

# CONTROLS AND AUTOMATION PRODUCTS



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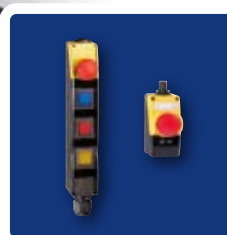


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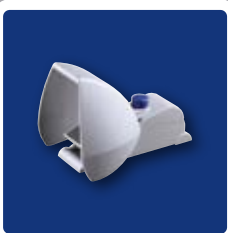


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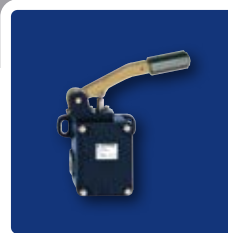
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# PUSHBUTTONS & INDICATOR LIGHTS:



## H Series

### Hygienic design

With the H series, Schmersal presents a complete programme of new command and signalling devices for hygiene-sensitive applications – especially for food processing. The characteristic features of the command and signalling devices in this programme include gap-free transitions between sealing elements and surfaces and the absence of protruding parts. The devices are easy to clean and are so well sealed that they can withstand regular cleaning, e.g. with high-pressure cleaners or aggressive cleaning agents.

The new series fulfils the requirements of DIN EN ISO 14159 ("Safety of machinery – Hygiene requirements for the design of machinery") and the new version of EN 1672-2 ("Food processing machinery – General principles for design"). This standard specifies very precise requirements for the hygienic design of all operating elements on the human-machine interface (HMI) of food processing machines. Another regulation that formulates requirements for the selection of materials for this area of application was also taken into account.

# PUSHBUTTONS & INDICATOR LIGHTS:

The devices consist of an operator head and a mounting flange. The modular system allows up to 3 contact blocks and light elements to be attached to the mounting flange, allowing the installer to configure a variety of contact arrangements for each operator element. Both the mechanical systems and the electrical components are of heavy-duty design.

The devices are intended for 22.3 mm diameter holes. The use of an adapter ring makes it possible to easily mount devices in a 30.5 mm installation diameter without needing additional sealing on the front panel of the machine to seal the installation hole.

Schmersal has developed several series of control devices and indicator lights with distinct features:

## Typical pushbutton assembly

N Series Assembly



R Series and EX-R Series Assembly



### N Series

#### IP69K rating and Hygienic design

Series N was originally developed for the specific requirements of Protection class IP69K. This means that even when cleaned on a regular basis using high-pressure, high temperature cleaners they have an extended service life. They were also designed on the basis of the general design concepts for hygienic construction of food processing machinery (EN 1762-2), from food safe materials and designed with smooth surfaces and gradual transitions. Typical applications include food processing, pharmaceutical, petrochemical, and medical industries. Due to their resistance to spray water, they are deployed in outdoor applications such as municipal vehicles, car washes, and in maritime areas. In addition, these devices are clean room approved.

The materials used in construction of these control devices and indicator lights are durable and chemical resistant; chromium plated ABS plastic fittings, thermoplastic operators, and pliable seals are available in white, black, or blue color.

### R Series

#### Robust metal pushbuttons

When designing control panels on machines that will be working under particularly harsh conditions, it is advisable to use the R product portfolio. The "R" stands for "robust", which represents the main feature of this switchgear. The R series is resistant to mechanical loading and you can also operate it easily when wearing gloves.

Typical application include material handling systems, packaging machinery, chemical processing equipment, robot cells, folding or brake presses, filter presses, punching machines, printing machines, injection molding, palletizers, and other packaging equipment

The materials used in construction of these control devices and indicator lights are durable and are heat and chemical resistant; die cast aluminum fittings, glass or thermoplastic lens covers. Versions are available with protective membranes to prevent scratches in abrasive environments.

### EX-R Series

#### For explosive atmospheres

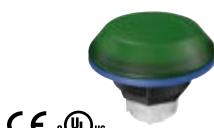
When designing control panels on machines that generate or will be exposed to potentially explosive or flammable gaseous or dust born atmospheres, there are requirements to limit ignition sources. Schmersal has developed devices that are intrinsically safe, meaning they are lower voltage and do not generate heat above 135°C; they do not provide suitable energy to ignite most gas environments. They are also IP65 rated, to prevent dust intrusion into the electrical contact area. These pushbuttons are ATEX rated for use in Zone 1 and 2 gas environments and Zone 21 and 22 dust environments.

Typical applications include gas environments of printing machines, paint spray-ing plants, and petrochemical industry, and dust areas of grain mills, powder coating machines, and the textile industry, among others.

The materials used in construction of these control devices and indicator lights are durable and are heat and chemical resistant; chrome plated brass, coated brass buttons, thermoplastic lens covers.

IP69K Test: 175° F Steam at 1450psi

# PUSHBUTTONS & INDICATOR LIGHTS: H SERIES



Series	HDRZ40-BL-RT-GB	HML	HDT	HDL
Type	Emergency Stop	Indicator light	Pushbutton	Illuminated Pushbutton
Operator Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Base Material	Stainless steel	-	Stainless steel	Stainless steel
IP Rating	IP69K	IP69K	IP69K	IP69K
Colors				
Bellows Color				
Notes	Latching, Pull reset with Yellow base no other label required	Use CLP001 voltage block with LE24/9WS LED		Use CLP001 voltage block with LE24/9WS LED



Series	HW	HHS	HWSE	HDAN6
Type	Selector Switch	Main Switch	Step Selector Switch	Potentiometer Knob
Operator Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Base Material	Stainless steel	Stainless steel plate	Stainless steel	Stainless steel
IP Rating	IP69K	IP69K	IP69K	IP69K
Colors				
Bellows Color				
Notes	2 or 3 position Momentary or maintained Extended knob (.1)	Integrated LO/TO device NH version for E-Stop for 16A, 40A, 63A, 125A with or without baseplate	2-12 steps Extended knob (.1)	Potentiometer not included

# PUSHBUTTONS & INDICATOR LIGHTS: H SERIES



Series	HDTP30	HDLP30	HDTP40	HDRZ40
Type	Mushroom button	Illuminated Mushroom button	Mushroom button	Mushroom button
Operator Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Base Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel
IP Rating	IP69K	IP69K	IP69K	IP69K
Colors				
Bellows Color				
Notes		Use CLP001 voltage block with LE24/9WS LED	Momentary	Latching, Pull reset integrated spring element

## TERMINAL BLOCKS



Series	CLP101	CLP110	CLP001
Type	Contact element	Contact element	Spring element
Connection	Screw terminals	Flat pin	none
Position	1, 2, or 3	1, 2, or 3	3 (center)
Options	1 NC contact  single or bulk (20) packaging  stackable	1 NO contact  single or bulk (20) packaging  stackable	Holder for Ba9S  single or bulk (20) packaging

## ACCESSORIES



Series	LE24/9WS	HB-BL
Type	Ba9S LED bulb for CLP001 light terminal	Blanking plug

# PUSHBUTTONS & INDICATOR LIGHTS: N SERIES



Series	NDRZ50RT	NDRR50RT	NML/NMLH	NME/NMEF	NDT	NDL
Type	Emergency Stop	Emergency Stop	Indicator light	Indicator light	Pushbutton	Illuminated Pushbutton
Operator Material	Thermoplastic	Thermoplastic	PA (12)	PA (12)	ABS / PA (12)	ABS / PA (12)
Base Material	Chrome plated ABS	Chrome plated ABS	Chrome plated ABS	Chrome plated ABS	Chrome plated ABS	Chrome plated ABS
IP Rating	IP69K	IP69K	IP69K	IP69K	IP69K	IP69K
Colors						
Bellows Color			-	-		
Notes	Latching, Pull reset integrated spring element Yellow label required, ordered separately	Latching, Pull reset Separate spring element EFR Yellow label required, ordered separately	L = Flat lens LH = Domed lens Separate illuminant L24/9 bulb or LE24/9WS LED Use EL or ELE voltage block	EF = Flat lens E = Domed lens Integrated LED Use ELE voltage block		Use EL or ELE voltage block with L24/9 bulb or LE24/9WS LED



Series	NW	NHS	NWSE	NDAN6
Type	Selector Switch	Main Switch	Step Selector Switch	Potentiometer Knob
Operator Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Base Material	Chrome plated ABS	Stainless steel plate	Chrome plated ABS	Chrome plated ABS
IP Rating	IP69K	IP69K	IP69K	IP69K
Colors				
Bellows Color		-	-	-
Notes	2 or 3 position Momentary or maintained Extended knob (.1)	Integrated LO/TO device NH version for E-Stop	3-12 steps Extended knob (.1)	Potentiometer not included

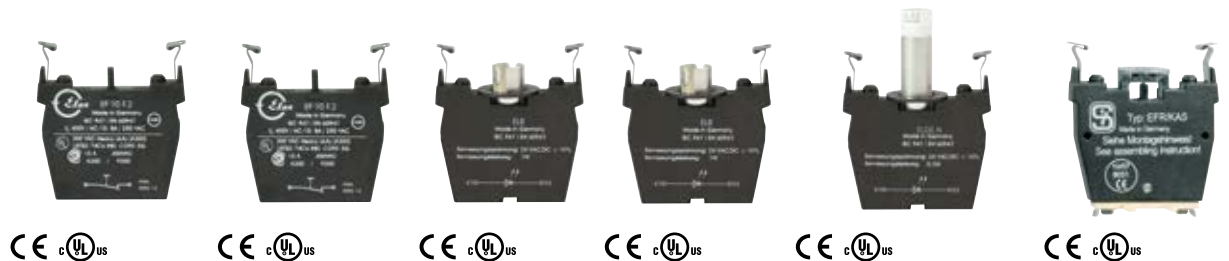


# PUSHBUTTONS & INDICATOR LIGHTS: N SERIES



Series	NDTP	NDLP	NDP50	NDRZ50	NDRR50
Type	Mushroom button	Illuminated Mushroom button	Mushroom button	Mushroom button	Mushroom button
Operator Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Base Material	Chrome plated ABS	Chrome plated ABS	Chrome plated ABS	Chrome plated ABS	Chrome plated ABS
IP Rating	IP69K	IP69K	IP69K	IP69K	IP69K
Colors					
Bellows Color					
Notes		Use EL or ELE voltage block with L24/9 bulb or LE24/9WS LED	Momentary	Latching, Pull reset integrated spring element	Latching, Pull reset Separate spring element EFR

## TERMINAL BLOCKS



Series	EF	EFK	EL	ELE	ELDE.N	EFR
Type	Contact Element	Contact Element	Light terminal	Light terminal	Light terminal LED	Spring element
Connection	Screw Terminals	Flat Pin	Screw Terminals	Screw Terminals	Screw Terminals	none
Position	1, 2, or 3	1, 2, or 3	3 (center)	3 (center)	3 (center)	3 (center)
Options	220 = 2 NC 303 = 1 NO & 1 NC 10 = 1 NC 03 = 1 NO 033 = 2 NO 103 = 1 NO & 1 NC 301 = 1 NO & 1 NC	220 = 2 NC 303 = 1 NO & 1 NC 10 = 1 NC 03 = 1 NO 033 = 2 NO 103 = 1 NO & 1 NC 301 = 1 NO & 1 NC			ELDE.N RT (red) ELDE.N GB (yellow) ELDE.N GN (green) ELDE.N BL (blue) ELDE.N WS (white) ELDE.N-RD-GN-YE-24VDC (red/green/yellow)	

# PUSHBUTTONS & INDICATOR LIGHTS: R SERIES



CE cUL US



CE cUL US



CE cUL US



CE cUL US



CE cUL US



CE cUL US

Series	RDRZ45RT	RM	RDT/RDM	RDL/RDLM	RDP40/RDR45	RW
Type	Emergency Stop	Indicator light	Pushbutton	Illuminated button	Mushroom button	Selector Switch
Operator Material	Aluminum	Glass (Flat) / PA (Domed)	Aluminum	Glass Lens	Aluminum	Thermoplastic
Base Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
IP Rating	IP65	IP65	IP65	IP65	IP65	IP65
Colors						
Notes	Latching, Pull reset integrated spring element Yellow label required, ordered separately	LF & EF= Flat lens LH & EH = Domed lens L = Use RLDEWS24 or RL voltage block with LE24/9WS LED E = Use RL voltage block	M = with membrane	M = with membrane L = Use RLDEWS24 or RL voltage block with LE24/9WS LED	40 - Momentary 45 - Latching, pull reset	2 or 3 position momentary or maintained extended knob (.1)

## TERMINAL BLOCKS



CE cUL US



CE cUL US



CE cUL US



CE cUL US



CE cUL US

Series	RS	RWSE	RDAN6
Type	Keyed Selector Switch	Step Selector Switch	Potentiometer Knob
Operator Material	Aluminum Key barrel	Thermoplastic	Thermoplastic
Base Material	Aluminum	Aluminum	Aluminum
IP Rating	IP65	IP65	IP65
Colors	Metal (silver)		
Notes	2 or 3 position momentary or maintained	2-12 steps Extended knob (.1)	Potentiometer not included

Series	RF	RL
Type	Contact Element	Light terminal
Position	1, 2, or 3	3 (center)
Options	RF10 = 1 NC RF03 = 1 NO	RL (for bulb) RLDEWS24 (white LED)

# PUSHBUTTONS & INDICATOR LIGHTS: EX-R SERIES



CE



CE



CE



CE



CE

Series	EX-RDRZ45RT	EX-RMLH	EX-RDT/EX-RDM	EX-RDL/EX-RDLM	EX-RDP40/EX-RDR45
Type	Emergency Stop	Domed Indicator light	Pushbutton	Illuminated button	Mushroom button
Operator Material	Coated brass	Thermoplastic lens	Coated brass	Thermoplastic lens	Coated brass
Base Material	Chrome plated brass	Chrome plated brass	Chrome plated brass	Chrome plated brass	Chrome plated brass
IP Rating	IP65	IP65	IP65	IP65	IP65
Colors					
ATEX zones	1, 2, 21, 22	1, 2, 21, 22	1, 2, 21, 22	1, 2, 21, 22	1, 2, 21, 22
Notes	Latching, Pull reset integrated spring element Yellow label required, ordered separately	Use EX-RLDEWS24	M = with membrane	M = with membrane Use EX-RLDEWS24	40 - Momentary 45 - Latching, pull reset

## TERMINAL BLOCKS



CE



CE



CE cULus



CE cULus

Series	EX-RW	EX-RS
Type	Selector Switch	Keyed Selector Switch
Operator Material	Thermoplastic	Aluminum Key barrel
Base Material	Chrome plated brass	Chrome plated brass
IP Rating	IP65	IP65
Colors		Metal (silver)
ATEX zones	1, 2, 21, 22	1, 2, 21, 22
Notes	2 or 3 position momentary or maintained extended knob (.1)	2 or 3 position momentary or maintained

Series	EX-RF	EX-RLDE
Type	Contact Element	LED Light terminal
Position	1, 2, or 3	3 (center)
Options	EX-RF10 = 1 NC EX-RF10.1 = 1 NC EX-RF03 = 1 NO EX-RF03.1 = 1 NO	EX-RLDEWS24 (white)



# PUSHBUTTON ENCLOSURES

## KG

The KG-series features ABS plastic housings for simple applications that do not require the highest level of sturdiness. The cable outlets are already mounted on these enclosures, which means that plant manufacturers only need to mount the command devices.

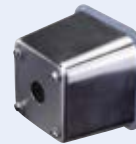


## KG

Housing material, thermoplastic

## NBG/EBG/EX-EBG

Series NBG / EBG / EX-EBG assembly housings are made of high-quality stainless steel using a special deep-drawing process; they have been specially developed for hygiene and heavy-duty applications. The special ribbed gasket that surrounds the base of the enclosure on which the enclosure cover is forged, makes it possible to implement the particularly high IP 69K degree of protection. The EX-EBG enclosures have an additional integrated reinforcement panel that exceeds the extreme requirements for explosion protection.



## NBG/EBG/EX-EBG

Housing material, stainless steel

## MBGAC/MBGHAC

The aluminium housings of the MBGAC series enjoy universal application owing to their simple and functional design. They offer the user a high level of sturdiness and a sealing concept that has proven its worth over many years. This protects the emergency stop from being actuated accidentally and has the advantage for the plant owner of reducing undesirable downtimes.



## MBGAC

Housing material, alloy



## MBGHAC

Housing material, alloy

For emergency stop with protective collar

## NBGLC

Hygienic mounting enclosure for pushbuttons

Three housing sizes with up to five holes for command devices

Hygienic design features:

- Stainless Steel
- IP69 rated
- ECOLAB approved materials
- Blue colored seals for screws, face plate, bottom detectable by vision systems
- Smooth surfaces, rounded corners
- Bevel on faceplate



## NBGLC11

one operator



## NBGLC32

two operators



## NBGLC33

three operators



## NBGLC54

four operators



## NBGLC55

five operators

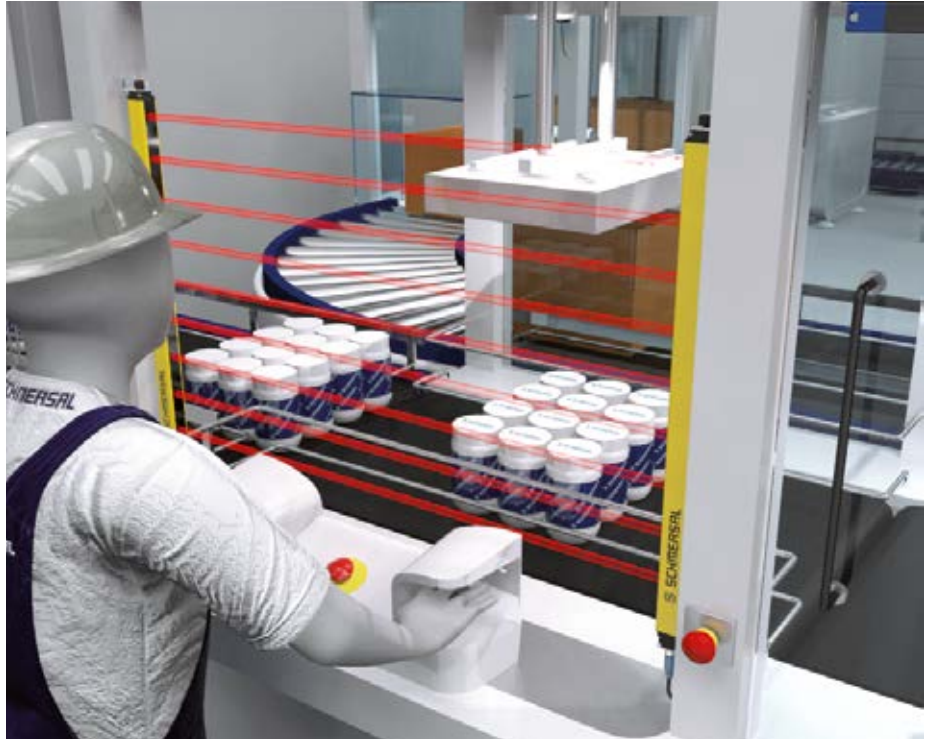


# TWO HAND CONTROLS

Two-hand control panels are designed as such so the operators need both hands at the same time to start a hazardous movement. This forces operators to keep their hands in the same place which means that they cannot reach into the danger zone while the system is carrying out the hazardous movement.

These two-hand control panels are fitted with an Emergency Stop button that complies with EN ISO 13850. It is also possible to mount up to eight additional command and signaling devices to the center console. Apart from this, there are guard hoods over the operating elements, which prevent people from circumventing the protection function using their hands, elbows, stomach, hips, thighs or knees. It is also not possible to operate from the back of the control panels.

The main areas of application for two-hand controls are presses and stamping units in the metal processing or powder metallurgy industries as well as similar machines and systems that involve manual insertion and removal operations. These include printing and paper processing machines, rubber and plastics processing machines, machines involved in the chemical industry and assembly plants.



Series	SEPK	SEPG
<b>Type</b>	Two hand control with hooded buttons	Two hand control with hooded buttons
<b>Material</b>	Thermoplastic	Die cast alloy
<b>IP Rating</b>	IP64	IP65
<b>E-Stop</b>	ADRR40RT	EDRR40RT
<b>Palm Buttons</b>	50 mm dia, black	50 mm dia, black
<b>Buttons</b>	1 NO & 1 NC	1 NO & 1 NC
<b>Connection</b>	Screw terminals	Screw terminals
<b>Notes</b>	8 knockouts for additional control or signal devices	8 knockouts for additional control or signal devices

# CONTROL STATIONS

Ergonomic operation of the main machine functions at the human-machine interface is a key factor in safety. The control units should be mounted as close as possible to the safety doors so that operators have an overview of the process. BDF Series control units meet this requirement. This series has been designed for mounting onto the commercially available aluminum profile systems of machine enclosures and you can quickly attach them and integrate them in the ambient structure. Machine builders can use the BDF range to represent the most common operator functions like Emergency Stop, ON/OFF, Forwards/Backwards, Operating Mode Selection, display of operating status conditions or error messages, etc.



The BDF200 Universal (-2875 variant) is field customizable, with several positions that can be adapted to become pushbuttons, illuminated pushbuttons or indicator lights of various colors. Choices are made by wiring and the application of various colored lens caps.

Base models include:

- All 4 positions customizable
- E-Stop and 3 customizable positions
- E-Stop, keyed selector and
- 2 customizable positions.



## Operator Options:

	PN	Type	Options	POS
	NH	E-Stop	Red button with yellow	POS1 only
	NHK	E-Stop with collar	Red button with yellow	POS1 only
	DT..	Pushbutton		All
	LT..	Illuminated pushbutton		All
	PT..	Mushroom button		All
	LM..	Signal light		All
	WS..	Selector, maintained	2 or 3 position	POS2, POS3
	WT..	Selector, momentary	2 or 3 position	
	WTS..	Selector, mixed	3 position	
	SW...	Keyed selector switch	2 position, maintained or momentary	POS2, POS3

Series	BDF100	BDF100 Universal	BDF200	BDF200 Universal
Type	Control panel	Control panel	Control panel	Control panel
# of Operators	Single operator	Single operator	4 operators	4 operators
Housing Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
E-Stop Contacts	1 NO & 2 NC (E-stops)	--	1 NO & 2 NC (E-stops)	1 NO & 2 NC (E-stops)
Operator Contacts	2 NO 1 NO & 1 NC	2 NO 1 NO & 1 NC	2 NO 1 NO & 1 NC 1 NO	2 NO 1 NO & 1 NC 1 NO
Features		Field customizable	Available with or without E-Stop (position 1) Selectable and factory assembled	Available with or without E-Stop (position 1) Field customizable

# CONTROL STATIONS

The BDF40 control panel is characterised by its modern and slim design. It is available in two versions, with or without emergency stop function.

Freely configurable coloured button caps for illuminated pushbuttons or pushbuttons and the combination with the AZM40 solenoid interlock and the DHS-U1 door system also offer maximum flexibility.

Alternatively, it can also be installed as a stand-alone control panel. The 12-pin M12 connector allows quick and error-free installation.



Series	BDF40
Type	Control panel
# of Operators	4 operators
Housing Material	Thermoplastic
E-Stop Contacts	1 NO & 2 NC (E-stops)
Operator Contacts	1 NO
Features	Available with or without E-Stop (position 1) Field customizable button caps (12 options)

# DOOR HANDLE

The innovative DHS-U1 door handle combines the functions of a robust door handle with the signalling of various machine statuses via large-scale illumination of the handle. The RGB technology used makes it possible to illuminate the handle in seven different colours.

A pushbutton is also available, which can be individually adapted to customer requirements using the coloured pushbutton cover caps supplied. The pushbutton can, for example, fulfil the tasks of a reset function or a request to open the safety guard.

The handle works well as a stand alone system, but can also be fitted with actuators for the AZM40 solenoid interlock or RSS safety sensors, for left or right facing doors.



Series	DHS-U1
Type	Illuminated door handle
# of Operators	Optional illuminated pushbutton
Housing Material	Thermoplastic
Operator Contacts	Pushbutton: 1 NO
Features	7 color LED handle Field customizable button caps (5 options)

# JOYSTICKS

Schmersal offers a series of industrial grade joysticks suitable for 22.5 mm or 30.5 mm diameter mounting.

Models are available with up to four switch positions/actuating directions with up to eight contacts (two contacts actuated in each direction).

A variety of sealing bellows options make them suitable for especially harsh industrial applications, including outdoor usage with UV resistance and operable temperatures of -25 °C to +80 °C, or hygienic applications

requiring IP69K Rating for high temp/high pressure wash downs.

Joysticks are available with two actuation types:

- Maintained switch, locks into place with return to center (rest/neutral) position by touch.
- Momentary switch, returns to center rest/neutral) position by spring force

Models are available with either one, or can mix the two styles.



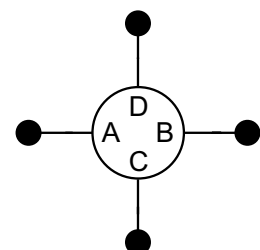
Series	MKT	MKS	WKT	WKS	RK	NK
Type	Spring Returned	Maintained	Spring returned	Maintained	Spring returned	Spring returned
Mounting Diameter	22.3 mm	22.3 mm	30.5 mm	30.5 mm	22.3 mm	22.3 mm
Mounting Type	Lock nut	Lock nut	Mounting flange	Mounting flange	Lock nut	Lock nut
Material	Stainless steel shaft duroplast knob	Stainless steel shaft duroplast knob	Stainless steel shaft duroplast knob	Stainless steel shaft duroplast knob	Stainless steel shaft duroplast knob	Stainless steel shaft duroplast knob
Shaft Length	77 mm	77 mm	90 mm	90 mm	85 mm	85 mm
Bellows Options	Rubber WKT-19.4 Rubber WKT-19.3 Silicone WKT-26 Silicone (IP69K)	Rubber WKT-19.4 Rubber WKT-19.3 Silicone WKT-26 Silicone (IP69K)	Rubber WKT-19.4 Rubber WKT-19.3 Silicone WKT-26 Silicone (IP69K)	Rubber WKT-19.4 Rubber WKT-19.3 Silicone WKT-26 Silicone (IP69K)	Silicone (IP69K)	Silicone (IP69K)

## MK & WK Directions and contact variants

A	B	C	D	PN Suffix
1 NO	1 NO			A32
1 NC	1 NC			A32/401
2 NO	2 NO			B32
1 NC & 1 NO	1 NC & 1 NO			B32/1x401
2 NO	2 NO			C32
1 NO	1 NO	1 NO		C42
1 NO	1 NO	1 NO	1 NO	C52
1 NC	1 NC	1 NC	1 NC	C52/2x401
4 NO	4 NO			E32
4 NC	4 NC			E32/404
4 NC	4 NC			E32/800
2 NO	2 NO	2 NO	2 NO	E52
1 NC & 1 NO	1 NC & 1 NO	2 NO	2 NO	E52/206
2 NC	2 NO	2 NO	2 NO	E52/206.1
1 NC & 1 NO	1 NC & 1 NO	1 NC & 1 NO	1 NC & 1 NO	E52/2x401

## RK & NK Directions and contact variants

A	B	C	D	PN Suffix
1 NO	1 NO			21
2 NO	2 NO			22
1 NO	1 NO	1 NO	1 NO	41
2 NO	2 NO	2 NO	2 NO	42





# FOOT SWITCHES

Foot switches are used to start and stop operations and production processes on machinery and equipment where operation by hand is not possible. Safety foot switches can also be used as enabling switches when carrying out set-up, retrofit or service processes where the machine will run with safety guards open.

Typical applications include metal forming machines, woodworking machines, and machinery for packaging and textile industries.

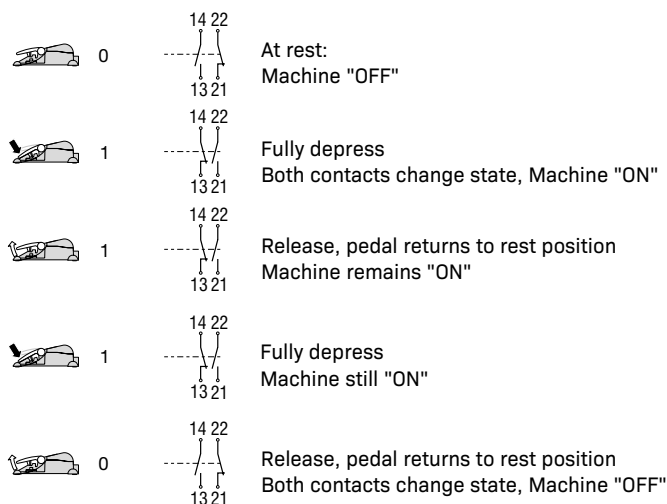
## NKF Series

The NKF foot switch is a compact, low profile design, offering one, two or three pedals. The rugged ABS plastic foot switch is available with snap-action change-over contacts, or NO contacts – up to two contacts per pedal. Standard with two meter pre-wired cable, other custom colors and pedal configurations are available.

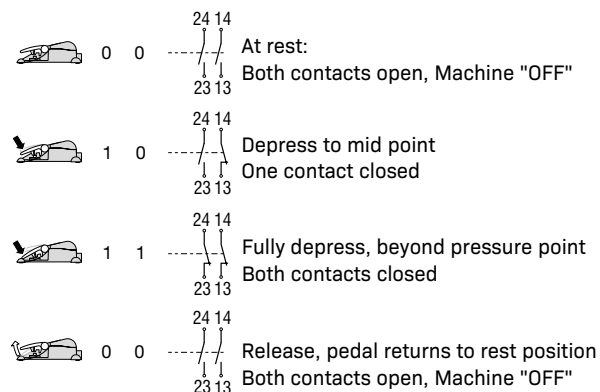
## F 232 Series

Foot switches of the F-232 series are available as single or dual pedal versions. The FH-232 series are available with an optional, ergonomic protective shield to protect against unintentional operation. The powder-coated, robust die-cast enclosures are resistant to high mechanical loads. The 232 series foot switches are available with slow action (T) or snap action (Z) contacts, with 2 or 4 NO/NC contact per pedal. Optional functions include a pressure point (staggered) operation or a bi-stable (start/stop) function. Custom housing colors are also available.

### F-232 options: Start/stop function (F)



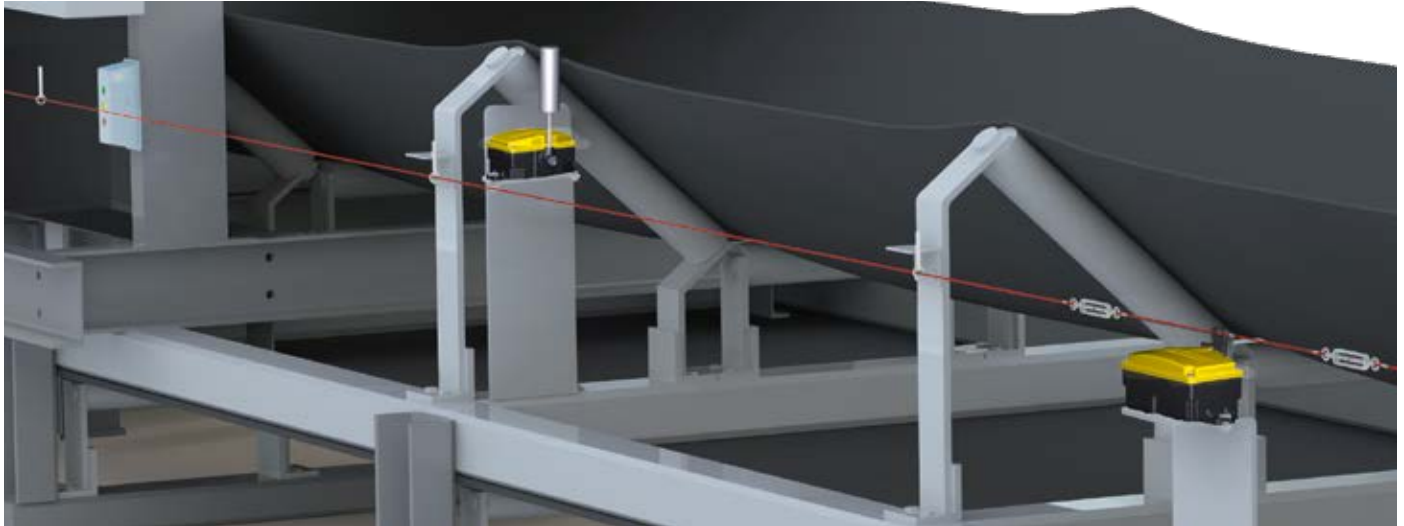
### Staggered contacts with 3 position actuation (HD)



Series	NKF	NKF2	NKF3	F 232	2F 232
Type	Single pedal	Two pedal	Three Pedal	Single pedal	Two pedal
Housing Material	Thermoplastic	Thermoplastic	Thermoplastic	Aluminum die-cast	Aluminum die-cast
Pedal Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Dimensions	77 x 49 x 123 mm	215 x 49 x 138 mm	351 x 49 x 150 mm	170 x 189 x 274 mm	295 x 189 x 274 mm
IP Rating	IP67	IP67	IP67	IP65	IP65
Contacts	1PW (1 Changeover) 2PW (2 Changeover) 10 = 1 NO 20 = 2 NO	1PW (1 Changeover) 2PW (2 Changeover) 10 = 1 NO 20 = 2 NO  (all pedals same)	1PW (1 Changeover) 2PW (2 Changeover) 10 = 1 NO 20 = 2 NO  (all pedals same)	11 = 1 NO & 1 NC 02 = 2 NC 20 = 2 NO 22 = 2 NO & 2 NC 04 = 4 NC 40 = 4 NO	11 = 1 NO & 1 NC 02 = 2 NC 20 = 2 NO 22 = 2 NO & 2 NC 04 = 4 NC 40 = 4 NO
Options	Cable from left, back, or right	Cable from left, back, or right	Cable from left, back, or right	Protective hood (H) HD = Staggered contacts with 3 position actuation F = start/stop function	Protective hood (H) HD = Staggered contacts with 3 position actuation F = start/stop function



# HEAVY DUTY SWITCHES



## Basic version: (BS655/656)

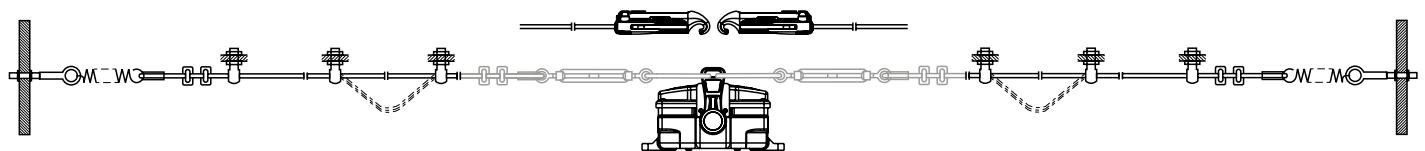
- Base switch provided without actuators. Function based on actuator types:
  - Position detection:** Lever arms with plastic or stainless steel roller
  - Belt alignment:** 3 different diameter rollers for use with belt speeds
- Serrated shaft – positive linkage, starting position of actuators can be set in 45° increments.
- Cast iron (655) or thermoplastic (656) housing for various application environments
- Optional Dupline® interface: diagnostic functions with minimal wiring effort

Find more details on page 24



## Emergency Cable Pull version: (RS655/656)

- The emergency stop function can be triggered at any point on the wire rope
- Bi-directional actuation, up to 100 meters (both directions) – reduces the number of pull-wire emergency stop switches, minimises costs
- Optional DuplineSafe® interface: fail-safe in series wiring including diagnostic with minimal wiring effort
- Cable and installation accessories available:





# HEAVY DUTY LIMIT SWITCHES

## M330 series

This series is a heavy duty version of standard full size European Norm switches. They are IP65 and thus suitable for low-pressure water spray. In addition they have seawater-proof bodies with stainless steel or surface protected external metal parts. The body and actuator seals are resistant to most oils and gasoline.

## Universal Series U 431,432,433 & 434

This series features slow action 1, 2, 3, and 4 contact models with field convertible NO and or NC contacts. In addition the switching point is field adjustable. Optionally, models are available with low temperature (-30°C) contacts, add -1252 to part number. These switches are IP65 rated and have three conduit entries.



Series	M330	U431	U432	U433	U434
<b>Material</b>	Die cast alloy	Die cast alloy	Die cast alloy	Die cast alloy	Die cast alloy
<b>Dimensions</b>	40 x 76 x 40 mm	58 x 62 x 50 mm	80 x 62 x 50 mm	105 x 62 x 50 mm	127 x 62 x 50 mm
<b>IP Rating</b>	IP65	IP65	IP65	IP65	IP65
<b>Connections</b>	Screw Terminals	Screw Terminals	Screw Terminals	Screw Terminals	Screw Terminals
<b>Actuation</b>	Snap Action	Slow Action	Slow Action	Slow Action	Slow Action
<b>Contacts</b>	1 NO & 1 NC	1 NO 1 NC	2 NO 2 NC 1 NO & 1 NC	3 NO 3 NC 1 NO & 2 NC 2 NO & 1 NC	4 NO 4 NC 1 NO & 3 NC 3 NO & 1 NC 2 NO & 2 NC
<b>Options</b>	LED (G24)	Low temperature (-1252)	Low temperature (-1252)	Low temperature (-1252)	Low temperature (-1252)
<b>Actuators</b>	S plunger 2S telescopic plunger 3S side plunger R roller plunger 3R side roller plunger K offset roller lever 3K angle roller lever AF spring rod 4D forked roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever	S plunger K offset roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever	S plunger K offset roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever	S plunger K offset roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever	S plunger K offset roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever



# HEAVY DUTY LIMIT SWITCHES

## T/M 015, 016 & 017 Series

This series features snap action and/or slow action contacts in 2, 3 & 4 contact configurations. Slow action models are available with over lapping contacts. As an option, blow out magnets are available for switching up to 1A at 220v DC. These switches are IP65 rated and feature 3 conduit entries for flexibility in installation.



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Series	T/M015	T016	T/M017	T422	T/M441
<b>Material</b>	Die cast alloy	Die cast alloy	Die cast alloy	Cast Iron	Cast Iron
<b>Dimensions</b>	75 x 67 x 43 mm	105 x 67 x 43 mm	130 x 67 x 43 mm	71 x 106 x 63 mm	99 x 106 x 63 mm
<b>IP Rating</b>	IP65	IP65	IP65	IP65	IP65
<b>Connections</b>	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
<b>Actuation</b>	Snap Action (M) Slow Action (T)	Slow Action	Snap Action (M) Slow Action (T)	Slow Action	Snap Action (M) Slow Action (T)
<b>Contacts</b>	1 NO & 1 NC 2 NO 2 NC	1 NO & 2 NC 2 NO & 1 NC 3 NO 3 NC	2 NO & 2 NC 1 NO & 3 NC 3 NO & 1 NC	1 NO 1 NC	1 NO & 1 NC
<b>Options</b>	Overlapping slow contacts (U) Staggered slow contacts (H) Magnetic blowout (C)	Overlapping slow contacts (U) Staggered slow contacts (H) Magnetic blowout (C)	Overlapping slow contacts (U) Staggered slow contacts (H) Magnetic blowout (C)	Extreme temp (T)	Extreme temp (T) Overlapping slow contacts (U)
<b>Actuators</b>	S plunger 2S telescopic plunger K offset roller lever 2K rocking offset roller 3K angle roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever	S plunger 2S telescopic plunger K offset roller lever 2K rocking offset roller 3K angle roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever	S plunger 2S telescopic plunger K offset roller lever 2K rocking offset roller 3K angle roller lever H roller lever 2H resin leaf-spring 3H large roller on lever 4H spring rod on shaft 6H steel leaf-spring 7H adj lever with roller 8H roller on short lever 9H steel rod lever 10H adj plastic rod lever	S plunger 2S telescopic plunger R roller plunger K offset roller lever J offset large roller lever 2C fork lever L roller lever D roller long lever	S plunger 2S telescopic plunger R roller plunger K offset roller lever J offset large roller lever 2C fork lever L roller lever D roller long lever

# HEAVY DUTY LIMIT SWITCHES

## T/M 422, 441, 452, 461 & 470

This series features 1, 2, 3, 4, & 6 contact configurations. Models for high/low temperature and tropical environments are optional. In addition, overlapping and staggered contacts are available on selected models. These switches are IP65 rated and have 2 or 4 (470 only) conduit entries.

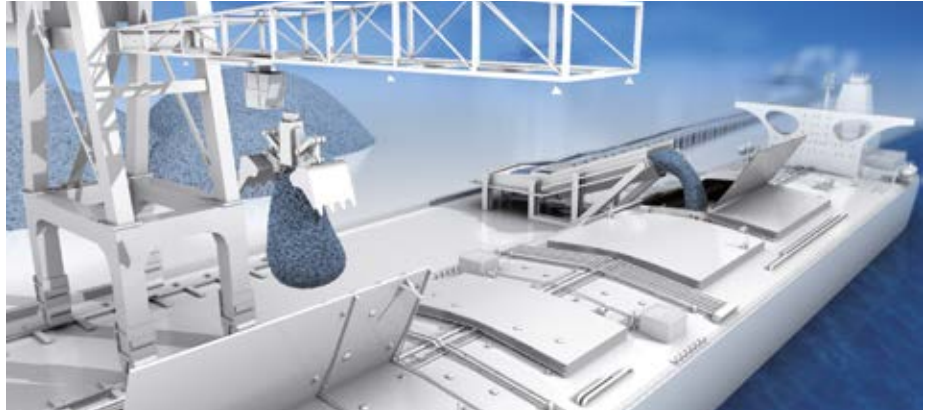


Series	T452	T461	T470	T/M064	T067
<b>Material</b>	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron
<b>Dimensions</b>	127 x 118 x 64 mm	155 x 118 x 64 mm	194 x 118 x 64 mm	156 x 111 x 149 mm	155 x 111 x 142 mm
<b>IP Rating</b>	IP65	IP65	IP65	IP65	IP65
<b>Connections</b>	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
<b>Actuation</b>	Slow Action	Slow Action	Slow Action	Snap Action (M) Slow Action (T)	Slow Action
<b>Contacts</b>	1 NO & 2 NC 2 NO & 1 NC 2 NO 2 NC	2 NO & 2 NC 1 NO & 3 NC 3 NO & 1 NC 3 NO 3 NC	3 NO & 3 NC	3 NO, 3 NC 1 NO & 2 NC 2 NO & 1 NC 4 NO, 4 NC 1 NO & 3 NC 2 NO & 2 NC 3 NO & 1 NC	2 NC 1 NO & 1 NC 2 NO 1 NC left & 1 NC right 1 NO left & 1 NO right
<b>Options</b>	Extreme temp (T)	Extreme temp (T)	Extreme temp (T)	Extreme temp (T) Position latching (R)	Overlapping contacts (U) Staggered contacts (H)
<b>Actuators</b>	S plunger 2S telescopic plunger R roller plunger K offset roller lever J offset large roller lever 2C fork lever L roller lever D roller long lever	S plunger 2S telescopic plunger R roller plunger K offset roller lever J offset large roller lever 2C fork lever L roller lever D roller long lever	S plunger 2S telescopic plunger R roller plunger K offset roller lever J offset large roller lever 2C fork lever L roller lever D roller long lever	S plunger J offset roller lever X offset roller long lever	L roller lever V roller long lever C fork lever A roller lever 2A roller long lever Z long pull lever 2Z pull lever 4D forked offset roller

# HEAVY DUTY LIMIT SWITCHES

## T/M 064, 067, 130, 136, 471, 035 & 250

These switches feature up to 10 contacts rated at 25 or 60 amps. A wide variety of options are available including high/low temperature models, overlapping and staggered contacts, latching contacts, and magnetic blow out contacts. Most are IP65 rated and have up to 4 conduit entries.



Series	T130	T136	T/M471	T/M035	T/M250
<b>Material</b>	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron
<b>Dimensions</b>	236 x 135 x 120 mm	236 x 154 x 120 mm	194 x 123 x 130 mm	58 x 142 x 61.5 mm	103 x 180 x 100 mm
<b>IP Rating</b>	IP65	IP65	IP65	IP67	IP67
<b>Connections</b>	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
<b>Actuation</b>	Slow Action	Slow Action	Snap Action (M) Slow Action (T)	Snap Action (M) Slow Action (T)	Snap Action (M) Slow Action (T)
<b>Contacts</b>	3 NO & 3 NC	3 NO 3 NC	2 NC left & 2 NC right 2 NO left & 2 NO right 3 NC left & 3 NC right 1NO/2NC left & 1NO/2NC right 2NO/1NC left & 2NO/1NC right 3 NO left & 3 NO right	1 NO & 1 NC 2 NO 2 NC	1 NO & 1 NC 2 NC 2 NC left & 2 NC right
<b>Options</b>	Overlapping slow contacts (U) Staggered slow contacts (H) Position latching (R )		Overlapping slow contacts (U) Staggered slow contacts (H) Position latching (R )	Overlapping slow contacts (U) Staggered slow contacts (H) Magnetic blowout (C)	Overlapping slow contacts (U) Magnetic blowout (C) Position latching (R ) Extreme temp (T)
<b>Actuators</b>	L roller lever V roller long lever C fork lever A roller lever 2A roller long lever Z long pull lever 2Z pull lever 4D forked offset roller	L roller lever V roller long lever C fork lever A roller lever 2A roller long lever Z long pull lever 2Z pull lever 4D forked offset roller	L roller lever V roller long lever C fork lever A roller lever 2A roller long lever Z long pull lever 2Z pull lever 4D forked offset roller	2L roller lever	D roller lever

# SPECIAL LIMIT SWITCHES

Material handling applications often need special purpose switches for slack wire detection, belt alignment, or rotation applications such as gear or spindle switches. Many feature the heavy duty limit switch housings with uniquely designed actuators for these purposes.

**Slack-wire** switches monitor wire rope tension. With correct tension present, the switch is actuated. The actuator arm contains a heavy duty roller.

**Belt alignment** switches are actuated when the conveyor belt becomes misaligned. Depending on the plant arrangements, this signal can be used to switch the equipment off or to provide automatic correction of the belt alignment. The actuator arm contains a heavy duty roller and can be actuated to either side.

The MSP452 **rotating spindle switch** with snap-action insert is suitable for use in normal to average operating conditions in machine tools, cranes, and conveyors. Actuation of the switch is adjustable and can be set between 4 and 55 spindle revolutions, with a 5 revolution run-out.

**Gear-switches** are suitable for use in the most varied application. In studios and on stages, applications include the control and positioning of carriages, portals and bridges. An important field of application is for the monitoring and control of outriggers, trolleys and lifting movements for cranes. On industrial ovens, gear-switches are used on door and gate control systems. Further applications are to be found on waterways (control of weirs and locks), in environmental protection (sewage plants, flue gas treatment plants), greenhouses and sport stadiums (roof controls). These switches are available with a variety of cam styles which can be offset for timing of particular events.



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Series	T/M 441	M 330	T/M250	T/M441	G50	MSP452
Type	Slack wire	Belt Alignment	Belt Alignment	Belt Alignment	Geared	Rotating Spindle
Material	Cast iron	Die cast alloy	Cast iron	Cast iron	Die cast alloy	Cast iron
Dimensions	106 x 181 x 63 mm	40 x 76 x 40 mm	103 x 180 x 70 mm	106 x 99 x 63 mm	200 x 98 x 114 mm	118 x 174 x 64 mm
IP Rating	IP65	IP66	IP65	IP65	IP66	IP65
Connection	Screw Terminals	Screw Terminals	Screw Terminals	Screw Terminals	Screw Terminals	Screw Terminals
Actuation	Snap Action (M) Slow Action (T)	Snap Action	Snap Action (M) Slow Action (T)	Snap Action (M) Slow Action (T)	Snap Action (M, Z) Slow Action (T)	Snap Action
Contacts	1 NO & 1 NC	1 NO & 1 NC	1 NO & 1 NC 2 NO & 2 NC	1 Changover (M) 1 NO & 1 NC	1 to 4 NO 1 to 4 NC	2 NO & 2 NC
Notes		Rod lever with nylon roller	Lever arm with aluminum roller, several roller length available Extreme temp version (T)	Lever arm with aluminum roller, several roller length available Overlapping contacts (U) Extreme temp version (T)	Various cam shapes for varying switch travel. Additional gear ratios available.	Adjustable spindle revolutions

## HDS PLATFORM

Suitable for limit switch or belt alignment, depending on optional actuator arms (ordered separately):



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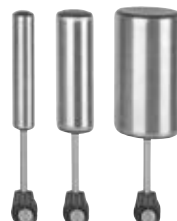
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**Position switch lever** (roller diameter 50 mm)

**BS-H50-110-RKS** Stainless steel lever with plastic roller

**BS-H50-110-RVA** Stainless steel lever with stainless steel roller



**Belt misalignment lever** (running surface 150 mm)

**BS-B30-150-RVA** Stainless steel lever with 30 mm stainless steel roller for belt speeds to 3 m/s

**BS-B50-150-RVA** Stainless steel lever with 50 mm stainless steel roller for belt speeds to 6 m/s

**BS-B90-150-RVA** Stainless steel lever with 90 mm stainless steel roller for belt speeds to 12 m/s

Series	BS655	BS656
Material	Cast iron	Thermoplastic
Dimensions	188 x 105 x 119 mm	188 x 108 x 119 mm
IP Rating	IP66, IP67	IP66, IP67
Notes	Screw Terminal connections Snap action (Z) or Slow action (T) actuation 2 NO & 2 NC or 3 NO & 3 NC contact configuration Optional Dupline communication module	

# PULL-WIRE SWITCHES

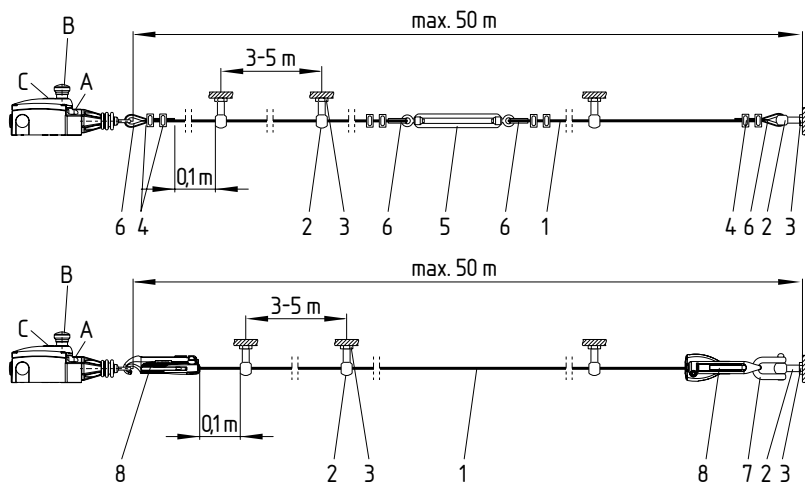
The pull-wire switches are used to give signals to start machines and to open or close electrically driven doors, gates and barriers. These switches are manually operated by pulling the wire.

## TQ200 & TQ700S

### Vertical mounting application



### Typical horizontal mounting application



#### Legend

- 1 Wire rope (STQ441-SC)
- 2 Eyebolt (STQ441-EB)
- 3 Spring (RZ-Spring)
- 4 Wire clamp (STQ441-CC)
- 5 Tensioner (STQ441-TB)
- 6 Wire thimble (STQ441-TH)
- 7 Shackle (S900-SH)
- 8 Rope tensioner (S900)
- A Position indicator
- B Reset button



Series	TQ200	TQ215/TQ315	TQ700	TQ900	TQ441
<b>Material</b>	Light alloy die-cast	Zinc Die cast	Thermoplastic	Zinc Die cast	Die cast alloy
<b>Dimensions</b>	60 x 250 x 32 mm	(215) 32 x 93.5 x 31 mm (315) 37 x 93.5 x 40 mm	40.5 x 160 x 42.2 mm	71.5 x 220.3 x 69.7 mm	106 x 99 x 63 mm
<b>IP Rating</b>	IP67	IP67	IP67	IP67	IP65
<b>Connection</b>	Screw Terminals	Screw Terminals	Screw Terminals	Screw Terminals	Screw Terminals
<b>Actuation</b>	Slow Action	Slow Action	Slow Action	Slow Action	Slow Action
<b>Contacts</b>	1 NC 1 NO / 1 NC	2 NC 1 NO / 1 NC 1 NO / 2 NC	2 NO 1 NO & 1 NC 2 NC	1 NO & 1 NC 2 NC 1 NO & 3 NC 2 NO & 2 NC 4 NC	2 NC
<b>Notes</b>	Vertical mount cable up to 3 m	Cable up to 25 m Pull to Left(L) or Right(R)	Cable up to 10 m	Cable up to 50 m	Cable up to 25 m Pushbutton or key reset

## PULL-WIRE ACCESSORIES



Red Cable



S900 Tensioner



Eyebolt



Shackle



Thimble



Wire clamp



Turnbuckle



Tension spring



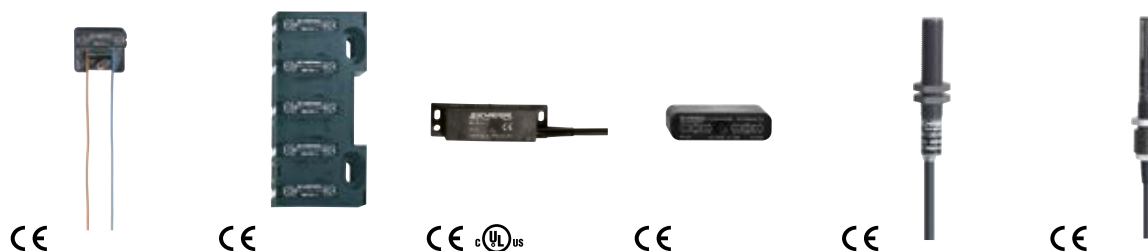
# MAGNETIC REED SWITCHES

Schmersal offers a wide variety of magnetic reed switches, which actuate in the presence of a magnetic field. They are available in rectangular or cylindrical profiles, constructed from durable thermoplastics or robust metal housings for harsher environments.

These magnetic reed switches have been successfully applied as position sensors in elevators, suspension railways, amusement park rides, and on AGVs. A wide variety of actuators are available, based on desired sensing distance, housing material, and mounting type.



Series	BN12	BN20	BN32	BN65	BN75	BN80
<b>Body Type</b>	Cylindrical	Rectangular	Rectangular	Cylindrical	Float switch	Rectangular
<b>Dimensions</b>	10.7 mm Ø x 71 mm	104 x 52 x 47 mm	85 x 26 x 24 mm	13 mm Ø x 103 mm	80 x 99.5 x 55 mm	44 x 13 x 9 mm
<b>Material</b>	Metal	Aluminum	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
<b>IP Rating</b>	IP67	IP67	IP67	IP67	IP68	IP67
<b>Connection</b>	Prewired Cable (1M)	Screw terminals	Flat plug connector	Prewired Cable (1M)	Plug connection or Prewired Cable (1M)	Prewired Cable (1M)
<b>Contacts</b>	1 NO 1 NC 1 Bistable	1 NO, 1 NC, 2 NO, 2 NC, 1 NC / 1 NO 1 Bistable, 2 Bistable 2 Bistable NC/NO	1 NO, 1 NC 1 Changeover 1 Bistable, 1 Bistable NC/NO	1 NO 1 NC 1 Bistable	1 NO 1 NC 1 NC / 1 NO	1 NO 1 NC 1 Bistable



Series	BN85	BN85-5	BN310	BN325	BN120	BN650
<b>Body Type</b>	Rectangular	Rectangular	Rectangular	Rectangular	Cylindrical	Cylindrical
<b>Dimensions</b>	40 x 35 x 16.5 mm	65 x 20 x 140 mm	88 x 25 x 13 mm	85 x 26 x 24 mm	10.7 mm Ø x 102 mm	13 mm Ø x 103 mm
<b>Material</b>	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
<b>IP Rating</b>	IP40	IP30	IP67	IP40 (plug) IP67 (cable)	IP67	IP67
<b>Connection</b>	2 wires	Connector, 10 pole	Prewired Cable (1M)	Flat plug connection or Prewired Cable (1M)	Prewired Cable (1M)	Prewired Cable (1M)
<b>Contacts</b>	1 Bistable	5 Bistable	1 NO 1 NC 1 Bistable	1 Bistable	1 NO 1 NC 1 Bistable	1 NO 1 NC 1 Bistable

# SATECH GUARDING SYSTEMS



## Overview

Schmersal is proud to partner with SATECH to provide guarding solutions

- Modular system based on framed panels and connection systems
- Installs quickly and easily
- Easy field modifications
- Rugged, steel construction
- Many access door options: hinged, folding, sliding, telescoping
- Accessories include cutting kit, ground latch for doors, post support strut.
- Mounting plates for Schmersal solenoid locks and safety sensors

## SATECH

Modular Machine Guards

## Design Services



These systems are custom designed for each client. Each design generates 3D models and a full parts list, including all of the necessary installation hardware.



## FastGuard

### Designed for Speed of installation

The machine guard chosen for the quickest assembly – no posts and few bolts saves up to 70% assembly time. Fence panels slip into footer stands and are secured at top with a clip. This system is ideal for the partitioning of areas and for conveyor belts on automatic lines.

## EasyGuard

### Designed for Handiness

The most popular machine guard system is simple and effective, ideal for most industrial applications. Fence panels are connected to posts using fast clips at the top and bottom. This system features two post size options, and welded baseplates.

## ImpactGuard

### Designed for Robustness


This robust machine guard is ideal for heavy-duty applications. Fence panels are secured to posts using captive bolts. This system provides a sturdy structure, able to absorb impacts from the inside up to 2200 J.

# Engineering Services

tec.nicum offers product- and manufacturer-neutral consultation on important matters relating to machine safety and work protection. Our TÜV Certified Functional Safety Engineers for Machinery can plan and realize complex solutions for safety around the world in close collaboration with clients.

**tec.nicum**  
Schmersal Group

tec.nicum services cover six areas, which can be obtained as individual modules or as complete packages:

<b>academy</b> <b>Education center</b> <ul style="list-style-type: none"><li>■ Training courses</li><li>■ Customer-specific trainings</li><li>■ In-house seminars</li><li>■ Certified courses (mce.expert and FSE)</li></ul>	 <b>consulting</b> <b>Analysis and documentation</b> <ul style="list-style-type: none"><li>■ Technical support</li><li>■ Risk assessment</li><li>■ CE conformity assessment</li><li>■ Evaluation of machines and production lines</li><li>■ Reports</li></ul>
<b>engineering</b> <b>Planning and design</b> <ul style="list-style-type: none"><li>■ Technical project planning</li><li>■ Conceptual project development</li><li>■ Electrical and mechanical design</li><li>■ Executive project management</li></ul>	 <b>integration</b> <b>Practical application</b> <ul style="list-style-type: none"><li>■ Turnkey approach</li><li>■ Installation</li><li>■ Retrofit</li></ul>
<b>digitalisation</b> <b>Software integration</b> <ul style="list-style-type: none"><li>■ tec.ps (Product Service System)</li><li>■ tec.ssm (Schmersal Smart Machine)</li><li>■ tec.cvs (AI and Computational Vision Solutions)</li><li>■ tec.dloto (Digital Lockout Tagout)</li><li>■ tec.ems (Energy Monitoring System)</li></ul>	 <b>outsourcing</b> <b>Serial solutions</b> <ul style="list-style-type: none"><li>■ Plug &amp; Play products</li><li>■ Engineer to Order projects</li><li>■ Systems and cabinets</li></ul>

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