4. Position switches
Description

Area of application

Type 1 position switches according to EN ISO 14119 are for determining the position and monitoring of movable components on machines and for protective equipment that can be moved laterally or is rotatable.

Position switches can generally be found in all industrial environments and are used in almost all areas of automation technology.

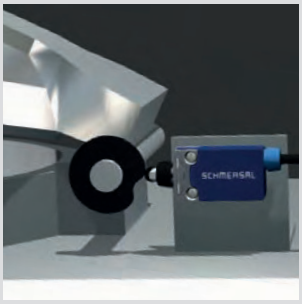
Design and way of functioning

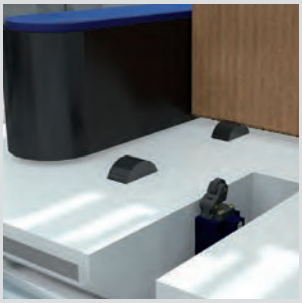
Different series are available. The bandwidth goes form the ultra-compact position switch to the integration in automated plants and also includes robust switch-gear being used in harsh ambient conditions in the materials handling industry or in the steel industry.

All position switches have positively opening NC contacts according to IEC 60947-5-1. In conjunction with an appropriate safety analysis, a single position switch can be used up to PL d according to EN ISO 13849-1. Using two position switches PL e can be achieved. Information for the selection of suitable safety relay modules can be found in the chapter "Safety relay modules" (refer to page 216).

The Schmersal Groups position switch range includes variants with integrated AS-i SaW interface (AS-Interface Safety at Work). They use the advantage of the simple and proven bus system of the open standards AS - International.

The ATEX/ IECEx-certified variants allow for use in potentially explosive environments. Corresponding solutions exist for the zones 2 and 22 as well as 1 and 21.





Various designs

Depending on the series, the position switch can be used in ambient temperatures up to -40 °C and +80 °C.

The user can select between metal and plastic, as well as various basic bodies. Mounting dimensions and switching points as well as actuators according to EN 50041 and EN 50047 create the prerequisite for universal use. In this way, it is also possible to install or retrofit the position switch in existing machine designs.

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

4. Position switches
Overview of the series

	■ PS116	■ 235	■ 236
Key Features			
	• 3 contacts • Design to DIN EN 50047 • Compact metall/thermoplastic enclosure • Cable 2 m or connector plug M12	• 2 contacts • Design to DIN EN 50047 • Metal enclosure • Screw terminal or M12 connector	• 2 contacts • Design to DIN EN 50047 • Thermoplastic enclosure • Screw terminal or M12 connector [1]
Other versions			
ATEX / IECEx	–	■	–
AS-i SaW	– [4]	■	■
Technical features			
Electrical characteristics			
Max. switching capacity U/I	230 VAC / 3 A; 24 VDC / 1.5 A	230 VAC / 4 A; 24 VDC / 1 A	230 VAC / 4 A; 24 VDC / 1 A
Mechanical data			
Housing material	glass-fibre reinforced thermoplastic, zinc die-cast	zinc die-cast, paint finish	glass-fibre reinforced thermoplastic
Cable entry	–	1 x M20	1 x M20
Cable section [3]	0.5 mm²	0.75 … 2.5 mm²	0.75 … 2.5 mm²
Dimensions (W x H x D)	31 x 52 x 16.6 mm	30 x 63.5 x 30 mm	30 x 61.5 x 30 mm
Ambient conditions			
Ambient temperature	−30 °C … +80 °C	−30 °C … +80 °C	−30 °C … +80 °C
Protection class	IP66, IP67	IP67	IP67
Actuator heads	see page 82	see page 88	see page 88
Safety classification			
Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
B_{10d} (NC contact)	20,000,000	20,000,000	20,000,000
Certificates			

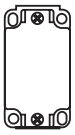
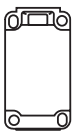
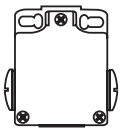
[1] Alternative with cut clamp terminals
[2] There is the possibility to feed the connection line through
[3] Incl. conductor ferrules (exception PS116)
[4] Can be realised via an external safety input module ASIM-C-M12-4P-xxxM

To get detailed information about the products and certificates, visit **www.schmersal.net**.

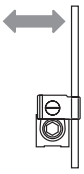
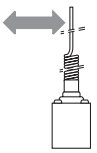
			
■ 256	**■ 335**	**■ 355**	**■ 336**
• 2 contacts • Design to DIN EN 50047 • Thermoplastic enclosure • Screw terminal or M12 connector [2]	• 3 contacts • Design to DIN EN 50041 • Metal enclosure • Screw terminal or M12 connector	• 3 contacts • Design to DIN EN 50041 • Metal enclosure • Screw terminal or M12 connector [2]	• 2 contacts • Design to DIN EN 50041 • Thermoplastic enclosure • Screw terminal or M12 connector
–	■	■	–
■	■	– [4]	■
230 VAC / 4 A; 24 VDC / 1 A	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A
glass-fibre reinforced thermoplastic	Aluminium die-cast, paint finish	Aluminium die-cast, paint finish	glass-fibre reinforced thermoplastic
2 x M20	1 x M20	3 x M20	1 x M20
0.75 … 2.5 mm²	0.75 … 2.5 mm²	0.75 … 2.5 mm²	0.75 … 2.5 mm²
58 x 50.5 x 31 mm	40.5 x 76 x 38 mm	66.7 x 76 x 38 mm	40.5 x 76 x 38 mm
−30 °C … +80 °C	−30 °C … +80 °C	−30 °C … +80 °C	−30 °C … +80 °C
IP67	IP67	IP67	IP67
see page 88	see page 96	see page 96	see page 96
EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
20,000,000	20,000,000	20,000,000	20,000,000

4. Position switches

Z/T 2../3.. - Preferred types and ordering details

Position switches					Actuator heads					
					Plunger				Offset roller lever	
					S	R	4NO	4R	1R	K / 1K
Design	Metal	Thermoplastic	Switching system	Contacts						
DIN EN 50047	 235		Snap action	1 NO/1 NC	ZS 235-11Z	ZR 235-11Z	Z4S 235-11Z	Z4R 235-11Z	Z1R 235-11Z	ZK 235-11Z
				2NC	ZS 235-02Z	ZR 235-02Z	Z4S 235-02Z	Z4R 235-02Z	Z1R 235-02Z	ZK 235-02Z
			Slow action	1 NO/1 NC	TS 235-11Z	TR 235-11Z	T4S 235-11Z	T4R 235-11Z	T1R 235-11Z	TK 235-11Z
				2NC	TS 235-02Z	TR 235-02Z	T4S 235-02Z	T4R 235-02Z	T1R 235-02Z	TK 235-02Z
				2NO	TS 235-20Z	TR 235-20Z	T4S 235-20Z	T4R 235-20Z	T1R 235-20Z	TK 235-20Z
		 236	Snap action	1 NO/1 NC	ZS 236-11Z	ZR 236-11Z	Z4S 236-11Z	Z4R 236-11Z	Z1R 236-11Z	ZK 236-11Z
				2NC	ZS 236-02Z	ZR 236-02Z	Z4S 236-02Z	Z4R 236-02Z	Z1R 236-02Z	ZK 236-02Z
			Slow action	1 NO/1 NC	TS 236-11Z	TR 236-11Z	T4S 236-11Z	T4R 236-11Z	T1R 236-11Z	TK 236-11Z
				2NC	TS 236-02Z	TR 236-02Z	T4S 236-02Z	T4R 236-02Z	T1R 236-02Z	TK 236-02Z
				2NO	TS 236-20Z	TR 236-20Z	T4S 236-20Z	T4R 236-20Z	T1R 236-20Z	TK 236-20Z
		 256	Snap action	1 NO/1 NC	ZS 256-11Z	ZR 256-11Z	Z4S 256-11Z	Z4R 256-11Z	Z1R 256-11Z	ZK 256-11Z
				2NC	ZS 256-02Z	ZR 256-02Z	Z4S 256-02Z	Z4R 256-02Z	Z1R 256-02Z	ZK 256-02Z
			Slow action	1 NO/1 NC	TS 256-11Z	TR 256-11Z	T4S 256-11Z	T4R 256-11Z	T1R 256-11Z	TK 256-11Z
				2NC	TS 256-02Z	TR 256-02Z	T4S 256-02Z	T4R 256-02Z	T1R 256-02Z	TK 256-02Z
				2NO	TS 256-20Z	TR 256-20Z	T4S 256-20Z	T4R 256-20Z	T1R 256-20Z	TK 256-20Z
DIN EN 50041	 335		Snap action	1 NO/1 NC	ZS 335-11Z	ZR 335-11Z	–	–	–	Z1K 335-11Z
				2NC	ZS 335-02Z	ZR 335-02Z	–	–	–	Z1K 335-02Z
			Slow action	1 NO/1 NC	TS 335-11Z	TR 335-11Z	–	–	–	T1K 335-11Z
				2NC	TS 335-02Z	TR 335-02Z	–	–	–	T1K 335-02Z
				2NO	TS 335-20Z	TR 335-20Z	–	–	–	T1K 335-20Z
				1NC L/1NC R	–	–	–	–	–	-
				1 NO/2 NC	TS 335-12Z	TR 335-12Z	–	–	–	T1K 335-12Z
				3NC	TS 335-03Z	TR 335-03Z	–	–	–	T1K 335-03Z
		 336	Snap action	1 NO/1 NC	ZS 336-11Z	ZR 336-11Z	–	–	–	Z1K 336-11Z
				2NC	ZS 336-02Z	ZR 336-02Z	–	–	–	Z1K 336-02Z
			Slow action	1 NO/1 NC	TS 336-11Z	TR 336-11Z	–	–	–	T1K 336-11Z
				2NC	TS 336-02Z	TR 336-02Z	–	–	–	T1K 336-02Z
				2NO	TS 336-20Z	TR 336-20Z	–	–	–	T1K 336-20Z
				1NC L/1NC R	–	–	–	–	–	-
	 355		Snap action	1 NO/1 NC	ZS 355-11Z	ZR 355-11Z	–	–	–	Z1K 355-11Z
				2NC	ZS 355-02Z	ZR 355-02Z	–	–	–	Z1K 355-02Z
			Slow action	1 NO/1 NC	TS 355-11Z	TR 355-11Z	–	–	–	T1K 355-11Z
				2NC	TS 355-02Z	TR 355-02Z	–	–	–	T1K 355-02Z
				2NO	TS 355-20Z	TR 355-20Z	–	–	–	T1K 355-20Z
				1NC L/1NC R	–	–	–	–	–	-
				1 NO/2 NC	TS 355-12Z	TR 355-12Z	–	–	–	T1K 355-12Z
				3NC	TS 355-03Z	TR 355-03Z	–	–	–	T1K 355-03Z

[1] Not all actuator heads are suitable for safety applications!

Actuator heads									
Angle roller lever			Roller lever						
3K	4K	K4	1H / H	7H [1]	7H-2138	10H [1]	12H	14H	AF [1]
									
Z3K 235-11Z	Z4K 235-11Z	ZK4 235-11Z	ZV1H 235-11Z	ZV7H 235-11Z	ZV7H 235-11Z-2138	ZV10H 235-11Z	ZV12H 235-11Z	ZV14H 235-11Z	ZAF 235-11Z
Z3K 235-02Z	Z4K 235-02Z	ZK4 235-02Z	ZV1H 235-02Z	ZV7H 235-02Z	ZV7H 235-02Z-2138	ZV10H 235-02Z	ZV12H 235-02Z	ZV14H 235-02Z	–
T3K 235-11Z	T4K 235-11Z	TK4 235-11Z	TV1H 235-11Z	TV7H 235-11Z	TV7H 235-11Z-2138	TV10H 235-11Z	TV12H 235-11Z	TV14H 235-11Z	–
T3K 235-02Z	T4K 235-02Z	TK4 235-02Z	TV1H 235-02Z	TV7H 235-02Z	TV7H 235-02Z-2138	TV10H 235-02Z	TV12H 235-02Z	TV14H 235-02Z	–
T3K 235-20Z	T4K 235-20Z	TK4 235-20Z	TV1H 235-20Z	TV7H 235-20Z	TV7H 235-20Z-2138	TV10H 235-20Z	TV12H 235-20Z	TV14H 235-20Z	–
Z3K 236-11Z	Z4K 236-11Z	ZK4 236-11Z	ZV1H 236-11Z	ZV7H 236-11Z	ZV7H 236-11Z-2138	ZV10H 236-11Z	ZV12H 236-11Z	ZV14H 236-11Z	ZAF 236-11Z
Z3K 236-02Z	Z4K 236-02Z	ZK4 236-02Z	ZV1H 236-02Z	ZV7H 236-02Z	ZV7H 236-02Z-2138	ZV10H 236-02Z	ZV12H 236-02Z	ZV14H 236-02Z	–
T3K 236-11Z	T4K 236-11Z	TK4 236-11Z	TV1H 236-11Z	TV7H 236-11Z	TV7H 236-11Z-2138	TV10H 236-11Z	TV12H 236-11Z	TV14H 236-11Z	–
T3K 236-02Z	T4K 236-02Z	TK4 236-02Z	TV1H 236-02Z	TV7H 236-02Z	TV7H 236-02Z-2138	TV10H 236-02Z	TV12H 236-02Z	TV14H 236-02Z	–
T3K 236-20Z	T4K 236-20Z	TK4 236-20Z	TV1H 236-20Z	TV7H 236-20Z	TV7H 236-20Z-2138	TV10H 236-20Z	TV12H 236-20Z	TV14H 236-20Z	–
Z3K 256-11Z	Z4K 256-11Z	ZK4 256-11Z	ZV1H 256-11Z	ZV7H 256-11Z	ZV7H 256-11Z-2138	ZV10H 256-11Z	ZV12H 256-11Z	ZV14H 256-11Z	ZAF 256-11Z
Z3K 256-02Z	Z4K 256-02Z	ZK4 256-02Z	ZV1H 256-02Z	ZV7H 256-02Z	ZV7H 256-02Z-2138	ZV10H 256-02Z	ZV12H 256-02Z	ZV14H 256-02Z	–
T3K 256-11Z	T4K 256-11Z	TK4 256-11Z	TV1H 256-11Z	TV7H 256-11Z	TV7H 256-11Z-2138	TV10H 256-11Z	TV12H 256-11Z	TV14H 256-11Z	–
T3K 256-02Z	T4K 256-02Z	TK4 256-02Z	TV1H 256-02Z	TV7H 256-02Z	TV7H 256-02Z-2138	TV10H 256-02Z	TV12H 256-02Z	TV14H 256-02Z	–
T3K 256-20Z	T4K 256-20Z	TK4 256-20Z	TV1H 256-20Z	TV7H 256-20Z	TV7H 256-20Z-2138	TV10H 256-20Z	TV12H 256-20Z	TV14H 256-20Z	–
Z3K 335-11Z	–	–	**Z4VH 335-11Z**	**Z4V7H 335-11Z**	**Z4V7H 335-11Z-2138**	**Z4V10H 335-11Z**	–	–	–
Z3K 335-02Z	–	–	**Z4VH 335-02Z**	**Z4V7H 335-02Z**	**Z4V7H 335-02Z-2138**	**Z4V10H 335-02Z**	–	–	–
T3K 335-11Z	–	–	**T4VH 335-11Z**	**T4V7H 335-11Z**	**T4V7H 335-11Z-2138**	**T4V10H 335-11Z**	–	–	–
T3K 335-02Z	–	–	**T4VH 335-02Z**	**T4V7H 335-02Z**	**T4V7H 335-02Z-2138**	**T4V10H 335-02Z**	–	–	–
T3K 335-20Z	–	–	**T4VH 335-20Z**	**T4V7H 335-20Z**	**T4V7H 335-20Z-2138**	**T4V10H 335-20Z**	–	–	–
–	–	–	TVH 335-01/01Z	TV7H 335-01/01Z	TV7H 335-01/01Z-2138	TV10H 335-01/01Z	–	–	–
T3K 335-12Z	–	–	**T4VH 335-12Z**	**T4V7H 335-12Z**	**T4V7H 335-12Z-2138**	**T4V10H 335-12Z**	–	–	–
T3K 335-03Z	–	–	**T4VH 335-03Z**	**T4V7H 335-03Z**	**T4V7H 335-03Z-2138**	**T4V10H 335-03Z**	–	–	–
Z3K 336-11Z	–	–	**Z4VH 336-11Z**	**Z4V7H 336-11Z**	**Z4V7H 336-11Z-2138**	**Z4V10H 336-11Z**	–	–	–
Z3K 336-02Z	–	–	**Z4VH 336-02Z**	**Z4V7H 336-02Z**	**Z4V7H 336-02Z-2138**	**Z4V10H 336-02Z**	–	–	–
T3K 336-11Z	–	–	**T4VH 336-11Z**	**T4V7H 336-11Z**	**T4V7H 336-11Z-2138**	**T4V10H 336-11Z**	–	–	–
T3K 336-02Z	–	–	**T4VH 336-02Z**	**T4V7H 336-02Z**	**T4V7H 336-02Z-2138**	**T4V10H 336-02Z**	–	–	–
T3K 336-20Z	–	–	**T4VH 336-20Z**	**T4V7H 336-20Z**	**T4V7H 336-20Z-2138**	**T4V10H 336-20Z**	–	–	–
–	–	–	TVH 336-01/01Z	TV7H 336-01/01Z	TV7H 336-01/01Z-2138	TV10H 336-01/01Z	–	–	–
Z3K 355-11Z	–	–	**Z4VH 355-11Z**	**Z4V7H 355-11Z**	**Z4V7H 355-11Z-2138**	**Z4V10H 355-11Z**	–	–	–
Z3K 355-02Z	–	–	**Z4VH 355-02Z**	**Z4V7H 355-02Z**	**Z4V7H 355-02Z-2138**	**Z4V10H 355-02Z**	–	–	–
T3K 355-11Z	–	–	**T4VH 355-11Z**	**T4V7H 355-11Z**	**T4V7H 355-11Z-2138**	**T4V10H 355-11Z**	–	–	–
T3K 355-02Z	–	–	**T4VH 355-02Z**	**T4V7H 355-02Z**	**T4V7H 355-02Z-2138**	**T4V10H 355-02Z**	–	–	–
T3K 355-20Z	–	–	**T4VH 355-20Z**	**T4V7H 355-20Z**	**T4V7H 355-20Z-2138**	**T4V10H 355-20Z**	–	–	–
–	–	–	TVH 355-01/01Z	TV7H 355-01/01Z	TV7H 355-01/01Z-2138	TV10H 355-01/01Z	–	–	–
T3K 355-12Z	–	–	**T4VH 355-12Z**	**T4V7H 355-12Z**	**T4V7H 355-12Z-2138**	**T4V10H 355-12Z**	–	–	–
T3K 355-03Z	–	–	**T4VH 355-03Z**	**T4V7H 355-03Z**	**T4V7H 355-03Z-2138**	**T4V10H 355-03Z**	–	–	–

Note for marked variants:
Adjustable switch function: • can be switched in both directions,
• can only be switched clockwise,
• can only be switched anti-clockwise

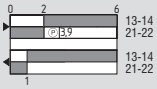
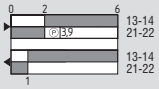
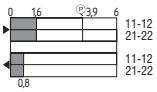
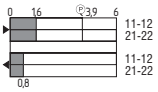
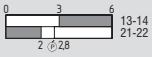
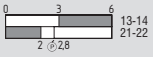
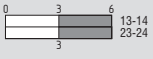
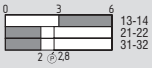
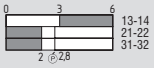
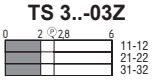
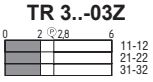
4. Position switches

Z/T 335, 336 and 355 - Actuator heads

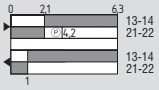
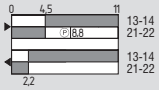
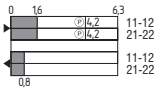
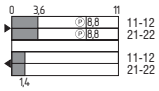
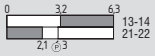
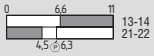
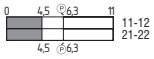
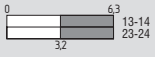
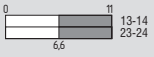
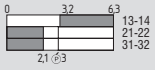
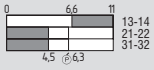
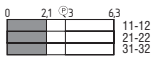
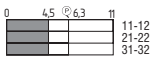
Actuator heads

	Plunger S	Roller plunger R
Actuator description	Actuator type B to EN 50041 Metal plunger	Actuator type C to EN 50041 Plastic roller
Actuating force / torque **Snap action**	12 N	12 N
Slow action	17 N	17 N
Actuating speed	max. 0.5 m/s	max. 0.5 m/s
Positioning the lever	–	–

Switch travel diagrams

Snap action	**1 NO / 1 NC**	**ZS 3..-11Z** 	**ZR 3..-11Z** 
	2 NC	**ZS 3..-02Z** 	**ZR 3..-02Z** 
Slow action	**1 NO / 1 NC**	**TS 3..-11Z** 	**TR 3..-11Z** 
	2 NC	**TS 3..-02Z** 	**TR 3..-02Z** 
	2 NO	**TS 3..-20Z** 	**TR 3..-20Z** 
	1NC left **1NC right**	–	–
	1 NO / 2 NC [2]	**TS 3..-12Z** 	**TR 3..-12Z** 
	3 NC [2]	**TS 3..-03Z** 	**TR 3..-03Z** 

[1] Not all actuator heads are suitable for safety applications!
[2] Only for series 335 and 355
To get detailed information about the products and switch travel diagrams, visit **www.schmersal.net**.

Offset roller lever 1K	Angle roller lever 3K
Thermoplastic offset roller lever with metal plunger	Thermoplastic offset roller lever with metal plunger
12 N	12 N
17 N	17 N
max. 0.5 m/s	max. 0.5 m/s
–	–
Z1K 3..-11Z 	**Z3K 3..-11Z** 
Z1K 3..-02Z 	**Z3K 3..-02Z** 
T1K 3..-11Z 	**T3K 3..-11Z** 
T1K 3..-02Z 	**T3K 3..-02Z** 
T1K 3..-20Z 	**T3K 3..-20Z** 
–	–
T1K 3..-12Z 	**T3K 3..-12Z** 
T1K 3..-03Z 	**T3K 3..-03Z** 

Contact closed

Contact open

Ⓟ Positive break travel / angle

4. Position switches

Z/T 335, 336 and 355 - Actuator heads

Actuator heads

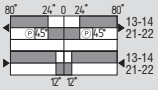
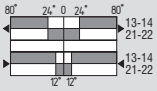
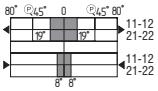
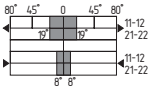
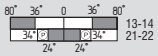
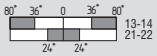
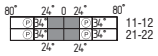
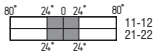
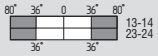
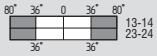
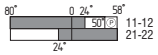
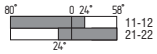
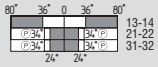
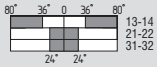
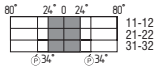
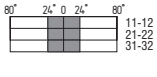
		Roller lever H	Roller lever 7H [1]
Actuator description		Actuator type A to EN 50041 Metal lever with plastic roller	Length-adjustable Metal lever with plastic roller Only suitable for positioning tasks!
Actuating force / torque **Snap action**		26 Ncm	26 Ncm
Slow action		31 Ncm	31 Ncm
Actuating speed		max. 2.5 m/s	max. 2.5 m/s
Positioning the lever		adjustable in 10° steps	adjustable in 10° steps

Switch travel diagrams

Snap action	**1 NO / 1 NC**	**Z4VH 3..-11Z**	**Z4V7H 3..-11Z**
	2 NC	**Z4VH 3..-02Z**	**Z4V7H 3..-02Z**
Slow action	**1 NO / 1 NC**	**T4VH 3..-11Z**	**T4V7H 3..-11Z**
	2 NC	**T4VH 3..-02Z**	**T4V7H 3..-02Z**
	2 NO	**T4VH 3..-20Z**	**T4V7H 3..-20Z**
	1NC left **1NC right**	**T4VH 3..-01/01Z**	**T4V7H 3..-01/01Z**
	1 NO / 2 NC [2]	**T4VH 3..-12Z**	**T4V7H 3..-12Z**
	3 NC [2]	**T4VH 3..-03Z**	**T4V7H 3..-03Z**

[1] Not all actuator heads are suitable for safety applications!
[2] Only for series 335 and 355
To get detailed information about the products and switch travel diagrams, visit **www.schmersal.net**.

Roller lever 7H-2138	Rod lever 10H [1)]
Length-adjustable Metal lever with plastic roller adjustable in 6.5 mm steps	Plastic rod, 200 mm Only suitable for positioning tasks!
26 Ncm	26 Ncm
31 Ncm	31 Ncm
max. 2.5 m/s	max. 2.5 m/s
adjustable in 10° steps	adjustable in 10° steps

Z4V10H 3..-11Z-2138 	**Z4V10H 3..-11Z** 
Z4V7H 3..-02Z-2138 	**Z4V10H 3..-02Z** 
T4V7H 3..-11Z-2138 	**T4V10H 3..-11Z** 
T4V7H 3..-02Z-2138 	**T4V10H 3..-02Z** 
T4V7H 3..-20Z-2138 	**T4V10H 3..-20Z** 
T4V7H 3..-01/01Z-2138 	**T4V10H 3..-01/01Z** 
T4V7H 3..-12Z-2138 	**T4V10H 3..-12Z** 
T4V7H 3..-03Z-2138 	**T4V10H 3..-03Z** 

Contact closed

Contact open

Ⓟ Positive break travel / angle