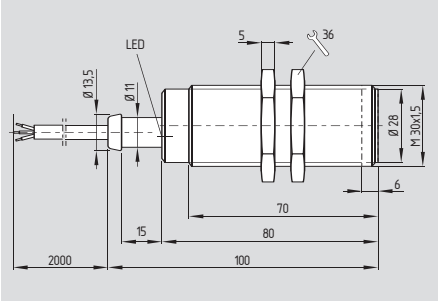
IFL 15-300M-10N



IFL 15-300M-10P



IFL M 30



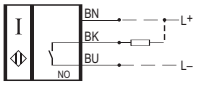
- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- DC 3-wire

Technical data

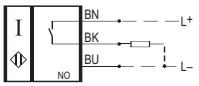
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3.5 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 200 Hz (embeddable) approx. 100 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

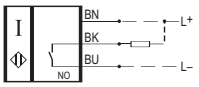
IFL 10-30L-10TN



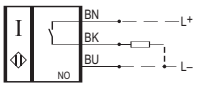
IFL 10-30L-10TP



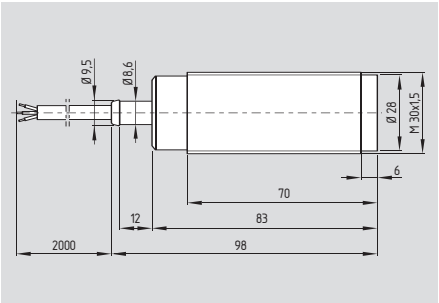
IFL 15-30L-10TN



IFL 15-30L-10TP



IFL M 30



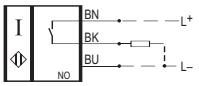
- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- DC 3-wire
- Max. + 130 °C
- Without LED
- Clamp H 30 is included in delivery, see accessories

Technical data

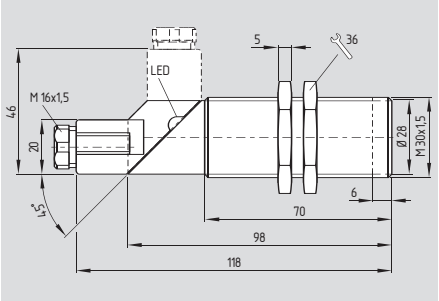
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 1.8 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity and inductive interference protection
Ambient temperature:	– 25 °C ... + 130 °C (dry heat) Index -2130-1: with silicon cable for humid environments
Switching frequency f:	approx. 60 Hz
Protection class:	IP 67 to EN 60529
Material:	housing: nickel plated brass clamp H 30: thermoplastic
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	silicone cable 155 3 x 0.34 mm², length 2 m, with strain relief
Note:	Normally supplied with clamp (version with nuts: ordering suffix -2130-2).

Contact variants

IFL 15-30L-10TP-2130



IFL M 30



- Metal enclosure
- Design M 30 x 1.5
- Wiring compartment
- DC 3-wire

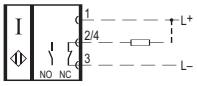
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

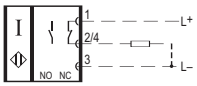
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	P: 3-wire DC, N: 3-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 200 Hz (embeddable) approx. 100 Hz (non-embeddable)
Protection class:	IP 65 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

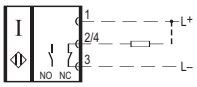
IFL 10-30L-10/01N



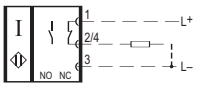
IFL 10-30L-10/01P



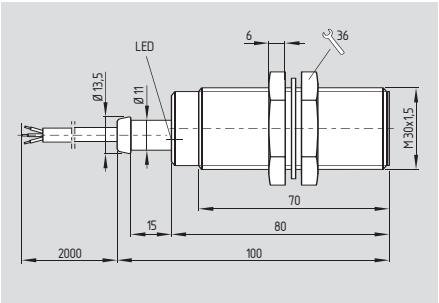
IFL 15-30L-10/01N



IFL 15-30L-10/01P



IFL M 30



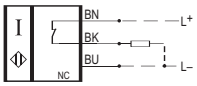
- Thermoplastic enclosure
- Design M 30 x 1.5
- Cable with strain relief
- DC 3-wire

Technical data

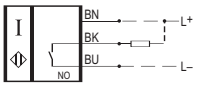
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

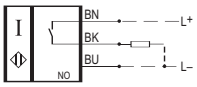
IFL 15-300L-01TP



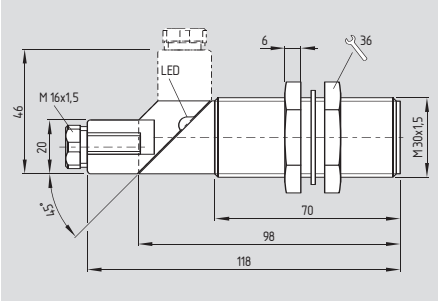
IFL 15-300L-10TN



IFL 15-300L-10TP



IFL M 30



- Thermoplastic enclosure
- Design M 30 x 1.5
- Wiring compartment
- DC 3-wire

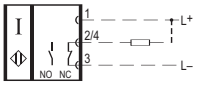
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

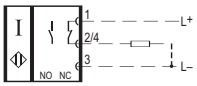
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

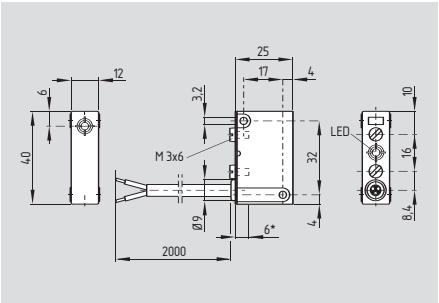
IFL 15-300L-10/01N



IFL 15-300L-10/01P



IFL 40 x 25 x 12 mm



- Thermoplastic enclosure
- Rectangular design 250 (40 x 25 x 12 mm)
- Cable
- DC 3-wire

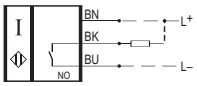
Switches can be mounted adjacent to each other without interference.

Technical data

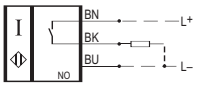
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact (on request: normally closed contact (-01) is available)
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP), with 2 screws M3 x 6 for rear mounting
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	* maximum screwing depth: 6 mm

Contact variants

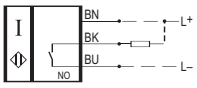
IFL 2-250-10N



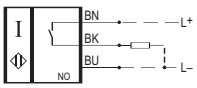
IFL 2-250-10P



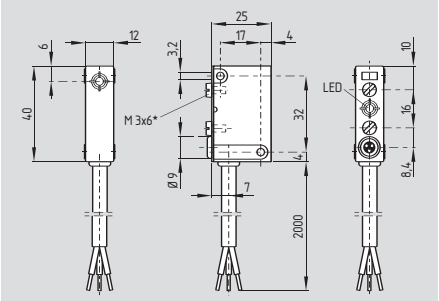
IFL 4-250-10N



IFL 4-250-10P



IFL 40 x 25 x 12 mm



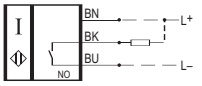
- Thermoplastic enclosure
- Rectangular design 250 (40 x 25 x 12 mm)
- Cable (sidewards)
- DC 3-wire

Technical data

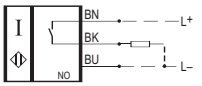
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 2-...: 2 mm, embeddable IFL 4-...: 4 mm, non-embeddable
Switching element function:	A: normally open contact (on request: normally closed contact (-01) is available)
Switching output:	P: 3-wire DC N: 3-wire DC
U_b:	10 ... 30 VDC
I_e:	200 mA
I_0:	approx. 3 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C … + 70 °C
Switching frequency f:	P: approx. 1 kHz, N: approx. 800 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP), with 2 screws M3 x 6 for rear mounting
Connection:	cable LiYY 3 x 0.34 mm^2, length 2 m
Note:	* maximum screwing depth: 6 mm

Contact variants

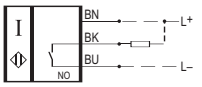
IFL 2-250-10N-1716



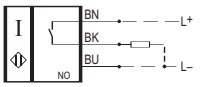
IFL 2-250-10P-1716



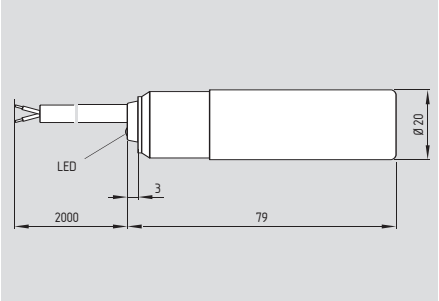
IFL 4-250-10N-1716



IFL 4-250-10P-1716



IFL Ø 20 mm



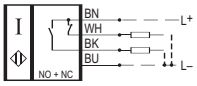
- Thermoplastic enclosure
- Design Ø 20 mm
- Cable
- DC 4-wire
- Clamp H 20 is included in delivery, see accessories

Technical data

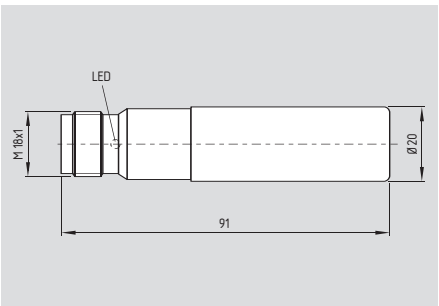
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 350 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and clamp H 20: thermoplastic
Connection:	cable LiYY 4 x 0.25 mm², length 2 m

Contact variants

IFL 10-200L-11P



IFL Ø 20 mm



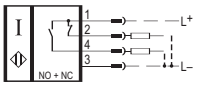
- Thermoplastic enclosure
- Design Ø 20 mm
- Plug-in connector
- DC 4-wire
- Clamp H 20 is included in delivery, see accessories

Technical data

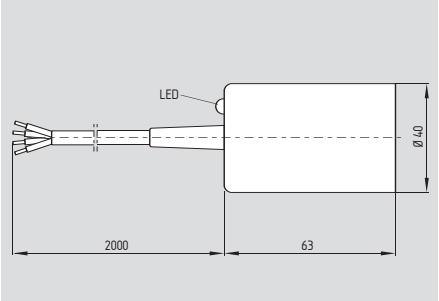
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 350 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and clamp H 20: thermoplastic
Connection:	Plug-in connector M18 x 1

Contact variants

IFL 10-200L-11STP



IFL Ø 40 mm



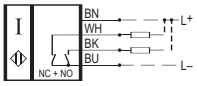
- Thermoplastic enclosure
- Design Ø 40 mm
- Cable
- DC 4-wire
- Clamp H 40 is included in delivery, see accessories

Technical data

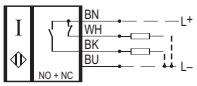
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	20 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and clamp H 40: thermoplastic
Connection:	cable LiYY 4 x 0.25 mm², length 2 m

Contact variants

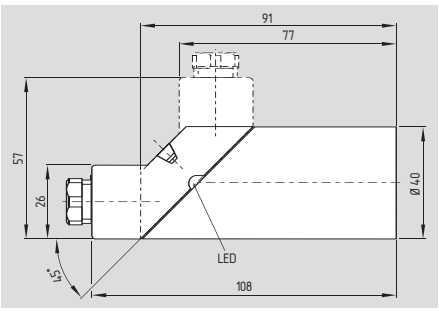
IFL 20-400-11TN



IFL 20-400-11TP



IFL Ø 40 mm



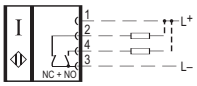
- Thermoplastic enclosure
- Design Ø 40 mm
- Wiring compartment
- DC 4-wire
- Clamp H 40 is included in delivery, see accessories

Technical data

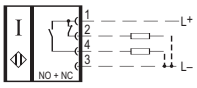
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	20 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing and clamp H 40: thermoplastic
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entry M16 x 1.5

Contact variants

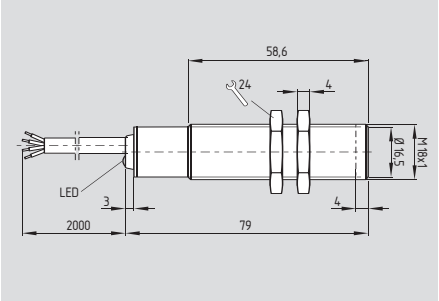
IFL 20-400-11N



IFL 20-400-11P



IFL M 18



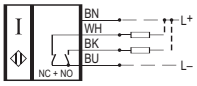
- Metal enclosure
- Design M 18 x 1
- Cable
- DC 4-wire

Technical data

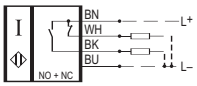
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent), on request also available as NO contact (-10) or NC contact (-01).
Switching output:	P: 4-wire DC, N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 500 Hz (embeddable) approx. 350 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable LiYY 4 x 0.25 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

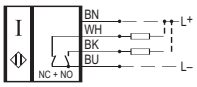
IFL 5-18L-11N



IFL 5-18L-11P



IFL 8-18L-11N



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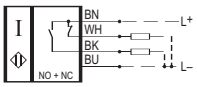
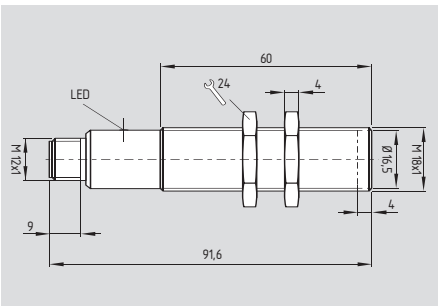


IFL M 18



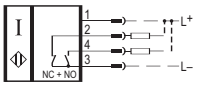
- Metal enclosure
- Design M 18 x 1
- Plug-in connector
- DC 4-wire

Technical data

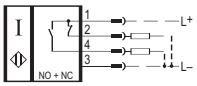
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 5-...: 5 mm, embeddable IFL 8-...: 8 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent), on request also available as NO contact (-10) or NC contact (-01).
Switching output:	P: 4-wire DC, N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 500 Hz (embeddable) approx. 350 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	Plug-in connector M12 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

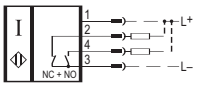
IFL 5-18L-11STN



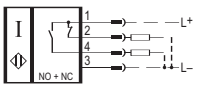
IFL 5-18L-11STP



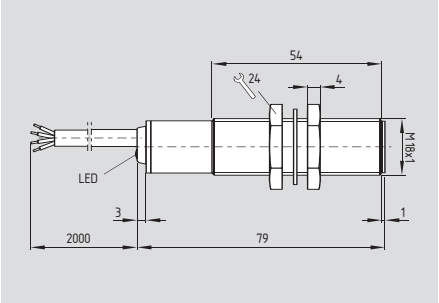
IFL 8-18L-11STN



IFL 8-18L-11STP



IFL M 18



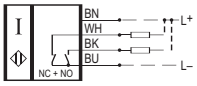
- Thermoplastic enclosure
- Design M 18 x 1
- Cable
- DC 4-wire

Technical data

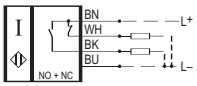
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 350 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	cable LiYY 4 x 0.25 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

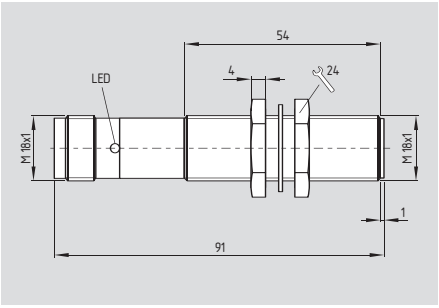
IFL 10-180L-11N



IFL 10-180L-11P



IFL M 18



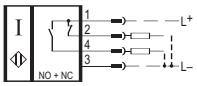
- Thermoplastic enclosure
- Design M 18 x 1
- Plug-in connector
- DC 4-wire

Technical data

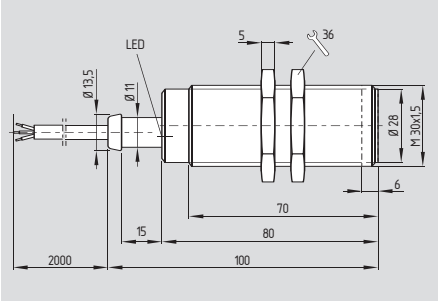
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	10 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 350 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 24 max. 300 Ncm
Connection:	Plug-in connector M18 x 1
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFL 10-180L-11STP



IFL M 30



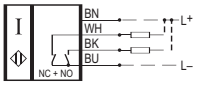
- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- DC 4-wire

Technical data

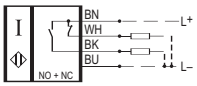
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 200 Hz (embeddable) approx. 100 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	cable LiYY 4 x 0.25 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

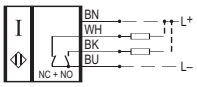
IFL 10-30L-11TN



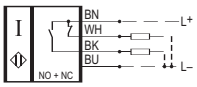
IFL 10-30L-11TP



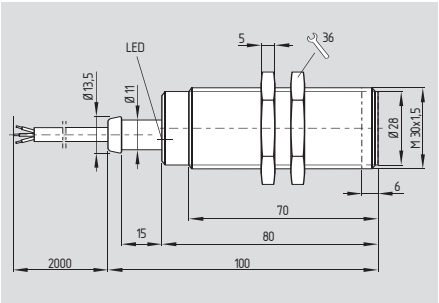
IFL 15-30L-11TN



IFL 15-30L-11TP



IFL M 30



- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- DC 4-wire
- Max. + 110 °C (230 °F)

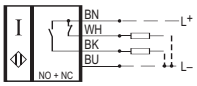
LED may become defective when operated above 90 °C. Operation of the switch, however, is not affected.

Technical data

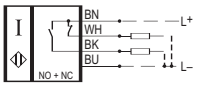
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 10-...: 10 mm, embeddable IFL 15-...: 15 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	200 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1 V (200 mA)
Protection circuit:	wrong polarity and inductive interference protection
Ambient temperature:	0 °C ... + 110 °C (dry heat)
Switching frequency f:	approx. 150 Hz (embeddable) approx. 50 Hz (non-embeddable)
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	silicone cable 4 x 0.25 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

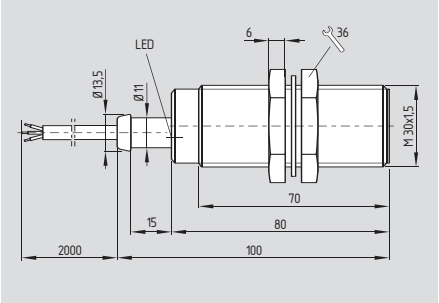
IFL 10-30L-11TP-1766



IFL 15-30L-11TP-1766



IFL M 30



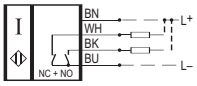
- Thermoplastic enclosure
- Design M 30 x 1.5
- Cable with strain relief
- DC 4-wire

Technical data

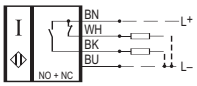
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	cable LiYY 4 x 0.25 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

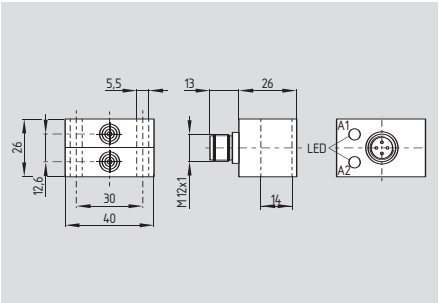
IFL 15-300L-11TN



IFL 15-300L-11TP



IFL 40 x 26 x 26 mm



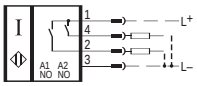
- Thermoplastic enclosure
- Rectangular design 255 (40 x 26 x 26 mm)
- Plug-in connector
- DC 4-wire

Technical data

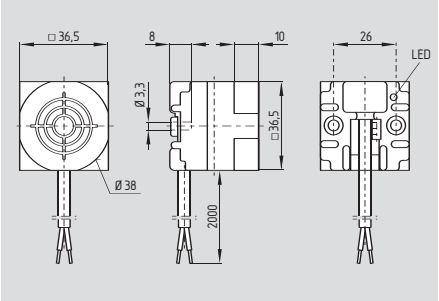
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	2 x 4 mm, non-embeddable
Switching element function:	A1: normally open contact and A2: normally open contact
Switching output:	P: 4-wire DC
U_b:	10 ... 40 VDC
I_e:	200 mA per output
I_0:	approx. 2.7 mA (24 V)
U_d:	approx. 1.2 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 650 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl), with 2 screws M5 x ... for mounting
Connection:	Plug-in connector M12 x 1

Contact variants

IFL 4/4-255-20STP



IFL 36.5 x 36.5 x 36.5 mm



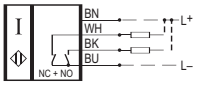
- Thermoplastic enclosure
- Rectangular design 333E (36.5 x 36.5 x 36.5 mm)
- Cable
- DC 4-wire
- Mounting bracket HWE-1 to simplify mounting available

Technical data

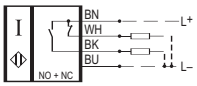
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 15-...: 15 mm, embeddable IFL 20-...: 21.5 mm, non-embeddable (36.5 x 36.5 mm opening)
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP)
Connection:	cable LiYY 4 x 0.25 mm², length 2 m

Contact variants

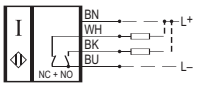
IFL 15-333E-11N



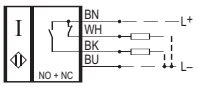
IFL 15-333E-11P



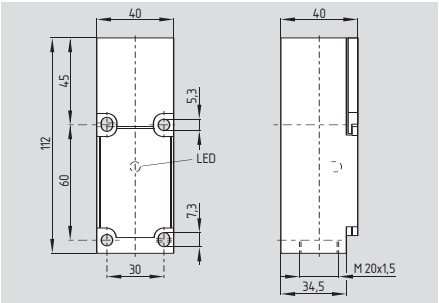
IFL 20-333E-11N



IFL 20-333E-11P



IFL 112 x 40 x 40 mm



- Thermoplastic enclosure
- Rectangular design 333 (112 x 40 x 40 mm)
- Wiring compartment
- DC 4-wire

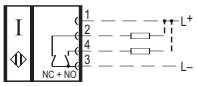
By repositioning the switch five different actuating directions can be selected. The selected actuating direction can be marked with a sticker.

Technical data

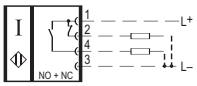
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	IFL 15-...: 15 mm, embeddable IFL 20-...: 20 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 100 Hz
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP) cover: Luran
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entry M20 x 1.5

Contact variants

IFL 15-333-11N



IFL 15-333-11P



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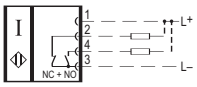
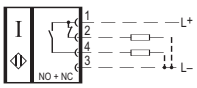
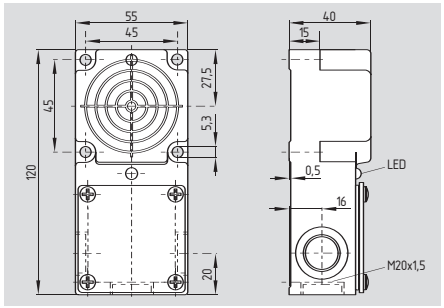


IFL 20-333-11P



IFL 120 x 55 x 40 mm



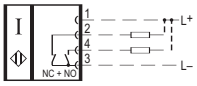
- Thermoplastic enclosure
- Rectangular design 384 (120 x 55 x 40 mm)
- Wiring compartment
- DC 4-wire

Technical data

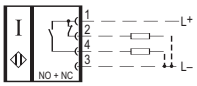
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	30 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 25 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl)
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entries 3 x M20 x 1.5 (break-out)

Contact variants

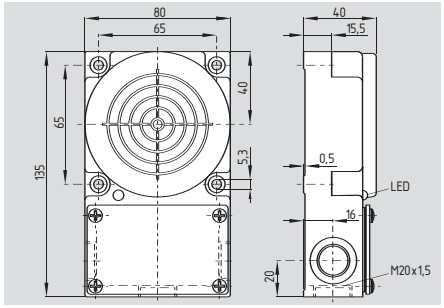
IFL 30-384-11N



IFL 30-384-11P



IFL 135 x 80 x 40 mm



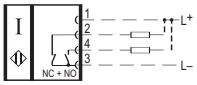
- Thermoplastic enclosure
- Rectangular design 385 (135 x 80 x 40 mm)
- Wiring compartment
- DC 4-wire
- Mounting bracket HW 385-1 to simplify mounting available

Technical data

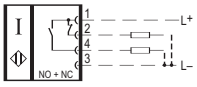
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	50 mm, non-embeddable (on request: switching distance 70 mm)
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC N: 4-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 5.5 mA (24 V)
U_d:	approx. 1.5 V (400 mA)
Protection circuit:	wrong polarity and inductive interference protection, on request: short-circuit and overload proof (Index -1665-1) Ie = 300 mA, Ud = approx. 1 V (300 mA)
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 25 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl)
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entries 3 x M20 x 1.5 (break-out)

Contact variants

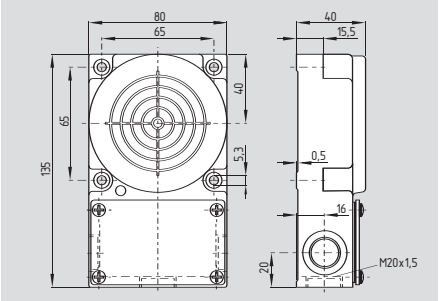
IFL 50-385-11ZNG



IFL 50-385-11ZPG



IFL 135 x 80 x 40 mm



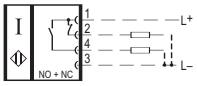
- Thermoplastic enclosure
- Rectangular design 385 (135 x 80 x 40 mm)
- Wiring compartment
- DC 4-wire
- Max. + 130 °C
- Without LED
- Mounting bracket HW 385-1 to simplify mounting available

Technical data

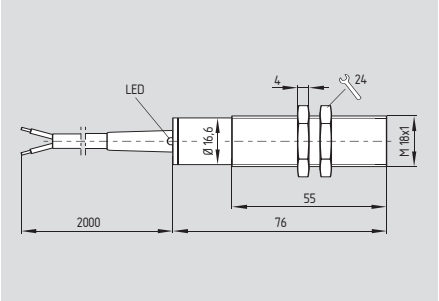
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	50 mm, non-embeddable
Switching element function:	A: normally open contact and B: normally closed contact (antivalent)
Switching output:	P: 4-wire DC
U_b:	10 ... 40 VDC
I_e:	200 mA
I_0:	approx. 4 mA (24 V)
U_d:	approx. 1.5 V (200 mA)
Protection circuit:	wrong polarity and inductive interference protection
Ambient temperature:	– 25 °C ... + 130 °C
Switching frequency f:	approx. 50 Hz
Protection class:	IP 67 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (Noryl)
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm^2, with cable entries 3 x M20 x 1.5 (break-out)

Contact variants

IFL 50-385-11P-2130



IFL M 18



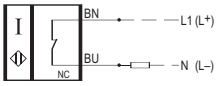
- Metal enclosure
- Design M 18 x 1
- Cable
- AC/DC 2-wire

Technical data

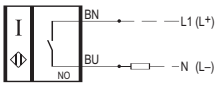
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	5 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	U: 2-wire AC/DC
U_b:	15 ... 250 VAC/DC
I_e:	300 mA
I_0:	approx. 0.3 mA (24 V) approx. 0.5 mA (220 V)
U_d:	approx. 4 V (300 mA)
Protection circuit:	wrong polarity and inductive interference protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 15 Hz
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable H03VV-F 2 x 0.5 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

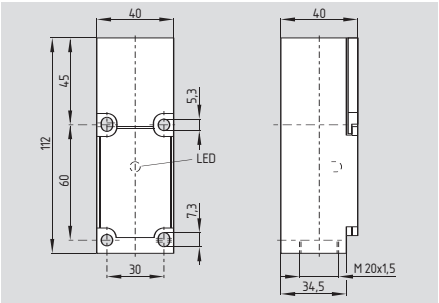
IFL 5-18-01A



IFL 5-18-10A



IFL 112 x 40 x 40 mm



- Thermoplastic enclosure
- Rectangular design 333 (112 x 40 x 40 mm)
- Wiring compartment
- AC/DC 2-wire

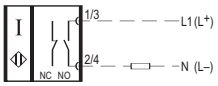
By repositioning the switch five different actuating directions can be selected. The selected actuating direction can be marked with a sticker.

Technical data

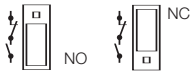
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, embeddable
Switching element function:	P: normally open contact or normally closed contact (Programmable by repositioning the plug-in jumper at the terminal screws)
Switching output:	U: 2-wire AC/DC
U_b:	15 ... 250 VAC/DC
I_e:	300 mA
I_0:	approx. 0.3 mA (24 V)
U_d:	approx. 4 V (300 mA)
Protection circuit:	wrong polarity and inductive interference protection
Ambient temperature:	– 25 °C ... + 70 °C
Switching frequency f:	approx. 15 Hz
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing: thermoplastic (PBTP) cover: Luran
Connection:	Terminal screws with self-lifting pressure clamps for max. 2 x 1.5 mm², with cable entry M20 x 1.5

Contact variants

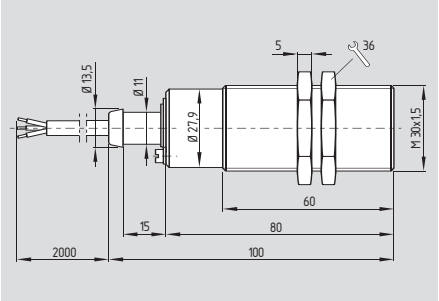
IFL 15-333-10/01A



Programmable by repositioning the plug-in jumper at the terminal screws



IFC M 30



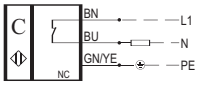
- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- AC 2-wire
- Specified for dielectricity (D)
- Without LED

Technical data

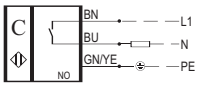
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	90 ... 250 VAC
Rated supply frequency:	48 ... 62 Hz
I_e:	min. 40 mA, max. 300 mA
I_r:	approx. 6 mA (230 V)
U_d:	approx. 8 V (100 mA)
Pull-in power:	max. 120 VA inductive
Protection circuit:	inductive interference protection
Effective operating distance s_r:	adjustable, depending on the material (The adjustable real switching distance s_r should be 75% of the effective switching distance s_n with high temperature differences.)
Usable operating distance s_u:	s_r ± 15% at 0 °C ... + 65 °C
Ambient temperature:	– 25 °C ... + 65 °C
Protection class:	IP 65 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	cable H03VV-F3G 3 x 0.75 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

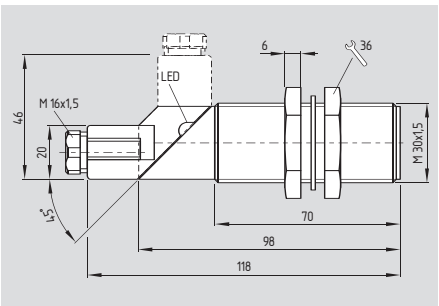
IFC 15-30-01YTD



IFC 15-30-10YTD



IFC M 30



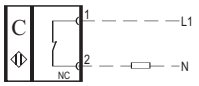
- Thermoplastic enclosure
- Design M 30 x 1.5
- Wiring compartment
- AC 2-wire
- Also suitable for liquids (L)

Technical data

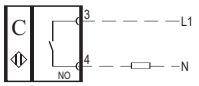
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	A: normally open contact or B: normally closed contact
Switching output:	F: 2-wire AC
U_b:	90 ... 250 VAC
Rated supply frequency:	48 ... 62 Hz
I_e:	min. 40 mA, max. 300 mA
I_r:	approx. 6 mA (230 V)
U_d:	approx. 8 V (100 mA)
Pull-in power:	max. 120 VA inductive
Protection circuit:	inductive interference protection
Effective operating distance s_r:	adjustable, depending on the material (The adjustable real switching distance s_r should be 75% of the effective switching distance s_n with high temperature differences.)
Usable operating distance s_u:	s_r ± 15% at 0 °C ... + 65 °C
Ambient temperature:	– 25 °C ... + 65 °C
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	Terminal screws with self-lifting pressure clamps for max. 1.5 mm²
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

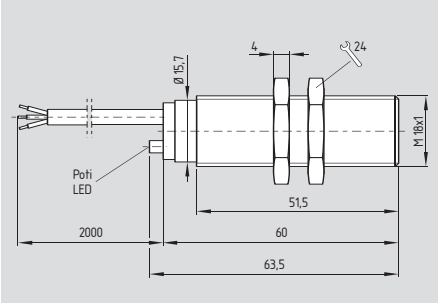
IFC 15-300-01YLD



IFC 15-300-10YLD



IFC M 18



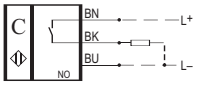
- Metal enclosure
- Design M 18 x 1
- Cable
- DC 3-wire
- Specified for dielectricity (D)

Technical data

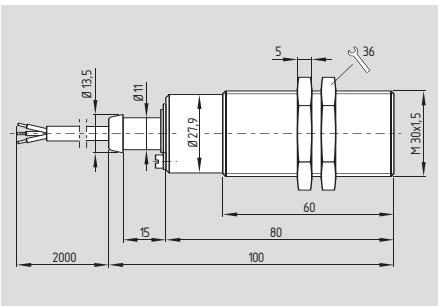
Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	8 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	12 ... 48 VDC
I_e:	300 mA
I_0:	approx. 6 mA
U_d:	approx. 2 V (300 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Effective operating distance s_r:	adjustable, depending on the material (The adjustable real switching distance s_r should be 75% of the effective switching distance s_n with high temperature differences.)
Usable operating distance s_u:	s_r + 20% at + 20 °C ... + 70 °C
Ambient temperature:	– 25 °C ... + 70 °C
Protection class:	IP 67 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 24 max. 1800 Ncm
Connection:	cable LiYY 3 x 0.34 mm², length 2 m
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFC 8-18-10PD



IFC M 30

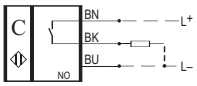


- Metal enclosure
- Design M 30 x 1.5
- Cable with strain relief
- DC 3-wire
- Specified for dielectricity (D)
- Without LED

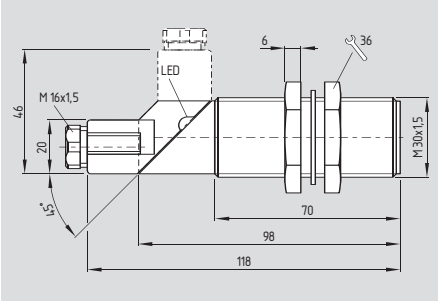
Technical data

Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 48 VDC
I_e:	300 mA
I_0:	approx. 10 mA (230 V)
U_d:	approx. 3.5 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection (approx. 5 min)
Effective operating distance s_r:	adjustable, depending on the material (The adjustable real switching distance s_r should be 75% of the effective switching distance s_n with high temperature differences.)
Usable operating distance s_u:	s_r ± 15% at 0 °C ... + 65 °C
Ambient temperature:	– 25 °C ... + 65 °C
Protection class:	IP 65 to EN 60529
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	cable H03VV-F3G 3 x 0.75 mm², length 2 m, with strain relief
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

IFC 15-30-10YTPD



IFC M 30



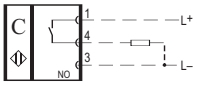
- Thermoplastic enclosure
- Design M 30 x 1.5
- Wiring compartment
- DC 3-wire
- Also suitable for liquids (L)
- Without LED

Technical data

Standards:	IEC/EN 60947-5-2 VDE 0660-208
S_n:	15 mm, non-embeddable
Switching element function:	A: normally open contact
Switching output:	P: 3-wire DC
U_b:	10 ... 48 VDC
I_e:	300 mA
I_0:	approx. 10 mA (24 V)
U_d:	approx. 3.5 V (200 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection (approx. 5 min)
Effective operating distance s_r:	adjustable, depending on the material (The adjustable real switching distance s_r should be 75% of the effective switching distance s_n with high temperature differences.)
Usable operating distance s_u:	s_r ± 15% at 0 °C ... + 65 °C
Ambient temperature:	– 25 °C ... + 65 °C
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	Terminal screws with self-lifting pressure clamps for max. 1.5 mm^2
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFC 15-300-10YPL



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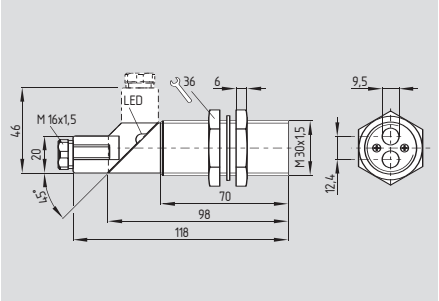
Data sheets, mounting and wiring instructions, declaration of conformity and other information at:
www.schmersal.com

IFO M 30



- Metal enclosure
- Design M 30 x 1.5
- Wiring compartment
- AC 2-wire

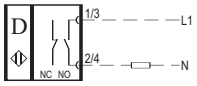
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

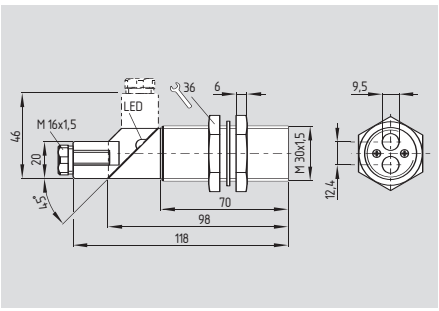
Standards:	IEC/EN 60947-5-2 VDE 0660-208
Sd:	max. 800 mm
Switching element function:	P: Programmable NO contact (Load switched with reflection / light-operated) or NC contact (Load not switched with reflection / dark-operated)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	approx. 3 mA
U_d:	approx. 7 V (250 V/500 mA)
Protection circuit:	inductive interference protection
U_{imp}:	max. 10 kV at Ri = 10 K bis 10 ms
Effective operating distance s_r:	adjustable, depending on the material
Switching frequency f:	max. 5 Hz
Ambient temperature:	0 °C ... + 70 °C
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFO 8-30-10/01

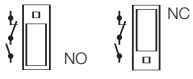


IFO M 30



- Thermoplastic enclosure
- Design M 30 x 1.5
- Wiring compartment
- AC 2-wire

Programmable by repositioning the plug-in jumper at the terminal screws

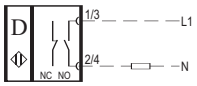


Technical data

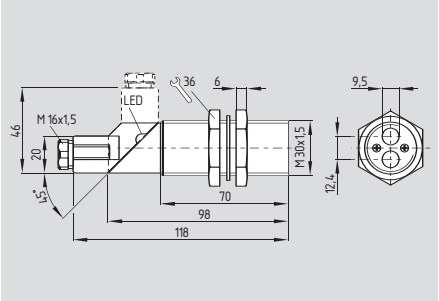
Standards:	IEC/EN 60947-5-2 VDE 0660-208
Sd:	max. 800 mm
Switching element function:	P: Programmable NO contact (Load switched with reflection / light-operated) or NC contact (Load not switched with reflection / dark-operated)
Switching output:	F: 2-wire AC
U_b:	15 ... 250 VAC
Rated supply frequency:	45 ... 65 Hz
I_e:	500 mA
I_m:	10 mA
I_r:	approx. 3 mA
U_d:	approx. 7 V (250 V/500 mA)
Protection circuit:	inductive interference protection
U_{imp}:	max. 10 kV at Ri = 10 K bis 10 ms
Effective operating distance s_r:	adjustable, depending on the material
Switching frequency f:	max. 5 Hz
Ambient temperature:	0 °C ... + 70 °C
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFO 8-300-10/01



IFO M 30



- Metal enclosure
- Design M 30 x 1.5
- Wiring compartment
- DC 3-wire

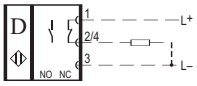
Programmable by repositioning the plug-in jumper at the terminal screws

Technical data

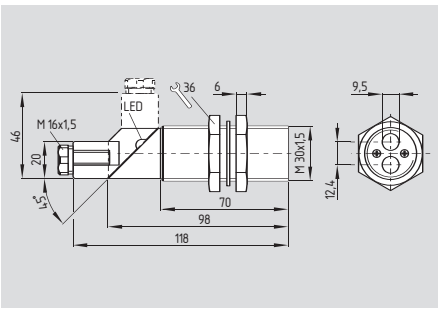
Standards:	IEC/EN 60947-5-2 VDE 0660-208
Sd:	up to 1000 mm
Switching element function:	P: Programmable NO contact (Load switched with reflection / light-operated) or NC contact (Load not switched with reflection / dark-operated)
Switching output:	P: 3-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 2.4 mA (24 V)
U_d:	approx. 2 V (400 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Switching frequency f:	approx. 100 Hz
Effective operating distance s_r:	adjustable, depending on the material
Ambient temperature:	0 °C ... + 70 °C
Protection class:	IP 65 to EN 60529
Protection class:	-
Material:	housing and nuts: nickel plated brass
Tightening torque for nuts:	A/F 36 max. 3000 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

Contact variants

IFO 10-30-10/01P

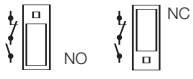


IFO M 30



- Thermoplastic enclosure
- Design M 30 x 1.5
- Wiring compartment
- DC 3-wire

Programmable by repositioning the plug-in jumper at the terminal screws

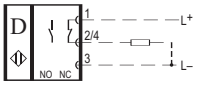


Technical data

Standards:	IEC/EN 60947-5-2 VDE 0660-208
Sd:	up to 1000 mm
Switching element function:	P: Programmable NO contact (Load switched with reflection / light-operated) or NC contact (Load not switched with reflection / dark-operated)
Switching output:	P: 3-wire DC
U_b:	10 ... 60 VDC
I_e:	400 mA
I_0:	approx. 2.4 mA (24 V)
U_d:	approx. 2 V (400 mA)
Protection circuit:	wrong polarity, inductive interference, industrial transients and short-circuit protection
Switching frequency f:	approx. 100 Hz
Effective operating distance s_r:	adjustable, depending on the material
Ambient temperature:	0 °C ... + 70 °C
Protection class:	IP 65 to EN 60529
Protection class:	II, ⧈
Material:	housing and nuts: thermoplastic (PBTP + PA 12) washer: rubber (perbunan)
Tightening torque for nuts:	A/F 36 max. 400 Ncm
Connection:	Terminal screws for max. 1.5 mm², with cable entry M16 x 1.5
Note:	Instead of nuts, a mounting clamp can be provided (see accessories).

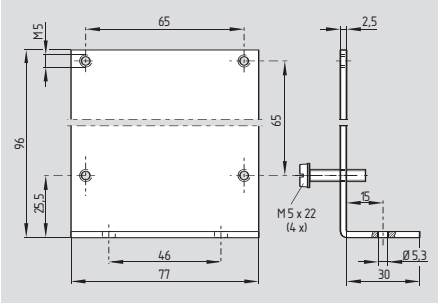
Contact variants

IFO 10-300-10/01P



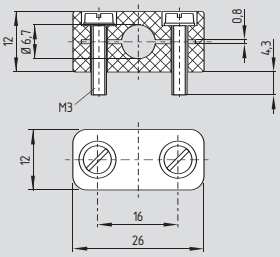
Accessories for proximity switches

Mounting bracket HW 385-1



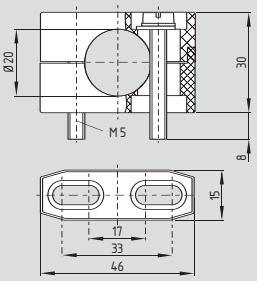
- For easy installation of inductive proximity switches (design 385)
- Steel, zinc-plated

Mounting clamp H 6.5



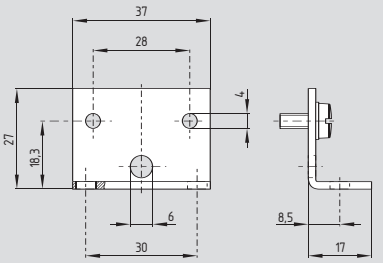
- For a smooth fitting of the proximity switches with cylindric shape
- For diameter 6.5 mm
- Material: thermoplastic

Mounting clamp H 20



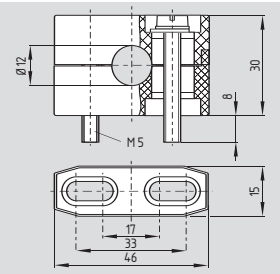
- For a smooth fitting of the proximity switches with cylindric shape
- For diameter 20 mm
- Material: thermoplastic

Mounting bracket HWE-1



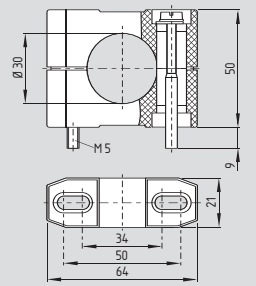
- For easy installation of inductive proximity switches (design 333E)
- Steel, zinc-plated

Mounting clamp H 12



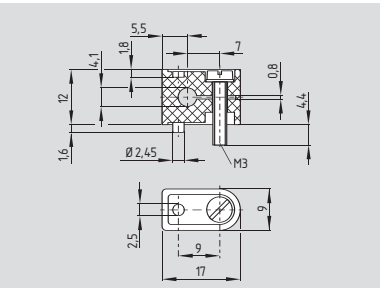
- For a smooth fitting of the proximity switches with cylindric shape
- For diameter 12 mm or thread M12
- Material: thermoplastic

Mounting clamp H 30



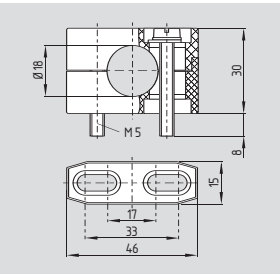
- For a smooth fitting of the proximity switches with cylindric shape
- For diameter 30 mm or thread M30
- Material: thermoplastic

Mounting clamp H 4



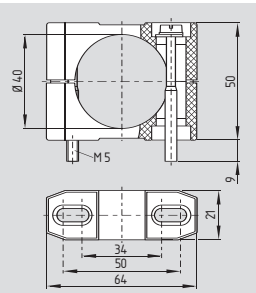
- For a smooth fitting of the proximity switches with cylindric shape
- For diameter 4 mm
- Material: thermoplastic

Mounting clamp H 18



- For a smooth fitting of the proximity switches with cylindric shape
- For diameter 18 mm or thread M18
- Material: thermoplastic

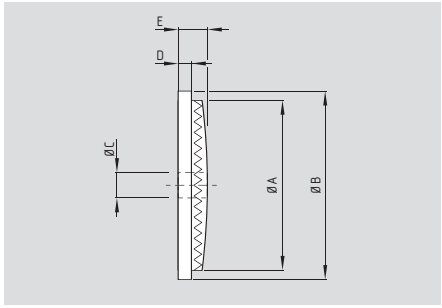
Mounting clamp H 40



- For a smooth fitting of the proximity switches with cylindric shape
- For diameter 40 mm
- Material: thermoplastic

Accessories for proximity switches

Reflectors



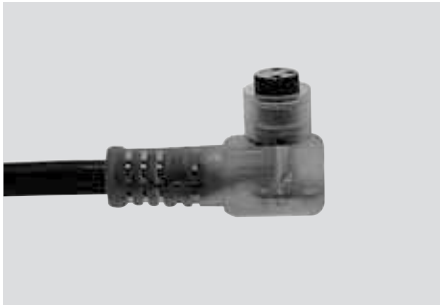
- For IFO
- Material: thermoplastic

Type	ø A	ø B	ø C	D	E
R 101	17.5	21	–	2.5	5.5
R 102	22.5	26	–	2.5	5.5
R 103	32	35.5	–	2.5	5.5
R 104	40.5	47	–	3.5	8.0

Connector plug Ø 6.5

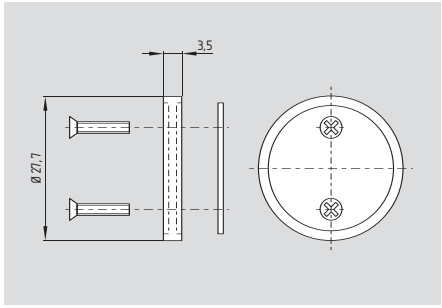
RKM 3-06/2m	**(Lumberg)**
Number of poles:	3
Enclosure protection class:	IP 65
Rated operating voltage:	60 VAC / 75 VDC
Rated operating current:	3 A

Connector plug Ø 6.5



VLPR3-025-EB-M	**(Woodhead)**
Number of poles:	3
Enclosure protection class:	IP 65
Rated operating voltage:	10…30 VDC
Rated operating current:	4 A
Special feature:	2 LEDs

Filter VF 30



- **For IFO**
- Filter disc of plastic for climiniation of dead zone and reduction of operating distance.
- AC; diffuse; Effective operating distance s_r: 130 mm (Poti = max.)
  Detection range with s_r: 0 … 130 mm
- Standard target: 100 x 100 mm
  90% reflectivity
  (all other data same as for standard unit)

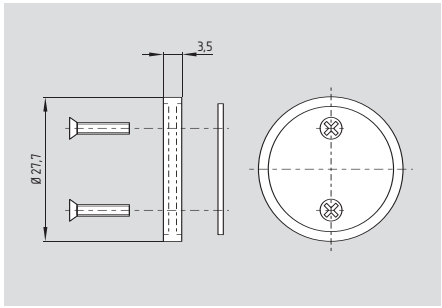
Connector plug Ø 6.5

RKMW/LED A 3-62/2m pnp	**(Lumberg)**
Number of poles:	3
Enclosure protection class:	IP 65
Rated operating voltage:	10…30 VDC
Rated operating current:	4 A
Special feature:	with LED

Connector plug M 8

RKM 4-07/5m	**(Lumberg)**
Number of poles:	4
Enclosure protection class:	IP 65
Rated operating voltage:	60 VAC / 75 VDC
Rated operating current:	3 A

Filter VS 30

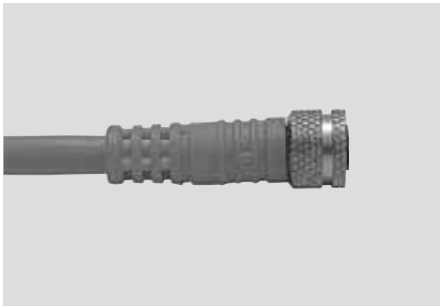


- **For IFO**
- Filter disc of plastic for climiniation of dead zone and reduction of operating distance.
- DC; clear; Effective operating distance s_r: 150 mm (Poti = max.)
  Detection range with s_r: 0 … 150 mm
- Standard target: 100 x 100 mm
  90% reflectivity
  (all other data same as for standard unit)

Connector plug Ø 6.5

VLFS3-025-EB-M	**(Woodhead)**
Number of poles:	3
Enclosure protection class:	IP 65
Rated operating voltage:	250 V
Rated operating current:	4 A

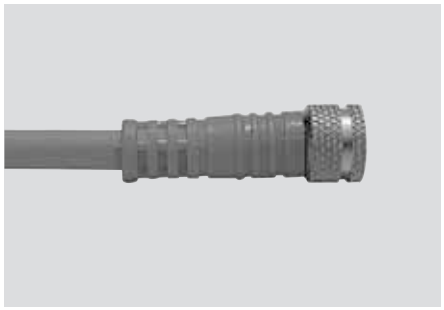
Connector plug M 8



RKMV 3-06/2m	**(Lumberg)**
Number of poles:	3
Enclosure protection class:	IP 67
Rated operating voltage:	60 VAC / 75 VDC
Rated operating current:	3 A

Accessories for proximity switches

Connector plug M 8



RKMV 4-225/2m **(Lumberg)**

Number of poles:	4
Enclosure protection class:	IP 67
Rated operating voltage:	60 VAC / 75 VDC
Rated operating current:	3 A

Connector plug M 12

Serie 713 Winkel (A coding) **(Binder)**

Number of poles:	4
Enclosure protection class:	IP 67
Rated operating voltage:	250 V
Rated operating current:	4 A
Special feature:	transparent

Connector plug M 12

Serie 763 shielded **(Binder)**

Number of poles:	4
Enclosure protection class:	IP 68
Rated operating voltage:	250 V
Rated operating current:	4 A

Connector plug M 12

Serie 713 gerade (A coding) **(Binder)**

Number of poles:	4
Enclosure protection class:	IP 67
Rated operating voltage:	250 V
Rated operating current:	4 A

Connector plug M 12

Serie 713 Winkel (B coding) **(Binder)**

Number of poles:	4
Enclosure protection class:	IP 67
Rated operating voltage:	250 V
Rated operating current:	4 A

Connector plug M 12

Serie 766 B 4x **(Binder)**

Number of poles:	4
Enclosure protection class:	IP 68
Rated operating voltage:	250 V
Rated operating current:	4 A

Connector plug M 12

Serie 715 gerade (B coding) **(Binder)**

Number of poles:	4
Enclosure protection class:	IP 67
Rated operating voltage:	125 V
Rated operating current:	4 A

Connector plug M 12

Serie 763 gerade **(Binder)**

Number of poles:	3
Enclosure protection class:	IP 68
Rated operating voltage:	250 V
Rated operating current:	4 A

Connector plug M 12

ELWIKA-KV 4312PS **(Hirschmann)**

Number of poles:	3
Enclosure protection class:	IP 68
Rated operating voltage:	10…30 VDC
Rated operating current:	4 A
Special feature:	with LED

Accessories for proximity switches

Connector plug M 12

ELWIKA 412 PSU	**(Hirschmann)**
Number of poles:	3
Enclosure protection class:	
Rated operating voltage:	10…24 V
Rated operating current:	4 A
Special feature:	with LED

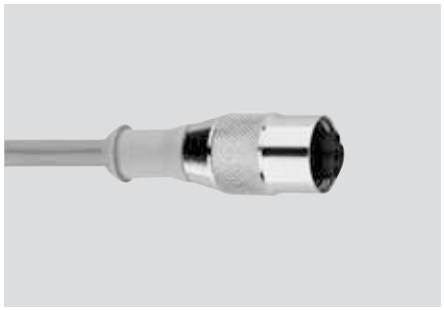
Connector plug M 12

RKWT/LED A 4-3-06/2m PVC	**(Lumberg)**
Number of poles:	3
Enclosure protection class:	IP 68
Rated operating voltage:	10…30 VDC
Rated operating current:	4 A

Connector plug M 18

Serie 714 Winkel	**(Binder)**
Number of poles:	4
Enclosure protection class:	IP 67
Rated operating voltage:	250 V
Rated operating current:	16 A

Connector plug M 12

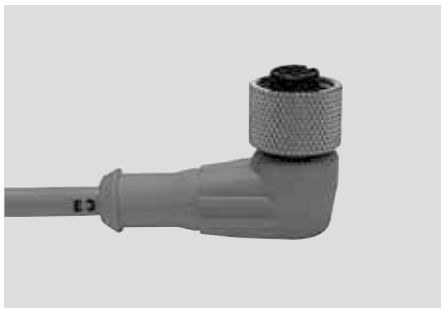


RKT 4-3-06/2m	**(Lumberg)**
Number of poles:	3
Enclosure protection class:	IP 68
Rated operating voltage:	250 VAC / 300 VDC
Rated operating current:	4 A

Connector plug M 12

RKWT/LED A 4-3-224/2m PUR	**(Lumberg)**
Number of poles:	3
Enclosure protection class:	IP 68
Rated operating voltage:	10…30 VDC
Rated operating current:	4 A

Connector plug M 12



RKWT 4-3-06/2m	**(Lumberg)**
Number of poles:	3
Enclosure protection class:	IP 68
Rated operating voltage:	250 VAC / 300 VDC
Rated operating current:	4 A

Connector plug M 18

Serie 714 gerade	**(Binder)**
Number of poles:	4
Enclosure protection class:	IP 67
Rated operating voltage:	250 V
Rated operating current:	16 A

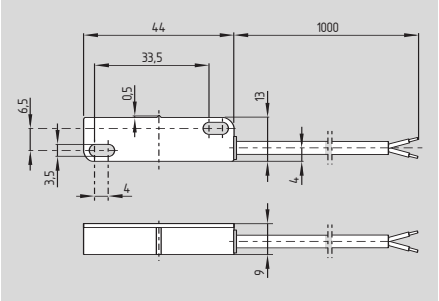
Selection table: Magnetic reed switches

Actuating distances

Actuating magnets	BN 80-10z	BN 80-01z	BN 80-rz	BN 85-r	BN 310-10z BN 310-01z	BN 310-rz	BN 32-10 BN 32-01 BN 32-11
Page 2-84	Page 2-72	Page 2-72	Page 2-72	Page 2-73	Page 2-76	Page 2-76	Page 2-77
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		5
BP 10 N						15	
BP 10 S			10-30	5-20		15	
2 x BP 10	12-20	2-13	2-13		17		12
2 x BP 10 N						20	
2 x BP 10 S			12-36	6-27		20	
BP 15	8-14	2-10			6		6
BP 15 N						17	
BP 15 S			12-30	5-22		17	
2 x BP 15	12-22	2-15			17		12
2 x BP 15S			13-38	7-28			
2 x BP 15/2					17		12
2 x BP 15/2 N						22	
2 x BP 15/2 S						22	
BP 34					5-20		15
BP 34 N						15-30	
BP 34 S			20-50	10-40		15-30	
2 x BP 34	12-26	5-18					
2 x BP 34 S			22-60				
BP 20	12-24	0-14			20		15
BP 20 N						3-25	
BP 20 S			10-38	3-28		3-25	
BP 31	12-24	0-14			20		15
BP 31 N						3-25	
BP 31 S			12-40	4-30		3-25	
BP 11	22-28	2-16			8-20		5-15
BP 11 N						15	
BP 11 S			10-30	4-23		15	
2 x BP 11 N						3-25	
2 x BP 11 S						3-25	
BP 12	24-32	4-20			10-30		10-25
BP 12 N						20	
BP 12 S			10-34	5-27		20	
2 x BP 12 N						10-30	
2 x BP 12 S						10-30	
BP 21					25-50		20-40
BP 21 N						15-45	
BP 21 S						15-45	
2 x BP 21 N						20-60	
2 x BP 21 S						20-60	
BP 22 S							
BP 22 N+BP 22 S							
2 x BP 22 S							
BE 20					20		15
BE 20 N						20	
BE 20 S						20	

BN 32-r BN 32-11r	BN 325-r	BN 65-10z BN 65-10z/1 BN 65-01z	BN 65-rz	BN 65-10z/V BN 65-01z/V BN 65-11z/V BN 65-11z/1V	BN 65-rz/V BN 65-11rz/V	BN 20-10z BN 20-20z BN 20-01z BN 20-02z BN 20-11z	BN 20-rz BN 20-2rz BN 20-11rz
Page 2-77	Page 2-78	Page 2-80	Page 2-80	Page 2-81	Page 2-81	Page 2-82	Page 2-82
		5					
10	10		15				5
10	10		15	5			5
		17			3	12	
15	15		20				10
15	15		20	10			10
		6					
12	12		17				7
12	12		17	6			7
		17					
		17				12	
17	17		22				15
17	17		22				15
		15-20			15		
10-25	10-25		15-30				10-25
10-25	10-25		15-30	20			10-25
		20			10	15	
5-20	5-20		25				15
5-20	5-20		25	15			15
		20			10	15	
5-20	5-20		25				15
5-20	5-20		25	15			15
		20			15	15	
10	10		15				5
10	10		15	5			5
20	20		25				15
20	20		25	15			15
		10-30			20	25	
15	15		20				10
15	15		20	10			10
10-25	10-25		10-30				5-2
10-25	10-25		10-30	25			5-20
		25-50			45		
15-40	15-40		15-45			20-45	10-35
15-40	15-40		15-45	30			10-35
20-55	20-55		20-60				15-50
20-55	20-55		20-60	20-55			15-50
				25			
					35		
				15-55			
	20				10	15	
15	15		20				10
15	15		20	6			10

BN 80



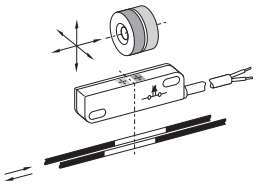
- Thermoplastic enclosure
- Flat design
- Long life
- Non-contacting principle
- 1 Reed contact
- Actuating distance up to 60 mm depending on actuating magnet and version
- Actuating surface marked by protrusion
- Pre-wired cable available, cable length 1 m
- Protection class IP 67

Technical data

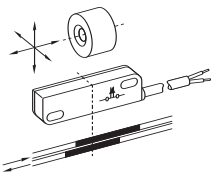
Standards:	IEC/EN 60947-5-1
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 67 to EN 60529
Termination:	cable LiYY 2 x 0.25 mm², length 1 m
Mode of operation:	magnetic
Switching voltage:	max. 250 VAC
Switching current:	max. 0.5 A
Switching capacity:	max. 10 VA, 8 W
Dielectric strength:	> 450 VAC (50 Hz)
Switching time “Close”:	max. 2 ms
Switching time “Open”:	max. 0.07 ms
Bounce duration:	max. 0.5 ms
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	1 billion operations
Electrical life:	5 million operations, depending on load
Resistance to shock:	15 g on sine wave oscillation
Resistance to vibration:	15 g on sine wave oscillation

Contact variants

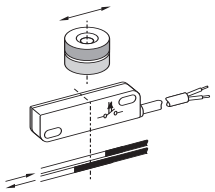
1 NC contact BN 80-01z with N-S actuating magnet



1 NO contact BN 80-10z with N-S actuating magnet



1 bistable contact BN 80-rz with S actuating magnet



Approvals

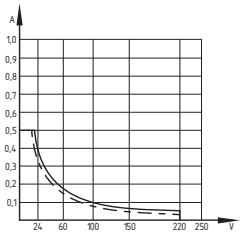
CE

Ordering details

BN 80-①z

No.	Replace	Description
①	01	1 NC contact
	10	1 NO contact
	r	1 bistable contact

Note



Switching capacity:

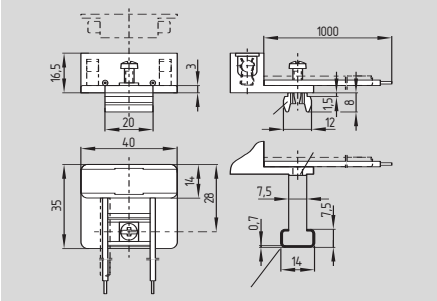
Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

BN 85



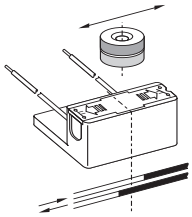
- Thermoplastic enclosure
- Long life
- Non-contacting principle
- Mounting with clamping feet and screw clamp
- Reed-contact to clip-in, on-location assembly
- Adjustment by loosening the central mounting screw
- Actuating distance up to 40 mm depending on actuating magnet and version
- Two individual wires LiYY 0.75 mm^2
- Protection class IP 40

Technical data

Standards:	IEC/EN 60947-5-1
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 40 to EN 60529
Termination:	2 individual wires LiY 0.75 mm^2, length 1 m
Mode of operation:	magnetic
Switching voltage:	max. 60 VAC/DC
Switching current:	max. 1 A
Switching capacity:	max. 30 VA/W
Dielectric strength:	400 VDC
Switching time “Close”:	max. 2 ms
Switching time “Open”:	max. 0.07 ms
Bounce duration:	max. 0.2 ms
Ambient temperature:	0 °C ... + 75 °C
Mechanical life:	1 billion operations
Electrical life:	500 million operations, depending on load
Resistance to shock:	60 g on sine wave oscillation
Resistance to vibration:	60 g on sine wave oscillation

Contact variants

1 bistable contact BN 85-rz with S actuating magnet



Approvals

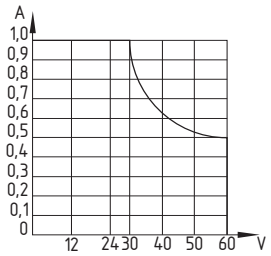
CE

Ordering details

BN 85-①-②

No.	Replace	Description
①	r	1 bistable contact
②		Mounting with clamping brackets + 2 single wires
	1831-1	Mounting on C DIN rail and 2 single wires without screws
	1831-2	like above with screws
	1824-1	Mounting on C DIN rail and sheathed cable without screws
	1824-2	like above with screws
	1824-3	Mounting with clamping brackets and sheathed cable

Note



Switching capacity:

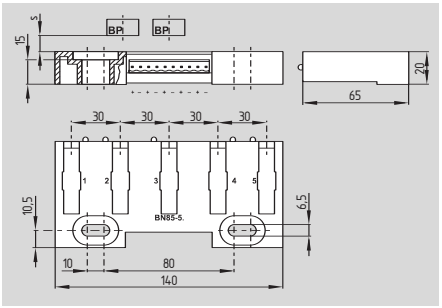
Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

BN 85-5



- Thermoplastic enclosure
- Long life
- Non-contacting principle
- For triggering of relays
- 5 reed-contacts to clip-on
- Reciprocal switch function through rotating the individual switching elements by 180°
- LEDs to indicate the switching condition
- Unused plugs can be filled with blank elements
- With 10-pole plug-in connection
- Protection class IP 30

Technical data

Standards:	IEC/EN 60947-5-1
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 30 to EN 60529
Termination:	connector, 10-pole
Mode of operation:	magnetic
Switching conditions indicator:	LED
Actuating magnet:	BP 7
Switching voltage:	12 … 60 VDC
Switching current:	max. 1 A
Switching capacity:	max. 30 W
Dielectric strength:	400 VDC
Switching time “Close”:	max. 2 ms
Switching time “Open”:	max. 0.07 ms
Ambient temperature:	– 10 °C … + 75 °C
Mechanical life:	1 billion operations
Electrical life:	500 million operations, depending on load
Resistance to shock:	60 g on sine wave oscillation
Resistance to vibration:	60 g on sine wave oscillation

Actuating distances:

With mounting on ferromagnetic material:

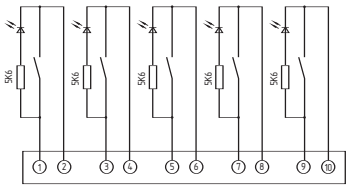
average max. actuating distance s:	14 mm
max. actuating distance under unfavourable conditions s_{max}:	11 mm
min. actuating distance s_{min}:	1 mm
effective actuating distance s_{nenn}:	6 mm

With mounting on non-ferrous material (e.g. plastic rail):

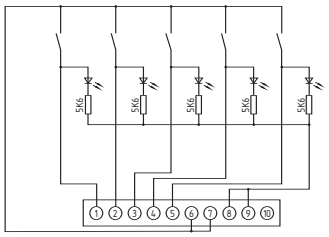
actuating distance s:	0 … 9 mm
effective actuating distance s_{nenn}:	5 mm

Contact variants

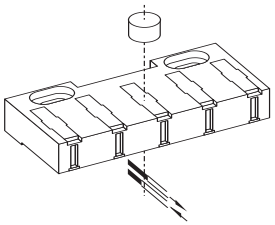
BN 85-5



BN 85-5-2031



1 bistable contact



Approvals

CE

Ordering details

BN 85-5-①

No.	Replace	Description
①		1 bistable contact activation of relays
	2031	1 bistable contact for connection to control units
		Suitable switch insert BN 85-re must be ordered separately !

Note

Included in delivery:

- 2 blank inserts
- Unit without switch inserts

The LED is illuminated when the switch is open. The LED is illuminated when the switch is closed. (ordering suffix -2031)

Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

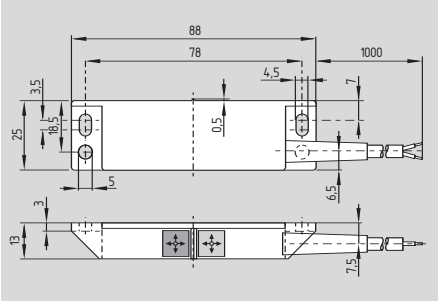
The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-84.

Download now

Data sheets, mounting and wiring instructions, declarations of conformity and other information at:
www.schmersal.com

BN 310



- Thermoplastic enclosure
- Flat design
- Long life
- Non-contacting principle
- 1 Reed contact
- Actuating distance up to 60 mm depending on actuating magnet and version
- Actuating surface and direction of actuation marked by switch symbol
- Pre-wired cable available, cable length 1 m
- Protection class IP 67

Approvals

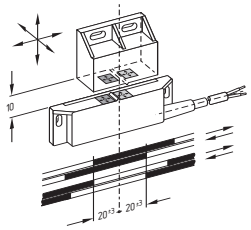
CE

Technical data

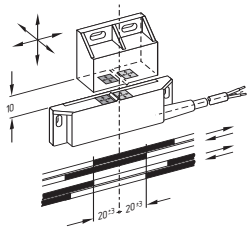
Standards:	IEC/EN 60947-5-1
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 67 to EN 60529
Termination:	cable H03VV-F 2 x 0.75 mm², length 1 m
Mode of operation:	magnetic
Switching voltage:	max. 250 VAC
Switching current:	max. 3 A
Switching capacity:	max. 120 VA/W
Dielectric strength:	> 600 VAC (50 Hz)
Switching speed:	max. 18 m/s
Switching frequency:	max. 300/s for BN 310-01z, -10z
Switching time “Close”:	0.3 ms - 1.5 ms
Switching time “Open”:	max. 0.5 ms
Bounce duration:	0.3 ... 0.6 ms
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	1 billion operations
Electrical life:	1 million - 1 billion operations, depending on load
Resistance to shock:	30 g / 11 ms
Resistance to vibration:	30 g / 11 ms
Resistance to vibration:	10 … 55 Hz, amplitude 1 mm
Switching point accuracy:	± 0.25 mm, T = constant

Contact variants

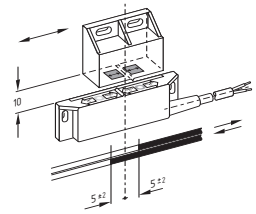
1 NC contact BN 310-01z with N-S actuating magnet



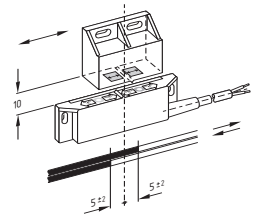
1 NO contact BN 310-10z with N-S actuating magnet



1 bistable contact BN 310-rz with N actuating magnet



1 bistable contact BN 310-rz with S actuating magnet

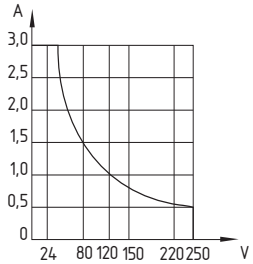


Ordering details

BN 310-①z

No.	Replace	Description
①	01	1 NC contact
	10	1 NO contact
	r	1 bistable contact

Note



Switching capacity:

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

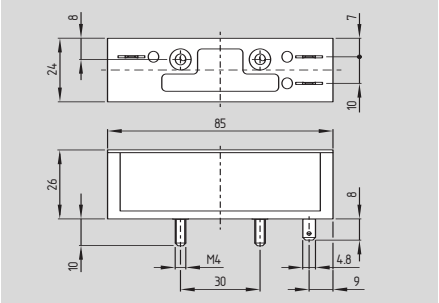
Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

When the switches and actuators come together, the colours must coincide:
Red (S) to red (S) and green (N) to green (N).
This does not apply to the bistable contact.

The switch is to be mounted on iron with a non-magnetic layer of at least 20 mm.

BN 32



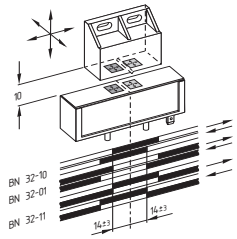
- Thermoplastic enclosure
- Long life
- Non-contacting principle
- 1 Reed contact
- Actuating distance up to 55 mm depending on actuating magnet and version
- Actuating surface and direction of actuation marked by switch symbol
- Mounting with two threaded bolts
- Spade connector 4.8 mm
- Protection class IP 67

Technical data

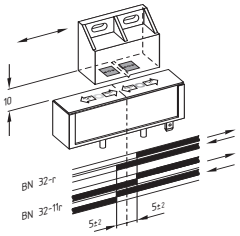
Standards:	IEC/EN 60947-5-1
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 00 ... IP 67 to EN 60529
Termination:	spade connector 4.8 mm spade connector 6.3 mm (ordering suffix -1389)
Mode of operation:	magnetic
Switching voltage:	max. 250 VAC BN 32-11, -11r: max. 220 VAC, 150 VDC
Switching current:	max. 3 A BN 32-11, -11r: max. 1 A
Switching capacity:	max. 120 VA/W BN 32-11, -11r: max. 60 VA/W
Dielectric strength:	> 600 VAC (50 Hz) BN 32-11, -11r: > 350 VAC (50 Hz)
Switching speed:	max. 18 m/s
Switching frequency:	max. 300/s BN 32-11, -11r: max. 200/s
Switching time “Close”:	0.3 ms - 1.5 ms
Switching time “Open”:	max. 0.5 ms
Bounce duration:	0.3 ... 0.6 ms
Ambient temperature:	– 25 °C … + 90 °C
Mechanical life:	1 billion operations
Electrical life:	1 million - 1 billion operations, depending on load
Resistance to shock:	–
Resistance to vibration:	15 g on sine wave oscillation
Resistance to vibration:	–
Switching point accuracy:	± 0.25 mm, T = constant

Contact variants

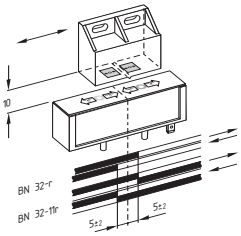
1 NO contact BN 32-10
1 NC contact BN 32-01
1 change-over contact BN 32-11
with N-S actuating magnet



1 bistable contact BN 32-r
1 bistable change-over contact BN 32-11r
with N actuating magnet



1 bistable contact BN 32-r
1 bistable change-over contact BN 32-11r
with S actuating magnet



Approvals

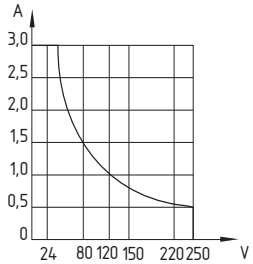
CE

Ordering details

BN 32-①

No.	Replace	Description
①	01	1 NC contact
	10	1 NO contact
	11	1 change-over contact
	r	1 bistable contact
	11r	1 bistable change-over contact

Note

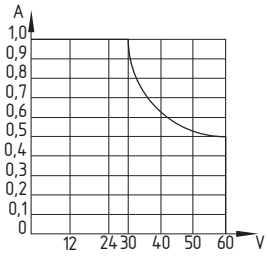


Switching capacity:
NC, NO, bistable contact

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

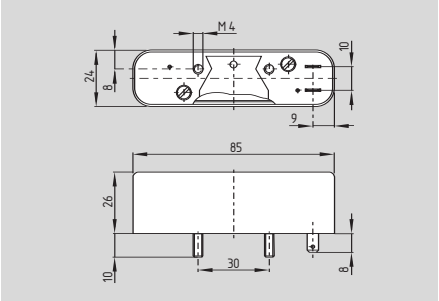
Note



Switching capacity:
change-over, bistable change-over contact

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

BN 325



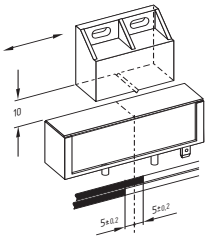
- Thermoplastic enclosure
- Long life
- Non-contacting principle
- 1 Reed contact
- Actuating surface and direction of actuation marked by switch symbol
- Mounting with two threaded bolts
- Spade connector 4.8 mm
- Protection class IP 40

Technical data

Standards:	IEC/EN 60947-5-1
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 00 IP 40 with insulated plug IP 67 with cable output and additional shielding plate (ordering suffix -1279 and -1297-2) to EN 60529
Termination:	spade connector 4.8 mm (ordering suffix -1239) spade connector 6.3 mm (ordering suffix -1389) cable output (ordering suffix -1279 and -1279-2)
Mode of operation:	magnetic
Switching voltage:	max. 250 VAC
Switching current:	max. 3 A
Switching capacity:	max. 120 VA
Dielectric strength:	> 600 VAC (50 Hz)
Switching speed:	max. 18 m/s
Switching frequency:	max. 300/s
Switching time “Close”:	max. 1.5 ms
Switching time “Open”:	max. 0.5 ms
Bounce duration:	0.3 ... 0.6 ms
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	1 billion operations
Electrical life:	1 million - 1 billion operations, depending on load
Resistance to shock:	50 g / 11 ms
Resistance to vibration:	30 g on sine wave oscillation
Resistance to vibration:	10 … 55 Hz, amplitude 1 mm
Switching point accuracy:	± 0.25 mm, T = constant

Contact variants

1 bistable contact BN 325-r with N actuating magnet



Approvals

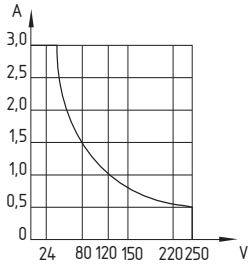
CE

Ordering details

BN 325-r-①

No.	Replace	Description
①		Spade terminal 4.8 mm and 1 shielding plate
	1239	Spade terminal 4.8 mm and 2 shielding plates
	1389	Spade terminal 6.3 mm and 2 shielding plates
	1279	Cable output left and 2 shielding plates
	1279-2	Cable output right and 2 shielding plates

Note



Switching capacity:

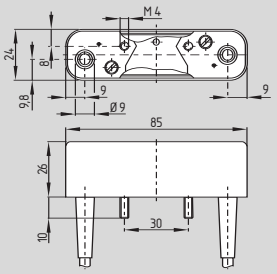
Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

BN 325 special versions



- additional shielding plate and cable output left or right (ordering suffix -1279 and -1279-2)

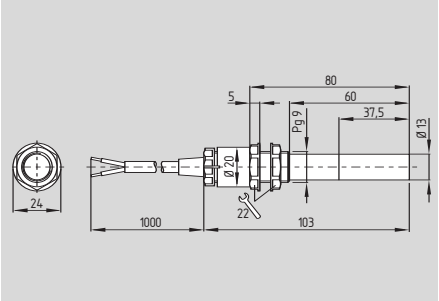
Approvals

CE

Ordering details

see left

BN 65



- **Actuation from side**
- Thermoplastic enclosure
- Central mounting
- Long life
- Non-contacting principle
- Pre-wired cable available, cable length 1 m
- Protection class IP 67

When the switches and actuators come together, the colours must coincide:
Red (S) to red (S) and green (N) to green (N).

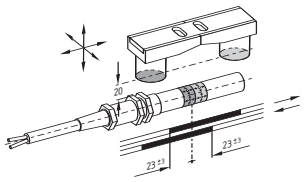
This does not apply to the bistable contact.

Technical data

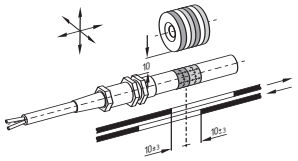
Standards:	IEC/EN 60947-5-1
Design:	cylindrical
Enclosure:	glass-fibre reinforced thermoplastic tightening force on nut 22 mm A/F max. 300 Ncm
Protection class:	IP 67 to EN 60529
Termination:	cable H03VV-F 2 x 0.75 mm^2, length 1 m
Mode of operation:	magnetic
Switching voltage:	max. 250 VAC
Switching current:	max. 3 A
Switching capacity:	max. 120 VA/W
Dielectric strength:	> 600 VAC (50 Hz)
Switching speed:	max. 18 m/s
Switching frequency:	max. 300/s
Switching time “Close”:	0.3 ms - 1.5 ms
Switching time “Open”:	max. 0.5 ms
Bounce duration:	0.3 ... 0.6 ms max. 3 ms
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	1 billion operations
Electrical life:	1 million - 1 billion operations, depending on load
Resistance to shock:	30 g on sine wave oscillation
Resistance to vibration:	30 g on sine wave oscillation
Resistance to vibration:	10 … 55 Hz, amplitude 1 mm
Switching point accuracy:	± 0.25 mm, T = constant

Contact variants

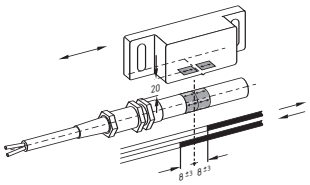
1 NO contact BN 65-10z with N-S actuating magnet



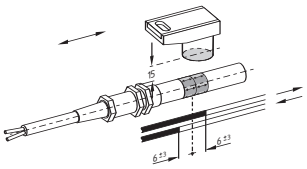
1 NC contact BN 65-01z with N-S actuating magnet



1 bistable contact BN 65-rz with N actuating magnet



1 bistable contact BN 65-rz with S actuating magnet



Approvals

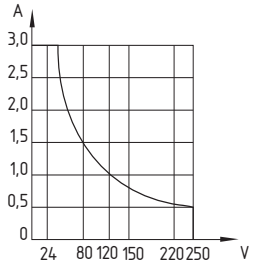
UL CE

Ordering details

BN 65-①z②

No.	Replace	Description
①	01	1 NC contact
	10	1 NO contact
	r	1 bistable contact
②		With bias magnet
	/1	Without bias magnet

Note



Switching capacity

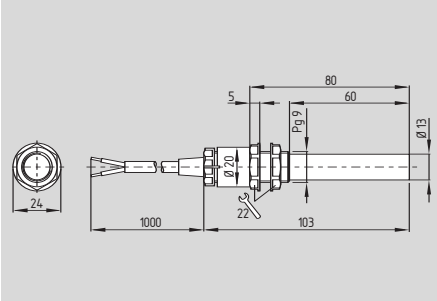
Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

BN 65/V



- **Actuation from front**
- Thermoplastic enclosure
- Central mounting
- Long life
- Non-contacting principle
- Pre-wired cable available, cable length 1 m
- Protection class IP 67

When the switches and actuators come together, the colours must coincide:
Red (S) to red (S) and green (N) to green (N).

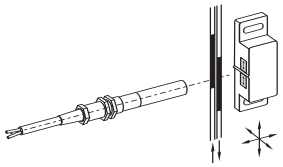
This does not apply to the bistable contact.

Technical data

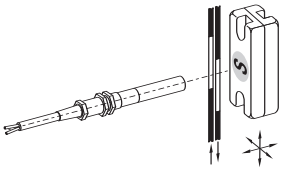
Standards:	IEC/EN 60947-5-1
Design:	cylindrical
Enclosure:	glass-fibre reinforced thermoplastic tightening force on nut 22 mm A/F max. 300 Ncm
Protection class:	IP 67 to EN 60529
Termination:	cable H03VV-F 2 x 0.75 mm^2, A03VV-F 3 x 0.75 mm^2, length 1 m
Mode of operation:	magnetic
Switching voltage:	max. 250 VAC BN 65-rz/V: max. 230 VAC/DC
Switching current:	max. 3 A BN 65-rz/V: max. 1 A
Switching capacity:	max. 120 VA/W BN 65-rz/V: max. 60 W
Dielectric strength:	> 600 VAC (50 Hz) BN 65-rz/V: > 350 VAC (50 Hz)
Switching speed:	max. 18 m/s
Switching frequency:	max. 300/s BN 65-rz/V: max. 200/s
Switching time “Close”:	0.3 ms - 1.5 ms
Switching time “Open”:	max. 0.5 ms
Bounce duration:	0.3 ... 0.6 ms max. 3 ms
Ambient temperature:	– 25 °C … + 75 °C
Mechanical life:	1 billion operations
Electrical life:	1 million - 1 billion operations, depending on load
Resistance to shock:	30 g on sine wave oscillation BN 65-rz/V: 15 g on sine wave oscillation
Resistance to vibration:	30 g on sine wave oscillation BN 65-rz/V: 15 g on sine wave oscillation
Resistance to vibration:	10 … 55 Hz, amplitude 1 mm
Switching point accuracy:	± 0.25 mm, T = constant

Contact variants

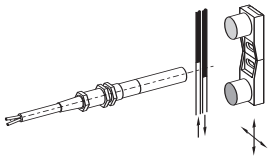
1 NO contact BN 65-10z/V with S actuating magnet



1 NC contact BN 65-01z/V with S actuating magnet



1 bistable contact BN 65-rz/V with N-S actuating magnet



Approvals

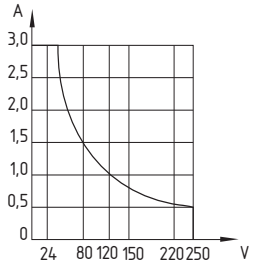
cULus CE

Ordering details

BN 65-①z/②V

No.	Replace	Description
①	01	1 NC contact
	10	1 NO contact
	r	1 bistable contact
②		With bias magnet
	/1	Without bias magnet

Note



Switching capacity

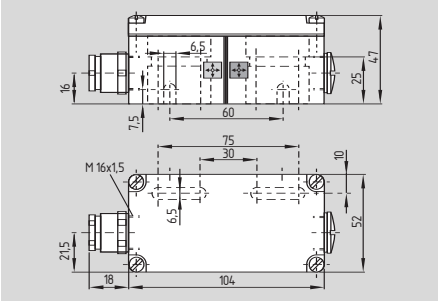
Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

BN 20



- Aluminium enlosure
- Long life
- Non-contacting principle
- 1 Reed contact
- Particularly resistant to vibration
- Available for actuation from front or side
- Actuating distance up to 50 mm depending on actuating magnet and version
- Screw terminal
- Protection class IP 67

When the switches and actuators come together, the colours must coincide:
Red (S) to red (S) and green (N) to green (N).

Approvals

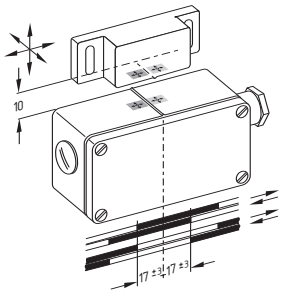
CE

Technical data

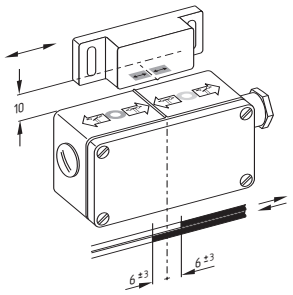
Standards:	IEC/EN 60947-5-1
Design:	rectangular
Enclosure:	Al Si12 die-casting, painted
Protection class:	IP 67 to EN 60529
Termination:	screw terminals
Mode of operation:	magnetic
Switching voltage:	max. 250 VAC
Switching current:	max. 3 A
Switching capacity:	max. 120 VA/W
Dielectric strength:	> 600 VAC (50 Hz)
Switching speed:	max. 18 m/s
Switching frequency:	max. 300/s
Switching time “Close”:	0.3 ms - 1.5 ms
Switching time “Open”:	max. 0.5 ms
Bounce duration:	0.3 ... 0.6 ms
Ambient temperature:	– 25 °C … + 90 °C
Mechanical life:	1 billion operations
Electrical life:	1 million - 1 billion operations, depending on load
Resistance to vibration:	50 g on sine wave oscillation
Switching point accuracy:	± 0.25 mm, T = constant

Contact variants

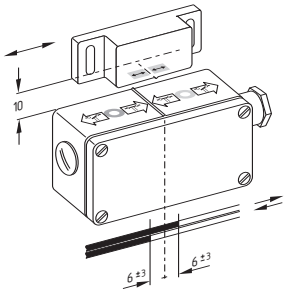
1 NO contact BN 20-10z
1 NC contact BN 20-01z
with N-S actuating magnet



1 bistable contact BN 20-rz
with N actuating magnet



1 bistable contact BN 20-rz
with S actuating magnet

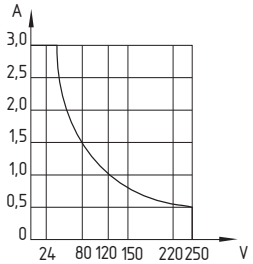


Ordering details

BN 20-①z

No.	Replace	Description
①	01	1 NC contact
	02	2 NC contacts
	10	1 NO contact
	20	2 NO contacts
	11	1 change-over contact
	r	1 bistable contact
	2r	2 bistable contacts
	11r	1 bistable change-over contact

Note



Switching capacity:

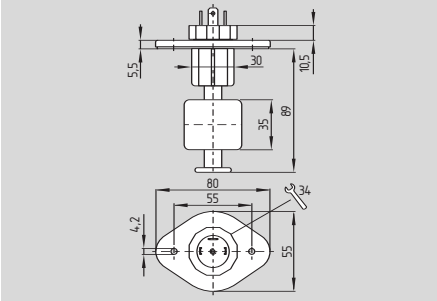
Note

The opening and closing functions depend on the direction of actuation, the actuating magnets and the polarity of the actuating magnets.

The actuating magnets are not included in delivery.

To choose the appropriate actuating magnets, please use the tables on page 2-70.

BN 75



- Float switch
- Thermoplastic enclosure
- Long life
- Non-contacting principle
- 1 Reed contact
- Available with plug-in connetor or pre-wired cable
- Protection class IP 68

Depending on how the floater is assembled, either a NO contact or a NC contact is possible.

The switching function is reversed accordingly, if the floater in a change-over contact element is turned upside-down.

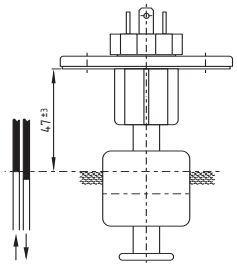
The operating points listed, apply for water.

Technical data

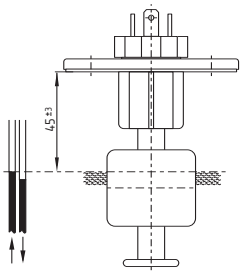
Standards:	IEC/EN 60947-5-1
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 68 plug connection IP 65 IP 67 cable connection (ordering suffix -1391) to EN 60529
Termination:	plug-in connetor or pre-wired cable
Mode of operation:	magnetic
Switching voltage:	max. 220 VAC
Switching current:	max. 1 A
Switching capacity:	max. 60 VA/W
Hysteresis:	ca. 3 mm
Dielectric strength:	> 600 VAC (50 Hz) BN 75-11y: > 350 VAC (50 Hz)
Bounce duration:	0.3 ... 0.6 ms BN 75-11y: max. 0.2/0.5 ms
Ambient temperature:	– 25 °C ... + 80 °C
Mechanical life:	1 billion operations
Electrical life:	1 million - 1 billion operations, depending on load

Contact variants

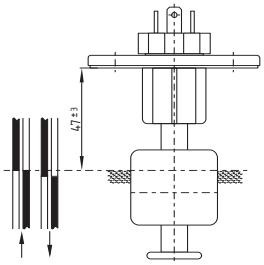
1 NO contact BN 75-10y



1 NC contact BN 75-01y



1 change-over contact BN 75-11y



Approvals

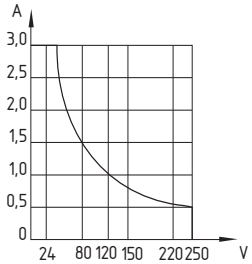
CE

Ordering details

BN 75-①y-②

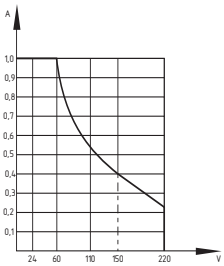
No.	Replace	Description
①	01	1 NC contact
	10	1 NO contact
	11	1 change-over contact
②		Plug-in connector to DIN 43650
	1391	Pre-wired cable

Note



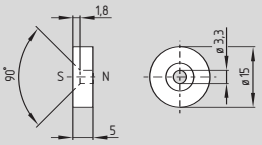
Switching capacity:
NC, NO, bistable contact

Note

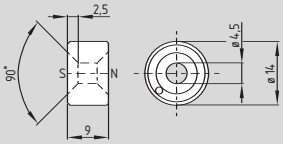


Switching capacity:
change-over, bistable change-over contact

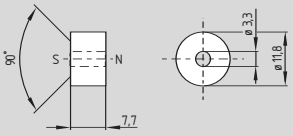
System components



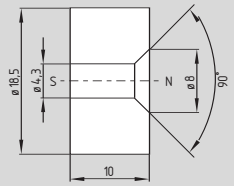
BP 6



BP 7

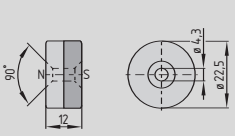


BP 8

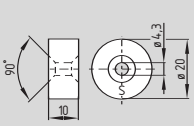


BP 10

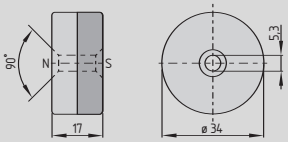
System components



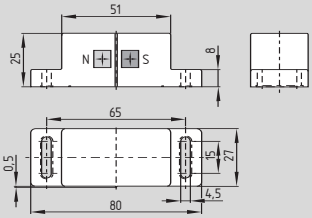
BP 15



BP 15/2

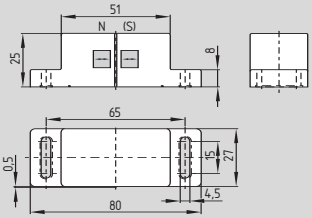


BP 34

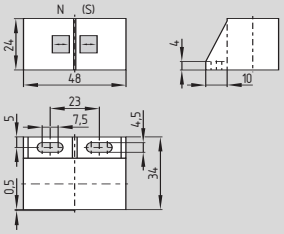


BP 20

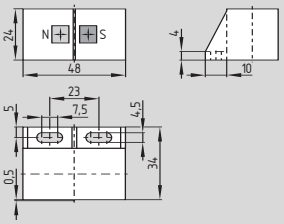
System components



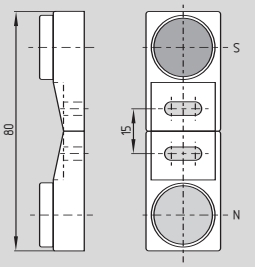
BP 20 N / BP 20 S



BP 31



BP 31 N / BP 31 S



BP 11

Ordering details

Actuating magnet

Unenclosed, N-S	**BP 6**
Unenclosed, N-S	**BP 7**
Unenclosed, N-S	**BP 8**
Unenclosed, N-S	**BP 10**

Ordering details

Actuating magnet

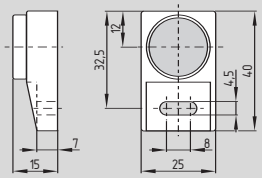
thermoplastic enclosure, N-S	**BP 15**
Unenclosed, N-S	**BP 15/2**
thermoplastic enclosure, N-S	**BP 34**
metal enclosure, N-S	**BP 20**

Ordering details

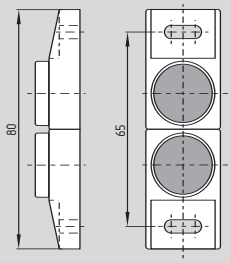
Actuating magnet

metal enclosure Al, N	**BP 20 N**
metal enclosure Al, S	**BP 20 S**
thermoplastic enclosure, N-S	**BP 31**
thermoplastic enclosure, N	**BP 31 N**
thermoplastic enclosure, S	**BP 31 S**
metal enclosure Al, N-S	**BP 11**

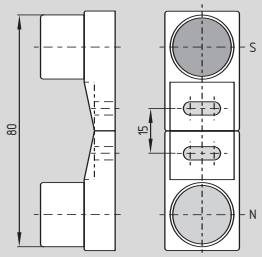
System components



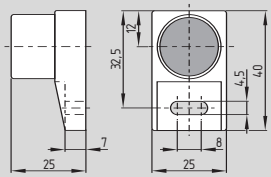
BP 11 N / BP 11 S



2x BP 11 N / 2x BP 11 S

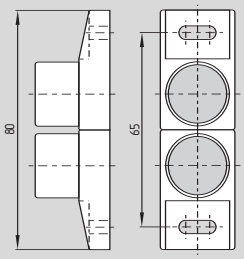


BP 12

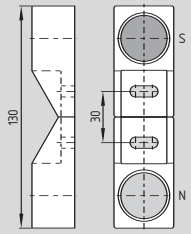


BP 12 N / BP 12 S

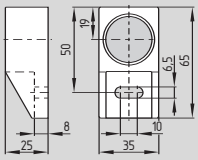
System components



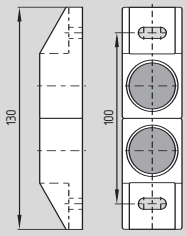
2x BP 12 N / 2x BP 12 S



BP 21

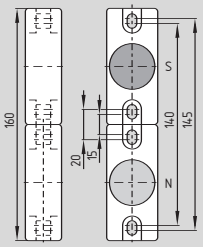


BP 21 N / BP 21 S

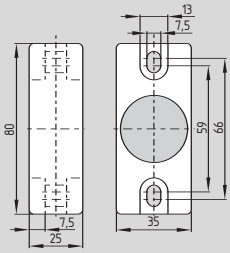


2x BP 21 N / 2x BP 21 S

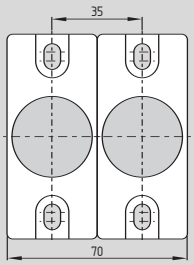
System components



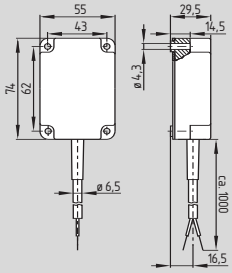
BP 22



BP 22 N / BP 22 S



2x BP 22 N / 2x BP 22 S



BE 20

Ordering details

Actuating magnet

metal enclosure Al, N	**BP 11 N**
metal enclosure Al, S	**BP 11 S**
metal enclosure Al, 2x N	**2x BP 11 N**
metal enclosure Al, 2x S	**2x BP 11 S**
metal enclosure Al, N-S	**BP 12**
metal enclosure Al, N	**BP 12 N**
metal enclosure Al, S	**BP 12 S**

Ordering details

Actuating magnet

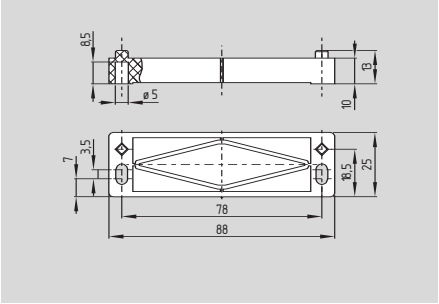
metal enclosure Al, 2x N	**2x BP 12 N**
metal enclosure Al, 2x S	**2x BP 12 S**
metal enclosure Al, N-S	**BP 21**
metal enclosure Al, N	**BP 21 N**
metal enclosure Al, S	**BP 21 S**
metal enclosure Al, 2x N	**2x BP 21 N**
metal enclosure Al, 2x S	**2x BP 21 S**

Ordering details

Actuating magnet

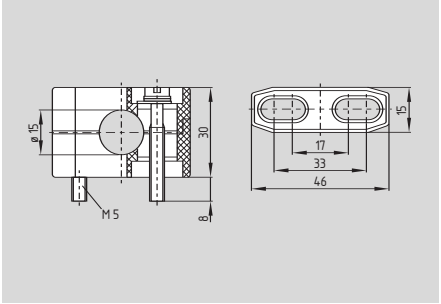
metal enclosure Zn, N-S	**BP 22**
metal enclosure Zn, N	**BP 22 N**
metal enclosure Zn, S	**BP 22 S**
metal enclosure Zn, 2x N	**2x BP 22 N**
metal enclosure Zn, 2x S	**2x BP 22 S**
Electromagnet, thermo-plastic enclosure	**BE 20**

Spacer BN 31/33



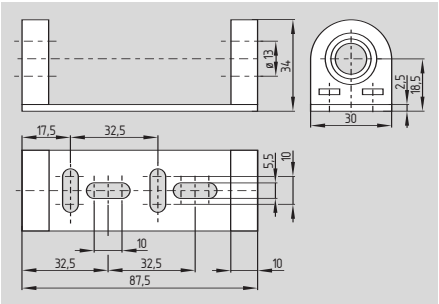
- To mount the magnetic safety sensor and actuator on ferromagnetic material

Terminal mounting H 15



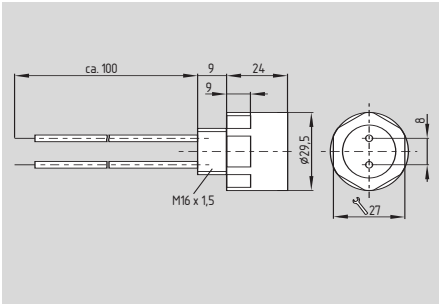
- For BN 65
- Material: thermoplastic

Holder H1/1



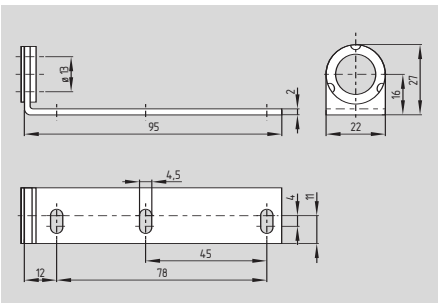
- For BN 65
- Metal holder with 2 elastic bearings
- Provides high resistance to vibration

Compensating coil KS 1



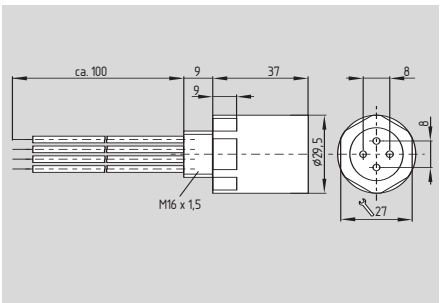
- Temperature range – 25 °C … + 90 ºC
- For cable lengths up to 100 m
- Cable H05V-K 1 mm^2, cable length 100 mm
- The bucking coil is to be wired in series with the reed contact
- Version for high temperature – 25 °C … + 150 ºC, ordering suffix -T

Holder H2



- For BN 65
- Metal holder with rubber washer

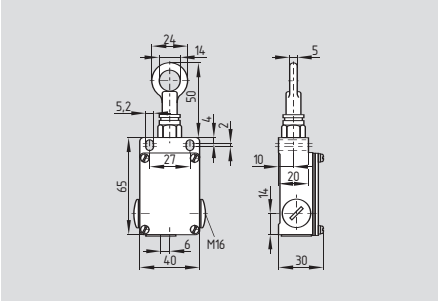
Compensating coil KS 2



- Temperature range – 25 °C … + 90 ºC
- For cable lengths up to 200 m or 2 x 100 m
- Cable H05V-K 1 mm^2, cable length 100 mm
- The bucking coil is to be wired in series with the reed contact

For the man-machine interface, Schmersal offers command devices, such as foot switches and pull-wire switches as well as signalling devices.

ES/EM 41 Z



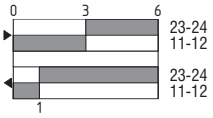
- Metal enclosure
- Slow action: 2 contacts
- Snap action: 2 contacts
- 3 cable entries M16 x 1.5
- Available with external watertight collar
- Protection class IP 65
- Plastic cover available
- Available in various spring pressure (actuating force) variants
- Execution with mounting angle for ceiling fitting available

Technical data

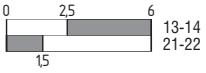
Standards:	IEC/EN 60947-5-1
Enclosure:	light-alloy diecast, paint finish
Cover:	steel, painted
Protection class:	IP 65 to EN 60529
Contact material:	silver
Contact type:	change-over contact, double break with 2 separate contact bridges, positive break NC contacts ⊖
Switching system:	slow or snap action
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	3 x M16 x 1.5
U_{imp}:	4 kV
U_i:	400 V
I_{the}:	10 A
I_e/U_e:	6 A / 400 V
Utilisation category:	AC-15
Max. fuse rating:	6 A gL/gG D-fuse
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	3600/h

Contact variants

Snap action
1 NO / 1 NC



Slow action
1 NO / 1 NC



2 NO

Approvals

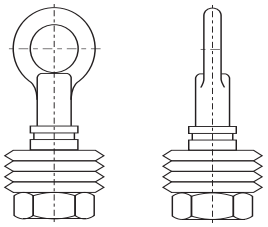
CE

Ordering details

E① 41 ②Z ③

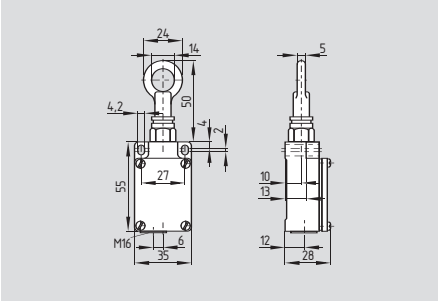
No.	Replace	Description
①	M	Snap action
	S	Slow action
②		Without watertight collar
	W	With watertight collar
③	1Ö/1S	1 NO/1 NC
	2S	2 NO (only for slow action)

Note



Collar to protect against the entry of foreign bodies

ES 51 Z



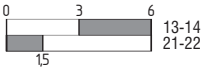
- Metal enclosure
- Slow action: 2 contacts
- Small body
- 1 cable entry M16 x 1.5
- Available with external watertight collar
- Available in various spring pressure (actuating force) variants

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	light-alloy diecast, paint finish
Cover:	steel, painted
Protection class:	IP 65 to EN 60529
Contact material:	silver
Contact type:	change-over contact, double break with 2 separate contact bridges, positive break NC contacts ⊖
Switching system:	slow action with self-cleaning contacts
Termination:	screw terminals M 3
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	1 x M16 x 1.5
U_i:	400 V
I_{the}:	10 A
I_e/U_e:	4 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	4 A gL/gG D-fuse
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	3600/h

Contact variants

Slow action
1 NO / 1 NC



Approvals

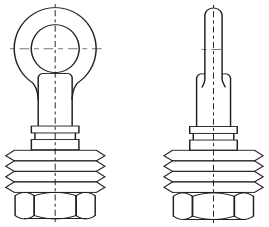
CE

Ordering details

ES 51 ①Z

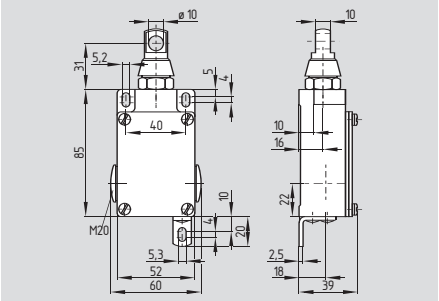
No.	Replace	Description
①		Without watertight collar
	W	With watertight collar

Note



Collar to protect against the entry of foreign bodies

ES/EM 61 Z



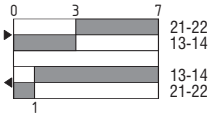
- Metal enclosure
- Slow action: 2 contacts
- Snap action: 2 contacts
- 3 cable entries M16 x 1.5
- Available with external watertight collar
- Protection class IP 65
- Available in various spring pressure (actuating force) variants
- Execution with mounting angle for ceiling fitting available
- EEx version available

Technical data

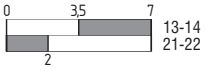
Standards:	IEC/EN 60947-5-1
Enclosure:	light-alloy diecast, paint finish
Cover:	steel, painted
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow or snap action
Contact type:	change-over contact, double break with 2 separate contact bridges, positive break NC contacts ⊖
Termination:	screw terminals M 3.5
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	3 x M16 x 1.5
U_{imp}:	6 kV
U_i:	400 V
I_{the}:	10 A
Utilisation category:	AC-15
I_e/U_e:	ES 61 Z: 16 A / 400 V EM 61 Z: 6 A / 400 V
Max. fuse rating:	ES 61 Z: 16 A gL/gG D-fuse EM 61 Z: 6 A gL/gG D-fuse
Ambient temperature:	– 20 °C … + 80 °C
Mechanical life:	> 1 million operations
Switching frequency:	3600/h

Contact variants

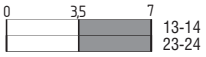
Snap action
1 NO / 1 NC



Slow action
1 NO / 1 NC



2 NO



Approvals

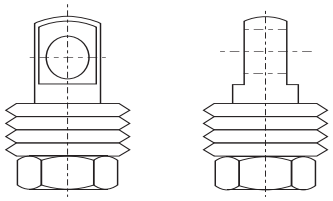
CE

Ordering details

E① 61 ②Z ③

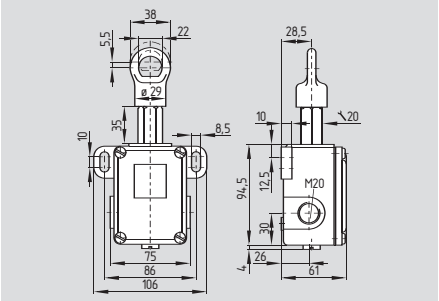
No.	Replace	Description
①	M	Snap action
	S	Slow action
②		Without watertight collar
	W	With watertight collar
③	1Ö/1S	1 NO/1 NC
	2S	2 NO (only for slow action)

Note



Collar to protect against the entry of foreign bodies

TQ 441



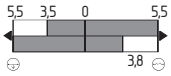
- Metal enclosure
- 2 contacts
- 2 cable entries
- Wire up to 25 m long
- Reset by push button or key possible
- Available for various actuating forces

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	light-alloy diecast, paint finish
Cover:	steel, painted
Protection class:	IP 65 key reset: IP 54 to EN 60529
Contact material:	silver
Contact type:	change-over contact, double break with 2 separate contact bridges, positive break NC contacts ⊖
Switching system:	slow action, positive break NC contacts ⊖
Termination:	screw terminal
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	4 kV
U_i:	400 V
I_{the}:	10 A
I_e/U_e:	4 A / 380 V
Utilisation category:	AC-15
Max. fuse rating:	25 A gL/gG D-fuse
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	30000 operations
Switching frequency:	3600/h

Contact variants

Slow action
1 NO / 1 NC



Approvals

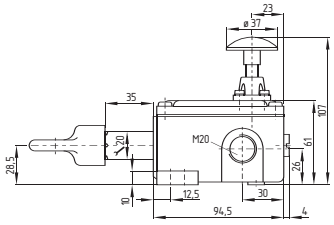
CE

Ordering details

TQ 441-01/01 ①

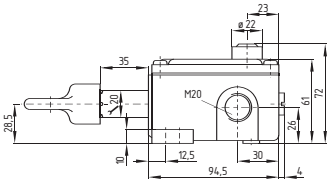
No.	Replace	Description
①	yü	Without latching, protection class IP 65
	yür	Push button reset, protection class IP 65
	xürs	Key reset, protection class IP 54

Note



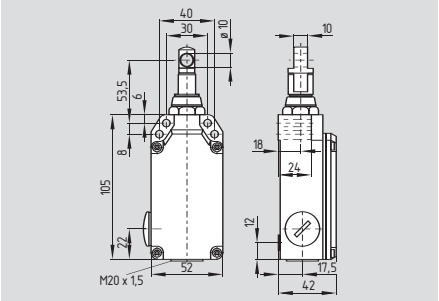
Push button reset
Ordering suffix r

Note



Reset by key
Ordering suffix rs

ZS 71 RE



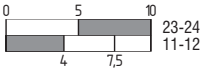
- Wire pull function with latching force
- Metal enclosure
- 2 contacts
- Small body
- 2 cable entries M20 x 1.5
- Twisting not possible
- Available with external watertight collar
- Signalling lamp available on request for various voltage

Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	cast aluminium, enamel finish
Cover:	thermoplastic ultramid
Protection class:	IP 65 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break
Switching system:	⊖ IEC 60947-5-1 slow action, NC contacts with positive break
Termination:	screw terminals
Cable section:	max. 1.5 mm² (incl. conductor ferrules)
Cable entry:	2 x M20 x 1.5
U_{imp}:	4 kV
U_i:	400 V
I_{the}:	4 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 400 VAC
Max. fuse rating:	4 A gL/gG D-fuse
Ambient temperature:	– 25 °C … + 70 °C
Mechanical life:	> 1 million operations
Indicator lamp:	on request

Contact variants

Slow action
1 NO / 1 NC



Approvals

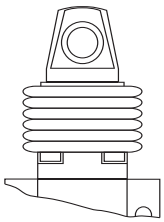
CE

Ordering details

ZS 71 ① 1Ö/1S RE

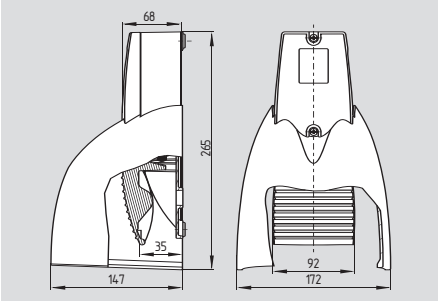
No.	Replace	Description
①		Without watertight collar
	W	With watertight collar

Note



Collar to protect against the entry of foreign bodies

GFI and GFSI



- 4 contacts
- Metal enclosure
- With or without protective shield
- High level of stability
- Low pedal height
- Ergonomic pedal shape
- Wiring compartment
- Cable entry M20 x 1.5
- Ex version available
- Available with mechanical interlock (only for slow action S)
- Available with special finish in RAL colour tones
- Also available as safety foot switch

Approvals

CE

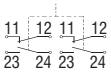
Technical data

Standards:	IEC/EN 60947-5-1
Enclosure:	pressure die cast Al alloy, paint finish RAL 5011
Pedal:	pressure die cast Al alloy, paint finish RAL 5011
Protective shield:	GFI: - GFSI: cast aluminium, paint finish, RAL 2004
Termination:	screw terminals for max. 2.5 mm^2 cables (including conductor ferrules)
Cable entry:	1 x M20 x 1.5
Contact material:	silver
Protection class:	IP 65 to EN 60529
Switching system:	slow action, double break, positive break NC contacts ⊖
Contact blocks:	1 NC / 1 NO 2 NC / 2 NO Potentiometer output (-Poti): 1 kΩ, 2 kΩ, 5 kΩ, 10 kΩ, 50 kΩ Analog output (-HS): 0...10 VDC, 0...20 mA DC, 4...20 mA DC 2-level switching (1ÖS D 1ÖS): 1 NC / 1NO pressure point 1 NC / 1 NO latching (-RE): 1 NC / 1 NO with latching
Utilisation category:	AC-15
I_e/U_e:	slow action: ES 60 GF: 16 A / 400 VAC snap action: insert ZS 232: 4 A / 230 VAC 2.5 A / 400 VAC 1 A / 500 VAC
Switching voltage:	max. 400 VAC
Max. fuse rating:	insert ES 60 GF: 16 A (slow blow) insert ZS 232: 4 A (slow blow)
Ambient temperature:	– 25 °C … + 80 °C
Mechanical life:	> 1 million operations

Contact variants

1 NO / 1 NC

2 NO / 2 NC



Ordering details

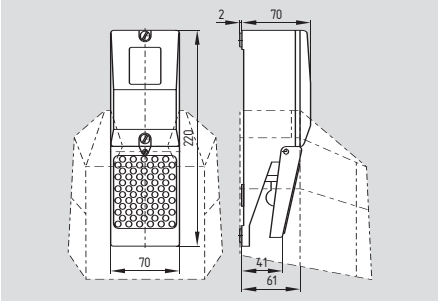
GF①I② ③

No.	Replace	Description
①		Without protective shield
	S	With protective shield
②		Slow action
	M	Snap action
③		per pedal:
	1Ö/1S	1 NO/1 NC
	2Ö/2S	2 NO/2 NC

Note

Other contact configurations avaiable on request (Max. 4 contacts per pedal).

GF and GFS



- Max. 4 contacts
- Metal enclosure
- With or without protective shield
- High level of stability
- Wide opening in shield
- Low pedal height
- Cable entry M20 x 1.5
- Ex version available
- Available with mechanical interlock (only for slow action S)
- Available with special finish in RAL colour tones
- Special versions, see page 3-9
- Also available as safety foot switch

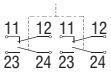
Technical data

Standards:	IEC/EN 60947-5-1 VDE 0113 part 1
Enclosure:	cast aluminium, enamel finish, RAL 5011
Cover:	GF: glass-fibre reinforced thermoplastic GFS: -
Pedal:	GF: glass-fibre reinforced thermoplastic, free of silicone GFS: glass-fibre reinforced thermoplastic
Protective shield:	GF: - GFS: cast aluminium, paint finish, RAL 5011
Cable entry:	GF/GFS: M20 x 1,5 GF2/GFS2: M25 x 1,5 GF3/GFS3: 2 x M25 x 1,5
Protection class:	IP 65 to EN 60529
Switching system:	slow or snap action
Utilisation category:	AC-15, DC-13
I_e/U_e:	slow action: 4 contacts: insert ES 40 GF: 6 A / 400 VAC 2 contacts: insert ES 60 GF: 16 A / 400 VAC snap action: insert ZS 232: 4 A / 230 VAC 2.5 A / 400 VAC 1 A / 500 VAC
Max. fuse rating:	insert ES 40 GF: 6 A insert ES 60 GF: 16 A insert ZS 232: 4 A (slow blow)
Ambient temperature:	– 25 °C … + 80 °C
Mechanical life:	> 1 million operations

Contact variants

1 NO / 1 NC

2 NO / 2 NC



Approvals

Ordering details

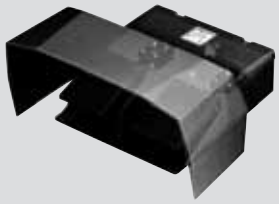
GF①② ③

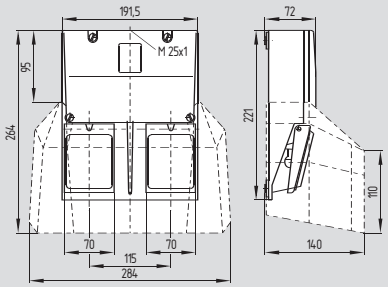
No.	Replace	Description
①		Without protective shield
	S	With protective shield
②		Slow action
	M	Snap action
③		per pedal:
	1Ö/1S	1 NO/1 NC
	2Ö/2S	2 NO/2 NC

Note

Other contact configurations avaiable on request (Max. 4 contacts per pedal).

GF 2 and GFS 2





- Double-pedal type
- Max. 4 contacts per pedal
- Various pedal function available
- Cable entry M25 x 1.5

Approvals

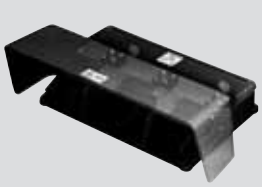
UL CSA CE

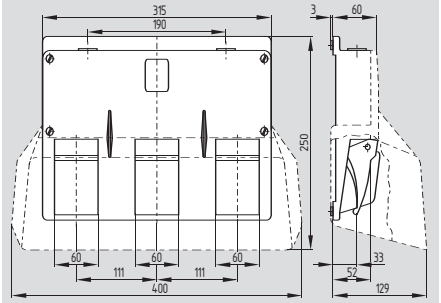
Ordering details

GF①② 2 ③ / ④

No.	Replace	Description
①		Without protective shield
	S	With protective shield
②		Slow action
	M	Snap action
③		Left pedal:
	1ÖS	1 NO/1 NC
	2ÖS	2 NO/2 NC
④		Right pedal:
	1ÖS	1 NO/1 NC
	2ÖS	2 NO/2 NC

GF 3 and GFS 3





- Triple-pedal types
- Max. 4 contacts per pedal
- Various pedal function available
- 2 cable entries M25 x 1.5

Approvals

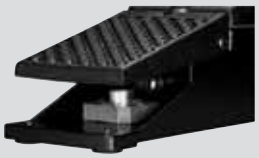
CE

Ordering details

GF①② 3 ③ / ④ / ⑤

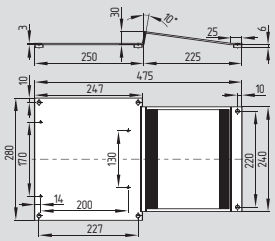
No.	Replace	Description
①		Without protective shield
	S	With protective shield
②		Slow action
	M	Snap action
③		Left pedal:
	1ÖS	1 NO/1 NC
	2ÖS	2 NO/2 NC
④		Central pedal:
	1ÖS	1 NO/1 NC
	2ÖS	2 NO/2 NC
⑤		Right pedal:
	1ÖS	1 NO/1 NC
	2ÖS	2 NO/2 NC

System components

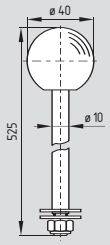


Pressure point D

Pedal cover K



Foot rest FST



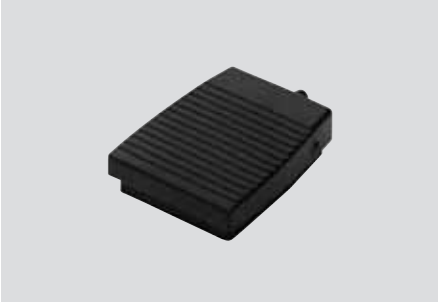
Carrying handle TST

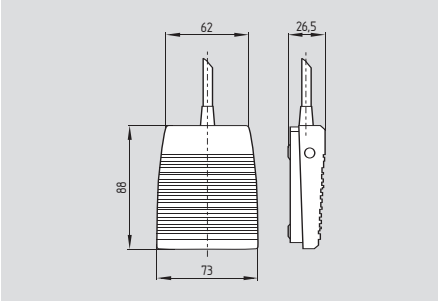
Ordering details

Pressure point	**ordering suffix D**
Pedal cover	**ordering suffix K**
Foot rest	**FST**
Carrying handle	**TST**

Only FST foot support can be retro-fitted.

LKF





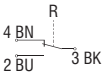
- Thermoplastic enclosure
- Small flat design
- Micro-break switches for switching currents up to 5 A
- 1 or 2 pole change-over contact
- With or without pre-wired cable available
- Pre-wired cable available, cable length 2 m

Technical data

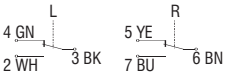
Standards:	IEC/EN 60947-5-1 VDE 0113 part 1
Enclosure:	shockproof thermoplastic
Pedal:	shockproof thermoplastic
Termination:	Customer-specific wiring with appropriate cable (with 1 PW: dmax. = 6.5 mm, with 2 PW: dmax. = 8.5 mm) Ordering suffix -2m: permanent die-cast wiring cable, 3 x 0.5 mm^2 or 6 x 0.5 mm^2, 2 m long
Protection class:	IP 65 with cable, IP 43 without cable to EN 60529
Switching system:	snap action
Max. fuse rating:	5 A (slow blow)
Switching voltage:	250 VAC/DC
Max. making current:	micro-break switches: 5 A
Max. switching capacity:	micro-break switches: 1250 VA
Ambient temperature:	– 10 °C … + 70 °C
Mechanical life:	> 1 million operations

Contact variants

1-pole change-over contact



2-pole change-over contact



Approvals

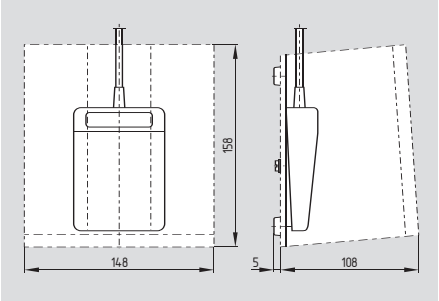
CE

Ordering details

LKF ①-②

No.	Replace	Description
①	1PW	1-pole change-over contact
	2PW	2-pole change-over contact
②		Without cable
	2m	Cable length 2m

KF and KFS



- 2 contacts
- Thermoplastic enclosure
- Protective metal shield
- Small flat design
- With or without protective shield
- Reed contacts for low switching currents from 1 mA to 1 A
- Micro-break switches for switching currents up to 5 A
- Pre-wired cable available, cable length 2 m
- Hall sensors available giving analogue output signal proportional to pedal deflection
- Execution with pressure point (2-stage switch) possible
- Plug-in connection possible
- Other cable types/lengths possible
- Available with special finish in RAL colour tones

Approvals

Technical data

Standards:	IEC/EN 60947-5-1 VDE 0113 part 1
Enclosure:	nylon 66, glass-fibre reinforced, self-extinguishing
Pedal:	glass-fibre reinforced thermoplastic (Nylon 66)
Protective shield:	KF: - KFS: stainless-steel casing, enamelled
Termination:	cable H03W-F, length 2 m
Cable section:	0.5 mm²
Protection class:	IP 65 to EN 60529
Switching system:	reed contacts or snap action, change-over contact
Switching voltage:	reed contacts: 12 … 250 VAC/DC
Max. making current:	reed contacts: 1 A micro-break switches: 5 A
Max. switching capacity:	reed contacts: 30 VA micro-break switches: 1250 VA
Ambient temperature:	– 10 °C … + 70 °C
Mechanical life:	> 1 million operations

Contact variants

1 NO

2 NO

Change-over contact

1 NO PNP

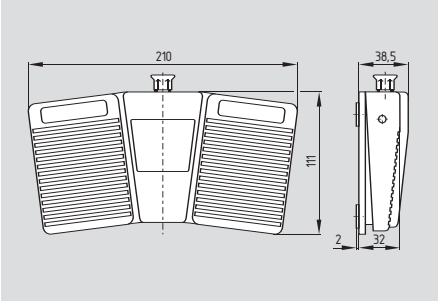
1 NO NPN

Ordering details

KF① ②

No.	Replace	Description
①		Without protective shield
	S	With protective shield
②		Reed contacts:
	1S	1 NO contact
	2S	2 NO contacts
	1W	1 change-over contact
		Micro switches:
	1PW	1 change-over contact
	1S PNP	1 PNP NO contact
	1S NPN	1 NPN NO contact

KF 2



- Max. 2 contacts per pedal
- Thermoplastic enclosure
- Small flat design
- Reed contacts for low switching currents from 1 mA to 1 A
- Micro-break switches for switching currents up to 5 A
- Pre-wired cable available, cable length 2 m
- Hall sensors available giving analogue output signal proportional to pedal deflection
- Available without pre-wired cable
- Plug-in connection possible
- Other cable types/lengths possible
- Available with special finish in RAL colour tones

Approvals

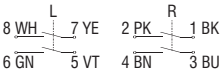
Technical data

Standards:	IEC/EN 60947-5-1 VDE 0113 part 1
Enclosure:	nylon 66, glass-fibre reinforced, self-extinguishing
Pedal:	glass-fibre reinforced thermoplastic (Nylon 66)
Termination:	cable H03VV-F, 2 m long or bell-mouth cable gland Pg 7
Cable section:	0.5 mm²
Protection class:	IP 65 to EN 60529
Switching system:	reed contacts or snap action, change-over contact
Switching voltage:	reed contacts: 12 … 250 VAC/DC
Max. making current:	reed contacts: 1 A micro-break switches: 5 A
Max. switching capacity:	reed contacts: 30 VA micro-break switches: 1250 VA
Ambient temperature:	– 10 °C … + 70 °C
Mechanical life:	> 1 million operations

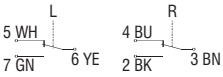
Contact variants

1 NO

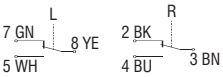
2 NO



Change-over contact (Reed contacts)



Change-over contact (Micro switches)

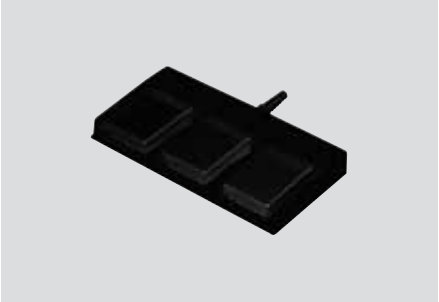


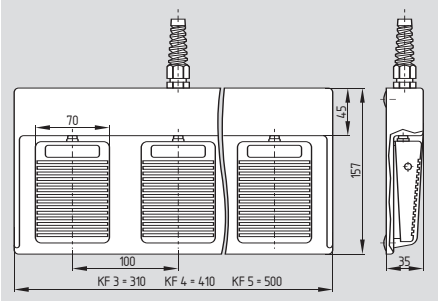
Ordering details

KF 2 ① / ②

No.	Replace	Description
①		Left pedal:
		Reed contacts:
	1S	1 NO contact
	2S	2 NO contacts
	1W	1 change-over contact
		Micro switches:
	1PW	1 change-over contact
②		Right pedal:
		Reed contacts:
	1S	1 NO contact
	2S	2 NO contacts
	1W	1 change-over contact
		Micro switches:
	1PW	1 change-over contact

KF 3, KF 4 and KF 5





- Max. 2 contacts per pedal
- Thermoplastic enclosure
- Small flat design
- Reed contacts for low switching currents from 1 mA to 1 A
- Micro-break switches for switching currents up to 5 A
- Pre-wired cable available, cable length 2 m
- Hall sensors available giving analogue output signal proportional to pedal deflection
- Available without pre-wired cable
- Available with plug-in connection
- Other cable types/lengths possible
- Other contact configurations available on request
- Available with special finish in RAL colour tones

Approvals

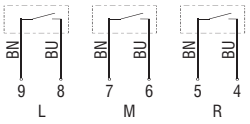
CE

Technical data

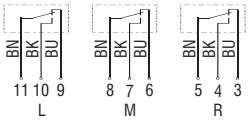
Standards:	IEC/EN 60947-5-1 VDE 0113 part 1
Enclosure:	nylon 66, glass-fibre reinforced, self-extinguishing
Baseplate:	anodized aluminium
Pedal:	glass-fibre reinforced thermoplastic (Nylon 66)
Termination:	cable H03W-F, length 2 m
Cable section:	0.5 mm²
Protection class:	IP 65 with cable, IP 30 without cable to EN 60529
Switching system:	reed contacts or snap action, change-over contact
Switching voltage:	reed contacts: 12 … 250 VAC/DC
Max. making current:	reed contacts: 1 A micro-break switches: 5 A
Max. switching capacity:	reed contacts: 30 VA micro-break switches: 1250 VA
Ambient temperature:	– 10 °C … + 70 °C
Mechanical life:	> 1 million operations

Contact variants

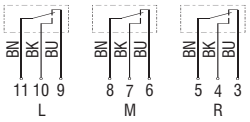
1 NO



Change-over contact (Reed contacts)



Change-over contact (Micro switches)



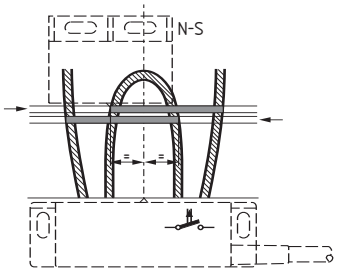
Ordering details

KF ① ② / ② / ② / ② / ②

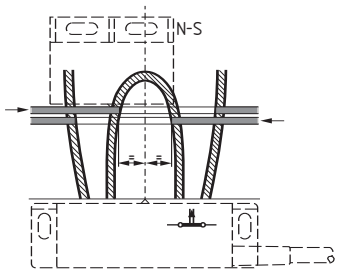
No.	Replace	Description
①	3	triple-pedal types
	4	four-pedal type
	5	quintuple-pedal types
②		per pedal:
		Reed contacts:
	1S	1 NO contact
	1W	1 change-over contact
		Micro switches:
	1PW	1 change-over contact

Explanations

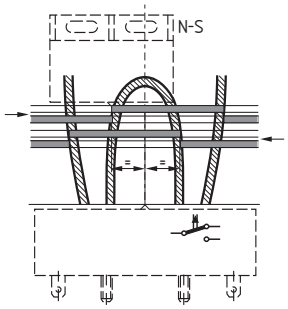
General information



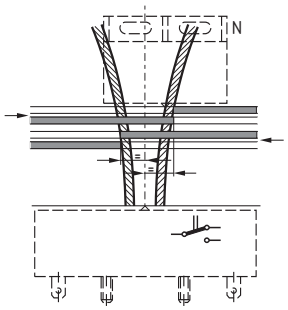
NO contact



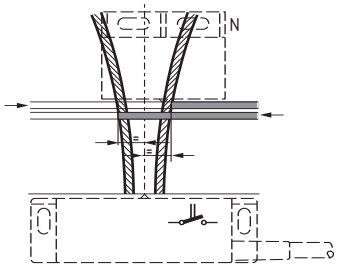
NC contact

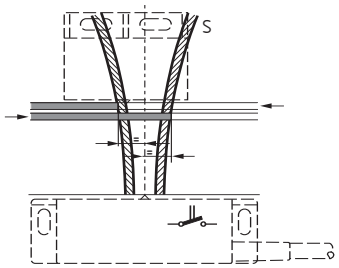


Change-over contact



Bistable change-over contact





Bistable contact

normally open contact, 

normally closed contact, 

change-over contact, 

bistable contact, 

bistable change-over contact. 

In addition, the bias magnets are set, so that the exact central position of the switch contact points is ensured.
This adjustment is factory set to the same distance with selected test magnets so that interchangeability of identical switch elements is guaranteed. After adjustment, reed tube and bias magnet are fixed to each other, and are then flexibly embedded in a sealing compound.

Permanent magnets, with and without casing, as well as electromagnets are used to actuate the switches. The corresponding actuating magnet has to be selected according to switch type. With normally closed and normally open contacts, a north-south pole switching magnet is used and with a bistable contact, a north or south pole magnet is required.

The permanent magnets are made from a material which is resistant to aging and does not lose its magnetism even as a result of stray magnetic fields. Its temperature coefficient of 0.2 %/°C should how-ever be taken into account for switching point accuracy. The magnetic force decreases with rising temperatures and increases when the temperature drops. No permanent change takes place, in the range between - 30° C to + 90° C.

Magnetic reed switches
Along with the mechanically operated limit switches, magnetic reed switches (magnetically operated) have been constantly gaining increased importance. They can be regarded as a complement to the plunger, roller and turret head operated limit switches and as an important addition to electronic proximity switches.

Magnetically operated reed switches are used preferably where mechanically operated limit switches can no longer function satisfactorily as a result of unfavourable operating conditions such as:

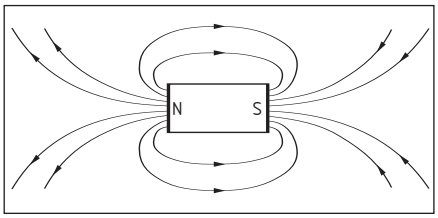
- high or low approach speeds,
- high operating frequency,
- influences from dust and dirt,
- high humidity,
- chemical atmosphere,
- considerable variations in actuating distance.

One type of non-contact proximity switches are the magnetic reed switches (further types: inductive, capacitive and optical proximity switches, see chapter I).

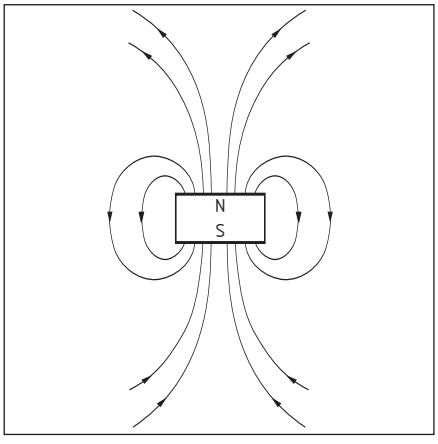
However, in order to be able to make the correct choice, it is necessary to be familiar with the general construction, function and the advantages and disadvantages of reed switches. The BN 2., BN 3., BN 6., and BN 8. series consist of of two pieces, the switch itself and the magnet actuator.

For all switch types, a standard reed tube filled with a protective gas mixture (nitrogen/hydrogen) is used. The iron-nickel alloy reed contacts are melted into the glass body and are rhodium plated at the contacts. The air gap between the reed contact is only 0.2 - 0.3 mm, so that the magnetic force required for switching is extremely low. The contacts are protected from dust, dampness and corrosion by the hermetically sealed glass body. As a result, reed switches possess an extremely high degree of contact reliability.

The type of contact is determined primarily by the kind of assembly required and exact adjustment of the bias magnet:



Magnetic field from a N-S magnet



Magnetic field from a N or S magnet

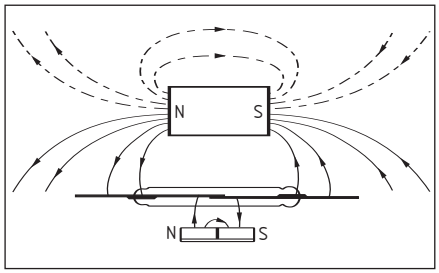
General information

Function

NO contact (normally open)
If the reed contacts are magnetized by an approaching magnet (permanent or electromagnet) and thus having an effect on them, the contacts will close after exceeding a certain "pull-in" force. As a result of the air gap diminishing during closure, the magnetic force increases following a square law, so that the contact closes by snap action. Opening takes place in the same way after falling below a certain "drop-out" value. The relatively small air gap of approximately 0.25 mm and the low masses result in extremely favourable values for switching and bounce times.

Depending on magnetic force, the "make" and "break" times are approximately 0.3 ... 1.5 ms and the bounce time is less than 0.6 ms.

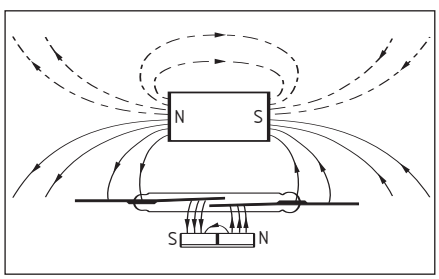
The bias magnet used for the NO contacts, prevents double switching even by the smallest switching distances, up to the magnet types which have a maximum switching distance of 25 mm. **The bias magnets require however, a clearly defined positioning of the magnet actuators relative to the switch, exactly according to specification: colour symbols red on red and green on green.**



Combined effects of magnetic field lines using a NO contact and a N-S magnet.

NC contact (normally closed)
The built-in bias magnet for this switch type is so strong, that the contacts remain closed. Due to the polarity of the bias magnet being opposite to that of the actuating magnet, the approaching magnet causes the contacts to open.

From this simple relationship, it is quite clear that the actuating magnet and switch must also be located in the correct position relative to one another **(red on red and green on green)**.

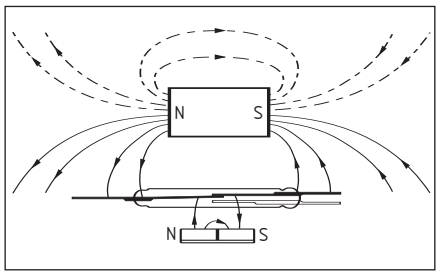


Combined effects of magnetic field lines using a NC contact and a N-S magnet.

The field line diagrams for the two types of switches NO and NC contact, show that an actuation is possible from all three directions, and even a 90° change of direction will provide a flawless function of the switch.

Change-over contact
By certain switch types, change-over reed tubes can be used. The general design of such tubes corresponds to that of the standard tubes. However, there is a difference, in that the air gap between the reed contacts is slightly smaller (0.2 mm) than that of the standard tubes. Therefore, there is a reduction in vibration resistance and in the dielectric strength.

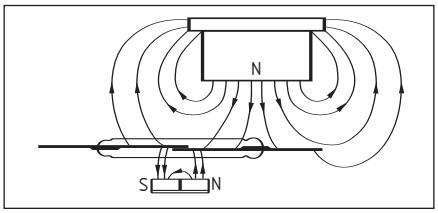
Magnetically, the function of the change-over contact is the same as the NO contact, since the reed of the NC contact is made of a non-magnetic material. For function, see NO contact.



Combined effects of magnetic field lines using a change-over contact and a N-S magnet.

Latch or bistable contact
This type of switch is determined by the exact dimensioning of the bias magnets. The force of these magnets is matched to the switching tube, so that its magnitude falls between the pull-in and drop-out values of the tube. To improve matching, and to obtain a safe switching action, selected reed tubes with considerable difference between pull-in and drop-out values are used. The contact will remain open or closed without the action of the magnet actuator. Before mounting, the required contact function - NC or NO - has to be established by actuation with a magnet.

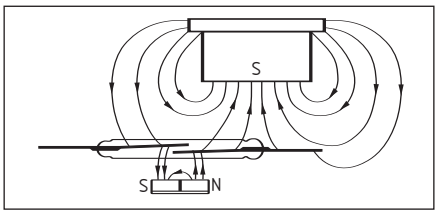
Actuation (closing or opening of the reed contacts) is effected by the magnet being moved past the switch **only longitudinally**. If for example, the magnet (N pole) is slid longitudinally past the switch from left to right, it will finally reach a position (see fig. below), where the magnetic fields of the magnet and bias magnets amplify each other (field lines are arranged in the same direction in the area of the reed contacts). By this field amplication, the pull-in value of the reed tube is exceeded, the reed contacts attract each other and make the contact.



Combined effects of magnetic field lines using a bistable contact and a N magnet.

When sliding further in the same direction, the magnetic field of the magnet becomes weaker and is no longer effective for the switch. However, the force of the bias magnet is still larger than that of the drop-out value of the reed tube, and therefore the contact remains closed. If the magnet actuator is moved back again, until its centre has passed over the switch, into a position where the magnetic fields of the magnet actuator and bias magnets weaken (magnetic field lines are arranged opposed to each other), the drop-out value of the reed tube is passed and the contact opens. The bias magnets alone are not able to close the reed contacts, if the magnet has been moved out of the active range of the switch, as their forces are below the pull-in value of the reed tube. The contact remains open. Once again it should be emphasized that satisfactory performance with this type of switch is only achieved **by lateral passage** of the north or south actuating magnets. No switching function takes place at right angles to the axis of the switch or on approach.

A reversed switching function (right = open, left = closed) is achieved for this switch using a magnet having reversed polarity (for S pole, see figure below).



Combined effects of magnetic field lines using a bistable contact and a S magnet.

General information

Bistable change-over contact
The mode of operation for this contact type is the same as for the standard bistable contact (see above).

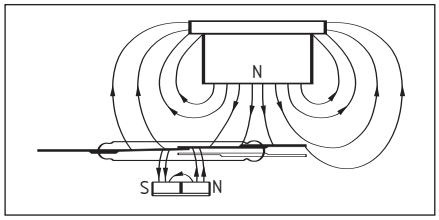
For the sake of simplicity, the following description will only be applicable with the contact-making side of the change-over contact.

The magnetic field lines of the magnet actuator and those of the bias magnet are added together, when the actuating magnet is moved in the longitudinal direction past the switch. This addition will cause the pull-in value of the reed tube to be exceeded, the reed contacts attract each other, and close the contact.

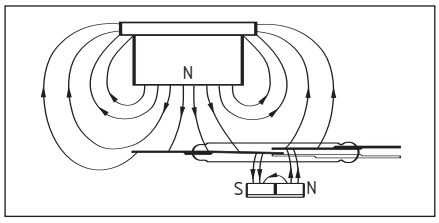
The field will no longer have an effect on the switch, if the actuating magnet continues to move in the same direction. However, the switch will remain closed, as the force of the bias magnet is larger than the drop-out value of the reed tube.

The magnetic field lines work opposite to those of the bias magnet, if the actuating magnet is moved in the opposite direction passing over the centre of the switch. The resulting field strength will be less than the drop-out value of the reed tube and the contacts will open again. The magnetic field on the switch will become ineffective, if the magnet continues to move in this direction. The switch will remain open, due to the force of the bias magnet being lower than the pull-in value of the reed tube.

The function described above shows that the bistable and bistable change-over reed switches can only be actuated, when the actuating magnet is moved past the switch in a longitudinal direction. The N or S poles of the magnets are selected according to the direction of motion and the desired switching function. There will be no switching action, if the actuating magnet is moved at right angle to the longitudinal axis of the switch.

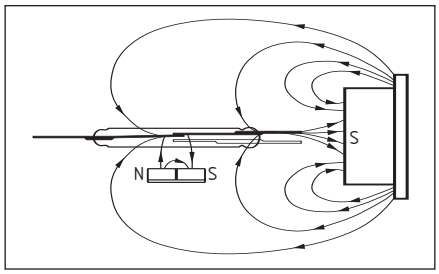


Interaction of the magnetic field lines on the bistable change-over contact by contact making



Interaction of the magnetic field lines on the bistable change-over contact by contact breaking

Front actuation
The BN 6. series switches can be actuated sideways as previously described, or from the front (index "V").



Front actuation

Switches with NO, NC and change-over type contacts, also use the N-S magnets for sideways actuation. All the switches are colour-coded to indicate the correct pairing and travel direction of the magnets.

The rule applied here is the same: red on red and green on green.

Front actuation for the NO, NC and change-over contacts can only be achieved by using the S pole magnet. For this reason a red label with arrows showing the direction, is printed on the front cap.

Switches with bistable and bistable change-over contacts must be actuated sideways with the N or S pole of the magnet, depending on function. The colour coded symbols (including the travel direction) are also shown on these switches.

Front actuating for the bistable and bistable change-over contacts can only be accomplished with a N-S magnet in the direction indicated on the coding label. The bistability is reversed, if the N-S magnet (magnet axis) is rotated by 180°.

Vibration protection
Although the factory adjustment of the bistable switches requires considerable accuracy compared to the NO and NC switches, these units have a high resistance to vibration. By embedding the switching tube receptacles in foam rubber, resistance to vibration is further increased. If the switch is under the influence of the actuating magnets, the switching condition will not be altered even by considerable vibrations. However, caution must be observed in the case of heavy shock loads. With these types of loads, it is possible that the reed switches - irrespective of contact type - may become inoperable.

Operating life
When mounting and testing, it must be observed that the precise setting of the equipment is not damaged by overload.

Reed switch contacts tend to stick, when the maximum specified current is exceeded. After separation of the contacts, they will continue to operate, but with reduced accuracy. It is also possible that the NC contact has now changed into a NO contact. If incandescent lamps or AC magnets are switched on, the inrush current peak can be as large as ten to twelve times at the rated current. When switching off inductivities, overvoltage occurs, resulting in the destruction of the switches over a short period of time. In such cases, suitable measures should be taken to provide arc suppression. To reduce the overvoltage to a permissible level, VDR resistors can be connected in parallel to the inductivity.

In the case of the usual arc suppression by means of capacitors, a field discharge resistor should also be provided in any case, as otherwise welding will take place as a result of the discharge current surge of the capacitor. The optimum values of the arc extinguishing means (RC combination) can only be determined by testing, for each individual case. It cannot be denied however, that incorrect matching can be more harmful than none at all. In a DC circuit we recommend connecting a diode, parallel to the inductivity, to protect the contact.

If magnetic reed switches are protected from overload, as recommended, an electrical contact life can be expected, which will far exceed that of the units to be controlled. Reed switches which are actuated with a minimum of force, are subjected to no form of wear and therefore have virtually an indefinite operating life.

Switching hysteresis (differential travel)
Reed switches, like electromechanical snap action switches, are also subject to switching hysteresis, which means that their operating and release points do not coincide. This property, which is sometimes disadvantageous for the user, results from the difference between the pull-in and drop-out excitations of the reed tubes. This difference is simultaneously a measure for the contact force and thus contact reliability. Therefore, an ideal value of zero (operating and release position, at one and the same point) cannot be achieved.

Fields of application
Magnetically operated reed switches have found their way into virtually all fields of control circuits. Due to their special properties, they are in many cases superior to mechanically operated limit switches. To name just a few examples:

General information

1. High switching speed and switching frequency: application in counting circuits;
2. safe contact even in the presence of corrosive media, as the contact area is hermetically sealed in a protective tube: use in electroplating plants;
3. no mechanical drive components, low actuating force: use with stop and start monitors;
4. silent operation: use in lift construction;
5. actuation without physical contact; action through non-magnetic materials: use as pressure monitor and float switch.

In order to provide a comprehensive supplement to the mechanically operated limit switches, the following types of switches have been developed:

BN 85 Series
Reed switch with thermoplastic housing, rail mounting with changeable switch inserts, IP 40
BN 85-5 Series
Multiple reed switch, thermoplastic housing with five changeable switch inserts, plug-type connection
BN 310 Series
Reed switch with thermoplastic housing,
a) with spade connectors, IP 00 (IP 67)
b) with cable connection, Index -1279
BN 32 and BN 325 Series
Reed switch with thermoplastic housing, one shield plate
a) with spade connectors, IP 00
b) with cable connection, two shielding plates, Index -1279
BN 65 Series
Reed switch with cylindrical design, encased thermoplastic housing and cable connection, Pg 9 single-hole centre mounting, IP 67
BN 2. Series
Reed switch with aluminum die-cast housing, screw connection, IP 67
a) BN 20-... maximum two reed tubes
b) sBN 20-... explosion-proof version (see catalogue Ex)
BN 75 Series
Magnetically operated float switch (thermoplastic), IP 68 (IP 65 - IP 00)

Due to the different switch types available and the possibility to combine various switches, it is possible to cover all switching functions which may arise in industrial applications.

Mounting instructions
Since magnetic reed switches operate on the principle of magnetism, it should be noted that the presence of steel in the vicinity of the switches could influence their function. A non-magnetic intermediate plate of not less than 20 mm should be used when mounting the BN 31 and BN 65 switches onto steel surfaces.

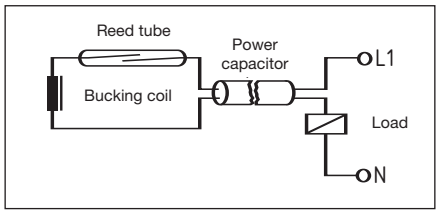
The BN 32, BN 6. reed switches with H1/1 and H2 brackets, and the BN 85 switches can be mounted to steel surfaces without difficulty.

Power lines running parallel to the switches could also have the same effect, as mentioned above. A minimum distance of 50 mm should be maintained. When several switches are located side by side, adequate spacing should be provided. Depending on the size of the magnets used, an unwanted actuation of the adjacent switch is possible. **An effective solution can be provided by using shielding plates mounted between the switches.** It should be noted that the steel plates absorb parts of the magnetic field lines, reducing the maximum actuating distance.

Contact sticking due to overload or capacitor discharge has already been mentioned previously in this chapter. Sticking also occurs, when longer cables are used. Due to the widely differing cable capacity, determined by the construction and the cross section, it is not possible to provide any detailed information. Actually with a cable length of 25 m a brief discharge current already causes sticking of the contacts. To prevent this type of sticking, bucking coils have been designed for various cable lengths.

Type KS 1, 1 coil (single pole), up to 100 m cable length;
Type KS 2, 2 coils (twin pole), up to 100 m cable length or with two coils connected in series, up to 200 m cable length;

These bucking coils are connected in series with the reed tubes.



Bucking coil connected in series with the switch tube

Magnet actuators
Suitable magnets have been designed for the various actuating distances and mounting methods.

Type BP 6
Without housing, S-pole side of magnet countersunk to provide for a M 3 flathead mounting screw. To be used as a N-S magnet and mounted on iron with a minimum distance of 10 mm.
Type BP 7
without housing, both sides of magnet countersunk to provide for a M 4 flathead mounting screw. S-pole marked red. To be used as a N-S magnet and mounted on iron with a minimum distance of 10 mm.
Type BP 8
actuating distances up to 8 mm, without housing. As N or S magnet, mounting on iron possible. Used as a N-S magnet, mounting on iron only and with a minimum distance of 10 mm.
Type BP 10
actuating distance up to 15 mm, without housing. As N or S magnet, mounting on iron possible. Used as a N-S magnet, mounting on iron only and with a minimum distance of approx. 15 mm. N-pole is countersunk.
Type BP 11
actuating distance up to 20 mm, aluminium housing, mounting on iron possible.
Type BP 12
actuating distance up to 30 mm, aluminium housing, mounting on iron possible.
Type BP 15
actuating distance up to 18 mm, thermoplastic housing. As N or S magnet, mounting on iron possible. Used as N-S magnet, mounting on iron only with a minimum distance of approx. 18 mm.
Type BP 15/2
actuating distance up to 18 mm, without housing. As N or S magnet, mounting on iron possible. Used as N-S magnet, mounting on iron only with a minimum distance of approx. 18 mm.
Type BP 20
actuating distance up to 25 mm, aluminium housing, mounting on iron only with a minimum distance of approx. 20 mm.
Type BP 21
actuating distance 15 - 60 mm, aluminium housing, mounting on iron possible.
Type BP 22
actuating distance 15 - 45 mm, zinc housing, mounting on iron possible.
Type BP 22/1(actuating distance up to 25 mm)
Type BP 22/2 (actuating distance up to 22 mm)
Type BP 31
actuating distance up to 25 mm, thermoplastic housing, mounting on iron only with a minimum distance of approx. 20 mm.
Type BP 34
actuating distance up to 25 mm, thermoplastic housing. As N or S magnet, mounting on iron possible. Used as N-S magnet, mounting on iron only with a minimum distance of approx. 25 mm.
Type BE 20
actuating distance up to 20 mm, electromagnet for DC only, thermoplastic housing, mounting on iron only with a minimum distance of approx. 25 mm.

The permissible switching distances for each proximity switch is listed in the technical data. To avoid actuation errors in combination with the magnetic reed switches and the respective actuating magnets, most switches are colour coded. The rule to be observed here is as follows: When mounting, the colours on the switch and magnet have to match (red on red and green on green).

In addition, all colour symbols indicate the possible directions of actuation.

Nearly all switches, magnets, and mounting brackets are provided with slotted holes so that an exact setting of the operating distances and switching points is possible.

CE marking of proximity switches

Schmersal´s proximity switches conform to current standards and guidelines.

You will find the **CE marking**
- on the product
- on the packing or
- in the mounting and wiring instructions.

Declarations of conformity are held as part of Schmersal´s internal product documentation and are available for examination when requested by a test authority.

The CE-marking is applied according to the following European directives:
- **Low Voltage Directive**
- **EMC-Directive**

The EC directives are addressed to the countries of the European community. These transform the directives into national laws.

Low Voltage Directive

Electrical devices must be designed in such a way, and in accordance with the current state of art, so that people and animals are not endangered during operation provided that installation, maintenance and application are correct.

The most important safety aims:

1. General conditions
- The essential conditions required for correct and safe use are affixed on the electrical device; or if this is not possible, are provided in the instructions.
- The producer's label or brandmark must be affixed to the electrical device, or if this is not possible, on the packaging.
- The electrical devices must be designed in such a way that connection and installation can be carried out safely and correctly.
- The electrical devices must be designed and manufactured in such a way, that correct use and maintenance exclude the hazards described in 2 and 3.

2. Protection against hazards originating from electrical devices.
Measures should be taken to ensure that:
- people and animals are protected to an appropriate level against injury or other damages, which can occur from direct or indirect contact with the device.
- no hazardous temperatures, arcing or radiation can occur.
- people, animals and property are protected from non-electrical hazards caused by the electrical device.
- the insulation is suitable for its intended use and environment.

3. Protection against hazards created by external influences on electrical devices.
Measures should be taken to ensure that:
- the device withstands the applied mechanical stress, and that neither people, animals nor property are endangered.
- under the predicted environmental conditions, the non-mechanical influences do not endanger people, animals or property.
- the device does not endanger people, animals or property under overload conditions.

Electrical devices that meet the safety requirements of the harmonised standards also conform to the Low Voltage Directive.

The Directive relating to electromagnetic compatibility (EMC)

- was legalised in November 1992 and
- is law since the beginning of 1996

It is valid for devices:
- which can generate electromagnetic interference or
- whose function can be affected by external interference

and defines the conditions for
- installation
- exhibition and
- use.

This means that devices that do not conform to the EMC-Directive can only be used in locations which are sufficiently shielded.

As defined in the EMC, **Electromagnetic compatibility** is:
- the ability of a device,
- to operate as intended
- in its electromagnetic environment.

Practically all the essential requirements are defined in the appropriate standards relating to electromagnetic environmental conditions.

Schmersal's proximity switches have the appropriate resistance to external interferences. Electromagnetic emissions are suppressed to the extent that the operation of approved radio and telecommunication systems is guaranteed.

The standards listed in the table below define these requirements:

In addition to extensive tests in our own laboratories, representative proximity switch types have been tested and approved by German national authorities (BG, TÜV).

The **surrounding electromagnetic environment** is of prime importance for interference-free operation. This is defined in detail in the international standard IEC 60947-5-2.

A poor electromagnetic environment can lead to the malfunctioning of proximity switches. If the local conditions are above the limits defined in the standards, this can lead to problems, even with CE marked products:

The defined limits for electromagnetic emissions are intended for proximity switches used in an industrial environment. In other environments proximity switches can interfere with radio and TV reception, unless suitably shielded by the user.

Radiophones often have strong electromagnetic emissions which can, to a degree, be tolerated by Schmersal proximity switches. If high-power radiophones are to be used in the immediate vicinity of proximity switches, additional measures or precautions should be taken.

CE marking of proximity switches

Standards for proximity switches

International standard	EC standard	German standard	Title
IEC 60947-1	EN 60947-1	VDE 0660 part 100	Low-voltage switchgear and controlgear part 1: General rules
IEC 60947-5-1	EN 60947-5-1	VDE 0660 part 200	Low-voltage switchgear and controlgear part 5-1: Control circuit devices and switching elements; electromechanical control cicuit devices
IEC 60947-5-2	DIN EN 60947-5-2	VDE 0660 part 208	Low-voltage switchgear and controlgear part 5-2: Control circuit device and switching elements; proximity switches
IEC 60664-1	HD 625.1S1	DIN VDE 0110 part 1	Insulation coordination for equipment within low-voltage systems part 1: Principles, requirements and tests
IEC 60204-1	EN 60204-1	VDE 0113 part 1	Electrical equipment of machines part 1: General requirements
IEC 60529	EN 60529	DIN VDE 0470 part 1	Degrees of protection provided by enclosures (IP code)
IEC 61000-6-4	EN 61000-6-4	VDE 0839-6-4	EMC standard, emission
IEC 61000-6-2	EN 61000-6-2	VDE 0839-6-2	EMC standard, immunity
CISPR 60011	EN 55011	VDE 0875 part 11	Limits and methods of measurement of radio disturbance of (ISM) radio-frequency equipment)
IEC 61000-4-2	EN 61000-4-2	VDE 0847 part 4-2	EMC-Testing and measurement techniques; electrostatic discharge immunity test
IEC 61000-4-3	EN 61000-4-3	VDE 0847 part 4-3	EMC-Testing and measurement techniques; radiated, radio-frequency electromagnetic field immunity test
IEC 61000-4-4	EN 61000-4-4	VDE 0847 part 4-4	EMC-Testing and measurement techniques; electrical fast transient/burst immunity test

General information

A proximity switch is a device which causes a switching action without physical contact. SCHMERSAL proximity switches respond to targets that come within the active range of their generated sensing fields. These units are completely self-contained, and house a field generator, amplifier, and other necessary circuitry to accomplish electronic switching. The units are all solid state and have no moving parts that can wear out. The electronic switches are not susceptible to contact contamination, contact erosion, or material transfer as are mechanical switches.

Their service life, within their specified ratings, is virtually unlimited. The switching is insensitive to vibration, and is positive (full step function) without chatter, regardles of how slowly the target approaches or recedes from the sensor.

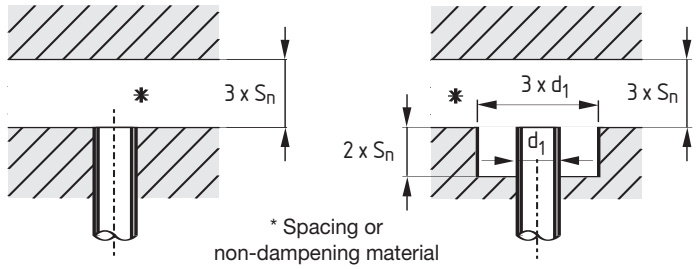
In general, proximity switches should be considered in the following applications and situations:

- when contact difficulties due to environmental conditions, or an extremely low switching current is to be expected
- when no actuating forces are present
- when contact difficulties due to environmental conditions, or an extremely low switching current is to be expected
- when no actuating forces are present
- when high switching frequencies are required
- when a long life expectancy is necessary
- when extreme vibrations are present
- when a control unit is switched
- when by DC switching, contact bounce must be avoided
- where the switch must switch without any retaining force (retaining force of mechanical limit switches, magnetic force of magnetic reed switches).

When selecting a proximity switch type and application, the following factors must be considered:

- it makes a difference, if AC or DC has to be switched
- a direct or indirect supply voltage is required
- the switching distance varies, when the actuating surface is made of different materials as well as with different kind of surfaces.
- ambient temperatures have a slight influence on the switching distance
- embedding or non-embedding mounting must be considered
- a minimum mounting distance between two switches has to be observed
- especially with high actuating speeds, the length and the distance between the next actuating surface plays a role
- inductive proximity switches react only to metal surfaces
- humidity affects more or less the switching distances of capacitive sensors when using certain materials

Mounting inductive cylindrical proximity switches



Embeddable mounting in dampening material

Non-embeddable mounting in dampening material

Fig. 1 a

Non-embeddable mounting of rectangular inductive proximity switches

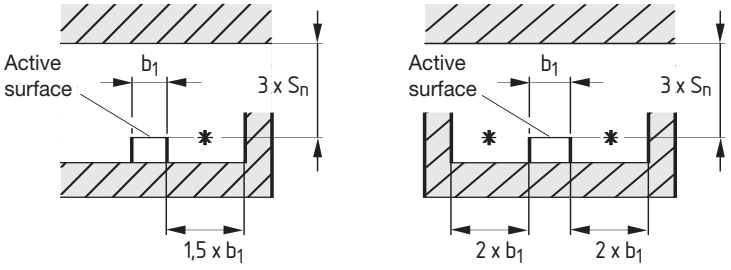
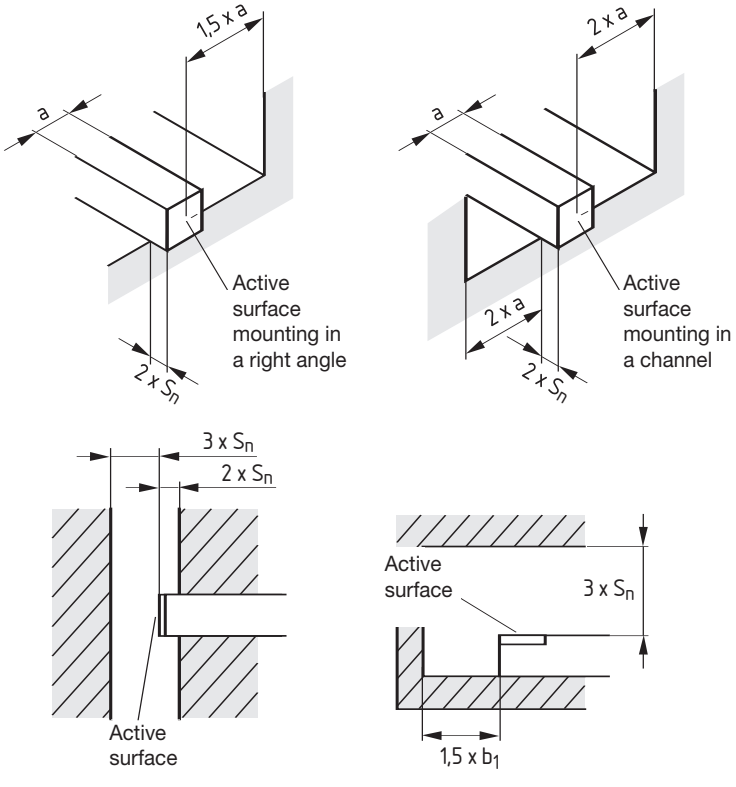


Fig. 1 b

Mounting quadratic inductive proximity switches



Embeddable mounting in dampening material

Non-embeddable mounting in dampening material

Fig. 1 c

General information

- when choosing a capacitive proximity switch, consideration has to be taken, if direct contact with fluids is given
- dust can alter the switching distances of photoelectric proximity switches.

These factors will be discussed in further details on the following pages.

Mounting
(Embeddable and non-embeddable)
The sensing field of the active surface is not only emitted in a vertical direction but also to the side where it can be influenced. This type of the proximity switch is only suited for non-embeddable mounting. When mounting, care must be taken that no materials are in the vicinity which could influence the operation of the switch. The minimum mounting distances, stated in figures 1a - 1c and those in the specifications, have to be observed. By shorter mounting distances, the switching distance will also change causing unwanted dampening of the oscillator.

For embeddable-mounted proximity switches, a preventive measure has been implemented so that a side-ways spreading of the sensing field is avoided. The inductive proximity switches, for example, include a metal shielding ring around the coil which prevents the switch from being influenced from the side. On the other hand, the switch is pre-dampened and has a shorter switching distance as with a non-embeddable mounted proximity switch.

Proximity switches can influence each other, and therefore it is important that there is sufficient clearance when mounting the switches.

IFL Inductive proximity switches
The oscillator resonant circuit, located in the proximity switch, uses an open core coil to help produce a concentrated high frequency electromagnetic (RF) field, which emerges from the active surface of the sensor. If a electroconductive target (e.g. metal) enters this field, eddy currents are induced. The floating induced eddy current draws energy from the LC circuit (L: coil, C: capacitor).
The load on the oscillator circuit evokes a decrease in the oscillating amplitude. The oscillator is attenuated (Fig. 2).
The decrease of the oscillating amplitude is converted into an electrical signal by the electronic circuit, which leads to a change of switching state of the proximity switch.
When the electroconductive material is removed from the inductive field, the pulse amplitude increases and via the electronic circuit the original switching position is recreated. The oscillator is unattenuated.

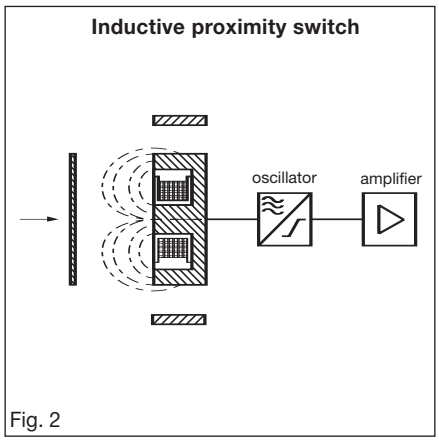


Fig. 2

IFC Capacitive proximity switches
Capacitive proximity switches operate using an RC resonant circuit (resistor-capacitor), where the capacity is affected. To achieve this, the electrodes of the capacitor are separated. One electrode is located in the proximity switch on the active surface. The second electrode is either the target with earth or ground as return line, or ground itself, whereby the target causes a change in the dielectric medium (Fig. 3).

When this medium approaches the active surface and thus the capacitor electrode in the sensor, capacitance increases to the extent where, with the resistor, the value for tripping the resonant circuit is reached and the oscillator starts oscillating.

When the actuating target is removed from the active surface, the opposite occurs, and the oscillator stops oscillating. Commencement and ceasing of oscillation, evaluated by the connected electronic circuitry, produces a change in the switching state of the proximity switch. A built-in potentiometer permits fine adjustment of the actuating distance within the field. The sensor responds to all solid and liquid media, such as water, glass, wood, paper, metal, plastic, foodstuffs, etc.

Since air forms the dielectric medium of a capacitor, it should be taken into account that a

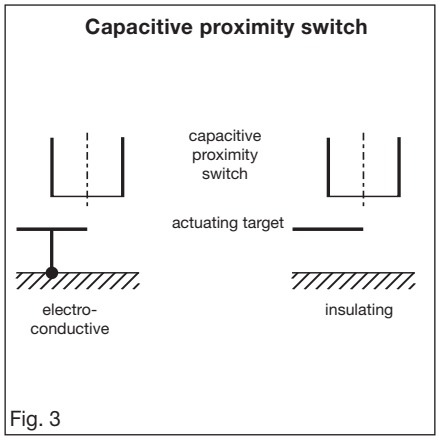


Fig. 3

pronounced change in air humidity will cause a change in the operating distance, which in turn, can lead to unwanted switching operations as in the case of delicately adjusted proximity switches.

The model “D” capacitive sensors listed in this catalog are particularly suitable for such dielectric media as, e.g. plastics, ceramics, glass, wood, foodstuffs, etc. The active surface should not, however, remain wet as otherwise the sensor will remain actuated.

For such cases, our type “L” sensor is specially suited for electroconductive solid and liquid media, as it is deactuated, as soon as the wetting film breaks down.

General information

Operating distance "s" of the inductive and capacitive proximity switches
Rated operating (switching) distance S_n is included in the order code of the proximity switch (IFL XX-.../IFC XX-...). The effective operating distance S_r , for any given switch, at room temperature and design voltage, will be within ± 10 % of S_n. It is determined by using square test targets of carbon steel, 1 mm thick (by axial approach to the active surface) (Fig. 4).

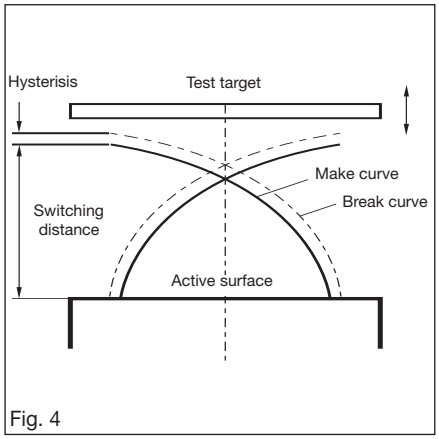


Fig. 4

$$S_r = S_n \pm 10\%$$

Usable operating distance S_u, will not vary from S_r by more than ± 10 % over the voltage and temperature limits listed in the technical data.

$$S_u = S_n \pm 10\%$$

For problem-free switching the proximity switch must, like a mechanical limit switch with snap action, have a switching hysterisis. This hysterisis (H) of the proximity switches is dependent on the effective operating distance and listed in the technical data of each proximity switch.

All mentioned operating distances refer to a 1 mm thick standard target consisting of carbon steel St 37. Other materials have different distance, values are given in the following diagram (Fig. 5).

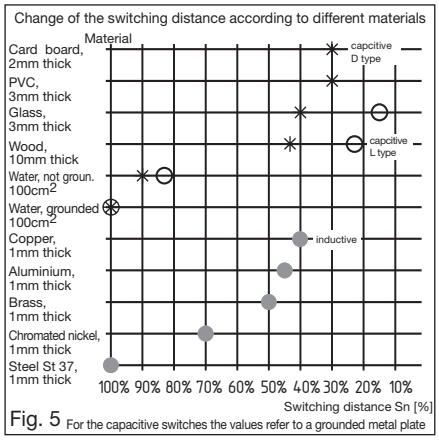


Fig. 5 For the capacitive switches the values refer to a grounded metal plate

Standard test plate

The switching distances S_n featuring in the technical data were calculated using a standard test plate. This square, single-surface test plate is made of 1 mm thick steel ST 37 (FE 360).

For capacitive proximity switches, this standard test plate is earthed. This standard test plate represents the optimal actuator for the proximity switches.
Deviations from these dimensions and from the material composition will lead to a reduced switching distance.

The standard test plate size (side length) is calculated as follows:
- Switching distance S_n x 3 or
- Internal circle diameter of the active surface

The highest value is always applicable!
For a proximity switch with a switching distance of 5 mm, the actuator should have the following dimensions: 15 x 15 x 1mm.
For rated operating voltages Ue of over 50 VAC and 120 VDC, switches that are not double-insulated ⧈ require a protective wire connection or protective measures against direct or indirect contact.

AC proximity switches (2-wire)
The AC inductive, capacitive and optical proximity switches listed in this catalogue are designed for two conductor connections and operate using alternating voltage. Similar to mechanical position switches, AC proximity switches are wired in series with the load (Fig. 6). The proximity switch receives its supply voltage through the load, making it operable.

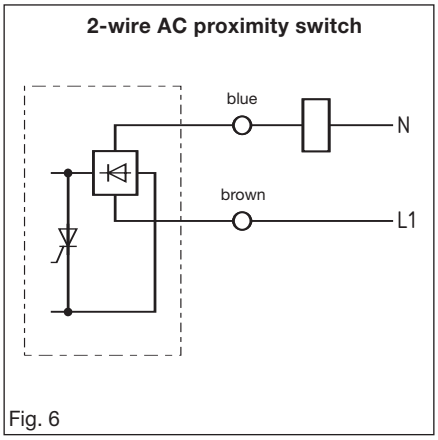


Fig. 6

Since the switch requires power in order to operate, even when the switch is in the "off" state, a small current flows through the switch and its load. The "off-state current" is stated in the technical data for each switch. Care must be taken in the application of AC proximity switches to ensure that the "drop-out" currents of relays or other minimum required loads are greater than the off-state currents of the proximity switches. When the proximity switches are "on" (carrying load current), there will be a voltage drop of approximately three to eight volts according to each switch.

All AC proximity switches in this catalogue are internally protected against transient voltage peaks.

DC proximity switches (2-wire)
2-wire DC inductive, capacitive and optical proximity switches are switched in series with the load. This enables them to switch either from the supply voltage load or from the ground load, and are therefore capable of replacing NPN and PNP sensors (Fig. 8 and Fig. 9).

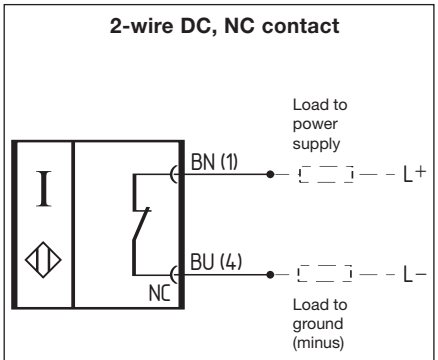


Fig. 8

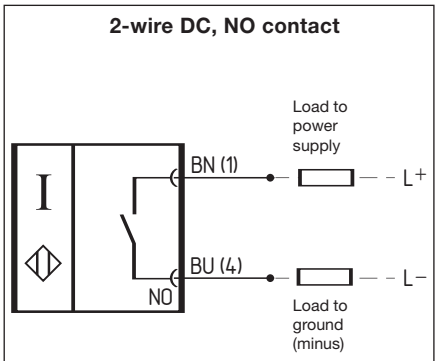


Fig. 9

DC proximity switches (3- and 4-wire)
3- and 4-wire DC proximity switches have a separate power supply circuit and therefore an additional wire. These switches have a no load supply current in the barred state which does not flow through the load.

The 3-wire proximity switches either work as NO or NC contact and the 4-wire proximity switches have an antivalent output and can be used as change-over contact.

When selecting the proximity switch the output type must be considered:

P-type proximity switches (PNP) switch the positive potential to the load (Fig. 10).

N-type proximity switches (NPN) switch the negative potential to the load (Fig. 10).

General information

DC proximity switches

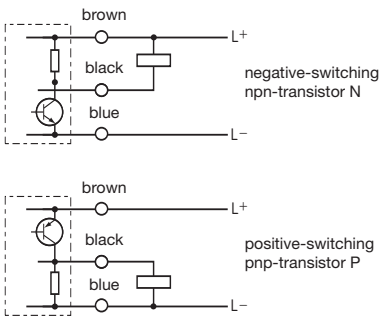


Fig. 10

The DC proximity switches are all equipped with wrong polarity protection circuits. The proximity switch will not be destroyed by exchanging the + and – connection. No switching function will occur. A built-in by-pass diode protects the switch from inductive voltage peaks. A built-in offset resistor prevents the transistor output from receiving floating potential caused by spurious pulses when actuating an electronic circuit. Additionally, all optical proximity switches and the majority of the inductive proximity switches are equipped with short-circuit and industrial transients protection.

UC proximity switches (AC and DC)/(2-wire)
The UC proximity switches which are listed can operate with AC and DC voltages, within the specified limits. They are constructed according to the 2-wire system and are connected, as with the AC proximity switches, in series with the load.

AC-DC (2-wire)

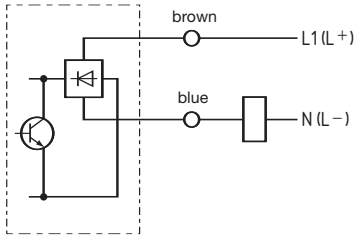


Fig. 11

When operating with 24 VDC, it should be verified that the load is properly operated with the specified voltage drop and off-state current.

Parallel switching

In principle, it is possible to connect proximity switches in series or parallel. However, the special features of each sensor type must be taken into consideration.

Parallel switching for AC proximity switches
It must be observed that the sum of the residual currents from each proximity switch is not too large, causing the connected contactor to always remain energized. Specifications for the residual currents are shown in the technical data specifications.

Parallel switching is not a problem, when proximity switches are alternately switched. However, if two proximity switches are connected to a contactor and switched alternately, the switch which is attenuated first, will switch, causing a voltage drop across the load and depriving the second switch of sufficient operating voltage. Power is restored to the second switch once the target has passed the first switch, causing it to de-energize. The second switch detects its target and re-energizes the load. The result is a momentary opening of the load circuit by targets which overlap in their time span. A contactor circuit with self-hold is only conditionally possible (Fig. 12). This also applies, if a mechanical limit switch takes the place of one of the sensors.

Parallel switching AC proximity switch

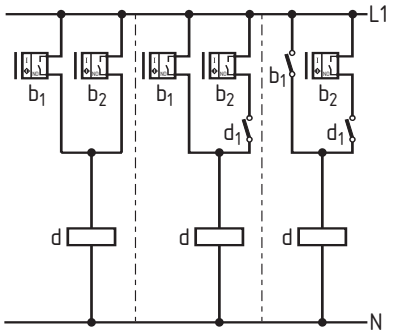


Fig. 13

Parallel switching DC proximity switch

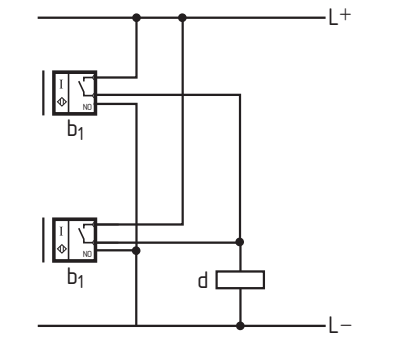


Fig. 14

Parallel switching for DC proximity switches
Since each DC switch receives a separate supply voltage, an almost unlimited amount of switches can be wired in parallel (Fig. 13). If proximity switches with built-in function indicators (LED) are wired in parallel, their outputs must be fitted with isolating diodes. This prevents the other LEDs from lighting up, if one switch is activated.

Series switching

Series switching for AC proximity switches
Also with series switching, the voltage drop for each proximity switch and user must be taken into consideration. For this reason, only two, or at the most three sensors having a voltage drop of 8 V, can be connected in series (Fig. 14). A maximum of four switches can be connected in series when the voltage drop does not exceed 4.5 V.

Series connection with two AC proximity switches

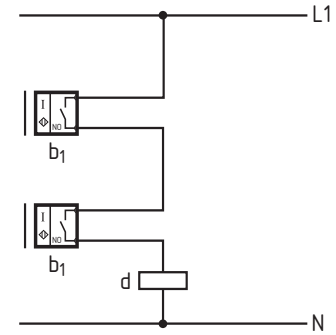


Fig. 15

Series switching for DC proximity switches
With series switching, the breaking capacity of the first switch has to be taken into consideration. The "b1" proximity switch not only carries the full load currrent but also the sum of the no-load currents of all the other switches in series (Fig. 15).

Series connection with three P-type DC proximity switches

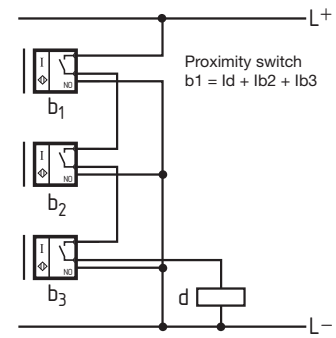


Fig. 16

General information

IFO photoelectric proximity switches
Not all applications for proximity switches can be handled by inductive or capacitive types. Inductive proximity switches only react to metal material up to an operating distance of approximately 50 mm. Capacitive switches can also detect insulating materials, but only over relatively short operating distances. For this reason we are offering a third type of switch in our program, the IFO photoelectric switch series. With this series it is possible to widen the range of applications considerably. Additionally, it was also a very important aspect that the optical design of the switches complement each other, and that the construction of the internal switching circuitry corresponds to those of the inductive and capacitive switches listed in our program.

The IFO photoelectric switches are non-contact switches which are suitable for use as a diffuse-reflective sensor (without reflector) or as a retro-reflective sensor (with reflector). Light emitter, receiver, electronic evaluation circuitry and amplifier for AC or DC are all in one common housing (self-contained type). No additional power supply, switching units or amplifiers are necessary. The operating principle is based on modulated light, which is emitted through the front lens of the switch directly to the object or reflector which is to be detected. The reflected light reaches the receiver through a second lens, and is processed electronically, causing a change in the output condition of the switch. Removal of the object from the detection zone causes the switch to return to its original switching position. Due to the synchronization of emitter and receiver circuitry, the photoelectric switch is insensitive against interference and external light.

Photoelectric switches can only detect objects which reflect sufficient light. Therefore, the operating distance depends a lot on the surface condition (reflectivity) of the object to be detected. A smooth white surface allows for a much larger operating distance compared to a dull black surface finish. With some models, the optimum operating distance for each application can be set, using the built-in potentiometer. In this way, undesired background reflections are eliminated. The provided LED is also helpful when setting the sensing distance, as it shows switching condition and is used as a function indicator. It is further possible to choose between light operation (ON with reflection, corresponding to NO contact) and dark operation (OFF with reflection, corresponding to NC contact) by repositioning a small jumper at the terminal screws.

Applications for IFO photoelectric proximity switches
Basically, the photoelectric proximity switch can be used in two different modes:
- as diffuse reflective sensor (proximity switch) (Fig. 16)
- as retro-reflective sensor (with reflector) (Fig. 17)

When operating as a **diffuse reflective sensor**, the emitted light from the sensor is diffuse reflected from the object to be detected. Part of this reflection enters the receiving lens of the sensor and causes a switching function.

When operating as a **retro-reflective sensor**, the emitted infrared light is reflected back to the receiver by a reflector (e.g. retro-reflector

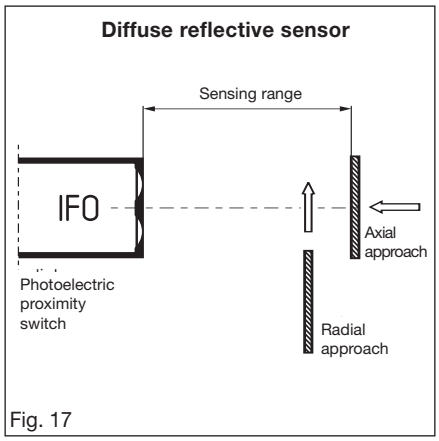


Fig. 17

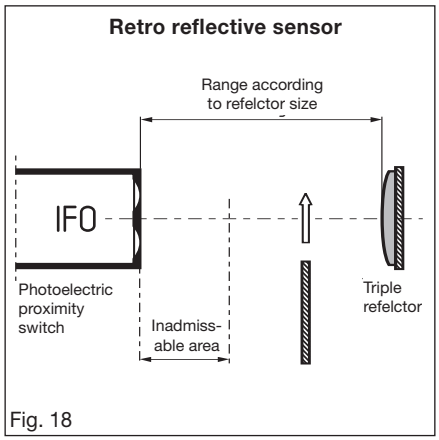


Fig. 18

RC 110). An interruption of this light beam by an object will cause a switching function.

Operation as a **diffuse reflective sensor** is preferred, when
- objects are to be detected at short distances
- the objects reflect sufficient light
- objects in the background do not cause interference, or if the interference can be eliminated by setting the potentiometer to reduced sensitivity
- limited space does not allow for the mounting of a reflector.

Operation as a **retro-reflective sensor** is preferred, when
- long sensing ranges are required
- there are no interfering objects at close range, which could reflect the emitted light directly back to the receiver
- the mounting of a reflector is possible
- the sensing distance must be independent from the distance of object to sensor.

Mounting the IFO photoelectric proximity switch
All photoelectric switches can be embeddably mounted, but for a reliable function the following conditions have to be considered:

Diffuse reflective senor
With this type of operating system, where background reflections may cause interference, the setting of the potentiometer (if available) can in most cases eliminate this interference. To do this, the object is brought into the active range of the sensor, and the sensitivity is slowly lowered at the potentiometer (turning with screwdriver counterclockwise), until the LED indicator changes (potentiometer setting "object"). Now the object is completely removed from the active range and the sensitvity is slowly increased (turning clockwise) until the LED indicator changes again (potentiometer setting "background"). The final setting of sensitivity is now adjusted to the middle between the two limits (half number of turns between "object" and "background"). In order to obtain a stable function for the IFO 30/300 models there should be a minimum of six turns between the two settings "object" and "background" (i.e. optimum setting three turns in either direction). If there are less than six turns between the two settings or if the LED does not change when removing the object, it may be necessary to remove strong reflecting materials from the active sensing area or to cover them with dull black surfaces.

It must also be taken into consideration that due to the emitting and receiving angles of the double lens system, that for some models it is possible that an object cannot be detected at close range. From the determined minimum distance, all objects will be detected up to their maximum sensing range.

The minimum distance is dependent on the surface characteristics of the object and the sensitivity setting.

A special filter (VF 30), which can be mounted at the front of the IFO 30/300, reduces the sensing range and also allows for detection at close range, from 0 to 150 mm.

General information

Retro-reflective sensor
With this operating method, where the light cannot be seen (infrared), the adjustment is not quite as simple as with barriers that operate with visible light. For easy adjustment and mounting, triple reflectors should be used instead of plane mirrors, where the adjustment has to be precise. A simple method of adjustment, is to follow the infrared beam by holding the reflector and moving it. The reception of the reflected signal is indicated by the LED indicator.

The triple reflector allows for an angular misalignment of approximately + 15° (Fig. 18).

When operating at close range, and depending on surface condition of the target and the settings of the potentiometer, all objects located within the sensing range should be removed as the direct reflection of these objects could cause interference.

Operating distance of the photoelectric proximity switch IFO
As a diffuse reflective sensor, the IFO has an operating range which depends on the surface condition (reflectivity) of the object, as well as on its size and the amount of pollution in the air.

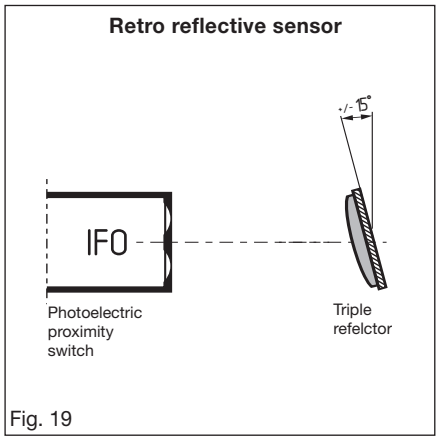


Fig. 19

The graph shows the response curve of the IFO 30/300, measured at varying distances from the sensor and with different settings of the potentiometer. The test object was a piece of white dull paper, 200 by 200 mm, with 90% refectivity, and a pollution-free environment was also given (Fig. 19).

Objects other than white dull paper with 90% reflectivity require correction factors. The following table shows approximate factors for some materials:

In addition to its surface structure, the size of an object plays an important role with regards to the operating range. Generally, the smaller an object is, the shorter the sensing range is. By increasing the object size, the operating range will also grow but will not continue to grow once a certain object size has been exceeded.

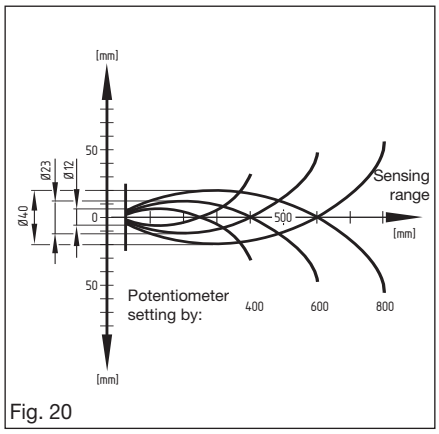


Fig. 20

The size of the reflector, as well as the amount of air pollution, is an important factor for the operation of the retro-reflective sensor. Fog, mist, dust and smoke, shorten the maximum sensing range. With our RC 110 reflector and a pollution-free environment, the sensing range is approximately seven times that of a diffuse-reflective sensor using white dull paper, 200 by 200 mm. With our smaller R 101 to R 104 reflectors, the sensing range is correspondingly shorter.

Material	correction factor (approx.)
metal, shining	1.2 . . . 1.6
aluminium, black	1.1 . . . 1.8
styropor, white	1.0
PVC, grey	0.5
wood, raw	0.4
cardboard, dull black	0.1

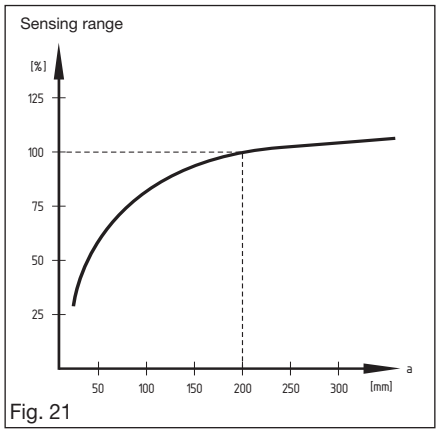


Fig. 21

General information

Connection and wiring identification according to IEC 60947-5-2

Type	Function	Wire colour	Terminal number
2 terminals AC and 2 terminals DC unpolarized	NO (make)	Any colour [1] except yellow, green or green-and-yellow	3 4
	NC (break)		1 2
2 terminals DC polarized	NO (make)	+ brown - blue	1 4
	NC (break)	+ brown - blue	1 2
3 terminals DC polarized	NO output	+ brown - blue black	1 3 4
	NC output	+ brown - blue black	1 3 2
4 terminals DC polarized	change-over (make/break) NO output NC output	+ brown - blue black white	1 3 4 2

[1] It is recommended that both wires are of same colour.

Note
The contact configuration of the NC contact types for all DC switches with plug-in connector does not conform to the IEC 60947-5-2.

The appropriate contact configuration is given on the corresponding catalogue page.

For rated operating voltages Ue of over 50 VAC and 120 VDC, switches that are not double-insulated ⧈ require a protective wire connection or protective measures against direct or indirect contact.

Authorised tightening forces for proximity switches with threaded pipes

Model	Messing	Plastic	Note
M 8 x 1 mm	600 Ncm	–	
	0 Ncm		The core coil area may **not** be loaded!
M 12 x 1 mm	1500 Ncm	90 Ncm	
	500 Ncm		The core coil area may be subjected to **small** loads!
M 18 x 1 mm	1800 Ncm	300 Ncm	
M 30 x 1.5 mm	3000 Ncm	400 Ncm	

Symbol legend

- Double insulated
- Positive break contact
- Personenschutzfunktion
- Positive break travel/angle
- Latching point
- Lever actuation point
- Wire breakage monitoring
- Pull-wire monitoring
- Actuated
- Not actuated
- A/F
- Inductive proximity switch
- Magnetic safety sensor, non-contact safety sensor
- I_0 No-load current
- I_e Rated operating current
- I_m Minimum operating current
- I_r Leakage current
- I_{the} Thermal test current
- U_d Voltage drop
- U_e Rated operating voltage
- U_i Rated insulation voltage
- U_{imp} Rated impulse withstand voltage
- U_s Rated supply voltage
- S_n Rated switching distance
- SA approval, Sweden
- UL approval, USA
- UL/CSA approval, USA
- CSA approval, Canada
- CSA/UL approval, Canada
- TÜV approved
- BG approved
- CE Compliance with directives, see declaration of conformity

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